D:\Research\Currency board\Curr Board.doc
27/02/02; 14:37

February 25, 2002

HONG KONG'S CURRENCY BOARD:

Modelling the discretion on the strong side

Stefan Gerlach*
Hong Kong Institute for Monetary Research

Abstract

While Hong Kong's currency board is frequently seen as indicating the advantages of a rule-bound monetary policy, this currency board is one-sided and involves discretion in that there is a commitment to sell, but not to buy, US dollars at a given rate. Using daily data for September 1998 to December 2001 to estimate reaction functions for dollar purchases, we show that the aggregate balance, interest rate spreads and market exchange rates help predict such purchases. However, this relationship has shifted over time. Moreover, while the variables are statistically highly significant, the predictive power is low.

JEL Numbers: E42, E58
Key words: currency board, Hong Kong, logit estimation

---

* HKIMR, 8/F Citibank Tower, 3 Garden Road, Hong Kong, tel. (852) 2878-8800, Fax (852) 2878-2280, email: stefan_gerlach@hkma.gov.hk. I am grateful to Priscilla Chiu, Petra Gerlach, Kitty Lai, Tony Latter, Robert McCauley and seminar participants and the HKIMR for helpful comments, and to Raphael Lam for excellent assistance with the data. The views expressed in this paper are solely my own and not necessarily those of the institutions I am affiliated with.

1. Introduction

It is widely recognised that Hong Kong is a rare example of a medium-sized economy that operates a successful currency board.[1] Hong Kong, as many other economies that were once colonies, has historically conducted monetary policy under some form of a currency board.[2] The current monetary arrangements, "the Link", were introduced in 1983 following a speculative run on the currency, which was partially related to concerns about the return of the colony to the mainland in 1997. Since then, the currency board has functioned smoothly and has delivered nominal exchange rate stability despite several episodes of strong pressures for a change of the peg. The most notorious of these episodes occurred in August 1998 when a massive speculative attack in the currency and equity markets was launched. The authorities responded by intervening in the equity market to impose losses on those taking short positions in equities and, in doing so, reaped large profits.

While Hong Kong's linked exchange rate is well-known, it is not always recognised by outsiders that the currency board is one-sided or asymmetrical. Thus, while the Hong Kong Monetary Authority (HKMA) has announced that it stands ready to sell US dollars (USD) against Hong Kong dollars (HKD) at the rate 7.8 HKD/USD, there is no explicit commitment on its part to purchase USD for HKD at a fixed exchange rate. While USD purchases thus are subject to discretion, they are conducted in light of market conditions. This suggests that there is likely to be a stable relationship between USD purchases and publicly observed financial variables, including the exchange rate, interest rates and the aggregate balance (monetary base), which market participants can use to form beliefs about the likelihood of the currency board entering the market.

In this paper we use publicly available data to estimate the probability of USD purchases by the currency board in an effort to assess what beliefs market participants may have regarding the HKMA's inclination to purchase USD. The paper is structured as follows. In Section 2 we provide a short overview of Hong Kong's currency board regime, focusing on the period since the Asian crisis in 1998. In Section 3 we review the data and discuss the empirical work, which relies on the estimation of logit models on daily data spanning the period September 3, 1998, to December 25, 2001. The empirical analysis suggests three conclusions. The first is

---

[1] The size of the Hong Kong economy is larger than many observers may believe. World Bank (2001) indicates that Hong Kong's PPP-adjusted gross national income in 1999 was 152 billion USD, that is, greater than that of a number of countries, including Chile, Denmark, Finland, Hungary, Israel, New Zealand, and Venezuela.

[2] See the essays in Jao and King (1990).

that financial market variables do contain information about the likelihood of dollar purchases. The stronger the exchange rate, the smaller the aggregate balance, and the higher HKD interest rates are relative to USD rates, the more likely is a purchase of USD. Second, there is evidence that the relative importance of the different variables has changed during the sample period. Third, despite the fact that USD purchases are forecastable, the level of predictability is limited. This is most likely due to the fact that daily data obscure important market developments that may occur within the day, and to the fact that there have been few cases of USD purchases, which suggests that the information content of the data is inherently low. Section 4 concludes.

2. Preliminaries

Before turning to the data analysis, it is useful to review the main features of Hong Kong's currency board system and the data. This is the task of this section.

2.1 Hong Kong's currency board

After having adopted a floating exchange rate in the early 1970s, Hong Kong reintroduced a fixed exchange rate in October 1983, when the HKD was pegged to the US dollar at 7.8 HKD/USD.[3] The main impetus behind the introduction of the linked exchange rate system was the sharp depreciation of the currency in 1982-1983. Between June 1982 and June 1983, the HKD fell from 5.9 per USD to 7.2, or by 18%, largely due to weak economic fundamentals.[4] During the summer, however, things turned for the worse and the exchange rate continued to experience a sharp depreciation. In this case, however, the depreciation was largely due to concerns arising from China's announcement that it intended to regain sovereignty over Hong Kong in 1997. The exchange rate fell further to 7.89 HKD/USD by September 16. The most dramatic phase of the depreciation occurred on September 23-24, when the exchange fell by 10% in a single day's trading to 9.6 HKD/USD but stabilised subsequently. On October 17, 1983, the two note-issuing banks, the Hongkong and Shanghai Banking Corporation and the Standard Chartered Bank, were required to back the note issue by depositing an equivalent amount in US dollars, using a conversion rate of 7.8 HKD/USD, with the currency board, the government's Exchange Fund. Moreover, the Exchange Fund

[3] Chiu (2001) contains an overview of Hong Kong's experience with a currency board.
[4] This section draws on Jao (1990).

started to conduct operations in the foreign exchange markets with the intent to stabilise the rate.[5] Together these two changes reintroduced the currency board system to Hong Kong.

