

**The Hong Kong Linked Rate
Mechanism: Monetary Lessons
for Economic Development**

by

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ABSTRACT: A currency board is a monetary institution that issues notes and coins which are fully convertible into a reserve currency at a fixed rate on demand. Reserves are equal to 100 per cent, or slightly more, of a board's notes and coins. There have been over seventy currency boards and all have maintained convertibility, even during civil wars. Although successful, currency boards fell victim to changing economic fashions, and most were replaced by central banks after World War II. Hong Kong has one of the few remaining currency board systems, although that system remains largely unknown, even to monetary specialists. An analysis of the evolution and workings of Hong Kong's system is presented in this text. Strengths and weaknesses of the current system are discussed, and measures to correct weaknesses are suggested. The desirability of the currency board system for developing countries, particularly those making the transformation from socialism to capitalism, is also examined.

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I. Introduction

Currency boards were widely employed in colonial Africa, Asia, and the Caribbean. (Clauson, 1944; Newlyn and Rowan, 1954; Walters and Hanke, 1992) Even though those monetary systems were successful, they fell out of fashion, and most were replaced by central banks when colonies were granted independence. Today, currency boards operate only in Hong Kong, Brunei, and in a few small island economies.

The search for monetary systems that will produce stability in Eastern Europe, the former Soviet Union, and Latin America has led economists and politicians to advocate a return to the currency board system. (cf. Friedman, 1991; Gressel, 1989; Hetzel, 1990; Jordan, 1991; Meltzer, 1991; Osband and Villanueva, 1993; Schwartz, 1992; Walters, 1993)²

For example, the International Monetary Fund (IMF) has indicated that it is considering recommending currency boards for the former Soviet Union.³ Significantly, on October 6, 1992, the Foreign Operations Act was signed into law in the U.S.⁴ Under that law, the U.S. quota contribution to the IMF may be used to establish currency boards. These developments stem from the fact that currency boards have an excellent record of providing stable, convertible currencies, even during civil wars. (cf. Hanke and Schuler, 1991a; Hanke and Schuler, 1991b; Hanke and Schuler, 1991c; Hanke and Schuler, 1993b; Hanke, Jonung and Schuler, 1993)

In a currency board system, all monetary policy is fully subordinated to the

² For a bibliography of proposals by Hanke and Schuler, see Hanke and Schuler (1993b).

³Hitt (1992).

⁴ Public Law 102-391.

maintenance of a perfectly fixed rate of exchange between the domestic currency and some foreign, "reserve" currency. A currency board's sole functions are to issue notes and coins and redeem them at the mandated, fixed exchange rate. To maintain the exchange rate link and full convertibility, a currency board is required (generally by statute) to hold 100 per cent (or greater) of its outstanding domestic currency in the reserve asset to which the domestic currency is tied.⁵ A board generates profits (seigniorage) because it holds most of its reserves in highly liquid, interest-bearing assets denominated in the reserve currency, and its liabilities (notes and coins) pay no interest. The currency board system, therefore, places any country that uses it in a unified currency area with its reserve currency country. (Friedman, 1968)

Currency board systems are not central banks. Indeed, they are marked by features and results that are in rather sharp contrast with typical central banks, particularly those that operate in developing countries. These distinguishing features and results include: can only supply notes and coins, fixed exchange rates, 100 per cent foreign reserves, full convertibility, an automatic (rule-bound) monetary policy, no discretionary control of the monetary base, no lender of last resort capacity, no capacity to regulate commercial banks, transparency, insulated from politics, high credibility, seigniorage from interest only (no capacity to earn seigniorage from inflationary finance), no capacity to finance government spending, and small staffs (Hanke and Walters, 1991; Hanke, Jonung and Schuler, 1993).

⁵Typically, currency boards do not engage in banking. Hence, they do not accept deposits. However, in cases where deposits in the domestic currency are accepted, they require 100 per cent reserve cover. Currency boards usually do not engage in commercial bank or financial regulation. Hence, they do not impose reserve requirements on the commercial banking system. It is important to stress that the 100 per cent reserve requirement for domestic currency issued by a board is not the same as a 100 per cent reserve requirement for commercial banks, as first presented by Simons (1934).

These features and results are found in Hong Kong, an economy that is larger than Russia's and one that has experienced the world's second-fastest real growth rate since 1965. Hong Kong's monetary system is ripe for study because so little analysis of its evolution and workings exists.

In light of the renewed interest in currency boards, an analysis and critique of Hong Kong's monetary authority, the Exchange Fund, are presented here. They provide insights for developing countries, particularly those going through the transition from socialism to capitalism. By building on the strengths and avoiding the weaknesses of Hong Kong's Exchange Fund, those countries could establish currency boards that produced stable, convertible currencies.

II. The Hong Kong Linked Rate Mechanism: History and Analysis

Governments maintain a monopoly franchise over the right to create money in virtually all countries of the world, despite a noticeable lack of any *prima facie* reason why this should necessarily be so.⁶ Buchanan (1989) and Buchanan and Brennan (1981) emphasize the need for a monetary constitution to restrain the government in its exercise of that monopoly franchise.⁷ Without such a set of rules, the government's monopoly franchise will inevitably be exploited. This exploitation is readily observed in developing countries, where most central banks create unstable, inconvertible currency; hence, currency substitution and capital flight are endemic.

⁶Buchanan (1989) offers a political explanation in the context of public choice theory.

⁷For a discussion of the logic behind constitutional economics, see generally Gwartney and Wagner (1988) and Buchanan (1991).

Although Hong Kong's monetary system has, on balance, been quite successful, particularly when compared to monetary systems in developing countries, it lacks an explicit monetary constitution. Consequently, Hong Kong has operated with different types of monetary arrangements. The workings of each arrangement are analyzed below.

A. The Pre-1974 Colonial Currency Board Regime⁸

The Exchange Fund was established by the Exchange Fund Ordinance of December 6, 1935. This marked the beginning of the "sterling exchange era" in Hong Kong. During that era, Hong Kong and Great Britain were part of the same unified currency area. The sterling exchange era lasted until June 1972, when the Exchange Fund switched its reserve currency from British pounds sterling to the U.S. dollar.

During the sterling exchange era, the Hong Kong dollar (HK\$) traded at a fixed rate with sterling.⁹ Moreover, Hong Kong dollars (notes and coins) were backed 100 per cent with sterling reserves, and they were fully convertible into sterling at the official, fixed rate.¹⁰ Consequently, the quantity of Hong Kong dollars in circulation was solely determined by the public's demand for currency at the fixed exchange rate. The Exchange Fund was, therefore, a classical British colonial currency board.

During this period, the fixed exchange rate for the HK\$ was considered to be immutable (see Figure 1). Consequently, any commercial banking transaction which

⁸This section relies heavily on the work of Greenwood (1982).

⁹ Prior to that date, Hong Kong was nominally on the international silver standard. For an account of this period, see King (1991).

¹⁰For a full account of Hong Kong's experience in the sterling exchange area, see Jao (1991a).

credited customers with Hong Kong dollars involved *no material foreign exchange risk vis-à-vis* sterling (Greenwood, 1982). In order to obtain HK\$ banknotes, Hong Kong commercial banks were forced to pay for them with sterling. Therefore, the process of domestic monetary expansion and contraction was determined by the net balances of sterling assets in the commercial banking sector. When the commercial banking system was a net recipient of sterling remittances, banks could either lend more Hong Kong dollars, thus expanding Hong Kong dollar deposit accounts, or purchase more currency from the Exchange Fund.¹¹ That would precipitate a monetary expansion. If the commercial banking system realized net reductions in sterling balances, the money supply process would be reversed and the money supply would contract.

The sterling exchange era for the HK\$ began to come under attack on November 18, 1967. That attack began four hours before London announced that the pound would be devalued by 14.3 per cent.¹² Initially, the Hong Kong government followed suit with a similar devaluation of the HK\$. However, Hong Kong's major trading partners at the time - - China, Japan, and the U.S. -- had not devalued, which meant that the HK\$ devaluation made imports more expensive. Since the Hong Kong economy was heavily dependent on imports the government reversed its initial decision and hastily revalued the HK\$ by 10 per cent on November 23, leaving a net 5.7 per cent devaluation (See Figure 1.). Since most financial institutions held sterling assets against their HK\$ liabilities, the revaluation imposed a large capital loss on the books of numerous financial institutions (Jao, 1991a).

¹¹As will be explained below, several banks in Hong Kong have the authority to print currency. Consequently, these banks were required to buy entitlements from the Exchange Fund to print currency.

¹²Hong Kong had also been forced to deal with a pound devaluation in 1949.

This incident illustrated that, as sterling continued its post-war decline, British monetary instability translated into instability in Hong Kong. Consequently, in May 1968, Hong Kong began negotiations with Britain for protection. Those negotiations resulted in the "Hong Kong Dollar Bond Scheme." That allowed Hong Kong to place up to half of its official sterling reserves in HK\$-denominated bonds with seven years to maturity, up to a maximum of £150 million. The bonds could be sold exclusively for sterling, guaranteeing that any sterling devaluation would result in a gain from holding the bonds.

During the sterling exchange era, Hong Kong was not alone in fixing its exchange rate to sterling. Indeed, numerous other nations fixed their local currencies to the British pound in the Overseas Sterling Area. The Hong Kong Dollar Bond Scheme created a great uproar in many of these nations because it implied that the HK\$ could be more stable than sterling, and because it allowed Hong Kong an opportunity to diversify out of part of its sterling risk without withdrawing from the sterling area.

In response to the requests by other members of the Overseas Sterling Area to establish schemes similar to the Hong Kong Dollar Bond Scheme, the Basle Agreement was reached in September 1968. Under that agreement, the British government guaranteed (up to 90 per cent of the U.S. dollar value) the value of official sterling reserves of countries in the Overseas Sterling Area.

While the Basle agreement gave nations protection against changes in the value of sterling, it also began to destabilize the sterling area by prompting perverse lending and borrowing between monetary authorities and local financial institutions. For example, the Exchange Fund's borrowing power was raised from HK\$30 million in 1968 to HK\$7,000

million in 1972. This greater borrowing power allowed the Exchange Fund to borrow sterling held by banks and individuals, thus counting those borrowings as "official reserves" and obtaining "insurance" against devaluations. The government, in turn, paid for these borrowings through the Exchange Fund Guarantee System, which allowed the Exchange Fund to guarantee 100 per cent loan repayment in HK\$'s, plus an "insurance premium."

