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**Currency Speculation and the Optimum Control
of Bank Lending in Singapore Dollar:
a Case for Partial Liberalization**

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Abstract

The Monetary Authority of Singapore (MAS) has a long-standing policy of controlling bank lending in Singapore dollars to nonresidents and to residents who use the funds outside Singapore. While the control may prevent the internationalization of the Singapore dollar and contain exchange rate volatility, it can hinder the deepening and widening of the financial markets in Singapore.

This paper suggests three policy options that would allow traders and investors to borrow Singapore dollars without any restrictions, while making it costly for speculators since their activities can cause exchange rate volatility which arguably imposes external costs to society.

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Contents	Page
Summary	3
I. MAS Restrictions	4
A. The Approved Category	5
B. The Banned Category	5
C. The Unlisted Category	6
II. The Effects of MAS Restrictions	6
III. The Case for Liberalization	9
A. Deepening of Singapore Financial Markets	9
B. Retention of Some of Singapore-Dollar Business in Singapore	9
C. Greater Scope for Singapore Firms to Hedge and Invest	10
D. Reduction in Transactions Costs and Gains in Seignorage	10
IV. Policy Options	10
A. Option I: Tax on Speculators	11
B. Option II: Loan Quota Rule	14
C. Option III: Fine-Tuning the Loan Quota Rule	15
V. A Comparison with Other Policy Options	16
VI. Conclusions and Policy Implications	18
Figures	
1. Flows of Funds Between DBUs and Nonresidents	20
2. Deposits in DBUs and ACUs	21
3. The September 1985 Exchange Rate Episode	22
4. Figure 4	23
5. Figure 5	24
Tables	
1. Annualized Tax Rates for Speculators Under Alternative Interest-Rate Regimes	25
2. Characteristics of Major Proposals to Deal with Currency Speculation	26
End Notes	27
References	31

Summary

The Monetary Authority of Singapore (MAS) controls bank lending in Singapore dollars to nonresidents and to residents who use the fund outside Singapore, in order to prevent the internationalization of the Singapore dollar and contain exchange rate volatility. Although liberalization of the use of the Singapore dollar may result in greater exchange rate fluctuations, it can provide several benefits to Singapore, including: (i) deepening and widening the Singapore financial markets; (ii) keeping some Singapore-dollar business in Singapore; (iii) allowing greater scope for Singapore firms to hedge and invest; and (iv) reducing transaction costs and seignorage gains.

An optimal policy would allow traders and investors to borrow Singapore dollars without any restrictions while making borrowing costly for speculators. The paper assesses three policy options available to the MAS.

First, under a perfect information situation in which the MAS can distinguish between speculators and nonspeculators, it could impose a tax on Singapore dollar loans to speculators while not taxing nonspeculators. The analysis suggests that the current MAS restrictions prohibiting speculators from borrowing Singapore dollar loans are equivalent to a prohibitive tax, which is a suboptimal policy.

Second, under an imperfect information situation in which the MAS cannot distinguish speculators from nonspeculators, a loan quota rule may be easy to operate. The loan quota should be large enough so it would not be binding during normal times; however, during a currency crisis, when the demand for Singapore dollar loans by speculators is excessive, the loan quota could be binding.

Third, even with imperfect information, the MAS could improve on the loan quota rule by allocating the loan quota for the subsequent period based on certain conditions. For instance, the loan quota could be restricted to residents, or banks could be allowed to allocate the loan quota based on long-term relationships with their customers.

During the 1992 turbulence within the European Monetary System (EMS), some EMS members (notably Spain, Ireland, and Portugal) resorted to capital controls to defend the speculative attacks on their currencies. Specifically, these countries imposed restrictions on lending of their domestic currencies to nonresidents. However, these controls were inadequate to prevent devaluations within the EMS. The Spanish peseta and the Portuguese escudo were both devalued by 6 percent on November 23, 1992 and the Irish pound by 10 percent on January 30, 1993. By early 1993, these controls were completely abolished. As a result, the IMF was able to claim in 1995 that nearly all industrial countries, including small economies such as Switzerland, Australia, and New Zealand, have eliminated all capital controls.¹

In contrast, the Monetary Authority of Singapore (MAS) has had a long-standing policy of "controlling" (but not "banning") bank lending of Singapore dollars to nonresidents and to residents who use the fund outside Singapore.² The objective is two-fold. One is to discourage speculation against the Singapore dollar. The other is to prevent the internationalization of the Singapore dollar. The MAS is concerned that internationalizing the local currency might lead to large destabilizing flows of capital into and out of the Singapore dollar. This would make it harder for the MAS to control the money supply and exchange rate.

The internationalization of the Singapore dollar is a highly controversial topic in Singapore. As Singapore has advanced into a "developed-economy" status, and with the increased competition in financial services from other financial centers such as Hong Kong and Tokyo, there is growing pressure from within Singapore to liberalize on the use of Singapore dollars.³ The issue has been widely debated in international magazines as well as in the local press, Parliament, and academic conferences. However, it has not been addressed in any academic paper even though there is a proliferation of literature on the internationalization of the yen and other currencies. This paper fills that vacuum. Section I describes the MAS restrictions on bank lending in Singapore dollar. Section II discusses the effects of MAS restrictions. Section III presents the case for the liberalization on the use of the Singapore dollar. Section IV examines the various policy options available to the MAS. Section V compares the policy options proposed in this paper with that in the literature to deal with currency speculation. Finally, Section VI gives the conclusions and policy implications.

I. MAS Restrictions

To enforce its controls on bank lending in Singapore dollar, the MAS requires that banks maintain accounts for their Asian Currency Units (ACUs) separate from that for their Domestic Banking Units (DBUs). The ACUs can only handle claims denominated in non-Singapore currencies. In contrast, the DBUs can only deal with deposits and loans denominated in Singapore dollar. As the activities of the DBUs have a direct bearing on the domestic money supply and exchange rate, these are tightly controlled by the MAS to ensure that its policy guidelines are adhered to.

The first definitive statement on the MAS policy was conveyed to the banks on November 1, 1983 and reads as follows:

"Banks should observe the Authority's policy of discouraging the internationalization of the Singapore dollar. Specifically, banks should consult the Authority before considering Singapore dollar credit facilities exceeding S\$5 million to nonresidents, or to residents where the Singapore dollars are to be used outside Singapore. Banks managing syndicated loans, bond issues, or other financial papers exceeding S\$5 million should do likewise. The terms "residents" or "nonresidents" include bank and nonbank customers. Details of such proposals should be submitted in writing to the Manager, Banking and Financial Institutions Department."

This policy statement appears to be too general and restrictive. It is administratively cumbersome and may introduce an element of uncertainty into business operations between banks and its customers. Consequently, in its circular on July 18, 1992, the MAS has streamlined its operation by listing out those activities which banks can finance, for whatever amount in Singapore dollars, without seeking MAS approval (the "approved" category) and those which banks are banned from financing in Singapore dollars (the "banned" category). For those activities which are not specifically mentioned by the MAS (the "unlisted" category), banks have been reminded that they should continue to follow the 1983 MAS guidelines.