Following the return to a fixed exchange rate system, the HKD experienced in the 1980s several episodes with strong pressures for a revaluation. However, nominal exchange rate stability was maintained. After the onset of the Asian financial crisis in the summer of 1997, the HKD was exposed to heavy speculation in late October that year. The precipitating event was the Taiwanese authorities' decision not to defend the new Taiwan dollar against speculative outflows, which led in turn to selling pressure on the HKD. In response, the HKMA purchased HKD. Since the banks collectively had purchased more HKD than they could settle through their credit balances, short-term interest rates rose very sharply with the overnight rate briefly reaching 280%. Subsequently, marked conditions normalised. While exchange market conditions remained turbulent in the first half of 1998, the currency board successfully withstood incidents of selling pressure in January and June.

The most dramatic episode of selling pressures on the HKD occurred in autumn 1998, when the currency was exposed to heavy selling pressure. One of the hallmarks of the currency board system is the automaticity of responses to currency outflows. In such instances, banks desiring to purchase USD from the currency board at the pre-specified rate trigger the convertibility undertaking (CU). While this prevents the exchange rate from depreciating, it leads to a contraction of the monetary base and a fully predictable rise in short-term interbank rates. Since the rise of interest rates in turn depresses equity prices, intense pressures were brought to bear on the exchange rate by market participants who took short positions in the equity market and sold the currency. During the most intense period of speculation that took place in late August, the Exchange Fund took the unprecedented step of purchasing equities for some 15 billion USD to impose losses on those taking short positions in the equity market. This calmed the equity and foreign exchange markets and more tranquil conditions were restored.

The severe attack on the linked exchange rate led the authorities to announce the so-called *seven technical measures* to improve the resilience of the currency board arrangement (HKMA 1998, 1999). The most critical element was the clear undertaking by the HKMA to licensed banks to convert HKD to USD at the fixed exchange rate of 7.75 HKD/USD, the

[5] While the authorities did not enter into a commitment regarding what exchange rate they intended to defend, over time they came to resist movements beyond 7.75 HKD/USD, that is, at a somewhat stronger exchange rate than that applicable to the backing of bank notes.

intervention rate at that time. The authorities also announced that the CU would be changed to 7.8 HKD/USD, that is, the exchange rate that applied to the issuance and redemption of bank notes. On November 26, 1998, it was further announced that the change in the CU from 7.75 to 7.8 HKD/USD would be undertaken in gradual way, by 1 pip (or 0.0001 HKD) per day, starting on April 1, 1999, and ending on August 14, 2000.

A second change of importance for the econometric research that follows below was the adoption of measures on November 26, 1998, to reduce fluctuations in interest rates. These entailed the introduction of a discount window facility with the interest rate determined by the federal funds target rate plus 150 basis points or, if this was higher, a five-day moving average of overnight and one-month interbank rates in Hong Kong.[6] A sharp rise in interbank rates would only gradually be passed along to the discount window and thus to the banking system more broadly. Pressures in the foreign exchange markets would instead impact on the aggregate balance. This suggests that during the sample period the aggregate balance became more informative about pressures in the interbank market and thus about the likelihood that the HKMA would enter the market to inject liquidity.

A third feature of the changes was the adoption of an increased level of transparency regarding the operations conducted by the currency board. In particular, from November 25, 1998, onwards, the HKMA published the aggregate balance and its components on a daily basis. From the perspective of this paper, this is important because it made it easier for market participants to understand the sources of changes in interbank liquidity and to form expectations about the currency board's participation in the market. This is likely to have promoted a smooth functioning of the interbank market.

2.2 Preliminary data review

As a preliminary step, it is useful to review the data used in the econometric analysis below. Figure 1 displays the CU together with the market exchange rate and Figure 2 display the distance between the two series (labelled DISTANCE in what follows) together with points indicating when and at what exchange rates the currency board purchased US dollars. The task of the econometric analysis below is to estimate a reaction function for these purchases.

---

[6] The discount window was in fact introduced in September 1998, but the mechanism for determining the cost of borrowing, which plays a key role in reducing interest rate volatility, was not introduced until November.

The figures show that in the first part of the sample the exchange appreciated quite often and for relatively long time periods above the 7.8 HKD/USD limit. This was associated with relatively frequent purchases of US dollars, particularly during the period in which the CU was gradually shifted from 7.75 to 7.8. In the latter part of the sample, however, the exchange rate has been much closer to the 7.8 level and US dollar purchases have been much rarer. Overall, the figures suggest that DISTANCE is likely to be a useful explanatory variable in the statistical analysis below.

