

External demand for Hong Kong dollar currency (revisited)

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Mainland China is the major source of external demand for Hong Kong's currency. According to this analysis, as much as half the total outstanding stock of the currency was due to external demand at the end of 2004.

However, the pattern of circulation of Hong Kong dollars on the Mainland can be influenced in the future by a number of structural factors, including continued economic integration, a further increase in the flexibility of the renminbi exchange rate and deepening financial reforms on the Mainland.

External demand has some implications for monetary management in Hong Kong as cash in circulation is the biggest component of the Monetary Base and is a key contributor to the accumulation of foreign exchange reserves.

I. Introduction

This paper studies the demand for Hong Kong dollar currency and estimates the scale of external demand. It is a follow-up to a similarly titled article first published in the March 2003 issue of the *Quarterly Bulletin*. For analytical purposes, the expression, "external demand for Hong Kong dollar currency" is defined as the stock of Hong Kong dollar currency held outside Hong Kong, as well as that held by visitors from Mainland China. As the socio-economic integration between Hong Kong and the Mainland strengthens, co-circulation of currencies has been increasing. Anecdotal evidence suggests that a large quantity of the Hong Kong currency is held outside Hong Kong, especially in southern China. Mainland visitors, rather than tourists from other countries, are considered an important determinant of demand for Hong Kong dollars, as they account for a dominating share of Hong Kong's tourism receipts, and have a higher tendency to use cash.

Since cash in circulation is the biggest component of the Monetary Base and is a key contributor to the accumulation of foreign exchange reserves, external demand has some implications for monetary management in Hong Kong. The rest of this paper is

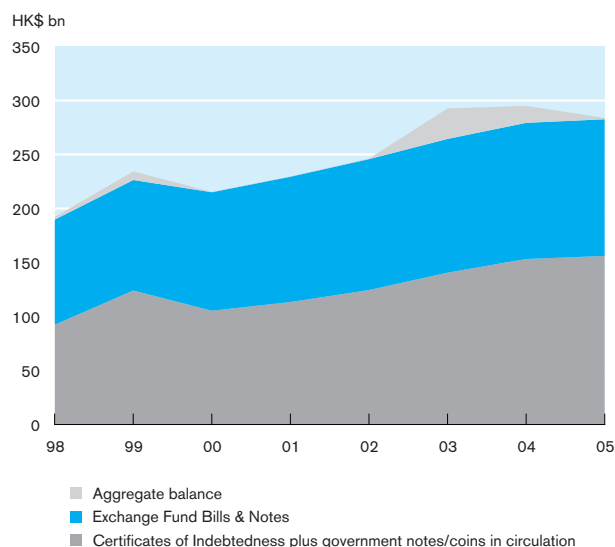
organised as follows. Section II discusses the background and key issues related to external demand for the Hong Kong currency. Section III provides some stylised facts on recent developments, and highlights the main factors that may influence the demand for the currency. Section IV reports estimates of the demand for the currency and discusses the implications. The final section concludes.

II. Background and key issues

There are several reasons why it is useful to study external demand for the Hong Kong currency. First, cash in circulation is the largest component of the Monetary Base (Chart 1). At the end of September 2005, the outstanding amount of Hong Kong dollar currency issued stood at HK\$154 billion, or 55% of the Monetary Base. Under the Linked Exchange Rate system, all Hong Kong dollar banknotes and coins are fully backed by US dollar reserves at the Linked Rate of HK\$7.8 to US\$1. Thus, foreign reserves corresponding to the Hong Kong dollar currency issued amounted to US\$19.8 billion at the end of September. This was equivalent to 16% of total foreign exchange reserves, or 49% of the Backing Assets.