A. The Approved Category

Since July 18, 1992, banks are not required to consult the MAS if the credit facilities in Singapore dollars, for whatever amount, are provided to residents or nonresidents for the following activities: (i) direct exports from and imports into Singapore; (ii) hedging by forward sales of Singapore dollar receipts from exports to Singapore; (iii) issue of performance bonds for economic activities in Singapore in favor of Singapore parties; and (iv) guarantee of payments arising from construction or other economic activities in Singapore.⁴

B. The Banned Category

Banks have also been told that they must not finance in Singapore dollars, activities which have no bearing on Singapore. Such activities include: (i) direct or portfolio investments outside Singapore by nonresidents; (ii) third country trade by nonresident-controlled companies; and (iii) nonresident subscription to equity in a Singapore company where the proceeds are used for takeovers or financial investments.

In addition, banks have been advised against granting Singapore-dollar credit facilities to nonresidents for speculating in the local financial and property markets.

To ensure that its regulations are not being circumvented through financial derivatives, the MAS has defined Singapore dollar credit facilities to cover a wide range of financial instruments, including loans, foreign exchange swaps, currency swaps, interest rate swaps, facilities incorporating options, and forward rate agreements in Singapore dollars. To see how these financial instruments can be used to get around the MAS restrictions, consider the case of a foreign exchange swap, which involves the selling (buying) of the Singapore dollar in the spot market with the simultaneous buying (selling) of the Singapore dollar in the forward market. Without any restrictions, a firm or individual can borrow Singapore dollars indirectly by first borrowing U.S. dollars and then doing a foreign exchange swap (which involves the buying of the Singapore dollar spot with the simultaneous selling of the Singapore dollar forward). This effectively replicates, or synthesizes, a Singapore dollar money market loan with a "lock-in" Singapore dollar interest rate.⁵

C. The Unlisted Category

The activities under this category are wide-ranging and include: (i) third-country trade as well as direct and portfolio investments overseas by residents; and (ii) direct investment and housing development in Singapore by nonresidents.

Although direct investment abroad by residents has been actively encouraged by Singapore as part of its efforts to develop an external wing to its economy, banks are still not given a free rein in extending credit facilities in Singapore dollars for such an activity. In 1992 and 1993, the MAS approved two Singapore-dollar loans totaling S\$725 million for the Batam's industrial project--which was jointly developed by Indonesia's giant Salim group and Singapore's government-linked companies (GLCs).⁶ The local financial community had hoped that the MAS would be more willing to approve Singapore-dollar loans for projects outside Singapore that do not involve Singapore's GLCs. Thus far, their wishes have not materialized. It has been argued that the MAS restrictions may have hampered Singapore's "go-regional" thrust. For such an activity, banks have been advised to consult the MAS. As a result, banks have different interpretations of the MAS regulations. Some banks prefer to obtain clearance from the MAS even if the amount for such an activity is less than S\$5 million. Others prefer to avoid prior consultations with the MAS and instead make the loan amount less than S\$5 million.

II. The Effects of MAS Restrictions

As the DBUs act as the most important conduit for the flow of Singapore-dollar funds, any liberalization on the use of the local unit can have an effect on the exchange rate. The flow of funds between the DBUs and nonresidents is shown schematically in Figure 1. Arrows A and B show that nonresidents who borrow Singapore dollars can deploy their funds in two ways with different implication for the exchange rate. One is to place them as Singapore-dollar deposits (Arrow A). The holding of Singapore-dollar deposits by nonresidents (whether in Singapore or other countries) implies the internationalization of the Singapore dollar but has no immediate impact on the exchange rate. Only when their

Singapore-dollar deposits are converted into other currencies would there be a downward pressure on the Singapore dollar. Another way is to convert their Singapore-dollar loans directly into other currencies (Arrow B), which exerts a downward pressure on the Singapore dollar.

The MAS frowns on internationalizing the local currency because it believes that a large pool of Singapore dollars in the hands of nonresidents can be a source of exchange rate instability. This would happen whenever there is any portfolio shift into or out of the Singapore dollar, in response to changes in market sentiment. Thus, any speculation against the Singapore dollar would weaken the ability and credibility of the MAS to control the exchange rate, which is the only macroeconomic instrument the MAS uses to stabilize domestic prices. In such a situation, the MAS would need to hold excess international reserves.⁷

The MAS restrictions may have slowed down, but have not prevented, the accumulation of Singapore dollar deposits by nonresidents. Currently, the DBUs may freely accept deposits in Singapore dollars from nonresidents. As Singapore is an important financial and trading center as well as a host-country for many multinational companies, the amount of Singapore dollar deposits accumulated by nonresidents is substantial. In 1994, the ACUs and the banks outside Singapore have amassed some S\$51.6 billion worth of Singapore-dollar deposits (or 25 percent of total liabilities) in the DBUs. As indicated in Figure 1, any movement of funds by nonresidents into or out of the Singapore-dollar deposits can affect the exchange rate. Arrow C shows that the inflow of nonresidents' funds into the DBUs will exert an upward pressure on the Singapore dollar. Conversely, Arrow D shows that the outflow of nonresidents' funds from the DBUs will weaken the Singapore dollar. Hence, the unobstructed inflows and outflows of nonresidents' funds in the Singapore-dollar deposits could have qualitatively similar consequences for the domestic economy as increases or decreases in the Singapore-dollar loans. During a financial crisis, nonresidents who are constrained from borrowing Singapore-dollar loans could always run down their Singapore-dollar deposits. In a sense, the MAS restrictions could not completely wipe out speculation against the Singapore-dollar. Instead, they could only reduce the flow of the Singapore-dollar funds and, consequently, the speculation against the Singapore currency.⁸

To speculate successfully, speculators must be able to borrow Singapore dollars to sell them.⁹ This is because there is a limit to running down the Singapore-dollar deposits, as these are needed by residents and nonresidents for domestic transactions and for repaying of debts. The events in September 1985 may be instructive. In 1985, Singapore experienced a sharp recession after two decades of high growth. Speculators attacked the Singapore dollar in September 1985, in the belief that the MAS wanted the local currency to fall in order to boost the ailing economy. As speculators were prevented from borrowing Singapore dollars to speculate, they might have resorted to converting their Singapore-dollar deposits in the DBUs into the U.S. dollar deposits in either the ACUs or elsewhere. Indeed, in September, the demand deposits of nonbank customers in the DBUs fell by about 8.0 percent while that of bank customers¹⁰ in the DBUs remained stationary as can be seen in Figure 2. During that

month, the foreign currency deposits of nonbank customers in the ACUs continued to rise, albeit by only 1.5 percent. Some Singapore residents might have placed their funds in Hong Kong and other financial centers to avoid paying taxes on interest income.¹¹ Figure 3 shows that although the Singapore dollar fell to S\$2.3025 per U.S. dollar on September 13, 1985 (a decline of about 5 percent in just a few weeks), it quickly recovered and stabilized at around the new level of about S\$2.100 per U.S. dollar. The MAS intervened by spending some S\$218.6 million of its foreign reserves (which is less than 0.1 percent of the total) in September. However, the tight liquidity caused the overnight interbank rate to jump to 30 percent on September 21.¹² The fact that speculators are restricted from borrowing Singapore dollars implies that they have less resources at their command to bet against the Singapore dollar and may help explain why Singapore has been so successful in fending off the speculative attacks on its currency.

