



**Managing Capital Flows:
The Case of Singapore**

Hwee Kwan Chow

February 2008

ADB Institute Discussion Paper No. 86

Hwee Kwan Chow was commissioned by the ADBI to provide a country study of Singapore for the project Managing Capital Flows. She is a practice associate professor at the Singapore Management University, Singapore. The author thanks the participants at the Technical Workshop on Managing Capital Flows for helpful comments and suggestions that led to improvements in the report.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, the Asian Development Bank (ADB), its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

ADBI's discussion papers reflect initial ideas on a topic, and are posted online for discussion. ADBI encourages readers to post their comments on the main page for each discussion paper (given in the citation below). Some discussion papers may develop into research papers or other forms of publication.

This discussion paper is part of the "Managing Capital Flows: Search for a Model" project.

Suggested citation:

Chow, Hwee Kwan. 2008. Managing Capital Flows: The Case of Singapore. ADBI Discussion Paper 86. Tokyo: Asian Development Bank Institute. Available: <http://www.adbi.org/discussion-paper/2008/02/21/2484.managing.capital.flows.singapore.case/>

Asian Development Bank Institute
Kasumigaseki Building 8F
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500
Fax: +81-3-3593-5571
URL: www.adbi.org
E-mail: info@adbi.org

© 2008 Asian Development Bank Institute

Abstract

The resurgence of private capital inflows into Asia in recent years has raised the question of whether the region is susceptible to yet another financial crisis. While a sudden large-scale reversal of capital flows is not likely to result in a liquidity crunch or balance of payments crisis, the attendant sharp corrections in asset prices will have an adverse impact on the economy particularly through indirect channels. We present, in this study, Singapore's experience in managing the risks posed by capital flows as well as the retention of control over exchange rates and monetary conditions. It is the overall package of policies—including strong economic fundamentals and a robust financial system, prudent policy management on both the fiscal and monetary side, and credible exchange rate policy aligned with underlying fundamentals—and having the latitude to react promptly and on a sufficiently large scale to economic and financial developments that serve to increase Singapore's resilience towards disruptive swings in capital flows.

JEL Classification: E58, F31, G28

Contents

I.	Introduction	3
II.	Trends in Capital Flows	4
III.	Overview of Monetary and Financial Developments	8
IV.	Exchange Rate-Centered Monetary Policy Framework	13
	IV.1 Exchange Rate as Key Monetary Policy Instrument	13
	IV.2 Basket-Band-Crawl Exchange Rate Regime	14
V.	Monetary Policy Operations since the Asian Crisis	16
	V.1 Policy Reactions during the Asian Crisis	16
	V.2 Monetary Policy during the Post-Crisis Period	17
	V.3 Management of Domestic Liquidity	18
VI.	Non-Internationalization of the Singapore Dollar	20
VII.	Conclusion	23
	References	28

I. INTRODUCTION

There has recently been much discussion on the state of the regional economies coinciding with the tenth anniversary of the Asian financial crisis. As has been widely noted, the Asian economies recovered quickly from the crisis and are now amongst the fastest growing in the world. Since Asia has not experienced further crises in the past decade, can one infer that the region is now less vulnerable to the destabilizing effects of unfettered international capital flows? After all, considerable efforts have been undertaken to build buffers and reduce vulnerabilities. Compared to the pre-crisis period, the Asian economies are now run more conservatively, have strengthened current accounts, and have significant buildups in foreign reserves. Meanwhile, the financial systems in the region have become more resilient, with the restructuring of balance sheets and the enhancement of surveillance.

However, there has been a resurgence of private capital flows into Asia in recent years. This resurgence has largely been attributed to the search for high-yielding investments arising from low interest rates in developed countries.¹ In view of the pro-cyclicality of such capital flows (Kaminsky et al., 2004), some question whether the region's exposure to a capital flow reversal will lead to yet another financial crisis. It is clear that structural reforms and stronger economic fundamentals have increased Asia's robustness towards such financial shocks. In contrast to the 1997 Asian crisis, the region has greater capacity to accommodate the capital outflows so that a liquidity crunch or balance of payments crisis is improbable. Nonetheless, should there be a sudden large-scale reversal of capital flows and investor confidence is undermined, financial market distress and other risk scenarios may ensue (Khor and Kit, 2007). In particular, the attendant sharp corrections in asset prices will have an adverse impact on the economy especially through indirect channels.

The purpose of this study is to present Singapore's experience in managing the risks posed by capital flows as well as the retention of control over exchange rates and monetary conditions. At the outset, we note that Singapore has the support of strong economic fundamentals including persistent budget surpluses, huge foreign exchange reserves, substantial current account surpluses, high savings rates, low inflation, robust institutions, a sound financial system, and a stable currency. In this paper, we address three key issues: Singapore's exchange rate-centered monetary policy framework, monetary policy operations since the crisis, and the non-internationalization of the Singapore dollar. We consider how these three broad areas, along with a framework of consistent macroeconomic and microeconomic policies, contribute towards defending Singapore against instability arising from free capital mobility.

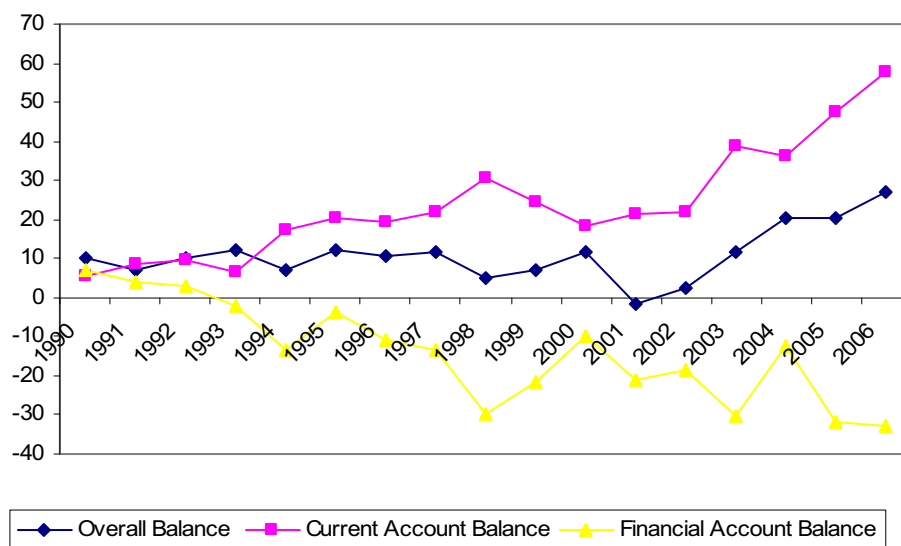
¹ Calvo *et al.* (1993) showed the dominant role for push factors, particularly the state of liquidity in the developed countries, as driving force for capital flows to emerging markets.

II. TRENDS IN CAPITAL FLOWS²

A key feature of the Singapore economy is its extreme openness to trade and capital flows. The size of total imports and exports has been approximately three times that of GDP over the past three decades. In relation to capital flows, almost all forms of capital controls and foreign exchange restrictions have been dismantled since 1978. As a consequence of its small open nature, the Singapore economy has often been buffeted by shocks from the external environment such as the downturn in the global electronics industry in 1996-1997, the Asian crisis in 1997-1998, and the burst of the information technology bubble in 2001.

Notwithstanding the fluidity of the economic environment and free capital mobility, Singapore has persistently recorded current account surpluses and exported capital abroad (see Figure 1). With the lone exception of 2001, the overall balance of payments (BOP) has remained positive since 1990. In fact, the overall BOP surplus has been growing in recent years, reflecting the expansion in the current account surplus over the same period. Concomitantly, the excess of national savings over investment has allowed Singapore residents to acquire foreign assets abroad. This includes the Singapore government investing public sector budget surpluses abroad.

Figure 1. Overall Balance of Payments (in S\$ billion)³

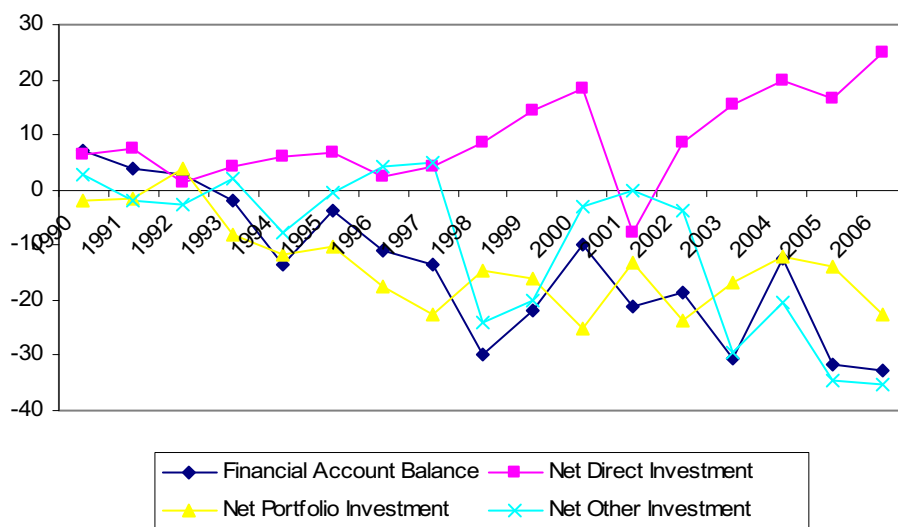


To differentiate amongst the various types of capital flows, Figure 2 provides a breakdown of the financial account into foreign direct investment, portfolio investment, and other investment. We observe a general pattern over the past decade that net positive foreign direct investment (FDI) is consistently offset by net outflows in portfolio and other investment accounts.

