Capital Controls, Financial Crises and Cures: Simulations with an Econometric Model for Malaysia

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Abstract

A country becomes more vulnerable to outside effects with liberalization of the capital account. Domestic policy makers have a problem in controlling their economy as seen in many countries, and controls have been advocated to deal with financial crises. They help to slow down capital flight and depletion of international reserves. This paper offers a method to study possible effects of capital controls, which takes feedback mechanisms in the economy into consideration. The proposed approach is the use of a macro-econometric model for Malaysia. A simultaneous equation model has the advantage of incorporating various aspects of the economy, and analyzing possible effects on many variables as well as on the growth, which is generally the focus of attention. The major conclusion of the paper is that capital controls in Malaysia had many desired effects on growth, inflation, and balance of payments, without doing much harm to the attraction of foreign direct investment, in the medium-run.

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1. Introduction

Capital flows to developing countries grew substantially during the post-1990 period. With liberalization of the capital account a country becomes more vulnerable to outside effects. Domestic policy makers have a problem in controlling their economy as seen in many countries (Mariano,et.al. 2002). Controls have been advocated to deal with financial crises. They help to slow down capital flight and depletion of international reserves. Krugman (1998) indicated that countries facing major crisis may benefit from temporary imposition of controls, by giving time to lower domestic interest rates and adopt a growth package. The reaction to the imposition of controls may be negative in international financial markets. There is a delicate balance between liberalization and controls. As Tobin (2001) concluded "Integration of finance throughout the world can be of benefit to developing, emerging, and transition economies, but not without some limits." The "Tobin Tax" gained considerable popularity among many international economists as a way to raise liquid funds, but Tobin often said that his intent was "to put sand in the wheels" in order to slow down crises in early stages of trouble.

Effects of capital controls, especially on economic growth, are highly debated (among others Calvo,1998; Edison, Klein, Ricci and Slok, 2002; Goldstein, Kaminsky, and Reinhart ,2000); IMF,1998a, 1998b; Kahler, 1998; Kaminsky & Reinhart,1998, 1999, 2000; Klein, 1998; Krugman,1979, 1998; Rodrik, 2001; and Salvatore, 1998). There are cross-country studies, as well as case studies using different methodologies. This paper offers another method to study possible effects of capital controls, which takes feedback mechanisms in the economy into consideration. The proposed approach is the use of a macro-econometric model for Malaysia. A simultaneous equation model has the advantage of incorporating various aspects of the economy, and analyzing possible

effects on many variables as well as on the growth, which is generally the focus of attention.

The major conclusion of the paper is that capital controls in Malaysia had many desired effects on growth, inflation, and balance of payments, without doing much harm to the attraction of foreign direct investment, in the medium-run.

The paper is in four sections. Section 2 is devoted to a very brief review of earlier studies. Main characteristics of the macro-econometric model are summarized in the third section. Simulation results are given in Section 4, and major conclusions are stated in the final section.

2. A Brief Review of Studies on Capital Controls and Financial Crises

It is argued that with liberalization of the capital account a country becomes more vulnerable to outside effects. The instability caused by liberalization can be compensated by a higher growth rate to follow, largely due to greater availability of capital (Summers, 2000). Stiglitz (2000) draws attention to the need for the distinction between various forms of capital flows, and advocates the flow of foreign direct investment) (FDI). Singh (2003) argues that "even FDI, if unregulated, may do more harm than good to many countries".

Edison, Klein, Ricci and Slok (2002) survey the effects of capital account and stock market liberalization on economic growth, and conclude that there is support for a positive effect of capital account liberalization on growth, especially for developing countries.

