Macroeconomic Policies in the Presence of Currency Substitution in Lao People's Democratic Republic

A Dissertation Submitted to the Graduate School of Economic Sciences in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy in Economics

Student ID: **1284101**

Written by: **Inthiphone Xaiyavong**

Supervised by: **Prof. Chris Czerkawski**

Hiroshima Shudo University
Graduate School of Economic Sciences
March 2015

Abstract

Among Asian countries, Lao People's Democratic Republic (Lao PDR) is one of economies with high degree of currency substitution (CS), recorded around 56% during 1992–2012. The feature of CS in Lao PDR is peculiar and more complicated than the case of other economies with CS, namely Cambodia or some Latin American countries. Menon (2008) defined the CS in Lao PDR as 'multiple currency phenomenon' because the country has two main foreign currencies—the US dollar and Thai baht—that are widely used in parallel with the domestic currency, kip. In this dissertation, I adopted Calvo and Végh's (1992) CS definition to reflect the substitution of domestic currency by foreign currencies in its role as a means of payment, unit of accounts, and store of value. The presence of CS has important implications for the conduct of monetary policy, exchange rate determination, and stability of demand for money functions.

In view of the adverse policy implications of widespread CS, a strategy for reducing CS should be considered. However, one of the impediments to the design of such strategy in Lao PDR is a scarcity of studies which provide a rigorous analysis of the determinants of CS. Reliable estimates of CS determinants can provide implications of CS for the design, execution, and effectiveness of monetary, fiscal, and exchange rate policies. The primary objectives of this dissertation are to examine three issues that play a crucial role in the macroeconomic management for promoting monetary and financial stability conducive to the sustainable growth in Lao PDR.

First, the dissertation examines the determinants of CS in Lao PDR over a two decade period within a cointegration and error-correction mechanism framework. Second, the dissertation tests the proposition of long-run neutrality (LRN) of money in the Lao economy based on the Fisher and Seater method. Third, the dissertation constructs a macroeconometric model to evaluate the effectiveness of macroeconomic policies in the Lao economy.

The results from the analyses of CS determinants show that the interest rate differential is a significant CS determinant in the Lao economy.

The negative relationship in the short-run and the positive relationship in the long-run between interest rate differential and the demand for foreign exchange suggest that a strategy for reducing the CS ratio through higher interest rate on kip deposits will only be effective in the short-run; however, in the long-run the high level of the interest rate and its further increase shift the domestic portfolio allocations toward foreign-denominated assets even more due to the increase in risk premium. Moreover, there is evidence supporting the existence of a ratchet effect in the currency allocation of deposits, implying that particularly strong policies would need to be pursued over an extended period of time in order to convince depositors to switch back to kip-denominated assets.

The results from the analyses of LRN show that changes in the quantity of money have negative effect on the level of real output in the long-run in Lao PDR. A permanent rise in the levels of M2 from 20% to 50% reduced real GDP by 1.5%. The negative impact of money on real GDP implies that monetary expansion is unlikely to stimulate output, eliminate recession, and increase job opportunity. By contrast, the net effect of expansionary monetary policy may result in higher prices and make the economy more vulnerable. Hence, the monetary authority should not manipulate monetary policy to stabilize the fluctuations in business cycle before considering the relationship between money and real output.

The results from the simulation analyses of macroeconomic policies effectiveness show that the combination of fiscal and monetary policies tends to be more effective under the fixed exchange rate regime than under the managed-floating exchange rate regime. An increase in both government investment and kip-denominated deposit rate increases real GDP by 1.8% and 3.6% under the managed-floating and fixed exchange rate regimes, respectively. This implies that a strategy to reduce the degree of currency substitution seems to be a clear means to strengthen the instruments of monetary policy and minimize seigniorage loss.

Key words: Currency substitution, long-run neutrality of money, macroeconomic policies, bounds test

Acknowledgements

Several people have made intellectual and personal assistance to this study; without their support this accomplishment would not have been achievable. The best I can do is to give a special appreciation to all of my supporters here.

Firstly, I would like to express my highest appreciation to my supervisor, Professor Chris Czerkawski, for the incalculable contributions he has made to this study. He has provided me with invaluable knowledge and ideas. His friendly advice, constant encouragement, criticism and the confidence shown to me during this study are sincerely appreciated.

Secondly, I highly appreciate two committee members, namely Professor Munenori Kitahara, and Professor Akio Moriyama for their constructive comments and suggestions on this dissertation.

In addition, I would like to express my special acknowledgement to the Graduate School of Economic Sciences of Hiroshima Shudo University that greatly facilitates the success of this dissertation. Special thanks to all staffs at the administration office, international cooperation center, and at the library for their support.

Furthermore, I am indebted the Japanese Government, Monbukagakusho (MEXT), for her financial support and contribution.

I also wish to express my sincere appreciation to Professor Toshihisa Toyoda, my former supervisor for his kind suggestions and encouragement during my studies.

Last, but not least, I am deeply thankful my family for their faith, understanding and encouragement during my studies in Japan. I am also thankful my colleges and friends for their support and encouragement.

Inthiphone Xaiyavong

Table of contents

List of tables

List of diagrams

Abbreviations

2SLS	Two-stage Least Squares
3SLS	Three-stage Least Squares
ADB	Asian Development Bank
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
ARDL	Autoregressive Distributed Lag
ARIMA	Autoregressive Integrated Moving-Average
ARMA	Autoregressive Moving Average
BOL	Bank of Lao PDR
CPI	Consumer Price Index
CS	Currency Substitution
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMQ	Cumulative Sum of Recursive Residuals of Square
EMCCA	Economic and Monetary Community of Central Africa
FCD	Foreign Currency Deposit
FDI	Foreign Direct Investment
FOF	Flow of Funds
GDP	Gross Domestic Product
GLS	Generalized Least Squares
GNI	Gross National Income
GNP	Gross National Product
IMF	International Monetary Fund
Lao PDR	Lao People's Democratic Republic
LRN	Long-run Neutrality of Money
MOF	Ministry of Finance
NEM	New Economic Mechanism
NPLs	Non-performing Loans
OLS	Ordinary Least Squares
RMSPE	Root Mean-squared Percentage Errors
SEACEN	South East Asian Central Banks
SOCBs	State-owned Commercial Banks
SOEs	State-owned Enterprises
VEC	Vector Error Correction

Introduction

Currency substitution (CS) is a phenomenon defined as the substitution of domestic currency by foreign currency in its role as a means of payment, unit of accounts, and store of value (Calvo and Végh, 1992).[1] CS has been a challenging issue to several developing and transitional economies since the early 1990s. While some countries suffered from the difficulties of maintaining competitive exchange rates, other countries faced the difficulties in managing monetary systems with high degree of CS and controlling inflation rate. As a consequence, CS is one of the topical issues in many developing countries in Asia as well as in Latin America and Africa; and in the transitional economies in Eastern Europe, and the former Soviet Union (Sahay and Végh, 1996).

Among Asian countries, Lao People's Democratic Republic (Lao PDR) is one of economies with high degree of CS, recorded around 56% during 1992–2012.[2] The feature of CS in Lao PDR is peculiar and more complicated than the case of other economies with CS, namely Cambodia or some Latin American countries. Menon (2008) defined the CS in Lao PDR as 'multiple currency phenomenon' because the country has two main foreign currencies—the US dollar and Thai baht—that are widely used in parallel with the domestic currency, kip. In this dissertation, I adopt Calvo and Végh's (1992) CS definition to reflect the substitution of domestic currency by foreign currencies in its role as a means of payment, unit of accounts, and store of value. The presence of CS has important implications for the conduct of monetary policy, exchange rate determination, and stability of demand for money functions. First, monetary policy becomes less effective, because changes in the domestic money supply or the domestic monetary base have less impact on domestic expenditure. Second, the volatility of exchange rates is likely to increase. With two or more currencies in circulation, the demand for domestic currency may become more sensitive to

[1] When only the store of value and the unit of account properties of the domestic currency are transferred to foreign monies, the term 'dollarization' is used (Calvo and Végh, 1992).

[2] CS is measured by the ratio of foreign currency deposit to broad money M2, which will be explained later.

changes in its expected opportunity costs. Third, the presence of CS causes the instability in the demand for money functions. As the demand for domestic money becomes less stable, the impact of monetary policy measure on spending is harder to predict.

In view of the adverse policy implications of widespread CS, a strategy for reducing CS should be considered. However, one of the impediments to the design of such strategy in Lao PDR is a scarcity of studies which provide a rigorous analysis of the determinants of CS. Reliable estimates of CS determinants can provide implications of CS for the design, execution, and effectiveness of monetary, fiscal, and exchange rate policies. The primary objective of this dissertation is to fill this research gap by examining the effectiveness of macroeconomic policies in the Lao economy.

The term 'macroeconomic policies' here refers to the monetary, fiscal and exchange rate policies that help determine the rate of inflation and output growth. In particular, I examine three issues that play a crucial role in the macroeconomic management for promoting monetary and financial stability conducive to the sustainable growth in Lao PDR.

First, the dissertation examines the determinants of CS in Lao PDR over a two decade period within a cointegration and error-correction mechanism framework. Because this study empirically investigates the determinants of CS using quarterly data for Lao PDR over the period 1993–2011, it differs from most existing Lao studies, which examine causes of CS using descriptive analysis. These include studies from Chaleunsinh (2003) and Keovongvichith (2007) who find that CS is caused by the deregulation of financial sector in the early 1990s and the rapid increase in high inflation and sharp exchange rate depreciation during the Asian financial crisis 1997–1998. There are two main problems with these studies. First, because the studies employ either graphical presentation or descriptive statistics, we cannot take the results of these analyses using a certain period and cannot generalize them to the longer period that the sample represents. Therefore, the contribution of these studies to the formulation of national policies is limited. Second, they do not take account of more recent advances in econometric modeling, such as testing for unit roots and cointegration, which address the issue of spurious regression and hence boost the reliability of results.

There are two major studies which empirically investigate the causes of CS in Lao PDR using time series analysis. These studies include de Zamarocksy and Sa (2002) and Ra (2008). De Zamarocksy and Sa (2002) conduct the causality test between inflation and CS, using monthly data from February 1995 to September 2001. These authors use the Granger (1969) methodology to test for the direction of causality between the two variables. Furthermore, Ra (2008) examines whether the holdings of US dollar depend on the effect of the expected rate of depreciation in market exchange rates, using monthly data over the period 1993–2007. My dissertation differs from de Zamarocksy and Sa (2003) and Ra (2008) in three important respects. First, I make use of the error-correction framework to report both long- and short-run impacts. Second, instead of using the Johansen method, I apply the bounds testing procedure to cointegration, within an autogressive distributed lag (ARDL) framework, which was developed by Pesaran and others (Pesaran and Pesaran, 1997; Pesaran and Shin, 1999; Pesaran et al., 2001). Finally, my study includes the interest rate differential and the ratchet variable in modeling CS in Lao PDR.

This study applies the bounds testing approach to cointegration to examine the dynamics of CS. Estimates using the Engle and Granger (1987) and Johansen (1988) methods of cointegration are not robust for small sample sizes (Mah, 2000). Expanding the number of observations through using monthly or quarterly data does not increase robustness to the cointegration results because what matters is the length of the period, instead of the number of observations (Hakkio and Rush, 1991). However, estimates in the bounds test are robust in small sample sizes (Pesaran and Shin, 1999).

The analysis of CS determinants also differs from existing studies in that I examine whether the parameter estimates are stable over time. There is no reason to believe a priori that the relative importance of factors affecting CS have remained unchanged over time. This has to be empirically ascertained. To do this, I apply the Pesaran and Pesaran (1997) test for parameter stability.

Second, the dissertation tests the proposition of long-run neutrality (LRN) of money in the Lao economy using data of monetary aggregates, real GDP, and real output in three sectors, namely, agriculture, industry, and

services. In the monetarist theories, money is assumed to be neutral in the long-run. That is, changes in the quantity of money affect the nominal variables in the macroeconomic system such as prices, wages and exchange rates, but not the real variables, like employment, real GDP, and real consumption.

Lao PDR offers an interesting case study for testing the LRN proposition for four reasons. First, the empirical study for Lao PDR provides more empirical evidence to the existing literature on LRN in the context of developing countries. The underdeveloped financial systems and less sophisticated economies in developing countries may conduce to money neutrality. As note by Humphrey (1991, p.4), three sources of non-neutrality–including sticky prices, sticky nominal wages, and fixed nominal costs–are unlikely to exist in developing countries.

The second reason for testing LRN in Lao PDR is that the country has experienced a series of monetary and financial sector reforms that aimed at improving the financial system launched since the implementation of the New Economic Mechanism in 1986. Despite these significant changes in the financial environment in Lao PDR, no study has taken into consideration the interaction of rising money stock and real GDP, with particular reference to the Lao experience.

The third reason for testing LRN in Lao PDR is that the identification of the money-income causality will be particularly relevant for policy makers in developing and transition economies who face a challenging task in designing appropriate stabilization programmes aimed at alleviating or eliminating vulnerability of their economies.

The fourth reason for testing LRN in Lao PDR is that it is important to determine if conclusions regarding LRN with respect to aggregate real output hold at the disaggregated or sectoral level. This is particularly important given the low power of the Fisher and Seater tests, an issue stressed by Coe and Nason (2003, 2004). If one fails to reject LRN at the aggregate level, a similar finding using sectoral data would provide support for the aggregate neutrality conclusion. It is also conceivable that one could fail to reject LRN at the aggregate level, yet miss significant

sectoral effects. Garrett (2003) shows that regression results using aggregate data can be very different from those using the disaggregated components. Alternatively, if LRN is rejected at the aggregate level, then it is important to examine disaggregated data to identify possible sources of non-neutrality and the transmission mechanism(s) of monetary policy.

Finally, the dissertation constructs a macroeconometric model to evaluate the effectiveness of macroeconomic policies in the Lao economy. Macroeconomic policies are evaluated for the case of an economy with partial CS compared with the case of an economy with complete CS. The economy with partial CS is represented by the managed-floating exchange rate regime, whereas the economy with complete CS is represented by the fixed exchange rate regime. The effectiveness of macroeconomic policies is evaluated against changes in output and price.

There are limited Lao studies on the evaluation of macroeconomic policies effectiveness. For example, Toyoda and Kyophilavong (2007) construct the Lao macroeconometric model and conduct a simulation analysis to examine the impacts of macroeconomic policies under different exchange rate arrangements in Lao PDR. However, their macroeconmetric model is based on only the product and labor markets. It also does not include any behavioral model to capture the feature of Lao economy with CS. My research will contribute to the policy debate and academic research on CS. As to the CS debate, the existing literature on CS offers two conflicting pieces of advice for economies with CS. One is that they should focus on the reduction of CS degree to improve macroeconomic policies' effectiveness. The other is that they should adopt 'official dollarization' which completely uses foreign currency. My research will provide additional evidence on the CS debate exemplified by the case of Laos. The academic contribution of my research is to introduce a money demand equation for foreign currency in macroeconometric model as a key characteristic of economy with CS. Therefore, the estimation results of Lao macroeconometric model reflect more realistic output and price determination.

Three different econometric approaches have been employed to analyze each of the objectives. The first objective, the determinants of CS in Lao PDR is investigated within the bounds testing procedure to cointegration,

within an autogressive distributed lag (ARDL) framework, which was developed by Pesaran and others (Pesaran and Pesaran, 1997; Pesaran and Shin, 1999; Pesaran et al., 2001). The second objective, impact of money stock on real output, is analyzed by applying the Fisher and Seater (1993) method. The third objective, policy options in the presence of CS, is investigated through the simulations in macroeconometric model.

Data on several macroeconomic variables, such as price level, output, consumption, investment, and trade will be collected over the period 1988–2011. Such data will be obtained from the Lao government's statistical agencies and international organizations, such as UN's World Investment Directory, IMF's International Financial Statistics, IMF's Direction of Trade Statistics, and other related sources.

The structure of this dissertation is organized as follows:

Chapter 1 provides a broad picture of the Lao economy in the pre- and post-structural reform. It first describes the reform process, transitioning from a centrally-planned economy to a market-oriented one. Then, major economic developments in the modern economic system have been reviewed by describing sources of output growth, and the financial system. Special emphasis has been placed on the financial system through the investigation of the banking system and flows of funds analysis.

Chapter 2 contributes to answering question whether the present institutional arrangements and the implementations of macroeconomic policies in Lao PDR promote financial sector stability and enhance efficiency and development. This chapter describes the institutional and macroeconomic policies framework for the Lao economy. The structures of two macroeconomic institutions have been investigated, including the Bank of Lao PDR, and the Ministry of Finance. The chapter ends with the review of three macroeconomic policies, including monetary policy, exchange rate policy, and fiscal policy.

Chapter 3 focuses on the theoretical and empirical developments of three macroeconomic issues, namely the determinants of CS in Lao PDR, the LRN proposition, and the effectiveness of macroeconomic policies in an economy with CS. The chapter starts with a review of empirical issues on the analysis of CS determinants and a review of the theoretical model of CS. It

then reviews the empirical evidence of the LRN proposition as well as its theoretical foundation. The chapter ends with a review of the application of macroeconometric model to evaluate the macroeconomic policies.

Chapter 4 provides a comprehensive discuss about the developments of empirical models for analyzing CS determinants, testing LRN proposition, and evaluating macroeconomic policies effectiveness in Lao PDR. Their respective estimation methods are also provided. Finally, data used in the empirical analyses are described in the final section of this chapter.

In Chapter 5, two main empirical results are presented. First, the determinants of CS in Lao PDR are investigated by applying a cointegration and error-correction mechanism framework. Second, the LRN proposition is tested for the Lao economy, applying the Fisher and Seater model.

Chapter 6 deals with the third major objective of this dissertation, the evaluation of macroeconomic policies in Lao PDR. The macroeconometric model is formulated and estimated. Several simulations have been conducted in order to investigate the outcome of implementing macroeconomic policies.

Finally, key findings and final conclusions are provided at the end of this dissertation. Moreover, some empirical results are reported in appendices.

Chapter 1 Development of Lao PDR's Economic System and Structural Reforms

In this chapter, I present the pre- and post-structural reform of the Lao economy. It first describes the reform process, transitioning from a centrally-planned economy to a market-oriented one. Then, major economic developments in the modern economic system have been reviewed by describing sectoral contribution of economic growth, and the financial system. In addition, financial systems are reviewed through the investigation of the banking system and flows of funds analysis.

1.1 Structural reforms: from centrally-planned economy to market-oriented economy

After a prolonged civil war from 1955 to 1974, the Lao PDR was proclaimed in 1975, abolishing the monarchy, and establishing a centrally planned economy until 1985. The economic system during 1975-1985, was extremely controlled. Prices and trade in agricultural products were administratively determined, trade among provinces was restricted, food coupons for public employees were usable only in state shops, and the exchange rate was artificially determined. The industrial and foreign trade sectors were largely composed of state-owned enterprises under the state planning system. These enterprises had to transfer annual targeted amounts to the budget, regardless of their financial performance, and often had to borrow heavily from the banking system to finance current operation. In addition, collectivization was introduced in the agricultural sector under consultation with the former Soviet Union and its allies (Otani and Pham 1996).

However, the results were unsatisfactory. Domestic price controls and foreign trade restriction led to the emergence of parallel markets for goods and foreign exchange. A lag monetary policy, which accommodated borrowing requirements of the state enterprises, had driven rapid inflation. Laos had been distressed by the chronic and expanding budget and trade deficit. The budget deficit rose from 300 thousand kip in 1976 to 93 billion kip in 1985. Trade deficit and external debt had also increased. The external

debt increased from 64 million dollars in 1975 to 478 million dollars in 1985. Because Laos had no export goods other than electricity power, logs and coffee which accounted for only about 30 percent of imports and most goods including fuel, machinery, raw materials, and consumer goods were import-dependent, structural deficits occurred.

In response to the unsatisfactory economic performance, the government officially announced the new economic reform as revision of socialism and permitted commercial activity by individual persons and private enterprises in 1986.

The introduction of the New Economic Mechanism (NEM) in 1986 generated an initial step for moving the economy towards a more market-oriented economy. Major reforms have been done by removing price controls, abandoning socialist cooperative farming, unifying the exchange rate system, removing the government's monopoly on trade, reducing the number of state-owned enterprises (SOEs), promoting private-firm establishments, implementing fiscal reform, and banking and financial reform.

Price liberalization resulted in the dramatic adjustments in official retail and wholesale prices, beginning with a nine-fold increase in the price for basic rice rations in 1985 and continuing with an average 360% increase in most other controlled prices throughout the rest of the year. The two-tier price system of market prices and generally much lower official prices lasted until 1989. The official prices were set on the basis of production costs plus margins, but in view of political and social considerations. The public sector pricing reform was made in 1987 to allow for market determination of prices, except those of a few utilities, public services, and several key industrial products.

Trade reform significantly reduced constraints on domestic and international trade. Prior to 1987, both domestic and foreign trade had been controlled by the government. The Lao Trade Corporation was responsible for official and wholesale trade and rice distribution at the national level, while provincial offices were in charge of procurement and distribution operations at the local level. Moreover, an extensive network of state stores and cooperative shops was responsible for distributing goods at the retail level. As to foreign trade, both exports and imports were monopolized by the state, except trade made by joint public and private companies or a few state

enterprises. However, the domestic and external trade system was liberalized since 1987, resulting in the elimination of most of these restrictions on trade in 1988.

In late 1989, the government extended the access of state and joint-venture industries to broad import licenses, which allowed the import of all but a small list of goods. Then, in 1990, all industries had granted permission to engage in nonstrategic import and export activity. Eligibility criteria for trade operations were limited to a registration procedure, whereby a potential exporter or importer obtained a permit from the Ministry of Industry and Commerce. At the same time, specific licensing are required for imports of petroleum, cement, steel, automobiles, motorcycles, rice, and a few locally manufactured items as well as for exports of timber, wood products, rattan, coffee, and livestock. In addition, the public sector monopoly on exports has been reduced to only two strategic goods, log and minerals, which only specially authorized state enterprises and provincial trading companies are allowed to export. All other goods can be freely exported by private sector.

State enterprise reform substantially enhanced the privatization of state-owned enterprises (SOEs) activity. Prior to the implementation of the NEM in 1986, SOEs were run based on the standard model of a command economy. Product and input prices, salaries, investment, reinvestment, financing, product mix, and output targets were controlled by the government according to the plan or the budget. In addition, the enterprises were obliged to transfer their operating surplus to the budget and to reimburse loans that they received from the government for their fixed investment. However, some degree of autonomy was granted to four of the most important centrally supervised enterprises in 1983. These enterprises included the tobacco and beer factories, the electricity company, and the Lao Wood Industry Corporation. In 1988, the government granted operating autonomy to state enterprises, and most of them became free to control their production levels, wage and price policies, and investment plans. Subsidies and capital transfers to state enterprises were stopped. As a result, in 1989, several state enterprises substantially increased wages in cash for their employees with opposite to the previous system as they mainly issued payments in kind of rice coupons and then financed the losses with bank

credit. Although the old system ended in 1990, several state enterprises had already accumulated substantial overdue debts to the banking system.

Exchange rate reform brought multi exchange rates into one in 1988. Seven different exchange rates prevailed in the Lao economy in the early 1986. These exchange rates consisted of a symbolic official rate of KN 10 per U.S. dollar; a commercial rate of KN 95 per U.S. dollar; and various rates close to the then-prevailing parallel market rate of roughly KN 400 per U.S. dollar. Thanks to the exchange rate reform, the exchange rates were brought down to four in September 1987 and to one in January 1988. In 1995, the managed floating exchange rate system was adopted within the framework of the Structural Adjustment Facility program supported by the IMF (Arshad, 2003, p. 92).

Fiscal reform started in 1988 to adjust the revenue and expenditure system as financial autonomy was extended to a larger number of SOEs. As to the reform of revenue system, the new tax system was implemented, resulting in several different tax rates. Based on the activity type, profit tax on commerce and industry was levied at rates ranging from 20% to 85% for profits obtained from domestic sales and ranging from 0% to 80% for profits obtained from exports. The turnover tax and the new import tariff system were levied with rates ranging from 1% to 15% and from 1% to 70%, respectively. As to the reform of expenditure system, expenditure priorities were reordered. Subsidies to civil servants and other consumer subsidies were gradually decreased, while public wages were raised.

Banking and financial sector reform began in 1988, resulting in the establishments of several commercial banks. Despite this reform, little change was made on interest rate policy, controlled by the cabinet of the Lao government. The originally low deposit rates were raised by 20–50%, and the lending rates were approximately doubled. Nonetheless, real interest rates remained negative. The reform also entailed the establishment of a two-tier banking system in 1988 with the establishment of the Bank of the Lao PDR (BOL) in accordance with the promulgation of the Central Bank Law. Moreover, the state-owned commercial banks (SOCBs) were recapitalized in 1994 due to increased competition in the banking sector.

Following the new economic reform in 1986, the Lao economic system has moved toward an open market-oriented economy. The reforms helped to reactivate private sector activity and the quantity of goods in domestic market was improved. The service sector was the quickest to respond to the improved incentives: private and public transport operator took advantage of the removal of international trade restrictions, while enterprises involving handicrafts and consumer services (repair shop, tailors and restaurants) quickly emerged. Many enterprises and activity have been privatized without adverse impact on employment. The privatization process has been central to the economic liberalization program.

However, reforms proceeded sporadically. The reform measures in the area of taxation, privatization, the civil service, as well as the updating of the rolling public investment plan were not implemented fully as planned. Some delays were also experienced with regard to institution building, notably the establishment of Treasury with an effective accounting system and the enactment of business and other laws. The government also lack of tools of indirect macroeconomic management which led to temporary financial policy slippages soon after the reforms were introduced. Furthermore, the institutional and administrative structure for implementing reforms was extremely weak and characterized by a lack of skill workers. This weak structure limited the absorptive capacity of the economy, as was shown in the delays in both the effective execution of aid-financed projects and the utilization of technical assistance. The extremely limited statistical data base severely constrained the authorities' ability to analyse and monitor economic developments and thus formulate policies.

1.1.1 Comparative socio-economic performance in Lao PDR

The social-economic performance in Lao PDR is relatively good. As illustrated in Table 1.1, Lao per capita GNI (gross national income) of $661 in 2012 is well in excess of the per capita income of the low-income countries ($403). This is a remarkable achievement considering that in 2000 the figure was only $360. The Lao high rate of growth is behind this almost two-fold increase in per capita income, with an annual average growth rate of 4.9% in real terms over the period 2000–2012. One reason for this high rate of growth has been a high rate of investment which has average 15.8%,

a rate much higher than for East Asia and the Pacific region which itself has experienced a fast growth in gross investment compared to other regions. The export sector is another factor which has seemingly contributed to high rate of growth in Lao PDR. The Lao export growth of goods and services was averaged 7.7% over 2000–2012. But it is lower than that of East Asia and the Pacific (8.2%) and of low-income countries (10.3%).

Table 1.1: Socio-economic profiles of Lao PDR and other regions, 2012

Indicator	Lao PDR	East Asia and the Pacific	Income groups		
			Low	Middle	High
Per capita GNI (constant 2005 US$)	661	17,039	403	3,144	30,268
Growth (2000–2012)					
Total GNI	6.8	5.4	5.4	4.9	2.9
Per capita GNI	4.9	4.0	2.8	3.5	1.9
Gross investment	15.8	7.5	10.0	8.3	3.6
Exports	7.7	8.2	10.3	8.6	5.3
GDP share (%)					
Agriculture	28	13	33	12	2
Industry	36	29	20	30	30
Manufacturing	8	13	9	13	13
Services	36	59	46	58	68
Urbanization (%)	35	58	32	54	76
Life expectancy at birth (years)	68	74	59	69	79
Infant mortality rate	55	22	58	27	6
Adult literacy rate[a]					
Female	63	77	16	73	92
Male	82	89	37	86	92

Source: World Bank, World Development Indicators, 2012.

[a] Figures are for 2005.

The rest of Table 1.1 provides a comparative picture of other socio-economic aspects of Lao economy, including sectoral composition, urbanization, life expectancy, infant mortality, and adult literacy rates. In all these respects, Lao PDR appears to be far behind of the East Asia and the Pacific region, whereas it compares favourably with the low-income countries.

1.1.2 Sectoral contribution of economic growth

In this section, summary of sectoral analyses covering key sectors are provided in order to gain better understanding about some of the sources of

Table 1.2: Development of Lao PDR real GDP by sector, period averages

Sector	Share of GDP				Growth rates				Contribution to growth			
	1990–1994	1995–1999	2000–2004	2005–2010	1990–1994	1995–1999	2000–2004	2005–2010	1990–1994	1995–1999	2000–2004	2005–2010
Agriculture	**58.7**	**50.9**	**43.1**	**35.1**	**5.2**	**3.8**	**2.3**	**3.4**	**3.6**	**3.1**	**2.6**	**2.6**
Industry	**16.8**	**19.1**	**20.3**	**23.9**	**12.5**	**15.4**	**55.6**	**15.4**	**1.0**	**1.1**	**1.2**	**1.8**
Mining	0.2	0.2	1.1	5.8	13.1	19.3	204.1	37.7	0.0	0.0	0.1	0.4
Manufacturing	12.2	11.1	9.0	9.9	13.8	10.6	8.9	8.3	0.8	0.7	0.5	0.7
Electricity, gas, and water	1.4	2.6	5.1	3.6	11.5	25.4	5.7	6.8	0.1	0.1	0.3	0.3
Construction	3.0	5.2	5.1	4.7	11.7	6.2	3.8	8.8	0.2	0.3	0.3	0.3
Services	**24.5**	**30.0**	**36.6**	**41.0**	**7.1**	**7.1**	**8.8**	**11.4**	**1.5**	**1.8**	**2.2**	**3.0**
Trade	7.6	12.0	17.7	20.9	9.1	6.9	14.8	7.6	0.5	0.7	1.1	1.5
Transport and communications	5.1	4.7	4.7	5.2	0.6	8.7	9.4	8.8	0.3	0.3	0.3	0.4
Finance	1.1	1.4	1.8	3.1	19.1	12.7	12.4	25.5	0.1	0.1	0.1	0.2
Public administration	4.7	4.1	4.3	4.8	-5.9	0.8	4.3	10.0	0.3	0.2	0.3	0.3
Others	6.0	7.7	8.1	7.0	12.4	6.1	3.2	5.0	0.4	0.5	0.5	0.5
GDP at factor cost	**100.0**	**100.0**	**100.0**	**100.0**	**6.2**	**6.0**	**6.1**	**7.3**	**6.2**	**6.0**	**6.1**	**7.3**

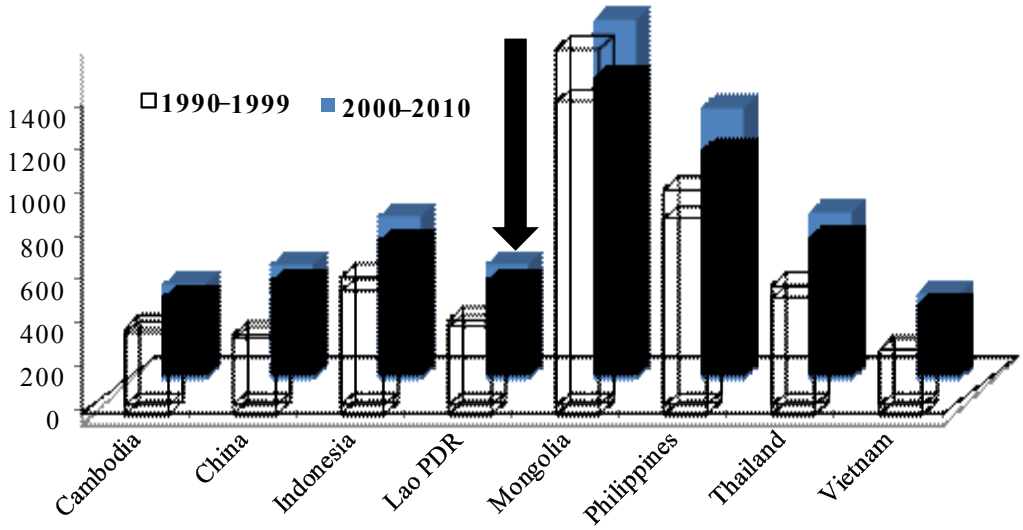
Source: Author's calculation based data from Asian Development Bank 'Key Indicators for Asia and the Pacific 2011', available at www.adb.org/statistics.

growth for the Lao economy. The share of GDP, growth rate, and contribution to overall GDP growth of each sector are provided in Table 1.2.

1.1.2.1 Evolution of Agricultural Sector

Agriculture is the most important sector for fighting poverty in Lao PDR. About 80% of the total population is engaging in farming and the overwhelming majority of them are the poor located in rural areas. As noted in Table 1.2, agriculture, including crops, livestock, fisheries, and forestry, accounted for more than half of GDP in the early 1990s, although substantially declined to about a third of GDP in 2005–2010. Agriculture also contributed nearly half of the GDP growth recorded in the 1990s, although this dropped to about a third in 2005–2010.

Diagram 1.1: Agriculture value added per worker (constant 2000 US$)



Source: Author's compilation.

The agricultural sector in Lao PDR has performed relatively well. Agricultural growth rate in Lao PDR was about 4.4% during 1990–2010 which is higher than Vietnam (3.8%), and Thailand (1.7%)[3]. Nonetheless, agricultural productivity in Lao PDR remains low. Agriculture value added

[3] Figures were obtained from the World Bank 'World Development Indicators and Global Development Finance', available at http://databank.worldbank.org/

per worker in Lao PDR was much lower than those in Mongolia and the Philippines (Diagram 1.1).

1.1.2.2 Evolution of Industrial Sector

The industrial sector has performed very well. It has achieved an impressive growth record of 25% on average, and accounts for 20% of GDP. The industrial sector gradually contributed to GDP growth, rising from 1% in 1990–1994 to 1.8% in 2005–2010.

The manufacturing sector is one of the most important sectors in industry although its share of GDP fell over time. It accounted from 12.2% of GDP in 1990–1994 and 9.9% in 2005–2010, falling by 2.3 percentage points. In contrast, the mining sector has achieved high growth rate, recorded at 69% on average over the period 1990–2010. Electricity and construction have also played a significant role in economic development in Lao PDR, accounting for 7.7% of GDP and stimulating about 8.2% of GDP growth on average over the 1990–2010 period.

Although the manufacturing sector in Lao PDR has performed well, there are several significant challenges for future development of this sector. First, the manufacturing sector has limited competitiveness due to relatively low labour productivity, high logistics and transport costs, high comparative cost of doing business. Second, several important subsectors can experience specific risks. It is still unclear whether Lao PDR' garment industry can compete in the global market as it became a member of the World Trade Organization in 2012. Wood and wood processing is characterized by low value-added and efficiency.

1.1.2.3 Evolution of Services Sector

Services account for an even greater share of GDP (over 33%), and performance has been moderately strong, with growth around 8.6% on average (see Table 1.2). The bulk of the growth contribution has come from wholesale and retail trade, which accounts for over 44% of services value added and more than 14% of total GDP, and has grown at over 9% on average. The second most important subsector is transport and communication, which accounts for about 15% of services value added and 4.9% of GDP. Tourism is widely cited as an area of high growth potential in services for Lao PDR, but the present, poor information base precludes any

detailed analysis. Using World Development Indicator Diagram s for cross-country comparisons, however, it is clear that during 1995–2009 Lao PDR attracts only a tiny fraction of the tourists received by its neighbours which is about 3.9% of Thailand and 15.3% of Vietnam on average. Improving tourist infrastructure and service quality could allow Lao PDR to tap into these large regional tourist flows as part of a multi-country visit.

1.2 Trade liberalization and changes in trade tax revenue

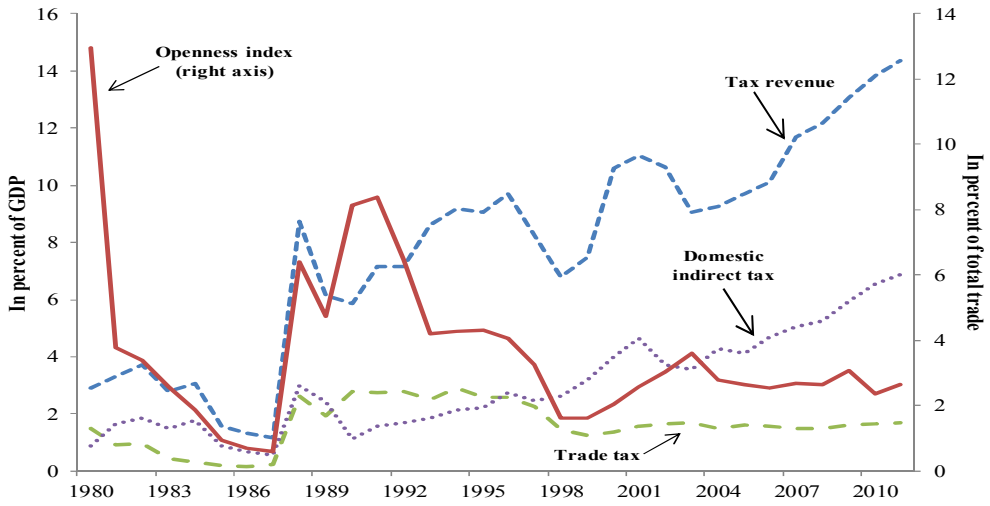
Efforts to liberalize trade reduce fiscal revenue unless the liberalizing countries are able to find alternative sources of revenue. In this section, the relationship between trade liberalization and trade tax revenue is evaluated in order to gain a better understanding about the foreign trade policy in Lao PDR. More precisely, the objectives of this section are to investigate the impact of trade liberalization on trade tax revenue and to examine whether reforms of domestic indirect taxes have been targeted to compensate for fiscal revenue losses from trade liberalization. To do so, it is interesting to begin with the developments of trade liberalization and domestic indirect taxes in Lao PDR.

Among other tax reforms in 1986, foreign trade tax as well as domestic indirect tax (turnover tax and excise tax) have been reformed. Efforts of the fiscal reform in the late 1980s aimed at generating sufficient sources of revenue to compensate for the losses of transfers from public enterprises due to the autonomy provided to state-owned enterprises, the price reform and the tightening of bank credits.[4]

As shown in Diagram 1.2, the share of total tax revenue in GDP rose from 1.2% in 1987 to 8.7% in 1988 and to 14.4% in 2011. One of the important sources of revenue is foreign trade tax. Approximately one third of total revenue was contributed from this source during 1988–1999, while it accounted for only one fifth of total revenue prior to the implementation of the reform during 1980–1987. The rapid increase in trade tax revenue in 1988 is explained by the significant increase in both import and export duties. While exports contracted since 1992, imports continued to rise until 1997. Fundamental factors describing the performance of revenue from

[4] 60 out of about 200 state-owned enterprises were privatized.

import duties included trade liberalization and the rising imports of intermediate inputs and capital goods, the substantial devaluation of Lao kip due to the unification of exchange rates at level close to parallel market rate, the elimination of exemptions for those benefiting imports from the non-convertible area, and improved tax collection. The fundamental factors describing the performance of revenue from export duties in the period 1988–1991 consisted of the elimination of most export restrictions, the introduction of a tax on profits from export and on exploitation of natural resources, the primary sector development, and improved tax collection.



Sources: Author's compilation from World Bank 'Lao PDR Country Economic Memorandum (various issues)', and BOL 'Annual Reports (various issues)'.

Diagram 1.2: Fiscal revenue and openness index in Lao PDR, 1980–2011

The openness index, measured as the percentage share of trade tax in total trade, follows the same pattern as the trade tax revenue. The greater the openness index is, the less open the Lao economy is. As can be seen from Diagram 1.2, the openness index fell from 8.4% in 1991 to 2.7% in 2011, implying that Lao PDR' foreign trade has been gradually liberalized. Trade liberalization has been rapid since 1997 due to the membership of the Association of South East Asian Nations and the preparation for the World Trade Organization membership.

In response to the need to compensate for the losses of transfers from public enterprises and the growing trade liberalization and to finance the

public expenditure, the Lao government in March 1988 established a turnover tax on service enterprises in the range of 1–15%. In June 1989, this tax was broadened to include not only services, but also wholesale trade and imports, with five rates in the range 3–20%. In February 1991, number of turnover tax rates in the range of 5–10% decreased from five to two and excise taxes on petroleum products and luxury goods were introduced. In 1995/96, specific excise duties—including gasoline, vehicles, alcoholic drinks, cigarettes—were replaced by *ad valorem* excise duties. The value added tax has also been introduced since 2010. The revenue generated by turnover and excise taxes increased gradually and exceeded the trade tax revenue in 1996 (see Diagram 1.2). The domestic taxes on goods and services accounted for 6.9% of GDP or 47.8% of total tax revenue in 2011, which rose from 1.1% of GDP or 19% of total tax revenue in 1990. At present, both turnover and excise taxes constitute the main source of government revenue.

Between 1986 and 2011, fiscal revenue grew significantly, but took the sole form of raising domestic indirect taxes. The analysis provided in the study suggests that this strategy had a low pay-off in terms of reduced trade tax revenue. This implies that further reduction of tariff rates offers the opportunity for further enhancing production efficiency through greater importation of capital goods and intermediate inputs as well as improving consumer welfare through greater access to a variety of consumer goods. Over time, the structure of domestic production would be affected as trade provides channels of communication that stimulate cross-border learning of production methods, product design, organization methods, and market conditions. The resulting expansion of industrial sector should provide more sources for taxation.

1.3 Main development of Lao PDR's balance of payments

This section outlines the trends in Lao PDR's balance of payments over the three decades from 1982 to 2011. As it is somewhat difficult to review such a sequence of developments which spans over a relatively long period of time all the same, it is important to highlight the salient features and pinpoint the principal changes.

1.3.1 Lao PDR's balance of payments during 1982-1995

Table 1.3 provides a statement of the available evidence on Lao PDR's balance of payments for the period 1982-1995, the 10 years (1986 onwards) that followed the market-oriented economic development.[5] In order to reduce the volume of data to manageable proportions, only the net figures, which are the difference between credits and debits on each category of transactions in the balance of payments, are presented. Moreover, instead of a complete time series, which would make for a cumbersome table, annual average figures for five-year periods are calculated. Such annual averages constitute a reasonable measure insofar as there were no sharp fluctuations from year to year, for most of this period.

I divided the period under review into two phases: (a) The period of planning from 1982-1985: it is worth noting that this phase did not experience any changes in the exchange rate. (b) The period since 1986, in which the role of economic planning has been steadily eroded by a major economic reform toward a more market-oriented economy: in this phase, long term perspectives were replaced by short-term responses to crisis situations, with reference to the balance of payments in particular and the economy in general.

1.3.1.1 Lao PDR's balance of payment during planning period from 1982-1985

From 1981 to 1985, the evidence in Table 1.3 relates to the first Five Year Plan period which aimed at reaching food self-sufficiency and promoting a balanced and diversified agricultural structure. The evolution of the balance of payments in this period was characterized by the large current account deficit of $85.2 million per annum (Table 1.3). The main factor accounting for this trend was the continued increase in imports.

---

[5] Ideally, the period under review should be extended back to 1975, the year of the declaration of independence of Lao PDR. However, data on balance of payments prior to 1982 are rare and the classification of payments is different from 1982 onwards. For instance, the capital account includes transfers. Therefore, we review Lao PDR's balance of payments since 1982.

Table 1.3: Lao PDR's Balance of Payments, 1982-1995

(In millions of US$)

	1982–1985	1986–1990	1991–1995
I. Current Account			
1. Exports f.o.b.	44.6	59.6	218.7
2. Imports c.i.f.	−159.2	−177.9	−413.1
A. Balance of Trade	*−114.6*	*−118.3*	*−194.4*
B. Net Invisibles, excluding transfers	*−9.2*	*5.9*	*26.3*
3. Transfer payments:			
(i) Official	36.9	23.1	97.1
(ii) Private	1.7	6.6	12.0
C. Balance on Current Account	*−85.2*	*−82.6*	*−59.0*
II. Capital and Financial Account			
4. Private transactions	3.8	3.8	47.7
5. Banking transactions, increase (-)	—	—	0.3
6. Official transactions:			
(i) Loans	47.5	46.1	71.3
(ii) Amortization	−7.2	−9.5	−10.7
(iii) Bilateral clearing arragements	37.0	43.3	—
7. Movements in reserves decrease (+) or increase (-)	−5.1	−6.5	−12.2
D. Balance on Capital and Financial Account	*76.1*	*77.2*	*96.5*
III. Errors and Omissions	9.1	5.4	−37.5

Note: Private transaction includes foreign direct investment and portfolio investment. Bilateral clearing arrangements refer to government-to-government reciprocal trade agreement up to a specific amount and for a limited period. Invisibles include income balance and services balance.