² All balance of payment data described in this section are obtained from the Singapore Department of Statistics.

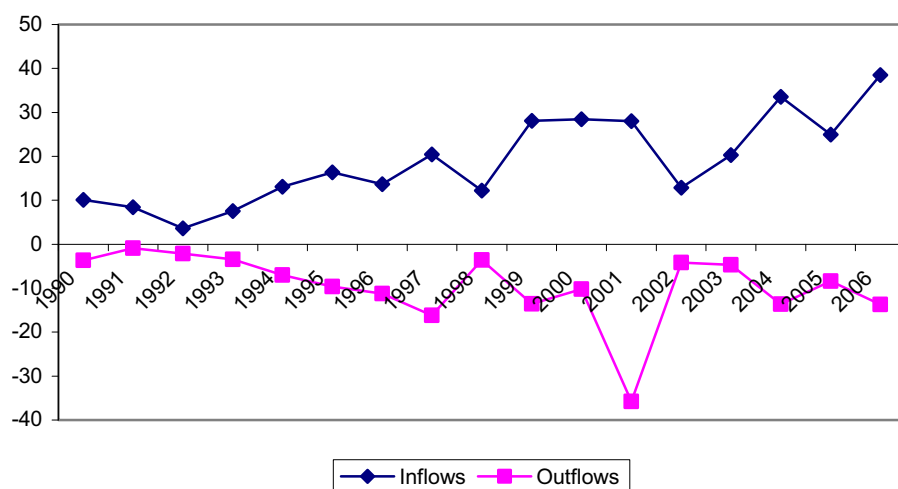
³ Flows in the capital account have been negligible, being dominated by those in the financial account, see summary table on Singapore balance of payments in Appendix.

Figure 2. Components of Financial Account (in S\$ billion)



It is evident from Figure 3 that direct investment inflows have been on a general upward trend since the early 1990s. In comparison, with the exception of 2001, direct investment outflows have been hovering around S\$10 billion.⁴ The strong inflows of FDI reflect Singapore’s commitment to attract multinational corporations to aid its economic growth. In terms of sectoral distribution, the financial services, manufacturing, and commerce sectors are the major recipients of the FDI inflows, accounting for 38%, 33%, and 16% of the total FDI stock at end 2005, respectively. As is well recognized, such long-term inflows are a relatively stable form of finance and generally do not contribute to an increase in macroeconomic or financial risk. Rather, they have undoubtedly been beneficial for the development and growth of the Singapore economy.

Figure 3. Direct Investment (in S\$ billion)



⁴ The huge direct investment outflow in 2001 is due to the two large foreign acquisitions by the local telecommunication company Singtel and the domestic bank Development Bank of Singapore (DBS).

In comparison, the portfolio investment account has consistently recorded net outflows. Figure 4 provides a breakdown of portfolio inflows and outflows into the various financial instruments. Portfolio inflows have generally been on the rise in the post-crisis period, partly reflecting a return of foreign investors to the local stock market since 2003. However, this is more than offset by the large portfolio outflows, which capture both government and private sector investment in foreign equity and debt markets. Portfolio flows tend to be volatile as investors have the flexibility to shift from one financial instrument into another because these instruments are traded. Indeed, portfolio investment has a tendency to accentuate crises (Dobson and Hufbauer, 2001). In this regard, the low volume of portfolio inflows (relative to FDI inflows) helps to reduce Singapore’s vulnerability to capital flow reversal.

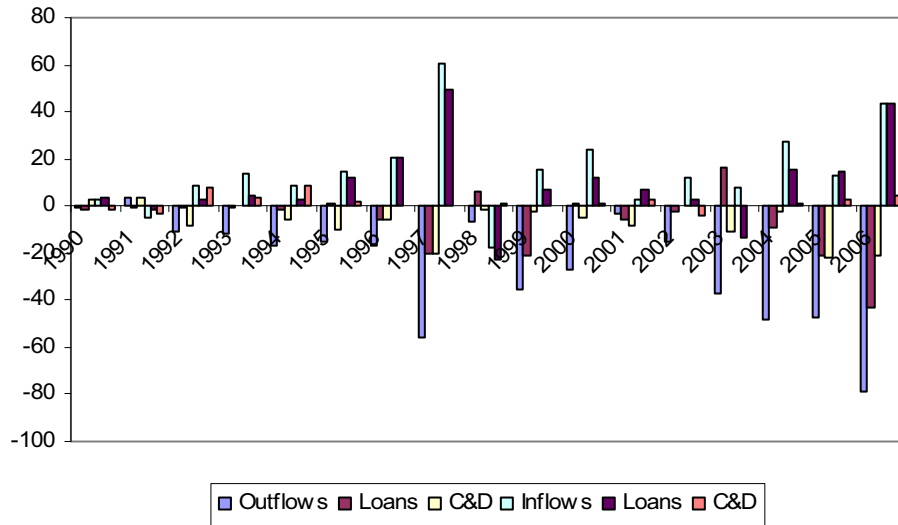
Figure 4. Portfolio Investment (in S\$ billion)



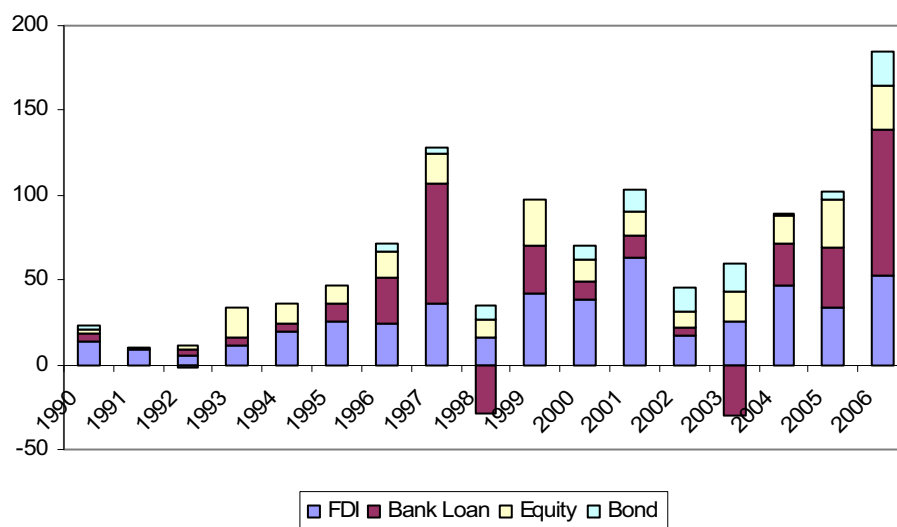
The main components of the other investment account include loans, and currency and deposits (C&D). Figure 5 depicts the trends in the key components of this category’s inflows and outflows. The high volume of capital flows reflects a lively interaction between domestic banks and foreign financial institutions (and other non-residents). As in the portfolio investment account, we observe an increase in both inflows and outflows in the recent period, with the latter exceeding the former. Bank lending⁵ is, by conventional wisdom, considered to be the most liable to reversal than the other forms of capital flows including portfolio investment. In the case of portfolio flows, adjustments in the volume are mitigated by price adjustments of the relevant assets (Williamson, 2005). We observe from Figure 5 that bank lending has been considerably reduced in net terms after the crisis.

⁵ Trade credits, which are relatively stable despite their short tenor, form a separate component in the other investment account.

Figure 5. Other Investment (in S\$ billion)



In total, gross capital inflows have not only recovered after the crisis but have exceeded the pre-crisis peak level (see Figure 6). The recent surge in capital inflows poses several interesting questions. In particular, how do the various types of capital inflows affect the domestic economy? What are the factors that serve to attract stable long-term capital flows while inhibiting volatile speculative inflows? What policies and measures has the government adopted to meet with the challenges posed by volatile capital flows? These issues will be examined in the following sections.

Figure 6. Gross Capital Inflows (in S\$ billion)⁶

III. OVERVIEW OF MONETARY AND FINANCIAL DEVELOPMENTS

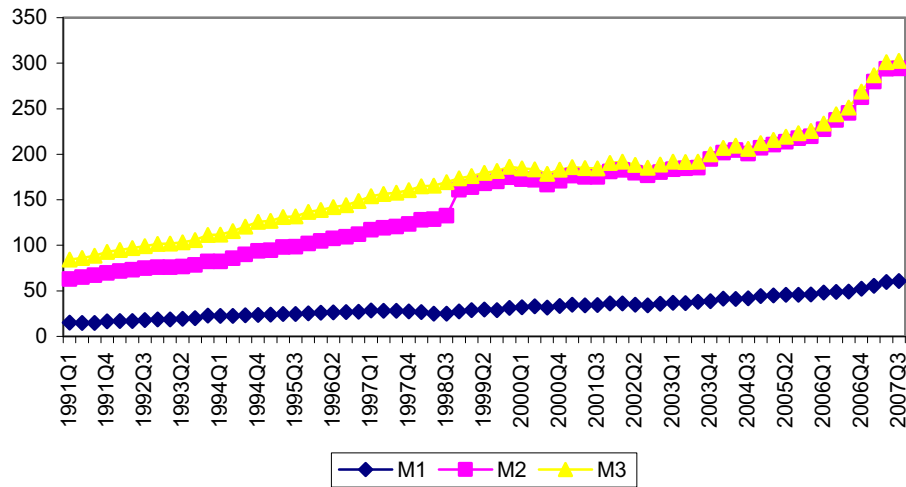
It has been observed that large capital inflows often give rise to increases in money supply and domestic liquidity, appreciation of both nominal and real exchange rates, and acceleration in asset prices. Hence, a country experiencing excessive capital inflows usually has to face the challenges of inflationary pressures, loss of a competitive exchange rate (which could undermine the international competitiveness of its manufacturing sector) and misallocation of capital into unproductive projects. In what follows, we provide a series of charts that give an overview of monetary and financial developments in Singapore since 1990. Specifically, Figures 7 to 12 depict the trends in Singapore's monetary aggregates, short-term interest rates, nominal and real effective exchange rates, consumer price and wage inflation, asset price indices, loans to key sectors of the economy, and value added for the key sectors of the economy, respectively.