Eichengreen & Langlang (2003) state that capital controls influence macroeconomic performance through two channels, directly with a positive impact on resource allocation and efficiency and indirectly by limiting the disruptive effects of crises. There are significant flows of capital toward sectors where the rate of return is high, provided

financial markets are working well. In that case, liberalization leads to a more efficient allocation of resources and to faster economic growth. If there are problems in domestic and/or international financial markets, the consequences can be less favorable. They also demonstrate the ability of controls to neutralize the disruptive effects of crises. Since vulnerability to crises varies across countries and with the structure and performance of the international financial system, "the effects of capital account liberalization on growth are contingent and context specific". They present empirical results using a panel of 21 countries covering a longer period of 1880-1997, and a wider panel for the post-1971 period to support their arguments.

Kaplan & Rodrik (2001) study how Malaysia performed compared to Thailand and Korea when they were all undergoing IMF programs. The reason for making that comparison was their view on Malaysian policies in the summer of 1998, which seemed to be unsustainable. They argue that pressure against the ringgit was building up, and the economic decline was not about to be reversed on its own. Controls were introduced to contain the joint effects of crisis, stabilization, and especially contagion to others in the region. They use difference-in-differences method and monthly and quarterly data to show that Malaysian policies including capital controls produced faster economic recovery compared to its neighbors.

Edison & Reinhart (2000) use monthly and daily data to study effectiveness of capital controls in Malaysia, Thailand, Philippines, and South Korea. Their GARCH(1,1) models using daily data indicate that capital controls were significant in reducing volatility in daily interest rates and daily changes in interest rates in Malaysia, and increasing volatility in daily stock returns in Thailand. They conclude that controls led to a greater stability in interest rates and exchange rates in Malaysia, but not in Thailand. A possible explanation given for the difference was the existence of offshore banking centers that provided leakages and arbitrage opportunities in Thailand. Attention was drawn to differences between experiences of Thailand and Malaysia. First, Thailand was undergoing speculative attacks when they tried to use capital controls as a defense mechanism; Malaysia was not. Second, Malaysian controls were quite broad and aimed

to eliminate all loopholes and speculations, while controls in Thailand were not as comprehensive.

Mariano, et.al. (2002) constructed a Markov switching autoregressive model that allows intercepts, lag coefficients and error variances to switch stochastically over time according to the value taken by a latent Markov chain describing the vulnerability of the country's currency to speculative attacks. Estimates of Markov switching models for Indonesia, Malaysia, the Philippines, and Thailand were obtained using monthly data from 1974 to 1998. The estimated models are mean-switching and variance-switching models of month-to-month percentage changes in nominal exchange rates, with transition probabilities in the Markov chain depending on deviations of real effective exchange rates from trend (REER), year-on-year percentage changes in the ratio of money supply (M2) to gross international reserves, and year-on-year percentage changes in real domestic credit. Real exchange rate overvaluation (relative to trend) is an important explanatory variable for predicting a switch from normal periods to vulnerable periods. The two other early warning variables, growth in real domestic credit and M2/Reserves, showed only moderate importance, entering into the final specifications only in selected countries. There is good evidence for the importance of non performing loans in crisis prediction. However, differences in definitions and treatment of these loans among countries render the use of it difficult. After the Asian crisis, there have been efforts for standardization of the definition of non-performing loans, which will eventually enable researchers to use it as one of the critical indicators.

For all four countries, one regime is a normal period with zero mean and low volatility in exchange rate percentage changes. The other regime is a financially vulnerable period with positive mean and high volatility in the dependent variable. Forecast probabilities of a vulnerable period, given past information, are calculated from the estimated model. Such forecast probabilities rise substantially for Malaysia and Thailand in early 1997 – prior to the start of the Asian crisis in July 1997 – but do not send strong signals for Indonesia and the Philippines.

3. Main Characteristics of the Macro-econometric Model

The model is a simultaneous-equations system designed to address the needs in short-term and medium-term forecasting and in scenario and policy analysis (Klein, Mariano, and Özmucur, 2002). The model covers all the major sectors of Malaysia's economy and the feedback linkages among them. It serves as a quantitative tool of Bank Negara in forecasting economic variables at a disaggregated level, in analyzing the macroeconomic impact of policy measures, and in simulating scenarios of interest to the Bank. There is a very detailed treatment of balance of payments, public sector, and the financial sector.