The MAS restrictions could actually help to stabilize the value of the Singapore dollar indirectly by reducing the Singapore money supply during a currency crisis. With the Singapore-dollar loan restrictions, speculators betting against the local currency would want to switch out of their Singapore-dollar deposits. Such an action would cause a contraction of the Singapore money supply through a reduction of the bank liabilities and assets.¹³ This should have a stabilizing effect of strengthening the Singapore dollar during the period when it was under speculative attacks. In the absence of the MAS restrictions, the Singapore money supply might have increased as speculators would borrow Singapore dollars to switch into foreign currencies. The MAS might be prompted to intervene to offset the tendency for the Singapore money supply to increase (and for the Singapore dollar to depreciate) by selling foreign reserves. However, it is unlikely that the borrowing of Singapore dollars by speculators would be unlimited. The banks eventually have to settle their liabilities in Singapore-dollars in the interbank market using their Singapore-dollar deposits with the MAS, which are limited in supply.

Obviously, there are other ways which speculators can use to bet against the Singapore dollar but these do not escape the watchful eyes of the MAS. One way is to sell the Singapore dollar in the forward market. As the forward market involving the Singapore dollar is rather thin, it cannot provide an effective vehicle for speculation. Moreover, even though the exchange control has been completely liberalized since June 1978, the MAS continues to monitor the forward transactions involving the Singapore dollar to ensure that they are not used for speculation or that they do not form part of a foreign exchange swap.¹⁴ Yet another way is to purchase foreign assets financed by borrowing the Brunei dollar--which has been kept at par with the Singapore dollar--in accordance with the interchangeability arrangement between these two countries.¹⁵ In the past, banks were reported to have booked their Brunei dollar loans under ACUs. Since July 1991, the MAS has plugged this loophole by requiring banks to move their Brunei dollar deposits and loans from ACUs to DBUs, thus allowing it to monitor movements in both currencies more effectively.¹⁶

III. The Case for Liberalization

The liberalization of the use of the Singapore dollar can provide several benefits to Singapore. These include: (A) the deepening of the Singapore financial markets; (B) the retention of some of the Singapore-dollar business in Singapore; (C) the greater scope for Singapore firms to hedge and invest; and (D) the reduction in transactions costs and the seigniorage gains.

A. Deepening of Singapore Financial Markets

Any liberalization on the use of the Singapore dollar can lead to a "deepening" of Singapore financial markets because of the increasing flow of Singapore dollar funds as the DBUs lend out more Singapore-dollar funds to nonresidents and to residents who use the funds outside Singapore. This should, in turn, stimulate the tradings of Singapore dollars against other currencies. Although Singapore is currently the fourth largest foreign exchange trading center with an average daily turnover of over S\$150 billion, the share of Singapore-U.S. dollar transactions constitutes only 5 percent.¹⁷ The "widening" of Singapore financial markets will arise when a wider range of Singapore-dollar instruments, including swaps and other derivatives, are traded without any restrictions. Currently, swap transactions involving the Singapore dollar are not well-developed, partly because they are tightly controlled to ensure that they are not being used to circumvent the MAS restrictions.¹⁸ It is thus not surprising that in 1980 the then Minister of Finance admitted in Parliament that "the wider use of the Singapore dollar will lead to the further growth of our foreign exchange, money, and capital markets."¹⁹

B. Retention of Some of Singapore-Dollar Business in Singapore

The relaxation of the MAS restrictions may also help arrest the growth of the Singapore-dollar business in other financial centers like Hong Kong, London, and New York. As long as there is a demand, banks in other financial centers will conduct the Singapore-dollar business to avoid the reserve as well as other regulatory costs and restrictions set by the MAS. Currently, there is evidence of a growing offshore Singapore-dollar market.²⁰ In the foreseeable future especially when the Singapore interest rates move up, more Singapore-dollar assets are expected to be traded overseas.²¹ If the domestic banks are prevented from lending out Singapore dollars, these financial centers will continue to undertake this task. Thus, the MAS restrictions will be counterproductive. Singapore will merely be watching its currency being used overseas, without reaping any of the benefits, since the latter accrue to the foreign banks operating elsewhere. The saving grace is that the MAS can always use its huge international reserves to mop them up periodically. In doing so, the MAS can control the size of the Singapore-dollar assets outside Singapore.

C. Greater Scope for Singapore Firms to Hedge and Invest

Being a small country with high savings but limited investment opportunities, Singapore will benefit if more of its firms expand overseas but continue to use its banking and other services. In 1994, its gross national savings reached a record 50 percent of GNP, current account surplus rose to S\$18.3 billion (17.4 percent of GNP), and the official foreign reserves climbed to S\$85.2 billion (6.9 months of merchandise imports). With its large surplus funds, Singapore can itself be a significant source of funds for the infrastructural and industrial projects in the Asian region, besides playing its traditional role as a conduit for the global flow of funds.²² The issue is not whether local funds should be used outside Singapore but whether the DBUs should be allowed to lend out in Singapore dollars rather than foreign currencies. While the lending in Singapore dollars for use outside Singapore may lead to greater exchange rate volatility, it can benefit Singapore firms intending to invest outside Singapore. As these firms have most of their assets in Singapore, it is only logical that they would want to hedge their positions by having their liabilities in Singapore dollar. Under the current MAS regulations, they may be forced to borrow non-Singapore currencies (probably from banks in other centers) for their investments outside Singapore. To hedge their exchange rate risk, they would need to incur transaction costs by selling Singapore dollars forward against the currencies they had borrowed. Moreover, if nonresidents were to be allowed to borrow by issuing Singapore-dollar-denominated assets, then Singapore firms with surplus funds could invest in these assets to avoid any foreign exchange risk.

D. Reduction in Transactions Costs and Gains in Seignorage

If the Singapore dollar were to become more widely used as a medium of exchange, Singapore traders would have greater scope for settling their accounts in the domestic currency. Thus, they would gain from a reduction in exchange rate risks and transaction costs because the need to hold working balances or to trade in a multitude of foreign currencies is diminished.²³ However, it is unlikely that the Singapore dollar will emerge as a medium of exchange or a unit of account beyond the Southeast Asian region simply because Singapore lacks the economic size and influence.²⁴ If the Singapore dollar plays a greater role as a store of value, Singapore would reap the seignorage gains from issuing domestic money to nonresidents.²⁵ There is a potential for the Singapore dollar to be used more widely as a store of value, in view of the confidence in both the political stability of Singapore and the value of its currency.

IV. Policy Options

While it is desirable to liberalize on the use of the Singapore dollar, an obstacle is that the activities of speculators can cause exchange rate volatility, which arguably imposes external costs to society. Viewed broadly, a problem of external costs arises whenever the activities of any one individual harm someone else without being internalized and accounted for. The external costs of exchange rate volatility is the willingness-to-pay by victims for a more stable exchange rate despite the existence of hedging opportunities. Victims are not

only the traders and investors but also the MAS. With greater exchange rate volatility, traders and investors would need to incur higher transaction costs and bear more risk, while the MAS would need more international reserves. If such externalities exist, a case can be made to "internalize" them by imposing a tax on the activities of speculators.