It is clear from Figure 7a that domestic liquidity has been growing since the 1990s. The monetary aggregates rose steadily until quarter one of 2006,⁷ after which they exhibited a sharp acceleration. Indeed, over the last two years, the year-on-year (y-o-y) monetary growth rates (see Figure 7b) have exceeded the y-o-y nominal GDP growth, which has averaged 10% only over the same period.

⁶ The negative values for inflow of loans refer to the repatriation of loans by foreign banks.

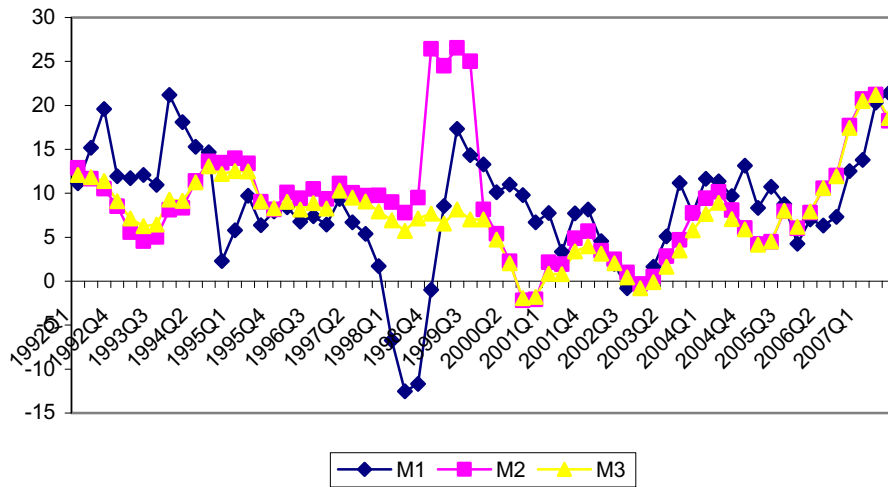
⁷ The trend break in the levels of M2 and the corresponding hikes in M2 growth rates at the end of 1998 are due to the incorporation of the Post Office Savings Bank (POSB) into the banking system when it was acquired by the DBS. From November 1998, POSB's data has been incorporated in M1 and M2, and not as a non-bank financial institution under M3.

Figure 7a. Monetary Aggregates (in S\$ billion)



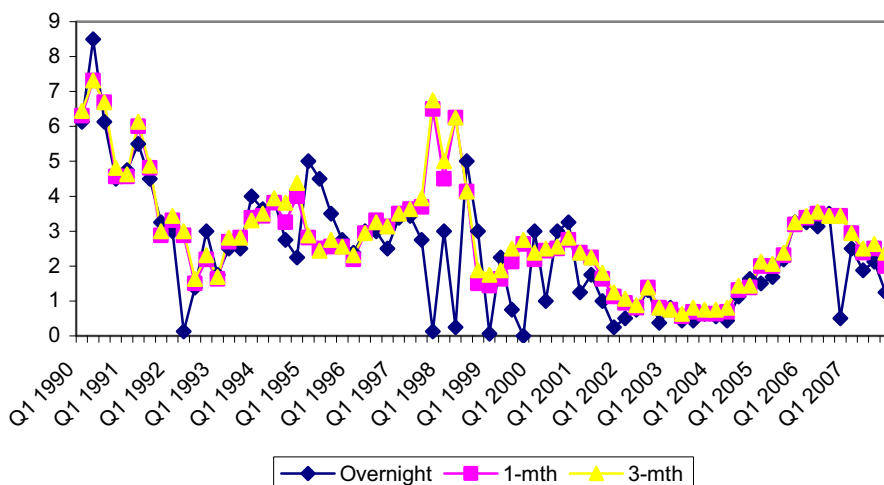
Source: Monetary Authority of Singapore

Figure 7b. Monetary Aggregates (year-on-year growth rates)



The various short-term interest rates—overnight, 1-month, and 3-month inter-bank rates—moved in tandem, staying low at below 4% after the temporary spike during the crisis (see Figure 8).

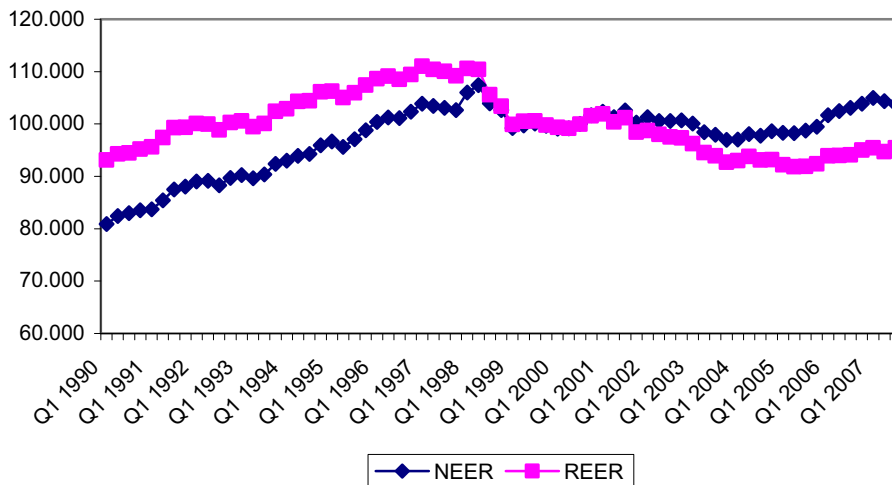
Figure 8. Short-Term Interest Rates



Source: Monetary Authority of Singapore

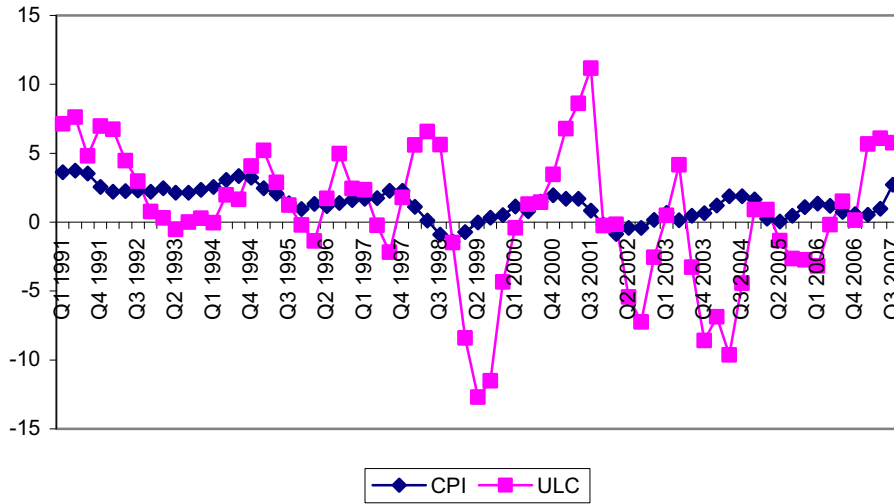
Turning to exchange rates, we see from Figure 9 that the Singapore nominal and real effective exchange rates (NEER and REER, respectively) exhibited an upward trend before the crisis, reflecting the Balassa-Samuelson effect. The NEER leveled off after the weakening of the currency during the crisis. Nonetheless, an appreciation in the NEER is discernible in the most recent period, reflecting a return of the Singapore dollar to an appreciation path against its major trading partners. By comparison, the REER continued its depreciation path for some time after the crisis, reflecting deflationary trends in domestic wages until the most recent period. Correspondingly, Figure 10 shows that while the consumer price inflation stayed low, growth rates of unit labor cost have frequently been negative post-crisis.

Figure 9. Nominal and Real Effective Exchange Rates



Source: International Financial Statistics

Figure 10. Consumer Price Inflation and Wage Inflation Rates

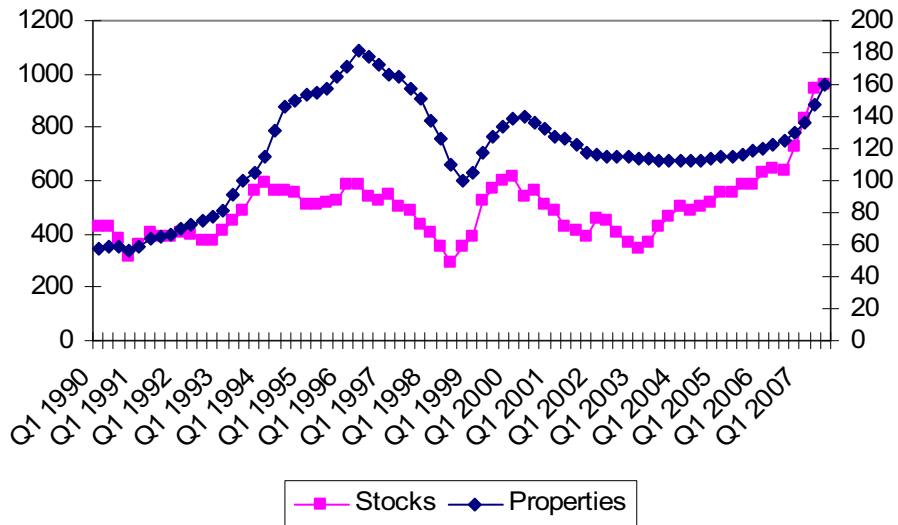


Notes: CPI = consumer price inflation; ULC = unit labor cost (% change)

Source: Singapore Department of Statistics

By contrast, stock prices have risen rapidly since 2003 (see Figure 11) in tandem with the increase in portfolio inflows to the local stock market (see Figure 4). A similar surge in property prices is seen in Figure 11, but this started only in the more recent period, with rising foreign investor interest in the high-end residential segment of the property market.