Source: Figures from 1982 to 1990 were collected from World Bank (various issues), while those from 1991 to 1995 were compiled from BOL (1997).

Large imports could not be covered by transfers. In the period 1981-1985, there was a small increase in private transfers, primarily as a consequence of the introduction of a preferential exchange rate for private remittances. Official transfers, in the form of technical assistance, were large relative to private transfers.

Reflecting developments in the current account, net capital inflows have increased steadily with $84.5 per annum. This was due mainly to an increase in financing provided under loans and bilateral clearing

arrangements, averaged of $47.5 million per annum and $37 million, respectively.

1.3.1.2 Lao PDR's balance of payment during market-based period from 1986-1995

From 1986 to 1990, export growth had been positive despite external shocks. Exports of hydroelectricity, providing about two-thirds of export earnings in 1987 dropped from 683 Mwh to 373.5 Mwh in 1988 as a result of the reduced capacity of the Nam Ngum Dam (World Bank, 1990, p. 22). The impact of the drought on export earnings was further aggravated by the reduction of the contractual price at which Thailand, the sole purchaser, bought Lao electricity, reflecting the evolution of the world market price of oil. This adverse development was more than offset, however, by the dramatic increase in wood and wood products exports and the rapid increase in manufactured goods exports, albeit from a negligible level. Easing of political tensions with Thailand and the consequent opening up of the border induced a sharp increase in border transactions, basically an exchange of logs and livestock from Lao PDR for Thai manufactured goods. Exports of services improved slightly, rising from the deficit of $9.2 million per annum to the surplus of $5.9 million per annum (Table 1.3).

The country's capacity to import depends on its export revenues and to a larger extent on the availability of foreign aid and bilateral clearing arrangements. While foreign assistance fell from $36.9 million per annum during 1982-1985 to $23.1 million per annum during 1986-1990, bilateral clearing arrangements increased from $37 million per annum to $43.3 million over the corresponding periods. The positive growth private transfer payments, invisibles, and bilateral clearing arrangements resulted in an expansion of imports over this period at an annual average value of $178 million.

From 1991-1995, rapid economic liberalization and growth in neighboring countries, particularly, China, Thailand, and Vietnam, provided ready markets for many products. These developments coupled with the continued domestic economic decentralization and the improvements in infrastructure and border access—especially, the completion in early 1994 of the first bridge across the Mekong, which provided an overland shipping

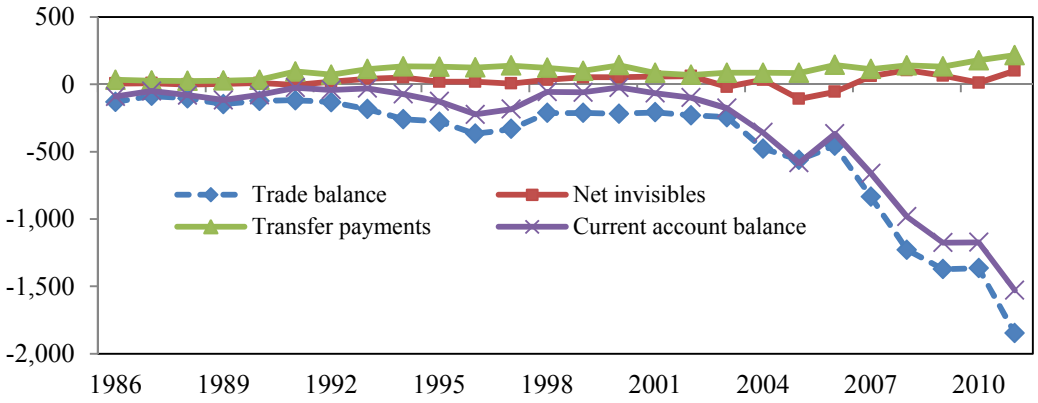
route from Thailand to Vientiane—stimulated large increases in recorded trade volume.

In spite of the rapid growth in export earnings, which constituted a distinct break from the stagnation in exports during the 1980s, the balance of trade deficit was more severe than the earlier levels and averaged at $194.4 million per annum. Part of the increase in export was due to a considerable expansion in wood exports. Increases in imports were fuelled by rising exports, as well as by very high levels of FDI; in addition, grants and project aid from industrial countries rose substantially, financing primarily inputs for infrastructural investment projects.

In this period, there was some surplus on account of invisibles and private transfers, taken together, averaged at $38.3 million per annum. Moreover, for the first time there were large FDI inflows, while official transfer payments rose more than triple from $23.1 million in 1986-1990 to $97.1 million in 1991-1995. Nonetheless, part of the current account deficit was financed by foreign aid inflows in the form of loans.

1.3.2 Lao PDR's balance of payments during 1996-2011

Annual average figures conceal important and substantial variations from year to year, because there were dramatic changes in the payments situation during the late 1990s which followed the Asian financial crisis. In an attempt to overcome this problem, the trends in the balance on current account and its components – the trade balance, net invisibles and transfer payments – are plotted in Diagram 2.1.



Source: IMF, Country Report (various issues).

Diagram 1.3: Lao PDR's current account and its components

Diagram 1.3 shows that, from 1986 to 1989, the balance of trade and the balance on current account moved in tandem, as the surplus on transfer payments, accounting for about 25% of the trade balance averaged over the period 1986-1989, were quite stable in the range of $86-147 million. Between 1990 and 2011, the trade balance and the current account balance not only diverged from each other but also experienced massive fluctuations. Net invisibles gradually increased, though moderately fluctuated, while there was a dramatic jump in transfer payments.

This evidence can be substantiated further by an examination of the statistical evidence, some of which is presented in Table 1.4. During the period 1986 to 1989, the average annual inflow on account of invisibles (excluding transfers) was $4.8 million; this rose at a dramatic pace to $102 million in 2011. Table 1.4 reveals that this trend was largely attributable to travel, i.e., foreign exchange earnings from tourism, although to some extent it was offset by a steady and substantial increase in outflows on account of investment income from the mining sector. Beginning in 1990, private transfer payments also increased by leaps and bounds: from about $10 million per annum in the early 1990s to more than $80 million in 2011. The huge surplus on account of transfer payments, which followed from this development, was attributable largely to the increase in remittances from Laotians overseas.

In the early 2000s, the current account deficit, as also the trade deficit, was slightly higher than it had been during the preceding years. The current account deficit and the trade deficit sharply increased from $176 million and $244 million in 2003 to $1,529 million and $1,848 million, respectively, in 2011. One of the key factors driving imports is the imports of capital goods needed by the mining sector.

The trends in foreign aid inflows in the period 1986-2011 are also worth noting. During 1986-1990, gross aid inflows on account of loans averaged about $46 million per annum; in the years that followed the structural reform in the first five year plan (1986-1990), it reached $155 million in 1996. In the years that followed the Asian financial crisis, 1999-2000, these loans plummeted to an average level of roughly $96 million.

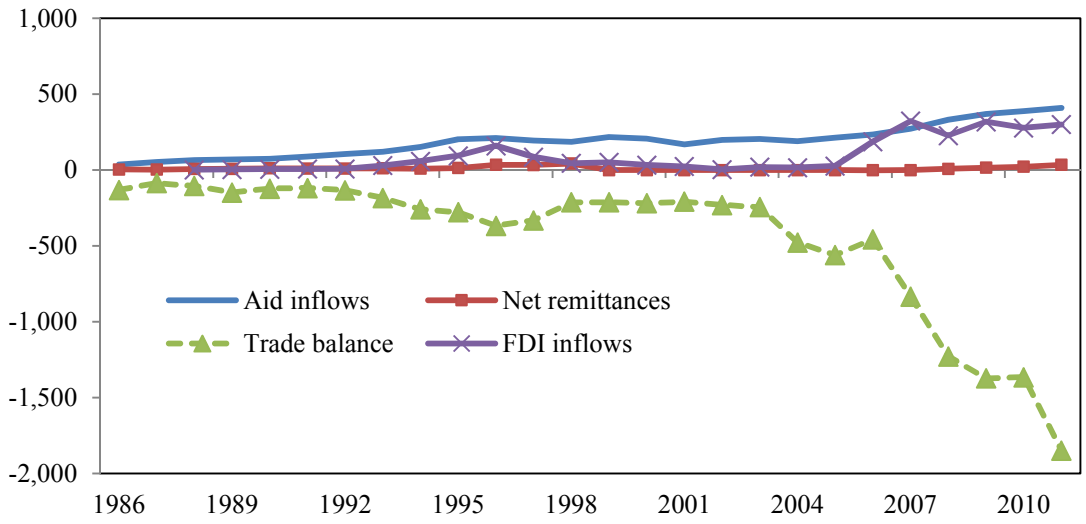
Table 1.4: Lao PDR's balance of payments, 1996-2011

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
I. Current Account																
1. Exports f.o.b.	323	317	341	342	351	334	340	450	500	646	1,133	1,321	1,609	1,521	2,217	2,801
2. Imports c.i.f.	−690	−648	−553	−554	−569	−542	−570	−694	−977	−1,206	−1,589	−2,156	−2,837	−2,893	−3,582	−4,649
A. Balance of Trade	−367	−331	−212	−212	−218	−208	−230	−244	−477	−560	−456	−835	−1,228	−1,372	−1,365	−1,848
B. Net Invisibles, excluding transfers	19	7	34	53	53	58	61	−18	34	−108	−55	61	105	65	13	102
3. Transfer payments:																
(i) Official	82	97	74	70	121	63	48	62	60	57	85	63	77	97	109	133
(ii) Private	43	43	49	30	21	22	23	24	26	28	59	51	64	35	70	84
C. Balance on Current Account	−223	−184	−55	−59	−23	−65	−98	−176	−357	−583	−367	−660	−982	−1,175	−1,173	−1,529
II. Capital and Financial Account																
4. Private transactions	176	104	46	82	31	24	60	42	234	349	335	779	921	785	692	1,071
5. Banking transactions (increase -)	−8	14	−18	−47	25	28	−7	−21	−39	22	−93	−117	65	140	−26	−17
6. Official transactions:																
(i) Loans	155	179	150	94	98	105	165	146	147	156	162	185	185	229	238	287
(ii) Amortization	−19	−18	−25	−29	−36	−39	−38	−28	−29	−41	−32	−45	−61	−67	−78	−97
(iii) Bilateral clearing arragements																
(iv) Miscellaneous																
7. Movements in reserves decrease (+) or increase (-)	−73	30	−7	−4	−44	0	−55	−21	−19	−16	−100	−202	−105	79	−101	−91
D. Balance on Capital and Financial Account	231	309	145	96	74	118	125	118	294	470	272	600	1,005	1,166	725	1,153
III. Errors and Omissions	−8	−125	−90	−37	−51	−53	−27	58	63	113	95	60	−23	9	448	376

Source: IMF, Country Report (various issues).

Since then, gross aid inflows gradually increased $105 million in 1991 to $287 million in 2011.

One of major developments towards the period under review was the rapid accumulation of foreign exchange reserves which averaged $87 million per annum during 2006-2011. Insofar as this coincided with large trade deficits and substantial repayments of foreign debts —amortizations rose from $32 million in 2006 to $97 million in 2011, the unprecedented accumulation of foreign exchange reserves is attributable to the high levels of foreign aid inflows, the rapid increase in net invisibles, and the most important perhaps the change in FDI inflows, all of which coincided in the late 2000s.



Source: Trade balance from 1986 to 1990 were obtained from World Bank (various issues), while those from 1991 to 1995 were compiled from BOL (1997). Diagram s from 1996 to 2015 were obtained from IMF Staff Report (various issues). Aid inflows and net remittances were collected from World Development Indicators.

Diagram 1.4: Balance of trade, remittances, FDI, and net aid inflows

Aid inflows from 1986 to 2005 were a reflection of the trade balance and, given a level of FDI, were the principle sources of financing trade deficits (Diagram, 1.4). However, there was a marked change in the situation as FDI inflows, for the first time in the period under review, surpassed aid inflows in 2006. An increase in FDI was short lived as FDI inflows dropped

from $324 million in 2006 to $301 million in 2011. The downward trend of FDI was compensated by the upward trend of aid inflows in this period. In addition, in 2010, there was an unprecedented trade deficit which became massive in 2011. The export-import ratio dropped from 0.71 in 2006 to 0.62 in 2010 and 0.60 in 2011. For the first time since 1986, the trade deficit was much larger than aid inflows, FDI inflows, and remittances taken together.

Net remittances refer to the difference between personal remittances received and personal remittances paid. Personal remittances comprise personal transfers and compensation of employees. Personal transfers consist of all current transfers in cash or in kind made or received by resident households to or from nonresident households. Personal transfers thus include all current transfers between resident and nonresident individuals. Compensation of employees refers to the income of border, seasonal, and other short-term workers who are employed in an economy where they are not resident and of residents employed by nonresident entities.

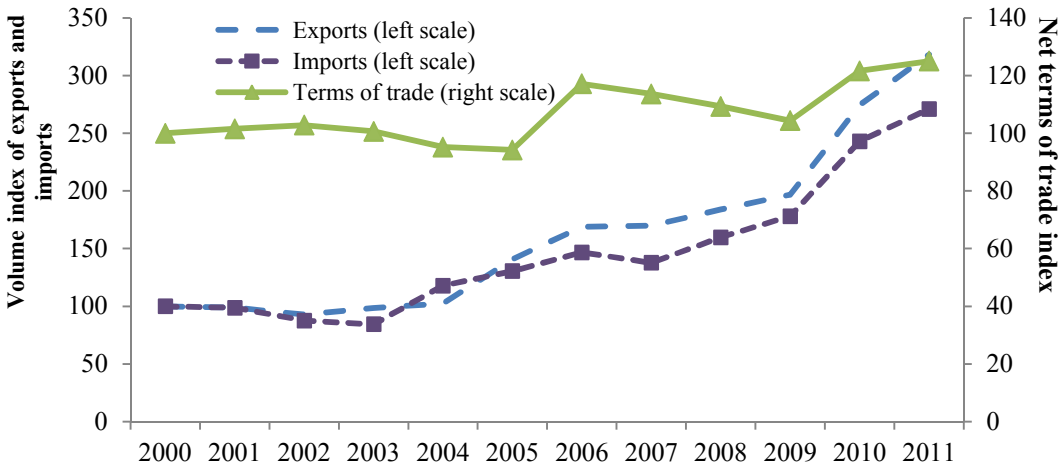
1.3.3 Recovery from the Asian financial crisis of 1997-1998

Inappropriate policy responses by the Lao government had increased the negative impact of the Asian financial crisis on the Lao economy. The Lao kip, given its close link to the Thai baht, was particularly vulnerable to the exchange rate volatility that rocked the region. Between July 1997 and June 1998, the kip lost 70% of its value against the dollar, resulting in hyperinflation. Weakening confidence in the economy as a whole as well as in the currency triggered an outflow of funds from the banking system.

Inappropriate monetary and fiscal policies have multiplied the negative effects of the crisis on domestic macroeconomic stability. A tightening of macroeconomic policy, particularly monetary policy, was needed to reverse or at least stem the loss of confidence in the currency and the economy. Instead, a focus on achieving food self-sufficiency led to extra expenditures through rapid monetary expansion, which further eroded investor confidence and accelerated the flight out of the kip.

Although the Lao economy had been severely affected by the crisis, it had experienced an annual average growth rate of around 6% over the period 2000-2003 and at least tided over balance of payments difficulties. There

were a number of underlying factors which, taken together, constitute an explanation.



Note: Terms of trade is defined as the ratio of exportable goods price to importable goods price. Here, the net terms of trade is defined by the ratio of export volume index to import volume index.

Source: World Development Indicator, 2013.

Diagram 1.5: The value index of exports and imports and the net terms of trade index (2000 = 100)

The first factor contributed to economic growth was an improved export performance, rising from $450 million in 2003 to $2,801 million in 2011 (Table 1.4). The growth in exports in real terms was also impressive, as reflected in the movement of the export volume index in Diagram 1.5. The export performance was unprecedented by previous standards though modest in the international context. The principal factors underlying the growth in exports were the mining sector boom and the production of electricity by the new hydropower dam, such as Nam Thern II, for exports.

The second factor contributed to economic growth was a slow expansion in imports, which saved the balance of payments situation from getting worse, as there was an improvement in the terms of trade in 2006 and once again during 2006-2009. The volume index of imports, for instance, rose slower than that of exports in the period 2009-2011. That was apparent from a mere glance at Diagram 1.5. Among other things, this was

attributable to the low level of capital goods due to the completion of hydropower dams.

The third factor contributed to economic growth is the huge deficit in trade and payments that prompted the government into large scale borrowing from abroad. Loans recorded in the capital and financial account increased almost triple, from $98 million in 2000 to $287 million in 2011 (Table 1.4). This trend is confirmed by Diagram 1.5.

Table 1.5: Lao PDR's foreign exchange reserves

Year	Foreign exchange	Gold	SDRs
1990	1.8	6.6	0.0
1995	78.0	6.6	14.1
2000	138.9	4.6	0.1
2001	127.5	20.0	3.4
2002	185.5	24.8	6.1
2003	189.5	48.9	19.1
2004	207.9	51.3	15.4
2005	220.2	74.8	14.1
2006	313.7	133.5	14.7
2007	517.1	175.1	15.5
2008	613.6	248.3	15.1
2009	528.5	310.4	80.1
2010	624.7	401.2	78.7

Source: IMF CD (2011), 'International Financial Statistics'.

The fourth factor contributed to economic growth was a dramatic increase in FDI inflows. It should be said that FDI inflows were not entirely new and had been significant during the early 1990s. Following the Asian financial crisis in 1997-1998, FDI inflows declines to $45 million in 1998 from $160 million in 1996 as the crisis severely affected the Thailand economy which is the main source of FDI inflows into Lao PDR. Since 2004, FDI began to rise rapidly. The trends and the possible reasons responsible for this change are outlined below.

1.3.4 The main problem of the accumulation of foreign exchange reserves

Foreign exchange reserves began to grow at a rapid rate to reach high levels within a short span of 10 years. Foreign exchange rose from $139 million in 2000 to $625 million in 2010 (Table 1.5). This favorable outcome was attributable to: (i) the high levels of foreign aid inflows; (ii) the change in FDI inflows; (iii) the dramatic increase in net invisibles constituted mostly by earnings from tourism; and (iv) the phenomenal growth in private transfer payments which were a manifestation of the sharp and sustained increase in remittances from Laotians resident abroad. These developments coincided with each other and were collectively more than enough to offset the deterioration of trade balance. Of these factors, FDI inflows were perhaps the most important factor.

Table 1.6: Trends in FDI during the 2000s

Year	FDI	FDI as a percentage of		
	(US$, million)	Exports	Aid inflows	Trade deficit
2000-2005				
(annual average)	21.1	4.8	10.6	−6.5
2006	187.3	16.5	79.9	−41.1
2007	323.5	24.5	118.3	−38.7
2008	227.8	14.2	68.7	−18.5
2009	318.6	20.9	86.2	−23.2
2010	278.8	12.6	71.7	−20.4
2011	300.7	10.7	73.2	−16.3

Source: Author's compilation. Data of FDI and aid inflows were obtained from World Bank database 'World Development Indicator'. Data of exports and trade deficit were collected from IMF Staff Report (various issues).

It is, therefore, necessary to examine the trend in inward FDI flows into Lao PDR and to analyze the underlying factors. The trends in FDI for the period 2000-2011 are outlined in Table 1.6, which confirms the large increase in FDI inflows beginning in the mid-2000s. The table also, relates FDI to the other important components of the balance of payments—export earnings, aid inflows, and the trade deficit—to reveal the substantial and

growing significance of FDI as a means of financing the trade deficit in Lao PDR.

1.4 Development of flow of funds account of the Lao economy

Flows of funds (FOF) accounts illustrate the transactions in financial instruments among major sectors of the economy. These accounts provide a broad framework for analysing issues related to financial sector and its relationships with the real economy and thereby facilitate insights into the role of the financial sector in the development process. Keeping in view the analytical uses of the FOF, I have compiled a simplified version of the FOF accounts for Lao PDR during 1990–2010.

The period 1990–2010 witnessed the growing integration of Lao economy with the global financial sector. Measures taken in pursuance of economic reforms that assigned greater role to the private sector in economic activities, enabled entry of variety of domestic and external players imparting depth and liquidity to the financial markets. While these dynamics reflect in enhanced role of external capital, the banking sector, however, continued to play a dominant role in meeting the financing needs of the deficit sectors. The FOF accounts presented in the ensuing sections have inter alia attempted to capture these developments.

Following Dawson (2004) and Suvannaphakdy (2013), I used data on the balance of payments, the banking sectors, and the government sector from the International Financial Statistics of IMF (2011), ADB (2012), and UNCTAD (2012). All financial data are expressed in real terms using the Lao GDP deflator with 2002 as the base year. This simple FOF system provides an integrated view of the entire financial system.

I compared the structure of FOF account in 1990 and 2010 to provide insight about financial development in Lao PDR. The line references in the 'source' column on each worksheet provide some guides on how Diagram s are derived. The worksheets are in the form of sector sources (S) and uses (U) of funds accounts, each headed by a sector's gross capital formation (U), gross saving (S), and net lending/borrowing (U/S). Then each sector's net lending/borrowing is analysed into five financial market flows: foreign claims, interbank claims, central government debt, private credit,

Table 1.7: Lao PDR's flow of funds matrix 1990 (billions of kip)

	Account	Central Government		Commercial Banks		Central Bank		Private Sector		Rest of the World		Discrepancy Sources	Total	
		U	S	U	S	U	S	U	S	U	S		U	S
2	**Gross capital formation**	**1,004**		**–**		**–**		**−57**					**947**	
4	**Gross saving**		**192**		**–**		**–**		**−315**		**1,070**			**947**
6	*Net lending (+) or borrowing (-)*	−813		**–**		**–**		−258		1,070			0	
9	**Δ Foreign claims, net**			**8**		**0**					**−1164**	**1,172**	**8**	**8**
11	Δ Foreign assets			28		5					−1173	1,206	33	33
12	Δ Foreign liabilities				20		6			−9		−34	−9	−9
14	**Δ Interbank claims**			**227**			**230**					**−3**	**227**	**227**
16	Δ Central bank credit to commercial banks				−234	−229						5	−229	−229
17	Δ Bank reserves			−8			1					−9	−8	−8
19	**Δ Central government debt**		**813**	**9**		**−14**		**79**		**−71**		**−810**	**3**	**3**
21	Δ Claims on central government		893	8		−16		79		−71		−894	−1	−1
22	Δ Central government deposits	81			−1		−3					85	81	81
24	**Δ Private credit, net**	**0**		**193**		**−130**			**322**	**260**			**322**	**322**
26	Δ Claims on nonbank financial institution			155		−130			25				25	25
27	Δ Other private credit	0		38					298	260			298	298
29	**Δ Money and quasi money**				**38**		**24**	**61**					**61**	**61**
31	Δ Currency and demand deposits				−8		24	16					16	16
32	Δ Time, savings deposits				46			46					46	46
34	**Δ Miscellaneous & discrepancies, net**		**0**		**398**		**−398**		**75**	**−283**		**−359**	**−283**	**−283**
37	**Total**	**1,004**	**1,004**	**436**	**436**	**−144**	**−144**	**83**	**83**	**−94**	**−94**	**0**		

Notes: The en-dash (–) indicates that data are unavailable.

S = Sources, which are equal to saving of each sector plus net incurrence of financial liabilities.

U = Uses, which are equal to capital formation and net acquisition of financial assets.

Source: Author's calculation based on data from IMF (2011), ADB (2012), and UNCTAD (2012).

and money and quasi-money. Finally, the flows for 1990 are assembled into separate matrix format which is Table 1.7. The FOF matrix shown in Table 1.7 contained five sectors: central government, commercial banks, central bank, private sector, and foreign sector (rest of the world). The private sector includes provincial and local government, nonbank financial institutions, nonprofit institutions, all nonfinancial business including government enterprises, and households. This table will be the foundation for the analysis that follows.

The 1990 gross capital formation in the private sector of 1,004[6] (Table 1.7, line 2) is financed by three means: first, a capital inflow from abroad; second, domestic savings; and third, private credit. To investigate the inflow of capital from abroad we refer to the rest of the world account on the matrix and to the breakdown in the placement of its surplus, 1,070 (Table 1.6, line 6).[7] There are three main inflows from abroad: (1) a central government debt flow of −71 (line 21) received by the central government, where negative sign indicates the lower indebtedness of the Lao government; (2) a private credit flow of 260 (line 27[8]) received by the private sector; and (3) a foreign claims flow of −9 (line 12) received by the commercial banks, where the negative sign indicates the capital outflow. If the third of these flows were positive, it should become embedded in the intermediary process of the banking system.

The flow of private credit from the commercial banks in 1990 was recorded at 38 (line 27). Nonetheless, they were able to supply more credit as the central bank reduced the bank reserves of 8 (line 17). The growth in money and especially quasi-money of 38 (line 29) was the source of funds in the banking sector accounting for 13% of the private credit extension. So, all told, a private credit total of 38 is provided (line 27). Together with the inflow of private credit from abroad (260, line 27), the private sector obtained the substantial total of 298 in private credit (line 27).

---

[6] Unless otherwise indicated data are expressed in billions of kip.

[7] The surplus is the Lao current account deficit as viewed from a rest-of-world perspective.

[8] Except as noted, line references are to Table 1.7.

Table 1.8: Lao PDR's flow of funds matrix 2010 (billions of kip)

	Account	Central Government		Commercial Banks		Central Bank		Private Sector		Rest of the World		Discrepancy Sources	Total	
		U	S	U	S	U	S	U	S	U	S		U	S
2	**Gross capital formation**	**3,646**		**–**		**–**		**7,440**					**11,086**	
4	**Gross saving**		**2,954**		**–**		**–**		**8,267**		**−135**			**11,086**
6	*Net lending (+) or borrowing (-)*	−692		**–**		**–**		827		−135			0	
9	**Δ Foreign claims, net**			**91**		**332**					**336**	**87**	**423**	**423**
11	Δ Foreign assets			949		277					1,272	−46	1,226	1,226
12	Δ Foreign liabilities				859		−55			936		133	936	936
14	**Δ Interbank claims**			**1,086**			**875**					**210**	**1,086**	**1,086**
16	Δ Central bank credit to commercial banks				182	442						260	442	442
17	Δ Bank reserves			1,268			1,317					−49	1,268	1,268
19	**Δ Central government debt**		**615**	**74**		**55**		**−215**		**526**		**−174**	**440**	**440**
21	Δ Claims on central government		615	173		0		−215		526		−131	484	484
22	Δ Central government deposits	0			98		−55					−44	0	0
24	**Δ Private credit, net**	**−78**		**2,269**		**588**			**4,309**	**1,530**			**4,309**	**4,309**
26	Δ Claims on nonbank financial institution			180		588			767				767	767
27	Δ Other private credit	−78		2,089					3,542	1,530			3,542	3,542
29	**Δ Money and quasi money**				**2,912**		**393**	**3,305**					**3,305**	**3,305**
31	Δ Currency and demand deposits				474		393	867					867	867
32	Δ Time, savings deposits				2,438			2,438					2,438	2,438
34	**Δ Miscellaneous & discrepancies, net**		**0**		**607**		**−293**		**−2046**	**−1855**		**−123**	**−1855**	**−1855**
37	**Total**	**3,568**	**3,568**	**3,519**	**3,519**	**975**	**975**	**10,530**	**10,530**	**201**	**201**	**0**		

Notes: The en-dash (–) indicates that data are unavailable.

S = Sources, which are equal to saving of each sector plus net incurrence of financial liabilities.

U = Uses, which are equal to capital formation and net acquisition of financial assets.

Source: Author's calculation based on data from IMF (2012), ADB (2012), and UNCTAD (2012).

It is worth considering how the government sector financed its gross capital formation, 1,004 (Table 1.7, line 2). The public investment was financed by the small volume of public saving of 192 (line 4). The rest of the capital formation might be financed by 79 from the domestic private sector and 9 from the commercial bank. Here we see the small contribution of the foreign credit to public capital formation.

As of 2010, the financial flows in Lao PDR were substantially improved relative to those in 1990, due mainly to the better functioning of the banking system and the expansion of businesses. Although the government sector was still the net borrower, the private sector turned to be a net lender and Lao PDR was also a net lender to the rest of the world (see Table 1.8).

In 2010, the flow of private credit received 2,089 from the commercial banks (Table 1.8, line 27). Nonetheless, they were able to supply more credit as the central bank reduced the bank reserves of 1,286 (line 17). The growth in money and especially quasi-money of 2,912 (line 29) was the source of funds in the banking sector accounting for 85% of the private credit extension. But the banking sector was able to advance to the private sector much more than its deposit expansion, partly by means of its foreign borrowing, 859 (line 12), but also by an increase of foreign assets, 947 (line 11), and an expansion of its net holding of government debt, 74 (line 19). So, all told, a private credit total of 2,089 is provided (line 27). Together with the inflow of private credit from abroad, the private sector obtained the substantial total of 3,542 in private credit (line 27).

Based on Tables 1.7 and 1.8, I found the following conclusions. First, the foreign sector is a net lender to the government in the Lao PDR; second, gross capital formation is largely financed by domestic sources of funds; and finally, the foreign sector did show some significant contribution as a source of capital for the government. Consequently, a shortfall in foreign finance can cause the government sector to cut down its investment dramatically. In contrast, there is no clear sign that the private sector would reduce its investment due to a shortfall in foreign finance because it is largely financed by domestic savings.

Chapter 2 Macroeconomic Management and Performance in Lao PDR

The aim of this chapter is to answer the question whether the present institutional arrangements and the implementations of macroeconomic policies in Laos promote macroeconomic stability. It describes the institutional and macroeconomic policies framework for the Lao economy. The structures of two macroeconomic institutions have been investigated, including the Bank of Lao PDR, and the Ministry of Finance. Three macroeconomic policies, including monetary policy, exchange rate policy, and fiscal policy, are also reviewed. The chapter ends with the review of macroeconomic performance in Lao PDR.

2.1 Macroeconomic policy institutions in Lao PDR

Successful macroeconomic policy implementation requires well-functioning institutions and feasible coordination mechanisms at the two levels of the policy process, namely policy-making and policy implementation. As in many developing countries, two institutions play a crucial role in macroeconomic policy formulation and implementation: the Bank of the Lao PDR (BOL) and the Ministry of Finance (MOF).

2.1.1 Development of financial institutions in Lao PDR

Prior to 1988 the banking system of Lao PDR consisted of a single financial institution, the State Bank of Lao PDR and its provincial and district branches, which performed both central and commercial banking functions. It issued banknote, regulated currency in circulation, handled payment system and served as a national treasury. It also accepted some deposits from public and lent money to state-owned enterprises according to central planner's instruction.

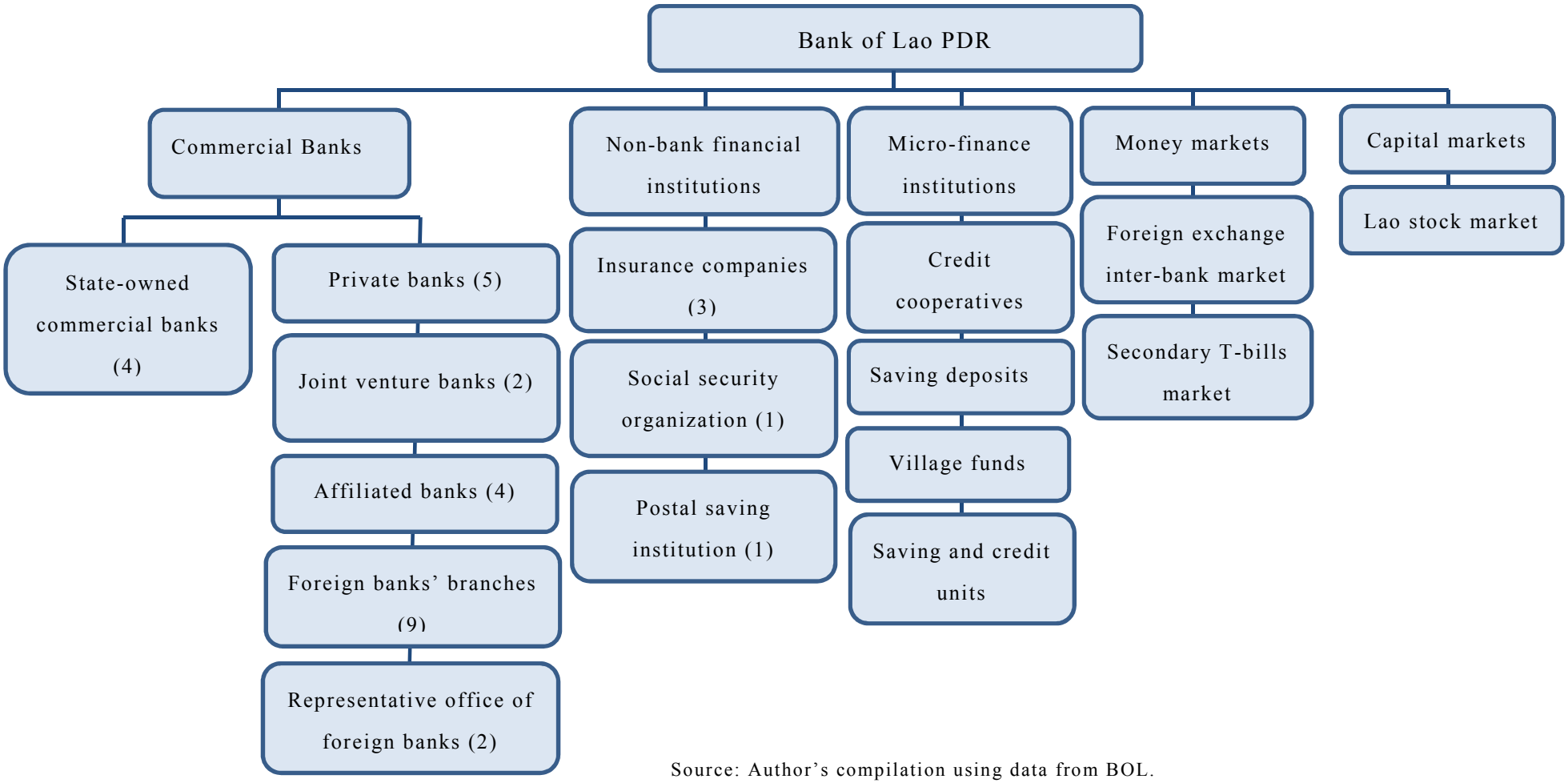
The financial institutions in Lao PDR have evolved with reforms in the Lao economy. Between 1975 and 1989, the banking system of Lao PDR was one tier banking system which was known as National Bank from 1975 to 1981 and then called State Bank of Lao PDR between 1981 and 1989.

The State Bank of Lao PDR had a headquarter in Vientiane capital and 19 regional branches nationwide performed both central and commercial

banking functions. It issued banknotes, regulated currency in circulation, handled payment system, and served as a national treasury. It also accepted some deposits from public and lent money to state-owned enterprises according to central planner's instruction. However, the banking sector during this period was unable to effectively perform its tasks, resulting in liquidity shortage, lack of efficiency and weak governance.

In 1989, the banking system had been transformed from a mono-banking system into a two-tier banking system and officially established the central bank called Bank of the Lao PDR. Consequently, the role of the central bank and the role of commercial banks were clearly separated. The rules and regulations on doing banking business have also been amended and created, and thereby improving business environment in the banking sector. From 1989 to 1995, private banks, joint-venture banks, branches of foreign banks and specialized banks were licensed to operate extensively, while other types of financial institutions, particularly insurance companies and micro-finance institutions were established.

At the end of 2011, the financial institutions in Lao PDR consisted of the central bank, commercial banks, non-banking financial institutions, micro-finance institutions, money markets and capital markets. Commercial banks include 4 state-owned commercial banks, 5 private banks, 2 joint venture banks, 2 affiliated banks, 8 foreign bank branches, and 2 representative offices of foreign bank. The non-banking financial institutions comprised of 3 insurance companies, one social security fund, postal saving institutions with 16 branches and 28 pawn shops. For the micro-finance institutions, there were 4 micro finance institutions accepting deposits, five credit cooperatives and 190 micro funds nationwide. Regarding to the money market and capital market, recently, there are foreign exchange inter-bank market and secondary T-bills market which are not very active, and the capital market was just created in 2010 under the supervision of the BOL (Diagram 2.1).



Source: Author's compilation using data from BOL.

Diagram 2.1: Structure of the financial institutions in Lao PDR, 2011

Although Lao PDR's financial institutions has been gradually improved, they are still at an early stage of development and thus, providing limited supply of credit to private sector. As shown in Table 2.1, total assets of commercial banks as percentage of GDP accounted for 25.2% in 2005–2007 and 40.8% in 2008–2010. The rate of financial assets growth was averaged at 29% per year. About two-thirds of this rapid growth of assets has been accounted for by the state owned commercial banks (SOCBs). More precisely, the assets expansion of SOCBs accounted for 61.5% of total assets growth, followed by the joint-venture banks and private banks (24.8%) and branches of foreign banks (13.8%).

Table 2.1: Lao PDR's financial developments in the fast growth period, period averages

Description	Share of GDP		Growth rates		Contribution to financial growth	
	2005–2007	2008–2010	2005–2007	2008–2010	2005–2007	2008–2010
Assets	**25.2**	**40.8**	**22.7**	**35.3**	**22.7**	**35.3**
State-owned commercial banks	15.2	25.3	23.8	33.8	13.8	21.9
Joint-venture banks + Private banks	5.8	10.5	20.8	56.1	5.2	9.1
Branches of foreign banks*	4.2	5.1	22.3	20.0	3.7	4.3
Deposits	**19.6**	**26.6**	**20.9**	**25.8**	**20.9**	**25.8**
State-owned commercial banks	13.9	18.6	16.9	24.7	14.6	17.9
Joint-venture banks + Private banks	3.2	6.0	35.0	46.5	3.7	6.1
Branches of foreign banks*	2.5	2.0	28.2	−3.3	2.6	1.8
Loans	**7.7**	**17.9**	**16.7**	**62.5**	**16.7**	**62.5**
State-owned commercial banks	5.1	11.3	21.8	57.4	11.4	40.5
Joint-venture banks + Private banks	1.2	4.1	1.2	108.6	2.3	12.8
Branches of foreign banks*	1.4	2.5	18.9	38.7	2.9	9.2

Source: Author's compilation based on data from the Bank of Lao PDR 'Lao Monetary Statistics' (various issues).

As income per capita increases, Lao people save more money that they earn. As shown in Table 2.1, the ratio of total deposits to GDP rose by 10 percentage points from 19.6% in 2005–2007 to 26.6% in 2008–2010. About 70% of money has been saved in SOCBs, 20% in the joint-venture and private banks, and the rest 9.6% in the branches of foreign banks. Nonetheless, savings in Lao PDR is low relative to the size of its GDP. There are three main reasons for this. First, People have limited access to the banking sector in the rural areas (Kyophilavong, 2010). Second, they have

low incomes (BOL et al., 2002). Finally, the majority of people living in the rural areas save in the form of gold and silver (Toyoda and Kyophilavong, 2005).

Total loans provided by the commercial banks account for an even small share of total deposits (55%) and GDP (12.8%), but the performance has been substantially strong, with growth around 39.6% on average (see Table 1.3). The bulk of the growth contribution has come from the SOCBs, which account for over 64% of total credits and more than 8% of total GDP, and has grown about 40% on average.

Total loans provided by the commercial banks are very small relative to the total deposits and the size of the economy. This implies that the financial market in Lao PDR is still at its early stage of the development, and relying on the banking sector as the only source of funding may not be sufficient to boost domestic investment. There are three main reasons for the low ratio of credit to GDP: lack of skilled workers in the banking sector, discouraging corporate access to banking services due to distort price signals, and lack of strong legal enforcement of non-performing loans (NPLs) to prevent credit risk (Kyophilavong, 2010).

In contrast, the non-banking financial institutions are still underdeveloped and there are only few non-banking fiancial institutions providing long term capital and life insurance. At present, Assurances Generales de France and Toko Assurance are only two insurance companies providing general insurance and life insurance while another company, Lao-Viet insurance company, is providing only financial and investment insurances.

Furthermore, the social security and pension systems were just introduced few years ago and these services are applied for civil servants only. Since 1989, all civil servants are required to contribute 6 percent of their salary to the “Social Security Fund” which provide protection including pension, child allowance, invalidity from war, medical care, death, maternity and sickness. This fund is managed by the Social Security Department, Ministry of Labor and Social Welfare.

2.1.2 Performance of the Central Bank of Lao PDR and its responsibility of conducting monetary policy

Bank of Lao PDR was formally established in June 1990, following the Central Bank Law No.4. Its rights and duties are to promote and maintain internal and external monetary stability, an efficient payments mechanism and the liquidity, solvency and proper functioning of a soundly based monetary, credit and financial system; and to foster conditions conducive to orderly, balanced and sustained economic growth for the prosperity of the Lao people. Moreover, only the BOL is authorized to grant or reject a license for establishing a bank or financial institution.

The BOL Law No.5 promulgated in October 1995 and amended in October 1999 forms the governance structure of BOL with an equivalent status to a ministry within the government. Its highest authority is the Board of Governors which consists of seven to nine members with a deputy prime minister as its chairman, the Governor of the BOL and Minister of Finance as co-vice-chairmen, a deputy governor, as well as three to five other members from various sectors of the national economy who are appointed by the Prime Minister. The Board of Governors plays a crucial role in determining money supply, credit and financial sector supervisory policies while leaving the day-to-day operations to the governor and deputy governors.

For the implementation of monetary policy, from 1990 to 1995, the central bank aimed at achieving the target of bank credits such as, setting an annual credit increase target, setting a ceiling for interest rates, and providing direct lending to major state-owned enterprises as well as the commercial banks. After the amendment of the Law on the Bank of Lao PDR in 1995, the objective of monetary policy was emphasized on maintaining the stability of the local currency and using indirect monetary policy such as defining the level money supply and reserve requirements, setting central bank rate, discount rate of the bills and reference rate of exchange rate, selling central bank bills, and lending the short-term credits to commercial banks. After the amendment of the law in 1999, the ceiling on interest rate was eliminated, and the role of the central bank has focused on the macroeconomic management by maintaining the stability of local currency to promote economic development as well as the development of commercial

banks and financial institutions without interfering in the management of state-owned commercial banks.

However, the current institutional arrangements of the BOL do not support the financial sector stability because of its lack of autonomy. Moreover, the BOL has not been very effective in conducting the monetary policy in Lao PDR because of four major reasons. First, the Lao economy is characterized by dollarization, with the ratio of foreign currency deposit to M2 of more than 50%. Second, the lack of autonomy of the BOL results in a long policy making process because of its consulting and seeking approval from the ministry of finance. Third, policy lending is used to finance the government investments or SOEs. As the BOL uses interest rates to constrain credit availability to high return projects, efficiency of the policy decision decreases as policy lending can affect the normal market credit allocation. Fourth, the BOL has limited financial resources which make it difficult to conduct appropriate monetary policies. Finally, the BOL's banking supervision is weak, particularly in the enforcement area (ADB and World Bank, 2002, pp. 14–17).

2.1.3 Performance of Ministry of Finance and its responsibility of conducting fiscal policy

The Ministry of Finance plays an important role in the management of financial system in Lao PDR. According to the Decree 80/PM dated on February 28 2007, "The Ministry of Finance is a public administrative organization within the Government's machinery, playing an important role in ensuring the management of public finance, accounting, government budget and asset and land areas for the whole country in a uniform manner, in line with the Party-Government policy/guidelines to serve the tasks of protection and socio-economic development of the country, ensuring its stability and strength in line with the Renovation Policy." The MOF was founded in 1988, and worked closely with the Committee for Planning under the same ministry, called 'Ministry for Economic Planning and Finance'. In 1993, this merger was dismantled, resulting in two separate ministries, the Ministry of Finance and the Ministry of Planning and Investment. At present, 12 departments have been created within the Ministry of Finance to implement fiscal policy and management. Four of them are responsibility of

revenue collection: the Customs Department, the Tax Department, the State Property Management Department and the Land and Housing Management Department.