The extent of speculations on the Singapore dollar cannot be underestimated. Using the 1993 statistics for Singapore, the average daily transactions for the current account is about US\$506.05 million and for direct investment (abroad and in Singapore) is US\$20.82 million.²⁶ In 1993, the daily turnover of foreign exchange transactions involving Singapore dollar is about US\$2,410 million.²⁷ It is clear that only about 20 percent of the foreign exchange transactions support international trade and investment.²⁸ The other 80 percent (about US\$1,883 million) is largely speculation, the sole purpose of which is to buy enormous volumes low and sell higher in order to make small unit profit, but a large overall profit.

While the activities of speculators should be curbed especially during the currency crises, those of traders and investors should be encouraged. Thus, it is desirable to develop a policy technique that would allow traders and investors to borrow Singapore dollars without additional costs, while making it costly for speculators. There are various policy options available to the MAS and the choice depends on its information set. First, under perfect information situation where the MAS can distinguish between speculators and nonspeculators, it could simply impose a tax on Singapore-dollar loans by speculators but allow nonspeculators to obtain Singapore-dollar loans without the tax. Second, with imperfect information where the MAS cannot "separate the wheat from the shaft," a loan quota rule may be easy to operate as a policy instrument. Third, even with imperfect information, the MAS can still improve on the loan quota rule by making use of various signals and other available information. The details on each of these three options are elaborated below.

A. Option I: Tax on Speculators

If the MAS knows who are the speculators, it could simply impose a tax on the Singapore-dollar loans to speculators. An optimal tax is not too difficult to determine, provided that all the data are available. Although one of the major obstacles to an optimal pricing is the lack of information, it is nevertheless useful to consider what the optimal solution would be if the necessary data were known. To begin with, suppose that the granting of Singapore-dollar loans to speculators involves an external cost in the form of greater exchange rate volatility. Figure 4 shows the tax on the vertical axis and the amount of Singapore-dollar loans to speculators (of which the exchange rate instability is a positive function) on the horizontal axis. A decrease in the Singapore-dollar loans to speculators (and hence exchange rate instability) from a higher level of tax must generate a downward-sloping demand curve (D) for the speculators. The marginal social cost curve (MSC) must be upward-sloping, as the exchange rate instability increases with the amount of Singapore-dollar loans to speculators.

If there is a complete liberalization on the use of the Singapore-dollar loans, the quantity of Singapore-dollar loans demanded by speculators will be Oqc . However, the efficient solution in this case does not call for a complete liberalization or a prohibition of Singapore-dollar loans to speculators. The current MAS restrictions (assuming that it is able to discriminate speculators from nonspeculators) are equivalent to a prohibitive tax at OY or higher. It is clear that the MAS restrictions result in a sub-optimal situation. The optimal solution is to price the tax at the intersection of D and MSC , which will yield a per unit tax per of OA . With OQa of Singapore-dollar loans to speculators, the tax revenue is $OQaLA$ and the social cost is $OQaL$. The net benefit (or welfare gain) to Singapore is thus OLA .²⁹ However, Singapore can do even better by exercising its monopoly position and pricing the tax at the intersection of the marginal tax revenue curve (MR) and the MSC (yielding a tax of OB) to extract the maximum rent from speculators.

The optimal tax can be affected if account is taken of the fact that any deepening and widening of the financial markets may have a complementary effect or a cost-reduction effect on the output of the whole financial sector in Singapore. The complementary effect can come from the high-fixed cost or from the increasing returns to scale in the output of the financial sector, while the cost reduction effect may arise from servicing currency speculators. These two effects can benefit the nonspeculative traders by providing them with more liquidity in the financial markets, aiding the development of forward markets, and lowering the bid-offer spreads. As a result, the new MSC should be lower and flatter than the old MSC .³⁰ It is possible that the new MSC is negative at some range, which implies that the Singapore-dollar loans to speculate yields net positive benefits to the economy. In this case, the optimal solution is a zero tax, which implies a complete liberalization on the lending of the Singapore dollar. Therefore, the tax revenue from the imposition of a positive tax must be used to compensate the losers; in this case, the financial sector whose development has been hindered by the tax.

The analysis thus far assumes that the MAS does not price discriminate between the domestic and foreign speculators and that the activities of the domestic speculators are considered socially wasteful. Suppose that the activities of the domestic speculators are not considered socially wasteful as they provide employment and a source of tax revenue for the government. To establish the optimal tax, there is a need to have separate demand curves for the two groups. As shown in Figure 5, the demand and marginal revenue curves of foreign speculators are denoted by D_f and MR_f respectively, while that of domestic speculators by D_d and MR_d respectively. For simplicity, it is assumed that they have identical demand curves. In this case, optimality requires that the SMC equals to the SMR (which is the horizontal summation of the demand curve of the domestic speculators and the MR of the foreign speculators). The tax for each group can be recovered by back-tracing the intersection of the SMC and SMR to their respective markets. It can be seen that the optimal tax for the domestic speculators at OT_d , which is lower than that paid by the foreign speculators at OT_f .

Even if the MAS could identify the speculators, it might still have difficulties obtaining the demand and MSC curves. However, it is certain that during a currency crisis, the demand

for Singapore-dollar loans by speculator would increase. This means that during a crisis, the optimal tax rate should be higher in order to act as a built-in stabilizer. Accordingly, it is proposed that the tax could take the form of a deposit requirement on bank lending in Singapore dollars to speculators. The deposit could be proportional to the loan and maintained interest-free at the MAS for the duration of the loan or for a fixed period. This is an implicit tax on speculators, which can be derived from the following equation:

$$(1) \quad x \text{ CR} + (1 - x) \text{ SR} = \text{NR}$$

where x represents the proportion that banks keep as cash reserves with the MAS, CR is the interest on the cash reserves (which is assumed to earn zero interest), NR is the interest rate charged on nonspeculators (which can be termed as the "normal" interest rate), and SR is the interest rate charged to speculators (obtained by adding the normal interest rate to the implicit tax, which is the reserve cost).

Rearranging equation (2) and setting CR equal to zero gives

$$(2) \quad \text{SR} = \left(\frac{1}{1 - x} \right) \text{CR}$$

It can be seen that if there is no deposit with the MAS for loans to speculators, then $x = 0$ and $\text{SR} = \text{NR}$. If $x > 0$, then $\text{SR} > \text{NR}$, and the difference between the two rates is the implicit tax (or reserve cost) on speculators. Moreover, a given change in the NR will lead to a more than proportionate change in the SR (the "magnification effect"). This merely shows that the implicit tax rate is higher (lower) when the normal interest rate is higher (lower). Based on 10 percent reserve requirement for a period of one year, the various annualized tax rates for speculators under alternative interest-rate regimes are presented in Table 1.

As shown in Table 1, for any given maturity of the loans, the opportunity cost of the deposit and, consequently, the tax rate for speculators will increase with the interest rate. This could act as a built-in stabilizer because during a speculative attack on the Singapore dollar, the Singapore interest rate is expected to rise in view of the increase in demand for Singapore-dollar loans by speculators as well as the efforts by the MAS to tighten liquidity to squeeze speculators. Moreover, as the deposit period is the same regardless of the maturity of the loans, the annualized tax rate is higher for short-term loans than long-term loans. This should make it more expensive for speculators to indulge in short-term speculations of the Singapore dollar, thus allowing the MAS more time to counteract any pressure on the local currency.