--- insert figures 1 - 2 ---

In interpreting Figure 2 it should be noted that all data are taken at the end of the day, except the transactions prices for the currency board's purchases which are taken during the day. Thus, the fact that some purchases of US dollars took place at rates much below the exchange rate quotation for the day may simply be an indication of intra-day exchange rate fluctuations. Alternatively, it may be that US dollar purchases by the currency board sent a potent signal to the markets that the Hong Kong dollar had appreciated excessively, leading the exchange rate to depreciate towards the CU during the rest of the day.

The aggregate balance (AGGBAL), measured in billion HKD, is plotted in Figure 3.[7] The figure indicates that over time the aggregate balance became much less volatile. Towards the latter half of the sample, it was on average very small, typically in the order of a few hundred million HKD.

Next we turn to the interest rate measure used in the analysis below. Since the HKD dollar is linked to the USD, spreads between HKD short-term Hibor rates and USD Libor rates play an important role for financial market developments in Hong Kong. Preliminary work on overnight, one-week, one-month, three-month, six-month and one-year interest rate spreads between HIBOR and LIBOR rates indicated that the spread between overnight rates (SPREAD) was much more significant than the other spreads. We there focus on them in the analysis below. Figure 4 shows that the overnight spread became less volatile during the period studied.[8]

[7] The measure of the aggregate balance used excludes discount window borrowing but includes interest payments on Exchange Fund instruments.

[8] It should be noted that there are 16 days for which there is no observation on the overnight spread (but observations on the other variables). Rather than dropping these observations from the

--- insert figures 3 - 4 about here ---

The fact that the market exchange rate stayed closer to the CU, and that the aggregate balance and the interest rate spread became much more stable, in the second part of the sample is probably due to a combination of factors, including a calmer external environment. However, the figures are suggestive of the improved functioning of the currency board following the introduction of the seven technical measures in September 1998. Over time as the HKMA has raised transparency and strengthened the system, market participants have better understood the policy makers' commitment to maintain the exchange rate close to the CU. This is turn has generated stabilising expectations which have tended to limit the size and length of the deviations between the market exchange rate and the CU, and reduced the need for dollar purchases.

2.3 Descriptive statistics

Table 1 provides descriptive statistics and Table 2 a correlation matrix for the data reviewed above. There are reasons to believe that market operations are not independent over time. For instance, on occasion sales of USD, which lead to a contraction of the aggregate balance, have been followed by USD purchases to inject liquidity. There have also been occasions on which the currency board has purchased USD several days in a row. We therefore include variables to account for such time dependence. BUY (SELL) is a dummy variable that takes the value of unity if the currency board bought (sold) USD. To allow for "memory," we define BUY2(t) = 0.5*BUY2(t-1) + BUY(t) and SELL2 analogously.

--- insert tables 1 and 2 about here ---

One important finding is that the correlation between the dummy variables for dollar purchases and the proposed explanatory variables is quite low. The highest correlation is with BUY2 (0.24) followed by BUY (0.23), which suggests that dollar purchases seem to be correlated over time. The third highest correlation is with the overnight HIBOR-LIBOR spread (0.22). The correlations with DISTANCE (-0.12) and AGGBAL (-0.11) are much lower. Disregarding the dummy variables for purchases and sales of USD, the correlations

---

econometric analysis below, we follow Greene (2000) and replace the missing observations by the average value of the overnight spread.

among the potential explanatory variables discussed above are generally quite low, with exception of the correlation between the aggregate balance and the overnight Hibor-Libor spread (-0.45).

Of course, these pairwise correlations say little about the partial correlations between the variables. To explore these, we next turn to the formal multivariate econometric analysis of the data.

3. Empirical results

In this part of the paper we report the results from estimated logit models for the decision to purchase USD. In these models, the dependent variable, PURCHASE, is a dummy that takes the value of unity on the days in which the currency board portfolio purchased US dollar and zero otherwise.[9] The independent variables are AGGBAL, DISTANCE, SPREAD and the lagged SPREAD. Since it is clear whether BUY or BUY2 (SELL or SELL2) best captures any time dependence in the data, we included all of them in the economic models and let the data speak to their relative importance. Below we refer to the logit regression that includes all these variables as the full model.

3.1 Specification and sample periods

Since, as noted above, we use end-of-day data, we lag the explanatory variables by one day to avoid problems arising from simultaneity. Thus, in the regression below we seek to determine if the values of the different variables at the end of the day *t-1* are useful in predicting USD purchases of the Exchange Fund the following day.

Given that the analysis above indicated that the institutional changes that have been introduced since 1998 are likely to have led to shifts in the predictive relationship, we consider three sample periods. The first of these contains 135 usable observations between September 3, 1998 and March 31, 1999, on six of which the currency board purchased USD. This sample thus covers the period immediately after the speculative attack in August. Given that this period was characterised by intense efforts to improve the functioning of the currency board and that a number of refinements were introduced, this is a period of considerable

[9] Logit models are discussed in any good introduction to econometrics, e.g., Greene (2000).

change of the currency board. As such, the estimated reactions functions below may fit the data poorly.