The macro-econometric model contains 438 equations in seven blocks. 259 of these equations are stochastic, and 179 are identities. There are 607 variables of which 438 are endogenous, and 169 are exogenous. The relatively large size of the model is a direct result of the need for capturing basic features of the Malaysian economy. These features may be summarized as the openness of the economy, diversity of exports ranging from agricultural commodities to semiconductors, diversity in the banking sector, and the significance of the public sector in the production as well as in the decision making process.

There are ten production and employment sectors. These sectors are: agriculture, mining, manufacturing, electricity, construction, wholesale and retail trade, transportation and communication, finance, government services, and other services. In addition, production of major commodities in agriculture and mining are also treated as endogenous variables. These commodities are: rubber, saw logs, palm oil, kernel oil, cocoa, crude oil, tin and natural gas. Industrial production indexes for major manufacturing sub-categories are also estimated in the model. There are five private investment categories, namely, agriculture, manufacturing, mining, construction and other.

There is a very detailed section on the export component of the balance of payments. The capital account is also treated as endogenous. Both foreign direct investment and

portfolio investment are treated endogenously in the model. Interest rates, exchange rates, and equity prices are explained within the model.

Because of the public sector's significance, the model has a detailed public sector block. Public revenues are determined within the model, using the appropriate base for the revenue being considered. Current expenditures are also treated as endogenous. Development expenditures are treated as exogenous. Non financial public enterprises, state and local governments' accounts are also studied in detail. The financial sector is also treated in detail. Monetary base and money supply are determined by the net claims of the government, net claims of the private sector, and net claims of the external sector. Money demand equations are estimated, assuming equilibrium in the money market. Banking sector balance sheets are treated in detail.

The in-sample forecasting performance of the model is assessed through static and dynamic simulations of the model over the period 1990 – 2001. The one-period simulation indicates that the major macroeconomic variables can be predicted within reasonable error margins (in terms of mean absolute percentage error or MAPE): GDP with 6.0 %, private consumption with 5.1 %, total investment with 5.2 %, and prices (CPI and the implicit GDP deflator) with 1.5 % and 3.0 %, respectively. For the unemployment rate and the interest rate, the relevant performance indicator is either mean absolute error (MAE) or root mean square error (RMSE). The mean absolute errors are 124 basis points for the unemployment rate. These errors are rather low when compared to those from other models; the model is relatively successful in tracking historical values.

4. Simulations with the Model

The model was solved (dynamic solution) for the 1997-2005 period for a baseline solution. The scenario of "no capital controls" was the alternative (simulation). In the model, there is a capital control dummy which is equal to 1 in 1994, 1998 and 1999, and

zero for other years[1]. This dummy variable is set to zero (no controls) for the period 1997-2005 to obtain the alternative solution. The difference (or the percentage difference) between the simulation and the baseline were calculated to see the possible effects of the "no capital controls" policy. The results are obtained for all endogenous variables, but for brevity, results for only selected variables are provided here.

The real GDP would have been 0.08% higher in 1998 without controls (Figure 1). This effect turns to negative 0.01% in 1999, negative 0.12% in 2000, and 0.02% in 2001. The overall effect is negative, indicating that GDP would have been lower without capital controls. The GDP deflator would have been 0.04% higher in 1998, and 0.03% higher in 1999. The percentage differences are negative, but quite small in magnitude, after 1999. The overall effect is positive, indicating that GDP deflator would have been higher without capital controls.

The real exports of goods and services would have been 0.15% higher in 1998 without controls (Figure 1). This effect turns to negative 0.01% in 1999, negative 0.22% in 2000, and 0.02% in 2001. The overall effect is negative, indicating that real exports of goods and services would have been lower without capital controls. The real imports of goods and services would have been 0.10% higher in 1998 without controls. This effect turns to negative 0.01% in 1999, negative 0.12% in 2000, and 0.02% in 2001. The overall effect is negative, indicating that real imports of goods and services would have been lower without capital controls.