The reserve ratio (x) could also be allowed to adjust according to the severity of currency crises. Any increase in x during times of crises would cause the wedge between SR and NR to widen. This would not only dampen the demand for Singapore-dollar loans by speculators but also help moderate the rise in NR during a crisis. The MAS could use its own

discretion to adjust x as and when it considers necessary. Alternatively, it could devise an index to measure the degree of currency speculation and then allow x to vary with the index. Eichengreen, Rose, and Wplosz (1995) has constructed such an index as a weighted average of changes in interest rates, exchange rate, and reserves.

Since speculators impose external costs to society, which should be internalized, why then only a few countries structure their policy to target speculators. Apart from Singapore, France is the other country noted for discriminating against speculators in its lending policy.³¹ One reason why other countries do not follow the examples of Singapore and France could be that the benefits from speculative activities outweigh the social costs, especially during the tranquil periods.³² If that is the case, then the MSC curve in Figure 4 would be on the horizontal axis or below it at some range. Another plausible explanation might be that it is difficult to distinguish between speculators and nonspeculators, owing to the asymmetry of information. There is some evidence that the MAS has difficulties trying to distinguish these two classes of borrowers. During the last speculative attack on the Singapore dollar, the MAS had to issue a press statement (dated September 18, 1985) lamenting that "some speculators have borrowed from banks to finance speculation." It advised banks "to recall such loans or not renew them on maturity when the purpose of the loan is known to be currency speculation." It also disclosed that some corporations dipped into their bank credit lines "to relend to the interbank market at a profit" and told them "to stick to their chosen fields and not act as financial intermediaries."³³

B. Option II: Loan Quota Rule

If the MAS cannot identify the speculators, then a case could be made for the MAS to set a loan quota per period (for example, S\$100 billion per month), which should be large enough such that during normal times both nonspeculators and speculators could have equal access to the Singapore-dollar loans.³⁴ Unlike the situation in Option I, the Singapore-dollar loans by speculators would not be taxed because they could not be easily identified. In the absence of a speculative attack, the loan quota should be nonbinding because there would be no excessive demand for Singapore-dollar loans by speculators who are the main culprits of the externality. Such a policy is tantamount to a complete liberalization on the use of the Singapore dollar during normal times. The loan quota rule could be viewed as a prudential measure to ensure that, when a crisis arises, speculators would be unable to quickly swamp the foreign exchange market with massive amount of Singapore dollars for exchange into other currencies.

However, when the Singapore dollar is under attack, it is possible for the loan quota to be binding. During such periods, there could be a stampede by both speculators and nonspeculators to borrow the Singapore dollars through the loan quota window. The excess demand for the loan quota could be cleared simply by raising the interest rates. This is equivalent to the defensive increases in interest rates during periods of "stress." A sharp increase in interest rates penalizes those who are short sellers of funds denominated in the

local currency, thus making it more costly to speculate. It also increases the demand for assets denominated in the home currency. This tactic is frequently employed by countries, including Singapore, when their currencies are under speculative attacks.³⁵

The major problem with the interest rate defense is that the incidence of the interest rate falls on all traders and not just speculators.³⁶ However, the punitive interest rates during a crisis would probably hurt the speculators more as they must borrow in Singapore dollars (not in any other currencies) if they still want to bet against the local unit. Moreover, they would need to borrow a large sum in order to be profitable but the amount of Singapore dollars they could borrow is limited to the loan quota. On the other hand, nonspeculators could obtain as much Singapore dollar as they want for their commercial needs by borrowing in other currencies and converting them into the local currency. If the covered interest parity holds, they would still have to incur a higher interest cost, but the transactions costs of converting from one currency to the another are likely to be minimal.³⁷ The conversion of foreign currencies into the Singapore dollar by nonspeculators in the spot market could actually help alleviate the speculative pressure against the local currency by speculators. This should provide the MAS with more time to deal with the speculative attacks on the Singapore dollar. The hardship encountered by nonspeculators during a crisis could be justified on the ground that they themselves are likely to turn into speculators by converting the Singapore dollars that they have borrowed into other currencies. Borrowers might be able to cheat by lying that their Singapore-dollar loans are for trade or investment purposes, which in actual fact are used for speculation.

C. Option III: Fine-Tuning the Loan Quota Rule

Although the loan quota rule as set out in Case II above is simple and objective, its main shortcoming is that the incidence of higher interest rates during a currency crisis falls on all traders and not just speculators. Apart from economic considerations, this might be politically unacceptable if it is necessary to keep interest rates high for a protracted period of time to combat the capital outflows driven by fundamental concern about the economy rather than by a brief period of purely speculative activity. If the constraint on using increases in interest rates to restrict the Singapore-dollar loans arises because traders as well as speculators are hit by the same higher cost of credit, can something be done to restrict the squeeze to the speculators? The French defense provides an example of one effort in this direction--albeit one that could easily be abused. By providing cheap funding for supposedly "commercial requirements" during the crisis, the French authorities might have difficulties ensuring that the funds are used for the intended purposes.

The MAS could fine-tune the loan quota rule by providing a refund to nonspeculators after the crisis, as opposed to the French way of giving a relief during the crisis. This should ensure that the cheap funding is used exclusively for nonspeculative purposes. The MAS and banks are in a better position to identify the nonspeculators after the crisis, because information on borrowers ex post is much easier to obtain than information ex ante. With the co-operation from banks, the MAS could then refund a part of the higher interest costs that

nonspeculators had incurred during the crisis. Of course, borrowers would have to prove their cases beyond a reasonable doubt before such a refund could be made to them.

As an alternative to the high interest rates, the MAS could simply allow an excess demand for the loan quota to prevail during the crisis period. The loan quota would then act as a circuit-breaker. An exhaustion of the loan quota would trigger off certain conditions (which would be applied automatically), which must be met to be eligible for the loan quota in the subsequent period.³⁸ Such conditions should be based on various signals and other available information, which would help to identify the types of borrowers and to ensure that the loan quota is channeled mainly to nonspeculators. The MAS could impose anyone of the following conditions for its quota allocation once a crisis is known.³⁹

1. One is that the Singapore-dollar lending should be restricted to residents. Such a measure has been adopted by Spain, Ireland, and Portugal during the ERM crisis in 1992. With imperfect information, the cheap funding provided to residents could be justified because they are less likely than nonresidents to be speculators. If the MAS further insists that the Singapore-dollar loans must be used only for nonspeculative purposes, it would have a more effective control over the usage of the Singapore-dollar funds, since it could easily monitor the behavior of residents.

2. The other is that only long-term customers of banks would be eligible for the Singapore-dollar loans. This would allow banks to use their repeated relationships and mutual reputations to monitor the behavior of their customers. Banks should be assigned the task of quota allocation, since they have more information than the MAS and thus are in a better position to identify the different types of borrowers. The only weakness with such a condition is that potential or nonrepeated customers of banks might be penalized.

V. A Comparison with Other Policy Options

This section compares the policy options proposed in this paper with some of the major proposals in the literature to deal with currency speculation. The salient characteristics of the various proposals are summarized in Table 2.