When the Basle Agreement was enacted in September 1968, sterling constituted 99 per cent of Hong Kong's official reserves. By September 1971, sterling had fallen to 89 per cent. Consequently, confidence in the exchange rate link eroded. Ultimately, the increasingly unstable and weakened exchange rate link with the pound was abandoned. When the British government untied the pound from its gold parity and let it float on June 23, 1972, it also abandoned the sterling area. Hence, the HK\$ was left to fend for itself.¹³

* The HK\$ floated for only two weeks, however, before it was refixed -- this time to the U.S. dollar.

Two conditions are required for the successful operation of a currency board system (Greenwood, 1982). First, the currency board must guarantee convertibility of the home currency into the reserve currency at an absolutely fixed rate. Second, the monetary authority must not interfere with or undermine the operation of this mechanism in any way, including changing the level of the exchange rate. In June 1972, the second condition was breached when the HK\$ exchange rate with sterling was abandoned and replaced with a link to the U.S. dollar.

This action alone was not enough to immediately destabilize the system. However,

¹³See Greenwood (1981). For an account of the demise of sterling and Bretton Woods, see Walters (1990, Chapter 3).

when the link was shifted to the U.S. dollar, the Exchange Fund also amended its rules to allow commercial banks to pay for entitlements to issue Hong Kong dollars with *domestic credit*, rather than the reserve currency. The Fund then redeposited the proceeds of these currency sales into the domestic banking system, thus leading to a huge monetary expansion in late 1972 and 1973. At the same time, the pegged exchange rate system of Bretton Woods was on the verge of collapse, due largely to the free capital flows sent into the system by the inflationary policies of the U.S. in the 1960's. Hence, Hong Kong's inflation of 1972-75 was actually a product of events which were, in part, initiated by the operation of the Bretton Woods system (Walters, 1990).

As a result of both the excessive, discretionary policies implemented in Hong Kong in 1972 and of the instability in the Bretton Woods system, the ensuing two years were marked by instability in the foreign exchange market and a dramatic fall in the value of the HK\$ vis-à-vis the US\$ (see Figure 1). Hong Kong thus decided to float its currency in November 1974,¹⁴ violating the first condition which a successful currency board must meet. In reality, though, Hong Kong's system had been undermined the instant the second condition was violated two years before.

B. The Floating Era and Black Saturday: 1974-1983

From November 1974 until October 1983 the Hong Kong dollar floated against the U.S. dollar, with the Exchange Fund assuming a more active role in the determination of

¹⁴See Greenwood (1982) for a chronicle of these events.

monetary policy.¹⁵ The currency float, along with the 1972 institutional change which allowed commercial banks to exchange HK\$ credit for permission to issue Hong Kong dollars, allowed the Fund to take full advantage of its monopoly franchise over money creation. Greenwood (1981) notes, "The net result, to put it crudely, was a free float *and* a free currency issue."

The monetary authority, therefore, eliminated any purchasing power tie for the currency. By adopting the policy of redepositing proceeds from currency sales back into the banking system, it also (ironically) emasculated its own ability to affect the level of the exchange rate through open market operations. For example, under the new regime, if the Fund wished to stop the Hong Kong dollar from depreciating, it would purchase Hong Kong dollars with foreign currency on the open market. However, the new policy prompted the Fund to redeposit those HK\$'s into the banking system, where they were again lent out. Thus, there was a shift in currency ownership, but the Fund was unable to influence the monetary base (Greenwood, 1981).

To say the least, the Hong Kong dollar did not float "on a sea of tranquility" for the decade which followed the colonial currency board regime. Given the political unrest in China and Hong Kong, the HK\$ was wildly volatile over much of that time, as Figure 1 shows. This volatility reached epic proportions in late September of 1983 after the end of the fourth round of Sino-British talks on the future of Hong Kong. When it became clear that the British were planning to transfer Hong Kong's sovereignty to the People's Republic of China in 1997, financial markets and the HK\$ went into tailspins.

¹⁵See Jao (1991a).

At the end of July 1983, the HK\$ was trading at 7.31HK\$/US\$. By Saturday, September 24th (dubbed "Black Saturday") the HK\$ had fallen to 9.55HK\$/US\$, with dealer spreads being reported as large as 10,000 basis points.¹⁶ Hong Kong had been sent into a state of complete panic; people began to hoard toilet paper, rice, and cooking oil in fear of impending economic chaos.¹⁷

The solution to the panic was a Stopgap Announcement made on September 25, 1983, which initiated a return to the era of the currency board, with some new twists. After some technical refinements, on October 15, 1983, the Hong Kong dollar was formally tied once again to the U.S. dollar at the rate of 7.8HK\$/US\$. The official parity has remained at that level since then.

C. Cash and Interest Rate Arbitrage: 1983-1988

From October 1983 to July 1988, Hong Kong's monetary system functioned like a colonial currency board, albeit in a sophisticated financial environment. Perhaps the easiest way to understand the operation of the system is to analyze the simplified accounts of the Exchange Fund and the banking system.¹⁸ Before presenting the accounts, some institutional details are presented.

During this period, the Exchange Fund was the sole monetary authority, and was charged with ensuring the full convertibility of HK\$'s into US\$'s at the rate of 7.8HK\$/US\$.

¹⁶This is not evident in Figure 1, which uses quarter-ending data only.

¹⁷For an account of these events, see Greenwood (1983a).

¹⁸This approach is due solely to the ingenuity of Greenwood. Cf. Greenwood (1988).

To accomplish this, the Fund was required *by ordinance* to hold 105 per cent of its HK\$ note issue in U.S. dollar reserves.

The Hong Kong banking system was (and is) completely separate from the Exchange Fund. All payments in the banking system are settled through the Hong Kong Association of Banks (HKAB) clearinghouse, which is managed by the Hongkong and Shanghai Banking Corporation (HSBC). Two banks -- the HSBC and Standard Chartered Bank -- are designated as "note-issuing banks." They alone are responsible for actually issuing Hong Kong dollar notes.¹⁹

Exhibit 1 shows a simplified version of the balance sheet for the Exchange Fund¹⁹ from October 1983 to July 1988. The assets of the Exchange Fund are the required foreign exchange reserves and HK\$ deposits of the Exchange Fund at the HSBC and at other banks. On the liability side of the Exchange Fund's balance sheet are coins and "Certificates of Indebtedness" (CI's). CI's are held by note-issuing banks and legally entitle them to issue one HK\$ for each CI they hold. *Only note-issuing banks are entitled to exchange the reserve currency for CI's and to print HK\$'s. Hence, only such banks have direct access to the official exchange parity.* Debt Certificates are also a liability of the Exchange Fund. They are receipts issued by the Fund to the Treasury for its fiscal account with the Fund.²⁰

Exhibit 2 shows the simplified balance sheet of the HSBC, as manager of the HKAB clearinghouse. As an asset, the HSBC holds CI's issued by the Exchange Fund. In turn, the HSBC has corresponding HK\$ notes as a liability. In addition, the HSBC's assets include

¹⁹While HK\$ notes issued by each bank trade at par with one another, they are physically distinct and advertise the bank of issue. For an overview of the Hong Kong financial system, see Freris (1991).

²⁰The Treasury Account is just another bank account with no influence on monetary policy.

HK\$-denominated assets and foreign currency-denominated assets, which may be in the form of notes and coins, regular loans, and interbank loans. Similarly, the HSBC has liabilities denominated in both foreign and domestic currency. These include interbank borrowings, foreign exchange borrowings, and deposits taken from other banks, the Exchange Fund, the Treasury, and the Public.²¹

Under this regime, the monetary base was passively and fully determined by the asset side of the Exchange Fund's balance sheet -- foreign exchange reserves plus domestic credit. Given the Fund's mandate to preserve the HK\$/US\$ link, the supply of Hong Kong dollars was infinitely elastic at 7.8HK\$/US\$, and the demand for HK\$, therefore, determined the quantity in circulation.

The mechanism by which the linked rate was preserved under this system was slightly different from the pre-1974 regime. To see how the new "cash arbitrage" mechanism worked, assume the HK\$ interbank rate depreciated to 7.85HK\$/US\$. A bank would then sell US\$ deposits for HK\$7.85, thus causing U.S. dollar deposits to fall and HK\$ interbank deposits to rise. That bank could then go to either note-issuing bank and buy US\$ deposits for HK\$ at the official fixed rate of 7.8HK\$/US\$. Consequently, the bank received a riskless HK\$0.05 per dollar transacted. The transaction was riskless because the exchange rate was *perfectly fixed*.

In consequence of this arbitrage, US\$ deposits rose and HK\$ currency holdings decreased. At the Fund, the opposite was true -- US\$ deposits and HK\$ currency liabilities

²¹It is not necessary to include balance sheets for the other banks in our simplified analysis, as all transactions in the banking system ultimately show up on the HSBC balance sheet because of its role as HKAB clearinghouse manager.

fell. However, the private bank was then left with less HK\$ currency than before, and assuming the banks' desired currency-to-deposit ratio remained unchanged -- a reasonable assumption since a bank's demand for cash is a derived demand from public requirements -- the bank would then be forced to replenish its HK\$ currency holdings by decreasing HK\$ lending. In this manner, a depreciated HK\$ on the interbank market prompted banks to decrease HK\$ lending, putting upward pressure on the HK\$ interbank exchange rate.²²

While clear enough in theory, there are three facets of this arbitrage process that merit attention. First, it may not always be desirable for banks to conduct arbitrage transactions. While the opportunity for arbitrage exists in theory, transactions costs will drive wedges around the HK\$7.80 rate in practice. Second, the transactions may never be consummated if the banks desire a constant currency-deposit ratio.²³ Third, access to the conversion facility is restricted to note-issuing banks only. Consequently, the number of potential arbitrageurs is limited.²⁴ As Figure 2 shows, deviations of the HK\$ exchange rate from the official parity were quite small. However, this has not been due to the cash arbitrage process, because of the practical limitations just noted. In terms of day to day operations, the mechanism by which the linked rate was preserved can be better

²²Note that this cash arbitrage was somewhat asymmetric. If the HK\$ interbank exchange rate *appreciated* rather than fell, as in the example, banks would have exchanged US\$ deposits for HK\$ currency. However, currency itself cannot be lent out, so the banks -- still facing a derived demand curve for cash -- would have been forced to wait until public demands for cash rose before the excess currency could be put into the system. As such, changes in the monetary base occurred much faster when the exchange rate fell below its official rate than when the converse occurred.

²³This problem was not a major concern, though, as banks did not fear temporarily increasing their vault cash holdings if they knew the demand for currency and loans was rising.

