



UNIVERSITI PUTRA MALAYSIA

**THE MONETARY APPROACH TO EXCHANGE RATE
DETERMINATION IN FIVE ASEAN COUNTRIES**

LEE CHIN.

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**THE MONETARY APPROACH TO EXCHANGE RATE DETERMINATION
IN FIVE ASEAN COUNTRIES**

By

LEE CHIN

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Doctor of Philosophy**

June 2005



Specially Dedicated To.....

Dad (Lee Kwan)

Mum (Liu Kui Fah)

Younger Brother (Lee Ong)

Youngest Brother (Lee Soon)

for their love and support.....



Abstract of thesis presented to the Senate of Universiti Putra Malaysia in
fulfilment of the requirements for the degree of Doctor of Philosophy

**THE MONETARY APPROACH TO EXCHANGE RATE DETERMINATION
IN FIVE ASEAN COUNTRIES**

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LEE CHIN

June 2005

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This study examines the monetary model of exchange rate determination for five ASEAN countries, namely, Indonesia, Malaysia, the Philippines, Singapore and Thailand; and to estimate their exchange rate misalignments before the 1997 currency crisis. The validity of the monetary models; the relationship between exchange rates and macroeconomic fundamentals; the restoration of the long-run equilibrium exchange rates; and the out-of-sample forecasts of monetary model were examined using vector error-correction model. The results showed that the series used are stationary and cointegrated. The likelihood ratio tests cannot reject the structural identification of the implied cointegrating relation is the sticky-price monetary model for all five ASEAN countries but rejected almost all the flexible-price monetary model and the imposed restriction of proportionality between the exchange rate and relative money. The estimated long-run parameters for Indonesia and Singapore strongly support the theory of monetary models while the result for the Philippines provides weak support. However, the long-run coefficients for Malaysia and Thailand are inconsistent with the theory. The error-correction terms are significant and correctly signed. The speeds of adjustment are rapid in Indonesia and Thailand while the speeds for Malaysia, the Philippines and Singapore are slower. Using the final parsimonious vector error-correction models, out-of-sample predictions for ASEAN five exchange rates are generated. The plotted actual and fitted exchange rates show that the models are able to track the actual exchange rate trend quiet well. The resulting residuals between the actual and the fitted values of exchange rate are the estimated misalignments. The results indicated that the Indonesia rupiah, Malaysian ringgit, Philippines peso and Singapore dollar were overvalued before the currency crisis while Thai baht was undervalued on the eve of the crisis. However, these five countries suffered modest misalignment. Therefore, little evidence of exchange misalignment is found to exist in 1997:Q2. In addition, the measure of the exchange rate valuation for ringgit Malaysia after imposing the pegging system shows that the RM/USD exchange rate has been pegged at equilibrium level after the implementation of pegging RM3.80 to one US dollar.



Abstrak thesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**PENENTUAN KADAR PERTUKARAN MENGGUNAKAN KAEDAH
MONETARI DALAM LIMA NEGARA ASEAN**

Oleh

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Kajian ini menguji model monetari bagi penentuan kadar pertukaran lima negara ASEAN, iaitu Indonesia, Malaysia, Filipina, Singapura, dan Thailand; dan menganggar pesongan kadar pertukaran mereka sebelum krisis kewangan tahun 1997. Pengesahan bagi model-model monetari; hubungan di antara kadar pertukaran dan asas makroekonomi; pemulihan keseimbangan kadar pertukaran jangka panjang; dan unjuran luar sampel dari model monetari diuji dengan menggunakan model vektor pembedahan ralat. Keputusan menunjukkan bahawa siri-siri yang diuji adalah pegun dan berintegrasi. Ujian nisbah kemungkinan tidak dapat menolak pengenalan struktur bahawa hubungan integrasi adalah model monetari lekutan harga bagi kelima-lima negara ASEAN, tetapi menolak hampir semua model monetari harga-mudah-ubah dan kekangan nisbah persamaan di antara kadar pertukaran dan wang relatif. Angkubah-angkubah jangka panjang yang kami dapati bagi negara Indonesia dan Singapura menyokong teori model monetari, sedangkan penemuan bagi negara Filipina memberi sokongan yang lemah, tetapi penemuan bagi Malaysia dan Thailand bercanggah dengan teori. Pembolehubah-pembolehubah pembedahan ralat mempunyai tanda yang betul dan signifikan. Kelajuan perlarasan adalah pantas bagi negara Indonesia dan Thailand tetapi agak lambat bagi negara Malaysia, Filipina, dan Singapura. Dengan menggunakan model vektor pembedahan ralat yang teringkas, unjuran luar sampel untuk kadar pertukaran bagi lima negara ASEAN diperolehi. Lakaran-lakaran kadar pertukaran sebenar dan jangkaan menunjukkan bahawa model-model ini berupaya untuk mengesan tren kadar pertukaran. Baki antara kadar pertukaran sebenar dan jangkaan adalah anggaran pesongan bagi kadar pertukaran. Keputusan menunjukkan bahawa rupiah Indonesia, ringgit Malaysian, peso Filipina, dan dollar Singapura adalah lebih nilai sebelum krisis kewangan, manakala baht negara Thai pula kurang nilai. Walaubagaimanapun, lima negara ini hanya mengalami pesongan kadar pertukaran yang sederhana. Oleh itu, tiada bukti yang kukuh menunjukkan wujudnya pesongan kadar pertukaran pada 1997:Q2. Pengukuran nilai kadar pertukaran bagi ringgit Malaysia selepas pelaksanaan sistem kadar pertukaran tetap menunjukkan bahawa kadar pertukaran RM/USD berada pada paras keseimbangan selepas pelaksanaan sistem kadar pertukaran tetap RM3.80 kepada satu dollar US.