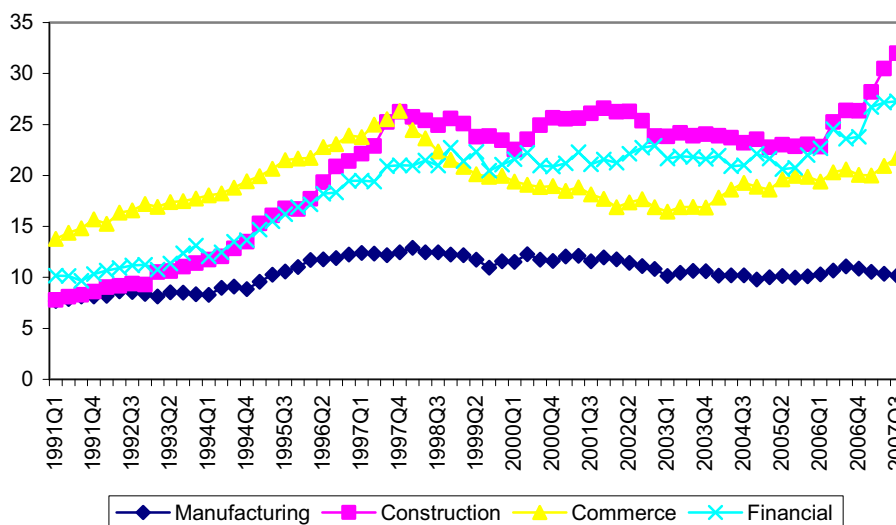
Figure 11. Stock Price and Residential Property Price Indices



Source: Singapore Department of Statistics

Concomitantly, we observe a pickup in the trend for loans to the construction sector in the recent period. Meanwhile, loans to the commerce and financial sectors also registered a rise in the corresponding period. However, loans to the manufacturing sector mostly remain steady (see Figure 12).

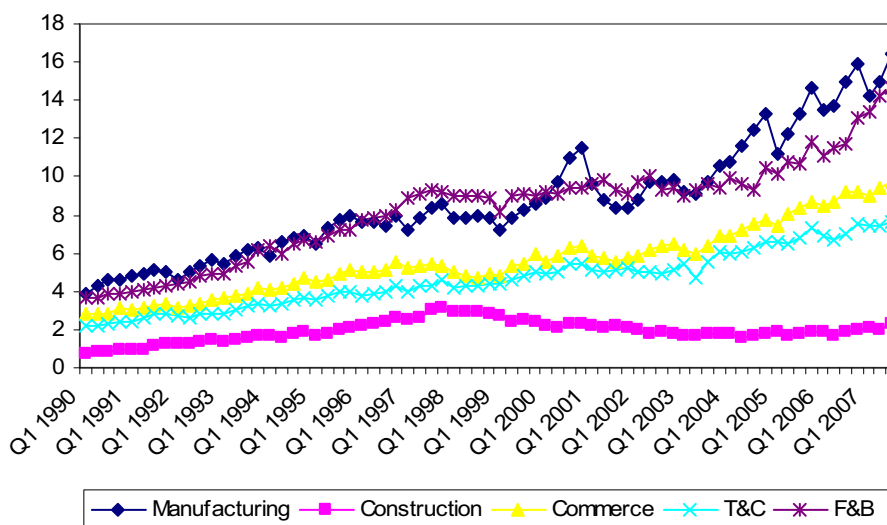
Figure 12. Loans to Key Sectors of the Economy (in S\$ billion)



Source: Monetary Authority of Singapore

As for the real economy, the FDI inflows into the various sectors of the economy have boosted the growth of these sectors. It is evident from Figure 13 that the manufacturing, financial, and commerce sectors all exhibited relatively faster growth rates in recent years, no doubt benefiting from direct investment flows into their industries.

Figure 13. Value Added for Key Sectors



Notes: T&C = Transport and Communication; F&B = Finance and Business

Source: Singapore Department of Statistics

IV. EXCHANGE RATE-CENTERED MONETARY POLICY FRAMEWORK

IV.1 Exchange Rate as Key Monetary Policy Instrument

Despite the recent increase in capital flows, the Singapore nominal effective exchange rate has been relatively stable. To advance our understanding on how the central bank retains control over the exchange rate, we consider the monetary policy framework. A unique feature of Singapore's monetary policy framework is the use of the exchange rate instead of the more conventional benchmark policy interest rate as the key policy operating tool. Singapore, as an international financial center, has opted for free capital mobility. With reference to the open-economy trilemma,⁸ it follows that the central bank can choose to use as its key policy instrument only one nominal variable: the exchange rate, the interest rate, or a monetary aggregate. The Monetary Authority of Singapore (MAS) has chosen to use the exchange rate instead of the interest rate as an intermediate target since the early 1980s.

The rationale of this decision is clear. A high import content of about 60% in domestic consumption as well as being a price taker in the international markets imply that Singapore is highly susceptible to imported inflation. It is thus unsurprising that the exchange rate is considered to be a more effective tool than the interest rate for stabilizing inflation. The other main influence on domestic cost pressures has been labor supply. While the tightness of the labor market has been somewhat eased by immigration policies, the exchange rate policy has helped to dampen aggregate demand thereby reining in wage inflation. In a study on Singapore's monetary transmission mechanism, Chow (2005) found that the exchange rate has a highly significant impact on the level of economic activity. Such a result is not in the least unexpected in view of the substantial contribution of external demand to growth—exports account for around two-thirds of total demand.

By contrast, the Singapore economy is less sensitive to interest rates. Firstly, domestic investment is not very sensitive to the interest rate because Singapore's heavy reliance on foreign direct investment limits the impact of the cost of domestic borrowing. Secondly, a decline in housing wealth plausibly caused by a rise in mortgage rates does not seem to have significant dampening effects on aggregate consumption, even though houses are a major component of personal wealth in Singapore (Abeysinghe and Choy, 2004). This rather unusual finding has been attributed to the illiquid nature of Singapore's housing assets as well as the strong bequest motives of Singaporean households (Phang, 2004). It is thus unsurprising that interest rates are deemed to have a relatively weaker effect than exchange rates on price stability, which is the final policy target.

Given the economy's vulnerability to external shocks, it is pertinent for Singapore's monetary policy to play a counter cyclical role in minimizing the impact of these and other shocks on the domestic economy. Parrado (2004) investigated the counter cyclical nature of Singapore's monetary policy through the use of a monetary reaction function. A variant of the Taylor rule (Taylor, 1993) was estimated, using changes in the exchange rate instead of the interest rate as the policy variable to reflect the use of the exchange rate as the key monetary policy instrument. The two target variables were inflation and output gap measures. The results suggest that monetary policy in Singapore does have

⁸ Obstfeld, Shambaugh, & Taylor (2004) provides a treatise on the open economy trilemma.

a forward-looking orientation aimed at dampening inflation and output volatility. This finding concurs with the stated objective of the monetary policy of the MAS, which is “to ensure low inflation as a sound basis for sustained economic growth.”

In a related study by McCallum (2007), a similar Taylor type policy rule was estimated. In that study, deviations of the real exchange rate from its equilibrium were included as an additional target variable. While the real exchange rate deviation variable turned out to have no explanatory power, the inflation variable remained highly important and the output gap variable was significant. The empirical evidence suggests that the real exchange rate does not play a role as an independent macroeconomic objective, but that adjustments in the policy variable are consistent with a policy designed to stabilize inflation and output around their desired target levels. In other words, Singapore’s monetary policy framework is like a variant of inflation targeting.

The past track record of low inflation and prolonged economic growth attests to the effectiveness of using the exchange rate as a key policy instrument for an ultra open economy like Singapore, albeit with the support of flexible factor markets and strong institutions.

IV.2 Basket-Band-Crawl Exchange Rate Regime

In implementing the exchange rate-centered monetary policy, the MAS manages the Singapore dollar under a basket-band-crawl (BBC) system (Khor et al, 2004; Williamson, 1999). Under this intermediate exchange rate regime the MAS monitors the value of the Singapore dollar in terms of a basket of currencies. Given Singapore’s diversified trade pattern, targeting a currency basket instead of a single foreign currency will result in a more stable effective exchange rate. The currency basket, termed the trade-weighted index (TWI), is a trade-weighted average of the currencies of Singapore’s major trading partners and competitors. These represent the various sources of imported inflation as well as competition in the export markets, with the basket weights reflecting their degree of importance. Neither the constituent currencies nor their assigned weights in the basket are made public by the MAS.

The MAS uses a prescribed policy band centered at a parity that is the target exchange rate for the TWI. The target rate reflects the long-run equilibrium exchange rate and is allowed to adjust gradually over time, keeping the policy band in tandem with Singapore’s slowly changing long-term economic fundamentals. It is critical not to make parity changes in occasional large steps like in an adjustable peg exchange rate regime as this attracts large capital flows speculating on an impending change. The crawl circumvents the emergence of a situation where the currency becomes significantly misaligned. It thereby reduces the incentive for speculative attacks against the currency. Notably, MacDonald (2004) and Lee (1999) amongst others have found no sustained deviation of Singapore’s real exchange rate from its equilibrium level even when the equilibrium value of the currency is measured using different approaches.