CHART 1

Currency becomes the biggest component in the Monetary Base



Secondly, Hong Kong can benefit from external demand for its currency through seigniorage. When the three note-issuing banks issue Hong Kong dollar banknotes, they are required to submit US dollars to the HKMA in return for Certificates of Indebtedness, which do not earn any interest. The US dollar funds submitted to the HKMA are managed as part of the foreign exchange reserves, and the earnings arising from this are seigniorage.¹

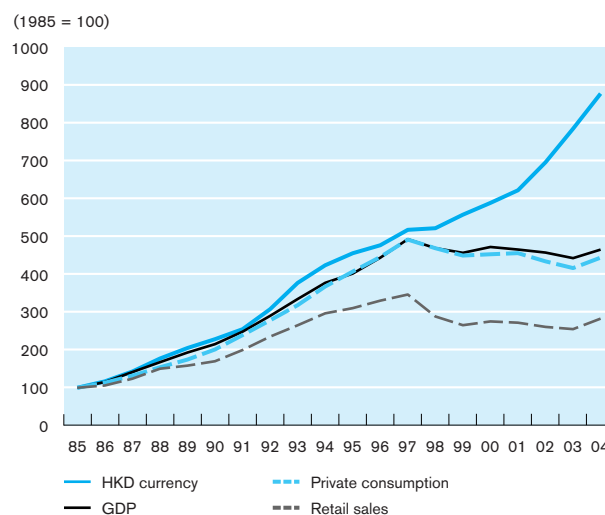
Thirdly, because a substantial portion of the Hong Kong dollar currency originates from external demand, this may obscure the reading and interpretation of the movements in money supply data. To monitor the associated potential risks and vulnerabilities, it is useful to have an understanding of the driving forces behind this component of the Monetary Base.

III. Stylised facts and recent developments

There are signs of a significant increase in external demand for the Hong Kong currency in recent years. First, there has been a rapid rise in the issuance of Hong Kong dollars that cannot be explained solely by domestic factors. Chart 2 shows the nominal indices of GDP, private consumption expenditure (PCE), retail sales and Hong Kong dollar currency. It shows that, from 1985 to 2004, the currency increased a lot more rapidly than GDP, PCE and retail sales, with the gap widening sharply between 1999 and 2004. The Hong Kong dollar currency as a percentage of broad money (M3) also rose markedly during this period (Chart 3).² This can be partly explained by the lower opportunity costs of holding cash, given that deposit rates fell considerably in 2001 and early 2002, and stayed low in 2003-2004. Nonetheless, the increase in the Hong Kong dollar currency was too large to be explained solely by lower interest rates. External demand probably played a role in this.

CHART 2

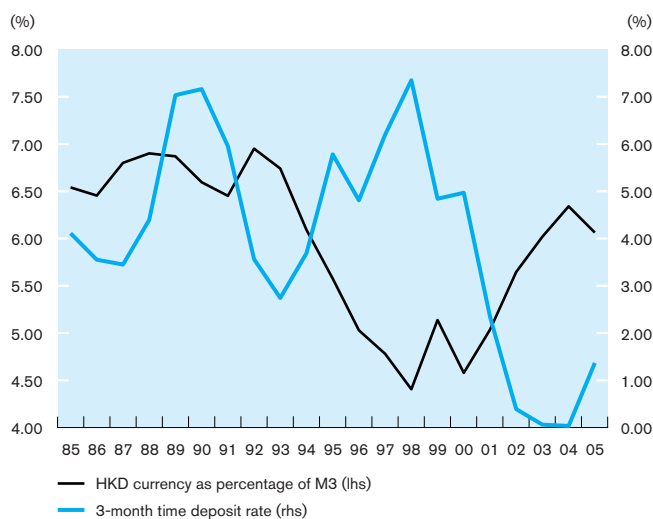
Nominal indices of HKD currency, GDP, private consumption and retail sales (1985=100)



¹ There are other benefits to the business of Hong Kong banks that are associated with the use of Hong Kong dollar currency on the Mainland. For example, according to Peng and Shi (2002), part of the Hong Kong dollar banknotes brought to the Mainland by visitors from Hong Kong are deposited with Mainland banks, which in turn are re-deposited with banks in Hong Kong. Banks in Hong Kong earn a profit margin on this intermediation.