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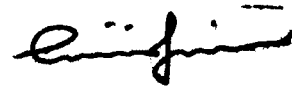


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DECLARATION

I hereby declare that the thesis is based on my own original work except for quotations and citations, which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.



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LIST OF ABBREVIATIONS/GLOSSARY OF TERMS

ADF	Augmented Dickey-Fuller
AFPMM	augmented flexible-price monetary model
AIC	Akaike information criterion
ARCH	autoregressive conditional heteroskedasticity
ARIMA	autoregressive integrated moving average
ARMA	autoregressive moving average
ASEAN	Association of Southeast Asian Nations
ASEAN-5	Indonesia, Malaysia, the Philippines, Singapore and Thailand
ASPMM	augmented sticky-price monetary model
BNM	Bank Negara Malaysia
CBP	Central Bank of the Philippines
CIP	covered interest rate parity
CPI	consumer price index
CV	cointegration vector
DF	Dickey-Fuller
ECM	error-correction model
ECT	error-correction term
FPMM	flexible-price monetary model
FDI	foreign direct investment
G7	Canada, France, Germany, Italy, Japan, United Kingdom, United State
GDP	gross domestic product
IMF	International Monetary Fund



IPI	Industrial product index
IRF	impulse response function
KPSS	Kwiatkowski, Phillips, Schmidt, and Shin
MAS	Monetary Authority of Singapore
MD	money demand
OECD	Organization for Economic Co-operation and Development
OLS	ordinary least squares
PPP	purchasing power parity
RID	real interest rate differential
RE	rational expectation
RM	ringgit Malaysia
RMSE	root-mean squared error
SE	standard error
SPMM	sticky-price monetary model
UIP	uncovered interest rate parity
U.K.	United Kingdom
U.S.	United States
VAR	vector autoregressive
VDC	variance decomposition
VECM	vector error-correction model



CHAPTER 1

INTRODUCTION

1.1 Background

The word most commonly used by economists to describe the Southeast Asia's remarkable economic growth during the 1980s and early 1990s was "miracle". Malaysia, Indonesia, Thailand, South Korea and other countries in the region enjoyed rates of growth of nearly 8% a year, several times faster than those in the U.S. and many other Western industrialized nations. The "Asian miracle" was considered extraordinary because the region's rapid economic growth was accompanied by very little unemployment and no significant wealth gap between the rich and the poor.

However, circumstances had dramatically changed in 1997. Since July 1997, Southeast Asia was gripped by an economic crisis of formidable proportions. At first, the economic crisis was limited to Thailand's financial sector, but it quickly grew to engulf Malaysia, Indonesia and South Korea as well. The immediate trigger of Southeast Asia's current predicament was the devaluation of currencies in the region. The devaluation had eroded the value of Asian currencies, making it much more difficult for Asian businesses and banks to pay back debts that they owed in foreign denominations, such as the U.S. dollars. A wave of loan defaults resulted, and much of Asia's financial sector loomed toward bankruptcy. Unable to raise enough financial capital to fix their ailing economies, several Asian governments were forced to ask for international assistance. For Indonesia, Thailand and South Korea, help arrived in the form of loans from the International Monetary Fund (IMF), a worldwide organization



that seeks to maintain financial stability in the global economy. In return for those funds, recipient countries must implement a series of austerity measures designed to contain the crisis and improve their free-market economic policies.