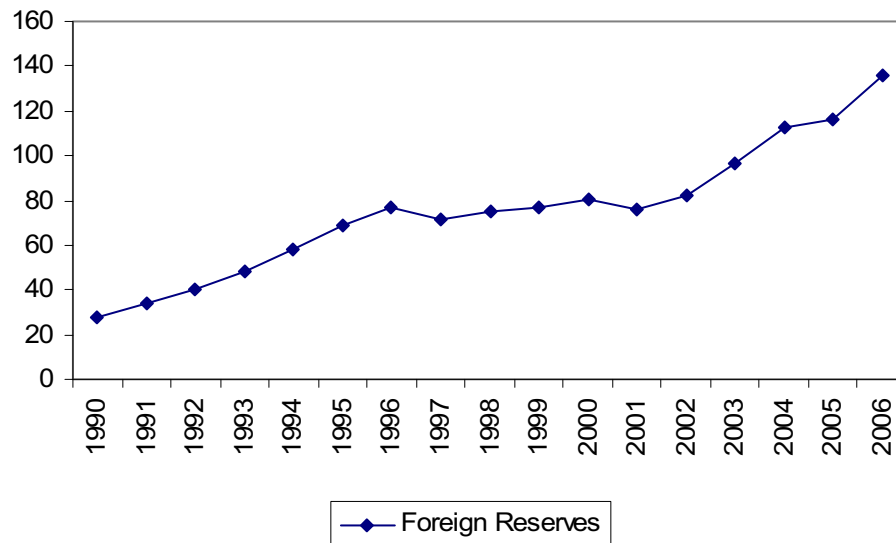
The TWI is allowed to float within the prescribed policy band to allow for short-term fluctuations in the foreign exchange markets. Like the central rates, the band limits are undisclosed. The MAS can directly influence the value of the currency and defend the band by carrying out intervention operations in the foreign exchange markets. When the TWI approaches or exceeds the boundaries of the policy band, the MAS may carry out intervention to “lean against the wind,” which means resisting the recent trend of the

exchange rate, thereby preventing the bounds from being breached. Such intervention operations always resist misalignments and push the TWI towards its estimated equilibrium value like in the reference rate proposal (Williamson, 2007). Additionally, the MAS can also intervene within the band to smooth out short-term exchange rate volatility as the latter could impair confidence in the currency.

We highlight two key features regarding the policy band that help to discourage destabilizing speculative flows. First, the band is sufficiently wide so that market participants cannot be sure of making a profit even when they correctly speculate on an impending change. Second, a BBC with hard bands, whereby the central bank is obliged to carry out intervention whenever the limits are reached, is avoided. This type of exchange rate regime is akin to a crawling band and, based on empirical evidence, could provoke a crisis. Hence, a BBC with soft margins is used instead.

Under the managed float system, it is pertinent to have large foreign reserves ready for use to defend the currency. The Singapore dollar is more than fully backed by foreign reserves (see Figure 14). In any case, the central bank enjoys high credibility earned from its track record in maintaining low inflation and a strong domestic currency. Consequently, most market participants are convinced that the MAS is committed to enforcing the policy band and they thus tend to keep within the bounds. Such market discipline in turn reduces the need for frequent central bank intervention operations (Krugman, 1991). Contrary to the conventional wisdom at the time of the Asian crisis that intermediate exchange rate regimes are not viable, the MAS has deterred speculators from attacking the domestic currency and has successfully maintained a managed float over the past few decades.

Figure 14. Total Official Foreign Reserves (in US\$ billions)



Source: Monetary Authority of Singapore

V. MONETARY POLICY OPERATIONS SINCE THE ASIAN CRISIS

V.1 Policy Reactions during the Asian Crisis

Notwithstanding a generally sound domestic environment, contagion from neighboring crisis-hit countries could mean that the fallout from volatile capital flows is unavoidable. A case in point is the Asian crisis, when Singapore's GDP dropped by 0.9% while both the equity and property markets plunged. The Straits Times Index of stock prices fell by 60% from a high of 2055.44 in January 1997 to 856.43 in September 1998. Meanwhile, the private property price index suffered a drop of 40% from 270 in quarter one of 1997 to 163.7 in quarter four of 1998 (Chan and Ngiam, 1998). Aware that the rigidity of the exchange rate was a channel of vulnerability, Singapore accepted market-driven depreciations in the wake of and amid the deepening of the crisis in tandem with deteriorating fundamentals. The Singapore dollar fell by 18.3% against the US dollar from S\$1.43 per US\$ the day before the float of the baht, to S\$1.75 per US\$ on 7 January 1998 (Kapur, 2005).⁹

The immediate market-driven depreciations brought about a sufficiently depreciated Singapore dollar that would have reduced the gains from further speculation. This lowered the incentive for currency speculators to engineer an over-depreciation in the domestic currency (Yip, 2005). Had Singapore adhered to a fixed currency peg and defended the currency from the beginning, greater adjustments—and thus, higher volatility in the real economy—would have been necessary. Instead, the MAS widened the boundaries of the policy band as it met with increased uncertainty during the crisis to allow for greater flexibility in managing the exchange rate. Subsequently, when the volatility in the regional markets subsided, the width of the band was narrowed. The quick reaction of the authorities as well as the flexibility in the exchange rate system have been advantageous in aligning the domestic currency with changing economic fundamentals and allowing the new equilibrium to emerge rapidly. No doubt, this contributes to the credibility of Singapore's exchange rate system and is one of the factors that helped to lessen the severity of the crisis.

The depreciation of the Singapore dollar during the 1997 Asian crisis (as well as during other major economic downturns) was accompanied by wage cuts in the form of downward adjustments in the contribution rates to the Central Provident Fund (CPF), which is a government administered compulsory saving scheme. Prior to the crisis, employees and employers were each required to contribute 20 percent of the employees' income to the CPF. With the outbreak of the crisis, the employer's CPF contribution rate was reduced to 10 percent coupled with a two-year wage restraint to bring down labor costs. In addition, other administrative policy measures such as cost-cutting and budgetary measures were employed.

Such coordination of wage adjustments and cost-cutting measures with the concurrent depreciation of the domestic currency alleviates the need for a bigger NEER depreciation targeted at preserving Singapore's international competitiveness edge. In this way, monetary policy in Singapore is complemented by a proactive and flexible wage policy, whereby real depreciations in the Singapore dollar are partly effected

⁹ With the onset of the Asian crisis, the Singapore dollar actually strengthened on a trade-weighted basis, despite having depreciated against the US dollar. This was due to a sharp depreciation of the regional currencies such as the Indonesian rupiah, Thai baht, and Malaysian ringgit.

through deflationary wage and price adjustments when the economy is hit by severe negative shocks.

V.2 Monetary Policy during the Post-Crisis Period

We next examine the conduct of monetary policy during the post-crisis period. Prior to 2001, the MAS would disclose the general thrust of its exchange rate policy stance via occasional policy announcements made by senior central bank officials. In early 2001, the MAS formalized the announcement of the exchange rate policy stance through a *Monetary Policy Statement* in conjunction with its semiannual exchange rate policy cycle. Table 1 traces Singapore's exchange rate policy stance since the Asian crisis.

We observe from Table 1 the various forms of adjustments to the TWI allowed by the BBC exchange rate regime. First, changes to width of the band can be carried out (as announced in the 11 September 2001 statement) in response to periods of heightened volatility. Second, there can be a re-centering of the policy band (as announced in the July 2003 statement) and third, a change to the slope of the crawl in the central parity can be effected (as announced in the October 2007 statement). These different ways of adjustments demonstrate the flexibility accorded by the exchange rate system, which allows the MAS to use the exchange rate to accommodate shocks to as well as structural changes in the economy (Khor et al., 2007).

Table 1. Tracing Singapore's Exchange Rate Policy Stance

Late 1990s	Against the backdrop of subsiding inflation and stalling economic growth, MAS ended the decade-long trend of appreciation of the TWI and eased policy to a neutral setting with the policy band centered on a zero appreciation path.
Early 2000	Against a backdrop of a favorable external environment and a strong rebound in the domestic economy, MAS tightened policy by inducing a gradual appreciation of the TWI.
January 2001	MAS maintained a gradual appreciation of the TWI to keep inflationary pressures in check.
July 2001	Against a backdrop of a weak external environment, global electronics downturn, and subsiding inflationary pressures, MAS eased policy to a neutral setting with the policy band centered on a zero appreciation path.
11 September 2001	Against a backdrop of an uncertain external environment and downside risks to the domestic outlook, policy bands were widened. When a degree of calm returned to the foreign exchange market, the narrower bands were restored but the neutral stance was maintained.
July 2003	In view of the downside risk in the external environment, MAS lowered the policy band by re-centering it at the then current level of TWI, while maintaining a zero appreciation path.
April 2004	Against a more favorable growth outlook for the domestic economy, and the risk of rising inflationary pressures, MAS announced a shift towards a gradual and modest appreciation of the TWI.
October 2007	Against a backdrop of rapid expansion of the domestic economy and rising inflationary pressures, MAS increased slightly the slope of the TWI policy band while maintaining a modest and gradual appreciation of the TWI policy band.

Since the BBC exchange rate system has functioned well for Singapore, a natural question arises as to whether it should be recommended for the other regional economies. To adopt this exchange rate arrangement, countries should have the capacity required to operate the system. This involves a good sense of what the equilibrium exchange rate level is and how it is evolving; the ability to resist intervention within a sufficiently wide policy band; having the latitude to carry out prompt large-scale intervention operations to defend the band; and possessing good judgment of what market conditions require the widening the policy band. Nevertheless, it is still possible that the flexibility accorded by the BBC regime may not be sufficient to deal with extremely severe external shocks. A case in point is Indonesia, which had to abandon its BBC regime when hit by contagion from Thailand during the Asian crisis (Williamson, 2007).