²⁴See Greenwood and Gressel (1988). Selgin (1989) suggests that all banks be allowed to issue notes, as long as they make those notes redeemable at the fixed rate in the reserve currency. See our discussion in Section IV of competing currency issues.

characterized as *interest rate arbitrage*. For example, a depreciation of the HK\$ on the spot foreign exchange market relative to the official Exchange Fund rate would induce banks to sell HK\$'s to the Fund and decrease their lending. Consequently, interbank and overnight HK\$ interest rates would rise in response. So, when the Hong Kong-U.S. interest rate differential became positive, portfolio managers would shift into HK\$-dollar-denominated assets, thus lowering the relative demand for U.S. dollars and causing the HK\$ interbank exchange rate to rise back towards the fixed parity. The opposite was true for appreciations; banks bought HK\$'s from the Fund at the official parity rate, which was lower than the spot rate, thus eventually easing interbank liquidity, lowering interest rates, and inducing a capital outflow to restore the spot rate to the fixed parity (See Figure 2.).

In practice, therefore, the 1983-1988 arbitrage system preserved all the attributes of a colonial currency board. Indeed, the arbitrage system was sufficient to preserve a fixed exchange rate. Moreover, the Exchange Fund was *not capable of affecting the level of exchange rate or the money supply, even if it wanted to*.

To appreciate this, suppose the Exchange Fund wanted to put upward pressure on the HK\$/US\$ rate by selling US\$'s for HK\$'s. Exhibits 1 and 2 show that the only avenue available to the Fund was the *asset* side of its balance sheet.²⁵ If the Fund sold foreign exchange to the HSBC, it would settle the transaction by debiting its HK\$ deposit account at the HSBC. However, the HSBC would then want to lend these funds to other banks in the system. So, a debit of the Fund's account at the HSBC would lead to a corresponding HK\$ credit at some other licensed bank. The net effect of such an operation by the Fund

²⁵Recall, the amount of CI's outstanding was a function of foreign exchange reserves.

was a change in the *composition* of deposits, but *not* their net supply. Hence, interbank liquidity, interest rates, and the exchange rate were unaffected by such moves.

D. A Drift Towards Discretion: July 1988-Present

In July 1988, the Monetary Affairs Branch (MAB) of the Hong Kong Government instituted what seemed to be a simple accounting change, but that change shifted the linked rate system from one of arbitrage-enforcement towards a system that allowed for discretionary policies.²⁶ Another alteration, which allowed for more discretion, was made in March 1990, when the MAB began issuing debt for the account of the Exchange Fund.²⁷ Both these changes allowed the Fund to influence monetary policy. The MAB's justification for instituting these changes was that intervention by the Fund would moderate the huge spikes in overnight interest rates that were associated with the interest rate arbitrage process. However, such short-term interest rate spikes show up primarily in overnight maturities (See Figure 2), suggesting that this variety of interest rate volatility is confined to a very small portion of the yield curve.

A cursory examination of Figure 2 reveals that, since July 1988, three-month money market rate differentials have indeed narrowed somewhat, but it has been at the expense of reducing the tightness of the exchange rate link. While the linked rate remains credibly in place, the mitigation of the market's ability to punish capital flight with huge on-shore overnight rates has clearly widened the bands of fluctuation for the HK\$ around its official

²⁶See Greenwood (1988).

²⁷See Freris (1990) and Culp (1991a).

parity. Since the sole objective of the currency board is to maintain the exchange rate, the MAB's decision to try and control interest rate volatility at the expense of the exchange rate tightness was a clear deviation from the stated objectives of a currency board.

Exhibits 3 and 4 show the revised balance sheets of the Exchange Fund and the HSBC at present. The additional items on the liability side of the Exchange Fund's balance sheet are the Treasury Account, the HSBC Account (hereinafter "The Account"), and the Exchange Fund Bills. The first two items were created by the July 1988 reforms, the so-called accounting changes mentioned above.

The Account is a non-interest bearing obligation of the Fund to the HSBC, as distinct from the normal bank account of the Exchange Fund at the HSBC. It can be viewed as an open market facility (Yam, 1991). The July 1988 regulations require that The Account be maintained at a level not less than the Net Clearing Balance (NCB) of the HKAB clearinghouse; hence, the net clearing balance of the rest of the banking system. If the balance of The Account falls below the NCB or if the NCB is in debit, then the HSBC must pay a penalty interest rate on the shortfall equal to the higher of the Hong Kong Interbank Offer Rate or the Best Lending Rate (Hong Kong's prime lending rate). This gives the HSBC the incentive to maintain a balance in The Account at least equal to the NCB. Moreover, the HSBC will never wish to have more in The Account than the NCB, since it is a non-interest bearing account.

The NCB directly affects interbank liquidity, as banks with surpluses or deficits at the HKAB clearinghouse must borrow or lend in the interbank market to rectify their imbalances. As such, variations in the NCB influence interbank rates, and hence the

HK\$/US\$ rate. Thus, the creation of The Account moved control over interbank liquidity from the HSBC (which previously had this control by virtue of its position as clearinghouse manager) to the Exchange Fund. This gave the Fund the capacity to intervene directly and exert pressure on interest rates, and hence the exchange rate.

To illustrate this, suppose that the HK\$/US\$ market rate falls to HK\$7.82. The Fund may then sell US\$'s for HK\$'s on the foreign exchange market. However, unlike the pre-1988 regime, the Fund can now settle this transaction on the liability side of its balance sheet. To finance its HK\$ purchases, the Fund can merely debit The Account, reducing its liability to the HSBC by the HK\$ amount of the sale. Wishing to avoid the penalty rate, the HSBC will reduce the NCB, thus reducing the supply of Hong Kong dollars in the interbank market. This will precipitate a rise in HK\$ interbank rates, thus increasing the demand for HK\$-denominated assets. Hence, the HK\$ will strengthen against the US\$ until the divergence between the market rate and the official linked rate is eliminated.

The July 1988 changes also allow the Fund to intervene in the foreign exchange market by using the Treasury Account. By consulting Exhibits 3 and 4, it is apparent that the Government can tighten liquidity and put upward pressure on the HK\$ by using that Treasury Account. It need only transfer funds from one of its accounts at a licensed private bank to the Treasury Account, thus resulting in a debit in The Account and a credit of the Treasury Account. As long as the transaction is settled through The Account, money market liquidity will be affected (Greenwood, 1988).

By inaugurating the Exchange Fund Bills market in March of 1990, the Fund was allowed to take another pro-active step. The Bills -- obligations of the MAB on behalf of

the Exchange Fund -- are a liability of the Fund. To exert an influence on the HK\$/US\$ rate, the Fund need only purchase or sell Bills. The Fund may either do this on auction day or on the secondary market (Culp, 1991a).

Assume that the Fund wants to exert upward pressure on the exchange rate by buying HK\$500 million on or just before an auction day. It can accomplish this by settling the auction through The Account and then not "neutralizing" the sale. At an auction of, say, HK\$500 million of 91-day Bills, the Fund merely sells the Bills and debits The Account by HK\$500 million. This precipitates a tightening of interbank liquidity, higher interest rates, and a firmer HK\$.

Alternatively, the Fund may not wish to influence the exchange rate or the monetary base.²⁸ If this is the case, the Fund must redeposit the proceeds from the auction into the accounts of the Exchange Fund in the commercial banking system. Even in that case, however, the Fund may wish to influence *relative* interbank liquidity. For example, the Fund may wish to smooth a kink in the interbank yield curve. If the Fund redeposits the proceeds from the auction into the one month interbank market, then an upward kink, for example, can be smoothed without overall interbank liquidity or the exchange rate being affected.

The MAB made an even more explicit move in the direction of discretion in March 1992. It created a formal discount window, the "Liquidity Adjustment Facility" (LAF). The LAF is designed to give banks access to overnight money in exchange for collateral and a wider-than-market spread. The LAF was intended to complement the Exchange Fund Bills market by improving the ability of banks to access the interbank market late in the

²⁸ Indeed, this seems to be the case.

afternoon, after many of the larger banks have closed their dealing books.

Despite the pro-active reforms of July 1988, March 1990, and March 1992, the Fund publicly maintains that its sole mandate is the maintenance of the linked rate. Moreover, to date, the Fund has generally confined its interventions to periods of financial crises.

Without an explicit monetary constitution, though, the system in Hong Kong has introduced features that allow for limited discretion. However, the Hong Kong system should not be confused with orthodox central banking. First, while the Fund has a monopoly franchise over the creation of money, the Fund is still bound by the 7.8HK\$/US\$ fixed exchange rate. Provided it honors its commitment to the official parity, the Fund cannot abuse its monopoly over the money creation franchise. Second, the Fund does not impose reserve requirements on banks of any kind. Local financial intermediaries do face "liquid asset" requirements, but they are relatively harmless and easy to satisfy. Third, the monetary authority does not have control over the clearing and payments mechanism or the physical issue of currency. While the Fund indirectly controls the supply of money by maintaining the exchange rate link, the HSBC and Standard Chartered retain the legal franchise over currency printing, and the HKAB clearinghouse retains a monopoly over clearing and payments. Fourth, unlike most central banks, the Fund does not engage in prudential banking regulation. That is carried out by the Banking Commissioner.

III. Price Level Control, Financial Crises, and Criticisms of Currency Boards

Alas, even though currency boards have an outstanding record of producing stable,

convertible currencies,²⁹ questions remain. A combination of misunderstandings about what currency boards are, a poor grasp of the actual performance of currency board systems and faulty analytics give rise to these questions. This section addresses some of the critics' concerns.

1. Currency Boards may not always lead to price level convergence.

Some critics question the claim that the price level in a currency board country will converge with that in the reserve currency country. To illustrate their point, they point to Hong Kong. Figure 3 shows the inflation differentials between Hong Kong's Consumer Price Index and Export Unit Value Index relative to the U.S. Consumer Price Index (CPI) and the U.S. Producer Price Index (PPI) since 1984. Recall that the HK\$ stopped floating, and the fixed exchange rate system was reinstated in October 1983. Hence, 1984 is the starting date for the price data in Figure 3.

The data, specifically the CPI data, suggest that the critics might have a point. However, a more careful analysis shows that the critics' concerns are unfounded.