The real private consumption expenditures would have been 0.08% higher in 1998 without controls. This effect turns to negative 0.01% in 1999, negative 0.11% in 2000, and 0.01% in 2001. The overall effect is negative, indicating that real private consumption expenditures would have been lower without capital controls. The real private fixed investment would have been 0.23% higher in 1998 without controls. This effect turns to negative 0.01% in 1999, negative 0.28% in 2000, and 0.02% in 2001. The

[1] Using a dummy variable indicates the existence of controls, but not the intensity of controls. There are attempts to measure the intensity to alleviate the limitation of using a dummy variable. See Edison & Warnock (2002).

overall effect is negative, indicating that real private fixed investment would have been lower without capital controls.

The real government consumption expenditures would have been 0.028% lower in 1998, and 0.022% lower in 1999 without controls. This effect turns to 0.02% in 2001, 0.005% in 2001, and 0.01% in 2002. The overall effect is negative, indicating that real government consumption expenditures would have been lower without capital controls. The real government fixed investment would have been 0.010% lower in 1998, and 0.008% lower in 1999 without controls. This effect turns to 0.006% in 2001, 0.002% in 2002. The overall effect is negative, indicating that real government fixed investment would have been lower without capital controls.

Figure 1. Effects of Capital Controls on Real Indicators and the GDP Deflator

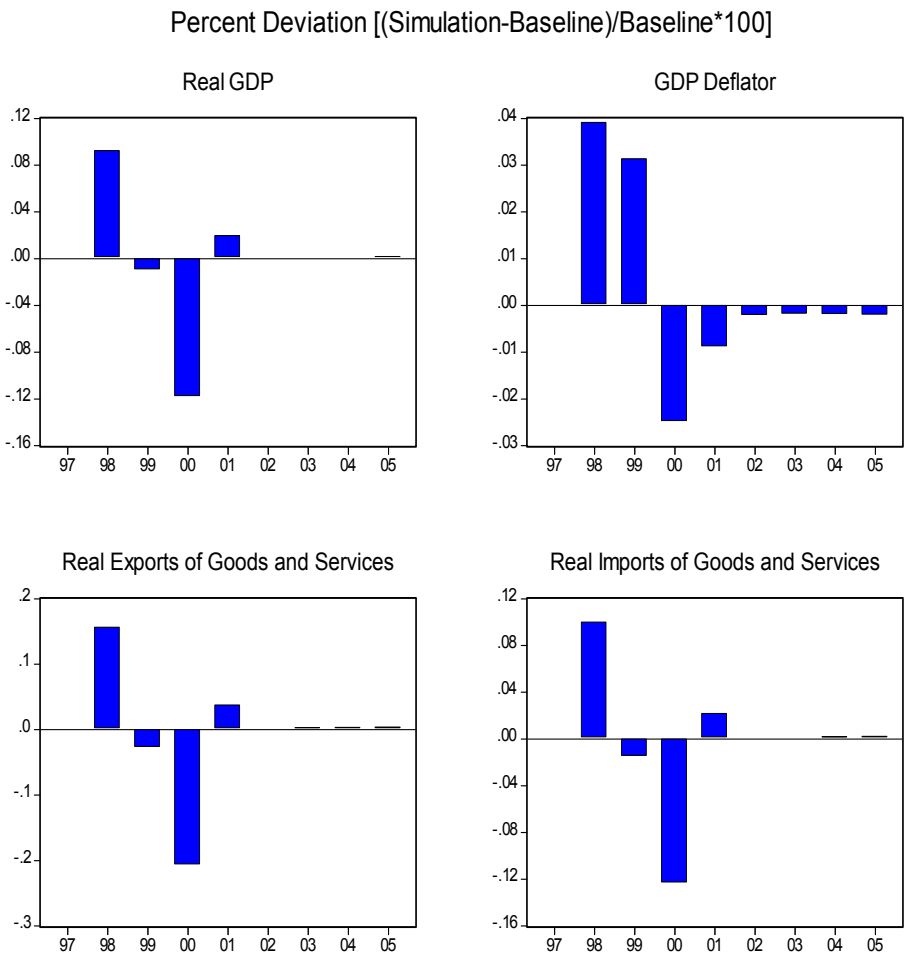
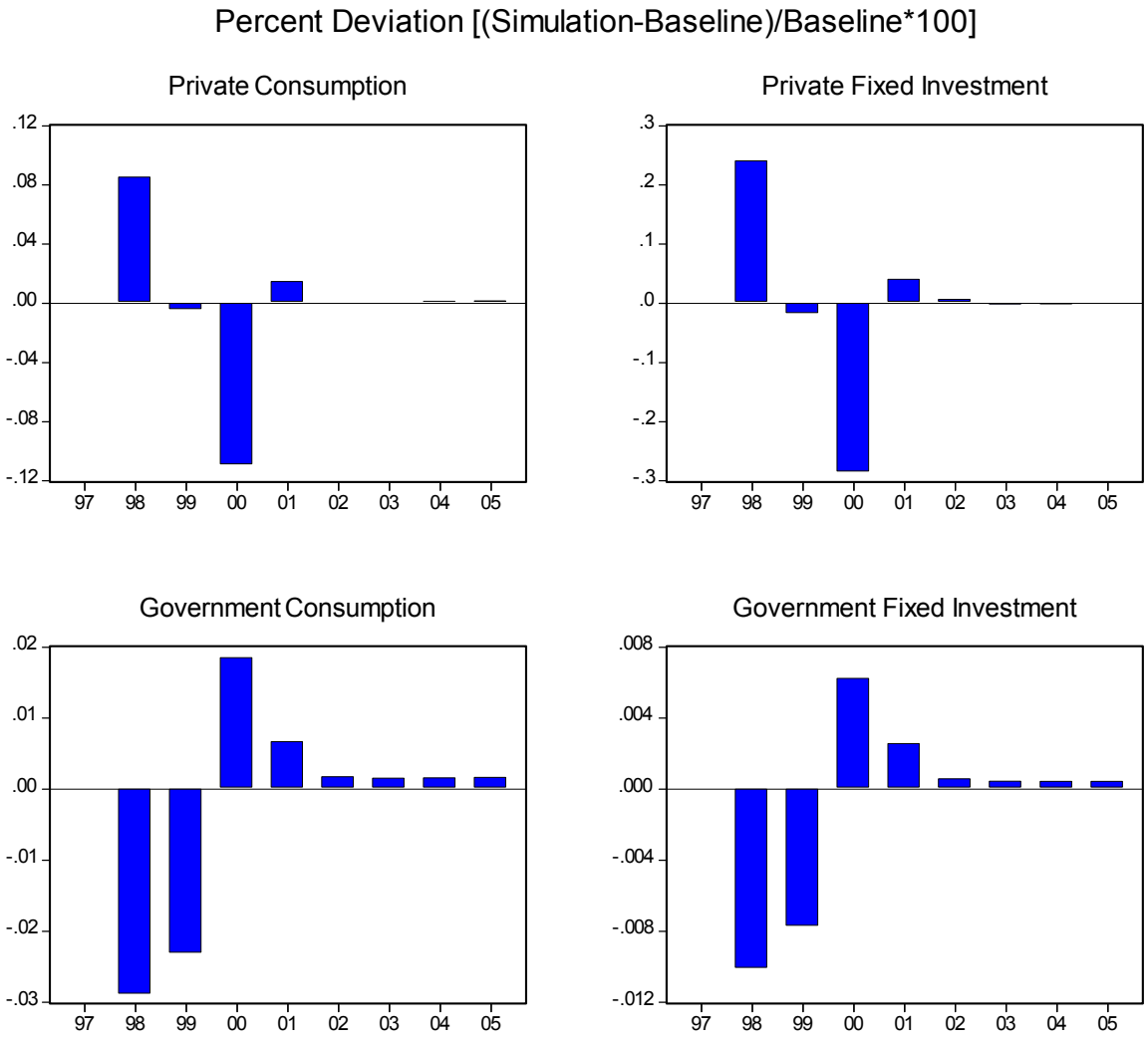