The roles played by the MOF have two significant aspects for the financial sector development. The first aspect is that the MOF dominates policy making and decisions associated with the financial sector. It is responsible for the formulation and implementation of fiscal policies. It prepares the government budget to be submitted to the National Assembly and administers the approved budget, including inspection of state-owned enterprises and government ministries for compliance. In particular, the MOF deals with tax administration, customs duties, management of the investments of SOEs and state property, and government procurement guidelines and regulations.

The second aspect is that the MOF can enhance or restrict the financial sector development depending on its financing methods. By using the Treasury-bills (T-bills) as a source of financing, the MOF provides relatively liquid financial instruments to the financial sector. While the MOF determines the volume of T-bills to be issued, the BOL serves as manager of T-bills and other government security issues. T-bills are sold at a discount in certificate form in units of 10 million kip with the maturity of six months. Starting in March 1994, T-bills were auctioned by the BOL twice a month and the rate at auctions was used as reference for determining lending rates of commercial banks.

However, the MOF has not been very effective in implementing fiscal policy and management due to several limitations. It has limited capability in formulating and implementing policy. With low research capacity, it cannot provide a comprehensive revenue planning. Furthermore, tax rates are often discretionary (Economic and Social Commission for Asia and the Pacific, 1997, p.22).

At the policy level, the coordination mechanisms between the Bank of Lao PDR and the Ministry of Finance are obvious since the Minister of Finance serves as a vice-chairman of the Board of Governor of the BOL. The coordination between two institutions can be strengthened through monthly meeting of the Board of Governor. At the implementation level, much

progress needs to be made as there is currently lack of any joint committee activity on undertaking regular discussions on technical matters. Establishing permanent joint committees can enhance the efficiency of many areas of macroeconomic policy implementation, including the determination of T-bill auction quantities, the monitoring of the programmes agreed upon with international agencies, the coordination of debt management and monetary policy, particularly the interest rate policy for government borrowing, and characteristics and operational aspects of government securities.

2.2 Development of macroeconomic policies in Lao PDR from 1988–2011

2.2.1 The operation of monetary policy in Lao PDR

The monetary policy framework in Laos has evolved with changing economic and financial environment, but the price stability continued to remain paramount. It can be roughly classified into two strategies: a strategy of targeting the growth in net domestic assets of the banking system—the initial period of the transition (1988–1994); and a strategy of targeting the growth of broad money—more developed banking system (1995–2012). The strategy of targeting the growth in net domestic assets of the banking system was adopted, taking into account the balance of payments objective and the expected demand for money. The main reason for adopting this strategy was due to a rudimentary monetary system and the lack of fully effective indirect policy instruments. Thus the authorities relied on direct instruments, including limits on currency issue and instructions to state-owned banks to reduce credit to state enterprises. These policies, coupled with the government's low level of bank borrowing, were successful in reducing credit and broad money growth, resulting in a decline of inflation rate from 35.6% in 1990 to 6.3% in 1993 (Table 2.2). However, the direct controls became less effective as the private sector has increasingly accounted for total credit. This entailed the change from net domestic asset targeting to monetary targeting, while developing indirect instruments for monetary management.

Table 2.2: Monetary survey in Lao PDR, 1990–2010

(In billions of kip)

	1990	1993	1996	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Net foreign assets	11.5	63.6	143.9	1,162.0	1,424.1	1,288.2	2,184.7	2,577.0	3,094.8	3,321.4	4,775.8	7,641.3	7,251.3	5,505.9	6,264.7
Net domestic assets	15.5	10.6	40.2	432.8	428.9	1,270.1	773.5	1,163.2	1,386.7	1,959.5	1,733.2	1,923.8	3,992.1	8,256.1	11,506.4
Domestic Credit	30.6	56.5	131.6	957.8	1,230.2	2,057.3	1,831.1	1,943.8	2,166.5	2,348.8	2,251.4	2,670.9	5,018.0	10,353.9	15,712.7
Net credit to Government	−15.0	−27.8	−61.0	−359.5	−630.6	−464.7	−807.0	−454.5	−513.7	−531.4	−365.5	−495.5	−826.6	−789.2	−557.4
Credit to nongovernment sector	45.6	84.2	192.6	1,317.3	1,860.8	2,522.0	2,638.1	2,398.3	2,680.2	2,880.2	2,616.9	3,166.4	5,844.6	11,143.1	16,270.2
Public enterprises	39.7	18.3	36.9	445.4	642.6	1,016.7	1,133.0	926.1	998.6	736.5	556.3	512.9	1,290.7	2,578.5	3,955.7
Private enterprises	5.9	65.9	155.7	871.9	1,218.1	1,505.3	1,505.1	1,472.2	1,681.6	2,143.8	2,060.6	2,653.5	4,553.8	8,564.6	12,314.5
BOL securities	0.0	−0.1	−20.7	−141.6	−159.0	−199.9	−165.5	−45.4	0.0	0.0	0.0	0.0	−12.2	−14.5	−187.4
Other items (net)	−15.1	−45.8	−70.7	−383.4	−642.3	−587.4	−892.1	−735.2	−779.8	−389.3	−518.2	−747.1	−1013.7	−2083.4	−4018.9
Broad money	44.3	125.9	244.9	1,544.5	2,255.6	2,565.0	3,529.4	4,237.9	5,154.9	5,560.3	7,046.1	9,774.2	11,564.0	15,311.4	21,302.6
Narrow money	25.1	52.2	75.6	219.0	344.4	371.8	587.0	836.5	1,207.3	1,558.9	1,998.3	3,064.7	3,715.3	4,790.5	6,349.8
Quasi-money	19.3	73.6	169.4	1,325.5	1,911.3	2,193.2	2,942.4	3,401.4	3,947.6	4,001.4	5,047.8	6,709.5	7,848.6	10,520.9	14,952.8
								(Percentage change)							
Domestic credit	15.9	41.5	−6.8	47.3	28.4	67.2	−11.0	6.2	11.5	8.4	−4.1	18.6	87.9	106.3	51.8
Net credit to nongovernment sector	11.2	51.7	23.1	74.2	41.3	35.5	4.6	−9.1	11.8	7.5	−9.1	21.0	84.6	90.7	46.0
Of which: Net credit to private sector	34.1	74.9	20.8	63.6	39.7	23.6	0.0	−2.2	14.2	27.5	−3.9	28.8	71.6	88.1	43.8
Broad money	7.9	64.6	26.7	78.4	46.0	13.7	37.6	20.1	21.6	7.9	26.7	38.7	18.3	32.4	39.1
Memorandum items															
Velocity of money[1]	13.8	7.6	7.0	6.7	6.1	6.1	5.2	4.8	5.2	5.5	5.0	4.0	3.9	3.1	2.5
Reserve money	22.0	60.7	104.4	481.8	766.7	822.5	1,079.1	1,329.9	1,545.3	1,823.2	2,502.0	3,973.6	4,776.0	6,302.2	9,371.8
Money multiplier[2]	2.0	2.1	2.3	3.2	2.9	3.1	3.3	3.2	3.3	3.0	2.8	2.5	2.4	2.4	2.3
Inflation rate, 2005 = 100	35.6	6.3	12.9	128.5	25.1	7.8	10.6	15.5	10.5	7.2	6.8	4.5	7.6	0.0	6.0

Notes: [1]Nominal GDP divided by broad money. [2]Broad money divided by reserve money.

Source: Author's calculation based on data from International Financial Statistics of the IMF.

However, it is unclear whether these two strategies can be used to fight inflation in Lao PDR because the relationship between monetary aggregates and economic activity was unstable and the high CS degree. As shown in Table 2.2, the velocity of money gradually fell, from 13.8 in 1990 to 6.1 in 2000 and to 2.5 in 2010. This indicates that in recent decades more money per unit of nominal GDP has been required for, in spite of massive innovation in financial technology. Meanwhile, the authorities floated the exchange rate in 1988 in view of finding a rate that reflected market forces more accurately than the fixed or managed float system, and of unifying the official system when financial imbalanced were reduced. From 1990 to 2010, the two approaches taken by the Lao authorities tend to be effective in reducing inflation from 35.6% in 1990 to 6% in 2010 while avoiding the significant decline in output that is often experienced in transition economies. This favourable outcome can be largely contributed by indirect monetary instruments.

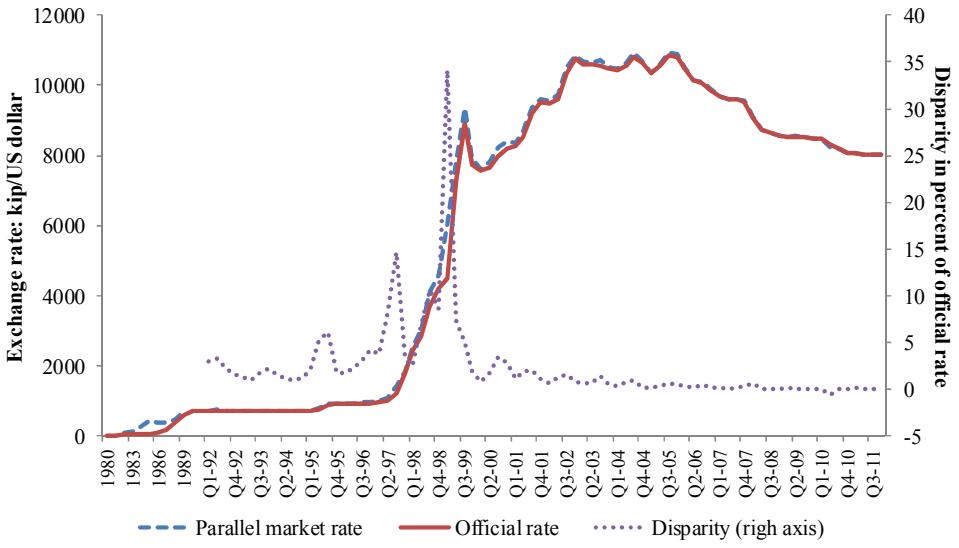
BOL has gradually developed indirect instruments of monetary management. First, a minimum reserve requirement of 5% for both kip and US dollar was introduced in 1989. This requirement was doubled to 10% in 1994 in order to absorb excess liquidity in the banking system. Since January 2002, the BOL maintained the reserve requirement rate for the US dollar about twice higher than the kip in order to reduce dollarization in the Lao economy. Second, a formal credit window was opened at the central bank in January 1992, allowing commercial banks to borrow to meet their short-term liquidity needs. Nevertheless, the credit window was replaced by a discount facility at the BOL in May 1994 to strengthen monetary control and tighten the provision of central bank credit. Third, treasury bill auctions were commenced on a regular basis since March 1994. The introduction of the discount facility and treasury bill, together with allowing market forces to determine interest rates, constituted an important step for liquidity management through market operations and contributed to the development of an interbank money market.

2.2.2 The operation of exchange rate policy in Lao PDR

Since the declaration of its independence in 1975, the Lao PDR has experienced two exchange rate regimes, multiple exchange rate system

during 1975–1987 on the one hand and managed-float regime afterwards on the other. During 1975–1987, the Lao government had operated seven exchange rates for many different purposes. The first exchange rate is called 'official exchange rate', which was used to convert loans from international organizations, namely ADB, IMF, and the World Bank or foreign loans and grants, into kip, as well as kip into the US dollar (USD). In 1986, this official exchange rate was 10 kip per USD.

The second exchange rate was used for diplomats and expenditures of the embassies. This rate was set at 35 kip per USD. The third exchange rate served as a means to protect the State Owned-enterprises. By doing so, the official commercial exchange rate was set to be 95 kip per USD, which was much lower level than the market rate. In 1987, the government limited the amount of foreign currency to be sold to SOEs. As a result, many of them had to buy it in the apparel market; those who could not do so, for whatever reason, were forced to produce much below their capacity because of a lack of raw materials or spare parts for their machinery.

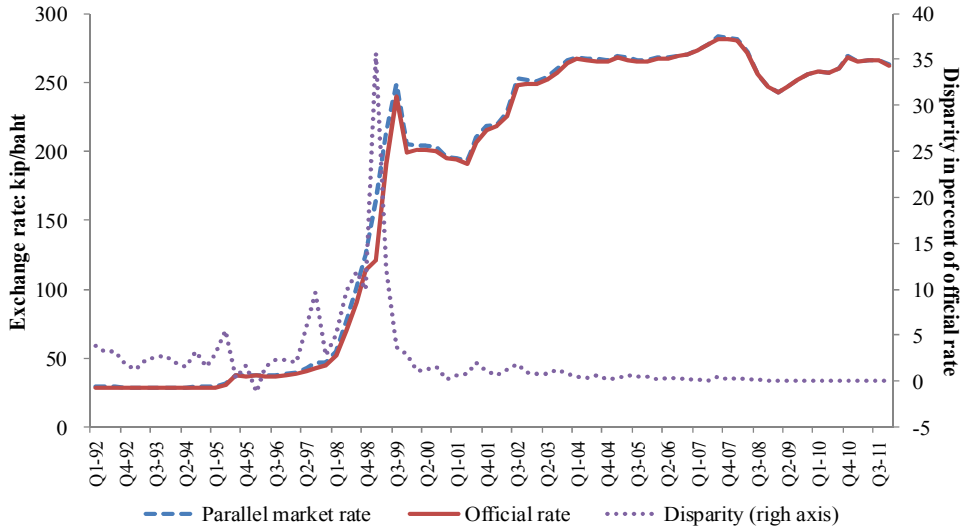


Note: The exchange rates are annual diagrams during 1980–1991 and quarterly Diagram s during 1992–2011.

Source: Bank of Lao PDR, *Financial Statistics* (various issues)

Diagram 2.2: Kip/USD exchange rate in the parallel and the official market, 1980–2011

The fourth exchange rate served as a means for transforming tourist receipts and inward remittances to non-Lao nationals of the residents of the country, which was set at 350 kip per USD. The fifth exchange rate was used as a means for transforming inward remittances to Lao nationals, which was set at 350 kip per USD. The sixth exchange rate served as a means for export-import mixed companies to do business with foreign partners during 1986 and 1987. The seventh exchange rate existed in the apparel or free market. During the period of 1985 to 1987, this exchange rate was around 390–420 kip per USD, which was very high relative to the official market (Diagram 2.2).



Source: Bank of Lao PDR, *Financial Statistics* (various issues).

Diagram 2.3: Kip/baht exchange rate in the parallel and the official market, 1992–2011

Following the unification of the official exchange rate of the kip in 1988, the BOL has maintained a managed-float exchange rate regime, allowing the official rate to adjust in line with the parallel market rate. Under this policy, the kip substantially depreciated by more than 100% against the USD, rising from 187 to 400 kip per USD as shown in Diagram 2.4. From mid-1991 to the end of 1994, tight financial policies brought inflation down, and the BOL maintained the official exchange rate at about 717 kip per USD while accumulating foreign reserves. The difference between the parallel and the official rate for the USD generally remained

below 10% of the official rate until the second quarter of 1997. A similar stable trend is also true for the kip/baht rate (Diagram 2.3). These favorable outcomes were due to the liberal access to foreign exchange as well as a continued rise in the number of authorized banks and foreign exchange bureaus.

However, the monetary management in Lao PDR was not very effective once the economy was affected by external shock. For instance, the Asian financial crisis in July 1997 resulted in considerable depreciations of both kip per USD and kip per baht rates, increasing from 1027 for the kip/USD and 70 for the kip/baht in the second quarter of 1997 to 8913 and 240 in the third quarter of 1999, respectively. During this period, the disparity between the parallel and the official rate was quite high, recorded on average at 10.32% for the kip/USD and 11.2% for the kip/baht. Both the kip/USD and kip/baht rates stood at new values in the post-crisis, which were much higher than the initial values in the pre-crisis.

Under the managed-floating exchange rate regime, the BOL determines the daily reference rate for the kip against the USD or the baht. It calculates this reference rate by using a weighted average of the previous foreign exchange transactions of commercial banks and market rates. This reference rate has been modified from time to time in response to market conditions. For instance, in 2006 commercial banks were required to adjust their buying and selling rates by ± 0.3% of the reference rate to narrow the spread of exchange rates and reduce the gap between official rates and market rates. In 2009, commercial banks were required to adjust their daily selling exchange rates within the range ± 0.25% for the kip/USD, 0.5% for kip/baht and kip/EUR, and less than 2% for other currencies.

2.2.3 The operation of fiscal policy in Lao PDR

2.2.3.1 The operation of fiscal policy under a centrally-planned economic system, 1975-1985

Since the formation of Lao PDR in 1975, the Lao government has taken an increasingly active role in economic matters in the form of both policy interventions and growth in financial and economic activities in the state sector. This section examines trends in the state budget over the period

1977-1985 and the impact of government's efforts to provide economic and social services, expand investments in infrastructure and productive facilities and raise domestic resources through taxation to finance these expenditures.

Table 2.3: Lao PDR's government revenue and expenditure, 1977-1985

(In millions of kip)

	1977	1978	1979	1980	1981	1982	1983	1984	1985
Revenue	*83*	*106*	*268*	*748*	*989*	*2,755*	*3,495*	*4,948*	*10,299*
Tax revenue	30	55	48	300	396	775	1,056	1,669	1,397
Tax on industrial and commercial profits	—	—	—	15	31	60	125	250	170
Agricultural tax	—	—	—	31	55	117	157	228	250
Turnover tax	—	—	—	91	195	383	565	960	786
Of which: State enterprises	—	—	—	81	119	223	232	453	424
Tax on international trade	—	—	—	155	109	205	172	181	160
Import tax	—	—	—	—	84	142	152	150	124
Of which: state enterprises	—	—	—	—	55	84	82	70	66
Export tax	—	—	—	—	25	63	20	31	36
Of which: state enterprises	—	—	—	—	21	53	14	24	30
Other	—	—	—	8	6	10	37	50	31
Nontax revenue	53	51	220	448	593	1,980	2,439	3,279	8,902
Transfers from state enterprises	51	33	184	365	520	1,895	2,112	2,962	7,761
Other	2	18	35	83	73	85	327	317	1,141
Expenditures	*490*	*573*	*636*	*1,777*	*1,956*	*5,475*	*6,695*	*8,384*	*20,806*
Current expenditures	329	384	394	1,028	1,028	2,259	2,945	4,126	10,624
Wages and salaries	—	105	114	269	200	280	320	580	2,520
Materials and supplies	—	—	—	668	725	1,798	2,145	3,419	6,810
Subsidies and transfers	—	168	165	68	59	85	380	10	2
Debt service	—	24	19	23	44	96	100	117	1,267
Capital expenditures	162	189	242	749	928	3,216	3,750	4,258	10,182
Education	—	4	4	24	21	77	100	90	265
Health	—	4	2	112	67	254	280	170	600
Agriculture and forestry	—	25	74	179	283	955	980	1,010	1,549
Industry and commerce	—	78	25	43	149	573	920	1,537	2,045
Transport, communications, and public works	—	64	113	283	373	1,237	1,250	1,256	4,212
Other	—	14	24	108	35	120	220	195	1,511
Deficit	*−408*	*−467*	*−368*	*−1,029*	*−967*	*−2,720*	*−3,200*	*−3,436*	*−10,507*
Financing	*408*	*467*	*368*	*1,029*	*967*	*2,720*	*3,199*	*3,437*	*10,507*
External resources	357	431	355	1,033	967	2,720	3,199	3,533	10,671
Domestic resources	51	36	14	−4	0	0	0	−96	−164

Source: World Bank, Country Economic Memorandum, various issues.

There were limited statistics on Lao PDR's public finance between 1975 and 1977. The Lao government started to collect fiscal statistics since 1977 when a formal budget was operated for the first time. Nonetheless, even with the statistical limitations, it is possible to sketch the budgetary position between 1975 and 1977 based on the World Bank's documents, and to indicate trends in public finance over the period 1978-1985. According to

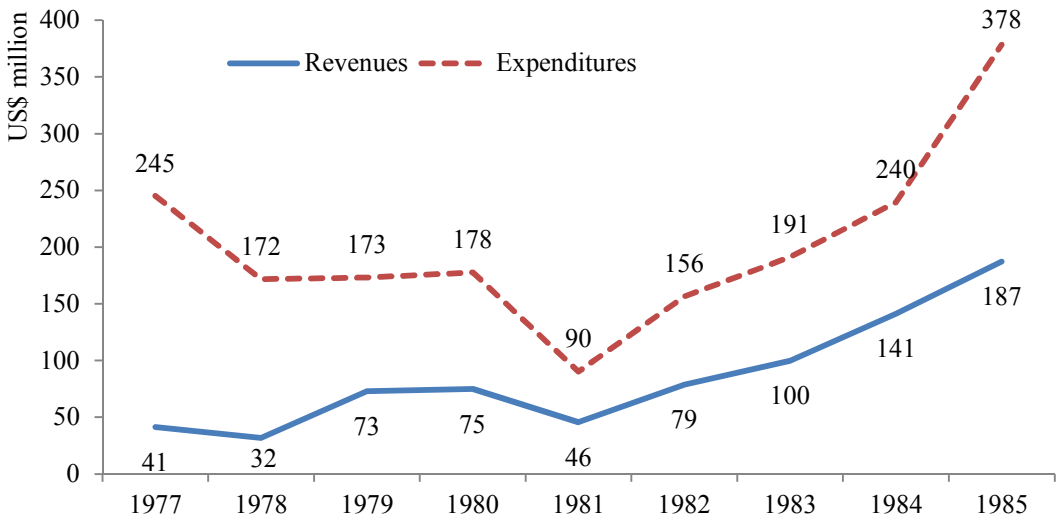
the World Bank (1983, pp. 30-31), expenditures grew much faster than domestic revenues. The underlying factors behind a rapid increase in expenditures included the resettlement program, food distribution and subsidies to the state enterprises and trading agencies, as well as the rising costs of development projects resulting from the inflation that was triggered by the tight supply situation and the government's liquidity expansion. Meanwhile, the Lao government was lack of the manpower as well as a well-established system to manage the public finance.

There were limited sources for domestic revenue. Public savings had been declining and the country's low income and dependence on foreign aids had constrained the development of other tax bases, particularly the industrial sector. While the financial of state enterprises were too weak to pay tax, relatively limited tax revenue was created by agriculture. The reduction in foreign trade had reduced tax proceeds from customs duties.

Substantial improvements in the budgetary situation have been made since 1977. The key changes in the state budget since 1977 included an increase in the share of expenditures, a shift in expenditures in expenditures towards development and the termination of government borrowing from the National Bank to finance part of the deficit. In 1985, domestic revenue (10,299 million kips) accounted for 50% of total expenditures (20,806 million kips) and almost all of current expenditures, compared with only 17% and 45% respectively in 1977, while capital expenditures comprised 49% of total expenditures in 1985 compared with 33% in 1978 (Table 2.3). These improvements were brought about partly by a broadening of the tax base, particularly the reform of agricultural taxation and improved financial performance of state enterprises, but also by stringent control of budgetary expenditures.

The data in Table 2.3 suggest that the budget expanded very rapidly over the period 1977-1985, but these are presented in nominal terms and much of the increase reflects price changes, particularly in 1980. No deflators of overall categories or subcategories of the budget are available to convert these nominal figures into real terms. However, it is possible to form some idea of the magnitude of real expenditures and revenues by converting revenues and expenditures into dollars at the official exchange rate. On this

basis, revenues in nominal dollars rose by 484% from $32 million in 1978 to $187 million in 1985 and expenditures rose by 120% from $172 million in 1978 to $378 million in 1985 (Diagram 2.4). Nonetheless, budget deficit was still large, given the low initial level of revenues.



Source: World Bank, Country Economic Memorandum (various issues).

Diagram 2.4: Lao PDR's government revenues and expenditures, 1977-1985

A breakdown of expenditures into current and capital expenditures using the same methodology of deflation indicates clearly that the low level of real growth of overall expenditures was to a significant reduction in the real level of current expenditures, which in nominal dollar terms increased only from $115 million to $193 million between 1978 and 1985 (Table 2.4). In nominal dollar terms, public sector salaries increased from $31 million in 1978 to $46 million in 1985. On the other hand, capital expenditures rose in nominal dollar terms from $47 million in 1978 to $185 million in 1985 and clearly rose in real terms in spite of substantial international inflation during the period. The data in Table 2.4 also show the heavy concentration of investment in the three ministries covering agriculture, forestry, mining, industry, and communications.

Table 2.4: Economic classification of government expenditures

(In US$ million)

	1977	1978	1979	1980	1981	1982	1983	1984	1985
Current expenditures	164	115	107	103	47	65	84	118	193
Wages and salaries	—	31	31	27	9	8	9	17	46
Materials and supplies	—	—	—	67	33	51	61	98	124
Subsidies and transfers	—	50	45	7	3	2	11	0	0
Debt service	—	7	5	2	2	3	3	3	23
Capital expenditures	81	57	66	75	43	92	107	122	185
Education	—	1	1	2	1	2	3	3	5
Health	—	1	1	11	3	7	8	5	11
Agriculture and forestry	—	8	20	18	13	27	28	29	28
Industry and commerce	—	23	7	4	7	16	26	44	37
Transport, communications, and		0	0	0	0	0	0	0	0
public works	—	19	31	28	17	35	36	36	77
Other	—	4	7	11	2	3	6	6	27

Source: World Bank's Country Economic Memorandum, various issues.

The improvements in the budgetary position through control of expenditures and their restructuring towards development were complemented by improvements in revenue generation which rose in parallel with expenditures (Diagram 2.4). The key feature of the government's revenue mobilization effort has been the increasing reliance on state enterprises as the major vehicle for generating taxes and collecting them from the population; between 1978 and 1985, the share of revenue generated by state enterprises (tax revenue and transfers) rose from 31% in 1978 to 80% in 1985. Therefore, the financial performance of the state enterprises, which comprised a small share of GDP, had become significant over the period for the government in its budget planning and execution. It is worth noting that the revenue growth depended on the growth of domestic production of rice and electricity and the expansion of imports. The government had successfully converted imports into budgetary resources either by selling them directly to the population or by selling them after processing in state enterprises. With the exception of electricity, exports had contributed little to state revenues.

2.2.3.2 The operation of fiscal policy under market-oriented economic system, 1986-2011

Fiscal policy has three principal functions that are interrelated. The first function is to secure some form of adjustment in the resource allocation. This involves minor changes in the resource allocation affected by the

market. The second function is to influence the distribution of income and wealth so as to achieve a politically desired distribution. This objective can be attained by the mobilization of the tax and transfer system. The third function of fiscal policy aims to maintain macroeconomic stability, a high level of capacity utilization, and macroeconomic balance.

The three main functions of fiscal policy play variant roles according to the kind of economic system, the development strategy, and historical and political factors. In market economies, most resource allocation is determined by the market, as is the distribution of income. While the fiscal policy plays a limited role in securing adjustments in the resource allocation and income distribution, it also plays a significant role as a stabilization policy with price stability and a high level of employment.

Since 1986 Lao PDR has implemented an ambitious reform programme in order to transform the Lao economy into a market economy. The fiscal reform that accompanied the reform programme in Lao PDR has addressed the revenue and expenditure sides of the budget. It comprises three key components. The first and most important component is the reform of the tax system. The second is the establishment of an allocation and total level of public expenditures that should be compatible with the objectives of overall reform policy and the magnitude of external assistance to Lao PDR. The third component is the reform of the institutional framework and an upgrading of administrative capacity and procedures to facilitate the implementation of the revised fiscal policy.

The first reforms occurred at the end of the 1980s and extended over a three-year period, although some small changes occurred in early 1993. The main objective was to generate sufficient revenue at the beginning of the reform process when the key source of revenue, transfers from public enterprises, diminished due to the autonomy provided to state-owned enterprises (SOEs) and the privatization of some of them, to the price reform, and to the tightening of bank credits. To compensate for the losses of transfers from public enterprises, the government in 1988 introduced a company profit tax with varying rates between economic sectors. In June 1989, this tax was replaced by a uniform tax rate of 45% on the net profits of industrial enterprises in order to avoid the distortions on resource allocation

Table 2.5: Lao PDR's real government revenues, 1993-2011

Description	Share of GDP				Growth rates				Contribution to total revenue growth			
	1993–1997	1998–2002	2003–2007	2008–2011	1993–1997	1998–2002	2003–2007	2008–2011	1993–1997	1998–2002	2003–2007	2008–2011
Revenue	**13.4**	**11.1**	**12.1**	**15.4**	**5.3**	**12.2**	**7.9**	**11.9**	**4.2**	**5.2**	**40.3**	**12.1**
Non-tax revenue	**2.7**	**2.2**	**1.9**	**1.8**	**0.6**	**10.9**	**−2.4**	**9.8**	**0.9**	**1.0**	**5.8**	**1.5**
Tax revenue	**10.6**	**8.9**	**10.2**	**13.6**	**6.9**	**12.7**	**9.9**	**12.3**	**3.3**	**4.2**	**34.5**	**10.7**
Profit tax	1.2	1.1	1.4	2.6	14.9	15.6	24.4	11.6	0.3	0.5	5.0	1.9
Income tax	0.7	0.7	0.7	0.8	12.3	16.1	4.8	16.2	0.2	0.4	2.2	0.7
Agricultural/Land tax	0.2	0.1	0.1	0.2	8.1	15.7	9.9	17.5	0.1	0.0	0.3	0.1
Turnover tax	2.0	1.8	2.4	2.5	13.0	11.4	11.8	−5.9	0.5	0.9	8.1	2.4
Excise tax	0.6	1.7	2.0	3.0	34.1	28.8	18.7	12.8	0.1	0.8	7.3	2.4
Import duties	2.6	1.1	1.5	1.5	4.6	0.5	8.3	8.6	0.7	0.5	4.7	1.2
Export duties	0.4	0.3	0.1	0.1	13.6	7.0	−13.4	49.9	0.2	0.1	0.4	0.1
Timber royalties	2.4	1.4	0.7	0.2	−3.6	32.7	−15.5	−11.2	1.1	0.6	1.7	0.1
Hydropower royalties	0.0	0.2	0.2	0.2	0.0	42.2	−4.7	39.9	0.0	0.1	0.5	0.1
Natural resources taxes	0.0	0.1	0.4	0.7	31.8	31.2	68.1	18.9	0.0	0.0	1.9	0.6
Other taxes*	0.5	0.5	0.7	1.8	5.6	19.2	15.9	74.4	0.2	0.2	2.5	1.1
Grants	**4.8**	**3.5**	**2.2**	**4.5**	**15.2**	**−2.1**	**34.1**	**45.6**	**2.1**	**2.3**	**8.1**	**3.8**
Revenue and grants	**18.1**	**14.7**	**14.3**	**19.8**	**6.3**	**7.5**	**9.7**	**16.0**	**6.3**	**7.5**	**48.4**	**16.0**

Notes: # Figures are in fiscal year, starting from 1 October and ending on 30 September. *include natural resources taxes during 1992–1994.

Source: Author's compilation based on data from 'Annual Economic Report' of the Bank of the Lao PDR, various issues.

resulted from different sector rates. The first wave served as the foundation for the development of the current tax system.

The second reform is associated with the tax law of 1995, aiming to broaden the tax base in order to finance increased development expenditures. The most important changes introduced by the 1995 tax law involved key areas: first, the broadening of the turnover tax, that currently covers most domestically produced goods and imported goods; second, the reduction and the standardization of the profit tax; third, the replacement of specific excise duties by ad valorem excise duties; and finally, the increase of income tax for the lowest bracket from 2 to 10%. Parallel to the 1995 tax law, trade liberalization measures were introduced with a simplification and lowering of import duties and the elimination of most export duties.

As shown in Table 2.5, the tax reforms have contributed positively to the tax revenues, rising from 10.6% of GDP in 1993–1997 to 13.6% of GDP in 2008–2011. The average growth rate of the tax revenues over the period 1993–2011 was recorded about 10.4%, which was much higher than the 6.9% tax revenue growth in the initial reform in 1993–1997. While tax revenues constitute about 65% of total revenue over the period 1993–1997, grants and non-tax revenues account for about 22% and 13%, respectively, of total government revenues. Among these three sources of government revenues, tax revenues have been increasingly contributing to growth of total public revenues, accounting for about half of the growth rate of total public revenues in 1993–1997 and more than two-thirds in 2008–2011.

The privatization of SOEs in the 1990s and the expansion of businesses have resulted in an increase in revenues from turnover and profit taxes. Table 2.5 illustrates that over the period 1993–2011, revenues generated from turnover tax were averaged about 2.2% of GDP with the annual growth of 7.6%, while those from profit tax were about 1.6% with the annual growth of 16.6%. Both turnover and profit taxes have played an increasingly significant role in raising total government revenues. Their combined growth rates contributed to the growth of total public revenues about 12.7% in 1993–1997 and 27% in 2008–2011. In addition, revenues from excise tax were also significant which recorded about 1.8% of GDP,

and performance has been substantially strong relative to those from turnover and profit taxes, with growth around 23.6% on average.

Tax revenues from the resource sector, namely timber, hydropower, and natural resources, accounted for 1.6% of GDP and 9.6% of total public revenues (Table 2.5). While revenues from timber royalties have trended downward, both hydropower royalties and natural resources taxes have shown upward trends. Nonetheless, increased tax revenues from hydropower and natural resources were insufficient to compensate for the decreased tax revenues from timber. As a result, contribution of the resource sector to the growth of total public revenues was only 5.3% in 2008–2011, declining from 16.7% in 1993–1997.

Fiscal adjustment in a transition to market economy cannot be carried out by relying exclusively on a reform of the tax system. A contraction of public expenditure should be associated with the tax reform in order to contain fiscal imbalances within manageable limits. Nonetheless, the reduction of public expenditures is difficult since some of the adjustment costs are taken up by the budget (severance payments, wage increases to compensate for the suppression of subsidies, etc.) and also due to resistance on the part of those affected by economic restructuring. Such problems existed in Lao PDR, where the combined impact of the reform of current and capital expenditures on total budget expenditures were relatively small.

Total public expenditures account for an even greater share of GDP (over 20.5%), and its growth has been moderately strong which was around 9.7% on average (Table 2.6). The bulk of the growth contribution has come from current expenditures, which accounts for half of total government expenditures and about 10.1% of total GDP, and has grown at over 8.8% on average. The share of current expenditures in GDP has grown rapidly, rising from 11.4% in 1993–1997 to 12.8% in 2007–2011. The most important contributor to the rising current expenditures is the expenditure for wage and salaries, which accounts for about 20.2% of total public expenditures and 4.1% of GDP. It has increasingly contributed to the growth of total public expenditures, accounting for about 20.6% of public expenditure growth in 1993–1997 and 23.2% in 2007–2011. Another is the rising debt payment, increasing from 0.8% of GDP in 1993–1997 to 1.8% in 2007–2011. This can

Table 2.6: Lao PDR's real government expenditure, 1993-2011

Sector	Share of GDP				Growth rates				Contribution to total expenditure growth			
	1993–1997	1998–2002	2003–2007	2008–2011	1993–1997	1998–2002	2003–2007	2008–2011	1993–1997	1998–2002	2003–2007	2008–2011
Current expenditure	**11.4**	**6.4**	**9.6**	**12.8**	**1.4**	**8.0**	**14.2**	**11.7**	**4.8**	**2.0**	**4.9**	**7.5**
Wages and salaries	5.2	2.5	3.7	5.1	4.7	4.8	12.7	12.7	2.1	0.8	1.7	3.0
Materials and supplies	3.7	1.6	1.8	2.2	−4.3	4.9	8.2	14.5	1.7	0.5	1.0	1.3
Transfers	1.5	1.2	2.0	2.5	5.0	28.8	4.0	20.8	0.6	0.2	0.8	1.4
Debt payment	0.8	1.0	1.5	1.8	9.6	22.3	43.4	4.0	0.3	0.5	1.0	1.1
Others	0.2	0.1	0.6	1.2	−14.7	142.2	331.9	7.2	0.1	0.1	0.4	0.7
Capital and net lending	**11.5**	**12.1**	**8.7**	**9.6**	**24.1**	**8.5**	**6.2**	**18.6**	**5.4**	**4.1**	**4.5**	**5.6**
Total expenditure and net lendin	**22.9**	**18.4**	**18.3**	**22.5**	**10.3**	**6.1**	**9.4**	**13.1**	**10.3**	**6.1**	**9.4**	**13.1**

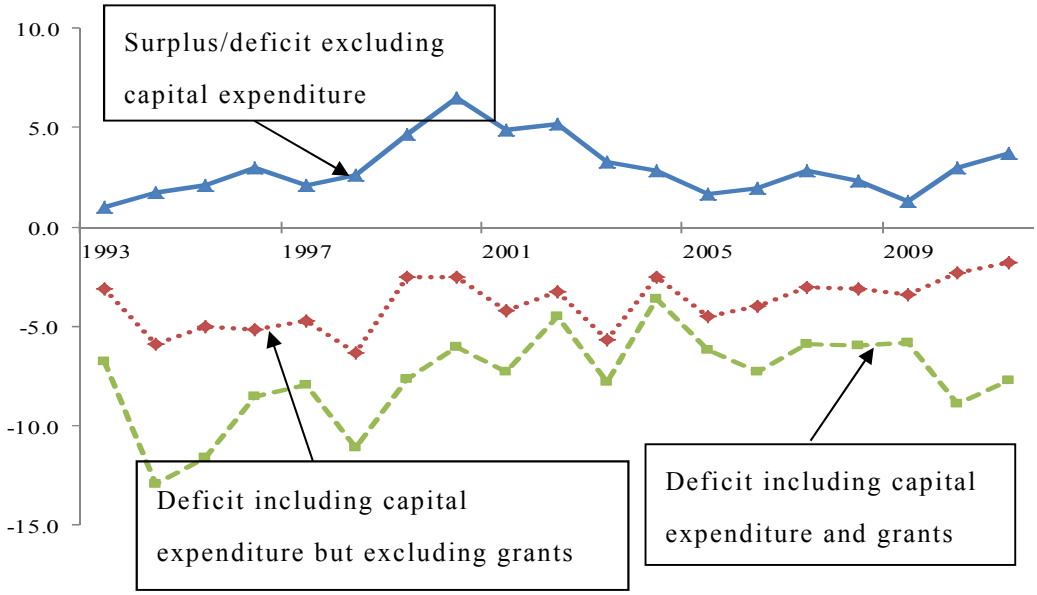
Source: Author's compilation based on data from 'Annual Economic Report' of the Bank of the Lao PDR, various issues.

be one of the great challenges for future development of Lao economy as resources have been diverted away from the socio-economic development plan.

Given the constant share of total public expenditures in GDP, the rising current expenditures were compensated by the gradual reduction of the capital expenditure and net lending. While both current and capital expenditures accounted for an equivalent share in total public expenditures in 1993, the latter has been dominated by the former since 2003–2007 (Table 2.6). As of 2008–2011, the capital expenditures and net lending accounted for about 43% of total public expenditures and 9.6% of GDP, whereas the current expenditures accounted for 57% of total public expenditures and 12.8% of GDP.

Having explained the developments of public revenues and expenditures, it is useful to consider the evolution of budget outcome. To do so, it is important to note that the development of budget policy in Lao PDR has not been occurring in a vacuum, but by interacting with the developments of other macroeconomic variables, namely prices and outputs. Therefore, the fiscal balance should not be viewed as the exclusive result of fiscal reforms beginning in the late 1980s and some subsequent fiscal reforms.

A comprehensive fiscal reform of the kind implemented in Lao PDR takes a fair time to work through the system. In the short-run, the impact of the fiscal policy reform on the budget situation should be much less favorable due to the difficulties in controlling public expenditures in at the beginning of the transition period. The difficulties in expenditure control include severe adjustment problems coupled with the time needed for revised tax system. The privatization of the SOEs may also bring about a rapid erosion of non-tax revenue. In the long-run, however, improved economic conditions and a more effective tax administration should result in a better budget outcome (less budget deficit). In other words, the pattern of fiscal developments exhibits an inverted J-curve with a fast growing budget deficit in the years following the beginning of the reform process, and a slow and continuous improvement afterward.



Source: Author's compilation based on data from 'Annual Economic Report' of the BOL(various issues).

Diagram 2.5: Fiscal account in Lao PDR, 1993–2011 (% of GDP)

This conjecture is partly supported by the fiscal developments in Lao PDR, where fiscal transition follows more a U-curve than an inverted J-curve. The transition period can be divided into three sub-periods. In the first years of transition, between 1987 and 1994, the budget situation deteriorated dramatically following the introduction of the new tax system and the structural reforms. The overall budget deficit (including grants) reached 5.9% of GDP in 1994 (Diagram 2.5). The second sub-period stretches over the period 1995–1996. Both public expenditures and revenues decreased, but former dominated the latter. Therefore, there was minor improvement in the budget deficit, falling from 5.9% of GDP in 1994 to 5.2% in 1996. The third sub-period covers the period 1997–2011. There has been a gradual improvement in the budget situation. Similar patterns are also true for the budget deficit when grants are excluded.

Since the volume of foreign assistance accounts for the large share of capital expenditures in Lao PDR, it may be more useful to exclude capital expenditures when assessing the impact of fiscal reform on the budget deficit. The development of the budget deficit, capital expenditures excluded,

is illustrated in Diagram 2.5. To a large extent, it confirms the pattern that emerges when concentrating on the overall budget deficit. Following the introduction of the new tax system in the late 1980s, the budget balance deteriorated rapidly. Since 1994, the budget deficit has steadily improved. Over the period 1993–2011, domestic tax and non-tax revenue has covered all current expenditures.

The institutional changes in the early 1990s coupled with the tax reforms and expenditures control beginning in the late 1980s in Lao PDR may explain the limited effect of the fiscal reforms on public finance in first half of the 1990s. This result emphasizes the role of institutional changes needed for the successful fiscal reforms. The slower progress of administrative and institutional change in Lao PDR can be due largely to political system, the lack of trained officials in the remote areas, and the time required to develop such skills.

2.3 Lao macroeconomic performance

To review the Lao macroeconomic performance, I first discussed the macroeconomic development of Lao PDR by comparing with countries in the region. Second, I reviewed the financial sector development in Lao PDR. Finally, I explained the development of CS in Lao PDR.

2.3.1 Comparative macroeconomic performance in Lao PDR

I discussed the macroeconomic development of Lao PDR by comparing with two countries, namely Cambodia and Vietnam. These two countries represent two polar cases in respect of CS degree. While the CS degree is about 25% in Vietnam, it is about 90% in Cambodia.

Lao PDR's GDP growth is relatively slow but quite stable compared to Cambodia and Vietnam. Real GDP growth was averaged at 6.8% per annum over the period 1995-2010 for Lao PDR, which was lower than that for Cambodia (7.31%) and Vietnam (7.73%). However, the Lao economic growth was more stable than Cambodia and Vietnam. The standard deviation of Lao real GDP growth was 1.14, which was lower than that of Cambodia (3.21) and Vietnam (1.37) (Table 2.7).

Table 2.7: Growth rates of selected indicators of Lao PDR, Cambodia and Vietnam, 1995–2010

Growth rates of selected variables	Laos		Cambodia		Vietnam	
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Real GDP	6.80	1.14	7.73	3.21	7.31	1.37
Narrow money (M1)	35.76	26.34	28.12	42.74	24.22	13.51
Quasi-money	39.35	31.92	32.88	20.84	36.61	14.92
Government consumption	4.12	14.93	8.95	22.49	6.39	3.87
Inflation	23.82	34.99	5.54	6.67	6.40	5.62
Exports	7.72	13.18	17.52	18.01	15.37	8.76
Exchange rate	22.41	47.45	3.37	7.25	3.42	3.67
Foreign debt	7.03	11.90	5.86	4.94	3.74	16.43

Source: World Bank, World Development Indicators, 2012.