The second sample covers the period April 1, 1999, to August 11, 2000, that is, the period during which the CU was gradually changed from 7.75 HKD/USD to 7.8 HKD/USD. As evidenced by Figures 1 and 2, the period was associated with several episodes in which the HKD appreciated and the currency board purchased USD. This interval contains 325 usable observations, 27 of which were associated with USD purchases.

The third sample covers the period August 14, 2000, to December 25, 2001, and consists of 321 usable observations on which USD were purchased on eight occasions. During this time span the exchange rate was typically very close to the CU. This suggests that the currency board mechanism functioned more smoothly after the technical improvements that were undertaken following the events of 1998.

Next we turn to the estimates.

3.2 First sub-sample

The results for the full model, shown in column 1 in Table 3, indicate that only the once- and twice-lagged interest rates spread are significant at the 10% level in the first sub-sample. Since most variables are insignificant, we followed the "general-to-specific" modelling strategy associated with David Hendry, and removed sequentially insignificant variables. This led to the specification in column 2.[10] The restrictions imposed by this equation on the model in column 1 were tested by a Wald test, which yielded a p-value of 75.9%, indicating that the restrictions are not rejected by the data. The results suggest that the HKMA responded to tightness in interbank liquidity, as captured by spreads between overnight rates in the HIBOR and LIBOR markets. The fact that DISTANCE does not enter the model is perhaps more surprising. Overall the model implies that purchases of USD occurred after the overnight rates had been high for two days in a row.

--- insert table 3 about here ---

[10] See, for instance, Hendry (2000). A key part in this strategy involves testing the predictive ability of the equation against new observations. Given the small sample period and the rarity by which the USD purchases are undertaken, this strategy is not feasible in this context.

3.3 Second sub-sample

The full model estimated on the data from the second sub-sample is presented in column 3. Also in this case is the lagged overnight spread significant. In addition, DISTANCE is also highly significant, indicating that USD purchases were more likely to take place when the HKD was strong. Sequentially dropping insignificant variables and re-estimating the model yields the results in column 4, in which the two overnight spreads, AGGBAL and DISTANCE are significant. It is notable that the fit of the equation, as captured by the McFadden R-squared (or, equivalently, by the values of the log likelihood functions), is not affected by the removal of the insignificant variables.

3.4 Third sub-sample

Next we estimate the model on the third sub-sample. As indicated by Figure 2, in this period the exchange rate deviated little from the CU and USD purchases occurred relatively rarely. With few occasions in which the exchange rate diverged from the CU, DISTANCE is not likely to be highly significant. In fact, the estimates of the general model in column 5 indicate that only SELL2 and the lagged SPREAD are significant at the 10% level. Sequentially removing insignificant variables leads to the model in column 6, in which the two spreads, BUY2 and SELL2 are all highly significant. By contrast, DISTANCE is only significant at the 15% level.[11] Overall, this model suggests that high interest rate spreads that were maintained for two days led the currency board to purchase USD to relieve the tightness in the interbank market, and that the likelihood of a USD purchases was linked to the pattern of past purchases and sales.

3.5 Economic significance

The analysis above indicates that the probability of USD purchases is statistically significantly related to a limited number of variables. This naturally raises the question of the economic significance of the relationship. This question is reviewed below. We first look at how well the different models predict whether the currency board will or will not purchase

[11] The reason for keeping DISTANCE in the model despite that fact that it is not significant at standard confidence levels is that a greater weight has been attached to keeping the market exchange rate close to the CU following the refinements of the currency board mechanism. Thus, institutional considerations suggest that it ought to be important in the period studied.

USD on a given day. Furthermore, we calculate probability response curves that show the probability of a dollar purchase, given the values of the explanatory variables.

Consider first Panel A in Table 4, which shows the predictive ability of the restricted equation for the first subsample, September 3, 1998, to March 31, 1999. In this sample of 135 observations, the currency board purchased USD on six days. The results show that the model did not predict (in the sense that the estimated probability was lest than 50%) a USD purchase on 128 of 129 days when no such purchase was made. Thus, the model appears to predict quite well when purchases will not be made. Turning to the more interesting question of how well the model predicts USD purchases, we see that it does so poorly. In particular, it predicted a dollar purchase on only one of the six days when such a purchase took place. This failure to predicting purchases suggests that the model does not adequately fit the data. A possible explanation is that with purchases taking place only on six of 135 observations, there is inherently little information in the data. Moreover, reasons to purchase USD may arise during the course of the day, implying that the information content of end-of-day data is low. In addition, it may be that in the first sample period, which contains the intermediate aftermath of the speculative attack in August 1998 and which is characterised by intense efforts to improve the functioning of the currency board, the authorities' implicit reaction function was evolving. If so, one would expect the explanatory power of the models to be higher in the subsequent sample periods.

To see if that is the case, we turn to Panel B in Table 4 which contains the results for the second time period, April 1, 1999, to August 11, 2000. The results indicate that the model correctly predicts no purchase on 293 of the 298 days (or about 98% of the cases) on which the currency board did not buy USD. However, only on three of the 27 days when purchases took place did the model predict so. Overall, the findings are broadly similar to (or somewhat worse than) those for the first sample period.