1.1.1 The Asian Miracle

Economists have long marveled over the ability of countries in Southeast Asia to pick themselves up from dire poverty and become some of the strongest economies in the world. The Association of Southeast Asian Nations (ASEAN)¹ countries have been among the fastest growing economies in the world. During 1970-96, the ASEAN economies grew by an average of 6.6% per annum (ASEAN Secretariat, 1998: p.4). Singapore recorded notable rates of growth averaging 8.5% per annum during the period of 1976-97, with the exception of the two recession years between 1985 and 1986. And the real gross domestic product (GDP) of Malaysia, Thailand and Indonesia had grown at an average rate of 7-8% during the late 1980's until the emergence of the currency crisis in mid 1997. Unlike the other four ASEAN countries, the Philippines did not record impressive GDP growth rates during the early 1990's due to major political and economic crisis. The economy was only picking up after 1993 with an annual growth of GDP averaged 4-5% during 1994-97. With the admission of Vietnam into ASEAN in 1995, Laos and Myanmar in 1997 and later Cambodia in 1999, these transition economies have added another dimension to the ASEAN macroeconomic picture. Sharp rise in foreign direct investment inflows has stimulated their economic growth and brought significant transformation to these

¹ The Association of Southeast Asian Nations or ASEAN was established on 8 August 1967 in Bangkok by the five original Member Countries, namely, Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Brunei Darussalam joined on 8 January 1984, Vietnam on 28 July 1995, Laos and Myanmar on 23 July 1997, and Cambodia on 30 April 1999.



economies (ASEAN Secretariat, 1998: p.6). Output growth had moderated in 1996 compared to 1995 for most ASEAN countries (Table 1.1). The average GDP growth rate in ASEAN declined from 7.3% in 1995 to 6.8% in 1996. However, the growth accelerated in Brunei Darussalam and the Philippines. Nevertheless, the GDP growth in the ASEAN region remained strong.

Table 1.1: GDP Growth Rates (%) of ASEAN Countries, 1995-2003

COUNTRY	1995	1996	1997	1998	1999	2000	2001	2002	2003
Brunei Darussalam	2.0	2.8	4.1	1.0	2.5	2.8	3.0	3.2	3.2
Cambodia						7.0	5.7	5.5	5.0
Indonesia	8.3	8.0	4.6	-13.6	1.3	4.9	3.4	3.7	4.1
Laos				5.0	6.5	5.8	5.8	5.9	5.9
Malaysia	9.4	8.6	7.7	-6.5	5.8	8.0	0.3	4.1	5.2
Myanmar				7.0	7.0	13.7	9.9	5.0	5.1
The Philippines	4.7	5.8	5.2	-0.4	3.2	4.4	4.5	4.4	4.5
Singapore	8.7	7.8	6.8	1.7	5.4	9.4	-2.4	2.2	1.1
Thailand	8.8	5.5	-0.4	-10.2	3.3	4.6	1.9	5.3	6.8
Vietnam		9.3	8.2	3.5	4.2	6.7	6.9	7.0	7.2
ASEAN ^a	7.0	6.8	5.2	-1.4	4.4	6.7	3.9	4.6	4.8

Note: a refers to the average growth rate.

Source: ASEAN Secretariat (2004).

1.1.2 Currency Crisis

The impressive growth trajectory in the first half of the 1990's changed dramatically with the onset of the currency crisis. Massive attacks on the baht took place on 14 and 15 May 1997, forcing the Bank of Thailand to sell dollars. Notwithstanding the huge amount of intervention to defend baht, the baht was forced to float on 2 July 1997. When the Thai baht came under speculative attack, the other Southeast Asian countries also experienced heavy selling pressure. The common reaction in the region to the difficulties is massive intervention by the central banks. The central bank of the Philippines used almost one billion U.S. dollars reserves within a few days without any positive results and thereafter allowed the peso to float on 11 July 1997. The central bank of Malaysia spent an estimated USD1.5 billion before surrendered on 14

July 1997. Indonesia rupiah also forced to float by market pressure on 14 August 1997. Although the Singapore dollar was not subjected to strong speculative attacks, the regional currency and financial crisis had impaired but not collapsed the Singapore dollar. The Singapore dollar depreciated against the U.S. dollar but rose sharply against other Asian currencies. The transition economies had not been spared from the effects of the regional crisis. In 1998, the Laotian Kip fell by 70%, the Myanmar Kyat lowered by 50% and the Vietnamese Dong devalued by 15% compared to their July 1997 values.