The monetary expansion in Lao PDR has exceeded that in Cambodia and Vietnam, with Vietnam experiencing a more stable monetary growth than Lao PDR and Cambodia. More precisely, while the narrow money growth in Lao PDR is far larger than that of Cambodia and Vietnam, it has a lower standard deviation than that in Cambodia. Moreover, the quasi money growth in Lao PDR is almost comparable with that of Cambodia and Vietnam, but it is widely unstable as indicated by its standard deviation. This suggests that the source of monetary instability in Lao PDR can be the quasi money. Similarly, with an annual average growth rate of 4.12% in government consumption, Lao PDR has shown a significantly greater fiscal discipline than Cambodia and Vietnam where government consumption has grown at a much faster pace.

In view of their different rates of monetary and fiscal expansion, prices varied substantially in three countries. With annual average rate of 23.82%, Lao economy has proved an extremely high degree of price instability compared to that of Cambodia (5.54%) and Vietnam (6.4%). This unfavorable outcome in containing inflation in Lao PDR may be attributed mainly to its expansionary monetary policy. As is often the case, an expansionary monetary policy in Lao PDR has been made necessary for financing the chronic budget deficit. Moreover, the growth rate of exports in Lao PDR is substantially lower than that of Cambodia and Vietnam, suggesting that there is still much progress to be made to improve export sector. Greater openness in trade and investment can stabilize prices by

generating high rate of growth, making fiscal deficits more sustainable, and enhancing productivity growth.

Table 2.7 also illustrates different patterns in terms of exchange rates and external debts. While both the values of Cambodian Riels and the Vietnamese Dong against the U.S. dollar have shown to be stable over the period, the Lao Kip has fluctuated widely with a downward trend since 2000. In fact, the gradual appreciation of Lao Kip against the U.S. dollar since 2005 has made its imports cheaper, but it has lowered the country's competitiveness, causing a large current account deficit. Steadily rising government financing requirement because of rising expenditure coupled with a deteriorating current account has implied a considerable resource gap in the case of Lao PDR. This has resulted in growing external debt. Therefore, it can be concluded that Lao PDR has suffered from serious macroeconomic instability over the period 1995–2010.[9] If a successful transmission of monetary policy requires macroeconomic stability, then the empirical evidence from Lao PDR should also show a negative relationship between monetary aggregates and real output in the short-run. Furthermore, if the financial markets in Lao PDR are underdeveloped, changes in money supply should have no impact on real output and hence the LRN proposition of money holds.

2.3.2 Financial sector development in Lao PDR

Effectiveness of macroeconomic policies may depend on the magnitude and pattern of financial sector development. Financial sector development generally involves three indicators. First, financial deepening, which entails growth of financial instruments, manifests itself in an increase in the volume of turnover and is typically measured by the ratio of monetary aggregates to GDP. Second, financial broadening, which implies an increase in the number of financial institutions and financial instruments. Finally, financial liberalization, which means deregulation of interest rates, free movement of foreign capital, and removal of other restrictive practices.

[9] The similar problem seems to exist in the Lao economy over the period 1980–1994.

Several aspects of financial sector development in Lao PDR, particularly relevant to this study, are provided in Table 2.8. As illustrated in Table 2.8, there has been a substantial growth in all monetary aggregates in Lao PDR over the period 1980–2011. In nominal terms, M1 has the highest growth rate, followed by M2, domestic credit and quasi-money. This pattern of monetary growth remains unchanged when expressed in real terms. The high rate of growth of M1, which consists of currency in circulation and demand deposits, is considered vital for economic growth. In contrast, the relatively slower rate of growth of quasi-money, which consists of savings and time deposits, may have been resulted from high rate of economic growth in Lao PDR. Similarly, the high domestic credit growth, which includes mainly loans, purchases of non-equity securities, and trade credits, may have been fostered by the growing business opportunities in Lao PDR. The growth pattern of M2 has followed closely the growth patterns of both M1 and quasi-money.

The financial sector development is measured by the ratio of money supply to GDP. As shown in Table 2.8, the ratio of M1 to GDP has increased from 1.51% in 1980 to 10.2% in 2011, representing almost a sevenfold increase. The GDP ratio of quasi-money has experienced a fourfold increase, while the GDP ratio of domestic credit has experienced a threefold increase over the same period. Because of the dominance of the ratio of quasi-money to GDP, the GDP ratio of M2 has increased slower than that of M1.

Financial liberalization can play a crucial role in financial sector development. Since money balances and real assets are complementary, McKinnon (1973) and Shaw (1973) have highlighted the significance of positive real interest rate and for achieving high rate of economic growth. Using annual data from 1990 to 2010, three real interest rates for 12-month deposits in Lao PDR have been calculated, namely kip accounts, baht accounts, and U.S. dollar accounts. This is a distinguishing feature of the Lao economy where accounts for two foreign currencies are allowed.

Table 2.8: Financial development indicators for Lao PDR, 1980–2011

Indicator	1980	1990	2000	2011	1980–2011
Nominal in millions of Kips:					(mean growth)[a]
Narrow money (M1)	157	25,088	344,351	6,473,800	54.64
Quasi-money	611	19,251	1,911,252	16,615,400	44.16
Broad money (M2)	768	44,339	2,255,603	23,089,200	46.74
Domestic credit	899	30,620	1,230,170	16,125,200	45.88
Real in millions of Kips[b]					
Narrow money (M1)	770	3,425	4,216	34,761	21.01
Quasi-money	2,995	2,628	23,400	89,217	15.24
Broad money (M2)	3,765	6,052	27,615	123,978	16.15
Domestic credit	4,407	4,180	15,061	86,585	18.94
Money/GDP ratio					mean: 1980–2011
M1/GDP	1.51	3.90	2.67	10.20	4.11
Quasi-money/GDP	5.88	2.99	14.80	26.19	10.61
M2/GDP	7.39	6.89	17.46	36.39	14.73
Domestic credit/GDP	8.65	4.76	9.52	25.42	9.72
Real 12-month deposit rates[c]					mean: 1993–2010
Kip accounts		11.23[d]	− 23.09	3.26[e]	− 8.03
Baht accounts		4.88[d]	2.31	− 0.14[e]	0.76
U.S. dollar accounts		2.32[d]	0.52	1.51[e]	0.89

Notes: [a] Annual average growth rate. [b] Real money supply diagrams have been calculated by deflating nominal aggregates by GDP deflator, 2002: 100. [c] Real interest rate diagram s have been calculated by subtracting current inflation from nominal rates. Consumer price index is used to calculate inflation rate. [d] Diagrams are diagram s for 1993. [e] Diagrams are diagrams for 2010.

Sources: IMF's International Financial Statistics; World Bank's Country Economic Memorandum (various issues); Bank of the Lao PDR's Annual Report of Interest Rate (various issues); and World Bank's World Development Indicators, 2012.

As shown in Table 2.8, Lao PDR has experienced a negative interest rate as indicated by the negative mean of interest rate for kip account. But the negative mean of the kip account's real interest rate does not reflect its actual development as the hyperinflation between 1998 and 1999 resulted in a substantially negative real interest rate. Once taking the average over the period 1990-2011, the real interest rate for kip deposit is negative. By closely examining the data, in real terms the deposit rate denominated in kip has been positive since 2001, while the deposit rates for the Thai baht and U.S. dollar do not show the exact pattern but mostly positive. By these measures, it is evident that Lao PDR has experienced a significant interest rate deregulation and hence financial liberalization. This forms the basis for

assuming that the positive real interest rate has contributed to a high rate of economic growth in Lao PDR. That is, positive real interest rate has boosted domestic saving which increases the availability of investable funds.

However, the domestic saving in Lao PDR, measured by the GDP ratio of quasi-money, is relatively low, which is about 10.61% (Table 2.8). Therefore, either raising deposit rate or bringing down inflation rate or some combination of the two can improve the growth rate of the Lao economy.

2.3.2.1 Stock market development in Lao PDR

The Lao stock market, officially called Lao Securities Exchange (LSX), is not large enough to be a significant source of funds to finance firm-level activities. Firms borrow funds and/or sell equities in the stock market to finance their investment activities, which in turn promotes growth. Some of the empirical papers implying a positive link between growth performance and stock market development are (Beck and Levine 2004; Levine and Zervos 1996). The level of stock market development is measured by four indicators, namely total listed domestic companies, stock market capitalization, total value of stocks traded, and turnover ratio of stocks traded. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Market capitalization (also known as market value) is the share price times the number of shares outstanding. Stocks traded refer to the total value of shares traded during the period. Turnover ratio is the total value of shares traded during the period divided by the average market capitalization for the period. According to these indicators, the level of LSX development is low in comparison with other ASEAN countries (Table 2.9).

In 2012, there were only two companies listed on the LSX, including Banque Pour Le Commerce Exterieur Lao Public (BCEL) and EDL Generation Public Company (EDL-Gen). The number of listed domestic companies in Lao PDR is far lower than other ASEAN countries, ranging from 268 companies in the Philippines to 502 companies in Thailand and to 921 companies in Malaysia. The ratio of market capitalization to GDP of LSX is 11%, which is comparatively low in ASEAN. The ratio of market capitalization to GDP is 21% in Vietnam, 105% in Thailand, and 156% in Malaysia. The total value of stock traded, which measures the market depth in terms of its liquidity or

the easiness to buy and sell shares, is only 0.17% in Lao PDR, while it is 2% in Vietnam, 41% in Malaysia, and 63% in Thailand. The turnover ratio of stocks traded is only 1.5% in Lao PDR, whereas it is 13% in Vietnam, 43% in Singapore, and 70% in Thailand.

Table 2.9 Indicators of stock market development in Lao PDR and other ASEAN countries, 2012

Country	Listed domestic companies, total	Market capitalization (% of GDP)	Stocks traded, total value (% of GDP)	Stocks traded, turnover ratio (%)
Lao PDR	2	11.19	0.17	1.52
Vietnam	311	21.14	2.17	13.18
Indonesia	459	45.26	10.46	23.30
Thailand	502	104.65	62.70	70.44
Philippines	268	105.58	13.87	16.15
Singapore	472	144.34	54.53	43.31
Malaysia	921	156.16	40.81	28.57

Source: Lao data were collected from the annual report of Lao Securities Exchange. Data for other ASEAN countries were obtained from the World Bank's World Development Indicators.

There are two main reasons for the low level of stock market development in Lao PDR. First, the LSX has been recently established on 10th October 2010. In 2012, it has only two brokers, namely Lanexang Securities Public Company and BCEL -KT Securities Company Limited. Second, there are few large enterprises that are qualified for participating in the LSX. According to enterprise survey in GIZ (2014), there are only 27 large enterprises[10], accounting for 4% of total surveyed enterprises.

2.3.3 Currency substitution in Lao PDR

In Lao PDR, people widely use two main foreign currencies, namely Thai baht and the US dollar, as a means of payment, a unit of account, and a store of value. Although both baht and dollar are not legal tender, in reality, residents can use both of them in economic transactions. In urban areas, for example, price of goods and services are often quoted either in the US dollar

[10] Large enterprises are enterprises that employ at 100 staff.

or Thai baht, and transactions are also carried out in both currencies, since consumers do not want to pay in kip, especially for high-value items.

Table 2.10: Private savings deposits at banks denominated by currency in 2003–2004

(In percent)

Currency	State banks		Foreign banks in Laos		Foreign banks outside Laos		Total	
	Local cities	Capital	Local cities	Capital	Local cities	Capital	Local cities	Capital
US dollar	60.31	65.63	44.16	34.65	0.00	96.27	59.16	83.02
Baht	30.52	20.54	13.06	59.05	0.00	3.69	29.28	14.45
Kip	9.17	13.83	42.77	6.30	0.00	0.04	11.56	2.52
Total	100.00	100.00	100.00	100.00	0.00	100.00	100.00	100.00

Source: Toyoda and Kyophilavong (2005, p.162).

Table 2.10 shows the deposits at banks denominated in three currencies, including, kip, dollar, and baht, for urban and rural Lao PDR. Deposits denominated in foreign currencies (the US dollar and Thai baht) accounted for almost 90% in local cities and almost all deposits in the capital city. Deposits at the state banks were mostly denominated in the US dollar accounting for 60% in local cities and 66% in the capital city, whereas deposits at the foreign banks in Lao PDR were denominated in the US dollar about 44% in local cities and about 35% in the capital city. About 96% of the deposits at foreign banks outside Lao PDR were denominated in the US dollar. Among the three banking institutions, deposits in Thai baht were larger than those in Lao kip but smaller than those in the US dollar, with the exception of deposits in Thai baht (59%) of urban people at foreign banks in Lao PDR, which were larger than those in the US dollar (35%). Deposits in Lao kip were lower than those in the US dollar and Thai baht, with the exception of deposits in Lao kip (43%) of rural people at foreign banks in Lao PDR, which were almost proportional to those in the US dollar (44%) and much higher than those in Thai baht (13%). All in all, Lao PDR's private savings deposits at banks were mostly denominated by the US dollar, followed by Thai baht and Lao kip.

Table 2.11: Currency substitution, exchange rate and interest rate in Lao PDR

Year	Currency substitution[a]	Exchange rate[b]		Interest rate[c]
		level	% change	
1993	0.35	728.04	−0.78	12.23
1994	0.35	726.31	−0.24	9.68
1995	0.37	849.89	17.01	10.95
1996	0.42	951.64	11.97	12.93
1997	0.47	1,350.15	41.88	13.00
1998	0.65	3,547.80	162.77	14.52
1999	0.78	7,769.39	118.99	15.91
2000	0.78	8,021.60	3.25	16.11
2001	0.75	9,004.42	12.25	13.86
2002	0.74	10,166.08	12.90	13.86
2003	0.67	10,649.84	4.76	13.76
2004	0.63	10,675.13	0.24	12.25
2005	0.60	10,690.06	0.14	10.45
2006	0.59	10,168.69	−4.88	8.78
2007	0.57	9,613.07	−5.46	8.12
2008	0.54	8,762.67	−8.85	7.76
2009	0.48	8,522.86	−2.74	6.54
2010	0.46	8,265.38	−3.02	5.97
2011	0.46	8,036.53	−2.77	5.28
2012[d]	0.46	8,007.61	−0.36	4.96

Notes: [a] Currency substitution = foreign currency deposits in commercial banks over money supply (M2). [b] Number of units of local currency (kip) per one US dollar. [c] Interest rate differential = interest rate on kip − interest rate on the US dollar. [d] Average of the first half of 2012.

Source: Quarterly Lao Financial Statistics published by Bank of Lao PDR.

In the Lao economy, there are two main causes of CS, which include high inflation (Zamarocksy and Sa, 2003) and exchange rate depreciation (Ra, 2008). CS reached its peak of 78% in 1999 which was the highest inflation period in Lao PDR (Table 2.11). However, Lao PDR has managed to achieve a significant reduction in CS over the past 12 years, when the share of FCD in M2 fell from 78% in 2000 to 46% in 2012. While this downward trend has slowed recently, with the interruption associated with the global financial crisis, the CS level remains well below that prevailing as of 2000. This tendency to reduce the CS degree represents an increasing preference for holding the national currency, which may be linked to the

improved confidence that comes with the elimination of high inflation and the implementation of sounder economic and financial policies.

In particular, following the more liberalized interest rate and more flexible exchange rate management in 1998 and the implementation of tight monetary and fiscal policies, CS started to reverse in 2001 and continued to decline. This reversal of CS was influenced by a large interest rate differential between Lao kip and US dollar denominated deposits, which reached more than 16% in 2000. Reverse CS continued even after the narrowing of the interest differential during the period 2003–2012. This period observed significant fiscal adjustment, stability of the exchange rate, large capital inflows, and improvement in investor sentiment.

In summary, the CS degree in Lao PDR has gradually decreased, but it is still much higher than the average degree of CS in other economies with CS (Honohan, 2007, p. 4). The persistence of CS degree in Lao PDR has important implications for the conduct of macroeconomic policies which are discussed in the following chapters.

Chapter 3 Currency Substitution, Neutrality of Money, and Effectiveness of Macroeconomic Policies

In this chapter, I review the theoretical literature that focuses on macroeconomic adjustments in economies with CS under three main macroeconomic theories: determinants of CS, long-run neutrality proposition, and effectiveness of macroeconomic policies in the presence of CS. This chapter also discusses some empirical literature related to each theory. The chapter consists of three sections. In the first section, the money demand function for analyzing CS determinants is discussed. Empirical studies on CS in Asia, Latin America, and Africa are also reviewed in the first section. The second section consists of a theoretical framework for testing LRN proposition based on Lucas-Sargent critique, and discusses empirical studies of testing LRN proposition using data from developed and developing countries. The third section presents a theoretical framework for assessing the effectiveness of macroeconomic policies, and discusses the effectiveness of macroeconomic policies under different exchange rate arrangements in terms of output and price.

3.1 Macroeconomic determinants of currency substitution

3.1.1 Theoretical framework of money demand function

The growth in CS in a number of countries has been associated with increasing awareness of the resulting implications for economic and financial policy management. The analyses of CS determinants have been undertaken in a number of theoretical frameworks, including those based on the marginal utility theory of money demand (Bordo and Choudhri, 1982; and Rojas-Suarez, 1992), on the portfolio balance approach (Brillembourg and Shadier, 1979), on the theory of the precautionary demand for cash balances (Poloz, 1986), and on the money services production function approach (Miles, 1978).

These analyses suggest that the main determinants of CS are actual or expected reductions in the value of domestic money holdings occasioned by increased domestic inflationary pressures, expectations of exchange rate depreciations, and lower interest rates on local currency holdings. By

altering the relative yield to holdings of foreign currency denominated money balances, and therefore their attractiveness as a store of value, these factors induce a change in the pace of CS. This process may be further affected by uncertainties regarding socio-political developments, as well as those relating to agents' expenditure patterns.

Following Rojas-Suarez (1992), we introduce the model for CS which assumes that there are two kinds of goods in an economy: tradable (with price P) and non-tradable goods (with foreign price P*). Let ε denote the nominal exchange rate. Assume the price of foreign goods is equal to one, so that the real exchange rate can be written as ε/P. Assume also that money is the only form of wealth. Domestic residents may allocate their portfolio holdings between domestic money and foreign money. Foreign money is assumed to be an imperfect substitute for domestic money.

The representative agent is assumed to maximize the following value function:

$$V(M_t, F_t, P_t, \varepsilon_t) = MaxE_t\left\{U_t(C_t^H, C_t^T) + \beta V(M_{t+1}, F_{t+1}, P_{t+1}, \varepsilon_{t+1})\right\} \qquad (3.1)$$

where:

C_t^H consumption of non-tradable goods.

C_t^T consumption of tradable goods.

M_t stock of domestic currency at the beginning of period *t*. That is, $M_t = M_{t-1} + \tau_t$, where τ_t is a transfer of domestic currency given by the government at the beginning of period *t*.

F_t stock of foreign currency.

β discount rate.

E_t expectation operator.

On the right-hand side of equation (3.1), there are two terms: $U_t(C_t^H, C_t^T)$ and $\beta V(M_{t+1}, F_{t+1}, P_{t+1}, \varepsilon_{t+1})$. $U_t(C_t^H, C_t^T)$ represents the utility from consuming non-tradable goods (C_t^H) and tradable goods (C_t^T) in year *t*. $\beta V(M_{t+1}, F_{t+1}, P_{t+1}, \varepsilon_{t+1})$ represents the discounted value function of portfolio allocation for domestic and foreign monies in year *t*+1. Taken the two terms together, equation (3.1) states that the representative agent considers not only the utility from consuming goods this year, but also future plan for

holding domestic and foreign currencies next year, when it allocates a portfolio between holdings of domestic currency and foreign currency this year.

The representative agent starts every period with a predetermined stock of domestic and foreign currencies. At the beginning of every period, it receives a transfer from the government in the form of domestic currency (τ_t). During the period, the agent engages in the production of tradable and nontradable goods and has to decide on its consumption plan of both commodities and on its demand for domestic and foreign currencies. Thus, the representative agent faces the following budget constraint:

$$Y_t + \frac{M_t}{P_{t-1}}\left(\frac{1}{1+\pi_t}\right) + \frac{\varepsilon_{t-1}F_t}{P_{t-1}}\left(\frac{1+x_t}{1+\pi_t}\right) = C_t^H + \frac{\varepsilon_t}{P_t}C_t^T + \frac{M_t}{P_t} + \frac{\varepsilon_t F_t}{P_t} \qquad (3.2)$$

where:

π_t inflation rate of the non-tradable goods.

x_t rate of change of the exchange rate.

Y_t total real income derived from the production of non-tradable goods (Y_t^H) and tradable goods (Y_t^T). Mathematically, Y_t is defined as: $Y_t = Y_t^H + \left(\frac{\varepsilon_t}{P_t}\right)Y_t^T$.

Equation (3.2) states that total wealth must equal total expenditure. Total wealth consists of three sources which are represented by the left-hand side of equation (3.2). The first source is income from production of tradable and non-tradable goods (Y_t). The second source of wealth is the real stock of domestic currency held by the agent last year $\left(\frac{M_t}{P_{t-1}}\left(\frac{1}{1+\pi_t}\right)\right)$. The third source of wealth is the real stock of foreign currency held by the agent last year $\left(\frac{\varepsilon_{t-1}F_t}{P_{t-1}}\left(\frac{1+x_t}{1+\pi_t}\right)\right)$. Total expenditure contains three main components. The component of expenditure is consumption of nontradable and tradable goods (C_t^H and C_t^T, respectively). The second component is the demand for real

stock of domestic currency this year ($\frac{M_t}{P_t}$). The third component is the demand for real stock of foreign currency this year ($\frac{\varepsilon_t F_t}{P_t}$).

In addition, the representative agent faces a liquidity in-advance constraint of the form:

$$C_t^H + \frac{\varepsilon_t}{P_t} C_t^T \leq l\left(\frac{M_t}{P_t}, \frac{\varepsilon_t F_t}{P_t}\right) \tag{3.3}$$

Equation (3.3) states that the consumption value of non-tradable and tradable goods must not exceed the total stock of domestic and foreign currencies. Equation (3.3) follows Calvo and Vegh (1992), where $l(.)$ is liquidity services production function and assumed to be a linear homogenous function where the marginal productivities of real domestic and foreign currencies (l_1 and l_2) are positive and diminishing. We also assume that $\frac{\partial l_1}{\partial\left(\frac{\varepsilon F}{P}\right)} < 0$ to ensure that domestic and foreign currencies are imperfect substitutes.

Maximizing equation (3.1) subject to equations (3.2) and (3.3), where λ_t denotes the Lagrange multiplier for budget constraint and γ_t denotes the Kuhn-Tucker multiplier for the liquidity-in-advance constraint, first-order conditions yield the following equations:

$$U_H(.) = \lambda_t + \gamma_t \tag{3.4}$$

$$U_T(.) = \frac{\varepsilon_t}{P_t}\lambda_t + \gamma_t \tag{3.5}$$

$$\beta E_t\left\{\frac{1}{P_t + 1}\left[\lambda_{t+1} + \gamma_{t+1} l_1\left(\frac{M_{t+1}}{P_{t+1}}, \frac{\varepsilon_{t+1} F_{t+1}}{P_{t+1}}\right)\right]\right\} = \lambda_t\left(\frac{1}{P_t}\right) \tag{3.6}$$

$$\beta E_t\left\{\frac{\varepsilon_{t+1}}{P_t + 1}\left[\lambda_{t+1} + \gamma_{t+1} l_2\left(\frac{M_{t+1}}{P_{t+1}}, \frac{\varepsilon_{t+1} F_{t+1}}{P_{t+1}}\right)\right]\right\} = \lambda_t\left(\frac{\varepsilon_t}{P_t}\right) \tag{3.7}$$

where (.) is the argument of the value function evaluated at year *t*.

The ratio of equations (3.4) and (3.5) yields the marginal rate of substitution between tradable and non-tradable goods and equals the real exchange rate. Equations (3.6) and (3.7) show that the marginal value of holding an additional unit of currency into period t + 1 is equal to its marginal cost, which is $\frac{\lambda_t}{P_t}$ for domestic currency and $\frac{\lambda_t \varepsilon_t}{P_t}$ for foreign currency. The ratio of equations (3.6) and (3.7) in the steady state, where $x_t = \pi_t$, can be expressed as follows:

$$\frac{l_1\left(\frac{M}{P}, \frac{\varepsilon F}{P}\right)}{l_2\left(\frac{M}{P}, \frac{\varepsilon F}{P}\right)} = 1 + \frac{x}{1-\beta} \tag{3.8}$$

Since the function $l(.)$ is homogenous of degree one, equation (3.8) implies that

$$\frac{\left(\frac{M}{P}\right)}{\left(\frac{\varepsilon F}{P}\right)} = g(x) \tag{3.9}$$

Equation (3.9) shows that, in the steady state, the rate of change of the exchange rate is negatively related to the ratio of holdings of domestic to foreign currency (expressed in terms of domestic currency). In chapter 4, we deal with extensions, measurements, and implications of this result for the Lao economy.

3.1.2 Empirical determinants of currency substitution

Existing literature consider the CS in the framework of demand for money. Within this framework, there are a number of simplifying assumptions. In particular, it is assumed that the scale variables in the two underlying money demand functions are similar and therefore play no role in determining the demand for local balances relative to that for foreign balances. In addition, it is assumed that both the transaction costs involved

in maintaining and switching between local and foreign balances and the overall level of monetization remain broadly unchanged throughout the estimation period. Using the framework of money demand, there are several studies that have examined the determinants of CS in a number of dollarized economies, including Latin American countries (Prock et al., 2003), Egypt and South African countries (Elkhafif, 2003), Peru (Rojas-Suarez, 1992), Kyrkyz Republic (Mogardini and Mueller, 1999), Thailand (Bahmani-Oskooee and Techaratanachai, 2001), Turkey (Us, 2003), and Cambodia (Samreth, 2011).

Rojas-Suarez (1992) analysed the process of CS and its implications for the conduct of monetary policy in Peru from January 1978 to December 1990. Applying an error-correction model, the author showed that there is a long-run relationship between the expected rate of depreciation in the parallel exchange rate and the ratio of domestic money to foreign money. This implies that the hypothesis of CS can explain the behavior of real holdings of money. Applying VAR model the author also tested for the impact of CS on inflation. The results demonstrated that the importance of CS as a transmission mechanism through which fiscal and monetary policies affected the dynamics of inflation was relatively small during a period of high but relatively stable inflation, while it because an important factor in the inflation process during a period of hyperinflation.

Prock et al. (2003) investigated the extent of currency substitution in Argentina, Brazil, and Mexico using monthly data from October 1986 to June 2001. In their analysis, a dependent variable is real money supply (M1) which is money supply deflated by CPI. A set of independent variables include interest rate on alternative assets of each countries as measured by the money market rate less the expected inflation rate, nominal effective exchange rate of each country as defined by the number of units of foreign currency per unit of the home currency, the productivity as measured by monthly percent change in manufacturing output and deflated by the CPI to proxy real income.

Applying a vector error correction (VEC) model for each country, they found that Argentina has the highest magnitude of exchange rate coefficients at all lags among the sample, whereas Mexico appears to have the lowest. The lags of money supply appear to be significant only for

Argentina and Brazil for which the magnitudes of the M1 lags are highest in absolute value. Moreover, the results from the impulse response functions showed that the impact of the exchange rate on M1 for Argentina is greater than Brazil and Mexico, the latter being the least impacted. Furthermore, the M1 response to exchange rate for Argentina is quicker and last longer than that for Brazil and Mexico. The productivity stock to M1 is similar for both to Argentina and Brazil exhibiting positive and significant responses. Therefore, the authors conclude that CS occurs more in Argentina and Brazil than Mexico.

In light of the empirical results, they concluded that the greater the degree of currency substitution, the more sensitive is a country's monetary aggregates to sudden movements in exchange rates, productivity and interest rates. It indicate that the country that wish to adopt another country's currency as a domestic currency needs to implement structural reforms to bring their economy in line with the anchor currency country. Such reforms would then lead to endogenous adjustments of key economic indicators such as: inflation rate, exchange rate, and interest rates to the level that are more consistent with dollarization as well as high sustainable growth.

Bahmani-Oshooee and Techaratanachai (2001) determined the relationship between currency depreciation and domestic money holding in Thailand using quarterly data from 1977 to 1990. In their analysis a dependent variable is the real money stock (M2). A set of independent variables include real income, interest rate on alternative assets which is proxied by money market rate, and the nominal effective exchange rate defined as units of foreign currency per unit of the Thai baht. Applying cointegration analysis, they found that income and interest rate elasticities are positive and negative respectively. But the nominal effective exchange rate carries a positive coefficient indicating that as the Thai baht depreciates, public holding of M2 declines. It supported their argument that devaluation in Thailand may result in CS away from domestic money. It in turn could result in a slowdown in economic activity, thus, a recession. In light of the empirical results, the authors argued that macro policies in Thailand must aim at not only stabilizing the economy, but also at stabilizing the exchange rate value of the Thai baht.

Mongardini and Mueller (1999) analysed the determinants that driven the CS process in the Kyrgyz Republic using monthly data from May 1993 to October 1998. In the analysis, a dependent variable is the degree of CS which is defined in two different ways. The first measure is defined as the ratio of foreign currency deposits to total deposits in the Kyrgyz banking system. The second measure is defined by the ratio of foreign currency deposits and cash to broad money. A set of independent variables include interest rate differential between the average monthly yield on three-month Kyrgyz GKO (treasury bills) and the average monthly yield on three-month U.S treasury bills, nominal depreciation of the exchange rate, and the ratchet effect defined as the maximum level of the CS ratio.

Applying the error-correction model, they found that the depreciation of the som has been a significant factor in increasing the CS ratio, particularly among deposits. Secondly, interest rate differentials have also been shown to be a significant determinant in the portfolio allocation of the private sector in the Kyrgyz Republic. Moreover, while there may be a ratchet effect in the currency allocation of deposits, this effect is not detectable in the economy at large. This implied that the economy as a whole has not yet reached a degree of CS that would make the process asymmetric and difficult to reverse, suggesting that policy measures may still have a strong impact on the portfolio decisions of the private sector. As a result, they concluded that particularly strong policies would need to be pursued over an extended period of time so as to convince deposit holders to switch back to som-denominated assets.

Elkhafif (2003) investigated the dynamic of CS in Egypt and South Africa using monthly data from July 1991 to July 2001. In their analysis, a dependent variable is CS defined as the share of nominal foreign currency in money supply (M2). A set of independent variable include exchange rate, and interest rate differential. Applying the error-correction model, they found that the elasticity of CS, with respect to exchange rate, is larger in South Africa than in Egypt, and the speed of adjustment from the short-term to long-term equilibrium is much faster in south Africa than in Egypt. In Egypt, changes in the exchange rate have significant impact on CS. The coefficient of the exchange rate suggests a short-term elasticity of 0.14, meaning that a 10% depreciation in Egyptian pound will lead to a 1.4%

increase in CS. The dynamic of the model implies a very slow adjustment process. The sum of the coefficients of the lagged dependent variable means that only 2% of the discrepancy between desired and actual holdings of foreign currencies is eliminated within one month, and the long-term desired holding of foreign currencies in response to a change in exchange rate will approaches its level in about 4 years.

Furthermore, Elkhafif (2003) showed that CS in South Africa is more responsive to changes in exchange rates than that in Egypt. The coefficient of exchange rate suggests a short-term elasticity of CD with respect to the exchange rate of 0.32. This means that a 10% depreciation in the South Africa rand will result in a 3.2% increase in CS. This elasticity is 2.3 times that of Egypt. The adjustment process is also 5 times faster than that of Egypt. The sum of the coefficient of the lagged dependent variable suggests that the discrepancy between the desired and actual holding of foreign currencies is reduced by 9.7% within one month, or the long-run equilibrium approaches its level in about 10 months.

Using the Granger causality tests, Elkhafif (2003) found that, in both Egypt and South Africa, changes in exchange rate lead to changes in CS. However, the causality between the exchange rate and interest rate differential breaks under the exchange rate anchoring policy (Egypt). Consequently, the author suggested that in a high CS environment, exchange rate anchoring policy can be effective in reversing the CS. The cost of this policy could take the form of a reduction in the reveres of the central bank and additional burden to public expenditure. As for inflation targeting policy, the evidence suggests that it can be effective in achieving its target in a low CS environment. The cost in this case could take the form of a high domestic interest rate and/or increase in CS. With a substantial increase in CS, the central bank may find itself forced to abandon inflation targeting and probably switch to exchange rate anchoring policy. However, under either policy, if the depreciation pressure on the domestic currency sources from chronic current account difficulties, either policy will be costly and ineffective. The long-term solution is to improve the productivity and competitiveness of the economy, which will ultimately reduce the pressure on the domestic currency from depreciation and bring the required stability to the economy.

Us (2003) analysed the persistence of CS at different level in Turkey through inclusion of a ratchet variable using monthly data for two subsample periods: 1990-1993 and 1995-1999. Applying an autoregressive distributed lag (ARDL) approach, the author found that, in the first period, for both levels of CS, the inclusion of the ratchet variable into the model produces insignificant coefficients. This suggests that in the first period, CS is not persistent enough to be irreversible. However, in the second period, even though CS in the narrow sense is persistent, CS in the broad sense is not irreversible. The empirical evidence showed that although there may be a ratchet effect in the narrow sense CS, this effect is not detectable in the overall economy. That is, the portfolio allocation preferences of domestic residents are not persistent. The monetary authorities can therefore conduct effective policies to induce reversal in the narrow sense of CS.

Ra (2008) examined whether the holding of US dollars depend on the effect of the expected rate of depreciation in market exchange rates using monthly data from the three South East Asian countries, Cambodia, Lao, and Vietnam, covering the period of December 1994 to June 2007, December 1993 to June 2007, and December 1992 to January 2007 (for Vietnam, data of January 1994 to December 1994 and July 1999 to November 2000 are omitted because the data are not available), respectively. Ra (2008) formulated the CS model using the ratio of foreign currency deposits to domestic money as a dependent variable. There are two definition of domestic money used in the estimation, namely M1 and M2. M1 is composed of domestic currency held outside banks and demand deposits. M2 consists of M1 plus quasi-money, which includes time and saving deposits plus foreign currency deposits (in terms of domestic currency). The independent variables include the expected rate of change of the exchange rate which is proxied by the actual change of the exchange rate.

Applying the Rojas-Suarez (1992) method, Ra (2008) found that firstly, the expected rate of depreciation of the exchange rate significantly impacts on the desired ratio of foreign to domestic currency in Cambodia and Lao PDR. For Cambodia, the coefficient of the expected rate of depreciation is statistically significant at the 1% significant level for all cases; for Lao PDR, the coefficient is statistically significant at the 1% or 5% significance level. Secondly, Cambodia seems to have stronger tendency

toward CS compared to Lao PDR and Vietnam. Foreign currency holdings in Cambodia have never been prohibited during the period under study whereas in Vietnam, the government has banned the use of foreign currencies. Third, the coefficient of the expected rate of depreciation in the past have also positive value and are statistically significant, implying that the desired composition of portfolio balance by economic agents is also significantly influenced by the exchange rate movement in the previous month for Cambodia and to Lao PDR. In other words, the dynamic adjustment process by domestic residents under the presence of CS in response to the previous month's exchange rate changes seem to be affected by the past exchange rate movement.

Ra (2008) suggested that, there are positive effects of the expected rate of depreciation in market exchange rates on holdings of US dollars. The results suggest strong evidence of CS in Cambodia, explaining the short-run behavior of domestic residents in substituting Cambodia riel in favor of US dollars. This suggests that changes in the expected rates of depreciation of riels have a significant impact on the composition of the US dollar holdings by an economic agent.

In chapter 4, I examined the extent to which the variables included in previous studies explain the variation in the CS for Lao PDR and analysed whether these variables have a different impact on the CS in Laos.

3.2 Long-run monetary neutrality proposition in Lao PDR

3.2.1 Theoretical framework of long-run monetary neutrality

Key classical macroeconomic hypotheses specify that permanent changes in nominal variables have no effect on real economic variables in the long-run. The simplest "long-run neutrality" proposition specifies that a permanent change in the money stock has no long-run consequences for the level of real output. Other classical hypotheses specify that a permanent change in the rate of inflation has no long-run effect on unemployment (a vertical long-run Phillips curve) or real interest rates (the long-run Fisher relation). In this dissertation, I focus on the long-run neutrality proposition.

Testing LRN proposition is still a controversial issue. For example, Lucas (1972) and Sargent (1971) provided examples in which it is

impossible to test long-run neutrality using reduced-form econometric methods. Their examples feature rational expectations together with short-run non-neutrality and exogenous variables that follow stationary processes so that the data generated by these models do not contain the sustained changes necessary to directly test long-run neutrality. In the context of these models, Lucas and Sargent argued that it was necessary to construct fully articulated behavioural models to test the neutrality propositions.

The specific critique offered by Lucas and Sargent depends critically on stationarity of variables used for testing the long-run neutrality proposition. In models in which nominal variables follow integrated variables processes, long-run neutrality can be defined and tested without complete knowledge of the behavioural model. But, even when variables are integrated, long-run neutrality cannot be tested using a reduced-form model. Instead, what is required is the model's "final form," showing the dynamic response of the variables to underlying structural disturbances.[11]

According to King and Watson (1997), the Lucas-Sargent critique can be formulated as follows. Consider a model consisting of an aggregate supply schedule (3.10a); a monetary equilibrium condition (3.10b); and a money supply rule (3.10c):

$$y_t = \theta(p_t - E_{t-1}p_t) \tag{3.10a}$$

$$p_t = m_t - \delta y_t \tag{3.10b}$$

$$m_t = \rho m_{t-1} + \varepsilon_t^m \tag{3.10c}$$

where

[11] Throughout this dissertation, by "structural model" we mean a simultaneous equations model in which each endogenous variable is expressed as a function of the other endogenous variables, exogenous variables, lags of the variables, and disturbances that have structural interpretation. By "reduced-form model" we mean a set of regression equations in which each endogenous variable is expressed as a function of lagged dependent variables and exogenous variables. By "final-form model" we mean a set of equations in which the endogenous variables are expressed as a function of current and lagged values of shocks and exogenous variables in the model.

y_t logarithm of output.

p_t logarithm of the price level.

$E_{t-1}p_t$ expectation of p_t formed at $t-1$.

m_t logarithm of the money stock.

ε_t^m mean-zero serially independent shock to money.

To solve for output from the system (1), we first substitute equation (3.10b) into equation (3.10a):

$$y_t = \theta[(m_t - \delta y_t) - E_{t-1}(m_t - \delta y_t)]$$
$$y_t = \theta(m_t - \delta y_t - E_{t-1}m_t + \delta E_{t-1}y_t)$$

Since $E_{t-1}y_t = E_{t-1}[\theta(p_t - E_{t-1}p_t)] = \theta(E_{t-1}p_t - E_{t-1}p_t) = 0$, we have

$$y_t = \pi(m_t - E_{t-1}m_t) \tag{3.11}$$

where $\pi = \theta/(1+\delta\theta)$

Substitute equation (3.10c) into equation (3.11), we have

$$\begin{aligned} y_t &= \pi(m_t - \rho m_{t-1}) \\ &= \pi(1-\rho L)m_t \\ &= \alpha(L)m_t \end{aligned} \tag{3.12}$$

where $\alpha(L) = \pi(1-\rho L) = \alpha_0 + \alpha_1 L$.

As in Lucas (1973), the model is constructed so that only surprises in the money stock are not neutral and these have temporary real effects. Permanent changes in money have no long-run effect on output. However, the reduced form equation $y_t = \alpha(L)m_t$ suggests that a one-unit permanent increase in money will increase output by $\alpha_0 + \alpha_1 = \alpha(1) = \pi(1-\rho)$. Moreover, as noted by McCallum (1984), the reduced form also implies that there is a long-run correlation between money and output, as measured by the spectral density matrix of the variables at frequency zero.

On this basis, Lucas (1972), Sargent (1971), and McCallum (1984) argue that a valid test of long-run neutrality can only be conducted by determining the structure of monetary policy (ρ) and its interaction with the short-run response to monetary shocks (π), which depends on the behavioural relations in the model ($\delta$and θ). While this is easy enough to

determine in this simple setting, it is much more difficult in richer dynamic models or in models with a more sophisticated specification of monetary policy.

However, if $\rho = 1$, there is a straightforward test of the long-run neutrality proposition in this simple model. Adding and subtracting ρm_t from the right-hand side of equation (3.12) yields

$$y_t = \pi\rho\Delta m_t + (1-\rho)m_t \qquad (3.12')$$

so that with $\rho = 1$, there is a zero effect of the level of money under the neutrality restriction. As a result, one can simply examine whether the coefficient on the level of money is zero when m_t is included in a bivariate regression that also involves Δm_t as a regressor.

With permanent variations in the money stock, the reduced form of this simple model has two key properties: (i) the coefficient on m_t corresponds to the experiment of permanently changing the level of the money stock; and (ii) the coefficient on Δm_t captures the short-run nonneutrality of monetary shocks. Equivalently, with $\rho = 1$, the neutrality hypothesis implies that in the specification $y_t = \sum \alpha_j m_{t-j}$, the neutrality restriction is $\alpha(1) = 0$, where $\alpha(1) = \sum \alpha_j$ is the sum of the distributed lag coefficients.

In chapter 4, I develop an empirical model for testing the long-run neutrality proposition based on the Lucas-Sargent critique represented in equation (3.12').

3.2.2 Empirical analyses of long-run neutrality proposition

A major strand of the literature, initiated by the work of Fisher and Seater (1993) and King and Watson (1997), has utilized progress in time-series theory on nonstationary regressors to generate and test hypotheses concerning long-run neutrality and long-run superneutrality. The original studies by Fisher and Seater (1993) and King and Watson (1997) on U.S. data, have been supplemented by a number of studies using data on developed countries, including Boschen and Otrok (1994), Haug and Lucas (1997), Olekalns (1996), Coe and Nason (1999), and Serletis and Koustas (1998).

Fisher and Seater (1993) applied a system of two equations which involve a money measure as one of the variables. They analysed previous studies on testing long-run neutrality propositions which did not take explicit account of the time-series properties of the data. Fisher and Seater (1993) argued that the empirical evidence on long-run neutrality of money in Andersen and Karnovsky (1972), Kormendi and Meguire (1984), Lucas (1980), and Geweke (1986) are mostly consistent with long-run neutrality and not very informative about long-run superneutrality. Fisher and Seater (1993) also empirically investigated the long-run neutrality using the Friedman and Schwartz (1982) data on money, prices, nominal income, and real income from 1867 to 1975 in the United States. All variables are viewed as $I(1)$, making tests of long-run neutrality possible. With respect to nominal income and prices, long-run monetary neutrality holds in this data, but with respect to real output, long-run monetary neutrality fails.

Evidence of the failure of long-run monetary neutrality is either surprising or suspect among monetary theorists. Applying Fisher and Seater (1993) methodology, Boschen and Otrok (1994) tested the long-run monetary neutrality using the Friedman and Schwartz (1982) data, but now updating the time series through 1992. They split the data set into two subsamples, 1869-1929 and 1940-92. Their results support the long-run neutrality proposition in both of the subsamples. They concluded that there may have been something special about the financial disruption during the Great Depression era that causes the test to fail when that period is included.

The importance of the Great Depression for the rejection of long-run monetary neutrality in the United States is also supported by Haug and Lucas (1997) who applied Fisher and Seater (1993) methodology. Since Canada did not experience bank failures during the Great Depression, the evidence on long-run neutrality using Canadian data might provide further evidence that something unusual happened in the United States during this period. Their data set includes real national income and the money supply (M2) from 1914 to 1994. They argued that pre-1914 data is inappropriate for this purpose because changes in the money supply were not exogenous in Canada at that time. Based on Augmented Dickey-Fuller (ADF) tests, both time series are $I(1)$. The results showed that long-run monetary neutrality with respect to real output cannot be rejected using the entire Canadian sample period.

The empirical evidence by Olekalns (1996) also supports the argument of Boschen and Otrok (1994) that the Great Depression matters for the rejection of long-run monetary neutrality in the United States. According to Olekalns (1996), the downturn of the 1930s was less severe in Australia than in the United States. Applying the Fisher and Seater methodology, Olekalns (1996) used two measures of money, M1 and M3, along with real gross domestic product to test for the long-run neutrality of money for 94 years in Australia. All variables are reasonably described as $I(1)$ according to ADF tests. Olekalns (1996) found that long-run monetary neutrality cannot be rejected using the narrower money measure. However, using the broader money measure, long-run neutrality can be rejected for this data set, and the rejection carries even when dummy variables are used to control for the Depression period as well as the World War II period. Olekalns (1996) concluded that results can be sensitive to the measure of money used.