Tobin (1978) has proposed what is commonly known as the Tobin tax as a strategy to throw "sand in the wheels" of the excessively efficient currency markets by imposing "an internationally uniform tax on all spot conversions of one currency into another, proportional to the size of the transaction." Because the concern of the MAS is over the speculation against the Singapore dollar, it could impose the tax on only those foreign exchange transactions involving the local currency. As the tax is payable every time the Singapore dollar is converted, it would hurt the short-run trading (speculators) more than the long-term trading (traders and investors). Accordingly, it would contain erratic exchange rate volatility and "direct traders' attention to the long-run fundamentals and away from transient contagious market sentiment."⁴⁰ However, it has a number of shortcomings. First, if

Singapore were to act unilaterally, the foreign exchange business involving the Singapore dollar would simply move abroad. Second, the tax could easily be circumvented by using the derivative markets.⁴¹ Third, the tax is too blunt and pervasive as an instrument. Although it hurts all kinds of speculations (whether they involve the use of leveraged loans or the switching out of Singapore-dollar deposits), it can be onerous to traders and investors.⁴²

Spahn (1995) has provided a variant of the Tobin tax by proposing that the tax (the "Spahn tax") should only be applied to currency conversions that occur when the exchange rate moves beyond some band. The Spahn tax would be the difference between the band and the market exchange rate. Such a tax can be viewed as a microeconomic means to internalize any externality associated with currency instability into currency prices. However, the Spahn tax is impractical for Singapore on at least three counts. One is that, like the Tobin tax, the foreign exchange business in Singapore would move elsewhere if Singapore were to implement such a tax unilaterally. The second is that, again like the Tobin tax, normal traders are hurt as much as speculators. The third problem is that since Singapore intervenes in the foreign exchange market to stabilize its exchange rate, the actual exchange rate volatility might understate the true social costs.

Eichengreen, Tobin, and Wyplosz (1995) has proposed a deposit requirement on domestic-currency lending to nonresidents (the "Eichengreen tax") as a way of stabilizing the exchange rates within the ERM during Stage II of the Maastricht process. A useful feature of the Eichengreen tax is that the opportunity cost of the noninterest-bearing deposit increases with the interest rate, which will rise during a currency crisis. Its main shortcoming is that it penalizes nonresidents who are nonspeculators. Currently, the MAS imposes an outright ban on Singapore-dollar loans to speculators but not to nonresidents who conduct a substantial amount of business in Singapore. The MAS is right by targeting at the source of the problem (which is speculators) but might have overreacted by banning the Singapore-dollar loans to speculators even during the tranquil periods.

In contrast, an implicit tax on Singapore-dollar loans to speculators or a loan quota rule recommended in this paper would avoid the shortcomings associated with the various proposals in the literature. Currently, the MAS could not prevent speculators from booking Singapore-dollar loans in other offshore centers. With a implicit tax or a loan quota, speculators would be allowed to book Singapore-dollar loans in Singapore. This is tantamount to a partial liberalization on the lending of Singapore dollars, which has been shown to be welfare-improving. Rather than losing the banking business relating to the Singapore dollar, as would be the case under the Tobin tax or Spahn tax, an implicit tax or a loan quota could actually "bring home" some of these business, which are currently being conducted in other countries or are nonexistent because of the MAS restrictions. Ideally, an implicit tax, if adopted, should target speculators and not arbitrageurs. However, it might be difficult to distinguish arbitrageurs from speculators who could easily disguise their activities as arbitrage. But arbitrageurs could still move their own funds in and out of Singapore without having to incur any additional costs.⁴³

VI. Conclusions and Policy Implications

The conclusions of this paper can be summed up with three propositions. First, the MAS cannot control the internationalization of the Singapore dollar, which will occur as long as the local currency can serve as a unit of account, a medium of exchange, and a store of value outside Singapore. Second, the MAS restrictions on Singapore-dollar loans to speculators can only slow down but cannot completely wipe out the speculation of the Singapore dollar. This is because speculators can always convert their holding of Singapore dollar deposits into other currencies during a currency crisis. Third, while the MAS restrictions may contain the exchange rate volatility, they can hinder the deepening and widening of the financial markets in Singapore.

In reviewing its policy, the MAS would have to weigh the costs against the benefits to society from the liberalization on the use of Singapore-dollar loans. While the activities of traders and investors should be encouraged, those of speculators should be controlled, especially during a currency crisis, because their activities impose external costs to the society. This paper proposes three policy options to deal with the externalities.

First, if the MAS is able to distinguish between speculators and nonspeculators, it could simply impose a tax on Singapore-dollar loans to speculators. The analysis suggests that the current MAS restrictions, which prohibit speculators from borrowing Singapore-dollar loans, are equivalent to a prohibitive tax, which is a sub-optimal policy. A nonprohibitive tax is justifiable as it serves to internalize the external costs that speculators have imposed on society. Under certain circumstances, the optimal policy might involve a zero tax, which suggests a complete liberalization on the lending of the Singapore dollar. The tax proposed in this paper takes the form of an interest-free reserve requirement for a fixed period at the MAS. As the reserve requirement is based on a certain percentage of the amount of Singapore-dollar loans to speculators, the tax burden for speculators would be high during the high interest rate regime, which is likely to be the case when there is a currency crisis. Moreover, since the cash reserve is for a fixed period, it would hurt the short-term speculators more than the long-term speculators.

Second, if the MAS cannot identify the speculators, it could set a loan quota rule, which could be used by both speculators and nonspeculators. The loan quota should be large enough, so that it would not be binding during normal times. However, during a currency crisis, when the demand for Singapore-dollar loans by speculators is excessive, the loan quota could be binding. Nonspeculators who are excluded from the loan quota could always obtain their funds indirectly by borrowing other currencies and converting them into the Singapore dollar. They would have to incur the additional transaction costs, which should not be too onerous as their transactions are usually long-term in nature. However, speculators must borrow Singapore dollars (at a high cost) in order to speculate against the local currency.

Third, if the crisis is prolonged or it is politically unacceptable to allow nonspeculators to bear such a heavy burden, then the MAS could always fine-tune the loan quota rule. It

could raise interest rates during a crisis but provide a refund of the high interest costs to nonspeculators after the crisis. Alternatively, it could decide not to raise interest rates during crisis and instead allocate the loan quota for the subsequent period based on certain conditions. One condition could be to restrict the loan quota to residents who are less likely than nonresidents to be speculators. The other condition could be to allow banks to allocate the loan quota based on long-term relationships and mutual reputations with their customers.

This paper also compares the policy options proposed in this paper with the major proposals in the literature to stabilize the exchange rate. Although the Tobin tax and the Spahn tax provide frictions to speculators, they can be onerous to exporters, importers, and investors. On the other hand, these two taxes are powerful instruments to stem all kinds of speculations, whether they involve the use of leveraged Singapore-dollar loans or the switching out of Singapore-dollar deposits. Their main drawback is that they require global coordination. Acting unilaterally, Singapore would stand to lose some of its foreign exchange business to other financial centers. While the Eichengreen tax can be implemented unilaterally by Singapore, its main disadvantage is that it penalizes nonresidents who are nonspeculators and who can contribute to the Singapore economy. The policy options proposed in this paper would avoid the shortcomings of the major proposals in the literature. Most importantly, they could be implemented unilaterally by Singapore, thus obviating the need for multilateral coordination.