To understand the upward drift in the Hong Kong - U.S. CPI inflation differential since 1986, some background is necessary. As part of its transformation strategy, China established Special Economic Zones in South China. Fueled by direct foreign investment, manufacturing output in those zones has grown very rapidly. A great deal of that foreign investment has originated in Hong Kong. To take advantage of low labor costs available in the zones, Hong Kong has shifted much of its manufacturing to the mainland. The services required for that new manufacturing activity -- banking, insurance, transport,

²⁹See Schuler (1992a) for a review of the evidence.

telecommunications, etc. -- are supplied from Hong Kong. Consequently, with the opening of the Special Economic Zones, Hong Kong's economy has gone through a dramatic restructuring, with a decline in manufacturing, which has been shifted to the mainland, and an increase in the demand for services supplied by Hong Kong. Since the CPI includes both tradeables (manufacturing) and nontradeables (services), it is not surprising that a Hong Kong - U.S. CPI divergence has continued to grow since 1986.³⁰

Currency boards only promise price convergence between tradeables in the currency board and reserve currency countries. Hence, price indices that include nontradeables, such as the CPI, should not be used as criteria for evaluating the performance of currency boards. Instead, indices that only include tradeables should be used. When those tradeable indices are used to compare prices in Hong Kong and the U.S., the expected results are obtained (See Figure 3). With fixed exchange rates, the Law of One Price -- that the same good cannot sell for two different prices, abstracting from transactions costs -- should hold. Since the currency board guarantees that the exchange rate is the same over time between Hong Kong and the U.S., the same tradeable goods should have identical nominal prices, adjusting for transactions costs, because of *arbitrage*.³¹ Figure 3 shows that, when properly measured, prices in Hong Kong and the U.S. do converge as the Law of One Price suggests they should.

³⁰To reduce the upward pressure on the CPI, which is currently running about 15 per cent per annum and is almost entirely accounted for by inflation in nontradeables, Sir Alan Walters has recently suggested that workers from the mainland should be allowed to work in Hong Kong (Lucas, 1993). Greenwood (1991) criticizes similar, earlier proposals.

³¹For this reason, the reserve currency should be selected in part based on the volume of trade between the home and reserve currency countries.

Some who understand that the relevant measure of price convergence between a currency board country and a reserve country is that measured by the indices for tradeables (and not the CPI, which includes nontradeables) raise a related criticism of currency boards, however. They argue that a currency board country, with its fixed exchange rates, is forced to import inflation from the reserve currency country. This is, of course, true. However, it is of little practical importance. For example, The World Bank reports inflation data -- more specifically, data for open inflation -- for 125 countries. If we assume that one of the three main reserve currencies -- the German mark, U.S. dollar, and Japanese yen -- would be used as reserves for a currency board country, we are left with 122 countries. Of those, only six had better inflation records than the three main reserve currency countries during the 1960-1990 period. One of those, Panama, is dollarized, and another, Singapore, operates under a modified currency board regime (The World Bank, 1992).³² Consequently, the adoption of currency boards in most countries -- assuming they would have chosen either the mark, U.S. dollar, or the yen as a reserve currency -- would have resulted in the importation of lower inflation than the inflation rates produced by their central banks. That would have been a good, not a bad, result.

2. A foreign currency as a reserve asset is too volatile and is inferior to a commodity standard.

Some object to the use of foreign exchange as the reserve asset because any volatility in the U.S. dollar or U.S. interest rates, for example, will be felt in Hong Kong, as well. This criticism is not compelling. Since the exchange rate link delivers interest rate

³² For a discussion of the Singaporean system, see Lee and Jao (1982). Fieleke (1992) correctly emphasizes that the Singaporean system is more similar to central banking than a currency board.

convergence, there is virtually no "basis risk" associated with hedging HK\$ transactions with US\$ financial instruments, such as interest rate futures, which are some of the most highly liquid and well-developed hedge instruments in the world.³³ "Swap deposits," which are very popular in Hong Kong, allow investors to swap HK\$'s for US\$'s.³⁴ Investors can lock in the Eurodollar interest rate and then swap back into HK\$'s in the future with minimal currency risk. Such deposits allow Hong Kong investors to obtain a deposit rate that is higher than the rate offered by local banks. (Note that local deposit rates are depressed by the Hong Kong Interest Rate Agreement, which is a cartel.³⁵)

Those who question the desirability of using a reserve currency often suggest that a commodity reserve would be preferable. However, commodity markets are, in general, far less liquid and much more volatile than currency markets.³⁶ Moreover, holding commodity inventories would deny the monetary authority of the ability to hold interest-bearing assets and extract seigniorage. Indeed, storage costs would have to be incurred. The only commodity in which seigniorage could be earned is gold. However, yields on gold loans in the London market are generally less than three per cent per annum. Consequently, the seigniorage generated from a gold-backed currency board system will be less than under alternative reserve currencies (Hanke and Schuler, 1993a).

³³This may provide one explanation for why Hong Kong's own interest rate future, the Hong Kong Interbank Offered Rate futures contract, has such a small volume. Specifically, there is little demand for the Hong Kong instruments because the risk can be hedged using Eurodollar derivative products traded in Chicago, London, and Singapore, where liquidity is high and transactions costs are low. (cf. Napoli, 1992)

³⁴Note that most Hong Kong institutions offer this product because they can hedge their dealer risk easily with U.S. dollar interest rate futures.

³⁵For a good discussion of the Interest Rate Agreement, see Kroszner (1990).

³⁶Implied option and historical volatilities on commodities are typically far in excess of currency volatilities.

3. *Currency Boards are just pegged exchange rate regimes in disguise.*

As the newfound interest in currency boards has arisen, so has the confusion about what boards are and how they work. The most common error is one of commission. Most economists incorrectly treat currency boards with fixed exchange rates as if they were central banks with pegged rates. During a two-day conference at The World Bank in January 1992 ("Conference on Currency Substitution and Currency Boards"), for example, the error was made repeatedly by a distinguished panel. Consequently, much of the criticism leveled at currency boards is simply misplaced because it is a criticism of central banks operating with pegged exchange rates, or what are oxymoronicly called "fixed but flexible" rates.

If the exchange rate regime allows for the possibility of a devaluation or revaluation in the so-called "fixed rate," *it simply cannot be referred to as fixed*. Hence, the Bretton Woods agreement was and the Exchange Rate Mechanism (ERM) of the European Monetary System is a pegged, not a fixed, exchange rate regime. In contrast, the pre-World War I gold standard was a fixed rate regime. Today, the only fixed rate systems are the currency boards whose sole function is to exchange domestic currency for a reserve currency (which is equal to 100 per cent of outstanding domestic currency) at a never-changing rate on demand. (cf. Friedman, 1968)

Under the absolutely fixed exchange rate type, central banks have no discretion vis-à-vis the exchange rate. However, under the pegged type, the government or the central bank has discretion about when to be pegged and when to be flexible. Much to the dismay of the authorities, currency speculators know that this discretion exists under pegging systems.

Consequently, they play on that fact for large stakes.³⁷

The nature of monetary policy under the two systems is quite different (Walters, 1990). If the exchange rate is fixed, there can be only one monetary policy. For example, the monetary policy of Hong Kong is determined by the Federal Reserve Board of the United States because the HK\$ is absolutely fixed to the US\$. That fix is credible because the currency board in Hong Kong must back the HK\$'s it issues by US\$ reserves of 100 per cent and must maintain full convertibility.

The superficial attraction of pegged exchange rates is obvious -- somehow the authorities think they are getting the best of both worlds, namely stability of nominal exchange rates and the flexibility to move them when tradeable goods prices and cost get out of line. (The original documents on the EMS in 1978 indicate that their authors believed that the system would give rise to an "area of stability" in exchange rates.)

However, with a pegged exchange rate type, responsibility is muddled and diffused. A pegged country can have a bit of a monetary policy, allowing the exchange rate to wander within the band, and on occasion moving the band to a new central value. Indeed, it is the equivocation of monetary policy that causes much of the trouble with the pegged system.

Even with the pegged system's troubles, such as those we witnessed with the ERM in September 1992, many argue that those troubles are worth their costs because the pegged system provides discipline. Indeed, the proponents' case for a pegged exchange rate is that it gives rise to a discipline which prevents runaway inflation and provides an effective containment of excess wage pressures. Furthermore, it is argued that fiscal reforms, again

³⁷For a detailed description and analysis of how this type of speculative attack against the ERM was played out in September 1992, see Goldstein, et al. (1993).

with the peg as the critical discipline, can be tackled and burgeoning budget deficits can be controlled.

If it were true that the fixed-but-flexible system gave considerable impetus to these reforms, it would be a powerful case for some sort of peg. The evidence on this proposition is, however, rather equivocal. For example, Italy has been pegged in the ERM since 1979, and to say the least, there has been no noticeable improvement in its fiscal balance, nor in its unsustainable welfare payments. Certainly since Britain joined the ERM, informally in February 1987 and formally in 1990, the fiscal position has deteriorated alarmingly. Indeed, in terms of performance on almost all indicators, the British government behaved itself far better when out than when in the ERM. Nor has membership of the ERM helped Belgium to reduce her government debt -- now much more than its GNP. As for Spain, fiscal rectitude under the ERM discipline has been as elusive as the Holy Grail. Indeed, if we look at Europe as a whole, budget deficits were on average -3.0% during the 1987-89 period. Then, after every country became firmly wedded, either formally or informally, to the ERM, the deficits steadily increased: they were -4.3%, -5.4%, and -6.7% in 1991, 1992, and 1993, respectively.

Incidentally, fixed-rate systems do promote fiscal discipline. Currency board countries do balance their fiscal accounts, or like Hong Kong, they run modest surpluses.

In the context of pegged versus fixed rate regimes, it is important to mention two recent currency reforms that have been mischaracterized as currency board reforms and, therefore, misanalyzed.³⁸ First, in early 1991, Argentina passed a convertibility law (Law

³⁸For a more extensive treatment, see Hanke, Jonung and Schuler (1993).

23.298). It took effect on 1 April 1991 and requires the Banco Central de la Republica Argentina to maintain an exchange rate of 10,000 Argentine australes (now redenominated as one peso) per US dollar, and to hold "freely usable reserves in gold and foreign currencies" equal to at least 100 per cent of the monetary base. (Note that the central bank may count a limited amount of Argentine government bonds payable in dollars (Bonex) as foreign reserves.)