An empirical analysis by Coe and Nason (1999) also contributes to this literature. They used the same methodology and U.S. data as Fisher and Seater (1993), except that they updated the data through 1997. When Coe and Nason (1999) used a broad measure of the money stock, they replicated the Fisher and Seater (1993) rejection of long-run monetary neutrality with respect to real output. But when they replace the broad money measure with the monetary base, they can no longer reject long-run neutrality. They also consider about a century of data from the United Kingdom, and fail to reject long-run neutrality using either broad or narrow measures of money. Coe and Nason (2003) concluded that the Fisher and Seater (1993) rejection of long-run neutrality is not robust to a change in either the measure of money or the country of study.

Another important work in this literature is King and Watson (1997) who also used bivariate systems by taking into account the order of integration of the variables involved when devising tests of neutrality propositions. Importantly, King and Watson (1997) emphasized identification issues. They analysed long-run neutrality propositions across a range of possible identifications of their bivariate system, in an effort to understand the robustness of various conclusions to differing assumptions. The identifying assumptions are that either one of the impact elasticities is known to be a certain value, or that one of the long-run elasticities is known

to be a certain value. They used quarterly data on real output and money (M2) for the United States from the first quarter of 1949 to the fourth quarter of 1990:4. Based on unit-root diagnostic tests, King and Watson concluded that all the series involved can reasonably be viewed as $I(1)$, so that tests of neutrality propositions can be executed. Their empirical results are consistent with the findings of Fisher and Seater (1993) and Boschen and Otrok (1994), because the sample period here covers the postwar United States.

Weber (1994) is the first paper that applied the King and Watson testing procedures to G7 economies: Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States. The data is quarterly, from the postwar era, but the particular years vary across countries. Weber begins with a battery of unit root diagnostics. For each country, he uses several different measures of the money stock, in part to confront the question of whether the results are sensitive to how money is defined. The combination of several diagnostic tests and many different time series produces a plethora of results that are not all the same. As a general rule, however, narrower monetary aggregates tended to be $I(1)$, while broader aggregates tended to be $I(2)$. Strictly speaking, according to the methodology outlined above, if money is $I(2)$ then superneutrality can be tested, whereas neutrality cannot.

In order to deal with this situation, Weber followed two approaches: In some cases, he performed neutrality tests anyway and warns the reader to interpret the results with caution, while in other cases he uses the $I(1)$ aggregates to test for neutrality and the $I(2)$ aggregates to test for superneutrality. The remaining series on output, inflation, interest rates, and unemployment rates, for the most part, can be reasonably interpreted as $I(1)$. Weber then turns to tests of long-run monetary neutrality in these countries, using the same wide variety of possible identifying assumptions that King and Watson used. His general finding is that for broader monetary aggregates, such as M2 or M3, a wide variety of identifying restrictions are consistent with long-run monetary neutrality in the G7 economies during the postwar era. For narrower measures of money, the range of identifying restrictions consistent with long-run monetary neutrality is much smaller. Superneutrality is examined using a bivariate VAR in differenced money growth and differenced real output. In general, long-run superneutrality with

respect to the level of real output is rejected for a wide variety of identifying restrictions across the G7 economies.

Bullard and Keating (1995) considered a sample of 58 countries that have at least 25 years to formulate tests of long-run neutrality propositions in the spirit of Fisher and Seater (1993) and King and Watson (1997). In working with a large number of countries, data availability and quality impinge significantly on the analysis. Accordingly, Bullard and Keating restrict attention to countries that produce at least moderately high quality data. Bullard and Keating focused their analysis on one particular version of a neutrality proposition: the effect of a permanent shock to inflation on the level of output. If money is long-run neutral—and the evidence reported in this survey suggests that this is a reasonable assumption— then this can be viewed as a test of monetary superneutrality with respect to the level of real output. Moreover, problems with the definition of money within and across countries are avoided.

Bullard and Keating also began with a battery of unit-root diagnostic tests for the real output and GDP deflator time series they use. They divided countries into groups based on the results of these tests, according to whether a country can be characterized as having experienced permanent shocks to inflation or not, and similarly for the level of real output. Countries that experienced permanent shocks to inflation and also to the level of output are candidates for a test based on a bivariate VAR; there were 16 countries in this group, dubbed Group A. There were also nine Group B countries for which evidence of a unit root in inflation was found, but evidence of a unit root in output was lacking. A large number of countries, 31, show no evidence of permanent shocks in the inflation series, and were put into Group C. The two remaining countries were special cases.

Following King and Watson (1997), Bullard and Keating (1995) estimated a two-variable VAR for the Group A countries, in differenced inflation and differenced output. The main results for the Group A countries are as follows: The long-run response of the level of output to a permanent inflation shock was positive and statistically significant for four countries, negative and statistically significant for one country, and not statistically different from zero for the remainder. The Group B countries, which possess permanent inflation shocks but no permanent output shocks, provide

evidence of superneutrality. The Group C countries are uninformative because they do not possess permanent inflation shocks. Altogether, the results appear to be consistent with superneutrality for most of the countries that are informative.

The empirical results by Serletis and Krause (1996) also support a hypothesis of long-run monetary neutrality. They used the Backus and Kehoe (1992) data set, which included more than 100 years of annual observations on real output, prices, and money for Australia, Canada, Denmark, Germany, Italy, Japan, Norway, Sweden, the United Kingdom, and the United States. Based on Zivot and Andrews' (1992) unit root test to account for structural breaks in the series, they concluded that money is reasonably described as $I(1)$ except in Germany and Japan where it is $I(0)$; these latter two countries are therefore uninformative on neutrality questions in this data set. Serletis and Krause (1996) found that output is $I(0)$ for Australia, Canada, Denmark, Italy, the United Kingdom, and the United States. These countries, therefore, provide direct evidence in favour of long-run neutrality with respect to output.

In order to understand the long-run relationship between inflation and productivity, Sbordone and Kuttner (1994) applied bivariate VAR methodology which is similar to that used by King and Watson (1997). Using data from the postwar United States, they concluded that both series are characterized as $I(1)$. Sbordone and Kuttner used the King and Watson (1997) approach to identification, setting impact multipliers and long-run multipliers to various values in an effort to learn about the sensitivity of the results to alternative identification schemes. Under many of these schemes, the long-run impact of a permanent, positive shock to inflation on productivity is negative. If the identification scheme is that the long-run impact of a permanent shock to productivity on inflation is zero, then the estimated effect of a permanent inflation shock on productivity is negative but is not statistically different from zero.

Following King and Watson (1997), Oi et al. (2004) investigated the long-run monetary neutrality in Japan over the period 1890-2003. They used three types of money stock, including cash currency in circulation, M1, and M2. Real output is represented by real GNP. Oi et al. (2004) started with the unit root and cointegration tests and found that the test results differ

depending on the testing procedures, especially whether or not consideration is given to a structural change. They concluded that the combination of M2 and real GNP satisfies the preconditions for testing long-run monetary neutrality: they are both I(1) and are not cointegrated. Meanwhile, the possibility that M2 is I(2) cannot be denied, so they also test long-run monetary superneutrality for M2. They find strong evidence supporting the proposition of monetary neutrality.

Some studies also focus on testing the long-run neutrality of money using a sample of developing countries. Sulku (2011) analysed the long-run neutrality of money (LRN) in the Turkish economy using quarterly data from January 1987 to March 2006. In his analysis, the dependent variables are real output and wholesale price index while a set of independent variables includes all alternative monetary aggregates such as M1, M2, M2Y and M3. M2Y is the summation of M2 and foreign exchange deposits in Turkish lira. Applying Fisher and Seater (1993) ARIMA framework, the author showed that LRN hypothesis holds in Turkey and the results are robust under all alternative monetary aggregates.

Chen (2007) investigated the long-run real output response to a permanent monetary stock in South Korea and Taiwan using quarterly data for money stack M2 and real output from 1970:1 to 2004:4, and 1965:1 to2004:1 respectively. Applying King and Watson (1997) approach, the author showed that the long-run neutrality of money is fully supported in the case of South Korea, but not in the case of Taiwan. That is level changes in money stock have no effect on the real variables and cause a proportionate increase in price level.

Habibullah et al (2001) analysed the long-run neutrality of money with respect to aggregate output and its disaggregate output, namely the output of agriculture, manufacturing and services sector in Malaysia using quarterly data for the period 1973:1 to1999:4. Applying Fisher and Seater (1993) approach, the author showed that narrow money M1 does not matter in Malaysia during the sample period. The output data at both aggregate and disaggregate sectors support the long-run neutrality of money in Malaysia. This implies that the permanent changes in narrow money do not lead to changes in real output. This suggests that the growth of money supply M1 is not the prime mover for the Malaysia's economic growth during the period

under study. Hence, de-emphasizing narrow money, M1, as intermediate target variable by mid-1980s was the right move by the central bank of Malaysia.

Ekomie (2013) analysed the long-run neutrality of money in the Economic and Monetary Community of Central Africa (EMCCA) countries using annual data cover the period 1970-2008. Ekomie (2013) used different monetary aggregates, money supply in narrow sense (M1), money supply in the large sense (M2), and domestic credit (credit to private sector) with response to real GDP. Applying Fisher and Seater (1993) approach, the results indicate that money aggregates have significantly positive impacts on real GDP in the long-run. This implies that the long-run monetary neutrality hypothesis is rejected. In light of the empirical results, the authors concluded that in the context of poverty and unemployment that characterizes EMCCA countries, the Central Bank should pursue an objective of stabilization of the product, along with the objective of monetary stability.

Bae and Ratti (2000) investigated the long-run neutrality and long-run superneutrality of money using annual data on monetary aggregate (M2), price index, and real output for Argentina and Brazil for the period 1884 to 1996 and for the period 1912-1995 respectively. Applying Fisher and Seater (1993) framework, the results show that, the real output series was found to be *I(1)* and the money series was found to be *I(2)* for both countries. This suggests that money is long-run neutral for both Argentina and Brazil. Furthermore, they found that superneutrality of money was not found for the period 1884-1996 in Argentina and for the period 1912-1995 in Brazil. This result is consistent with the predictions of cash-in-advance models in which inflation is a tax on investment or labour. This suggests that indexing in the Brazilian economy and dollarization in Argentinean economy have not been fully effective at insulating real output from permanent shocks to the rate of money growth. The estimates imply that if the rate of money growth were to permanently rise from 40% per year to 100% per year, output would be approximately 4.0% lower in Argentina and Brazil.

Moosa (1997) investigated the long-run neutrality of money with respect to real output and price level in India using quarterly data for the period 1972:1 to 1990:4. Applying seasonal cointegration techniques, the

author found that money and output are not cointegrated at the zero frequency which represents the long-run. On the other hand money and prices are cointegrated at all frequencies including zero frequency. This implies that money affects nominal but not real variables in the long-run. In light of the empirical results, the authors concluded that the effectiveness of monetary policy as a stabilization anti-inflation tool depends on the existence of stable and well understood link between money and prices.

3.3 Macroeconomic policies in economies with currency substitution

3.3.1 Theoretical framework of macroeconomic policies in the presence of currency substitution

The impacts of macroeconomic policies on output and prices tend to be different in economies with and without CS. Following Clarida et al. (1999), I formulate a theoretical framework of the "New Keynesian" monetary policy model which includes N economies, indexed by i ($i = 1,2,\dots,N$). The loss function of each economy's monetary authority takes the form

$$L_i = \frac{1}{2} E_t \left\{ \sum_{j=0}^{\infty} \beta^i \left[\alpha_i \left(y_{i,t+j} - k_i \right)^2 + \pi_{i,t+j}^2 \right] \right\} \tag{3.13}$$

where

y output (in deviations from trend).

π inflation.

α relative weight on output deviations ($\alpha > 0$).

β discount factor.

E mathematical expectation.

k output target. It is assumed to be equal or larger than zero because of distortions, such as imperfect competition or taxes.

For each economy, aggregate supply is given by a "New Keynesian" expectations-augmented Phillips curve:

$$\pi_{i,t} = \lambda_i y_{i,t} + E_t \pi_{i,t+1} + u_{i,t} \tag{3.14}$$

where $\lambda_i > 0, u_{i,t} = \emptyset_i u_{i,t+1}, z_{i,t}, 0 < \emptyset_i < 1$ and $z_{i,t} \sim iid(0, \tau_i^2)$. This can also be written in aggregate-supply form as

$$y_{i,t} = \vartheta_i(\pi_{i,t} - E_t\pi_{i,t+1}) + \nu_{i,t} \tag{3.15}$$

where $\vartheta = 1/\lambda_i$ and $\nu_{i,t} = -u_{i,t}/\lambda_i$. Note that this implies $\nu_{i,t} = \phi_i \nu_{i,t} - \lambda_i^{-1} z_{i,t}$.

Without CS, when each economy's central bank can pursue an independent monetary policy, minimizing (3.13) subject to (3.14) leads to the following outcome ("discretion"):

$$\pi_{i,t}^{IND} = \alpha_i q_i u_{i,t} + \frac{\alpha_i}{\lambda_i} k_i = \alpha_i q_i \lambda_i \nu_{i,t} + \frac{\alpha_i}{\lambda_i} k_i \tag{3.16}$$

and

$$y_{i,t}^{IND} = \lambda_i q_i u_{i,t} = \lambda_i^2 q_i \nu_{i,t} \tag{3.17}$$

where *IND* superscript denotes outcomes under independent monetary policy, and $q_i = 1/[\lambda_i^2 + \alpha_i(1 - \beta\phi_i)]$. The macroeconomic performance of the economy will be characterized by average ("trend") inflation equal to

$$\bar{\pi}_i^{IND} = \alpha_i k_i / \lambda_i \tag{3.18}$$

and output ("business-cycle") volatility

$$Var(y_i^{IND}) = \lambda_i^4 [\lambda_i^2 + \alpha_i(1 - \beta\phi_i)]^{-2} \sigma_i^2 \tag{3.19}$$

Equation (3.18) states that the inflation bias is increasing with the weight on output (α), the output target *(k)*, and the slope of the aggregate supply curve, $\vartheta = 1/\lambda$. It is also apparent that there is a trade-off between average inflation and output variability:[12] if α is very low, average inflation will be very low, but output very unstable.

The economy with complete CS is represented by the formation of monetary union. Suppose that there are *N* economies to form a monetary union, monetary authority is delegated to the United States (*i* = 1), and the U.S. dollar is adopted by all *N* economies. Then, at equilibrium, each

[12] As pointed out by Taylor (1979), there is also a trade-off between output variability and inflation variability, given here by: $Var(\pi_i^{IND}) = \alpha_t^2 \lambda_t^2 [\lambda_t^2 + \alpha_t(1 - \beta\phi_i)]^{-2} \sigma_t^2$ a low α reduces the volatility of inflation but raises that output.

member country of the monetary union has inflation rate equal to that of the United States. Mathematically, it is represented by $\pi_{1,t}^{DOLL} = \pi_{1,t}^{DOLL} = \pi_{1,t}^{IND}$, where $\pi_{1,t}^{IND}$ is given by (3.14) and the *DOLL* superscript refers to outcomes under dollarization. Substituting into (3.15) gives

$$y_{1,t}^{DOLL} = -\alpha_1 q_1 (1 - \emptyset_1)\nu_{1,t} + \nu_{i,t}, \tag{3.20}$$

Equation (3.20) states that with CS, economy *i's* output is affected not just by its own output shock, $\nu_{i,t}$, but also by the shock from the United States, $\nu_{1,t}$. The economies with CS import the U.S. shock via the conduct of monetary policy by the Federal Reserve.

How does the macro economy perform in the presence of CS? Average inflation will be given by

$$\pi_i^{-DOLL} = \alpha_1 k_1 / \lambda_1 \tag{3.21}$$

and business-cycle volatility by

$$Var\left(y_i^{DOLL}\right) = \alpha_1^2 q_1^2 (1 - \phi_1)^2 \sigma_1^2 + \sigma_i^2 - 2\alpha_1 q_1 (1 - \phi_1)\rho_{i,1}\sigma_i\sigma_1 \tag{3.22}$$

where $\rho_{i,1} \equiv corr\left(\nu_{i,t}, \nu_{1,t}\right)$. Costs and benefits of CS can now be identified.

The main macroeconomic benefit of CS can be seen in terms of inflation by comparing equations (3.18) and (3.21). CS will reduce a country's average inflation rate, provided the United States has a more conservative monetary authority ($\alpha_1 < \alpha_i$ and $k_1 < k_i$) and a less temping aggregate supply ($\vartheta_1 < \vartheta_i$): $\pi_i^{-DOLL} < \pi_i^{-IND}$.

However, equations (3.19) and (3.22) show that CS may increase output volatility: this is the macroeconomic cost of CS. From equation (3.22), this cost will be smaller, the closer $\rho_{i,1}$ is to unity. Intuitively, if business cycles in Lao PDR and the United States are highly correlated, countercyclical monetary policy conducted by the U.S. Federal Reserve will be a very close substitute for monetary policy conducted by BOL. The presence of CS in Lao PDR, even though it means giving up independent monetary policy, will not be very costly. If, on the other hand, Lao PDR's output is negatively correlated with that of the United States, so that expansions in one of the two countries tend to coincide with recessions in

the other, surrendering monetary policy to the United States will destabilize Lao PDR by amplifying its business cycle.

3.3.2 Exchange rate system and economic performance

The recurrence of currency crises in emerging countries— Mexico, in 1994, Thailand, Indonesia and Korea in 1997, Russia and Brazil in 1998, and Argentina and Turkey in 2000— has generated an intense debate on exchange rate policies. Countries that did not have pegged rates—among them South Africa, Israel in 1998, Mexico in 1998, and Turkey in 1998—avoided crises of the type that afflicted emerging market countries with pegged rates. That said, pegged-but-adjustable exchange rate regimes have rapidly lost in popularity, while hard pegs and freely floating rates have gained in popularity (Fischer, 2001). This implies that emerging nations should completely give up their national currencies, and adopt an advanced nation's currency as legal tender.

The impacts of macroeconomic policies on output and price depend on different degree of CS and thereby different exchange rate systems in an economy. In this review, I divide CS into two types: partial CS and complete CS. Partial CS refers to the unofficial use of foreign currency in an economy which exists in developing countries with floating exchange system. Complete CS refers to the official adoption of foreign currency in an economy which implies the fixed exchange rate system.

Recently, some emerging countries have decided to officially move toward complete CS, or official dollarization. Ecuador abolished its currency, the sucre, and adopted the U.S. dollar in 2000. El Salvador adopted the U.S. dollar as a legal tender in Guatemala in 2001. In other countries, however, politicians have systematically refused to consider official dollarization[13], even in the face of major and costly financial crises. This was the case, for instance, of Argentina during late 2001 and early 2002.

Supporters of complete CS argue that countries that give up their currency will be unable to engage in monetary and macroeconomic mismanagement. Public finances will stay in balance, macroeconomic policy

[13] The term 'dollarization' here refers to the complete substitution of domestic currency by foreign currency.

will be credible, and the external accounts will move within reasonable bounds. According to this view, complete CS will have two major positive effects on economic performance. First, inflation will be lower in countries with complete CS than in countries with partial CS. Alesina and Barro (2001, p. 382), for instance, argued that adopting another nation's currency 'eliminates the inflation bias problem of discretionary monetary policy'. Second, countries with complete CS will tend to grow faster than countries with partial CS. This growth effect is supposed to take place through two channels: (a) complete CS will mean lower interest rates, higher investment, and faster growth (Dornbusch, 2001); and (b) by eliminating exchange rate volatility, complete CS is supposed to encourage international trade and this, in turn, will result in faster growth. Rose (2000) and Rose and Wincoop (2001), among others, emphasized this trade channel.

Other authors, however, have voiced scepticism regarding the alleged positive effects of complete CS on growth and overall macroeconomic performance. According to Eichengreen (2001) the evidence on the relationship between monetary regimes and growth is inconclusive, and does not support the claim that official dollarization—or any exchange rate regime, for that matter—is an important determinant of growth.

The traditional view, on the other hand, is that in countries with a hard peg it is difficult to accommodate external shocks, including terms of trade and world interest rate disturbances. This, in turn, will be translated into greater instability and lower economic growth (Fischer, 1977). Frankel (1999) argued that there is no unique recipe on exchange rate policy; while some countries will benefit from hard pegs, for other countries a floating regime will be more appropriate.

There are few empirical studies on the economic consequences of CS, except Edwards and Magendzo (2003). International comparative studies on alternative exchange rate and monetary regimes have ignored countries with CS. For example, the comprehensive study on exchange rate regimes, growth and inflation by Gosh et al. (1995) does not include nations that do not have a currency of their own. Likewise, the IMF (1997) study on alternative exchange rate systems excludes countries with CS, and the recent paper by Levy-Yeyeti and Sturzenegger (2001) on exchange rates and economic performance excludes nations that do not have a central bank. This lack of

empirical evidence means that countries that are contemplating dollarization have very little information on how other countries have historically performed under this monetary regime. Rose and Engel (2000) provide an early empirical analysis of economic performance in countries with no currency of their own. Their analysis, however, does not emphasize countries with CS that use an advanced nation's currency. Instead, they focus mostly on currency unions, or countries whose common currency is not the currency of an advanced nation, but rather the union's own currency. The Rose and Engel's (2000) dataset include 26 countries that do not have a currency of their own and have data on real GDP per capita. Of these 23 countries, only one—Panama—corresponds to a nation with CS; the other 25 countries in the data set correspond to currency unions.

Edwards and Magendzo (2003) is the first study to analyse macroeconomic performance of economies with complete CS. The empirical results show that inflation has been significantly lower in countries with CS than in countries without CS. They also found that countries with CS have had a lower rate of economic growth than countries without CS; and that macroeconomic instability, measured by the degree of volatility of GDP growth, is not significantly different across countries with and without CS. They concluded that the lower rate of economic growth in countries with CS is due, at least in part, to these countries' difficulties in accommodating external disturbances, such as major terms of trade and capital flows shocks.

In economies with partial CS, some economists argue that the instruments of macroeconomic stabilization in the form of monetary policy are not effective. For example, Menon (2009) argued that growth in capital inflow in Vietnam needs to be accommodated by real exchange rate appreciations. However, the nominal exchange rate cannot be relied upon to deliver it, so inflation is usually the result, and it is also difficult for the central bank to conduct open market operations, in order to sterilize large capital inflows, or mop up excess liquidity. This could add to inflation. The combination of a young and inexperienced banking system and an investment-hungry state owned enterprise sector only exacerbates the situation, and increases the risk of imbalances that can result in a crisis.

Given that the effectiveness of monetary policy is curtailed by CS, Menon (2009) suggested that the fiscal policy will play a crucial role in

stabilizing the economy. By cutting back on fiscal expenditure, the government can reduce its reliance on foreign savings to finance investment, and thereby limit the growth in the current account deficit. To reduce the pressure on real exchange rate appreciation associated with large capital inflows, selective liberalization of the capital account to facilitate capital outflow could be pursued.

In contrast, using a sample of 108 developing countries over the period 1980-2001, Reinhart et al. (2003) found no evidence that partial CS makes it more difficult to bring down inflation from high levels, or that it alters or adds complexity to the monetary transmission process—particularly through systematic changes in the behaviour of money velocity, or in the link between money and prices. Seigniorage revenues are found to be fairly similar—both in terms of levels and variability—across all categories of economies with CS, especially in the late 1990s. Output fluctuations, and the scope for using countercyclical monetary policy to reduce them, are also found to be fairly similar in countries with different degrees and varieties of CS.

The existing literature remains inconclusive about the effectiveness of macroeconomic policies in dollarized economies. In chapter 4, I built a small macroeconometric model to evaluate fiscal and monetary policies effectiveness in the Lao economy.

Chapter 4 Developments of Empirical Models for Currency Substitution, Neutrality of Money, and the Evaluation of Macroeconomic Policies

In chapter 4, I discuss the model specifications for the analysis of currency substitution and the examination of neutrality proposition. This is followed by the structure of Lao macroeconometric model for the evaluation of monetary and fiscal policies under different exchange rate arrangements. Data description and estimation methods for each empirical model are also discussed.

4.1 Model specification and data for analysing the determinants of currency substitution

Empirical studies on the process of currency substitution (CS) are based mainly on a standard money demand function in which real domestic balances are specified to be a function of a scale variable (real wealth or income) and the opportunity cost of holding real balances. Conceptually more important existing literature following the framework of demand for money include Ramirez-Rojas (1985), El-Erian (1988), Rojas-Suarez (1992), Clements and Schwartz (1992), Mongardini and Mueller (1999), Us (2003), and Samreth (2011). The key assumption of these model specifications is that the demand for foreign currency by residents is driven by the uncovered interest parity condition, which, in turn, depends on the interest rate level abroad, the domestic interest rate, and expected developments in the inflation rate level abroad.

4.1.1 Development of empirical model for testing the determinants of currency substitution

The empirical specification in this paper was modified from the model structure of Mongardini and Mueller (1999) which comes closest to the standard representation of the demand for foreign currenciesgiven data constraints. It can be formulated as follow:

$$\ln CS_t = \alpha + \beta_1 I_t + \beta_2 E_t + \beta_3 \ln R_t + \varepsilon_t \qquad (4.1)$$

where CS_t is currency substitution. I_t is the interest rate differential, measured by the difference between domestic and foreign currency deposit rates in the Lao banking system. E_t is the expected depreciation of the Lao kip against the US dollar.The ratchet variable is denoted by $\ln R_t$ representing the persistence effect in the CS. It is proxied by the past peak value of the CS ratio. ε_t is an error term and assumed to be white noise and normally and identically distributed.

The interest rate differential (I_t) represents the opportunity costs of holding kip and US dollar. It is measured by the difference between the rates on kip-denominated 12-month time deposits and the dollar-denominated 12-month time deposits. β_1 is expected to be negative because a ceteris paribus increase in the interest rate differential raises the return on kip-denominated deposits, thereby reducing the CS ratio.

With the considerations for CS, the opportunity cost of holding domestic balances has to include another argument that is usually represented by the expected change in the nominal exchange rate. If the domestic currency depreciates (appreciates), the opportunity cost of holding domestic balances increases (decreases) relative to foreign money. Therefore, resident will switch to foreign balances (domestic balances). Following El-Erian (1988) and Rojas-Suarez (1992), for the proxy for the expected rate of domestic currency depreciation, $\ln E_t$, I choose the actual change of the exchange rate as a proxy to represent the expected rate of change of the exchange rate.[14]Although there are two main foreign currencies, US dollar and Thai baht irculating in the Lao economy, my study focuses onlyon kip per US dollar rate because the use of US dollar in economic transactions in Lao PDR dominate over the use of Thai baht. The coefficient of the expected depreciation of kip per US dollar, β_2, is expected to be positive. That is, a ceteris paribus increase in the expected rate of depreciation of kip would imply an increase in the holdings of US dollar relative to kip.

Equation (4.1) also incorporates the CS ratchet for two reasons. One reason is that it gradually reaches new peaks during the observation period

[14]Because there is lack of reliable quarterly inflation data available especially for the first few years of the observation period, it was decided to use the depreciation of the exchange rate as a proxy.

and thus is relatively immune to outliers, thereby more accurately representing the theoretical justification behind the inclusion of the ratchet effect in the model structure, particularly the building up of a sufficiently strong awareness threshold for the presence of large inflation and currency depreciation and the resulting process of developing, learning, and slowly beginning to apply inflation-beating money management techniques. Another reason is that it represents all the factorswhich in the past have influenced the CS process (Mueller, 1994). In the CS model that includes the CS ratchet, it is assumed that the CS ratio reacts asymmetrically to changes in the CS ratchet. Since the CS ratchet is defined as the past peak value of the dependent variable, its sign is expected to be positive.

The dummy variable, $Asian_t$, representing the effect of Asian financial crisis on Lao economy from the first quarter of 1997 to the fourth quarter of 1998, is included in Equation (4.1). The rapid exchange rate depreciation during the Asian financial crisis caused a dramatic change in exchange rates in Lao PDR. Between 1997 and June 1999, the kip lost 464% of its value against the dollar. This caused a rapid increase in inflation rate of 150% in the early 1999 and an increase in the ratio of CS from 41% to 80% in the same period. In line with the above, the estimation equation can be modified as becomes

$$\ln CS_t = \alpha + \beta_1 I_t + \beta_2 E_t + \beta_3 \ln R_t + \beta_4 Asian_t + \varepsilon_t \qquad (4.2)$$

Where $Asian_t$ = 1 for t = 1997:Q1–1998:Q4, and $Asian_t$ = 0 otherwise. β_4 is expected to be positive because people might diversify their wealth portfolios by switching from kip into foreign currency denominated accounts in order to avoid the impact of repeated devaluation.

4.1.2 Econometric methodology for testing the determinants of currency substitution

Following the modelling approach described in Pesaran et al. (2001), I assume that, there are two stages for the bounds test. The first stage involves establishment of long-run relationship exists among the variables in Equation (4.2). The second stage involves estimation of long- and short-run coefficients of Equation (4.2) once variables are found cointegrated. To conduct the bounds test, consider a vector of two variables z_t where $z_t = (y_t, x_t')'$, y_t is the dependent variable and x_t is a vector of independent variables. The data generating process of z_t is a p-order vector autoregression. For cointegration, Δy_t is modelled as a conditional error-correction model:

$$\Delta y_t = \beta_0 + \beta_1 t + \pi_{yy} y_{t-1} + \pi_{yx.x} x_{t-1} + \sum_{i=1}^{p} \psi \Delta y_{t-i} + \sum_{j=1}^{q} \phi' \Delta x_{t-j} + \theta w_t + \varepsilon_t, \qquad (4.3)$$

where π_{yy} and π_{yx} are long-run multipliers, β_0 is the drift, t is the time trend, w_t is a vector of exogenous components. Lagged values of Δy_t and current and lagged values of Δx_t are used to model the short-run dynamic structure. The bounds test for the absence of any level relationship between y_t and x_t is conducted by excluding the lagged variables y_{t-1} and x_{t-1} in Equation (4.3). It follows then that our test for the absence of a conditional level relationship between y_t and x_t entails the following null and alternative hypotheses:

$$H_0 : \pi_{yy} = 0,\ \pi_{yx \cdot x} = 0',$$

$$H_1 : \pi_{yy} \neq 0,\ \pi_{yx \cdot x} \neq 0' \text{ or } \pi_{yy} \neq 0,\ \pi_{yx \cdot x} = 0'$$
$$\text{or } \pi_{yy} = 0,\ \pi_{yx \cdot x} \neq 0' \qquad (4.4)$$

I examine these hypotheses with the standard F-statistic. Since the F test has a non-standard distribution in the current ARDL setting, critical values reported in Pesaran et al. (2001) are used. Critical value bounds exist for all classifications of the regressors into purely first order of integration or I(1), purely I(0) or mutually cointegrated. If the computed F-statistic falls

outside the critical bounds, a conclusive decision can be made regarding cointegration without knowing the order of integration of the regressors. If the estimated *F*-statistic is higher than the upper bound of the critical values, then the null hypothesis of no cointegration is rejected. If the estimated *F*-statistic is less than the lower bound of the critical values, then the null hypothesis of no cointegration cannot be rejected.

Once I establish that a long-run cointegration relationship exists, Equation (4.2) is estimated using the following ARDL(*m, n, p, q*) specification:

$$\ln CS_t = \beta_0 + \sum_{i=1}^{m} \beta_{1i} \ln CS_{t-1} + \sum_{i=1}^{n} \beta_{2i} I_{t-1} + \sum_{i=1}^{p} \beta_{3i} E_{t-i} + \sum_{i=1}^{q} \beta_{4i} \ln R_{t-i} + \beta_5 Asian_t + \varepsilon_t \quad (4.5)$$

The long-run impact of the CS determinants can be obtained by estimating equation (4.6). The short-run impact of CS determinants can be obtained by estimating the error correction representation of equation (4.6) which is expressed as:

$$\Delta \ln CS_t = \beta_0 + \sum_{i=1}^{m} \delta_{1i} \Delta \ln CS_{t-1} + \sum_{i=1}^{n} \delta_{2i} \Delta I_{t-1} + \sum_{i=1}^{p} \delta_{3i} \Delta E_{t-1} + \sum_{i=1}^{q} \delta_{4i} \Delta \ln R_{t-1} + \delta_5 Asian_t + \theta EC_{t-1} + \mu_t \quad (4.6)$$

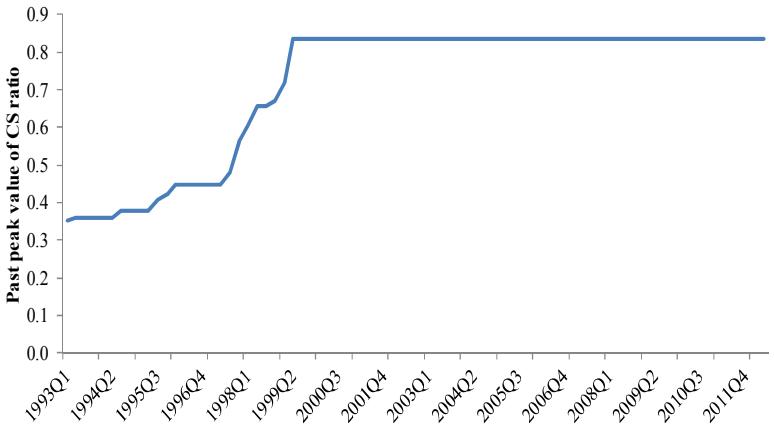
4.1.3 Selection of data for testing the determinants of currency substitution

The CS model specified in Equation (4.2) contains four main variables, namely, the CS ratio, interest rate differential, expected rate of exchange rate depreciation, and the past peak value of the CS ratio. This study uses quarterly data on these variables for the Lao economy from the first quarter of 1993 to the second quarter of 2012. Quarterly data are used because the relevant data series do not exist in monthly form. The starting point of the estimation period was determined on the basis of data availability.

The data of M2, interest rates on kip-denominated 12-month time deposits and the dollar-denominated 12-month time deposits, exchange rate,

and foreign currency deposits were collected from various issues of the Quarterly Lao Financial Statistics published by Bank of the Lao PDR. For the exchange rate, I use the quarterly average of the parallel market exchange rate, kip per US dollar. The proxy for CS is (e × FCD)/M2, where e is the nominal exchange rate for kip/US dollar and M2 is defined as the sum of currency in circulation, kip- and dollar-denominated deposits. Following Mongardini and Mueller (1999) and Cuddington et al. (2002), the accumulated experience ($\ln R_t$) is represented by the past peak value of the CS ratio, which can be expressed as follows:

$$R_t = \max_i CS_i, i = 0, 1, \ldots, t-1. \tag{4.7}$$



Note: The accumulated experience of domestic residents in using foreign currency is represented by the past peak value of the currency substitution (CS) ratio.

Source: BOL, Quarterly Lao Financial Statistics (various issues).

Diagram 4.1: Accumulated experience of domestic residents in using foreign currency

The plot of R_t over the sample period is illustrated in Diagram 4.1. The past peak value of CS ratio started at the very low level in the first quarter of 1993. It then gradually rose from 0.36 in the first quarter of 1994 to 0.38 in the first quarter of 1995. As the Lao economy was severely affected by the Asian financial crisis during 1997–1998, R_t sharply increased from 0.45 in the first quarter of 1997 to 0.84 in the second quarter of 1999. Therefore, all past peak values of CS ratio occurred in 1990s.

4.2 Model specification and data for testing long-run monetary neutrality proposition

Neutrality of money has received increasing attention from academic researchers. Many papers have analyzed long-run monetary neutrality (e.g., King and Watson 1992, 1997; Fisher and Seater 1993; Boschen and Otrok 1994; Haug and Lucas 1997; Serletis and Koustas 1998, 2001; Shelley and Wallace 2004; Noriega 2004; Coe and Nason 2004; Bae et al. 2005; and Noriega et al. 2005, among many others). Most of these papers test the existence of long-run monetary neutrality (i.e., a permanent change in the money stock has no long-run effects on real GDP) and superneutrality (i.e., permanent changes in the growth rate of money have no real effects on real money balances). Using unit-root tests on monetary aggregates and output with a long period of sample, the tests are then applied on the reduced form of the Fisher and Seater (1993) conditions.

4.2.1 Development of empirical model for testing long-run monetary neutrality proposition

Fisher and Seater (1993) work in terms of bivariate systems, with a measure of money as one of the variables. Adopting their notation, let m be the natural logarithm of the nominal money stock M. Let y be a second variable, expressed in either real or nominal terms, which is the logarithm of a variable like the price level or real output, and where the variable itself is Y[15]. Denote the order of integration of a variable by $\langle x \rangle$, so that if x is integrated of order 1, we write $\langle x \rangle = 1$. I also will use the phrase "x is $I(1)$" to describe the order of integration. Denote a difference operator by Δ, so that Δy indicates the approximate growth rate of the variable Y. Fisher and Seater study the following system:

---

[15] One could use other methods to statistically model a permanent shift in the level or growth rate of a monetary variable. One could, for instance, posit a discrete shift in the mean of the variable at a given date, T, and one could then check to see how other variables responded to such a permanent movement. Nothing here is ruling out such an approach, but the literature surveyed in this paper focuses on unit-root characterizations of variables of interest as measures of whether these series have permanent components or not.

$$a(L)\Delta^{\langle m\rangle}m_t = b(L)\Delta^{\langle y\rangle}y_t + u_t \tag{4.8}$$

$$d(L)\Delta^{\langle y\rangle}y_t = c(L)\Delta^{\langle m\rangle}m_t + w_t \tag{4.9}$$

where *a(L), b(L), c(L)* and *d(L)* are lag polynomials, and $a_0 = d_0 = 1$ and b_0 and c_0 are unrestricted. The error vector (u_t, w_t) is *iid* with zero mean and covariance $\sum$. Now let $x_t \equiv \Delta^i m_t \; and \; z_t \equiv \Delta^j y_t$, with *i, j* = 0 or 1. Fisher and Seater define a certain long-run derivative (LRD) that is central to their findings. The LRD is a change in *z* with respect to permanent change in *x*, given by

$$LRD_{z.x} = \lim_{k\to\infty} \frac{\partial z_{t+k} / \partial u_t}{\partial x_{t+k} / \partial u_t}, \tag{4.10}$$

provided $\lim_{k\to\infty} \partial x_{t+k} / \partial \mu_t \neq 0$, otherwise the LRD is undefined and the long-run neutrality is not testable. Fisher and Seater then define long-run neutrality and long-run superneutrality in this framework, and for each, discuss four cases that depend on the order of integration of the variables.[16]

Firstly, money is long-run neutral with respect to *y* if $LRD_{y,m} = 1$ when *y* is a nominal variable or if $LRD_{y,m} = 0$ when *y* is a real variable. The four cases are: first, the order of money growth (denoted by $\langle \Delta m \rangle$) is less than one. Mathematically, the first case is represented by $\langle m \rangle < 1$. Here the LRD is not defined because there have been no permanent shocks to the level of the money stock, and the data are uninformative concerning long-run monetary neutrality. The second case is that the order of money growth is greater than one and the order of real output ($\langle y \rangle$). Mathematically, this case is represented as $\langle m \rangle \geq \langle y \rangle + 1 \geq 1$. Here the LRD is zero because while there have been permanent shocks to the level of the money stock, there have been none to output, if *y* is a nominal variable, long-run neutrality is violated, otherwise it holds. The third case is that the order of money growth is greater than one but is equal to the order of real output. Mathematically,

[16] To simplify the discussion in this section, interest rates are left out here, even though they are included in Fisher and Seater's (1993) framework.

the third case is represented by $\langle m \rangle = \langle y \rangle \geq 1$. This case admits tests of long-run neutrality, in an effort to find out if the permanent shocks to the level of the money stock are correlated with the permanent shocks to the variable y. The fourth case is that the order of money growth is greater than one but is less than the order of real output. Mathematically, the fourth case is represented by $\langle m \rangle = \langle y \rangle - 1 \geq 1$. This case in more complicated. A necessary condition for long-run neutrality is that the permanent shock to money does not change the growth rate of y.

Secondly, money is long-run superneutral with respect to y if $LRD_{y,\Delta m} = 0$. There are four cases for testing the long-run monetary superneutrality. The first case is that the order of money growth (denoted $\langle \Delta m \rangle$) is less than one. Mathematically, the first case is expressed by $\langle \Delta m \rangle < 1$. Here the LRD is not defined because there have been no permanent shocks to the growth rate of the money stock, and the data are uninformative concerning long-run monetary superneutrality. The second case is that the order of money growth is greater than one and the order of real output ($\langle y \rangle$). Mathematically, this case is expressed by represented as $\langle \Delta m \rangle \geq \langle y \rangle + 1 \geq 1$. The LRD is zero because while there have been permanent shocks to the growth rate of the money stock, there have been none to y. Long-run superneutrality holds. The third case is that the order of money growth is greater than one but is equal to the order of real output. Mathematically, the third case is expressed by $\langle \Delta m \rangle = \langle y \rangle \geq 1$. This case admits tests of long-run superneutrality, in an effort to find out if the permanent shocks to the level of the money stock are correlated with the permanent shocks to y. The fourth case is that the order of money growth is greater than one but is less than the order of real output. Mathematically, the fourth case is expressed by $\langle \Delta m \rangle = \langle y \rangle - 1 \geq 1$. Here $LRD_{\Delta y,\Delta m} = 0$ is testable; that is, one can determine whether a permanent change in the growth rate of money is associated with a permanent change in the growth rate of y.

The Fisher and Seater analysis provides a simple test of long-run neutrality. If money and real output are integrated of order one, the long-run derivative of real output with respect to money is equal to the slope coefficient of regression of growth rates of real output on growth rates of money. Therefore, the proposition of long-run neutrality is found if this

slope coefficient approaches zero as the span over which these growth rates are calculated approaches to infinity. This is formally illustrated in Equation (4.11), where y denotes the log of real output, m is the log of money, and b_k is the slope coefficient. The long-run money neutrality is tested under the null hypothesis of $b_k = 0$.

$$y_t - y_{t-k-1} = \alpha_k + b_k(m_t - m_{t-k-1}) + e_{kt}\ ,\ \ k = 1, \ldots, 20 \qquad (4.11)$$

Table 4.1: Growth rates of M1, M2, real GDP, and sectoral outputs

Year	M1	M2	GDP	Agriculture	Industry	Services
1985–1989	178.70	114.71	4.14	4.17	7.60	3.49
1990–1994	20.59	33.82	6.13	5.23	12.93	4.68
1995–1999	33.75	60.11	6.42	4.82	11.12	7.42
2000–2004	41.99	27.81	5.98	3.72	10.93	5.95
2005–2009	32.17	24.80	7.73	3.85	13.12	8.15
2010–2011	30.04	30.50	7.90	3.39	14.25	7.24
1985	41.11	35.55	5.07	11.04	5.54	−2.61
1986	64.88	70.00	4.89	5.12	15.91	1.66
1987	101.24	131.01	−1.43	−1.92	−16.06	3.27
1988	65.45	6.71	−2.01	−4.19	−2.26	0.82
1989	620.80	330.29	14.19	10.78	34.88	14.31
1990	−0.16	7.84	6.70	8.65	16.23	1.53
1991	12.52	15.73	4.30	−1.75	19.86	7.47
1992	24.50	49.01	5.56	8.27	7.58	0.87
1993	48.64	64.59	5.91	2.71	10.30	6.84
1994	17.43	31.93	8.16	8.30	10.69	6.68
1995	9.51	16.40	7.03	3.14	13.05	8.83
1996	12.48	26.73	6.93	2.64	17.16	8.09
1997	5.79	65.76	6.87	7.08	8.22	7.52
1998	111.40	113.28	3.97	3.67	8.55	4.96
1999	29.59	78.36	7.31	7.58	8.60	7.69
2000	57.25	46.04	5.80	4.93	8.50	5.34
2001	7.98	13.72	5.75	3.77	10.13	5.81
2002	57.86	37.60	5.92	3.98	10.11	5.94
2003	42.51	20.07	6.07	2.51	18.33	3.77
2004	44.32	21.64	6.36	3.42	7.60	8.90
2005	29.12	7.87	7.11	1.42	12.67	9.91
2006	28.19	26.72	8.62	4.16	17.58	7.65
2007	53.36	38.72	7.60	7.40	7.77	7.66
2008	21.23	18.31	7.82	3.46	12.89	8.65
2009	28.94	32.41	7.50	2.83	14.65	6.87
2010	32.55	39.13	8.53	2.79	19.38	5.62
2011	14.12	23.94	8.04	0.49	16.58	7.39
Average (1985-2011)	58.62	50.72	6.24	4.16	11.65	5.98

Source: Author's calculation using data from World Bank (2011) and International Monetary Fund (2012).