Figure 1

Flows of Funds Between DBUs and Nonresidents

Figure 2

Price of US\$ in S\$
(S\$/US\$)

Figure 3

The September 1985 Exchange Rate Episode
(Weekly data)

Source: MAS Monthly Statistical Bulletin.

Figure 4

Figure 5

Table 1. Annualized Tax Rates for Speculators
Under Alternative Interest-Rate Regimes

Maturity of Loans	Normal Interest Rate (NR)		
	NR = 5%	NR = 10%	NR = 20%
1 month	6.80	14.16	30.15
3 months	2.22	4.51	9.18
6 months	1.10	2.23	4.49
1 year	0.55	1.11	2.22

Assumptions: (1) Reserve requirement at 10 percent of the loan amount.

(2) Reserve is held interest-free at the MAS for a one-year period.

Table 2. Characteristics of Major Proposals
to Deal with Currency Speculation

	Tobin (1978)	Spahn (1995)	Eichengreen/ Tobin/Wyplosz (1995)	Chan/ Ngiam
Tax base	A tax on all spot conversions of one currency to another.	A tax on currency conversions when exchange rate moves outside of a band.	Noninterest bearing deposits at central bank on domestic-currency lending to nonresidents.	Option I: Noninterest bearing at central bank on domestic currency lending to speculators. Options II and III: Loan quota rule.
Tax rate	Proportional and uniform.	Difference between band and exchange rate.	Implicit and varies with interest rate.	Option I: Implicit and varies with interest rate. Options II and III: None.
Scope of application	International, multilateral.	International, multilateral.	National, unilateral.	Option I, II, and III: National, unilateral.

End Notes

1. See IMF Annual Report 1995, page 49.
2. The terms "residents" and "nonresidents" include banks and nonbanks customers. Nonresidents include Singapore-incorporated companies, which are majority-owned, jointly-owned or otherwise controlled by nonresidents. Residents include Singapore citizens and permanent residents who have made Singapore their home and live in Singapore.
3. See, for example, "Policy against global Sing\$ may hamper go-regional move" in *The Straits Times*, May 20, 1993.
4. Manufacturing, construction, the provision of transport and communications services, financial and business services are examples of economic activities in Singapore. Financial and portfolio investments do not fall within this category.
5. As foreign banks in Singapore do not have a large Singapore-dollar deposit base, they can obtain Singapore-dollar funds for "legitimate" borrowers through either the interbank borrowings or the foreign exchange swaps. If covered interest parity holds and there is no transaction costs, the interest cost from either of these two channels should be similar.
6. The first loan of S\$125 million was granted in March 1992 and the second loan of S\$600 million in March 1993. It is noteworthy that the second loan was treated as an offshore rather than a domestic loan. For the details and implications, see "MAS further relaxes rules on S\$ offshore loans" in *The Strait Times*, March 15, 1993.
7. Speculators can wager that the local unit will appreciate by borrowing foreign currencies to acquire Singapore-dollar assets. This is not as serious problem because the MAS can always issue more Singapore dollars to stabilize the appreciation.
8. Nonresidents can also sell their Singapore stocks and properties. However, it is more costly to sell such assets as they are often illiquid.
9. Domestic speculators can behave in the same way as foreign speculators. However, domestic speculators do not seem to be a major concern as the Government can bring them to task if they bring down the Singapore dollar. Hence, restricting the Singapore-dollar loans to foreigners and to Singaporeans living abroad may seem sufficient.
10. Bank customers include only the ACUs and banks outside Singapore.
11. Currently, Singapore residents need to pay taxes on their interest income earned in Singapore. However, they do not have to pay taxes if such income originates outside Singapore and is not brought back to Singapore.

12. The overnight interbank rate actually shot up to a record high of 120 percent on 18 September.
13. The ratio of broad money to monetary base may fall as well.
14. Generally, banks entering into such transactions are required to ascertain the purpose from their clients in writing. To comply with the MAS regulations, banks only deal with such derivatives if these are used for hedging and not for speculation.
15. For a discussion of this arrangement, see Chan and Ngiam (1992).
16. See "Banks told to stop booking Brunei \$ loans under ACUs" in *The Straits Times*, July 25, 1991.
17. Total foreign exchange turnover in Singapore is obtained from the *1995 Annual Report of Singapore Foreign Exchange Committee*. The share of the Singapore-U.S. trading is estimated using the data from the Bank for International Settlements (1993).
18. Speculators can create a "synthetic" Singapore-dollar loan by simultaneously buying Singapore dollars spot and selling them forward. However, on order to speculate against the Singapore dollar, they would have to square (or liquidate) their long-spot position by selling the Singapore dollar spot. In so doing, they would end up with a short forward position in the Singapore dollar.
19. This statement was made on February 26, 1980.
20. See "The Currency Game" in *The Far Eastern Economic Review*, November 30, 1995.
21. A rise in interest rates would cause the cost of (constant) reserve requirements to be higher. This should have the effect of causing a shift of Singapore-dollar deposits and loans offshore. For a fuller discussion, see Duffy and Giddy (1994).
22. The DBUs have already channeled a substantial sum of funds in foreign currencies (worth some S\$50.7 billion in 1994) to ACUs and to banks outside Singapore for on-lending to regional borrowers.
23. Traders can, of course, use the forward market to cover their risks, but, as studies of invoicing behavior have shown, they have not generally hedged their foreign exchange exposures in the forward or futures markets. Such markets are typically thinner than spot markets and the forward market with a maturity of one year or more is usually nonexistent.
24. For a justification of this point, see Frankel (1995).
25. Any holding of the Singapore currency (notes and coins) by nonresidents would be equivalent to an interest-free loan to Singapore.

26. These figures are obtained from the *Balance of Payments Statistics Yearbook* (1994).
27. See Bank for International Settlements (1993), Table 2-D.
28. This is in line with the findings for the U.S., where only about 18 percent of the foreign exchange transactions support international trade and investment. For more details, see Wachtel (1995).
29. This analysis assumes that the consumer surplus is unaffected by the tax.
30. In addition, the MSC could incorporate the loss of seigniorage gains as a result of the tax.
31. During the ERM crisis in September 1992, France used high interest rates to squeeze speculators. To offset the adverse effects on nonspeculators, banks with normal commercial requirements received cheap funding that could be passed through to customers. According to Folkerts-Landau and Ito (1993), France had some success with tailoring a policy in this manner.
32. During the tranquil periods, the optimal tax rate could well be zero. However, it might still be necessary to have a minimum tax rate during such times in order to serve as a monitoring and controlling device.
33. With the asymmetry of information, there will certainly be cheating and disguise by speculators. Hence, the policy of distinguishing lending by class of borrower is unlikely to be 100 percent effective. But one can argue that to slow down speculative activity it is not necessary for the measure to be water-tight. The Singapore experience in 1985 indicates that discriminating against the speculators has had some effects on warding off attacks on the Singapore dollar, even when the measure was less than totally effective.
34. One can choose the cut-off loan quota to be at the level of liquidity where the Singapore dollar begins to feel the stress (and gets risky) or where externality kicks in.
35. See Goldstein et al. (1993) for further discussion of the interest rate defense tactic adopted by various countries during the ERM crisis in 1992.
36. The use of an aggressive interest rate policy may be constraint by concerns about the ability of the banking sector to survive the shock and of the Government to service its debt. However, such concerns are not valid for the case of Singapore, as it has a strong banking sector and only a meager amount of public debt.
37. The bid-offer spread of the Singapore-U.S. dollar exchange rate is normally five pips for a transaction size of US\$1 million.
38. When a crisis is known, it would be too late to apply the conditions to the loan quota for the current period.