Unlike a typical currency board system, the Argentine monetary system has limited convertibility. Permission from the central bank is required for certain current-account transactions, although currently permission is merely a formality. The executive branch of the government has the power to impose capital controls by decree, forbidding foreign investments from being converted into foreign currency for up to three years. Furthermore, institutional protection for the exchange rate and the reserve ratio is weak. The central bank cannot devalue the peso at its own discretion, but it can do so with the permission of the legislature, which it could probably obtain easily. Argentina's long history of failed currency reforms has created anxiety that the peso will be devalued by the time that the current finance minister, who conceived the convertibility law, leaves office. Finally, the Banco Central remains a lender of last resort to commercial banks. If a large commercial bank fails, the Banco Central's role as a lender of last resort may conflict with its promise to hold foreign reserves of 100 per cent of the monetary base.

Argentine interest rates are evidence of the imperfect credibility of the link of the peso to the US dollar, and of the perception that the exchange rate of the peso is pegged, not fixed. Indeed, the peso has experienced the typical difficulties of a pegged exchange

rate. For example, an attack on the peso by currency speculators occurred on 11 November 1992. For the first time since the convertibility law was passed, the Banco Central intervened in the foreign-exchange market, selling dollars and buying pesos with its excess foreign reserves. The Banco Central also ceased lending to banks that wished to borrow pesos to buy dollars. In reaction to the attack on the peso, interest rates on short-term peso deposits increased from 15 per cent to 85 per cent a year, whereas interest rates on short-term dollar deposits in Argentina remained at about 7 per cent. Although the November 1991 speculative attack was an isolated incident, it is important to note that the spread between annualized three-month yields on peso deposits and Eurodollar deposits has been positive since the convertibility law was passed. For example, the average spread was 6.27 per cent during the April 1991 - January 1992 period. The higher peso interest rates reflect a perceived risk that peso will be devalued. If the Argentine setup was a currency board with fixed exchange rates, that possibility would not exist and comparable peso-dollar interest rates would tend to be the same. In reality Argentina has a central bank with a pegged exchange rate, which has been given enhanced credibility because of its foreign exchange reserve backing requirements.

Second, the Estonian monetary reform of 20-22 June 1992 replaced the ruble with a new currency, the Estonian kroon. It represents another pseudo currency board arrangement. The kroon is pegged to the German mark at a central rate of 8 kroons per mark. The exchange rate of the kroon is allowed to fluctuate up to 3 per cent from the central rate. The Bank of Estonia (Eesti Pank), the central bank, is required to hold gold and foreign-currency assets equal to 100 per cent of the monetary base, like the Argentine

central bank.

As in Argentina, in Estonia institutional protection for the exchange rate and for the reserve ratio is weak. The central bank cannot devalue the kroon by itself, but the legislature can authorize the central bank to devalue the kroon. However, the governor of the central bank has warned that he would have to devalue the kroon if the Estonian parliament approved a high minimum wage. Unlike a currency board, the Bank of Estonia has a lender of last resort capacity and some restrictions have been placed on capital account transactions.

Estonia, like Argentina, has a central banking setup with pegged exchange rates and a foreign exchange reserve requirement to enhance the credibility of the kroon. It is not a currency board with fixed exchange rates. As evidence of that fact consider that short-term deposit rates are 30 per cent per year in Estonia and only about seven per cent in Germany, Estonia's reserve currency country.

4. The Currency Board System Prevents Fiscal Flexibility

Some critics argue that, due to their requirement of strict fixed exchange rates, currency boards eliminate the role of fiscal policy. Ironically, many of these same critics advocate the need for balanced budgets as a precondition for successful macroeconomic stabilization programs.

Under a currency board regime, government spending can be financed by taxes or the issuance of debt instruments. However, that spending cannot be financed by monetization of deficits and inflationary finance. In principle, therefore, fiscal policy can

be used in currency board countries. However, as we have noted, in practice most currency board countries, such as Hong Kong, have typically balanced their budgets or run small surpluses. (Culp, 1991a) This has been due in part to fiscal prudence. In other cases, it has been because the countries did not have the means to borrow from the public or abroad. In any case, the elimination of soft budget constraints by the adoption of currency boards in developing countries and countries going through the transformation from socialism to capitalism is a desirable consequence of currency boards. Indeed, that fiscal policy is constrained by currency boards is a small cost to pay for the elimination of soft budget constraints.³⁹

5. The currency board system is inconsistent with a lender of last resort.

Because a currency board is not a central bank and does not have the capability to act as a Lender of Last Resort (LLR), some argue that the currency board system is incapable of dealing with banking panics, financial crises, and systemic instability.

There are several alternative views of the LLR function, but the classical justification for a LLR is usually attributed to Henry Thornton and Walter Bagehot.⁴⁰ Their views suggest that the LLR (a central bank) should precommit to lend without hesitation in serious financial panics to help prevent "contagion" effects, or situations in which problems with a small number of financial institutions may spread to otherwise sound institutions.

³⁹See Hanke, Jonung and Schuler (1993). Related to this point, Chu and Feltenstein (1978) report interesting findings for Argentina. They note the government transfers to state-owned enterprises translated one-for-one into high-powered money through central bank financing of the government deficit, while private losses were financed by the commercial banks and were not, as a general rule, rediscounted by the central bank. Hence, their data suggest that state-owned enterprise transfers were proportionately ten times as inflationary per unit of transfer as the private losses.

⁴⁰For reviews, see Bordo (1990) and Humphrey (1989).

The alternative view is that the LLR creates serious moral hazard problems. By extending a safety net under banks, excessive risk-taking and irresponsible investment and lending are encouraged. In this manner, the LLR can actually be one of the financial system's worst enemies (Selgin, 1989).

An examination of how the Exchange Fund in Hong Kong has dealt with financial crises without relying on LLR functions demonstrates the fallacy of claims leveled at currency board systems. This examination is particularly interesting in Hong Kong, where no state-sponsored deposit insurance exists. (cf. Culp, 1991b)

Since Thornton thought a key attribute of the LLR should be its ownership of the monopoly franchise to create money, it is logical to discuss the linked rate in the same context as systemic banking crises. Hence, the ability of the linked rate to withstand pressures which cause systemic instability is presented first.

Greenwood (1984, 1989) distinguishes between two types of problems which can arise to challenge the integrity of a currency board's linked rate: internal and external drain. An internal drain occurs when there is a large shift in the currency to deposit ratio. For example, such a shift would occur in a bank run or banking panic because of a large positive shock to the public's demand for currency. In that case, banks would seek to restore their previous currency-deposit ratios by selling US\$'s to the Fund for HK\$'s. This often requires borrowing US\$'s in the interbank market. The banks' attempt to restore currency-deposit ratios will put upward pressure on the HK\$ vis-à-vis the US\$. Until banks can acquire enough HK\$'s from the Fund, HK\$ interbank rates will rise sharply. This will reduce profitable lending opportunities for banks, thus leading to slower credit creation, a

contraction in deposit growth, and eventually a contraction in the monetary base.⁴¹

An external drain occurs when there is a capital flight out of the Hong Kong dollar, as in the week preceding the inception of the linked rate in 1983. The quantity of deposits may not change, but US\$ holdings will rise relative to HK\$ holdings, and the HK\$ will depreciate against the US\$ in the spot market vis-à-vis the official parity. At some point, this will trigger arbitrage in which HK\$ notes are sold to the Fund for US\$'s. This, in turn, will precipitate an increase in HK\$ interbank rates as interbank liquidity dries up, thus again reducing profitable lending, lowering credit-creation and deposit growth, and precipitating a contraction in the monetary base.

Hong Kong's linked rate has withstood both types of pressures without any help from the Exchange Fund. Figure 4 shows that from late December 1983 to early January 1984, an internal drain occurred. The cause of the drain was merely a large increase in public demand for cash during the Christmas holiday season. However, banks had failed to anticipate this demand in the wake of the new exchange rate link. As a result, overnight interest rates in Hong Kong rose to nearly 25 per cent (annualised), and the HK\$ went to a large premium in the interbank market relative to the official parity. Nonetheless, the linked rate mechanism held tight, arbitrage occurred, and the drain finally subsided, thus returning the exchange rate to parity.

Two examples of the internal drain have occurred since the July 1988 reforms which allowed for official interventions by the Fund in the foreign exchange market. For example, on June 5 and 6, 1989, in the wake of events in Tiananmen Square, Hong Kong residents

⁴¹In the short run, it is not likely that the monetary base will change much, if at all.

registered their concern by making massive withdrawals from the Bank of China. The Bank of China, scrambling for currency, was forced to borrow on the interbank market, which drove annualised overnight rates up about 12 per cent. The HK\$ traded at around 7.78HK\$/US\$ in the spot market, and the Exchange Fund intervened through The Account by injecting HK\$194 million. It is not clear to what extent the intervention and interest rate premium affected interbank liquidity. However, the crisis soon subsided, and so did the premiums in the foreign exchange and interbank markets. The linked rate was again preserved.

More recently, Citibank H.K. and Standard Chartered Bank experienced relatively large bank runs in the wake of the government's incompetence in handling the Bank of Credit and Commerce International affair (Culp, 1991b). The Exchange Fund intervened by injecting overnight assistance of HK\$200 million into the banking system through The Account. Moreover, both the Bank of China and the HSBC offered their full assistance to Standard Chartered and Citibank H.K., so that they could meet their liquidity demands. The runs were quelled with no lasting damage to the system.

It is worth noting, however, that the Christmas 1983 example showed that an internal drain could be dealt with *without* intervention by the Fund. It is quite likely that, in light of this, the latter two examples could also have been quelled without assistance from the Fund. Indeed, with respect to the second post-1983 example, it seems that a commitment of the Bank of China and the HSBC to support the two banks being run was far more important than the Fund's infusion of liquidity. The intervention was a one-time boost for liquidity and revealed nothing about the financial viability of the victim banks. However,

the announcement of a commitment to provide liquidity by the other banks was surely construed as a testament to Citibank H.K. and Standard Chartered's viability, thus helping to halt the run.

The other type of problem which can challenge the linked rate -- an external drain -- occurred in July 1984, when political trouble in China prompted a flight out of Hong Kong dollars. Annualised overnight rates rose to nearly 28 per cent, and the HK\$ fell to roughly 7.88HK\$/US\$. The month-end exchange rate, shown on Figure 4, was still at a discount of HK\$7.84/US\$. Nonetheless, the high overnight rates were enough to quell capital flight, and the crisis subsided with no damage to the linked rate mechanism. (see Figure 2)

Given the inability of Britain and Italy to withstand the pressures of the "external drain" in September 1992, it is worth mentioning once again the difference between the fixity of a currency board exchange rate link and the pseudo-fixed nature of the ERM. In the ERM, exchange rates are neither fixed nor freely floating. Rather, exchange rates are allowed to float within specified bands around declared central exchange rates. When the market exchange rate reaches its boundary, the ERM member nations' central banks must intervene to preserve the exchange rate's central parity. This is done with both open market currency operations and shifts in relative monetary policy. However, the realignment option of the central rates also remains viable.