V.3 Management of Domestic Liquidity

What impact do foreign exchange interventions—carried out mostly to moderate the appreciation of the Singapore dollar—have on domestic liquidity? Defending appreciations usually leads to an increase in foreign reserves and a rise in the monetary base, thereby raising inflationary pressures in the domestic economy unless the central bank carries out sterilization. Indeed, excessive credit growth and the high costs of sterilized foreign exchange interventions are well-recognized challenges posed by large capital inflows.

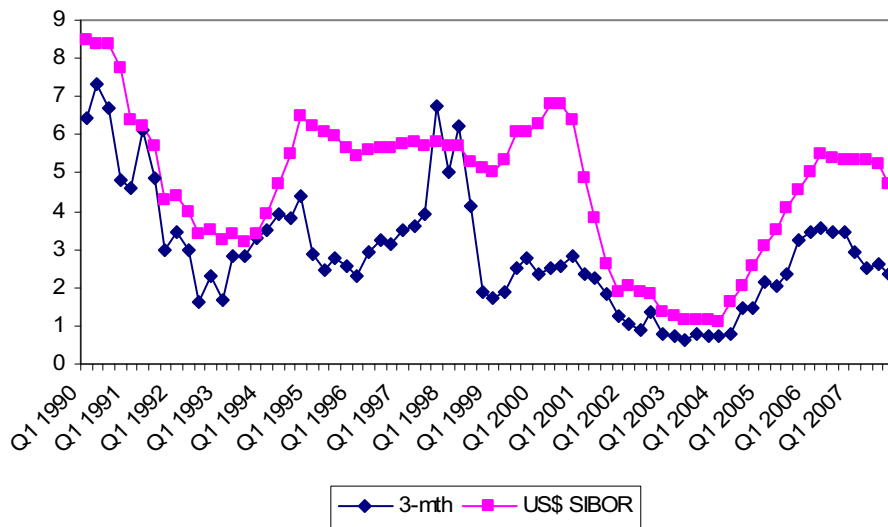
However, instead of having to manage excess domestic liquidity and withdraw funds, the MAS is generally in the position to supply funds to the domestic banking system. The first reason for this is prudent fiscal management—the Singapore government has continued to run budget surpluses averaging around 5% of GDP since the crisis. As the government's financial agent, the MAS is in receipt of public sector surpluses from the government, which in effect removes liquidity from the domestic economy. The second reason is that the contributions to the CPF tend to be in excess of withdrawals, and these positive net contributions to the CPF also effectively represent a withdrawal of funds from the domestic financial system. In fact, both the public funds transfers and the CPF net contributions channel substantial liquidity out of the economy, causing the money supply to shrink and putting pressure on the Singapore dollar to appreciate.

The MAS can actively offset this liquidity drain through foreign exchange operations that use the Singapore dollar to purchase the US dollar. In this way, funds are channeled back to ensure an appropriate level of liquidity in the domestic banking system, thereby offsetting the effect on the exchange rate. In fact, the MAS can achieve a wide range of exchange rate appreciation or depreciation by controlling the amount of liquidity re-injection. By the same token, the MAS can exert a limited degree of control over domestic interest rates by varying the amount of liquidity re-injections, particularly when the TWI is “floating” within the prescribed policy band. For instance, if the economy is deemed to be overheating, less liquidity could be re-injected into the market. The relative reduction in the money supply would raise domestic interest rates, which would in turn help to cool the economy. Conversely, if the economy is slowing down, the MAS could re-inject more liquidity into the economy with an attendant reduction in the domestic interest rates, which would help to stimulate the economy.

It is evident in Figure 15 that domestic interest rates in Singapore are generally lower than US interest rates, reflecting investor expectations of an appreciation of the domestic

currency. However, Figure 16, which depicts the *ex post* three-month uncovered interest differential, reveals that the differentials are quite different from zero and as pointed out by Yip (2003) they are substantially larger in magnitude compared with corresponding figures from Hong Kong, China. Hence, the fluctuations in the differentials are indicative of some autonomy in the interest rate policy, albeit to a rather limited extent. This is because Singapore’s extensive network of international financial and trade linkages results in such huge and rapid capital flows that domestic interest rates are largely determined by foreign interest rates and market expectations of the future value of the Singapore dollar.¹⁰

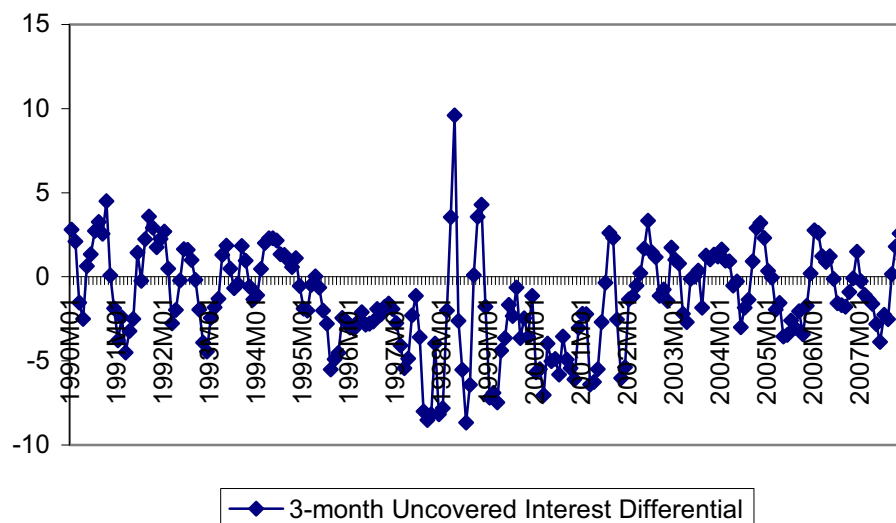
Figure 15. Three-Month Domestic Inter-Bank Rate and Three-Month US\$ SIBOR



Note: SIBOR = Singapore Inter-bank Overnight Rate

Source: Monetary Authority of Singapore

¹⁰ The MAS (2000) found that covered and uncovered interest parity tended to hold between Singapore and US one- and three-month inter-bank rates, respectively, in the 1990s before the Asian crisis.

Figure 16. Ex Post Three-Month Uncovered Interest Differential

Source: Monetary Authority of Singapore

To complement its exchange rate policy, the MAS conducts money market operations in order to foster orderly money market conditions. The MAS adds or withdraws funds from the market using instruments such as foreign exchange (reverse) swaps, direct lending to or borrowing from banks, direct purchase or sales of Singapore Government Securities (SGS), and repurchase agreements on SGS (MAS, 2003). With the use of such money market operations, the MAS is able to pump in or mop up liquidity from the domestic banking system on a massive scale in response to economic and financial developments. For instance, the MAS injected S\$2.5 billion into the domestic banking system in the immediate aftermath of the September 11 terrorist attacks to forestall turmoil in the local financial markets.

VI. NON-INTERNATIONALIZATION OF THE SINGAPORE DOLLAR

Arising from the use of the exchange rate as a benchmark policy instrument, the policy of non-internationalization of the Singapore dollar was adopted in the early 1980s as a rather limited form of capital control. Singapore has eradicated all exchange controls since 1978 in order to promote the development of its offshore financial markets. Hence, residents and non-residents are free to remit Singapore dollar funds in and out of Singapore and are also free to purchase or sell Singapore dollars in the foreign exchange market. Singapore's role as an international financial center has also led to the development of a large offshore banking sector, the Asian Dollar Market (ADM), whose assets are denominated in foreign currencies. There are no controls on capital flows between the ADM and the domestic banking system, so holders of Singapore dollars can easily convert their funds into foreign currency deposits and vice versa.

However, the absence of capital restrictions means that speculative attacks on the Singapore dollar could compromise the conduct of the exchange rate-centered monetary policy. The non-internationalization policy, which restricted the international use of the domestic currency, essentially protected the Singapore dollar from speculative attacks to facilitate the effective conduct of monetary policy. At the same time, the policy ensured

that the growth of the Singapore dollar market was in line with the development of the economy. Under the non-internationalization policy, safeguards were put in place to prevent a buildup of offshore deposits of the currency that could be used by speculators to short the Singapore dollar. These included allowing bank credit in the Singapore dollar to be extended to non-residents only in cases where borrowing was meant for funding real economic activities. Additionally, restrictions were imposed on inter-bank Singapore dollar derivatives to limit access to liquidity in the onshore foreign exchange, currency, and interest rate swaps and options markets in order to hinder leveraging or hedging of Singapore dollar positions. These restrictions mainly took the form of consultative requirements to limit speculative activities in Singapore's financial markets, and did not seem to have impeded trade and capital mobility (Lee, 2001).¹¹

Nevertheless, the restrictions became overly binding as the Singapore economy became more globalized and its financial industry matured. In the first place, increased demand by corporate players and financial institutions for the Singapore dollar and its derivatives for commercial transactions called for the liberalization of the policy. Secondly, the non-internationalization policy hampered the development of Singapore's capital markets, particularly the bond market. For instance, short-sales of securities and access to domestic currency credit lines are essential to deepen market liquidity (see Gobat, 2000). Hence, under the imperative to foster greater financial sector diversification the restrictions on the non-internationalization of the Singapore dollar were progressively relaxed. Four major reviews were undertaken after the Asian crisis, resulting in the lifting of restrictions to avert obstruction of market activities. Table 2 below traces the evolution of the non-internationalization policy.

¹¹ We note that none of the restrictions had been imposed on the liability side of the bank balance sheet which means non-residents are free to build up Singapore dollar holdings by converting foreign currency into Singapore dollars and then place them with the domestic banking unit.