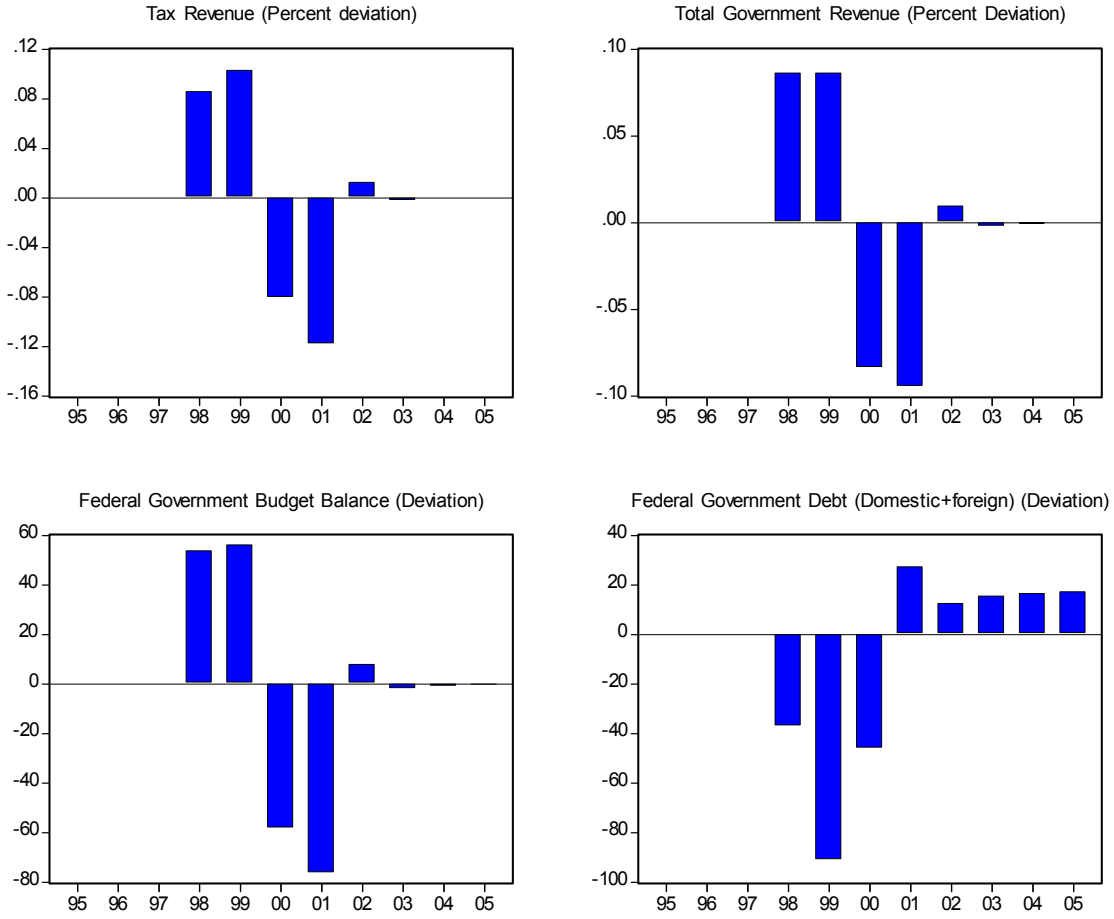
Figure 1.Effects of Capital Controls on Real Indicators and the GDP Deflator(Continued)