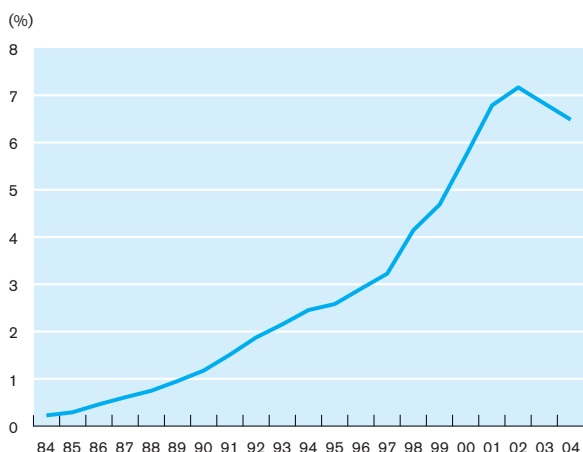
² This percentage declined between 1993 and 1998, mainly due to a rapid rise in M3 during this period of rapid economic growth, rather than a fall or unusually slow growth in Hong Kong dollar currency.

CHART 3
HKD currency as a percentage of M3 and 3-month time deposit rate



Secondly, the use of non-cash means of payments by Hong Kong residents, such as credit cards and electronic payment systems, has been growing during this period, substituting the use of cash in transactions at the retail level. The ratio of credit card advances to PCE rose markedly from 0.2% in 1984 to 6.5% in 2004, indicating the growing use of credit cards (Chart 4).

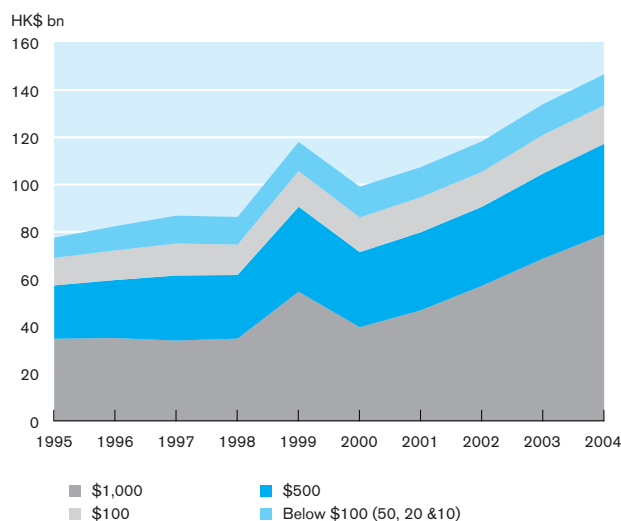
CHART 4
Credit card advances as a percentage of PCE



Thirdly, anecdotal evidence indicates that spending by Mainland visitors is mainly by cash rather than credit cards. This suggests that expenditure made by this group of visitors has been growing rapidly in recent years, and it may have a higher “cash intensity” compared with spending by Hong Kong residents and other overseas visitors. In 2003 and 2004, Mainland visitors accounted for some 60% of Hong Kong’s tourism receipts. Thus, they are an important determinant of demand for the Hong Kong currency.

Fourthly, the rise in the amount of Hong Kong dollar banknotes issued in recent years was due almost entirely to the issuance of HK\$1,000 notes, which rose by some HK\$39 billion during 2001-2004 (Chart 5). As nominal private consumption expenditure was largely on a declining trend between 1998 and 2003, it is unlikely the increased issue of HK\$1,000 notes was mainly for domestic use.