1.2 Issues

Before the currency crisis, the ASEAN countries were among the fastest growing economies in the world, accompanied by low to moderate inflation and unemployment rates, rapid export growth, manageable external debt and improvement in current account deficits. During 1970-1996, the ASEAN economies grew by an average of 6.6% per annum (ASEAN Secretariat, 1998: p.4). As the economies experienced unprecedented growth in the last decade, the region also saw continuing development and liberalization in the financial system. After the total collapse of the Bretton Woods system in March 1973, the South East Asia countries then evolved into a generalized floating exchange rate system. Initially, some of their exchange rates were pegged to a single currency while others adopted a system of pegging to a basket of their trading partners' currencies. Still others preferred a managed float system. Before the onset of currency crisis, Indonesia and Brunei peg their currencies to US dollar and Singapore dollar, respectively. Meanwhile Malaysia, Thailand and Myanmar peg their currencies to a basket of their respective trading partners'



currencies. While Singapore, Vietnam and Laos practised the managed float system and that the Philippines adopted an almost fixed nominal exchange rate regime. In pursuit of economic policies, most ASEAN countries placed a heavy reliance on the exchange rates, both as a means of maintaining international competitiveness and as an anchor for domestic prices. In doing so, different countries adopted variations of the flexible rate system in a way that real effective exchange rate would guide movements in the nominal exchange rate so that these two objectives are kept under constant check. Their outcomes, however, were diverse both in patterns and in magnitudes, and so are the characteristics of each individual ASEAN countries.

The Southeast Asian currencies came under speculative pressure following the renewed attacks on the Thai baht beginning of May 1997. Following the abandonment of the baht-USD exchange rate peg on 2 July 1997; the contagion effects swept across the regional economies. The ringgit depreciated sharply and forced to float on 14 July 1997 after valiant attempt by the central bank, Bank Negara Malaysia (BNM), to defend it, while the Philippines peso was floated on 11 July 1997, followed by Indonesian ruppiah on 14 August 1997. Most Southeast Asian economies, which maintained fixed but adjustable exchange rates together with a fairly open capital account for the past decade (and longer in some cases) was not sustainable. Malaysia opted to close their capital accounts significantly while the other four major Southeast Asian economies have adopted floating regimes, albeit with some central bank smoothing interventions. Indonesia and Thailand were forced to float by market pressures in mid-1997. Subsequently they have adhered to this regime as part of the IMF agreement. On the other hand, the Philippines and Singapore have floated voluntarily.

The impact of the currency crisis has been more severe than anticipated. Substantial currency depreciations, sharp declines in equity prices, financial collapse, corporate bankruptcies, higher unemployment, increase in price levels, lower real household income and increased poverty levels have all lowered the growth prospects of ASEAN economies leading to recession in some countries. Thus, after the currency crisis, the economic growth of Malaysia, Thailand and Indonesia had contracted by as much as 6.5%, 10.2% and 13.6% respectively in 1998. The Philippines only experienced -0.4% of economic growth while Singapore, Brunei, Laos and Vietnam registered a sharp slowdown in economic growth in 1998.

Many studies have tried to figure out the causes of Asian currency crisis, but the discussion has essentially centred around two broad approaches. The first is what is known as the “fundamentalist” view most notably advocated by Corsetti *et al.* (1998). This view suggests that the crisis was due to structural weaknesses prevalent in the domestic financial institutions together with unsound macroeconomic policies. And there were also some signs of vulnerability in the economies, such as current accounts deficit, overvalued exchange rates and a slowdown in export growth. The second view tells the story of a “financial panic”, a view put forward by Radelet *et al.* (1998). This view emphasizes the role of expectations, panic and over adjustment in explaining the propagation of the crisis. The crisis was largely due to an abrupt change in investor expectations.

It should be noted, however, that the two broad views on the origins of the crisis are by no means exclusive. There are issues, which both sides have agreed upon. It is agreed that the subsequent contagion effect that spread throughout the region was

caused by panic and there were some fundamental concerns about the economies before the crisis. There is, therefore, yet to be an international consensus on the cause of the crisis. But it has become obvious that these economic fundamentals play an important role in this crisis.

As recalled by former Governor of the Central Bank of Indonesia, Djiwandono (1998), the economic growth in recent years had been the result of less and less efficient investment financed partly by foreign capital. Piei and Ariff (1998) also underlined the fact that over the last few years the total factor productivity growth in Malaysia had fallen considerably, and even became negative in 1997, hence making the growth process progressively less sustainable. Whereas, in Thailand, a series of corporate failures, lack of rigour in the management and supervision of national financial systems, insufficient strictness on behalf of national authorities and the distortions created by the government had a certain responsibility in the crisis (Narongchai, 1998).

One of the principal policy mistakes in the region, which is highlighted by a few observers (Hill, 1998; Nidhiprabha, 1998; Sadli, 1998 and Athukorala, 1998), was the commitment to a rigidly fixed exchange rate or quasi-fixed exchange rates. For example, Indonesia pegged to a single currency, the U.S. dollar, while others pegged to a basket of currencies, in which the effective weight of the U.S. dollar in the basket was so high that it could be characterized as an implicit peg to the U.S. currency. They were hoping that the pegged to the value of the U.S. dollar would help to ensure its stability, however, in recent years, a robust U.S. economy had strengthened the dollar which had led many investors to believe that these currencies were overvalued.