39. The first-come-first-serve basis of allocating the loan quota is ruled out because the loan quota could end up largely in the hands of speculators.
40. See Tobin (1991), page 16.
41. Garber and Taylor (1995) discussed some of the possible strategies that banks could adopt to avoid the Tobin tax if financial derivatives were not subject to the tax.
42. Employing a Tobin tax to control the activities of speculators is like performing an acupuncture with a fork.
43. As long as there is a free flow of capital, the covered interest parity (CIP) involving the Singapore dollar is expected to hold. Evidence that it holds is provided by Frankel (1993), which shows that Singapore has a smaller covered interest differential than some open European countries like Germany. Similarly, Tse, and Tan (1996) show that deviations from the CIP involving the Singapore dollar are small and attribute this to the various liberalization measures taken by the authorities over the years.

References

- Asian Wall Street Journal, "Singapore Intervenes in Market and Hits Currency Speculators," September 19, 1985.
- Bank for International Settlements, Central Bank Survey of Foreign Exchange Market Activity in April 1992, Basle: Bank for International Settlements.
- _____, 1995, BIS Releases the Preliminary Global Findings of the Central Bank Survey of Foreign Exchange Market Activity in April 1995, BIS Review (October 24): 1-4.
- Bowring, Philip, "Gaining Currency in Singapore," Far Eastern Economic Review, July 4, 1985.
- Bryant, Ralph, 1989, "The Evolution of Singapore as a Financial Centre," in *Management of Success: The Moulding of Modern Singapore*, ed. K.S. Sandhu and P. Wheatley. (Singapore: Institute of South East Asian Studies).
- Chan, Kenneth S., and Kee-Jin Ngiam, 1992, "Currency Interchangeability Arrangement Between Brunei and Singapore: A Cost-Benefit Analysis," Singapore Economic Review 37 (October): 21-33.
- Dooley, Michael, 1995, "A Survey of Academic Literature on Controls over International Capital Transactions," Working Paper No. 318 (June). University of California, Santa Cruz.
- Eichengreen, Barry, James Tobin, and Charles Wyplosz, 1995, "Two cases for sand in the wheels of international finance," Economic Journal 105 (January): 162-172.
- Eichengreen, Barry, Andrew Rose, and Charles Wyplosz, 1995, "Is There a Safe Passage to EMU? Evidence on Capital Controls and a Proposal," Working Paper No. C95-047 (January). University of California, Berkeley.
- Fieleke, Norman, 1994, "International Capital Transactions: Should They Be Restricted?" New England Economic Review (March: 28-39).
- Felix, David, 1995, the Tobin Tax Proposal: Background, Issues and Prospects, Futures 27 (March: 195-208).
- , 1995, "Financial Globalization Versus Free Trade: The Case for the Tobin Tax," Working Paper No. 108 (October). United Nations on Trade and Development.
- Folkerts-Landau, David, and Takatoshi Ito, 1995, International Capital Markets:

Developments, Prospects, and Policy Issues, Washington, D.C.: International Monetary Fund.

Frankel, Jeffrey A., 1993, "Quantifying International Capital Mobility in the 1980s," in *Exchange Rates*, ed. Jeffrey A. Frankel (Boston: MIT Press.).

----- 1995, "Still the Lingua Franca: The Exaggerated Death of the Dollar," *Foreign Affairs* 74 (July/August): 9-16.

----- 1996, "How Well Do Foreign Exchange Market Function: Might a Tobin Tax Help?" Working Paper No. 5422 (January). National Bureau of Economic Research.

Garber, Peter, and Mark P. Taylor, 1995, "Sand in the Wheels of Foreign Exchange Markets: A Skeptical Note." *Economic Journal* 105 (January): 173-180.

Goldstein, M., et al., 1993, *International Capital Markets, Part I: Exchange Rate Management and International Capital Flows*. Washington D.C.: International Monetary Fund.

Hakkio, Craig, 1994, "Should We Throw Sand in the Gears of Financial Markets?" *Economic Review* 79 (second quarter): 17- 30. Federal Reserve Bank of Kansas City.

Kenen, Peter B., 1995, "Capital Controls, the EMU, and EMU." *Economic Journal* 105 (January): 181-192.

Koh, Linda, 1995, "Monetary and Exchange Rate Management with International Capital Mobility: the Singapore Experience" in *Monetary and Exchange Rate Management with International Capital Mobility: Experiences of Countries and Regions Along the Pacific Rim*. Hong Kong: Hong Kong Monetary Authority.

Mathieson, Donald J., and Liliana Rojas-Suárez, *Liberalization of the Capital Account*, IMF Occasional Paper No. 103 (Washington D.C.: International Monetary Fund, March 1993).

Ngiam, Kee Jin, 1996, "Singapore as a Financial Center: New Developments, Challenges, and Prospects," in *Financial Deregulation and Integration in East Asia*, ed. Takatoshi Ito and Anne O. Krueger. University of Chicago Press.

Schwert, William G., and Paul Seguin, 1993, *Securities Transaction Taxes: An Overview of Costs, Benefits and Unresolved Questions*. *Financial Analyst Journal* (September/October): 27-35.

Shome, Parthasarathi, and Janet G. Stotsky, "Financial Transactions Taxes," IMF Working Paper 95/77 (Washington, D.C.: International Monetary Fund, August 1995).

Spahn, Paul Bernd, "International Financial Flows and Transactions Taxes: Surveys and Options," IMF Working Paper 95/60 (Washington, DC.: International Monetary Fund, June 1995).

Tavlas, George S., and Yuzuru Ozeki, *The Internationalization of Currencies: An Appraisal of the Japanese Yen*, IMF Occasional Paper No. 90 (Washington, DC.: International Monetary Fund, January 1992).

Teh, Kok Peng, and Tharman Shanmugaratnam, 1992, "Exchange Rate Policy: Philosophy and Conduct over the Past Decade," in *Public Policies in Singapore: Changes in the 1980s and the Future Signposts*, ed. Linda Low and Mun-Heng Toh. Singapore: Times Academic Press.

Tse, Yiu Kuen and Tan Kim Song, 1996, "Interest Rate and Dynamic Capital Mobility: The Experience of Singapore," in *Financial Deregulation and Integration in East Asia*, ed. Ito, Takatoshi and Anne O. Krueger. University of Chicago Press.

Tobin, James, 1979, "A Proposal for International Monetary Reform," *Eastern Economic Journal* 4 (July): 153-159.

Wachtel, Howard M., 1995, *Taming Global Money. Challenges* (January): 36-40.