Panel C gives the results for the third sub-sample period, August 14, 2000, to December 25, 2001. Again we find that the model predicts very well when purchases will not take place, that is, it predicts no purchase on 312 of the 313 days when no purchase occurred. More importantly, the model does a marginally better job in predicting USD purchases in this period in that it correctly predicts four of the eight days purchases took place.

Overall these results suggest that while the statistical significance of the explanatory variables are typically high, the model does not predict dollar purchases very well. As noted above, the most likely explanations for this finding are the scarcity of observations for which

PURCHASE = 1 and the fact that the daily data are unable to capture within-the-day developments in the markets.

3.6 Probability response function

The estimated logit regressions allow us to compute the probability of a purchase, as a function of the observed variables, using the restricted model estimated on the data for the last sub-sample. Since the functional form of the models is non-linear, the impact of a change in any variable depends on the assumed values for the other variables. We therefore compute the probability of a purchase as a function of SPREAD for two sets of values for the other variables in the logit equation in column 6 in Table 3. The first set consists of the sample averages of these variables on the days the currency board purchased USD, and the second of the averages for the days it did not purchase do so. Next we draw the estimated probability of a purchase as a function of DISTANCE, again setting the other variables equal to their average values for purchase and non-purchase days. Table 5 provides the means and the standard deviations for the explanatory variables.

In Figure 5 we plot the probability response functions for SPREAD. In order to provide some indication of the normal range of values for SPREAD, we compute the probabilities by varying it in the interval given by its conditional mean plus/minus three standard deviations.[12] Figure 6 contains the analogue results for DISTANCE.[13]

--- insert figures 5 - 6 here ---

The most interesting aspect of these figures is that the probability of a purchase tends to be much higher on purchase than on non-purchase days. The reason for this is that the independent variables in the logit regressions take more extreme values on purchase than non-purchase days. For instance, the mean of SPREAD on non-purchase days is –0.49, but on purchase days it is 0.63. Similarly, the mean of DISTANCE on non-purchase days is –0.06 while on purchase days it is –0.20. Since the curves in Figures 5 and 6 depend on the average values of the variables for purchase and non-purchase days, it follows that the curves differ.

[12] Thus, for non-purchase days we vary SPREAD in the range $-0.49 \pm 3\times0.81$; for purchase days we vary it in the range of $0.63 \pm 3\times0.77$.

[13] The range defined by the mean plus/minus three standard deviations includes positive values for DISTANCE. However, we plot the probability response function only for negative values of DISTANCE.

A second interesting aspect of the figures is that, for purchase days, the probability of a purchase is quite sensitive to changes in the independent variables. For instance, when SPREAD is zero, the probability of a purchase is about 30%. When the overnight Hibor rate exceeds the overnight Libor rate by 100 basis points, however, the probability of a USD purchase is about 70%. When the spread is 200 basis points, the probability is close to 90%.

4. Conclusions

In this paper we have reviewed the behaviour of key monetary and financial variables in Hong Kong in the period September 1998 to December 2001, focussing on the issue of what market participants can infer about the HKMA's strong side operations. The major conclusions are two-fold. First, the process of refining the currency board mechanism that was set in motion by the events of August 1998 has been associated with reduced interest rate volatility. Moreover deviations of the exchange rate from the convertibility undertaking of have become smaller and less protracted, and the authorities have purchased USD increasingly rarely. While this partially may be attributable to a calmer economic environment, it suggests that the currency board has functioned more smoothly following the introduction of the *seven technical measures.* Second, while it is possible to use publicly available data to predict USD purchases by the currency board portfolio, it is not easy to do so. The main reason for this appears to be that the smooth functioning of the currency board has reduced the need for USD purchases. Given the paucity of purchases, the data are inherently not very informative about the likelihood of market operations. A further explanation for the low predictive power is that rapid market developments that cause the authorities to take action within the day are not captured by the daily data.

The research reported on in this paper raises the question of how to model the likelihood of USD sales by the currency board. While these operations arise on the initiative of banks (as opposed to the currency board that decides on USD purchases), there may be some interaction between the two types of operations. If so, it would be of interest to model jointly the probability of USD purchases and sales. This we leave for future research.

References

Chiu, Priscilla (2001), "Hong Kong's Experience in Operating the Currency Board System," Paper prepared for the IMF Seminar on Exchange Rate Regimes, Washington, March 19-20, 2000.

Greene, W.H. (2000), Econometric Analysis, 4th ed., Prentice-Hall, Upper Saddle River, NJ.

Hendry, D.F. (2000), Econometrics: Alchemy or Science? 2nd ed., Oxford University Press, Oxford.

Hong Kong Monetary Authority, HKMA (1998), "Strengthening of Currency Board Arrangements in Hong Kong," Quarterly Bulletin, November, 7- 11.

Hong Kong Monetary Authority, HKMA (1999), "The Currency Board Account and other Fine-Tuning Measures to Strengthen the Currency Board Arrangements in Hong Kong," Quarterly Bulletin, May, 1- 5.

Jao, Y.C. (1990), "From Sterling Exchange Standard to Dollar Exchange Standard: The Evolution of Hong Kong's Contemporary Monetary System 1967-89," in Y.C. Jao and F.H.H. King (1990).