Notes: growth rates of M1, M2, real GDP, and sectoral outputs are calculated as $\Delta x_t = \left[\frac{x_t - x_{t-1}}{x_{t-1}}\right] \times 100$, where x_t the levels of M1, M2, real GDP, and sectoral outputs.

Most existing literature obtains estimates of b_k for values of k ranging from one to 30 over the periods of study (see for example, Fisher and Seater, 1993; Boschen and Otrok, 1994; Haug and Lucas, 1997). They plot the estimates of b_k along with the 95% confidence intervals versus the values of k. Since our sample period is very short relative to them, the values of k are set to equal 20, accounting for more than half of the period under investigation.

The analysis of long-run impact of money on output in this dissertation takes a similar approach and compares the response of output in four sectors of the economy. The principal aim is to provide stylised facts about how monetary policy developments feed through the economy. As a corollary, these facts might also provide some indirect evidence about the underlying nature of the transmission mechanism. At the broadest level, the output measure of the economy, GDP, can be sub-divided into three parts, namely agriculture, industry, and services. Manufacturing sector is also added as a component of the industrial sector.

4.2.2 Selection of data for testing long-run monetary neutrality proposition

An important source for the monetary aggregates (M1 and M2) is the World Bank online database 'World Development Indicators', which provides data on real GDP and sectoral output in Lao kip for the period 1984–2011, and M1 and M2 data for the period 1987–2011. The money supply reported in the World Bank measures the value of the money supply circulating in the economy. The broad monetary aggregate, M2, comprises M1 plus short-term (usually a year and under) savings and time deposits, certificates of deposit, foreign currency transferable deposits and repurchase agreements. The monetary aggregate, M1, comprises currency held outside the banking system; the current account deposit liabilities of commercial banks held for transactions; and some foreign currency deposits that are used for domestic transactions.

Data sources for M1 prior to 1988 and M2 prior to 1986 are World Bank publications 'Lao People's Democratic Republic Country Economic Memorandum'. Data source for M1 and M2 for the year 2011 is the BOL publication 'Annual Report 2011', which reports the latest data on Lao monetary aggregates for 2011. The growth rates of monetary aggregates and real output are presented in Table 4.1. The growth rates of M1 and M2 in Laos fell from 179% and 115% per year for the period 1985–1989 to 30% and 30.5% for the period 2010–2011. Similarly, the growth rates of agriculture and manufacturing decreased from 4.2% and 11.2% to 3.4% and 8.6% for the same periods. In contrast, the growth rates of real GDP, industry and services, rose from 4.1%, 7.6%, and 3.5% for the period 1985–1989 to 7.9%, 14.3%, and 7.2%, respectively, for the period 2010–2011.

4.3 Development of macroeconometric model and selection of data for testing the effectiveness of fiscal and monetary policy in Lao PDR

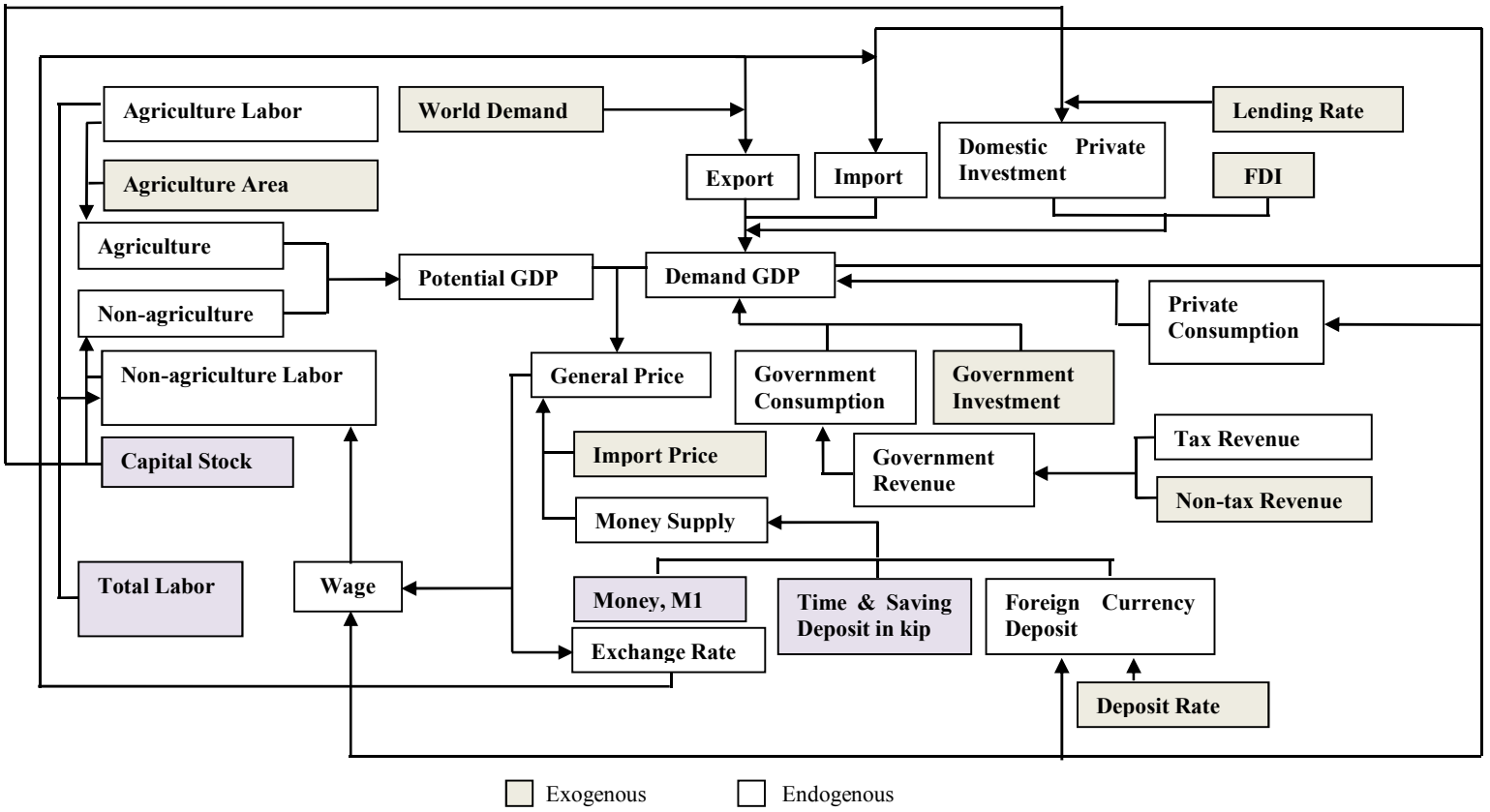
4.3.1 Structure of Lao macroeconometric model

The Lao macroeconometric model is a small, compact, and highly aggregate macro model. It is divided into four blocks: production, final demand, government, and money and price. The relationship between four blocks is illustrated in Diagram 4.1. Diagram 4.1 presents flow chart of the model which illustrates the relationships between endogenous and exogenous variables. At the bottom part of the flow chart, all shaded variables are the exogenous variables while all non-shaded variables are either endogenous variables or variables used in the identities. A brief description of each block is given below.

a. Production structure of Lao economy

The production block consists of three behavioral equations and two identities. The behavioral equations include agriculture output, non-agriculture output, and non-agriculture labor. Agriculture output per labour is a function of agriculture area per labour. Non-agriculture labour is a function of nominal wage and its lag one year. The identities include GDP in supply side and agriculture labour. GDP in supply side is the sum of

agriculture and non-agriculture outputs. Agriculture labour is the difference between total labour force and non-agriculture labour.



Source: Author's compilation.

Diagram 4.1: Flowchart of Lao macroeconometric model

b. Composition of Lao final demand

The final demand block consists of five behavioral equations and three identities. The behavioral equations include private consumption, government consumption, domestic private investment, export, and import. Private consumption is specified as a function of the disposable income and its own lag. Government consumption is a function of government revenues and its own lag. Domestic private investment is a function of GDP growth, lag of capital stock, and domestic lending rate denominated in kip. Export is a function of world demand and kip/dollar exchange rate. Import is a function of Lao GDP and kip/dollar exchange rate. The identities include GDP in demand side, national income, and total investment. GDP in demand side is the sum of consumption, investment and the trade balance. National income is defined as GDP minus indirect tax revenue. Total investment is the sum of government investment, domestic private investment, and foreign direct investment (FDI). Both government investment and FDI are treated as exogenous variables.

c. Tax revenue of the government

The government block consists of one behavioral equation and one identity. The behavioral equation is direct tax revenue which is a function of net national income and its own lag. Direct tax revenue includes revenue from income and profit taxes. National income is derived by subtracting indirect tax revenue from GDP. An increase in national income tends to increase direct tax revenue at a given tax rate. The identity is total tax revenue which is the sum of direct and indirect tax revenue.

d. Monetary aggregates, exchange rate and price level

The money and price block consists of four behavioral equations and one definitional equation. The behavioral equations include money demand for foreign currencies, general price, wage, and managed-floating exchange rate. The money demand for foreign currencies is a function of the ratio of domestic deposit rate in kip to domestic deposit rate in US dollar and of GDP. General price is a function of domestic demand pressure, ratio of M2

to GDP and kip-dollar exchange rate. Nominal private wage is a function of general price, nominal GDP, and its lag one year. Real exchange rate is determined by its own lag which reflects the backward-looking behaviour in exchange rate expectations. The definitional equation is the broad money supply (M2) which is the sum of narrow money supply (M1), saving and time deposits denominated in kip, and foreign currency deposits.

4.3.2 Estimation method for macroeconometric model

The three-stage least squares (3SLS) method is employed to estimate the Lao macroeconometric model. 3SLS involves the application of generalized least squares estimation to a system of equations, each of which has been then first estimated by using 2SLS. In the first stage the reduced form of the parameters are estimated by the 2SLS estimates. In the second stage, the residuals of each equation are used to estimate the cross-equations variances and covariances, just like in the SUR estimation process. In the third and final stage, generalized least squares (GLS) estimates parameters are obtained. The 3SLS procedure can yield more efficient parameter estimates than 2SLS because it takes into account cross-equation correlation (Pindyck and Rubinfeld, 1998).

The system method of 3SLS is superior to single-equation methods, namely ordinary least squares (OLS) and two-stage least squares estimates (2SLS). 3SLS can address the simultaneity problem in the macroeconometric model, while OLS cannot. Because of the simultaneous nature of the equations in the macroeconometric model, OLS cannot provide consistent parameter estimates. Unbiasedness and consistency of OLS estimates rest on the assumption that the explanatory variables are uncorrelated with the stochastic disturbance terms. This assumption becomes invalid for any individual equation in a system of equations whenever at least one of the explanatory variables of that equation is jointly determined and makes the use of the OLS inappropriate.

3SLS is more efficient than 2SLS. 2SLS provides a very useful information procedure for obtaining the values of structural parameters in over-identified equations. 2SLS estimation uses the information available from the specification of an equation system to obtain a unique estimate for

each structural parameter. However, the 2SLS is less efficient than 3SLS when there are cross-equation error correlations in the model.

Table 4.2: Key variables' names and data sources

Variable	Code	Unit	Endogenous/ Exogenous	Source
Agriculture land	*AL*	1,000 ha	Exogenous	Food and Agriculture Organization
Government consumption	*CG*	Bill. kip	Endogenous	United Nations Conference on Trade and Development (UNCTAD)
Private consumption	*CP*	Bill. kip	Endogenous	UNCTAD
Domestic private consumption	*DPI*	Bill. kip	Endogenous	UNCTAD
Dollar-denominated deposit rate	*DRD*	Percent	Exogenous	Bank of the Lao PDR (BoL)
Kip-denominated deposit rate	*DRK*	Percent	Exogenous	BoL
Demand pressure (GDP/GDPS)	*DS*		Endogenous	UNCTAD
Direct tax revenue	*DTAX*	Bill. kip	Endogenous	BoL
Exports	*EX*	Bill. kip	Endogenous	UNCTAD
Foreign currency deposit	*FCD*	Bill. kip	Endogenous	BoL
Foreign direct investment	*FDI*	Bill. kip	Exogenous	UNCTAD
Government expenditure	*G*	Bill. kip	Endogenous	UNCTAD
Real GDP (demand side)	*GDP*	Bill. kip	Endogenous	UNCTAD
Agriculture output	*GDPAG*	Bill. kip	Endogenous	UNCTAD
Non-agriculture output	*GDPNAG*	Bill. kip	Endogenous	UNCTAD
Nominal GDP	*GDPP*	Bill. kip	Endogenous	UNCTAD
Real potential GDP (supply side)	*GDPS*	Bill. kip	Endogenous	UNCTAD
Total investment	*I*	Bill. kip	Endogenous	UNCTAD
Government investment	*IG*	Bill. kip	Exogenous	UNCTAD
Imports	*IM*	Bill. kip	Endogenous	UNCTAD
Indirect tax revenues	*ITAX*	Bill. kip	Exogenous	BoL
Capital stock	*K*	Bill. kip	Exogenous	UNCTAD
Time and saving deposits in kip	*KCD*	Bill. kip	Exogenous	BoL
Lending rate for kip	*LRK*	Percent	Exogenous	BoL
Money supply (M1)	*M1*	Bill. kip	Exogenous	BoL
Broad money supply (M2)	*M2*	Bill. kip	Endogenous	BoL
Non-agriculture labour	*NAL*	Bill. kip	Endogenous	UNCTAD
Real national income	*NI*	Bill. kip	Endogenous	UNCTAD
Non-tax revenues	*NTAX*	Bill. kip	Exogenous	BoL
General price	*PL*	Index	Endogenous	UNCTAD
General price of U.S.	*PLU*	Index	Exogenous	UNCTAD
Exchange rate	*RATEU*	Kip/dollar	Endogenous	UNCTAD
Government revenues	*REV*	Bill. kip	Endogenous	BoL
Total tax revenues	*TAX*	Bill. kip	Endogenous	BoL
Total labour force	*TL*	1,000 persons	Exogenous	UNCTAD
Private wage rate	*WAG*	Bill. kip	Endogenous	UNCTAD
World demand	*WD*	Bill. dollar	Exogenous	Asian Development Bank

Source: Author's compilation.

4.3.2 Lao macroeconomic data for the macroeconometric model

To estimate the Lao macroeconometric model, I utilized Lao PDR's macroeconomic data which includes production, monetary aggregates, and prices. Key production data include agriculture and non-agriculture sectors, and labour force. The nominal exchange rate between kip and US dollar is defined as the price of kip in terms of US dollar.

Primary data sources include Lao Annual Economic Report of the Bank of the Lao PDR (BoL), United Nations Conference on Trade and Development (UNCTAD), and 'Key Indicators of Developing Asian and Pacific Countries 2013' of Asian Development Bank. The data covers the period 1993-2012. The lower bound of the sample period is limited by the availability of interest rates, while the upper bound is the maximum year of Lao economic data availability at the time of estimation. Variables' names and data sources are summarized in Table 4.2.

Chapter 5 Determinants of Currency Substitution and Long-Run Monetary Neutrality in Lao PDR—Empirical Analysis

In Chapter 5, I report two main empirical results, namely determinants of currency substitution and testing long-run monetary neutrality in Laos. The discussions refer to Lao economic background discussed in Chapters 2; to the theoretical issues discussed in Chapter 3; and to the methodology in Chapter 4. This chapter is divided into two main sections. The results of CS determinants and of LRN proposition in Lao PDR are discussed in Section 5.1 and 5.2, respectively. Each section is further divided into three subsections, including unit root tests of the relevant variables, discussion of the empirical results, and policy implications.

5.1 Determinants of currency substitution in Lao PDR

This section begins with a unit root test of the relevant variables using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. Then we apply the autoregressive distributed lagged model to investigate the determinants of currency substitution in Laos. Finally, we discuss our findings and draw some policy implications based on the empirical results of currency substitution.

5.1.1 Time series properties of the data on currency substitution

The critical values for the bounds test reported in Pesaran et al. (2001) is based on whether the variables in consideration are I(0) or I(1). If any of the variables are integrated of order 2 or I(2), the *F*-test conducted to confirm the existence of a cointegration relationship among the variables may not be applicable. In what follows, it is therefore necessary to check the characteristics of the CS ratio and its determinants based on the ADF and PP tests.

The ADF test, proposed by Said and Dickey (1984), is an augmented version of the basic autoregressive unit root test developed by Dickey and Fuller (1979) to accommodate general autoregressive moving average (ARMA (p, q))[17] models with unknown orders. An important practical issue

[17] p is the order of the autoregressive part. q is the order of the moving average part.

for the implementation of the ADF test is the specification of the lag length p. If p is too small then the remaining serial correlation in the errors will bias the test. If p is too large then the power of the test will suffer. In our application, the lag length is determined by the Akaike information criterion (AIC).[18] The ADF statistic used in the test is a negative number. The more negative it is, the stronger the null hypothesis of a unit root is rejected. Some empirical studies on currency substitution based on the ADF tests include Prock et al. (2003), Ra (2008), and Samreth (2011).

Table 5.1 Unit root tests

Model 1 (trend and constant)			Model 2 (constant)		Model 3 (none)		Likely degree of integration
Phillips-Perron			Phillips-Perron		Phillips-Perron		
Variable	Levels	Differences	Levels	Differences	Levels	Differences	
ln*CS*	−0.89	−8.62***	−1.25	−8.49***	−0.65	−8.54***	I(1)
I	−1.80	−10.05***	−0.71	−8.86***	−1.05	−8.51***	I(1)
E	−3.96**	−27.00***	−3.70***	−24.92***	−3.47***	−25.34***	I(0)
ln*R*	−0.82	−5.62***	−2.38	−5.22***	−3.42***	−4.87***	I(1)
Variable	ADF		ADF		ADF		
	Levels	Differences	Levels	Differences	Levels	Differences	
ln*CS*	−0.85	−8.61***	−1.18	−8.48***	−0.64	−8.54***	I(1)
I	−1.07	−12.28***	0.17	−12.09***	−1.29	−11.94***	I(1)
E	−3.94**	−8.25***	−3.62***	−8.29***	−3.39***	−8.35***	I(0)
ln*R*	−1.05	−5.66***	−2.18	−5.23***	−2.78***	−4.89***	I(1)

Note: *, **, *** is significant at 10%, 5%, and 1% level, respectively.

Source: Author's estimation.

To further investigate the time series properties of the CS variables, the PP test developed by Phillips and Perron (1988) is applied. The PP unit root tests differ from the ADF tests mainly in how they deal with serial correlation and heteroskedasticity in the errors. In particular, while the ADF tests use a parametric autoregression to approximate the ARMA structure of the errors in the test regression, the PP tests correct for any serial correlation and heteroskedasticity in the errors by directly modifying the test statistics. According to Zivot and Wang (2006), the PP tests are more

[18] The formula for calculating AIC is expressed as AIC = −[2×ln(likelihood)] + (2×k), where k is number of parameters estimated.

advantageous than the ADF tests for two reasons. First, they are robust to general forms of heteroskedasticity in the error term. Second, they do not require any specifications of a lag length for the test regression.

Table 5.2: *F*-statistics for cointegration relationship

Critical value bounds of the *F*-statistic for $k = 3$										
	90% level			95% level				99% level		
	I(0)		I(1)	I(0)		I(1)		I(0)		I(1)
Intercept and trend	3.47		4.45	4.01		5.07		5.17		6.36
Intercept and no trend	2.72		3.77	3.23		4.35		4.29		5.61
	Lag length									
Calculated *F*-statistics	1	2	3	4	5	6	7	8	9	10
$F_{\ln CS}(\ln CS \mid I, E, \ln R, trend)$	3.15	4.96*	5.29**	4.85*	3.50	2.37	3.10	11.10***	8.42***	7.61***
$F_{\ln CS}(\ln CS \mid I, E, \ln R)$	2.62	5.22**	5.20**	4.36*	2.62	1.12	2.38	12.64***	9.05***	7.97***

Source: Author's estimation.

Results of unit root tests for CS variables are presented in Table 5.1. A rejection of the null hypothesis is marked with asterisks, namely, one asterisk for the 1% significance level, two asterisks for the 5% significance level, and 10% for the 10% significance level. The ADF test provides similar result about the characteristics of variables under investigation with that of the PP test. Both of them indicate that none of the variables are I(2). More precisely, I(0) is found in the expected exchange rate depreciation (E) calculated from the quarterly average of the parallel market exchange rate, whereas I(1) is found in the logarithm of the CS ratio ($\ln CS$) and interest rate differential (I). The order of integration of $\ln R$ is mixed: it is I(0) when either the intercept or time trend is excluded in the unit root test and I(1) when the intercept and a time trend are considered. The mixed results of this integration order also justify the use of the ARDL approach instead of the maximum likelihood approach for cointegration analysis proposed by Johansen and Juselius (1990), which requires all variables to be I(1).

5.1.2 Empirical results for currency substitution in Lao PDR

In the first step of the ARDL analysis, we tested for the presence of long-run relationships in Equation (4.2). As we use quarterly data, the maximum number of lags in the ARDL was set equal to 4. Table 5.2 reports

the calculated F-statistics with various lag orders. According to the F-statistics with and without time trend, generally $F_{CS}(\cdot)$ is higher than the upper bound critical value. Therefore, the null hypothesis of no cointegration cannot be accepted and there is a long-run cointegration relationship amongst the variables in the model.

Table 5.3: Estimated long-run impacts of the CS determinants in Laos

Regressor	ARDL (1, 1, 1, 2)	
	Coefficient	Standard error
I	0.0431***	0.0075
E	0.2121	0.6940
ln*R*	0.6743***	0.0792
Asian	0.0770	0.1083
Constant	4.4605**	1.8574

Note: ARDL (1, 1, 2, 1) was selected based on the Akaike Information Criterion.

Source: Author's estimation.

Given the long-run cointegration relationship amongst the CS variables, Equation (4.6) (Chapter 4) is estimated to investigate the short- and long-run impact of CS determinants. A maximum of 4 lags was used in

Table 5.4 Estimated short-run impacts of the CS determinants in Laos

Regressor	Coefficient	Standard error
ΔI_t	−0.0109**	0.0045
ΔE_t	0.0867	0.0771
$\Delta \ln R_t$	1.2304***	0.1644
$Asian_t$	0.0236	0.0316
Constant	−0.0094*	0.0053
EC_{t-1}	−0.3164**	0.1346
S.E. of regression	0.0432	
$\bar{R}^2$	0.4672	
F-statistic	14.1555	
DW statistic	2.0407	
Functional form test	F = 1.8651 [0.1765]	

$EC = 0.0431I + 0.2121E + 0.6743\ln R + 0.0770Asian + 4.4605$

Source: Author's estimation.

the estimation of Equation (4.6). The estimated model presented here is based on minimizing the AIC. Given two or more models fit on the same data, the model with the smaller value of the information criterion is considered to be better. The empirical results, obtained through normalizing on the log of CS (ln*CS*), in the long-run are reported in Table 5.3.

The short-run impacts of the CS determinants together with diagnostic statistics based on Equation (4.6) are presented in Table 5.4. The *F*-statistic is highly significant, suggesting that the included regressors can jointly determine the CS ratio. The value of $\overline{R}^2$ is 0.47, indicating that the model can explain about 47% in the variation of CS in the Lao economy over the period 1993–2012. The error-correction term (EC_{t-1})in the short-run error correction model is statistically significant with a negative sign, which confirms that a long-run equilibrium relationship exists between the variables. The error-correction coefficient is −0.3164, which means that once shocked convergence to equilibrium is quite fast with 32% of the adjustment occurring in the first year. The short-run model passes the standard test for functional form and, as expected under the ARDL procedure, the Durbin-Watson statistic does not indicate any sign residual serial correlation.

5.1.1.1 Expected rate of domestic currency depreciation

The expected rate of depreciation of the kip/US dollar has an expected positive sign, but is not statistically significant at any conventional level in the long-run model. Although the estimated coefficient of expected exchange rate depreciation is not statistically significant, the magnitude of its coefficient indicates that a 1% increase in the expected rate of depreciation of the kip/US dollar will result in a 0.21% increase in CS ratio. The result is consistent with the observation that an increase in the expected exchange-rate depreciation will increase the CS and increase the demand for foreign currency.

The magnitude of the long-run estimate is in the range of the previous study for Lao PDR, but is below that of other countries. Previous Lao study suggests that the long-run impact on dollarization of the expected rate of change in the exchange rate lies between 2.07 and 2.57 (Ra, 2008, Tables IV and V). The long-run estimate of the expected rate of change in the exchange

rate in the CS model varies significantly across countries, ranging from 3.13 in Cambodia (Samreth, 2011), 3.18 in Vietnam (Ra, 2008), 11.95 in Kyrgyz Republic (Mongardini and Mueller, 1999), to 28 in Peru (Rojas-Suarez, 1992) and to 32.44 in Turkey (Us, 2003). This suggests that the CS in Lao PDR is less sensitive to the expected rate of depreciation than the experiences of other countries suggest.

As expected, the impact on CS of expected exchange-rate depreciation is much larger in the long-run than the short-run, which suggests that exchange rate policy will have stronger effect over time. The magnitude of the short-run impact on CS of expected exchange-rate depreciation is small and is statistically insignificant. In the short-run, the impact on CS of the expected rate of change in the exchange rate is 0.0867. This is similar to what estimated by Ra (2008) for Lao PDR and Vietnam, which were 0.093 and 0.108, respectively, and they were statistically insignificant. However, the estimated impact on CS of expected exchange-rate depreciation in our study is much lower than in other dollarized economies. It ranges from 0.47 in Cambodia (Samreth, 2011), 0.60 in Kyrgyz Republic (Mongardini and Mueller, 1999), and to 2.59 in Turkey (Us, 2003).

5.1.1.2 The currency substitution ratchet variable

The coefficient of the ratchet effect denoting the persistence of CS has the expected sign in both the short- and long-run, and is statistically significant at 1% level. In the long-run the ratchet effect on CS is 0.6743, while in the short-run, it is 1.2304. This indicates that as the past peak value of CS increases, the current CS increases in the short-run. Such impact will, however, decrease over time. Previous studies have found different long-run estimates of the ratchet effect on CS. In Cambodia, estimate of the Ratchet effect was 0.8411 (Samreth, 2011). In Turkey, the long-run ratchet effect was 0.62 (Us, 2003), while in Kyrgyz Republic, it is much higher, being estimated at 5.10 (Mongardini and Mueller, 1999). Therefore, our estimate of the long-run ratchet effect on CS is at the lower end of the range of estimates found in the previous studies in other countries.

5.1.1.3 Interest rate differential

Both the short-run and long-run coefficients of interest rate differential are statistically significant. The coefficient of interest rate differential is negative in the short-run, whereas it is positive in the long run. This indicates that in the long-run as the gap between the rates on kip-denominated 12-month time deposits and the dollar-denominated 12-month time deposits increases, demand for foreign exchange increases. Normally, we would have expected this relationship to be negative. However, the negative relationship in the short-run and the positive relationship in the long-run between interest rate differential and the demand for foreign exchange suggest that a strategy for reducing the CS ratio through higher interest rate on kip deposits will only be effective in the short-run; however, in the long-run the high level of the interest rate and its further increase shift the domestic portfolio allocations toward foreign-denominated assets even more due to the increase in risk premium. Therefore, we see a positive relationship between the interest rate differential and the demand for foreign exchange in the long-run. This finding is similar to that in South Africa by Elkhafif (2003) and that in Turkey by Us (2003), who use similar empirical model.

5.1.1.4 Dummy of Asian financial crisis

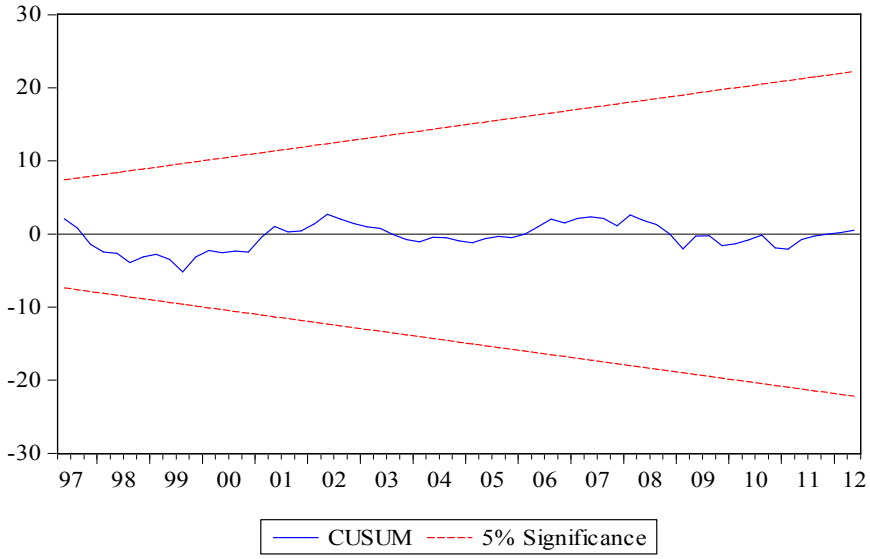
The dummy variable of the Asian financial crisis has an unexpected sign and is not statistically significant in the short- and long-run model. Its positive coefficient indicates that when there is a large economic shock, domestic residents fear of not being able to withdraw their deposits from banks or other financial institutions. Therefore, they rush to withdraw money, leading to a reduction in foreign currency deposits and eventually in a decrease in the CS ratio. This finding is similar to that in Cambodia by Samreth (2011) who found that the effect of political upheaval from 1997 to 1998 reduced the CS ratio.

Nevertheless, this dummy should be explained with caution because the financial anxiety caused by economic disturbances can be captured by other macroeconomic variables, especially exchange rate and interest rate. Since the exchange rate and interest rate have also been included into the model, they may partially capture the impact of Asian financial crisis on the

CS in Lao PDR, thereby reducing the explanatory power of the *Asian* dummy. Therefore, the coefficient of *Asian* dummy is not statistically significant in our model.

5.1.1.5 Recursive residual tests for structural breaks

As indicated by Hansen (1992), estimated parameters of a time series may vary over time. Parameter stability tests are of particular importance, because unstable parameters can lead to model mis-specification, which can bias the results. The parameter stability tests are conducted using the Pesaran and Pesaran (1997) test.

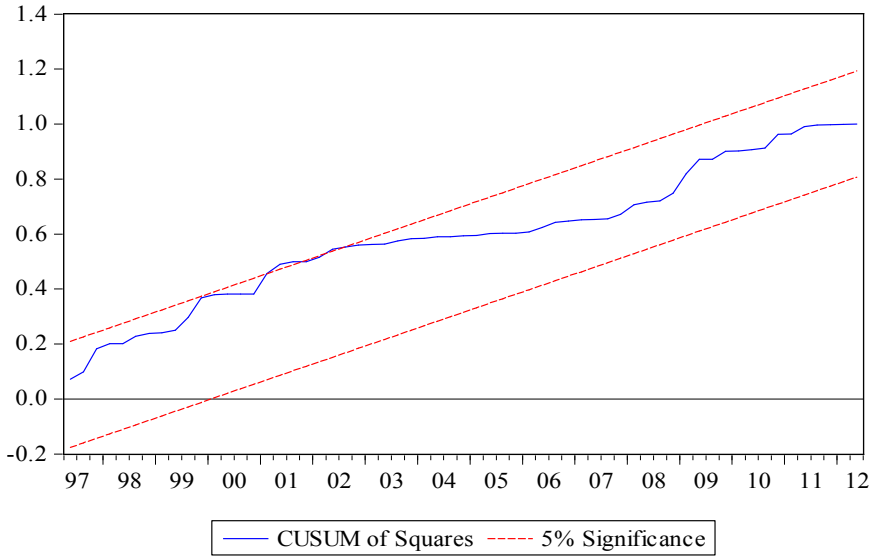


Source: Author's estimation.

Diagram 5.1: Recursive CUSUM test on CS ratio

According to Pesaran and Pesaran (1997), the short-run dynamics are essential in testing for the stability of the long-run coefficients. The Pesaran and Pesaran (1997) test amounts to estimating the error-correction model specified in Equation (4.6) (see Chapter 4). Once the model has been estimated, Pesaran and Pesaran (1997) suggest applying the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests proposed by Brown et al. (1975) to assess the parameter constancy. Both the CUSUM and CUSUMSQ tests plot the cumulative sum together with 5% critical lines. Parameter instability is found if the cumulative sum goes outside the area between the two critical lines. So, movement of the

sample CUSUM and CUSUMSQ tests outside the critical lines is suggestive of coefficient instability.



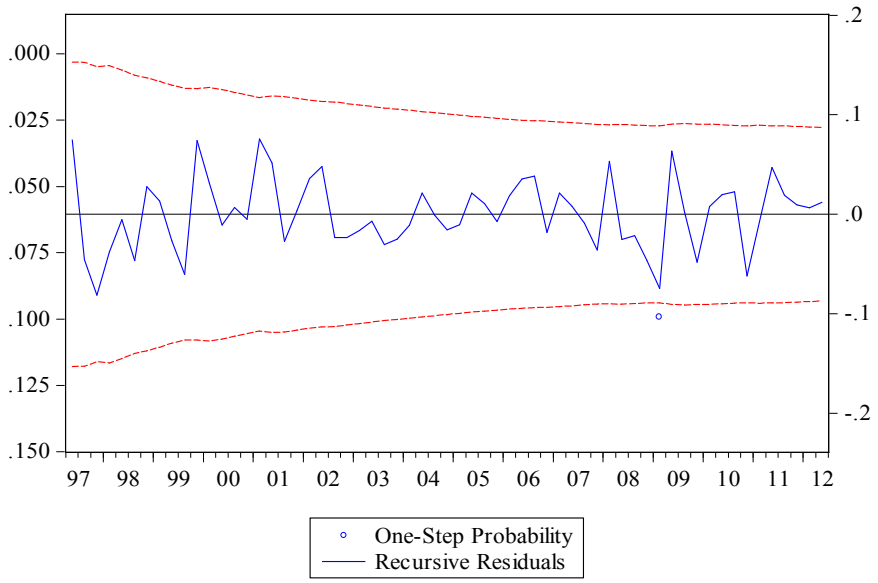
Source: Author's estimation.

Diagram 5.2: Recursive CUSUMSQ test on CS ratio

The model was estimated by ordinary least squares and the residual was subjected to the CUSUM and CUSUMSQ tests. Diagram s 5.1 and 5.2 plot the CUSUM and CUSUMSQ tests for Equation (4.6). The result from the CUSUM clearly indicates the absence of any instability of the coefficients because the plot of the CUSUM statistics is confined within the 5% critical bounds of parameter stability. In contrast, the result from the CUSUMSQ shows some instability of the coefficients, but the deviation seems to be transitory as the plot of CUSUMSQ returns toward the criterion bands

As a further check on parameter stability, the one-step forecast test allowing for the identification of the specific point of break in the data series was conducted. The test result is presented in Diagram 5.3.The upper portion of the graph (right vertical axis) reports the recursive residuals and standard errors while the lower portion (left vertical axis) shows the probability values for those sample points where the hypothesis of parameter stability would be rejected at the 5, 10 and 15% levels. The point with p-value less than 5% corresponds to those points where the recursive residuals go outside the standard error bounds. In this case, the graph will sometime

show dramatic jumps as the postulated equation tries to digest a structural break. As shown in Diagram 5, no break point was found in the CS ratio data. Thus, the results of the one-step forecast test statistics corroborate those of the CUSUM and CUSUMSQ tests. This indicates that the structure of the parameters have not diverged abnormally over the period of the analysis.



Source: Author's estimation.

Diagram 5.3: Recursive one-step forecast test on CS ratio

To summarize, the econometric results show that the parameters estimated are stable, and that the interest rate differential is a significant determinant of the CS process in the Lao economy. Moreover, there is a ratchet effect in the allocation of deposits.

5.1.2 Policy implications for reducing the degree of currency substitution in Lao PDR

The empirical evidence and econometric results have illustrated that the CS phenomenon in Laos has reached an irreversible threshold. In particular, there is a ratchet effect in the portfolio allocation of the sophisticated Lao deposit holders at large. The presence of the ratchet effect in the CS ratio implies that particularly strong policies over an extended period of time would need to be pursued to convince deposit holders to

switch back to kip-denominated assets, while a reduction of the relative importance of dollar cash may be easier and faster to achieve.

Interest rate differential has been shown to be a significant determinant in the portfolio allocation of the private sector. The econometric results are based on the difference between 12-month deposit rate of kip and that of dollar. Since interest rates are liberalized in Laos, the authorities' scope for directly affecting banks' setting for such rates is limited. Nominal interest rates on kip deposits have been relatively low, while those on dollar deposits have been relatively high over the past few years. This reflects the fact that banks have been eager at times to attract dollar deposits by providing relatively high interest rates on these deposits in order to extend additional dollar credits and profit from the large margin associated with them.

Consequently, the interest rate differential may not have been sufficiently high to compensate kip depositors for the expected depreciation of the domestic currency and the risk premium that inevitably is associated with it. Since the estimated long-run coefficient of interest rate differential is positive, the strategy of raising kip denominated deposits should be carefully considered. Otherwise, this could deteriorate the public trust in kip, thereby increasing the CS ratio rather than reducing it.

The econometric results also show that the depreciation of the kip has not been a significant factor in increasing the CS ratio, particularly among deposits, for two reasons. First, the increasingly restricted holdings of foreign currency in Laos prevent residents to adjustment their wealth balances immediately after a change in the CS ratio from the previous quarter. Second, the main incentive for the public to switch to dollar deposits has not been to hedge against the risk of further depreciation. Instead, the hovering of the deposit-based CS ratio at about 50% during that period could indicate that the role of dollar deposits as a provider for the store-of-value function to sophisticated investors has been gradually replaced by the medium of exchange function for holding foreign exchange in Laos.

While reliance on foreign currency in financial intermediation can be beneficial, the relative importance of, and persistence in, the use of foreign currency in financial intermediation in Laos raises the question of the

potential fragility of the banking system, which is commonly known as one of the major costs of dollarization. The non-performing loans in the Lao banking system are related to repayment difficulties of some borrowers for dollar-denominated loans. According to IMF (2002, p. 5), the Lao state-owned commercial banks—accounting for about 63% of total loans in the Lao economy in 2009 (BOL, 2011)— provide about 75% of loans made in foreign currencies (US dollar and Thai baht) to borrowers who do not have a foreign exchange income source. This clearly illustrates the need to adopt special prudential measures to help commercial banks weather times of significant exchange rate adjustments and swings of capital flows.

This is even more important as distress in the banking system reduces the predictability of the monetary transmission process and impedes the central bank to perform its function as lender of last resort. In the current environment, it is therefore imperative to enhance banking supervision and enforce an appropriately defined loan risk classification system in order to maintain confidence in the banking system. It is also useful to regularly assess the appropriateness of the BOL's monetary policy instruments and liquidity forecasting techniques.

Finally, one of the main factors driving the CS in dollarized economies is the lack of markets for medium- and long-term securities denominated in the domestic currency. This lack of medium- and long-term intertemporal markets is typically associated with periods following high inflation, as in the case of Laos. Given the lack of these securities, the natural demand for credits that go beyond the longest horizon in the domestic currency, especially mortgages and business credits, can only be fulfilled by denominating the credits in foreign currency and attracting matching liabilities. In view of this, an additional avenue for reducing the degree of CS is to actively pursue a deepening of financial assets by lengthening the maturing of domestic securities, in particular government bonds which could set a benchmark for long-term private securities.

5.2 Testing the long-run neutrality of money in the Lao economy

This section begins with a unit root test of the relevant variables using the Augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests. Then I apply the Fisher and Seater method to investigate the impact of

monetary aggregates on real GDP and real output of agriculture, industry, manufacturing, and services. Finally, I discuss the findings and draw some policy implications based on the empirical results of LRN in Laos.

5.2.1 Time series properties of the data on long-run monetary neutrality

King and Watson (1992) and Fisher and Seater (1993) showed that tests of long-run neutrality can be conducted if the order of integration of both monetary aggregates and real macroeconomic variables is at least equal to one and equal for both series. The order of integration of the annual data on money and output for Lao PDR therefore has to be established. In this regard, it is necessary to test for stationarity of variables based on the ADF and PP tests. Some empirical studies on monetary neutrality based on the ADF tests include Weber (1994), Olekalns (1996), King and Watson (1997), Haug and Lucas (1997), Serletis and Koustas (1998), Wallace (1999), and Bae and Ratti (2000).

Table 5.5: Results of stationarity tests with and without a time trend

Variables	Unit root tests				Likely degree of integration
	ADF		PP		
	Levels	1st diff.	Levels	1st diff.	
With constant					
lnGDP	2.024	–4.221***	4.893	–4.156***	I(1)
lnARG	–0.387	–5.691***	–1.702	–6.399***	I(1)
lnIND	1.056	–4.681***	1.795	–4.783***	I(1)
lnSER	2.144	–3.063**	2.217	–5.786***	I(1)
lnM1	–1.109	–5.059***	2.000	–5.059***	I(1)
lnM2	–2.516	–5.656***	–2.622	–5.631***	I(1)
With constant and trend					
lnGDP	–2.186	–4.906***	–2.101	–5.917***	I(1)
lnARG	–2.750	–5.579***	–2.814	–6.276***	I(1)
lnIND	–2.832	–4.757***	–2.594	–5.075***	I(1)
lnSER	–2.344	–3.116*	–4.443***	–5.581***	I(1)
lnM1	–2.283	–5.472***	–2.205	–5.472***	I(1)
lnM2	–1.681	–4.002**	–1.537	–6.632***	I(1)

Source: Author's estimation.

Results of unit root tests for Lao PDR's money and output data over the period 1984–2011 based on the ADF method are presented in Table 5.5, second column for level form and third column for first-differenced form. A rejection of the null hypothesis is marked with asterisks, namely, one asterisk for the 1% significance level, two asterisks for the 5% significance level, and 10% for the 10% significance level. The null hypothesis of a unit root in all variables cannot be rejected for a variety of specifications and lag lengths. For the change in all variables, however, the null hypothesis of unit root cannot be accepted for any of the specifications and time periods tested. Consequently, the ADF tests indicate that monetary aggregates and real aggregate and sectoral outputs contain a unit root, implying that the series are integrated of order one which is denoted as I(1).

To further investigate the time series properties of the LRN variables, the PP test is applied. Some empirical studies on monetary neutrality based on the PP tests include Noriega (2004) and Oi et al. (2004). Results of unit root tests for LRN variables based on the PP method are presented in Table 5.5, fourth column for level form and fifth column for first-differenced form. The null hypothesis of a unit root in all variables cannot be rejected for a variety of specifications and lag lengths. For the change in all variables, however, the null hypothesis of unit root for all series, except *lnSER* with constant, cannot be accepted for any of the specifications and time periods tested. The results unit root tests based on the PP method confirm those of the ADF that Laos' monetary aggregates and real aggregate and sectoral outputs are I(1). Therefore, the series can be tested for LRN.

The findings in this study that unit root tests for Lao monetary aggregates (M1 and M2) and real output are I(1) are consistent with international evidence on unit root tests for monetary aggregates and real output by Noriega (2004) and Oi et al. (2004). Using three methods of unit root tests, namely, ADF, PP, and Kwiatkowski–Phillips–Schmidt–Shin (KPSS), Noriega (2004) find that real output and money supply (M2) are I(1) for Argentina, Australia, Italy, Sweden, and the United Kingdom. Similarly, Oi et al. (2004) show that real output, M1, and M2 are I(1) for Japan. However, our findings stand in sharp contrast with the results in Weber (1994) who examines long-run monetary neutrality using post-war quarterly

data for the G-7 countries. Weber (1994) points out that the narrowly defined money stock tends to be I(1), while the broadly defined money stock tends to be I(2).