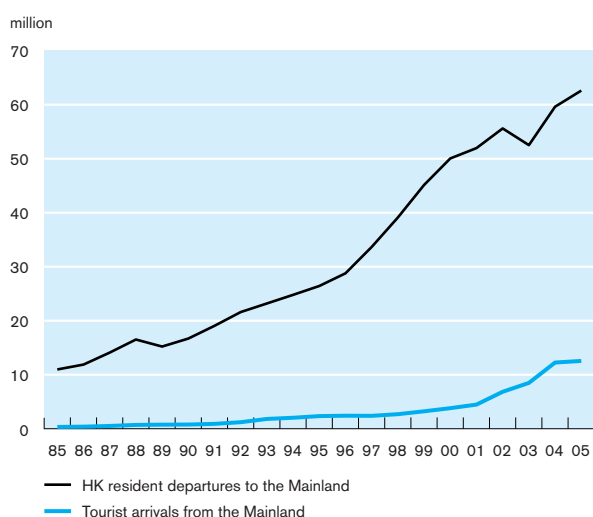
CHART 5
Notes in circulation by denominations



Hong Kong dollar currency is demanded on the Mainland for two major reasons. The increased economic integration between Hong Kong and the Mainland has led to more cross-border transactions. With cross-border investment and trade growing rapidly in the past two decades, the frequency of Hong Kong people visiting the Mainland has risen substantially.³ Hong Kong residents make more than five million visits to the Mainland every month. On the other hand, since the introduction of the Individual Visitor Scheme in July 2003, there has also been rapid growth in the number of Mainland visitors coming to Hong Kong (Chart 6).

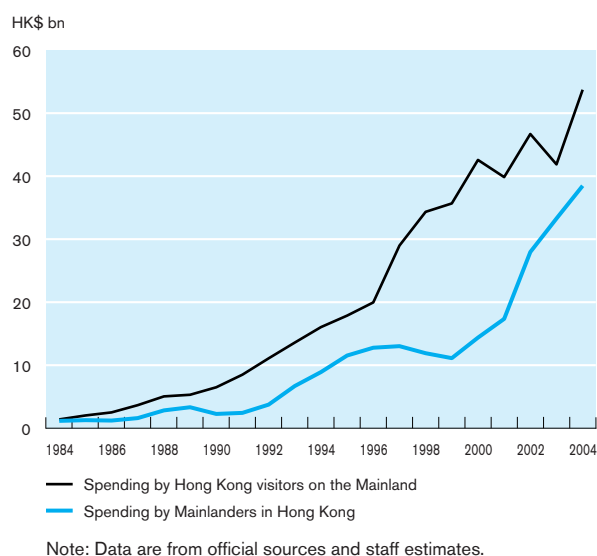
CHART 6

HK resident departures to the Mainland and tourist arrivals from the Mainland



Spending by these two groups of visitors can be used to gauge the external demand for the Hong Kong currency (Chart 7). The figures have been obtained from official sources as well as staff estimates. The chart shows that spending by Hong Kong residents has increased sharply since 1997, and that by Mainland visitors has grown more rapidly since 2002, bringing the aggregate spending by the two groups to HK\$95 billion in 2004.

CHART 7
Cross-border spending



Secondly, Hong Kong's currency has larger denominations than the renminbi and is probably regarded as a more convenient means of payment for high-value cash transactions, as well as a useful means for store of value. The Mainland is still largely a cash-based economy because non-cash means of payments, such as credit cards, are not yet popular. With strong growth in household income during the past decade, there has been a growing number of "big ticket" transactions. However, as the highest denomination of renminbi notes is only RMB100 yuan (or HK\$96 at an exchange rate of 1.042 at the end of 2005), compared with Hong Kong's HK\$1,000 banknote, the Hong Kong currency is considered a more convenient means of payment for high-value cash transactions.

³ As Hong Kong dollar currency can be used across the border, this trend will increase the external demand for the currency.

IV. Estimation of external demand for Hong Kong dollars

The issue of external circulation was examined in a number of studies. Among these, Greenwood (1990) adopted a relatively straight-forward approach by assuming that the currency-to-GDP ratio would stabilise after decreasing for a period of time as a result of financial innovations (“currency-to-GDP ratio approach”). It was estimated that 18% of the Hong Kong dollar currency was demanded externally at the end of 1989.