Table 1: Descriptive Statistics

Sample period: 9/03/1998 – 12/25/2001

	PURCHASE	AGGBAL	DISTANCE	SPREAD	BUY	BUY2	SELL	SELL2
Mean	0.062	1.386	-0.115	-0.530	0.062	0.125	0.061	0.123
Median	0.000	0.766	-0.060	-0.390	0.000	0.000	0.000	0.000
Maximum	1.000	7.968	0.000	3.630	1.000	1.750	1.000	1.751
Minimum	0.000	-3.900	-1.000	-5.510	0.000	0.000	0.000	0.000
Std. Dev.	0.242	1.609	0.145	1.125	0.242	0.317	0.240	0.320
Observations	864	816	815	800	864	864	864	864

Table 2: Correlation Matrix

Sample period: 9/03/1998 – 12/25/2001

	PURCHASE	AGGBAL	DISTANCE	SPREAD	BUY	BUY2	SELL	SELL2
PURCHASE	1.000							
AGGBAL	-0.105	1.000						
DISTANCE	-0.117	-0.380	1.000					
SPREAD	0.224	-0.450	0.098	1.000				
BUY	0.229	-0.073	-0.136	0.187	1.000			
BUY2	0.237	-0.055	-0.163	0.149	0.874	1.000		
SELL	-0.017	0.069	0.140	-0.017	-0.067	-0.064	1.000	
SELL2	0.039	0.037	0.165	0.049	0.002	-0.009	0.890	1.000

Table 3: Logit Models

Sample period	9/03/98 – 3/31/99		4/01/99 – 8/11/2000		8/14/2000 – 12/25/2001	
CONSTANT	-5.82	-3.55	-3.14	-3.07	-8.52	-7.56
	[3.3%]	[0.0%]	[0.0%]	[0.0%]	[0.1%]	[0.0%]
DISTANCE	0.51		-12.18	-11.51	-7.62	-6.08
	[87.0%]		[0.0%]	[0.0%]	[15.2%]	[14.7%]
AGGBAL	1.04		-0.52	-0.50	0.26	
	[17.6%]		[2.9%]	[2.8%]	[83.7%]	
SPREAD	2.90	1.63	0.51	0.54	1.90	1.78
	[2.4%]	[2.0%]	[11.2%]	[9.2%]	[8.5%]	[2.2%]
Lagged SPREAD	3.97	1.12	0.84	0.81	2.51	2.13
	[4.7%]	[7.9%]	[1.2%]	[1.2%]	[4.2%]	[1.0%]
BUY	3.78		-0.70		0.84	
	[35.5%]		[53.4%]		[84.8%]	
BUY2	-5.63		0.20		2.19	2.95
	[16.0%]		[83.2%]		[56.2%]	[1.5%]
SELL	24.10		-1.21		-4.35	
	[100%]		[57.8%]		[35.6%]	
SELL2	-63.48		0.91		13.44	8.42
	[21.6%]		[54.0%]		[7.5%]	[0.4%]
Observations	135	135	325	325	321	321
Log likelihood	-10.79	-14.86	-67.71	-68.24	-12.89	-13.54
McFadden R-sq	0.56	0.39	0.27	0.27	0.66	0.64
Restrictions, p-value		75.9%		90.4%		73.2%

Notes: p-values in brackets []

Table 4: Predictive Ability

Panel A
Sample period: 9/03/1998 –3/31/1999

	PURCHASE = 0	PURCHASE = 1	Total
Predicted PURCHASE = 0	128	5	133
Predicted PURCHASE = 1	1	1	2
Total	129	6	135
Percent correct	99.2	16.7	95.6
Percent incorrect	0.8	83.3	4.4

Note : Assuming a success cut-off rate of 50%

Panel B
Sample period: 4/01/1999 –8/11/2000

	PURCHASE = 0	PURCHASE = 1	Total
Predicted PURCHASE = 0	293	24	317
Predicted PURCHASE = 1	5	3	8
Total	298	27	325
Percent correct	98.3	11.1	91.1
Percent incorrect	1.7	88.9	8.9

Note : Assuming a success cut-off rate of 50%

Panel C
Sample period: 8/14/2000 – 12/25/2001

	PURCHASE = 0	PURCHASE = 1	Total
Predicted PURCHASE = 0	312	4	316
Predicted PURCHASE = 1	1	4	5
Total	313	8	321
Percent correct	99.7	50.0	98.4
Percent incorrect	0.3	50.0	1.6

Note : Assuming a success cut-off rate of 50%

Table 5: Descriptive Statistics for Explanatory Variables

Sample period: 8/14/2000 – 12/25/2001

VARIABLE	MEAN (STANDARD DEVIATION)		
	PURCHASE=0	PURCHASE=1	ALL DAYS
DISTANCE	-0.06 (0.08)	-0.20 (0.14)	-0.07 (0.08)
SPREAD	-0.49 (0.81)	0.63 (0.77)	-0.46 (0.82)
Lagged SPREAD	-0.50 (0.79)	0.91 (0.97)	-0.47 (0.83)
SELL2	0.03 (0.14)	0.21 (0.36)	0.04 (0.15)
BUY2	0.05 (0.21)	0.56 (0.62)	0.06 (0.24)

Note: Standard deviations in parenthesis.