Obviously, market participants are aware of the realignment option. Consequently, when a currency is perceived to be misvalued and the central banks' intervention capacities and/or commitments are limited -- such as the pound and lira vis-à-vis the mark prior to September 16, 1992 -- it is a reasonably safe bet that the intervention and interest rate

weapons to defend central ERM rates will ultimately fail. After all, the more speculative pressure to which the currency is subjected, the more difficult it becomes for the central banks to preserve the pegged rate. Indeed, prior to the 1992 sterling devaluation, the Bank of England increased short term interest rates in the middle of an economic slump and reportedly spent US\$26 billion in pound purchases in a fruitless effort to prop up its sagging currency.⁴² As noted earlier, currency boards are immune to this problem because the exchange rate is viewed widely as being virtually immutable.⁴³ The moment that most of the public believes the exchange rate may be changed, what was formerly an arbitrage operation is transformed instantly into foreign exchange speculation. The key to the game is the credibility of the exchange rate link, as the contrast between Hong Kong and the ERM shows.⁴⁴

The linked rate performs well under pressure. It does not contribute to financial panics. Indeed, it lends stability to Hong Kong's financial system. But, how does the financial system perform, given that the Fund does not have a classical LLR capacity and Hong Kong does not have state-sponsored deposit insurance? The classical LLR function is provided by whatever institution is ultimately responsible for providing interbank liquidity. Prior to July 1988, that responsibility was held by the HSBC as manager of the HKAB clearinghouse, leading many to refer to the HSBC as Hong Kong's *de facto* central bank.

⁴²Compare that amount with the US\$23 billion in equity which changed hands on the New York Stock Exchange on October 19, 1987, the largest trading day (measured by volume) in the history of the New York Stock Exchange.

⁴³To the extent that changes in the central rate are due to problems in the reserve currency, such as hyperinflations or the instability of the pound in the sterling exchange era, this will not be a problem. Speculative attacks cannot themselves generate hyperinflations or severe macroeconomic instability. Provided devaluations are tied explicitly to such events there is no risk of such attacks which increase the probability of devaluations.

⁴⁴See Goldstein, et al. (1993).

In the sterling era of the Hong Kong currency board, the two note-issuing banks implicitly performed the LLR function on many occasions, most notably the Banking Crisis of 1965. In 1964, a similar panic was also averted when the Fund actually flew in large packages of foreign currency to assure the public of the convertibility guarantee. Most of the packages were returned to London unopened, as the panic was forestalled by the assurance of convertibility.⁴⁵

Implicit in all of this was the position of the Hong Kong government. It apparently would not allow a note-issuing bank to fail. The British Monopolies and Mergers Commissions explained in 1982 that "we were told that on occasion either at the Government's request or on its own initiative HSBC had provided funds to avert banking crises or rescue ailing companies. In the unlikely event of HSBC finding itself in difficulties, it would be the Hong Kong Government which would act as lender of last resort, using assets in the Exchange Fund."⁴⁶ This suggests, then, that while the Fund may not perform an explicit LLR function, Hong Kong nonetheless implicitly practices what is commonly referred to as the "Too Big to Fail" doctrine.⁴⁷

In closing, the distinction between a LLR and deposit insurance merits discussion, particularly given the absence of deposit insurance in Hong Kong. The LLR exists to help deal with systemic crises, while deposit insurance exists to forestall bank runs which might, through contagion effects, result in systemic crises. Although they are separate, they are related. Hong Kong has no formal state-sponsored deposit insurance program.

⁴⁵See Greenwood (1983b).

⁴⁶Quoted in Jao (1991b), p.49.

⁴⁷ Some might argue that "Too Big to Fail" itself implies that there is a LLR. For a discussion of "Too Big to Fail," see, for example, Hetzel (1991), Kaufman (1988), and Miller (1992).

Consequently, Hong Kong is subject to bank runs. These runs are further motivated by the existence of "inner reserves," which are politically-created accounting "sunspots" that allow banks to partially conceal assets in their balance sheets and smooth their earnings. (Culp, 1991b; Diamond and Dybvig, 1983; Kroszner, 1990) However, the Hong Kong runs appear to provide a positive form of market discipline on banks, constraining banks from making irresponsible investment decisions.⁴⁸ Indeed, the Hong Kong bank runs tend to fizzle out after a short duration and do not degenerate into systemic crises.

Another feature of the Hong Kong financial system acts to contain the frequent bank runs. Competing banks typically offer each other overnight liquidity assistance. For example, even though the HSBC is a competitor with other major banks, it is *not* in the interest of the HSBC to allow a systemic panic to develop. Consequently, each bank has a very strong incentive to forestall a systemic crisis by offering overnight assistance to liquidity-constrained banks. This creates an implicit form of the cross-guarantee system among the Hong Kong banks. This market discipline is a most compelling reason to believe that banks will continue to back other solvent banks in the event of liquidity crises. Moreover, they will quickly let one another fail if the bank being run is indeed insolvent.⁴⁹

The informal system of cross guarantees that exists in Hong Kong could, of course, be formalized and strengthened, however. To appreciate that, consider the history of the U.S. banking system. Research has shown that the pre-1914 U.S. banking system dealt

⁴⁸See Kaufman (1988) and Culp (1991b).

⁴⁹Note that the recent introduction of a discount window (the LAF) at the Exchange Fund for purposes of providing overnight liquidity was unnecessary, since that liquidity is provided by banks loaning overnight funds to each other.

effectively with problems of system-wide panics and systemic instability, even in the absence of the Federal Reserve and a central LLR. A clearinghouse system existed. Under that system, member banks effectively cross-guaranteed one another, and in periods of serious crises, the clearinghouse became a *de facto* single firm comprised of its member banks. It provided deposit insurance and even issued its own currency as a LLR. (Calomiris, 1990; Gorton, 1985; Gorton and Mullineaux, 1987; Timberlake, 1984). Since Hong Kong already has a clearinghouse system, it would be easy to introduce pre-1914, U.S.-type cross-guarantee schemes to Hong Kong.⁵⁰ All that would be necessary would be to divorce the HKAB clearinghouse from the HSBC to prevent the exercise of monopoly power.⁵¹

IV. The Political Calculus and a Monetary Constitution

Hong Kong's Exchange Fund has provided for a stable, convertible currency that has contributed to the rapid economic progress of Hong Kong. Even though the Fund does not have a formal monetary constitution, it has established a high degree of credibility with regard to the two conditions necessary for the successful currency board: the maintenance of the exchange rate link at a specified level and a commitment to non-interference with the linked rate, including any change in its level.

However, the history of the Fund suggests that changes could be made to improve the operation of the Fund. The changes, which would enhance the Fund's credibility, would eliminate the possibility for the Fund to adopt features of central banking, such as

⁵⁰Culp (1991b) develops this further.

⁵¹See Selgin (1988).

discretionary monetary policies and prudential regulation of commercial banking. These changes, which should be implemented by the adoption of a monetary constitution, are noteworthy not only for Hong Kong, but also for those who are interested in adopting currency board systems.

The history of Hong Kong shows that the legal and institutional environment in which the Exchange Fund has operated was inadequate to prevent the Fund from sliding ever so slightly towards central banking and away from a unified currency regime. Even if the Fund has, in general, remained committed to the linked rate throughout much of its history, its tendency to adopt degrees of discretion has devalued the perceptible benefit of the currency board system -- namely, certainty and credibility. Recall that it is the credible commitment to the preservation of convertibility at the fixed rate which separates a currency board from the unsatisfactory pegged exchange rate regimes of central banks.

The appropriate means of safeguarding against such abuses is the establishment of an ironclad monetary constitution to prevent any possibility of long-run abuses. Buchanan and Brennan (1981) observe that "[r]eforms in policy to be implemented by ordinary men can only come through reforms in the rules within which they operate." In particular, such a constitution should contain several specific provisions.⁵²

First, a currency board should have its legal seat and most of its assets in a safe haven country, such as Switzerland. That will limit the possibility of reserve asset expropriations and thus lend more stability to the exchange rate link. Protection of assets is important, even in places like Hong Kong, particularly in light of the changes in Hong

⁵²See Hanke, Jonung and Schuler (1992 and 1993).

Kong's sovereignty that will occur in 1997.

Second, the monetary constitution must require the currency board to adhere to the maintenance of an exchange rate link at its specified level and with full convertibility.

Third, the constitution should specify the exact terms of the exchange rate, including the level of the rate itself, the structure of the currency board's balance sheets (to avoid the creation of another HSBC Account), and the terms of access to the official exchange rate. With regard to the first condition, it is not critical that the rate be set at some "fundamental equilibrium" level, as long as the rate is reasonable and allows the currency board country's exports to be competitive. With regard to the last condition, it is desirable that *all banks* have *direct* access to the currency board's official exchange rate.

Moreover, the constitution could allow for changes in the official rate, provided the manner in which those changes occur is known in advance and designed only to deal with "acts of God." For example, if the reserve currency began hyperinflating, a provision should exist to either revalue the home currency vis-a-vis the hyperinflating reserve currency or to select another reserve currency. (Hanke and Schuler, 1991c) However, such provisions must be carefully structured with specific predefined "trigger points" to avoid problems similar to those which arose in the wake of the Basle Agreement.

Fourth, the monetary authority should have a board of directors comprised of both domestic and foreign members who are rewarded for adherence to the currency board's constitution. For example, representatives could be paid on an annual fee plus bond basis. The value of the bond would be geared to the length of service on the board and would be paid on retirement, only if the board adhered to the currency board's constitution during the

term the director served.

Fifth, appropriate attention should be paid in formulating compensation schemes for the currency board's inside management. For example, managers might have part of the pay in the form of an option portfolio written on the Hong Kong dollar. (Culp and Hanke, 1993) There are various possibilities for how such a portfolio might be structured. A simple example is to give managers a "butterfly spread." Such a portfolio of options would allow managers to collect extra income, the amount of which would vary according to the departure of the market rate from official parity.