Table 2. Evolution of the Non-Internationalization Policy

1983	The policy codified into MAS Notice 621, whereby access to the Singapore dollar is restricted for both residents and non-residents.
1992	Amendment is made to MAS Notice 621 to lift the consultation requirement for extension of Singapore dollar credit facilities of any amount where the funds are to be used to support economic activities in Singapore.
1998	In conjunction with an extensive financial sector liberalization program, the new MAS Notice 757 replaces MAS Notice 621, whereby all restrictions on residents are lifted; some restrictions on non-residents in relation to arranging Singapore dollar equity listings and bond issues of foreign companies are relaxed.
1999	To foster the development of Singapore capital markets, banks are allowed to engage in a wider range of activities—namely, to transact all Singapore dollar interest rate derivatives with non-residents freely and arrange Singapore dollar equity listing for foreign companies.
2000	Only measures to limit access to the Singapore dollar for speculative activity remain. Banks are allowed to freely extend Singapore dollar credit facilities to non-residents for investment purposes in Singapore and to fund offshore facilities provided the proceeds are first swapped into foreign currency before remitting abroad.
2002	All individuals and non-financial institutions are exempted from the Singapore dollar lending restrictions. Non-resident financial entities are permitted to engage in a wide range of derivative transactions.
2004	Non-resident non-financial issuers of Singapore dollar bonds and equities are no longer required to swap their Singapore dollar proceeds into foreign currencies before remitting them abroad.

The current policy has only two core requirements, as stated in the revised *MAS Notice 757 of 28 May 2004*. First, financial institutions may not extend Singapore dollar credit facilities exceeding S\$5 million to non-resident financial entities where they have reason to believe that the proceeds may be used for speculation against the Singapore dollar. Second, for a Singapore dollar loan to a non-resident financial entity exceeding S\$5 million or for a Singapore dollar equity or bond issue by a non-resident entity that is used to fund overseas activity, the Singapore dollar proceeds must be swapped or converted into foreign currency before use outside Singapore. These restrictions do not apply to non-resident financial institutions and there is currently a large offshore market in Singapore dollars abroad. Nevertheless, the MAS deems the current policy useful to deter offshore speculators from accessing liquidity in Singapore's onshore foreign exchange swaps and money markets (MAS, 2002).

On the first restriction, there is clearly an element of judgment involved in determining whether a client intends to engage in speculative activities. In the words of the MAS, "Financial institutions are expected to institute appropriate internal controls and processes to comply with this restriction...[these] include [obtaining] written confirmation from the non-resident financial institution specifying the purpose of funding... and [executing a] formal evaluation process of the client profile, which provides a clear basis for assessing that the client is unlikely to use the Singapore dollar proceeds for currency speculation" (MAS, 2006, p. 3). In view of the reputation the MAS has for toughness, the financial institutions are expected to err on the side of caution when implementing this policy. As for the second restriction, which has been in effect since 28 May 2004, non-

resident non-financial issuers of Singapore dollar bonds and equities are no longer required to swap their Singapore dollar proceeds into foreign currencies before remitting them abroad. The amendment to the policy relieves foreign issuers from incurring the additional cost of swapping, thereby removing an advantage in directly issuing foreign currency bonds. For non-resident financial institutions, however, the requirement is retained.

With the lifting of the various restrictions, there is no longer a non-internationalization policy *per se*. Rather, the policy has been reduced to a lending restriction and is now known as MAS' policy on lending Singapore dollars to non-resident financial institutions. Has the liberalization of the non-internationalization policy resulted in the Singapore dollar being at risk of speculative attacks, or has the policy outlived its purpose? The past restrictions by themselves are unlikely to have been the single most important factor in protecting the Singapore dollar against speculative attacks. Rather, it is the maintenance of both internal and external macroeconomic balance as well as the absence of balance sheet vulnerabilities that offers little incentive for speculators to wage attacks against the currency or to circumvent the restrictions for speculative purposes. Furthermore, the MAS places great emphasis on the prudential supervision of financial institutions, ensuring sound credit practices and a strong capital position.¹² In addition to its strong banking system, Singapore continues to develop deep and liquid capital markets for the efficient intermediation of financial flows, thereby enhancing the resilience of its financial system to shocks.

VII. CONCLUSION

In summary, Singapore's experience with capital flows after the crisis appears to have been somewhat benign. Clearly, it is the overall package of policies—including strong economic fundamentals and a robust financial system, prudent policy management on both the fiscal and monetary side, and credible exchange rate policy aligned with underlying fundamentals—that serves to increase Singapore's resilience towards disruptive swings in capital flows. In addition, the government also relies on direct credit controls when appropriate, such as in curbing surging residential property prices due to availability of easy credit. In view of the destabilizing effects of sudden shifts in capital flows, particular emphasis has been placed on having the latitude to react promptly and on a sufficiently large scale to economic and financial developments.

Pronounced shifts in capital flows, regardless of whether they are triggered by misguided policies or contagion, are often associated with the loss of foreign investor confidence in the prospects for the domestic economy. Ocampo (2003) found that the variations in capital flows can be attributed primarily to shifts in risk evaluation. We have highlighted the need for disciplined macroeconomic and financial policies as well as the crucial role of strong mature institutions, strong human resource capacity, and strong governance in order to bolster the confidence of investors and other market participants. In this regard, it is important for the regional economies to continue the process of building a sound and efficient domestic financial system, and installing an effective system of prudential supervision.

¹² Since the end of 1997, the MAS has shifted its supervisory regime from a one-size-fits-all regulation to a risk-based approach.

Domestic financial development is often achieved through prudent external financial liberalization, which tends to catalyze both financial deepening and broadening. Chow and Kris (2007) pointed out that the extent of domestic financial development and the scope of capital account liberalization need to be managed holistically, as interactions between them present both opportunities for growth as well as potential risks.¹³ On the one hand, sufficiently developed domestic financial sectors are necessary to absorb and allocate capital inflows to their most efficient uses. On the other, domestic financial markets cannot fully realize their potential without exposure to international capital markets. For instance, partial international liberalization exerts pressure to overcome entrenched interest and policy inertia to reforms that are necessary to establish core institutional infrastructure. Further, the opening of the domestic sector to foreign financial institutions often leads to capacity building and increases the pressure to strengthen supervisory and regulatory frameworks.

Smooth responses to fluctuating capital flows not only require accelerated institutional reforms in individual countries but also an upgraded regional financial infrastructure. Although it is the domestic authorities and institutions that are ultimately responsible for a country's financial development and stability, regional cooperation of policy measures can play a supportive role during the liberalization process. For instance, regional financial cooperation efforts such as the Chiang Mai Initiative, regional reserve pooling initiatives, and regional financial surveillance help to build the resilience of the region to financial shocks. Given that some countries in Asia are too small to have liquid domestic capital markets, the region could also proactively integrate the financial markets in order to benefit from economies of scale and liquidity agglomeration effects.

Is it possible for a country whose financial system is not yet well-developed to reap the potential advantages of capital movements without the costs of crises? Closing the capital account, at one extreme, would mean foregoing the potential benefits that capital mobility could bring. At the other extreme, complete capital account convertibility inevitably results in instability. A way forward is for such a country to strike a middle ground, by imposing selective restrictions to alter the composition of capital inflows. The capital controls (provided they can be effectively enforced), should be targeted at curbing excessive inflows of short term loans that are prone to reversal. However, this may deter some investors from investing all in the country, resulting in a reduction in the other more beneficial forms of capital inflows. As pointed out by Williamson (2005), this calls for a judicious balance between the volume and stability of capital flows.

¹³ The authors suggested a policy-driven paradigm for financial liberalization in emerging open economies: management of the *financial liberalization trilemma* which states that the extent of any two of the following three components, namely domestic financial development, exchange rate flexibility and capital market openness, should determine the proper course of action for the third.

Appendix. Singapore Balance of Payments (in S\$ millions)

	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002
A. Current Account Balance	-3376	128	5659	20462	19597	25112	35188	25737	22834	28854	33794
Goods Balance	-5981	-3340	-2959	1384	3136	1660	24788	20299	21948	28170	35544
Services Balance	3885	2571	7558	17089	14013	16496	2402	4110	3383	1293	444
Income Balance	-1022	1231	1824	3244	3961	8718	9979	3042	-565	1394	-246
Current Transfers (Net)	-258	-333	-763	-1255	-1513	-1762	-1982	-1714	-1932	-2003	-1948
B. Capital and Financial Account Balance	3419	1401	7115	-6811	-7525	-19907	-36049	-21929	-10203	-25861	-24405
Capital Account (Net)	30	-136	-40	-101	-196	-257	-378	-324	-281	-289	-287
Financial Account (Net)	3388	1537	7155	-6710	-7329	-19650	-35671	-21605	-9922	-25572	-24118
Direct Investment	2437	1780	6418	1311	2890	-1149	11745	13302	20547	-3628	3636
Portfolio Investment	27	385	-1880	-10430	-15531	-19167	-13128	-15046	-25855	-17829	-19932
Official	-27	-21	-	-9353	-13826	-16491	-12500	-13191	-9575	-7975	-7461
Other Sectors	54	405	-1880	-1078	-1705	-2676	-628	-1855	-16281	-9854	-12470
Other Investment	924	-627	2617	2410	5312	666	-34287	-19862	-4614	-4115	-7822
Assets	-1590	-5155	-399	-14572	-17032	-52923	-7773	-40580	-27184	-12021	-14206
Banks	-778	-3058	4909	1635	-4981	-18385	3711	-16710	3394	-17599	1922
Official	-1	0	-1	-4959	-4165	-2899	-2526	-1534	-4066	-1036	-442
Other Sectors	-811	-2096	-5307	-11249	-7886	-31640	-8959	-22336	-26512	6614	-15687
Liabilities	2514	4527	3016	16982	22344	53589	-26514	20719	22570	7906	6384
Banks	1070	2040	-1864	6269	11325	27746	-21401	5347	13278	14726	-609
Other Sectors	1444	2487	4880	10713	11019	25843	-5114	15372	9292	-6819	6993
C. Net Errors and Omissions	1377	1413	-2882	-1477	-1666	6650	5841	3514	-796	-4595	-7103
D. Overall Balance (A+B+C)	1419	2942	9893	12174	10407	11856	4981	7321	11835	-1602	2287
E. Official Reserves (Net)	-1419	-2942	-9893	-12174	-10407	-11856	-4981	-7321	-11835	1602	-2287
Special Drawing Rights	-24	-18	-28	-16	-9	-38	-112	12	-30	-57	-30
Reserves Position in the IMF	-34	-26	3	-49	2	-136	-50	-294	41	-52	-5
Foreign Exchange Assets	-1361	-2898	-9868	-12110	-10399	-11682	-4819	-7039	-11846	1710	-2252