The government's total tax revenues would have been 0.08% higher in 1998, and 0.10% higher in 1999 without controls (Figure 2). This effect turns to negative 0.08% in 2000, and negative 0.12% in 2001. The overall effect is a small negative, indicating that government tax revenues would have been lower without capital controls. Similar results are obtained for total revenues of the government. The federal budget balance would have been about 50 million ringits higher both in 1998 in 1999 without controls. This effect turns to negative 60 million in 2000, and negative 80 million in 2001. The overall effect is negative, indicating that federal government budget balance would have been lower without capital controls. The federal government debt would have been 40 million

ringitts lower in 1998, 90 million lower in 1999 and 40 million lower in 2000 without controls. This effect turns to 30 million in 2001, and remains in the neighborhood of 10 million until 2005. The overall effect is negative, indicating that federal government debt would have been lower without capital controls. It should be noted that this is largely driven by domestic debt.

Figure 2. Effects of Capital Controls on Government Revenues, Balance and Debt



The effect of capital controls on net private capital flows is of special interest. The net effect on long-term private capital flows is negative, but very small in magnitude (Figure 3). The effect on the short-term capital flows is also small in magnitude and negative. The net private short-term capital flows would have been 200 million higher in 1999. The figure turns to be negative 300 in 2000, and negative 280 in 2001, and positive 400 in 2002. The net effect is very small, especially when these are compared with the effects on the current account and the balance of payments. There is a significant effect on the current account, and hence the basic balance and the overall balance of payments. The balance of payments could have been 2500 million lower in 1998 and 2800 million lower in 1999. The effects are much smaller in following years. The corresponding figures for the basic balance were 2600 million in 1998 and 3200 million in 1999. The major determinant of the change in the basic balance is the change in the current account balance.

The initial effect on interest rates would have been higher in 1998, but generally smaller in 1999 and 2000 if there were no capital controls (Figure 4). The overall effect on interest rates and exchange rates is quite small. However, since the model is an annual one it is not possible to study another interesting question, namely the volatility of interest rates, and stock prices as done by Edison & Reinhart (2000).

All in all, temporary controls of capital flows in Malaysia achieved intended goals of keeping inflation under control, and resuming growth without much distortion in foreign exchange and financial markets. A coordinated stabilization policy was the key to a successful outcome.