For example, suppose the transaction cost bounds around the Hong Kong dollar suggest that it should stay within $7.7\text{HK\$/US\$}$ and $7.9\text{HK\$/US\$}$. Then, the managers of the currency board would each be given a portfolio of four options: one long call with a $\text{HK\$}7.9$ strike price, one long put with a $\text{HK\$}7.7$ strike, and a short call and a put each "at the money," at $\text{HK\$}7.8$. Then, managers would "collect option premium" on the value of their position, *as long as the rate stayed within $\text{HK\$}7.7$ and $\text{HK\$}7.9$* . Beyond that, the long call and long put would prevent managers from making a loss on the position. So, to maximize the value of their premium collected, managers would have a strong incentive to minimize Hong Kong dollar - U.S. dollar volatility. (Note also that an increase in *implied* volatility -- due perhaps to any anticipation of a change in the rate -- would also adversely affect the profitability of the compensation scheme.)

This provision is in the spirit of the compensation arrangement for the Governor of the Reserve Bank of New Zealand. With the passage of the Reserve Bank Act of December 1989, which made that central bank independent, the Governor's employment

contract became contingent upon the Reserve Bank meeting prespecified inflation targets.

Finally, it is important that *a currency board need not be operated by the government.*

Demsetz (1968) explains that a so-called natural monopoly may be owned and operated by a private firm in a competitive environment. Private firms could be allowed to compete for the right to control the currency board and receive seigniorage (or part of the seigniorage) provided that they strictly met the conditions of the monetary constitution, and that they posted a performance bond.

The feasibility of such a private currency board system merits consideration, particularly in light of the work by Fama and Jensen (1983a and 1993b) on "financial mutuals." Financial mutual organizations are characterized by the fact that the residual claimholders are also the customers of the organization. In the currency board case, the commercial banking sector is the customer, and the board's sole assets are the foreign currency reserve assets.

Since there is no *prima facie* presumption that currency supply is a natural monopoly, another feature should be included in the monetary constitution, in any case: competing currencies should be allowed. (cf. Cowen and Kroszner, 1993; Dowd, 1989, 1992; Glasner, 1989; Schuler, 1992b; Selgin, 1988; White, 1989; Yeager and Greenfield, 1989). This could be accomplished in two ways. First, the monetary constitution should specify that any international currency can be used by residents of the currency board country. The threat of currency substitution would, therefore, reinforce incentives for the currency board to adhere to its constitution.

Second, multiple intranational note issues should be allowed, perhaps even by

competing currency boards.⁵³ The one official currency board would be required, but the monetary constitution should not prohibit other note issues. The ultimate determination, as to whether these other internal currencies would be held, would, of course, be their stability and convertibility.

When viewed as a financial mutual, the most powerful form of discipline on the currency board is the ability of its customers as residual claimholders to effectively force the liquidation of the board at any time. All the customers would have to do is redeem the board's currency for its reserve currency.

V. Concluding Observations

One of the most successful monetary regimes in the world is the linked rate mechanism of Hong Kong. For most of the period since the inception of Hong Kong's linked rate, the Colony has experienced strong economic growth, vigorous trade, a relatively low rate of producer price inflation, and an atmosphere of confidence and stability in the wake of a highly uncertain political future. While not strictly a colonial currency board by the classical definition, Hong Kong is a modern analogue. With modifications -- namely, a monetary constitution -- it could be used as a model for developing countries and those going through a transformation from socialism to capitalism.

⁵³See Hanke, Jonung, and Schuler (1992).

Exhibit 1

Exchange Fund

Assets	Liabilities
FOREX Assets	Certificates of Indebtedness Coins
Domestic Assets: HK\$ Deposits at HSBC HK\$ Deposits at Other Banks	Debt Certificates

Exhibit 2

Hongkong and Shanghai Banking Corporation (HSBC)

Assets	Liabilities
Certificates of Indebtedness	HK\$ Notes Issued
HK\$-Denominated Assets: Notes and Coins Held Loans	HK\$ Deposits from Banks Exchange Fund Treasury Public
HK\$ Interbank Loans	HK\$ Interbank Borrowings
FOREX Assets	FOREX Deposits FOREX Borrowings

Exhibit 3

Exchange Fund

Assets	Liabilities
FOREX Assets	Certificates of Indebtedness Coins
Domestic Assets: HK\$ Deposits at HSBC HK\$ Deposits at Other Banks	Debt Certificates Treasury Account Exchange Fund Bills
	HSBC Account ("The Account")

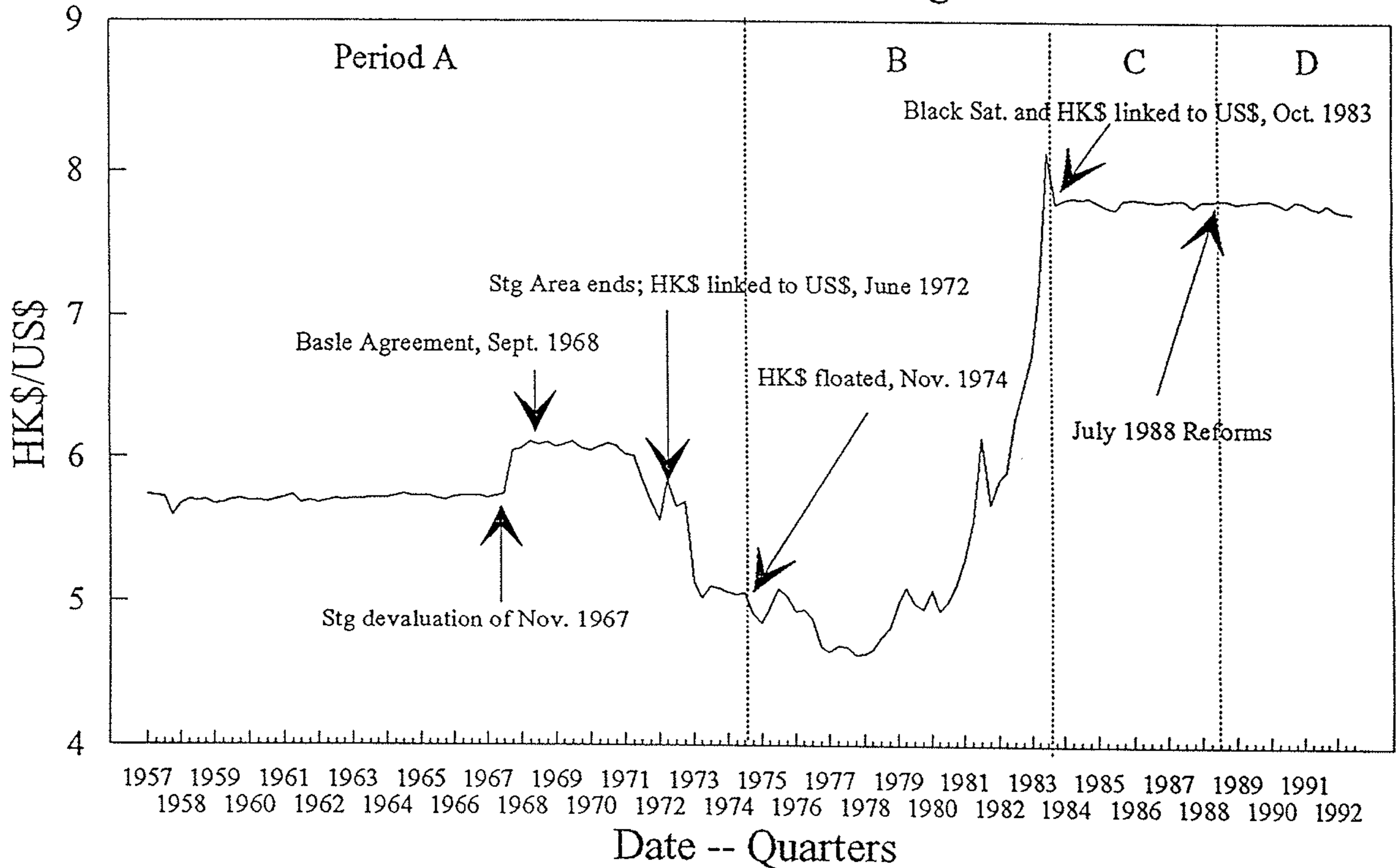
Exhibit 4

Hongkong and Shanghai Banking Corporation (HSBC)

Assets	Liabilities
Certificates of Indebtedness	HK\$ Notes Issued
HK\$-Denominated Assets: Notes and Coins Held Loans Exchange Fund Bills	HK\$ Deposits from Banks Exchange Fund Treasury Public
HK\$ Interbank Loans	HK\$ Interbank Borrowings
FOREX Assets	FOREX Deposits FOREX Borrowings
HSBC Account at the Exchange Fund	