5.2.2 Testing monetary neutrality based on money supply, M2

Money supply (M2) measures the "store of value" characteristic of money. Since household savings represent deferred consumption, M2 should provide leading information about future spending and, hence, about inflation (Atta-Mensah, 2000). Given the I(1) of Lao PDR's data on M2 and real aggregate and sectoral outputs, the hypothesis of monetary neutrality can be tested by the method of Fisher and Seater. Table 5.6 presents the values of estimated coefficients (b_k) and White's (1980) heteroskedasticity-consistent standard errors of the long-run relationship between M2 and real GDP as well as the GDP components expressed in equation (4.9), over the period 1984–2011. Due to the limited number of observations on the output and money series, k is restricted to values from 1 through 20.

The results in Table 5.6 indicate that the hypothesis of long-run neutrality of money is rejected with respect to broad money supply and real GDP and real sectoral output, except agriculture (lnARG). In particular, a permanent change in the level of M2 has an impact on real GDP and real outputs of industry, and services in the long-run. For real GDP, the point estimates for b_k are negative and statistically significant for $k \geq 2$. For real output of industry, the point estimates for b_k are negative and statistically significant for $2 \leq k \leq 8$ and $k \geq 14$. For real output of services, the point estimates for β_k are negative and statistically significant for $k \geq 3$.

For real GDP, the point estimates of β_k for $k \geq 2$ are approximately −0.067. This value implies that if the level of M2 were to permanently rise from 20% per year to 50% per year, the level of output would be about 1.5% lower for an extended period. The estimates are obtained in the following way. Increases in levels of M2 of 20% and 50% imply log values of 0.182 and 0.405. Thus, a permanent rise in the levels of M2 in Laos from 20% to 50% implies a change in the log of output given by $b_k(0.405 - 0.182) = -0.067(0.223) = -0.015$. Since $e^{-0.015} = 0.985$, output is reduced by 1.5%. By the same token, if the level of M2 were to further rise permanently from 50%

Table 5.6: Long-run regressions of real output on money supply, M2

	GDP		Agriculture		Industry		Services	
k	b_k	SE_k	b_k	SE_k	b_k	SE_k	b_k	SE_k
1	−0.023	0.026	0.030	0.025	−0.059	0.080	−0.025	0.022
2	−0.051**	0.017	0.005	0.024	−0.114**	0.055	−0.038	0.023
3	−0.053**	0.014	0.008	0.021	−0.095**	0.038	−0.045***	0.014
4	−0.054**	0.013	0.014	0.015	−0.079**	0.036	−0.059***	0.014
5	−0.056**	0.015	0.025	0.017	−0.074**	0.033	−0.068***	0.018
6	−0.061**	0.015	0.024	0.017	−0.081***	0.026	−0.072***	0.017
7	−0.064***	0.013	0.027	0.017	−0.086***	0.025	−0.079***	0.019
8	−0.063***	0.014	0.034*	0.017	−0.084**	0.032	−0.078***	0.020
9	−0.057***	0.017	0.041**	0.016	−0.058	0.045	−0.074***	0.023
10	−0.051**	0.020	0.043**	0.018	−0.037	0.051	−0.065**	0.023
11	−0.052**	0.020	0.032	0.022	−0.030	0.046	−0.063***	0.020
12	−0.060***	0.015	0.021	0.020	−0.044	0.038	−0.072***	0.018
13	−0.061***	0.013	0.016	0.016	−0.058	0.034	−0.076***	0.018
14	−0.064***	0.011	0.016	0.013	−0.067*	0.034	−0.084***	0.014
15	−0.070***	0.011	0.017	0.014	−0.089**	0.032	−0.090***	0.016
16	−0.081***	0.010	0.010	0.015	−0.107***	0.027	−0.098***	0.018
17	−0.088***	0.012	0.001	0.016	−0.112***	0.032	−0.104***	0.019
18	−0.092***	0.018	−0.001	0.019	−0.119***	0.033	−0.105**	0.030
19	−0.098***	0.021	−0.008	0.021	−0.150***	0.038	−0.093**	0.034
20	−0.098***	0.021	−0.002	0.025	−0.189***	0.045	−0.081*	0.037

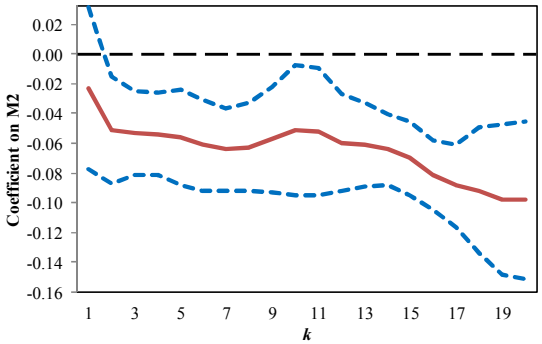
Source: Author's estimation.

per year to 100% a year then output would be lower by a further 1.9%. These estimates are not implausible given the data collected from the World Bank's World Development Indicator and Bank of Lao PDR's annual report, which indicates that real GDP growth in Lao PDR averaged only about 6.2% per year from 1985 to 2011, while the growth rate of M2 was 50.7% per year for the same period. In contrast, Lao real GDP growth averaged about 7.9% per year from 2005 to 2011, while the growth rate of M2 was 26.7% per year for the same period. This supports our findings that the higher the growth rate of M2, the lower the growth rate of real GDP.

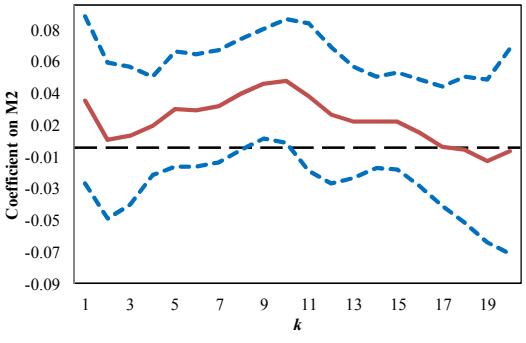
For the real output of industry, the point estimates of b_k for $2 \leq k \leq 8$ are approximately −0.087, and imply that a permanent increase in the level of M2 from 20% per year to 50% would reduce the level of industrial output by about 1.9%. A further permanent rise in the level of M2 from 50% per year to 100% per year would reduce industrial output a further 2.5%. These are conservative estimates of the effect of permanent increases in the level of M2 on long-run output since the absolute value of b_k is increasing as k rises, although not all the b_k for $k \geq 8$ are statistically significant. The average value of the b_k that are statistically significant ($2 \leq k \leq 8$ and $k \geq 14$), given by −0.103, indicates that a rise in the level of M2 from 20% to 50% would reduce industrial output by 2.3%.

Similar to the industrial sector, the point estimates of b_k of the service sector for $k \geq 3$ are approximately −0.078, and imply that a permanent increase in the level of M2 from 20% per year to 50% would reduce the level of service output by about 1.7%. A further permanent rise in the level of M2 from 50% per year to 100% per year would reduce service output a further 2.2%.

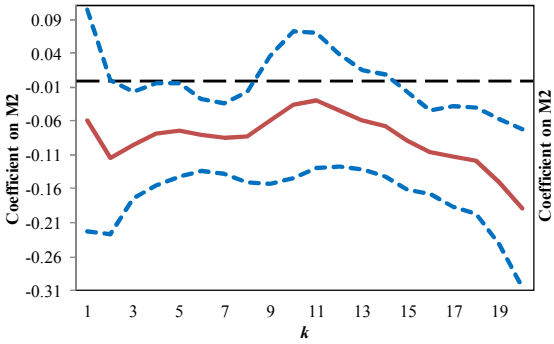
a. GDP



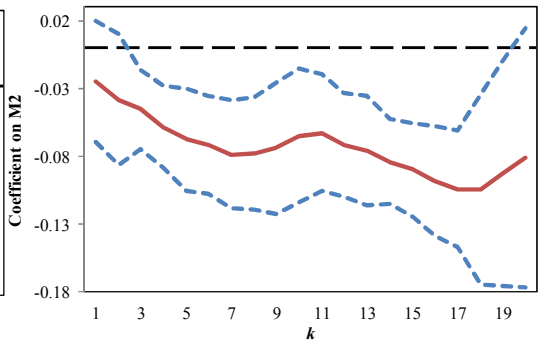
b. Agriculture



c. Industry



d. Services



Source: Author's estimation.

Notes: A continuous line refers to the point estimates. A dashed line refers to the confidence interval. A straight dashed line refers to the zero origin of the diagram.

Diagram 5.4: Lao real output on M2 money, 1984–2011

To further investigate the long-run impact of M2 on the real sector, Fisher and Seater (1993) present the point estimates and confidence intervals with a diagram. The hypothesis of long-run monetary neutrality is rejected when the confidence intervals do not contain a number of zero values. Diagram 5.1 depicts the results of the long-run relationship between M2 and real GDP (Diagram 5.1a) as well as the GDP components (Diagrams 5.1b-5.1.e) for Lao PDR, over the period 1984–2011. The coefficient on M2 (the continuous line) is plotted along with its 95% confidence intervals (the dashed lines). Due to the limited number of observations on the output and money series, k is restricted to values from 1 through 20.

The results in Diagram 5.1 support the findings shown in Table 5.6 that real GDP and real sectoral output, except agriculture (lnARG) and manufacturing, reject the hypothesis of long-run neutrality of money. In particular, a permanent change in the level of M2 has an impact on real GDP, real industrial output, and real service output in the long-run. The main contrast with the findings of Fisher and Seater (1993), Boschen and Otrok (1994), and Haug and Lucas (1997) is that the point estimates for b_k are negative and statistically significant for all values of k. The point estimates for b_k in my empirical results diverge from zero as k increases.

The existing literature shows that structural break could lead to the rejection of LRN. This issue is particularly acute in Lao PDR as the Asian

financial crisis caused a dramatic rise in inflation rate in the period 1997–1999. In this regard, it is important to include a crisis dummy for the period 1997–1999. Xaiyavong and Czerkawski (2013) show that the inclusion of such dummy does not change the conclusion regarding the non-neutrality of money in Lao PDR. In particular, they find that the results do not support LRN as the point estimates of b_k move away from the zero line and are significantly different from zero for all values of k. The findings in my study are consistent with the evidence from Chen (2007) who tested the LRN in South Korean and Taiwan, and Puah et al. (2008) who tested the LRN in 10 member countries of the South East Asian Central Banks (SEACEN) Research and Training Centre, including Indonesia, Malaysia, Myanmar, Nepal, Philippines, Singapore, South Korea, Sri Lanka, Taiwan, and Thailand, and found the evidence that does not support the LRN hypothesis in the case of Indonesia, Taiwan, and Thailand. However, the empirical results of these four countries provide positive estimate coefficient on money supply.

Previous studies show that LRN proposition can sometimes be rejected when different types of money stock data are adopted (Weber, 1994; Olekalns, 1996; Coe and Nason, 2003; Jefferson, 1997; Serletis and Koustas, 2001). For this reason, the use of money stock data aside from M2 is considered to be important and is therefore investigated in the following subsection.

5.2.3 Testing monetary neutrality based on money supply, M1

Money supply (M1) measures the "transactions" characteristic of money in Laos. Given the I(1) of Lao data on M1 and real aggregate and sectoral outputs, the hypothesis of monetary neutrality can be tested by the method of Fisher and Seater. Table 5.7 presents the values of estimated coefficients (b_k) and White's (1980) heteroskedasticity-consistent standard errors of the long-run relationship between M2 and real GDP as well as the GDP components for Lao PDR expressed in equation (4.9), over the period 1984–2011. Due to the limited number of observations on the output and money series, k is restricted to values from 1 through 20.

The results in Table 5.7 indicate that the hypothesis of long-run neutrality of money is rejected with respect to M1 and real GDP and real

Table 5.7: Long-run regressions of real output on money supply, M1

	GDP		Agriculture		Industry		Services	
k	b_k	SE_k	b_k	SE_k	b_k	SE_k	b_k	SE_k
1	−0.013	0.022	0.007	0.023	−0.018	0.065	−0.008	0.016
2	−0.034**	0.015	−0.016	0.015	−0.059	0.053	−0.020	0.016
3	−0.042***	0.010	−0.020**	0.009	−0.058	0.037	−0.034***	0.012
4	−0.042***	0.008	−0.015	0.010	−0.048	0.029	−0.047***	0.010
5	−0.046***	0.011	−0.014	0.014	−0.042	0.028	−0.058***	0.015
6	−0.050***	0.013	−0.017	0.010	−0.046*	0.024	−0.063***	0.017
7	−0.051***	0.014	−0.019*	0.011	−0.050*	0.024	−0.068**	0.024
8	−0.054***	0.014	−0.021**	0.010	−0.056*	0.027	−0.074***	0.023
9	−0.048***	0.016	−0.017	0.018	−0.038	0.036	−0.068**	0.028
10	−0.046**	0.018	−0.011	0.019	−0.023	0.040	−0.061*	0.029
11	−0.042*	0.021	−0.008	0.019	−0.022	0.037	−0.051	0.031
12	−0.050*	0.020	−0.005	0.016	−0.041	0.034	−0.056*	0.028
13	−0.054**	0.018	0.002	0.012	−0.061*	0.031	−0.065*	0.031
14	−0.059***	0.017	0.012	0.013	−0.065	0.037	−0.077**	0.025
15	−0.064***	0.017	0.016	0.013	−0.079*	0.039	−0.084***	0.023
16	−0.071***	0.017	0.007	0.014	−0.085**	0.036	−0.084**	0.024
17	−0.074***	0.015	−0.002	0.014	−0.083*	0.036	−0.084**	0.022
18	−0.069***	0.017	−0.003	0.016	−0.080**	0.034	−0.074**	0.026
19	−0.066***	0.016	−0.004	0.015	−0.093**	0.032	−0.058*	0.024
20	−0.063**	0.015	0.002	0.017	−0.119**	0.033	−0.048	0.025

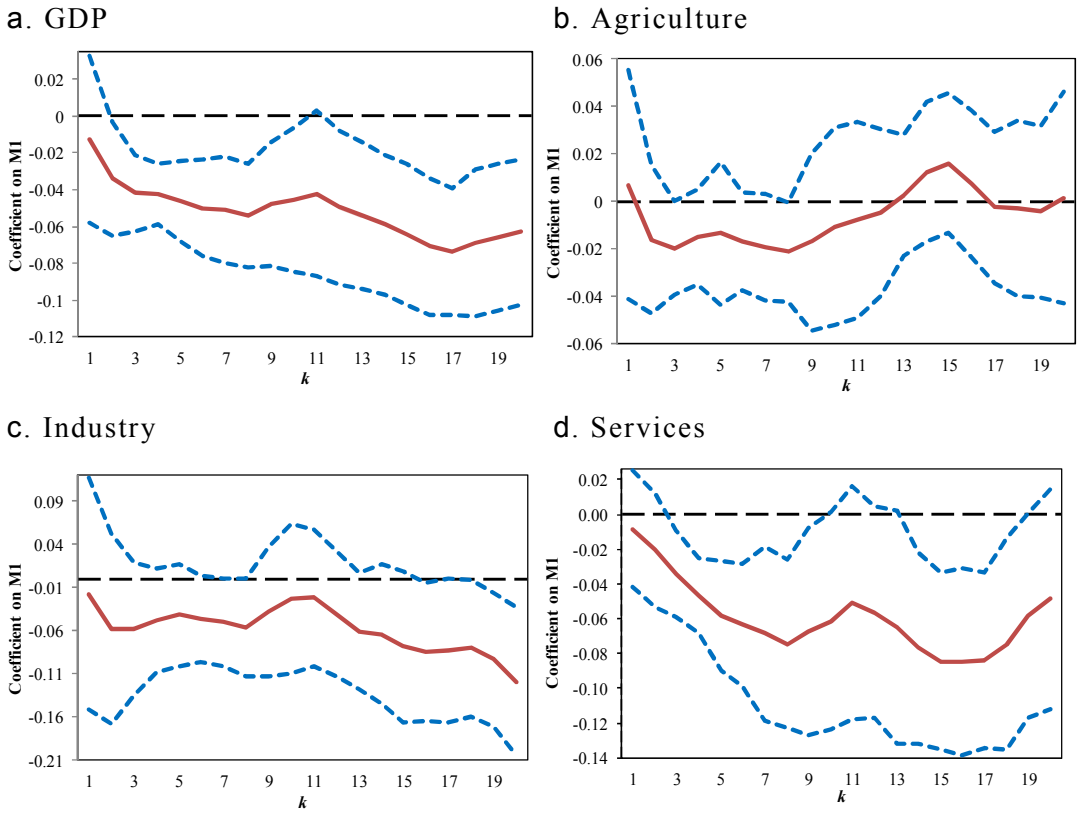
Source: Author's estimation.

sectoral output. Generally, the results are consistent with those found in Table 5.5. In particular, a permanent change in the level of M1 has an impact on real GDP and real outputs of industry and services in the long-run. For real GDP, the point estimates for b_k are negative and statistically significant for $k \geq 2$. For real output of industry, the point estimates for b_k are negative and statistically significant for $6 \leq k \leq 8$ and $k \geq 15$. For real output of services, the point estimates for b_k are negative and statistically significant for $3 \leq k \leq 10$ and $k \geq 12$.

For real GDP, the point estimates of b_k for $k \geq 2$ are approximately −0.054. This value implies that if the level of M1 were to permanently rise from 20% per year to 50% per year, the level of output would be about 1.2% lower for an extended period. By the same token, if the level of M2 were to further rise permanently from 50% per year to 100% a year then output would be lower by a further 1.5%. These estimates are not implausible given the data collected from the World Bank's World Development Indicator and Bank of Lao PDR's annual report, which indicates that real GDP growth in Lao PDR averaged only about 6.2% per year from 1985 to 2011, while the growth rate of M1 was 58.6% per year for the same period. In contrast, Lao real GDP growth averaged about 7.9% per year from 2005 to 2011, while the growth rate of M1 was 29.7% per year for the same period. This supports my findings that the higher the growth rate of M1, the lower the growth rate of real GDP.

For the real output of industry, the point estimates of b_k for $6 \leq k \leq 8$ are approximately −0.051, and imply that a permanent increase in the level of M1 from 20% per year to 50% would reduce the level of industrial output by about 1.1%. A further permanent rise in the level of M1 from 50% per year to 100% per year would reduce industrial output a further 1.5%. These are conservative estimates of the effect of permanent increases in the level of M1 on long-run output since the absolute value of b_k is increasing as k rises, although not all the b_k for $k \geq 9$ are statistically significant. The average value of the b_k that are statistically significant ($6 \leq k \leq 8$ and $k \geq 15$), given by −0.07, indicates that a rise in the level of M1 from 20% to 50% would reduce industrial output by 1.6%.

Similar to the industrial sector, the point estimates of b_k of the service sector for $3 \leq k \leq 10$ and $12 \leq k \leq 19$ are approximately −0.066, and imply that a permanent increase in the level of M1 from 20% per year to 50% would reduce the level of service output by about 1.5%. A further permanent rise in the level of M1 from 50% per year to 100% per year would reduce service output a further 1.9%.



Source: Author's estimation.

Notes: A continuous line refers to the point estimates. A dashed line refers to the confidence interval. A straight dashed line refers to the zero origin of the Diagram .

Diagram 5.5: Lao real output on M1 money, 1984–2011

To further investigate the long-run impact of M1 on the real sector, a diagram is used to present the point estimates and confidence intervals. The hypothesis of long-run monetary neutrality is rejected when the confidence intervals do not contain a number of zero values. Diagram 5.2 depicts the results of the long-run relationship between M1 and real GDP (Diagram 5.2a) as well as the GDP components (Diagrams 5.2b-5.2e) over the period 1984–2011. The coefficient on M1 (the continuous line) is plotted along with

its 95% confidence intervals (the dashed lines). Due to the limited number of observations on the output and money series, k is restricted to values from 1 through 20.

The results in Diagram 5.2 support the findings shown in Table 5.7 that real GDP and real sectoral output, except agriculture (*lnARG*), reject the hypothesis of long-run neutrality of money. In particular, a permanent change in the level of M1 has a negative impact on real GDP, real industrial output, and real service output in the long-run. The conclusion is robust for an alternative specification with a time dummy for the period during which the Asian financial crisis affected the Lao economy (Xaiyavong and Czerkawski, 2013).

The underdeveloped financial markets may distort the monetary polic, resulting in the rejection of LRN with respect to real GDP and services output. Any increase in money supply is unlikely to stimulate the real sector through an increase in private investment as investors run their businesses under imperfect information and are lack of confidence in government policy. The net effect of expansionary monetary policy only results in higher general prices and makes the economy more vulnerable. As Xaiyavong (2013) points out, the BOL used real monetary aggregates as the main policy instrument, implying that its monetary policy tends to suffer from instability in the demand for money either due to high degree of CS and persistent changes resulting from financial innovation. The macroeconomic instability seems to exist in the Lao economy not only in the short-run but also in the long-run. This is why the empirical results provide negative estimated coefficient on money supply. Similar empirical evidence with negative estimated coefficient on money is also found by Wallace (1999) who tested the LRN in the Mexican economy and Sulku (2011) who tested the LRN in the Turkish economy. However, both studies found empirical evidence that support the LRN proposition.

5.2.4 Implications for monetary policy in Lao PDR

Applying the reduced-form neutrality of Fisher and Seater (1993) to examine the impact of money supply on real GDP in Laos over the period 1984–2011, it is found that the LRN proposition holds with respect to agricultural and industrial output. In contrast, the LRN proposition does not

hold with respect to real GDP and services output. In particular, changes in the quantity of money have negative long-run effect on the level of real GDP and services output in Lao PDR. The rejection of LRN proposition with respect to real GDP and services output is robust whether M1 or M2 is used as the monetary measure. It is also robust for an alternative specification with a time dummy for the period during which the Asian financial crisis affected the Lao economy.

The negative impact of money on real GDP implies that monetary expansion is unlikely to stimulate output, eliminate recession, and increase job opportunity. By contrast, the net effect of expansionary monetary policy may result in higher prices and make the economy more vulnerable. Hence, the monetary authority should not manipulate monetary policy to stabilize the fluctuations in business cycle before considering the relationship between money and real output.

Chapter 6 Macroeconomic Policies under the Managed-Floating and Fixed Exchange Rate Regimes in Lao PDR—Empirical Analyses

In Chapter 6, I present the empirical results on the evaluation of macroeconomic policies effectiveness by the simulation analyses in the Lao macroeconometric model. The simulation analyses involve two alternative degrees of CS, partial CS and complete CS. Macroeconomic policies are evaluated for the case of an economy with partial CS compared with the case of an economy with complete CS. The economy with partial CS is represented by the managed-floating exchange rate regime, whereas the economy with complete CS is represented by the fixed exchange rate regime. The effectiveness of macroeconomic policies is evaluated against changes in real GDP. This chapter consists of six sections. In Section 1, I present the model specifications and estimation results of Lao macroeconometric model estimated by the three-stage least square. The model performance is reported in Section 2. The simulation analyses on the macroeconomic policy effectiveness in Lao PDR are discussed in Section 3, and policy implications of the results are provided in Section 4.

6.1 Estimation results of Lao macroeconometric model

The Lao macroeconometric model is constructed under the managed-floating and fixed exchange rate regimes. The major difference between the two regimes is that exchange rate is treated as an endogenous variable in the latter, while it is treated as an exogenous variable. The estimation results under the two regimes are very similar. Therefore, the specifications and estimations for the Lao macroeconometric model are explained only under the managed-floating exchange rate regime. The Lao macroeconomic model consists of four building blocks: production, final demand, money and prices, and government. There are 13 behavioural equations, six identities, and one definitional equation. Given the estimated behavioural equations, accounting identities and definitional equation, a policy shock initially disturbs a specific relation and then affects the economy through the propagation mechanism across the four building blocks. All the variables go through a

dynamic adjustment process until the economy finds a new equilibrium. The estimation results and a brief description of the behavioural equations in each block are presented in the following subsections.

6.1.1 Production structure of Lao economy

a. Agriculture output

Agriculture output (*GDPAG*) is a function of agriculture area (*AAG*) and labour supply for agriculture sector (*AL*). Alternatively, agriculture output per labour is a function of agriculture area per labour.

$$\log(GDPAG/AL) = 7.180 + 9.863\log(AAG/AL)$$
$$(11.53) \qquad (11.95)$$
$$Adjusted\ R^2 = 0.84,\ S.E.\ of\ regression = 0.45$$

The estimation result shows that the model of agriculture output is good. The model's *adjusted* R^2 is 0.84, suggesting that agriculture area per labour (AAG/AL) can explain the variation of agriculture output about 84%. Agriculture area per labour is positive and statistically significant at 1% level. The coefficient of agriculture area per labour is about 9.9, indicating that a 1% increase in agriculture area per labour increases agriculture output per labour by 9.9%.

b. Non-agriculture output

Non-agriculture output (*GDPNAG*) is a function of capital stock lagged one year (K_{t-1}) and non-agriculture labour (*NAL*). Alternatively, non-agriculture output per labour is a function of capital stock per labour.

$$\log(GDPNAG/NAL)_t = 0.406 + 1.178\log(K_{t-1}/NAL_t)$$
$$(3.06) \qquad (21.55)$$
$$Adjusted\ R^2 = 0.91,\ S.E.\ of\ regression = 0.39$$

The estimation result shows that the model of non-agriculture output is very good. The model's *adjusted* R^2 is 0.91, suggesting that capital stock per labour (K_{t-1}/NAL_t) can explain the variation of non-agriculture output about 91%. Capital stock per labour is positive and statistically significant at

1% level. The coefficient of capital stock per labour is about 1.2, indicating that a 1% increase in capital stock per labour increases non-agriculture output per labour by 1.2%.

c. Non-agriculture labour

Non-agriculture labour (NAL) is a function of nominal wage (WAG) and its lag one year (NAL_{t-1}). The estimation result shows that the model of non-agriculture labour is very good. However, the coefficient of WAG is negative and not statistically significant. In theory, the coefficient of WAG should have a positive sign, meaning that an increase in nominal wage should encourage more workers to work in the non-agriculture sector. The negative sign and non-statistical significance of the coefficient of WAG may imply that the labour market in Lao PDR is underdeveloped. The underdevelopment of labour market reflects imperfect information about wage.

$$\log(NAL_t) = -0.066 - 0.003\log(WAG) + 1.021\log(NAL_{t-1})$$
$$(-1.24) \qquad (-1.61) \qquad (90.24)$$
$$Adjusted\ R^2 = 0.99,\ S.E.\ of\ regression = 0.005$$

Instead of relying on wage information as an indicator for participating in the non-agriculture sector, workers may decide to work through social connections. The coefficient of NAL_{t-1} is positive and statistically significant at 1% level. Its magnitude is about 1, indicating that a 1% increase in last year labour forces in the non-agriculture sector may lead to a proportional increase in this year labour forces.

6.1.2 Composition of Lao final demand

Final demand or real GDP is defined as the sum of private consumption, government consumption, private fixed investment, government fixed investment, increase in stock or inventory, exports of goods and services minus imports of goods and services, and statistical discrepancies. Nominal GDP is the product of the real GDP and GDP deflator.

a. Private consumption

Real private consumption (CP/PL) is specified as a function of the real disposable income (NI)and its own lag ($(\text{CP/PL})_{t-1}$).[19] Both NI and $(\text{CP/PL})_{t-1}$ can explain real private consumption very well. The adjusted R-squared ($adjusted\ R^2$) is 0.99, indicating that NI and $(\text{CP/PL})_{t-1}$ can explain the variation in real private consumption about 99%. The estimated coefficient of NI is statistically significant at 1% level as its t-statistic is 24.58. The magnitude of NI coefficient is 0.915, suggesting that a 1% increase in the real disposable income increases real private consumption by 0.9%. The estimated coefficient of $(\text{CP/PL})_{t-1}$ has a negative sign, but it is not statistically significant at any conventional level. It thereby implies that household does not decide the current consumption level based on the past consumption.

$$\log(\text{CP/PL})_t = 0.764 + 0.915\log(NI_t) - 0.024\log(\text{CP/PL})_{t-1}$$
$$(5.78) \qquad (24.58) \qquad (-0.65)$$
$$Adjusted\ R^2 = 0.99,\ S.E.\ of\ regression = 0.10$$

b. Government consumption

Government consumption (CG_t) in the final demand block is a part of government expenditures consisting of government consumption and government investment. CG_t is a function of government revenues (REV_t) and its own lag (CG_{t-1}). The specification is based on a simple relationship between the government account and national income account.

$$\log(CG_t) = -0.391 + 1.065\log(REV_t) - 0.041\log(CG_{t-1})$$
$$(-2.58) \qquad (13.57) \qquad (-0.58)$$
$$Adjusted\ R^2 = 0.99,\ S.E.\ of\ regression = 0.15$$

The estimation result shows that both REV_t and CG_{t-1} can explain CG_t very well. The $adjusted\ R^2$ is 0.99, indicating that REV_t and CG_{t-1} can explain the variation in government consumption about 99%. The government consumption is more sensitive to government revenues than its

[19] 'PL' denotes the price level measured by the GDP deflator.

past consumption. The estimated coefficient of REV_t is statistically significant at 1% level and about 1.1. That is, a 1% increase in government revenues leads to 1.1% increase in government consumption. However, the past level of government consumption does not help explain the current level of government consumption. The estimated coefficient of CG_{t-1} is not statistically significant at any conventional level.

c. Domestic private investment

Domestic private investment is part of the total investment consisting of government investment, foreign direct investment (FDI), and domestic private investment. Both government investment and FDI are treated as exogenous variables. Government investment is by principle made by government and is therefore treated as a key variable of fiscal policy. FDI inflows can be mainly influenced by source countries and thereby, treated as an exogenous variable. Real domestic private investment ($(DPI/PL)_t$) is a function of real GDP growth ($log(GDP_t/GDP_{t-1})$), lag of real capital stock ($(K/PL)_{t-1}$), and real domestic lending rate denominated in kip ($(LRK/PL)_t$).

$$log(DPI/PL)_t = -0.535 + 0.591log(GDP_t/GDP_{t-1}) + 1.571log(K/PL)_{t-1}$$
$$(-1.90) \quad (0.31) \quad (4.77)$$
$$-6.931log(LRK/PL)_t$$
$$(-1.18)$$
$$Adjusted\ R^2 = 0.53,\ S.E.\ of\ regression = 2.41$$

The estimation result shows that the model of domestic private investment is moderately good. The model's *adjusted* R^2 is 0.53, suggesting that real GDP growth, lag of real capital stock, and real domestic lending rate can explain the variation of real domestic private investment about 53%. More specifically, only the estimated coefficient of $(K/PL)_{t-1}$is positive and statistically significant at 1% level. The magnitude of the coefficient is about 1.6, indicating that a 1% increase in the past level of real capital stock leads to an increase in real domestic private investment by 1.6%.

d. Exports

Export (EX) is a function of world demand (WD) and kip/dollar exchange rate. World demand is represented by the weighted average of top five countries for Lao exports, namely Thailand, Vietnam, Republic of China, Germany, and United Kingdom. An increase in the world demand tends to absorb exports from Lao PDR.

$$\log(EX_t) = -31.545 + 2.447\log(WD_t) + 0.794\log(RATEU_t)$$
$$(-27.07) \quad (26.36) \quad (26.61)$$
$$Adjusted\ R^2 = 0.99,\ S.E.\ of\ regression = 0.14$$

The estimation result shows that the model of exports is very good. The model's *adjusted* R^2 is 0.99, suggesting that world demand and kip/dollar exchange rate can explain the variation of exports about 99%. The coefficients of both world demand and kip/dollar exchange rate are positive and statistically significant at 1% level. However, exports tend to be more sensitive to world demand than kip/dollar exchange rate. The magnitude of the world demand's coefficient is about 2.5, indicating that a 1% increase in the world demand leads to an increase in exports by about 2.5%. The magnitude of the kip/dollar exchange rate's coefficient is about 0.8, indicating that a 1% depreciation of the kip/dollar exchange rate leads to an increase in exports by about 0.8%.

e. Imports

Import (IM) is a function of GDP and kip/dollar exchange rate. The estimation result shows that the model of imports is very good. The model's *adjusted* R^2 is 0.99, suggesting that world demand and kip/dollar exchange rate can explain the variation of exports about 99%. The coefficients of both world demand and kip/dollar exchange rate are statistically significant at 1% level. However, imports tend to be more sensitive to GDP than kip/dollar exchange rate. The magnitude of GDP's coefficient is about 1.7, indicating that a 1% increase in GDP leads to an increase in imports by about 1.7%. The magnitude of the kip/dollar exchange rate's coefficient is about -0.9, indicating that a 1% depreciation of the kip/dollar leads to a reduction of imports by about 0.9%.

$$\log(IM_t) = 0.617 + 1.660\log(GDP_t) - 0.911\log(RATEU_t)$$
$$(2.61) \quad (21.24) \quad (-9.27)$$
$$Adjusted\ R^2 = 0.99,\ S.E.\ of\ regression = 0.13$$

6.1.3 Tax revenue of the Lao government

a. Direct tax revenue

Direct tax revenue ($DTAX$) is a function of net national income (NI) and its own lag ($DTAX_{t-1}$). $DTAX$ includes revenue from income and profit taxes. NI is derived by subtracting indirect tax revenue from GDP. An increase in NI tends to increase direct tax revenue at a given tax rate.

$$\log(DTAX_t) = -0.671 + 0.262\log(NI_t) + 0.763\log(DTAX_{t-1})$$
$$(-2.42) \quad (5.77) \quad (23.13)$$
$$Adjusted\ R^2 = 0.99,\ S.E.\ of\ regression = 0.15$$

The estimation result shows that the model of direct tax revenue is very good. The model's *adjusted* R^2 is 0.99, suggesting that net national income and lagged direct tax revenue can explain the variation of current direct tax revenue about 99%. The coefficients of both net national income and lagged direct tax revenue are statistically significant at 1% level. However, current direct tax revenue tends to be more sensitive to its own lag than net national income. The magnitude of lagged direct tax revenue's coefficient is about 0.7, indicating that a 1% increase in lagged direct tax revenue leads to an increase in current direct tax revenue by about 0.7%. The magnitude of net national income's coefficient is about 0.3, indicating that a 1% increase in net national income leads to an increase in current direct tax revenue by about 0.3%.

6.1.4 Monetary aggregates, exchange rate, and price level

a. Foreign currency deposit

Foreign currency deposit (FCD) is part of broad money supply (M2) which consists of M1 (i.e., currency in circulation and demand deposit), saving and time deposits denominated in kip, and saving and time deposits denominated in Thai baht and US dollar. In this dissertation, saving and time deposits denominated in Thai baht and US dollar are referred to as FCD. The model specification of FCD is based on the money demand framework which

states that money demand depends on the opportunity cost of holding money and income. The opportunity cost of holding money is represented by domestic interest rates for 1-year time deposit denominated in kip and US dollar. Income is represented by real GDP. In the Lao macroeconometric model, real FCD (FCD/PL) is a function of the ratio of real domestic deposit rate in kip to real domestic deposit rate in US dollar (DR) and of real GDP. Deposit rate, DR is mathematically defined as $(DRK/PL)/(DRD/PLU)$, where DRK is kip deposit rate, PL is general price in the Lao PDR, DRD is dollar deposit rate, and PLU is general price in the US.

$$\log(\mathrm{FCD/PL})_t = -4.322 - 0.178\log(\mathrm{DR}_t) + 1.263\log(\mathrm{GDP}_t)$$
$$(-16.83) \quad (-4.66) \quad (47.24)$$
$$Adjusted\ R^2 = 0.98,\ S.E.\ of\ regression = 0.19$$

The estimation results show that the model of FCD is very good. The model's *adjusted* R^2 is 0.98, suggesting that DR and GDP can explain the variation of real FCD about 98%. Both DR and GDP are statistically significant at 1% level. FCD is more sensitive to GDP than deposit rate. The coefficient of DR is negative and about 0.2, indicating that a 10% increase in kip deposit rate reduces FCD by 2%. The coefficient of GDP is positive and about 1.3, indicating that a 10% increase in GDP increases in FCD by 12%.

b. General price level

General price (PL) is a function of domestic demand pressure (DS), ratio of M2 to GDP (MS/GDP) and kip-dollar exchange rate ($RATEU$). The estimation result shows that the model of general price is very good. The model's *adjusted* R^2 is 0.88, suggesting that DS, MS/GDP, and RATEU can explain the variation of general price about 88%. All variables are statistically significant at 1% level. General price is more sensitive to DS than MS/GDP. The coefficient of DS is positive and about 2, indicating that a 1% increase in domestic demand pressure increases general price by 2%. The coefficient of MS/GDP is positive and about 0.6, indicating that a 1% increase in the ratio of M2 to GDP leads to an increase in general price by 0.6%.

$$\log(PL_t) = 1.579 + 1.976\log(DS_t) + 0.556\log(MS/GDP)_t - 0.077\log(RATEU_t)$$
$$(7.59) \qquad (5.23) \qquad (16.81) \qquad (-3.55)$$
$$Adjusted\ R^2 = 0.88,\ S.E.\ of\ regression = 0.11$$

The coefficient of $RATEU$ has an unexpected sign which is negative. In theory, it should have a positive sign, meaning that the depreciation of exchange rate results in an increase in general price because of higher costs of imports. Nonetheless, the negative sign of $RATEU$ coefficient may indicate that the depreciation of exchange rate may improve competitiveness of local businesses in Lao PDR. An improvement of competitiveness may encourage domestic firms to produce more outputs and thereby, reducing general price.

c. Private wage

In theory, nominal private wage (WAG) is a function of general price, nominal GDP, and its lag one year. Higher prices of goods may force workers to request for higher wage rates in order to maintain their purchasing power. Higher GDP may indicate more demand for goods which induce firms to produce more outputs. An increase in production leads to an increase in labour demand which causes higher wage rate. The lagged nominal private wage may reflect the backward looking behaviour of firms to adjust the wage rate. In the Lao macroeconometric model, the model of private wage is formulated in real term. In particular, real private wage (WAG/PL) is a function of real GDP (GDP), and its lag one year $(WAG/PL)_{t-1}$.

$$\log(WAG/PL)_t = 4.710 + 0.370\log(GDP_t) + 0.496\log(WAG/PL)_{t-1}$$
$$(7.40) \qquad (9.89) \qquad (8.92)$$
$$Adjusted\ R^2 = 0.93,\ S.E.\ of\ regression = 0.31$$

The estimation result shows that the model of real wage is very good. The model's *adjusted* R^2 is 0.93, suggesting that real GDP and lagged real wage can explain the variation of current real wage about 93%. All variables are statistically significant at 1% level. Current real wage is more sensitive to last year's real wage than real GDP. A 10% increase in last year's real

wage results in an increase in the current real wage by about 5%. A 10% increase in real GDP increases the current real wage by about 4%.

d. Exchange rate

The nominal exchange rate is represented by the kip/dollar exchange rate (RATEU). There are two alternative exchange rate regimes in the Lao macroeconometric model. Fist, the fixed exchange rate regime is represented by the treatment of exchange rate as an exogenous variable. That is, exchange rate is controlled by the Bank of Lao PDR. Therefore, the model of exchange rate is not discussed here. Second, the managed floating exchange rate is characterized by the government intervention in the foreign exchange market without specifying a pre-announced path for the exchange rate (Bofinger and Wollmershäuser 2001). Under the managed-floating exchange rate regime, real exchange rate is determined by its own lag which reflects the backward-looking behaviour in exchange rate expectations.

$$log(RATEU/PL)_t = 1.570 + 0.823\log(RATEU/PL)_{t-1}$$
$$(3.92) \qquad (17.54)$$
$$Adjusted\ R^2 = 0.87,\ S.E.\ of\ regression = 0.36$$

The estimation result shows that the model of real exchange rate is good to predict the development of exchange rate. The model's *adjusted* R^2 is 0.87, suggesting that lagged real exchange rate can explain the variation of current real exchange rate about 87%. It is statistically significant at 1% level. A 10% depreciation of last year's real exchange rate results in a depreciation of current real exchange rate by about 8%.

6.1.5 Identities and definitional equation in Lao macroeconometric model

Six identities and one definitional equation are included to close the models. The identities include GDP in supply side, agriculture labour, GDP in demand side, national income, total investment, and total tax revenue. GDP in supply side is the sum of agriculture and non-agriculture outputs. Agriculture labour is the difference between total labour force and non-agriculture labour. GDP in demand side is the sum of consumption, investment and the trade balance. National income is defined as GDP minus

indirect tax revenue. Total investment is the sum of government investment, domestic private investment, and foreign direct investment (FDI). Both government investment and FDI are treated as exogenous variables. The definitional equation is the broad money supply (M2) which is the sum of narrow money supply (M1), saving and time deposits denominated in kip, and foreign currency deposits. The identities and definitional equation are represented as follows:

$$GDPS_t = GDPAG_t + GDPNAG_t$$

$$AL_t = TL_t - NAL_t$$

$$GDP_t = CP_t + CG_t + DPI_t + IG_t + FDI_t + EX_t - IM_t$$

$$NI_t = GDP_t - ITAX_t$$

$$TAX_t = DTAX_t + ITAX_t$$

$$I_t = DPI_t + IG_t + FDI_t$$

$$M2_t = M1_t + KCD_t + FCD_t$$

The identities and definitional equation are taken into account when constructing a model for simulation analyses.

6.2 Performance of Lao macroeconometric model

The model under the managed-floating exchange rate regime performs better than the model under the fixed exchange rate regime. Table 6.1 shows the ex-post simulation which compares the actual and fitted values of variables used in the Lao macroeconometric model. The estimation of Lao macroeconometric model under the managed-floating exchange rate regime includes the behavioural equation of exchange rate, while the estimation of Lao macroeconometric model under the fixed exchange rate regime excludes it. Under the managed-floating exchange rate regime, the root mean-squared percentage errors (RMSPE) of fitted values are 0.44% for *NAL*, 8.96% for *CP*, and 26.53% for *WAG*. Under the fixed exchange rate regime, RMSPE of fitted values are 0.45% for *NAL*, 9.09% for *CP*, and 28.01% for *WAG*.

Table 6.1: Comparison of model performance by root mean square percentage error

Macroeconomic variable	Managed floating exchange rate	Fixed exchange rate
NAL	0.44	0.45
CP	8.96	9.09
CG	15.03	15.22
EX	12.71	12.71
IM	12.04	12.06
DTAX	13.65	13.66
FCD	17.23	17.45
PL	10.12	9.24
WAGE	26.53	28.01
RATEU	29.30	—

Source: Author's estimation.

This may reflect the partial CS in Lao PDR which exists under the managed-floating exchange rate regime. The complete CS represented by the fixed exchange rate may not reflect well the actual CS in Lao PDR. Therefore, RMSPE of variables under the fixed exchange rate regime are slightly higher than those variables under the managed-floating exchange rate regime.

6.3 Simulation analyses of fiscal and monetary policies under the managed-floating and fixed exchange rate systems

6.3.1 Effects of fiscal and monetary policies on Lao economy

The combination of fiscal and monetary policies tends to be more effective under fixed exchange rate regime than under managed-floating exchange rate regime. Table 6.2 shows the effects of policy mix which is the combination of expansionary fiscal policy and restrictive monetary policy. Expansionary fiscal policy is conducted by an increase in government investment. Government investment is assumed to increase by 2% of GDP which is consistent with annual average of the simulated period (2005-2012). Restrictive monetary policy is conducted by an increase in kip-denominated deposit rate which may be considered as a strategy to reduce FCD. The combination of an increase in both government investment and kip-denominated deposit rate increases real GDP in demand side (*GDP*) by 1.8%

and 3.6% under the managed-floating and fixed exchange rate regimes, respectively. Similarly, it increases real GDP in supply side (*GDPS*) by 1.8% and 3.8% under the managed-floating and fixed exchange rate regimes, respectively.

Table 6.2: Effects of policy mix, percentage change of the baseline

Macroeconomic variable	ΔIG = 2% × GDP, ΔDRK = 20%	
	Managed floating exchange rate	Fixed exchange rate
Production block		
GDPS (Real)	1.812	3.805
GDPAG (Real)	0.024	0.055
GDPNAG (Real)	−0.001	−0.002
AL	−0.003	−0.006
NAL	0.008	0.019
Final demand block		
GDP (Real)	1.786	3.609
DS	−0.026	−0.187
NI (Real)	1.785	3.604
CP	−0.204	−0.572
CG	0.771	1.550
DPI	−0.548	−0.348
EX	−1.412	0.000
IM	4.674	6.144
Government block		
REV	0.747	1.501
TAX	0.864	1.765
DTAX	1.211	2.616
Money and price block		
M2	−1.185	−1.145
FCD	−2.167	−2.140
PL	−1.774	−3.626
WAGE	−0.664	−1.503
RATEU	−1.774	—

Note: Figures are the percentage change of the baseline, mathematically defined as $(simulated\ value - baseline\ value) \times 100/(baseline\ value)$.