Figure 3. Effects of Capital Controls on Balance of Payments

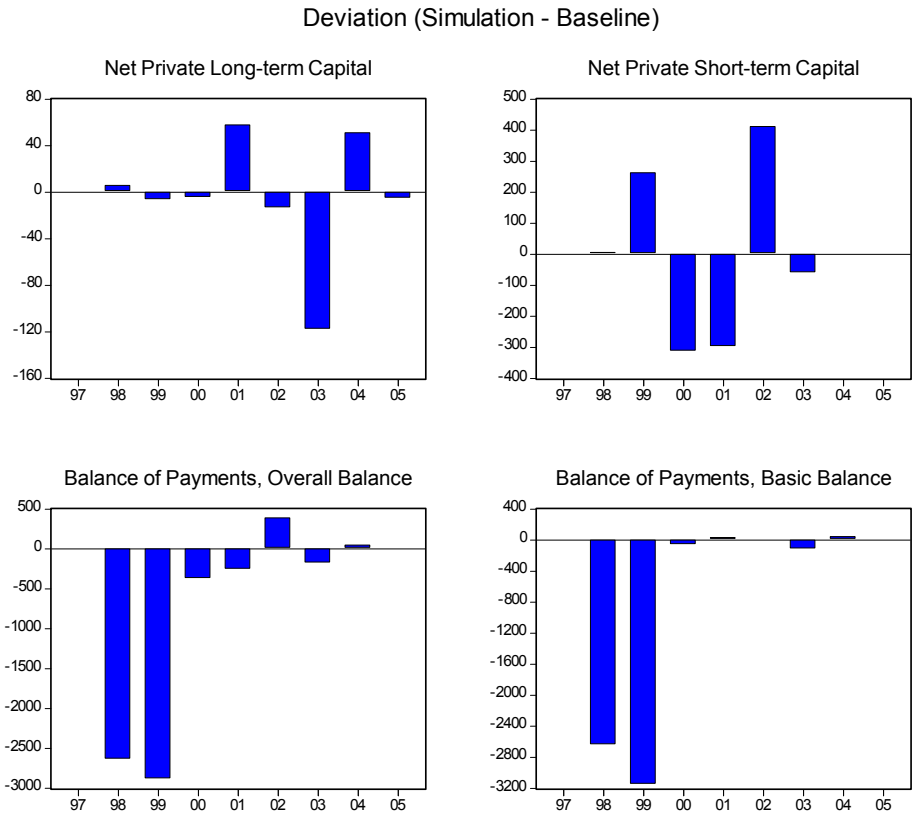
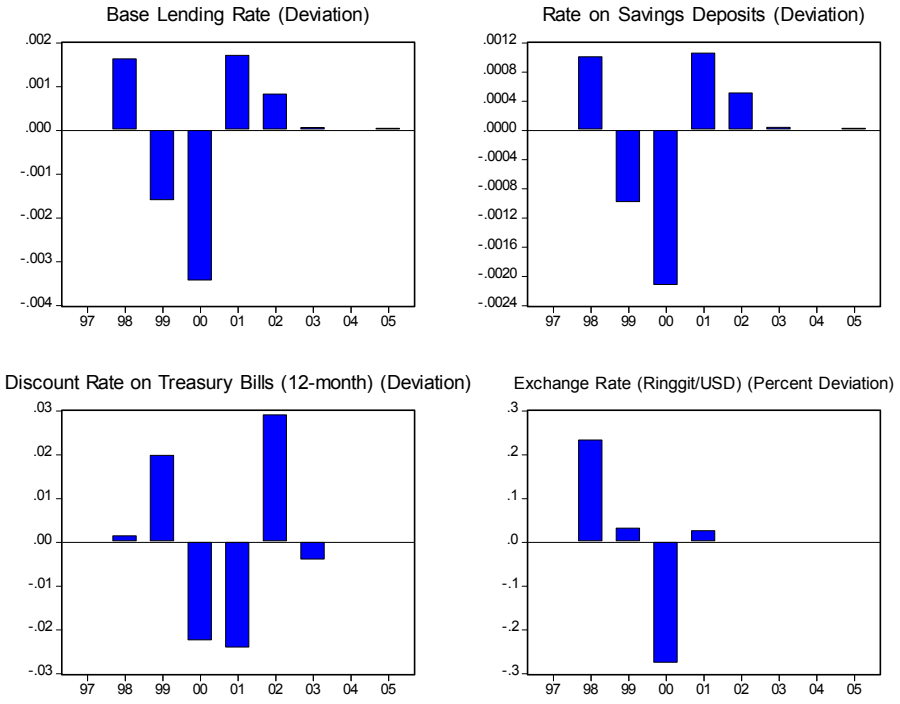


Figure 4. Effects of Capital Controls on Interest Rates and Exchange Rates



5. Conclusion

Results based on alternative methods indicate that capital controls worked well in Malaysia, but not in Thailand. The timing, the dosage, degree of commitment to and the duration of a policy as well as initial conditions are critical determinants of the success of a policy. Controls over capital flows are no exception to this general rule.

A simultaneous equation macro-econometric model is used to study possible effects of capital controls. Simulation results indicate that controls improved the performance of the Malaysian economy. A probable channel is the reduction of the level of uncertainty surrounding the key prices such as the exchange rate and the interest rate.

There are lessons to be learned from the Malaysian experience. Probably, the first requirement is to have the house in order. This is a necessary but not a sufficient condition. A small open economy is always vulnerable to external shocks, and policy making is always more difficult in such an open economy because of lack of control over most of the policy instruments usually employed. There is definitely a need for early warning indicators of financial vulnerability such as real exchange rate overvaluation, growth in real domestic credit and ratio of money supply to reserves.

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