Figure 1

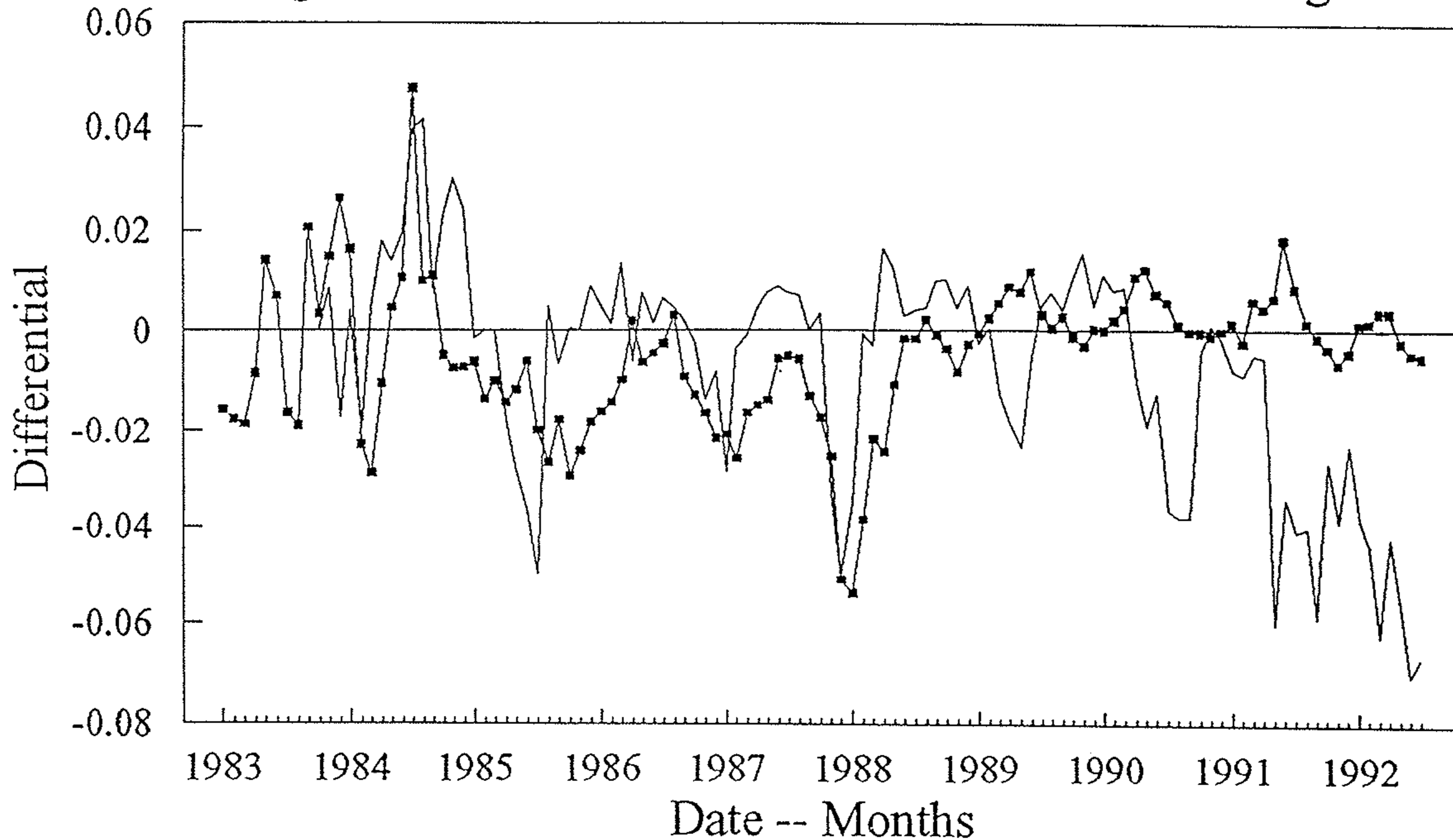
HK\$/US\$ Interbank Exchange Rate



Periods A-D correspond to historical periods presented in Part II of the text
 Source: Citicorp

Figure 2

Divergences of US\$ and HK\$ Interest Rates and Exchange Rate



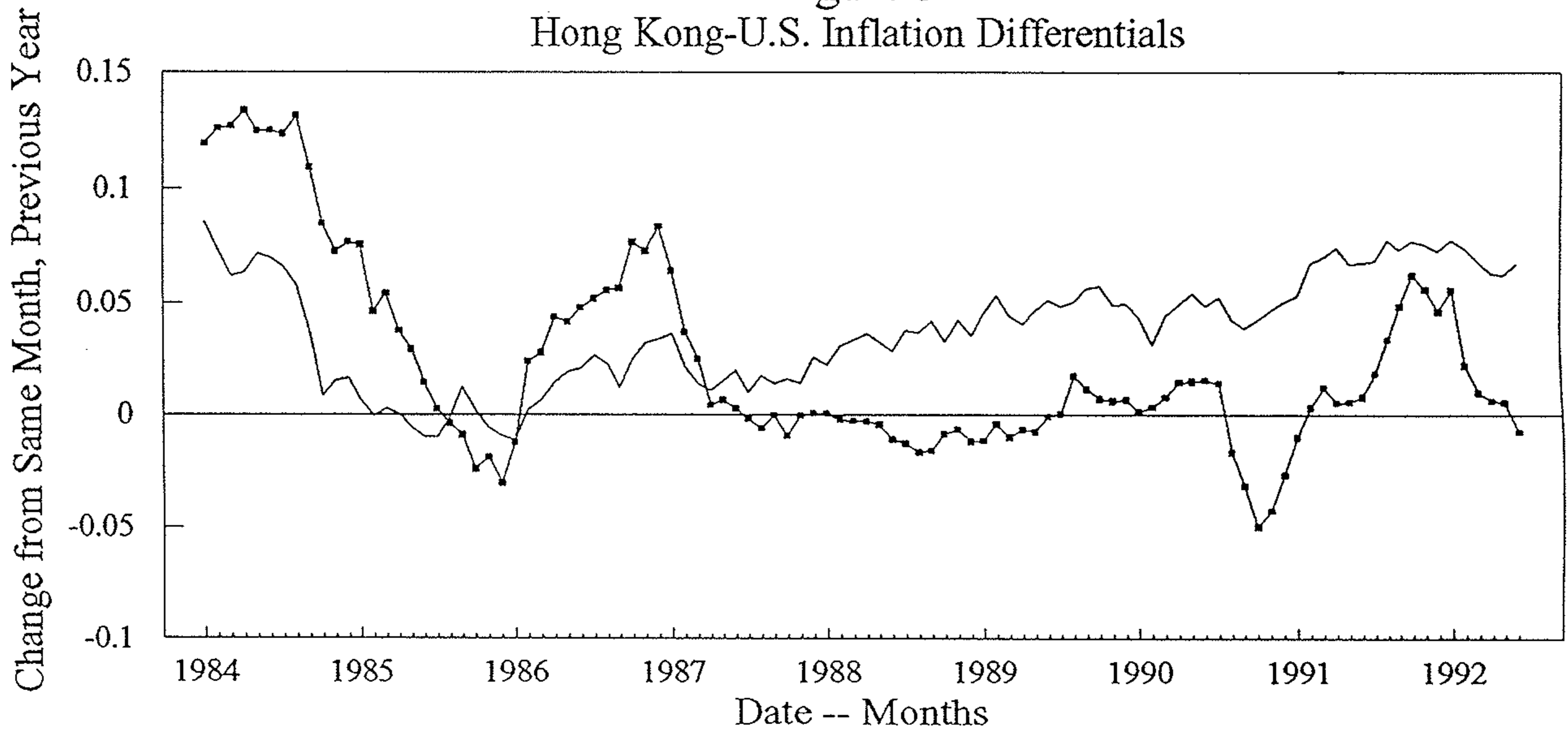
—■— 3-mo HK\$ interbank rate - 3-mo. Eurodollar rate (divided by 100)

— HK\$/US\$ market rate - official parity (7.8HK\$/US\$)

A negative exchange rate differential implies that the HK\$ is stronger than its official parity vis-a-vis the US\$.

Source: Citicorp, GT Management (Asia) Limited

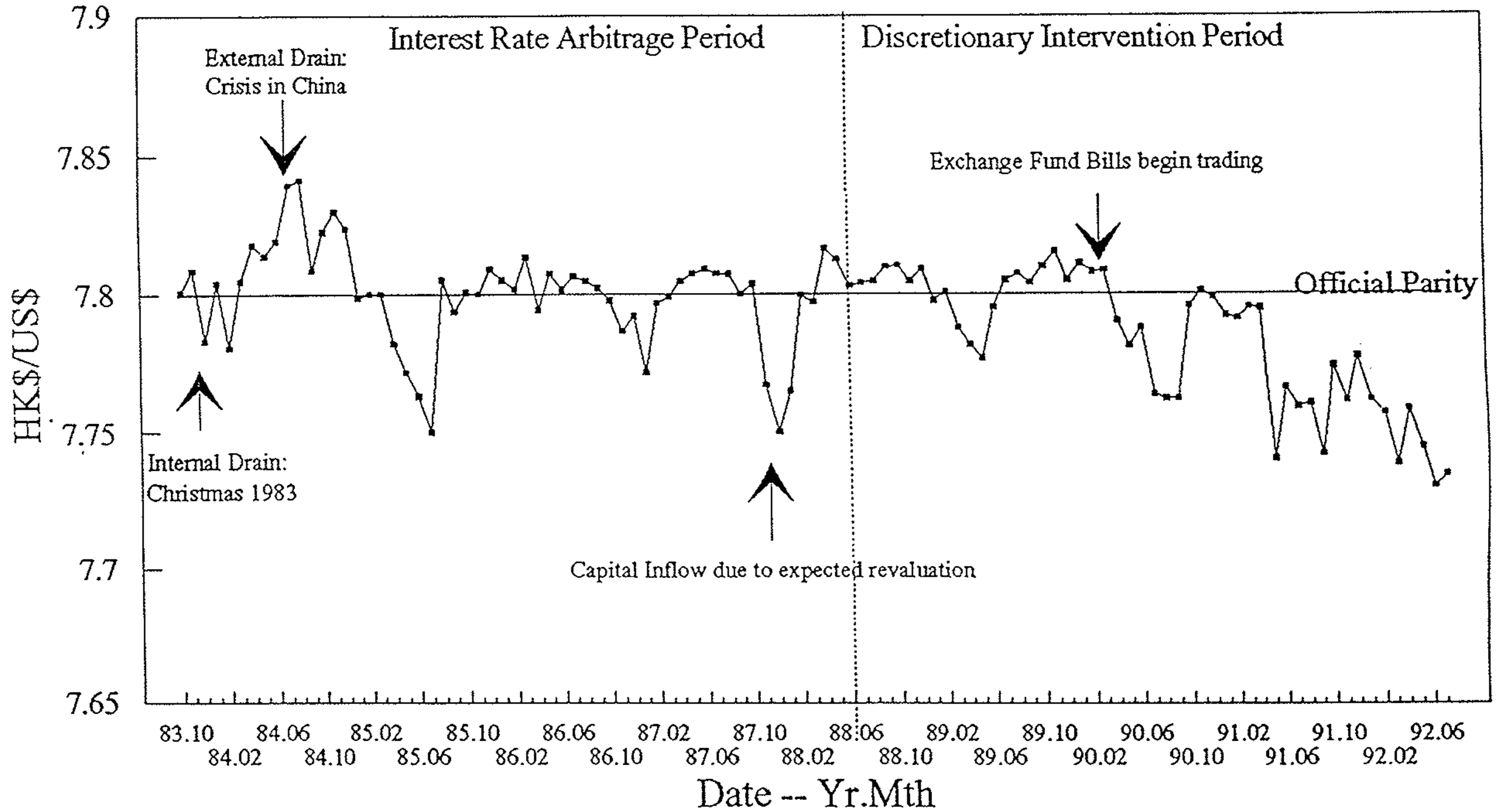
Figure 3
Hong Kong-U.S. Inflation Differentials



- Change in HK Export Unit Value Index - Change in US Producer Price Index
- Change in HK Consumer Price Index - US Consumer Price Index (CPI-W)

NOTE: The composition of the consumer and producer price indexes in each country are not necessarily equal.
Source: Citicorp, GT Management (Asia) Limited, International Financial Statistics

Figure 4
 HK\$/US\$: October 1983 - September 1992



Source: Citicorp, Asian Monetary Monitor staff

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