Source: Author's estimation.

Under the managed-floating exchange rate, an increase in kip-denominated deposit rate increases the cost of holding the US dollar and thereby, reducing FCD. An increase in government investment results in an increase in GDP which also increases FCD. The net impact of policy mix leads to a reduction in FCD by 2.2% and hence M2 by 1.2%. The reduction of M2 implies that there is less money to purchase goods. The reduction of

M2, fall of domestic demand pressure, and an appreciation of kip/dollar rate decrease the price level by 1.8%. A fall in the price level reduces private wage rate (*WAGE*) by 0.7% and results in the appreciation of kip/dollar rate (*RATEU*) by 1.8%.

The fall in the wage rate has important effects on the Lao economy. Since the reduction of wage rate is smaller than the price level, real wage rate increases in the non-agriculture sector. An increase in real wage increases supply of labour in the non-agriculture sector by 0.008%, while reduces the supply of labour in the agriculture sector by 0.003%. Given the fixed capital stock, an increase in non-agriculture labour means that labours have lower productivity, resulting a fall of the production of output in the non-agriculture sector. In contrast, given the limited agricultural land, lower labour supply in the agriculture sector improves productivity of farmers, resulting in an increase in agriculture output. The net impact of the rise of real wage is that aggregate production (*GDPS*) increases by 1.8%.

The appreciation of kip/dollar rate also has important effects on the Lao economy. It reduces the exports of goods and services by 1.4%. The combined effect of the appreciation of kip/dollar rate and an increase in GDP in the demand side stimulates more imports by 4.7%. Since the percentage change of exports is slower than that of imports, trade deficit of Lao PDR tends to be more severe. Such trade deficit can be offset by other components of GDP, especially government consumption (*CG*).

The net effect of policy mix under the managed-floating exchange rate regime increases government consumption by 0.8%. This favourable outcome is resulted from an improvement in government revenue. The conduct of policy mix generates total government revenue by 0.8%. For instance, the policy mix increases national income (*NI*) by 1.8%, resulting in an increase in revenues of direct taxes (*DTAX*) by 1.2%. In contrast, the conduct of policy mix reduces private consumption (*CP*) by 0.2% and domestic private investment (*DPI*) by 0.5%.

Under the fixed exchange rate regime, the kip/dollar rate is treated as an exogenous variable. The conduct of policy mix under both fixed and managed-floating exchange rate regimes produce similar economic outcomes in that they increase real GDP while reducing the price level. However, the reduction of the price level is much higher in the fixed exchange rate regime

(−3.6%) than in the managed-floating exchange rate regime (−1.8%). This is consistent with the theory that the managed-floating exchange rate regime may absorb some shocks in the economy, while the fixed exchange rate regime translates all shocks to the economy. Since real GDP is defined as the ratio of nominal GDP to the price level, the impact of policy mix on real GDP under the fixed exchange rate regime is 3.6% which is much higher than that under the managed-floating exchange rate regime.

6.3.2 Effects of tight monetary policy on Lao economy

Monetary policy tends to be more effective under the managed-floating exchange rate regime than under the fixed exchange rate regime

Table 6.3: Effects of tight monetary policy, percentage change of the baseline

Macroeconomic variable	ΔDRK = 20%	
	Managed floating exchange rate	Fixed exchange rate
Production block		
GDPS (Real)	−0.057	−0.176
GDPAG (Real)	−0.002	−0.004
GDPNAG (Real)	0.000	0.000
AL	0.000	0.000
NAL	−0.001	−0.002
Final demand block		
GDP (Real)	0.013	−0.060
DS	0.070	0.116
NI (Real)	0.015	−0.057
CP	0.070	0.125
CG	0.007	−0.024
DPI	0.021	0.040
EX	0.045	0.000
IM	−0.030	−0.101
Government block		
REV	0.007	−0.023
TAX	0.008	−0.027
DTAX	0.012	−0.041
Money and price block		
M2	−1.249	−1.196
FCD	−2.288	−2.241
PL	0.056	0.176
WAGE	0.065	0.138
RATEU	0.056	—

Note: Figures are the percentage change of the baseline, mathematically defined as $(simulated\ value - baseline\ value) \times 100/(baseline\ value)$.

Source: Author's estimation.

(Table 6.3). An increase in kip-denominated deposit rate by 20% increases real GDP in demand side by 0.013% under the managed-floating exchange rate regime, while it reduces real GDP in the demand side by 0.060% under the fixed exchange rate regime. More precisely, tight monetary policy under the managed-floating exchange rate regime has more favourable effects on production, final demand, government revenues, and prices than those of the fixed exchange rate.

Under the managed-floating exchange rate regime, real GDP in production side reduces by 0.057%. In contrast, components of final demand also increase by 0.070% for private consumption, 0.045% for exports, and 0.007% for government consumption. Given the decrease in imports by 0.030%, trade balance tends to improve. In addition, government revenue increases by 0.007%. FCD decreases by 2.288%, resulting in a decrease in M2 by 1.249%.

Under the fixed exchange rate regime, real GDP in production side reduces by 0.176%. Government consumption and import decrease by 0.024% and 0.101%, respectively. A decrease in import tends to improve trade balance between Lao PDR and its trading partners given that export remains unchanged. Government revenue decreases by 0.023% which is in sharp contrast with the case of managed-floating exchange rate regime where tight monetary policy increases government revenue. FCD decreases by 2.242%, resulting in a decrease in M2 by 1.196%. In contrast, private consumption and domestic private investment increase by 0.125% and 0.040%, respectively.

6.3.3 Effects of expansionary fiscal policy on Lao economy

Fiscal policy tends to be more effective under the fixed exchange rate regime than under the managed-floating exchange rate regime (Table 6.4). This is different from the case of tight monetary policy where monetary policy tends to be more effective under the managed-floating exchange rate regime than under the fixed exchange rate regime. An increase in government investment by 2% of GDP increases real GDP in demand side by 3.670% under the fixed exchange rate regime and 1.772% under the managed-floating exchange rate regime. Therefore, expansionary fiscal policy under the fixed exchange rate regime has more favourable effects on

production, government consumption, government revenues, and prices than those of managed-floating exchange rate regime.

Table 6.4: Effects of expansionary fiscal policy, percentage change of the baseline

Macroeconomic variable	ΔIG = 2% × GDP	
	Managed floating exchange rate	Fixed exchange rate
Production block		
GDPS (Real)	1.870	3.988
GDPAG (Real)	0.026	0.059
GDPNAG (Real)	−0.001	−0.002
AL	−0.003	−0.007
NAL	0.009	0.021
Final demand block		
GDP (Real)	1.772	3.670
DS	−0.096	−0.304
NI (Real)	1.769	3.661
CP	−0.274	−0.697
CG	0.763	1.573
DPI	−0.569	−0.391
EX	−1.456	0.000
IM	4.704	6.249
Government block		
REV	0.740	1.524
TAX	0.855	1.792
DTAX	1.199	2.656
Money and price block		
M2	0.071	0.065
FCD	0.134	0.128
PL	−1.830	−3.793
WAGE	−0.729	−1.639
RATEU	−1.830	—

Note: Figures are the percentage change of the baseline, mathematically defined as $(simulated\ value - baseline\ value) \times 100/(baseline\ value)$.

Source: Author's estimation.

Under the fixed exchange rate regime, real GDP in production side increases by 3.988%. Government consumption and import increase by 1.573% and 6.249%, respectively. An increase in import tends to worsen trade balance between Lao PDR and its trading partners given that export remains unchanged. Government revenue and direct tax revenue increase by 1.524% and 2.656%, respectively. FCD and M2 increase by 0.128% and 0.065%, respectively.

Under the managed-floating exchange rate regime, real GDP in production side increases by 1.870%. Government consumption increases by 0.763%. While export reduces by 1.456%, import increases by 4.704%. This tends to worsen trade balance between Lao PDR and its trading partners. Government revenue and direct tax revenue increase by 0.740% and 1.199%, respectively. FCD and M2 increase by 0.134% and 0.071%, respectively.

6.4 Policy implications for macroeconomic management in Lao PDR

The simulation analyses reveal some aspects of the linkage between macroeconomic policies and macroeconomic performance in the presence of CS. By incorporating a model of FCD into the Lao macroeconometric model, I conducted simulation analyses by changing kip-denominated deposit rate and/or government investment to evaluate fiscal and monetary policies effectiveness under the managed-floating and fixed exchange rate regimes. The simulation analyses show that policy mix tends to be more effective under the fixed exchange rate regime than under the managed-floating exchange rate regime. This implies that adopting foreign currency to replace the Lao kip tends to increase the effectiveness of Lao macroeconomic management. But the decision to move toward this direction depends on the political view which may not occur in the short-term. An alternative strategy is to reduce the level of FCD, which seems to be a clear means to strengthen the instruments of fiscal and monetary policies.

The conduct of monetary policy in the presence of partial CS is not effective (Menon, 2009). For example, growth in capital inflow needs to be accommodated by real exchange rate appreciations. However, the nominal exchange rate cannot be relied upon to deliver it, so inflation is usually the result, and it is also difficult for the central bank to conduct open market operations, in order to sterilize large capital inflows, or mop up excess liquidity. This could add to inflation.

In the presence of CS, the fiscal policy will play a crucial role in stabilizing the economy. For instance, to deal with large capital inflows, cutting back on government investment can reduce the government's reliance on foreign savings to finance investment, and thereby limit the growth in the current account deficit. To reduce the pressure on real exchange rate appreciation associated with large capital inflows, selective liberalization of

the capital account to facilitate capital outflow could be pursued (Menon, 2009). More stable exchange rate would encourage the public to hold more kip, and therefore reduce FCD.

Conclusions

The study was set out to empirically evaluate the effectiveness of fiscal and monetary policies in the presence of currency substitution (CS) in Lao PDR. The theoretical literature on this subject in the context of Lao PDR is inconclusive on several vital questions within the CS discourse. The study sought to answer three main questions:

1. What are the determinants of CS in the Lao economy?
2. Does the proposition of long-run neutrality hold in the economy with CS?
3. Are fiscal and monetary policies effective in the presence of CS?

The main empirical findings are chapter specific and were summarized within the respective empirical chapters: Chapter 5 'Determinants of Currency Substitution and Long-Run Monetary Neutrality in Lao PDR—Empirical Analysis' addressed the first two research questions; Chapter 6 'Macroeconomic Policies under the Managed-Floating and Fixed Exchange Rate Regimes in Lao PDR—Empirical Analyses' addresses the third research question. The following sections will synthesize the empirical findings to answer the study's three research questions.

The analysis of CS determinants in Lao PDR contributes to the CS literature in two aspects. First, I empirically investigated the CS determinants within the error-correction framework for the period 1993–2012. The error-correction framework is useful for the CS analysis because it reports both long- and short-run impacts of CS determinants. Given the short sample period, I applied the bounds testing or ARDL approach to cointegration whose estimates are robust in small sample sizes and do not require the same order of integration for variables under investigation (Pesaran and Shin, 1999). This issue has not been sufficiently addressed in most of the empirical analyses of CS determinants (de Zamarocksy and Sa, 2002; Chaleunsinh, 2003; Keovongvichith, 2007; Ra, 2008).

The bounds testing approach to cointegration is demonstrated by the empirical case study of CS determinants in Lao PDR. Results of unit root tests for CS variables show the mixed results of integration order. For

instance, the order of integration of the CS ratchet effect ($\ln R$) is mixed: it is I(0) when either the intercept or time trend is excluded in the unit root test and I(1) when the intercept and a time trend are considered. The mixed results of integration order justify the use of the bounds testing approach instead of the maximum likelihood approach for cointegration analysis proposed by Johansen and Juselius (1990)[20]. Therefore, the bounds testing approach is adopted to examine the long- and short-term relationship between CS and its determinants in Lao PDR.

The findings in this study for the long-run impacts of the CS determinants are generally consistent with previous Lao studies and studies for other countries. The coefficient of the expected exchange rate depreciation was found to be statistically insignificant, and thereby indicating an increase in the CS ratio may not be associated with the expectation of exchange rate depreciation. This finding is consistent with Ra's (2008) results for the case of Lao PDR. The coefficient of the interest rate differential between kip and US dollar is statistically significant and positive, indicating the CS ratio increases when the interest rate differential widens. Therefore, a strategy of reducing the CS ratio by raising the interest rate of kip-denominated deposits should be carefully considered.

More importantly, the ratchet variable—the past peak value of the CS—was proven to exist. This implies that the CS during 1993–2012 is persistent and that particularly strong policies would need to be pursued over an extended period of time in order to convince depositors to switch back to kip-denominated assets. The coefficient of the ratchet variable is towards the lower end of existing estimates, namely Mongardini and Mueller (1999) for Kyrgyz Republic and Samreth (2011) for Cambodia. This suggests that in Lao PDR changes in foreign currency holdings, and therefore in the CS ratio, in response to measures for the reduction of CS such as the direct control of using the US dollar for economic transaction within the country, is likely to be slower than what Mongardini and Mueller (1999) and Samreth (2011) suggest.

[20] Johansen and Juselius's (1990) cointegration approach requires all variables to be the first order of integration.

However, the short-run impact is much larger than the long-run impact, and the coefficient of the error-correction term is large. Therefore, in the short-run changes in the CS ratio in response to policy changes designed to reduce foreign currency holdings will be large and over time they will gradually decrease. Nevertheless, the experience of other countries suggests that direct control of foreign currency holdings by monetary authorities should be complemented with an appropriate policy that leads to public trust in domestic currency. Otherwise, the direct control of foreign currency holdings is not recommended and must be avoided.

Second, it is argued that the parameter stability of the money demand function is an empirical issue. The estimation of a time series may result in unstable parameters which can lead to model mis-specification and hence, biases the results (Hansen, 1992). In this dissertation, the parameter stability tests applies the Pesaran and Pesaran (1997) test, which involves the CUSUM, CUSUM of squares, and one-step forecast tests for parameter stability. Both the CUSUM and CUSUMSQ tests plot the cumulative sum together with 5% critical lines. Parameter instability is found if the cumulative sum goes outside the area between the two critical lines. As a further check on parameter stability, the one-step forecast test is used to identify the specific point of break in the data series. The CUSUM, CUSUM of squares, and one-step forecast tests show that the parameters for the determinants of the CS degree for Lao PDR are stable over time. This result lends support to the persistence of CS in the Lao economy over the period 1993-2012.

The long-run neutrality of money was tested for the Lao economy using data of monetary aggregates, real GDP, and real output in three sectors, namely, agriculture, industry, and services. In the monetarist theories, money is assumed to be neutral in the long-run. That is, changes in the quantity of money affect the nominal variables in the macroeconomic system such as prices, wages and exchange rates, but not the real variables, such as employment, real GDP, and real consumption. The empirical study for Lao PDR provides more empirical evidence to the existing literature on LRN in the context of developing countries.

Following the existing literature on testing long-run monetary neutrality (e.g., Shelley and Wallace, 2004; Coe and Nason, 2004; Noriega, 2004), I apply the Fisher and Seater's (1993) method to test for LRN for the Lao economy over the period 1984–2011. The Fisher and Seater analysis provides a simple test of LRN. The LRN proposition is found if this slope coefficient approaches zero as the span over which these growth rates are calculated approaches to infinity. The test is commonly shown in the diagram which plots the slope coefficients from 1 to 30 over the periods of study along with the 95% confidence intervals (Fisher and Seater, 1993; Boschen and Otrok, 1994; Haug and Lucas, 1997). Since the sample period for the Lao economy is short relative to the existing literature, I plot the slope coefficients from 1 to 20 over the periods of study along with the 95% confidence intervals.

The empirical results on testing LRN proposition for the Lao economy show that the LRN proposition holds with respect to agricultural and industrial output. My results confirm the hypothesis of LRN found in the previous studies, including Sulku (2011) for Turkey, Chen (2007) for South Korea and Taiwan, and Habibullah et al (2001) for Malaysia.

In the aggregate level, however, the LRN proposition does not hold with respect to output of services and real GDP in the Lao economy. In particular, changes in the quantity of money have negative long-run effect on the level of real GDP. The rejection of LRN proposition with respect to services output and real GDP is robust whether M1 or M2 is used as the monetary measure. It is also robust for an alternative specification with a time dummy for the period during which the Asian financial crisis affected the Lao economy. The negative impact of money on real GDP implies that monetary expansion is unlikely to stimulate output, eliminate recession, and increase job opportunity. By contrast, the net effect of expansionary monetary policy may result in higher prices and make the economy more vulnerable. Hence, the monetary authority should not manipulate monetary policy to stabilize the fluctuations in business cycle before considering the relationship between money and real output.

The presence of CS has important implications for the conduct of fiscal and monetary policies. First, the government faces some loss of

seigniorage. The replacement of domestic currency by foreign currency in transactions limits the revenue that the government receives for printing domestic currency. Second, monetary policy becomes less effective, because changes in the domestic money supply or the domestic monetary base have less impact on domestic expenditure. The loss of government revenue and less effectiveness of monetary policy tools complicate the macroeconomic management in countries with partial CS.

Fiscal and monetary policies in Lao PDR were evaluated by the simulation analyses in the Lao macroeconometric model. The simulation analyses involve two alternative degrees of CS, partial CS and complete CS. Macroeconomic policies are evaluated for the case of an economy with partial CS compared with the case of an economy with complete CS. The economy with partial CS is represented by the managed-floating exchange rate regime, whereas the economy with complete CS is represented by the fixed exchange rate regime. The effectiveness of macroeconomic policies is evaluated against changes in real GDP.

The Lao macroeconometric model was constructed under the managed-floating and fixed exchange rate regimes. The major difference between the two regimes is that exchange rate is treated as an endogenous variable in the latter, while it is treated as an exogenous variable. The estimation results under the two regimes are very similar. Therefore, the specifications and estimations for the Lao macroeconometric model are explained only under the managed-floating exchange rate regime. The Lao macroeconomic model consists of four building blocks: production, final demand, money and prices, and government. There are 13 behavioural equations, six identities, and one definitional equation. Given the estimated behavioural equations, accounting identities and definitional equation, a policy shock initially disturbs a specific relation and then affects the economy through the propagation mechanism across the four building blocks. All the variables go through a dynamic adjustment process until the economy finds a new equilibrium.

The simulation analyses of fiscal and monetary policy under different exchange rate arrangements support the view that the implementation of policy mix between fiscal and monetary policy is more effective to stimulate

economic growth than the implementation of either fiscal or monetary policy. By incorporating a model of FCD into the Lao macroeconometric model, I conducted simulation analyses by changing kip-denominated deposit rate and/or government investment to evaluate fiscal and monetary policies effectiveness under the managed-floating and fixed exchange rate regimes. The simulation analyses show that policy mix tends to be more effective under the fixed exchange rate regime than under the managed-floating exchange rate regime. This implies that adopting foreign currency to replace the Lao kip tends to increase the effectiveness of Lao macroeconomic management. But the decision to move toward this direction depends on the political view which may not occur in the short-term. An alternative strategy is to reduce FCD, which seems to be a clear means to strengthen the instruments of fiscal and monetary policies.

The empirical results on the assessment of fiscal and monetary policies effectiveness in Lao PDR supported Menon (2009) who argues that the conduct of monetary policy in the presence of partial CS is not effective. For example, growth in capital inflow needs to be accommodated by real exchange rate appreciations. However, the nominal exchange rate cannot be relied upon to deliver it, so inflation is usually the result, and it is also difficult for the central bank to conduct open market operations, in order to sterilize large capital inflows, or mop up excess liquidity. This could add to inflation.

In the presence of CS, the fiscal policy will play a crucial role in stabilizing the economy. For instance, to deal with large capital inflows, cutting back on government investment can reduce the government's reliance on foreign savings to finance investment, and thereby limit the growth in the current account deficit. To reduce the pressure on real exchange rate appreciation associated with large capital inflows, selective liberalization of the capital account to facilitate capital outflow could be pursued (Menon, 2009). More stable exchange rate would encourage the public to hold more kip, and therefore reduce FCD.

The scale of currency-substitution debate is extensive and multifaceted even at a single country level. To generate achievable policy strategies and development targets with regards to the reduction of CS level, there is a need to investigate other macroeconomic implications of CS to

allow further assessment of cost and benefit of the subject. Exploring the following as future research strategies can facilitate the attainment of this goal.

First, the research should address the research question of whether partial CS has promoted international trade between Lao PDR and its partners. The existing studies on the relationship between the appropriate exchange regime and trade remain inconclusive. In theory, the hard peg option, such as a currency union or dollarization, is seen as having two potential benefits; providing a nominal anchor for macroeconomic stability, and fostering trade integration between an emerging market country and the industrial country to which it links its currency. The conjecture that currency unions foster trade integration could be supported by Rose (2000) and Rose and van Wincoop (2001) who demonstrate that membership in a currency union has a large, statistically significant effect on bilateral trade patterns. In contrast, the empirical results by Klein (2005) doubt on the trade-enhancing effects of dollarization among those countries most likely to adopt this policy. Currency unions do not significantly promote bilateral trade of Western Hemisphere countries that have experience with dollarization, nor do they affect bilateral United States trade with non-industrial countries or with Western Hemisphere countries.

Second, the research should address the research question of whether partial CS has helped Lao PDR achieve lower inflation, economic stability, and growth. The literature on CS and economic performance remains inconclusive. Supporters of CS have argued that countries that give up their currency will not encounter in monetary and macroeconomic mismanagement. Public finances will stay in balance, macroeconomic policy will be credible, and the external accounts will move within reasonable bounds. According to this view, CS will have two major positive effects on economic performance. First, inflation will be lower in countries with CS than those without CS. Alesina and Barro (2001), for instance, have argued that adopting another country's currency eliminates the inflation-bias problem of discretionary monetary policy. Second, countries that give up their currency will tend to grow faster than countries without CS. This growth effect is supposed to take place through two channels: (a) CS will mean lower interest rates,

higher investment, and faster growth (Dornbusch, 2001). And (b), by eliminating exchange rate volatility, CS may promote international trade and this, in turn, will result in faster growth.

Other authors, however, do not agree with the potential positive effects of CS on growth and overall macroeconomic performance. The empirical evidence on the relationship between monetary regimes and growth does not support the claim that CS or any exchange rate regime is an important determinant of growth (Eichengreen, 2001). Countries with a hard peg are difficult to accommodate external shocks, including terms of trade and world interest rate disturbances, which will be translated into greater instability and lower economic growth (Fischer, 1977). There is no unique recipe on exchange rate policy; while some countries will benefit from hard pegs, for other countries a floating regime will be more appropriate (Frankel, 1999).

References

Asian Development Bank (ADB). (2012). Retrieved March 2013, from Country Tables: Asian Development Bank: http://www.adb.org /Documents/ Books/Key_Indicators/2010/ Country.asp

Bank of Lao PDR (BOL) . (2012). Retrieved March 11, 2013, from Lao Monetary and Financial Statistics: http://www.bol.gov.la/english /financial_statistics.html

UNCTAD. (2013). Retrieved January 2013, from UNCTADstat: http://unctadstat.unctad.org/wds/ReportFolders/reportFolders.aspx?sCS_ChosenLang=en

World Development Indicators. (2013). Retrieved January 2013, from World Bank: http://databank.worldbank.org/data/views/variableselection /selectvariables.aspx?source=world-development-indicators

Alesina, A., & Barro, R. J. (2001). Dollarization. *The American Economic Review, 91*(2), 381-385.

Andersen, l. C., & Karnosky, D. S. (1972). The appropriate time frame for controlling monetary aggregates: The St. Louis evidence. *Controlling Monetary Aggregates II: The Implementation, Conference Series(9)*, 147-177. Boston: Federal Reserve Bank of Boston.

Arshad, I. (2003). Economic theory, transition & alternatives: Application to Lao PDR. *National Economic Research Institute*. NERI, Vientiane Capital, Lao PDR.

Atta-Mensah, J. (2000). Recent developments in the monetary aggregates and their implications. *Bank of Canada Review*.

Backus, D. K., & Kehoe, P. J. (1992). International evidence of the historical properties of business cycles. *American Economic Review, American Economic Association, 82*(4), 864-888.

Bae, S.-K., & Ratti, A. (2000). Long-run neutrality, high inflation, and bank insolvencies in Argentina and Brazil. *Journal of Monetary Economics, 46*, 581-604.

Bahmani-Oskooee, M., & Techaratanachai, A. (2001). Currency substitution in Thailand. *Journal of Policy Modeling, 23*(2), 141-145.

Bank of Lao PDR (BOL). (1997). Economic and financial statistics: 1990-1996. Vientiane: Bank of Lao PDR.

Bordo, M. D., & Choudhri, E. U. (1982). Currency substitution and the demand for money: Some evidence for Canada. *Journal of Money, Credit and Banking, 14*, 48-57.

Boschen, J. F., & Otrok, C. M. (1994). Long-run neutrality and superneutrality in an ARIMA framework: comment. *American Economic Review, 84*, 1470-1473.

Brillembourg, A., & Shadier, S. M. (1979). A model of currency substitution in exchange eate determination, 1973-1978. *International Monetary Fund Staff Papers*. Washington: International Monetary Fund.

Brown, R. L., Durbin, J., & Evans, J. M. (1975). Techniques for testing the constancy of regression relationships over time. *Journal of the Royal Statistical Society, Series B, 37*, 149-163.

Bullard, J., & Keating, J. W. (1995). The long-run relationship between inflation and output in postwar economies. *Journal of Monetary Economics, 36*, 477-496.

Calvo, G. A., & Végh, C. A. (1992). Currency substitution in developing countries: An introduction. *IMF Working Paper, WP/92/40*. Washington: International Monetary Fund.

Chaleunsinh, C. (2003). Dollarization in Laos: Causes, effects and possible solutions. *NERI's Economic Review*. Vientiane: National Economic Research Institute.

Chen, S. W. (2007). Evidence of the long-run neutrality of money: The case of South Korea and Taiwan. *Economics Bulletin, 3*(64), 1-18.

Clarida, Rechard, Jordi, G., & Mark, G. (1999). The science of monetary policy: A new Keynesian perspective. *Journal of Economic Literlature, 37*, 1661-1707.

Clements, B., & Schwartz, G. (1992). Currency subsitution: The recent experience of Bolivia. *World Development, 21*(11), 1883–1893.

Coe, P. J., & Nason, J. M. (1999). Long-run monetary neutrality in three samples: The United Kingdom, the United States, and the small. *Discussion Paper(99-06)*. University of Calgary, Department of Economics.

Coe, P., & Nason, J. M. (2003). The long-horizon regression approach to monetary neutrality: how should the evidence be interpreted? *Economics Letters, 78*, 351-356.

Coe, P., & Nason, J. M. (2004). Long-run monetary neutrality and long-horizon regressions. *Journal of Applied Econometrics, 19*(3), 355-373.

Cuddington, J., Garcia, R.-M., & Westbrook, D. (2002). A micro-foundations model of dollarization with network externalities and portfolio choice: The case of Bolivia. *Manuscript*. Georgetown University.

Dawson, J. C. (2004). The Asian crisis and flow-of-funds analysis. *The Review of Income and Wealth, 50*(2), 243-260.

de Zamarocksy, M., & Sa, S. (2003). Economic policy in highly dollarized economy: The case of Cambodia. *Occasional Paper 219*. Washington, DC: International Monetary Fund.

Dickey, D., & Fuller, W. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American Statistical Association, 74*, 427-431.

Dornbusch, R. (2001). Fewer monies, better monies. *American Economic Review, 2*, 238-242.

Economic Commission for Asia and the Pacific. (1997). Overcoming institutional constraints to implementing macroeconomic policies. *LDC series no. 1*.

Edwards, S., & Magendzo, I. I. (2003). Dollarization and economic performance: what do we really know? *International Journal of Finance and Economics, 8*, 351-363.

Eichengreen, B. (2001). What problems can dollarization solve? *Journal of Policy Modeling, 23*(3), 267-277.

Ekomie, J. T. (2013). Testing the long-run neutrality of money in developing economies: Evidence from EMCCA. *Modern Economy, 4*, 49-55.

El-Erian, M. A. (1988). Currency substitution in Egypt and the Yemen Arab Republic: A comparative quantitative analysis. *IMF Working Paper, WP/87/43*. International Monetary Fund.

Elkhafif, M. A. (2003). Exchange rate policy and currency substitution: The case of Africa's emerging economies. *R & D Management, 15*(1), 1-11.

Engle, R. F., & Granger, C. W. (1987). Cointegration and error correction representation. *Econometrica, 55*, 251-276.

Fischer, S. (1977). Stability and the exchnage rate system in monetarist model of the balance of payments. In R. Aliber, *The Political Economy of Monetary Reform.* Allahand.

Fischer, S. (2001). Exchange rate regimes: Is the bipolar view correct? Distinguished lecture on economics in government. *Journal of Economic Perspectives, 15*(2), 3-24.

Fisher, M. E., & Seater, J. J. (1993). Long-run neutrality and superneutrality in an ARIMA framework. *American Economic Review, 83*, 402-415.

Frankle, J. A. (1999). No single currency regime is right for all countries at all times. *National Bureau of Economic Research Working Paper(7338)*.

Friedman, B. M., & Schwart, A. (1963). *A monetary history of the United States.* Princeton University Press, Priceton, NJ. 1971.

Friedman, M., & Schwart, A. J. (1982). Monetary trends in the United States and the United Kingdom. *Chicago: University of Chicago Press*.

Garrett, T. A. (2003). Aggregated versus disaggregated data in regression analysis: implications for inference. *Economics Letters, 81*, 61-65.

Geweke, J. (1986). The superneutrality of money in the United States: An interpretation of the evidence. *Econometrica, 54*, 1-21.

Habibullah, M. S., Hong, P. C., & Mohamed, A. (2001). Testing long-run neutrality of money in Malaysia. *Journal Ekonomi Malaysia, 35*, 69-83.

Hakkio, C. S., & Rush, M. (1991). Cointegration: how short is the long-run? *Journal of International Money and Finance, 10*(4), 571–581.

Hansen, B. E. (1992). Tests for parameter instability in regressions with I(1) processes. *Journal of Business & Economic Statistics, 10*(3), 321-335.

Haug, A. A., & Lucas, R. F. (1997). Long-run neutrality and Superneutrality in an ARIMA framework. *The American Economic Review, 87*(4), 756-759.

Honohan, P. (2007). Dollarization and exchange rate fluctuations. *World Bank Policy Research Working Paper, No. 4172*. World Bank.

Humphrey, T. M. (1991). Nonneutrality of money in classical monetary thought. *Federal Reserve Bank of Richmond*.

International Monetary Fund (IMF). (2002). Lao People's Democratic Republic: Selected issues and statistical Appendix. *IMF Country Report(02/207)*. Washinton: International Monetary Fund.

International Monetary Fund (IMF). (2012, October). Lao People's Democratic Republic. *Staff Report for the 2012 Article IV Consultation*. Washington, D.C.: International Monetary Fund.

Jefferson, P. N. (1997). On the neutrality of inside and outside money. *Economica, 64*(256), 567–586.

Johansen, S. (1988). Statistical analysis of cointegrating vectors. *Journal of Economic Dynamics and Control, 12*, 231-254.

Johansen, S., & Juselius, K. (1990). Maximum likelihood estimation and inference on cointegration-with application to the demand for money. *Oxford Bulletin of Economics and Statistics, 52*(2), 169-210.

Keovongvichith, P. (2007). Foreign currency use in Laos: recent evidence and policy perspective. *Juth Pakai 9*. UNDP Lao PDR.

King, R. G., & Watson, M. W. (1997). Testing long-run neutrality. *Federal Reserve Bank of Richmond Economic Quarterly*, 69-101.

King, R. G., & Watson, W. W. (1994). The post-war U.S. Phillips Curve: A revisionist econometric history. *Canegie-Rochester Conference Series on Public Policy*, *41*, pp. 157-219.

Klein, M. W. (2005). Dollarization and trade. *Journal of International Money and Finance, 24*(6), 935-943.

Kormendi, R. C., & Meguire, P. G. (1984). Cross-regime evidence of macroeconomic rationality. *Journal of Political Economy, 92*, 875-908.

Kyophilavong, P. (2010). Lao People's Democratic Republic: Dealing with multiple currencies. In G. Capannelli., & J. M. eds, *Dealing with multiple currencies in transitional economies: The scope for regional cooperation in Cambodia, Lao PDR, and Vietnam* (pp. 99–130). Mandaluyong (Philippines): Asian Development Bank.

Levy-Yeyati, E., & Sturzenegger, F. (2001). Exchange rate regimes and economic perfomance. *IMF Staff Papers, 47*, 62-98.

Lucas, R. E. (1972). Expectations and the neutrality of money. *Journal of Economic Theory*, 103-124.

Lucas, R. E. (1973). Some international evidence on output-inflation trade-off. *The American Economic Review, 64*, 326-334.

Mah, J. (2000). An empirical examination of the disaggregated import demand of Korea—the case of information technology products. *Journal of Asian Economics, 11*, 237-244.

Malik, W. (2007). Monetary policy objectives in Pakistan. *PIDE Working Paper, 35*. Pakistan Institute of Development Economics.

McCallum, B. T. (1984). On low-frequency estimates of long-run relationships in macroeconomics. *Journal of Monetary Economics, 14*(1), 3-14.

McCallum, B. T. (1988). Robustness properties of rule for monetary policy. *Carnegie-Rochester Conference Series for Public Policy, 29*, 173-203.

McKinnon, R. I. (1973). *Money and capital in economic development.* Washinton, D. C.: The Brooking Institution.

Menon, J. (2008). Dealing with multiple currencies: what options for the transitional economies of Southeast Asia ? *Journal of the Asia Pacific Economy, 13*(2), 131–146.

Menon, J. (2009). Managing success in Vietnam: Macroeconomic consequences of large capital inflows with limited instruments. *ASEAN Economic Bulletin, 26*(1), 77-95.

Miles, M. (1978). Currency substitution, flexible exchange rates, and monetary independence. *American Economic Review, 68*(3), 428-436.

Mogardini, J., & Mueller, J. (1999). Ratchet effects in currency substitution: An application to the Kyrgyz Republic. *IMF Working Paper, WP/99/102*. International Monetary Fund.

Moosa, I. A. (1997). Testing the long-run neutrality of money in a developing economy: the case of Idia. *Journal of Development Economics, 53*, 139-155.

Mueller, J. (1994). Dollarization in Lebanon. *IMF Working Paper, No. 94/129*. Washington: International Monetary Fund.

Noriega, A. E. (2004). Long-run monetary neutrality and the unit-root hypothesis: further international evidence. *The North American Journal of Economics and Finance, 15*, 179-197.

Noriega, A. E., Soria, L. M., & Velazquez, R. (2005). *International evidence on monetary neutrality under broken trend stationary model*. Retrieved January 2013, from http://repec.org/esLATM04/ up.7482.1 080751251.pdf

Oi, H., Shiratsuka, S., & Shirota, T. (2004). On the long-run monetary neutrality in Japan. *Monetary and Economic Studies*, 79-113.

Olekalns, N. (1996). Some further evidence on the long-run neutrality of money. *Economics Letters, 50*(3), 393-398.

Oskooee, B. M., & Techaratanachai, A. (2001). Currency substitution in Thailand. *Journal of Policy Modeling, 23*(2), 141-145.

Otani, I., & Pham, C. D. (1996, May). The Lao People's Democratic Republic: Systemic Transformation and Adjustment. *Occasional Paper No. 137*. Washington DC: International Monetary Fund.

Pesaran, M. H., & Shin, Y. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. In S. Strom, *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium.* Cambridge: Cambridge University Press.

Pesaran, M., & Pesaran, B. (1997). *Working with Micro¯t 4.0: An interactive econometric software.* Oxford University Press, Oxford.

Pesaran, M., Shin, Y., & Smith, R. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*, 289-326.

Phillips, P. C., & Perron, P. (1988). Testing for unit roots in time series regression. *Biometrika*, 335-346.

Pindyck, R. S., & Rubinfeld, D. L. (1998). *Econometric models and economic forecasts* (4 ed.). New York: McGraw-Hill.

Poloz, S. (1986). Currency substitution and the precautionary demand for money. *Journal of International Money and Finance, 5*(1), 115–124.

Prock, J., Soydemir, G. A., & Abugri, B. A. (2003). Currency substitution: Evidence from Latin America. *Journal of Policy Modeling, 25*, 415-430.

Prock, J., Soydemir, G. A., & Abugri, B. A. (2003). Currency substitution: Evidence from Latin America. *Journal of Policy Modeling, 25*, 415–430.

Puah, C. H., Habibullah, M. S., & Mansor, S. A. (2008). On the long-run monetary neutrality: Evidence from the SEACEN Countries. *Journal of Money, Investment and Banking*(2), 50-62.

Ra, H.-R. (2008). Modeling dollarization: A case study for Cambodia, Laos, and Vietnam. *Global Economic Review, 37*(2), 157–169.

Ramirez-Rojas, C. L. (1985). Currency substitution in Argentina, Mexico, Uruguay. *International Monetary Fund Staff Papers, 32*(4), 629–667.

Reinhart, C. M., Rogoff, K. S., & Savastano, M. A. (2003). Addicted to dollars. *NBER Working Paper Series(10015)*. National Bureau of Economic Research.

Rojas-Suarez, L. (1992). Currency substitution and inflation in Peru. *IMF Working Paper(WP/92/33)*. International Monetary Fund.

Rose, A. K. (2000). One money, one market: Estimating the effect of common currencies on trade. *Economic Policy, 15*(30), 7-46.

Rose, A. K., & Engel, C. (2000). Currency unions and international integration. *Working Paper(7872)*. National Bureau of Economic Research.

Rose, A. K., & Wincoop, E. V. (2001). National money as a barrier to international trade: The real case for currency union. *American Economic Review, 91*(2), 386-390.

Sahay, R., & Végh, C. (1996). Dollarization in transition economies: Evidence and policy implications. In P. Mizen., & E. J. eds, *The Macroeconomics of International Currencies: Theory, Policy and Evidence* (pp. 193–224). P. Mizen, and E.J. Pentecost eds: Cheltenhem: Edward Elgar Publishing.

Said, S. E., & Dickey, D. A. (1984). Testing for unit roots in autoregressive-moving average models of unknown order. *Biometrika, 71*(3), 599-607.

Samreth, S. (2011). An empirical study on the hysteresis of currency substitution in Cambodia. *Journal of Asian Economics, 22*, 518–527.

Sargent, T. J. (1971). A note on the accelerationist controversy. *Journal of Money, Credit and Banking, 3*(3), 721-725.

Sbordone, A., & Kutner, K. (1994). Does inflation reduce productivity? *Federal Reserve Bank of Chicago Economic Perspectives*, 2-14.

Serletis, A., & Koustas, Z. (1998). International evidence on the neutrality of money. *Journal of Money, Credit and Banking, 30*(1), 1-25.

Serletis, A., & Koustas, Z. (2001). Monetary aggregation and the neutrality of money. *Economic Inquiry, 39*(1), 124–138.

Serletis, A., & Krause, D. (1996). Empirical evidence on the long-run neutrality hypothesis using low frequency international data. *Economics Letters, 50*, 323-327.

Shaw, E. S. (1973). *Financial deepening in economic development.* New York: Oxford University Press.

Shelley, G., & Wallace, F. (2004). Long-run neutrality and superneutrality of money: Aggregate and sectoral tests for Nicaragua. *Macroeconomics*.

Sulku, S. N. (2011). Testing the long-run neutrality of money in a developing country: Evidence from Turkey. *Journal of Applied Economics and Business Research, 1*(2), 65-74.

Suvannaphakdy, S. (2013). An empirical study of trade and foreign direct investment in Laos. *PhD Dissertation*. Hiroshima Shudo University, Japan.

Toyoda, T., & Kyophilavong, P. (2005). Saving and asset holding behaviors of urban households in the Lao PDR. In N. Amakawa., & N. Y. eds, *Towards a Market Economy under One Party System in the Lao PDR.*

Toyoda, T., & Kyophilavong, P. (2007). Unfavorable truth of currency integration: The case of Laos. *Journal of Economic Sciences, 11*(1), 1-18.

Us, V. (2003). Analyzing the persistence of currency substitution using a ratchet variable: The Turkish case. *Emergin Markets Finance and Trade, 39*(4), 58-81.

Viseth, K. (2001). Currency substitution and financial sector developments in Cambodia. *Working Paper 01–4*. Asia Pacific School of Economics and Government.

Wallace, F. H. (1999). Long-run neutrality of money in the Mexican economy. *Applied Economics Letters, 6*, 637-639.

Weber, A. A. (1994). Testing long-run neutality: Empirical evidence for G7-countries with special emphasis on Germany. *Carnegie-Rochester Conference Series on Public Policy, 41*, 67-117.

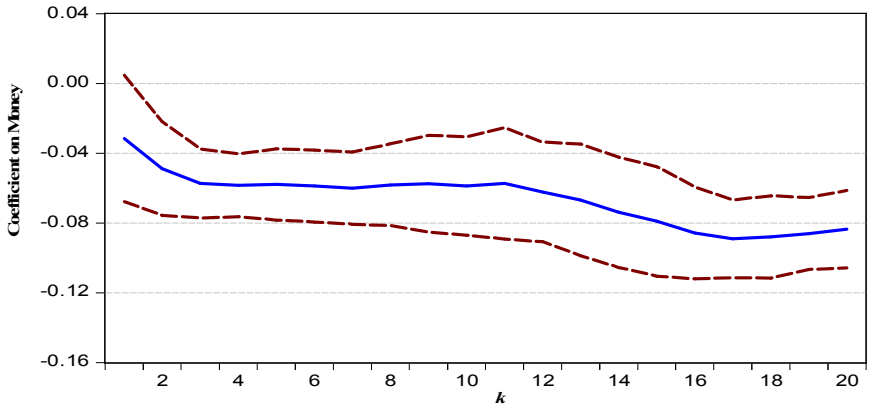
White, H. (1980). A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica, 48*(4), 817-838.

Xaiyavong, I., & Czerkawski, C. (2013). Money and real output in Laos: An econometric analysis. In M. C. Kitahara, *Social Systems Solutions Through Economic Sciences* (pp. 59-72). Kyushu University Press.

Zivot, E., & Andrew, D. W. (1992). Further evidence on the great crash, the oil price schock, and unit root hypothesis. *Journal of Business and Economic Statistics, 10*(3), 251-270.

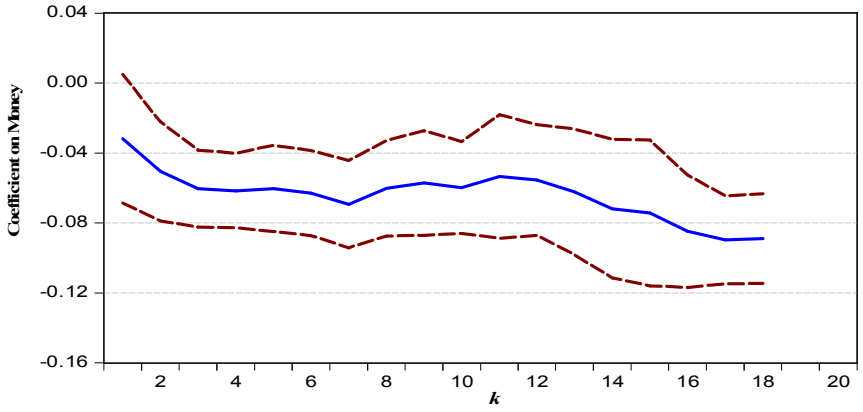
Zivot, E., & Wang, J. (2006). *Modeling Financial Time Series with S-PLUS.* University of Washington.

Appendix A



Source: Author's estimation.

Diagram A.1 Lao real output on M1 money, 1980–2011: 95% confidence interval



Source: Author's estimation.

Diagram A.2 Lao real output on M1 money with crisis dummy, 1980–2011: 95% confidence interval