	2003	2004	2005	2006	2007 Q1	2007 Q2	2007 Q3
A. CURRENT ACCOUNT BALANCE	38909	36415	47617	57661	16603	18263	20773
Goods Balance	51506	55532	61150	71054	19563	18393	22048
Services Balance	-6330	-5945	-3898	-4564	-2852	-1268	-756
Income Balance	-4296	-11228	-7618	-6633	574	1828	236
Current Transfers (Net)	-1971	-1944	-2018	-2197	-682	-690	-756
B. CAPITAL AND FINANCIAL ACCOUNT BALANCE	-30736	-12868	-31923	-33262	-13496	-7744	-12108
Capital Account (Net)	-292	-310	-336	-360	-93	-97	-109
Financial Account (Net)	-30444	-12558	-31588	-32902	-13403	-7648	-11999
Direct Investment	15626	19868	16593	24757	9843	2913	1500
Abroad	-4695	-13647	-8379	-13707	-2497	-5883	-5067
In Reporting Country	20321	33514	24972	38464	12340	8796	6567
Portfolio Investment	-16686	-11902	-13792	-22536	928	-2057	-3631
Assets	-25793	-14582	-23025	-34030	-6142	-10909	-7733
Banks	-320	-1079	-1484	-5972	106	-1789	2354
Official	-7167	-7756	-10105	-11592	-3333	-4584	-4685
Others	-18306	-5747	-11436	-16467	-2915	-4537	-5402
Liabilities	9107	2680	9233	11494	7070	8852	4103
Banks	169	241	405	1470	-610	715	-457
Others	8938	2439	8828	10023	7680	8137	4559
Other Investment	-29384	-20524	-34389	-35123	-24174	-8504	-9868
Assets	-36899	-47832	-47199	-78566	-36153	-32924	-25094
Banks	18567	-8938	-15367	-45964	-12802	2832	-1204
Official	-14101	-15397	-10030	-16941	-6043	-21368	-7683
Others	-41366	-23497	-21802	-15661	-17309	-14388	-16207
Liabilities	7515	27308	12810	43443	11980	24420	15226
Banks	-15695	7469	4906	34289	-1570	10662	5091
Others	23210	19839	7904	9154	13550	13758	10135

	2003	2004	2005	2006	2007 Q1	2007 Q2	2007 Q3
C. NET ERRORS AND OMISSIONS	3601	-3077	4704	2597	-1592	-1383	-2633
D. OVERALL BALANCE (A+B+C)	11775	20469	20397	26996	1515	9136	6031
E. OFFICIAL RESERVES (NET)	-11775	-20469	-20397	-26996	-1515	-9136	-6031
Special Drawing Rights	-46	-123	-2	-10	-1	-12	-9
Reserves Position in the IMF	-131	244	421	91	14	48	3
Foreign Exchange Assets	-11597	-20590	-20816	-27076	-1529	-9172	-6025

References

- Abeyasinghe, T., and K.M. Choy. 2004. The Aggregate Consumption Puzzle in Singapore. *Journal of Asian Economics* 15(3): 563-578.
- Calvo G., L. Leiderman, and C. Reinhart. 1993. Capital Inflows and Real Exchange Rate Appreciation in Latin America: The Role of External Factors. *IMF Staff Papers* 40 No. 1.
- Chow, H.K. 2005. A VAR Analysis of Singapore's Monetary Transmission Mechanism. In *The Economic Prospects of Singapore*, edited by Winston T.H. Koh and Robert S. Mariano. Singapore: Addison Wesley, 274-298.
- Chow, H.K., and P. Kriz. 2007. Financial Liberalization Trilemma and Regional Policy Cooperation: Fresh Perspectives for Emerging Markets in East Asia. Presented at *Singapore Economic Review Conference*, August 2007, Singapore.
- Chan K.S., and K.J. Ngiam. 1998. Currency Crisis and the Modified Currency Board System in Singapore. *Pacific Economic Review* 3(3): 243-263.
- Dobson W., and G. Hufbauer. 2001. *World Capital Markets: Challenges to the G-10*. Washington: Institute for International Economics.
- Gobart, J. 2000. Singapore—Financial Sector Development: A Strategy of Controlled Deregulation. Singapore—Selected issues 00/83, Washington: IMF.
- Kaminsky G.L., C.M. Reinhart, and C.A. Vegh. 2004. When it Rains, it Pours: Procyclical Capital Flows and Macroeconomic Policies. *NBER Working Paper* No. 10780.
- Kapur B.K. 2005. Capital Flows and Exchange Rate Volatility: Singapore's Experience. *NBER Working Paper* No. 11369.
- Khor H.E., E. Robinson, and J. Lee. 2004. Managed Floating and Intermediate Exchange Rate Systems: The Singapore Experience. *MAS Staff Paper* No. 37.
- Khor H.E., J. Lee, E. Robinson, and S. Saktiandi. 2007. Managed Float Exchange Rate System: The Singapore Experience. *The Singapore Economic Review* 52(1): 7-25.
- Khor H.E., and W.Z. Kit. 2007. Ten Years from the Financial Crisis: Managing the Challenges Posed by Capital Flows. *MAS Staff Paper* No. 48.
- Krugman, P. 1991. Target Zones and Exchange Rate Dynamics. *The Quarterly Journal of Economics* 106(3): 669-682.
- Lee, J. 1999. Singapore: Competitiveness Issues. Singapore—Selected issues 99/53, Washington: IMF.
- Lee, J. 2001. Evolution of the Policy on Noninternationalization of the Singapore Dollar. Singapore—Selected issues 01/177, Section IV, Washington: IMF.
- MacDonald, R. 2004. The Long Run Real Effective Exchange Rate of Singapore—A Behavioural Approach. *MAS Staff Paper* No. 43.

- McCallum, B.T. 2007. Singapore's Exchange Rate-Centered Monetary Policy Regime and its Relevance for China. *MAS Staff Paper* No. 48.
- Monetary Authority of Singapore. 2000. Financial Market Integration in Singapore: The Narrow and the Broad Views. *MAS Occasional Paper* No. 20.
- Monetary Authority of Singapore. 2002. Singapore: Policy of Non-internationalization of the S\$ and the Asian Dollar Market. Paper presented to BIS/SAFE Seminar on *Capital Account Liberalization*, 12-13 September, Beijing, China.
- Monetary Authority of Singapore. 2003. Monetary Policy Operations in Singapore. *MAS Monograph*.
- Monetary Authority of Singapore. *Notice 757 of 28 May 2004*.
- Monetary Authority of Singapore. 2006. *Frequently Asked Questions on MAS Notice 757 and Equivalent Notices*.
- Obstfeld M., J.C. Shambaugh, and A.M. Taylor. 2004. *The Trilemma in History: Tradeoffs among Exchange Rates, Monetary Policies, and Capital Mobility*. Mimeo, University of California, Berkeley, Dartmouth College, March.
- Ocampo, J.A. 2003. Capital Account and Countercyclical Prudential Regulations in Developing Countries. In *From Capital Surges to Drought: Seeking Stability for Emerging Economies*, edited by R. Ffrench-Davis and S. Griffin-Jones. Basingstoke: Palgrave Macmillan for the United Nation University/World Institute for Development Economics Research.
- Phang, S. 2004. House Prices and Aggregate Consumption: Do They Move Together? Evidence from Singapore. *Journal of Housing Economics* 13(2): 101-119.
- Parrado, E. 2004. Singapore's Unique Monetary Policy: How Does it Work? *MAS Staff Paper* No. 31.
- Taylor, J.B. 1993. Discretion Versus Policy Rules in Practice. *Carnegie-Rochester Conference Series on Public Policy* 39(1): 195-214.
- Williamson, J. 1999. Future Exchange Rate Regimes for Developing East Asia: Exploring the Policy Options. Paper presented to a conference on *Asia in Economic Recovery: Policy Options for Growth and Stability*, organized by Institute of Policy Studies, Singapore, 21-22 June.
- Williamson, J. 2005. *Curbing the Boom-Bust Cycle: Stabilizing Capital Flows to Emerging Markets*. Washington: Institute of International Economics.
- Williamson, J. 2007. The Case for an Intermediate Exchange Rate Regime. *Singapore Economic Review* 52(3): 259-307.
- Yip, S.L. 2003. A Re-statement of Singapore's Exchange Rate and Monetary Policies. *Singapore Economic Review* 48(2): 201-212.
- Yip, S.L. 2005. *The Exchange Rate Systems in Hong Kong and Singapore, Currency Board Vs Monitoring Band*. Prentice Hall: Singapore.