Figure 1
Convertibility Undertaking and market exchange rate

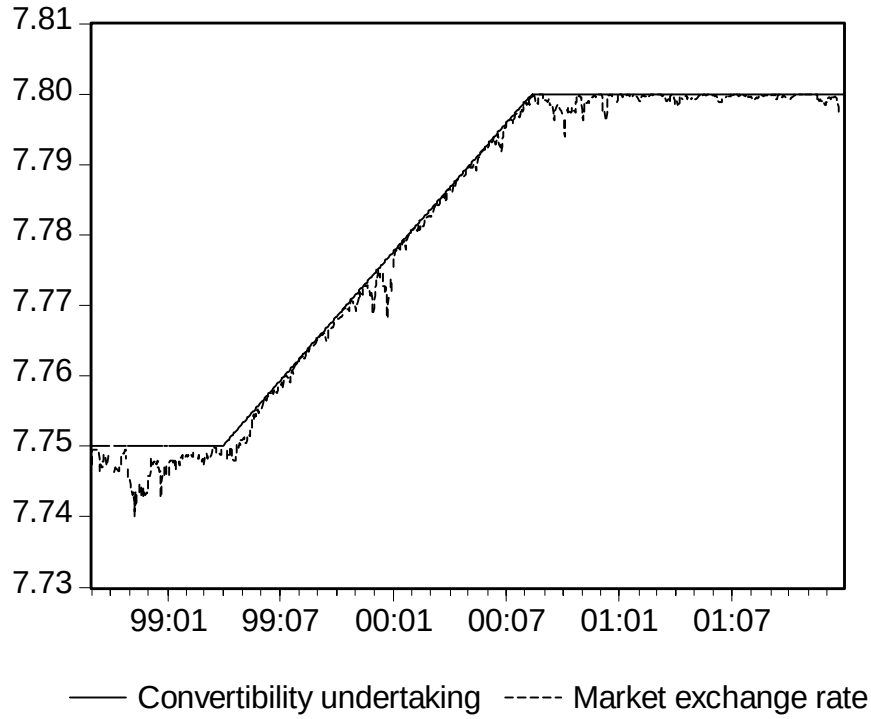

Figure 2
Distance between convertibility undertaking and market exchange rate, and between convertibility undertaking and purchase rate

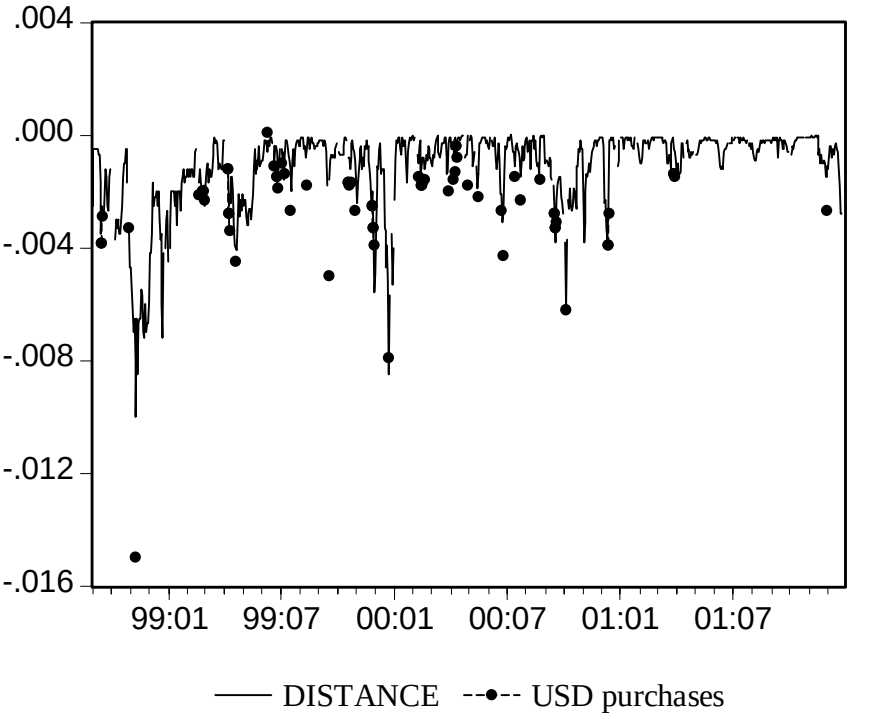

Figure 3
Aggregate balance

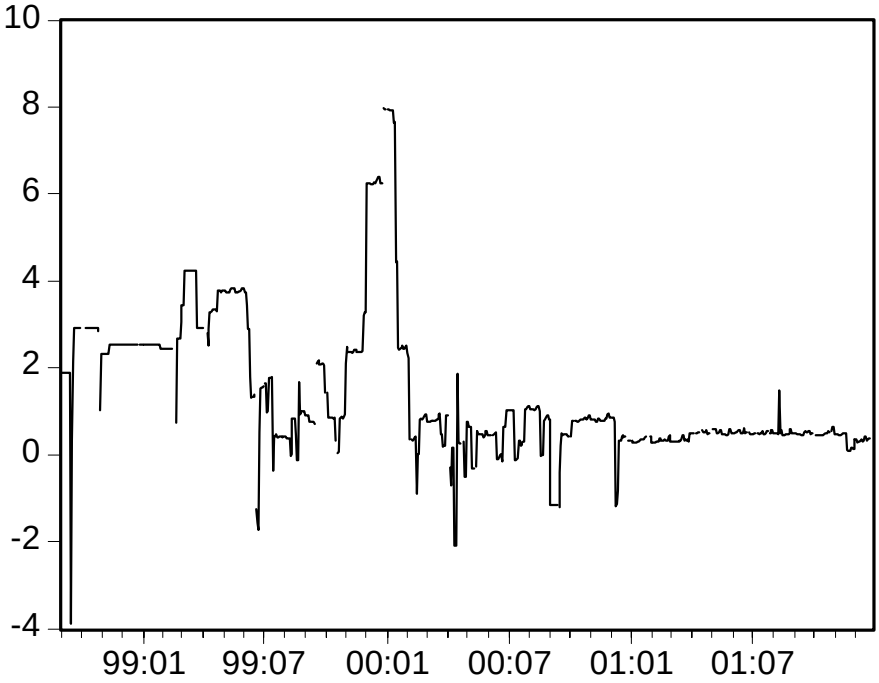

Figure 4
Spread between overnight HIBOR and LIBOR rates

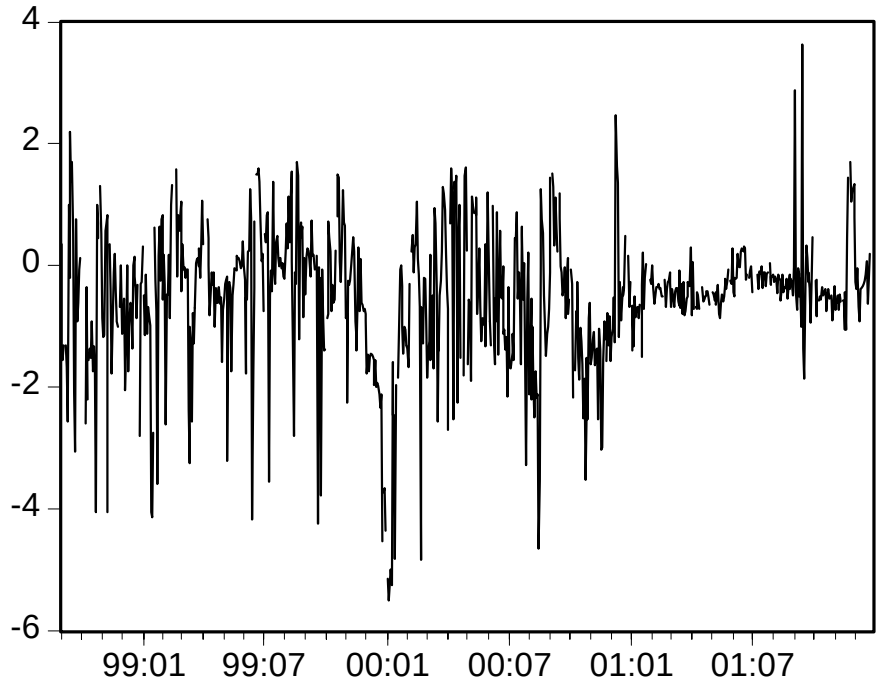

Figure 5:
The probability of a USD purchase as a function of the size of the spread between overnight HIBOR and LIBOR rates

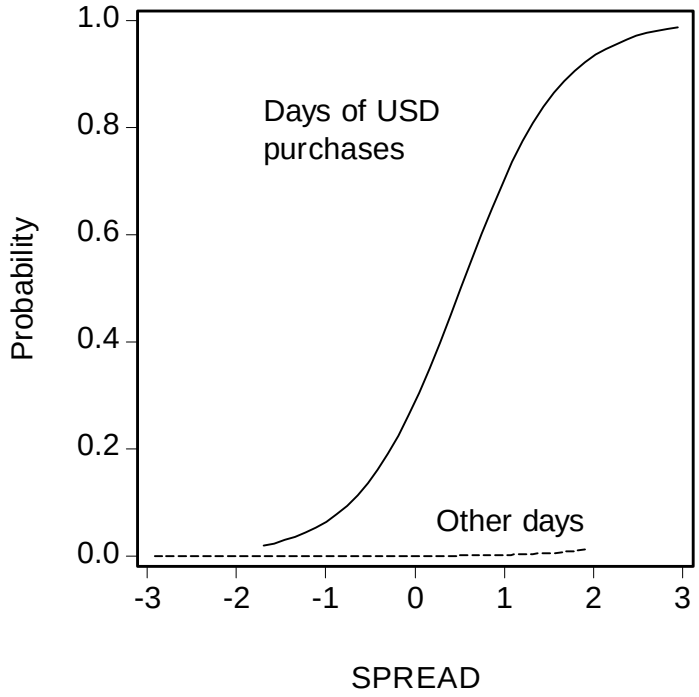

Figure 6:
The probability of a USD purchase as a function of the distance between the convertibility undertaking and the market exchange rate