Hawkins and Leung (1997) estimated error-correction models of money demand based on monthly data by using a two-step, Engle-and-Granger approach. When estimating the demand for cash in circulation, it was assumed that the external demand for the Hong Kong currency started to grow from zero in the mid-1980s and then followed a linear trend (a “time-trend dummy variable” was adopted). It was estimated that at the end of 1994, 25% of Hong Kong’s currency was circulated outside Hong Kong. However, the linear time trend of external circulation was merely an assumption and was not based on any economic rationale.

A more recent paper by Peng and Shi (2002) adopted an alternative approach to estimate the amount of external circulation. The analysis employed a maximum-likelihood method to estimate a money demand function for cash, by assuming that a fixed proportion of the Hong Kong currency was held outside Hong Kong throughout the whole sampling period. The money demanded for domestic uses (after deducting the part held externally), was specified as a function of real GDP, interest rate and inflation rate. By altering the assumption about the proportion of external circulation from zero to unity, different estimation results were obtained, yielding different values in the log likelihood function. The assumption yielding the highest value in the log likelihood function was considered as the best estimate of the proportion of external holdings of Hong Kong dollars (“best-fit assumption approach”).

Based on this approach, it was estimated that about 16% of the currency was held outside Hong Kong. It should be noted that this figure was an average estimate for the whole sampling period from 1972 to 2001, and it might over-estimate the ratio in the earlier years but under-estimate it in the more recent period. Peng and Shi (2002) also updated the analysis in Greenwood (1990), estimating that 25% of Hong Kong’s currency was held externally at the end of 2001.

All estimation methods have their own limitations and caveats. It is useful to compare estimates from different approaches to assess the robustness of the results. In this paper, we adopt two different approaches. In the first approach, we estimate a money demand function for the Hong Kong dollar currency by explicitly taking into account the effect of economic integration. The second approach is to estimate “local demand for the currency”, (the demand for domestic use by residents in Hong Kong), and use the difference between the actual issuance of Hong Kong dollars and the fitted value of local demand to estimate external demand. In addition, we update the analysis in the selected previous studies. The results are reported at the end of this section. Based on the results, we estimate the amount of Hong Kong dollars circulating outside Hong Kong.

Approach 1: Explicitly consider the economic integration effect

Taking into account the effect of economic integration to estimate demand for the Hong Kong currency, we adopt a typical log-linear form money demand function to model demand for the currency. The general form is specified as follows.⁴

$$(m^d - p) = \gamma_0 + \gamma_1 y + \gamma_2 (R_{out} - R_{own}) + \gamma_3 \Delta p + \gamma_4 exp$$

where $(m^d - p)$ is the logarithm of the quantity of real money demanded, y is a scale variable such as real income (also expressed in logarithm), R_{out} and R_{own} are rates of return on assets outside of money and on money itself, and Δp represents the expected

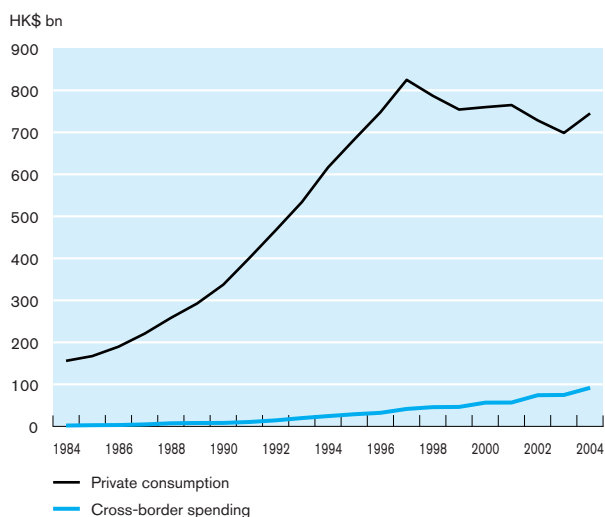
⁴ Based on Ericsson (1998).

inflation rate. The rate differential ($R_{out} - R_{own}$) is a measure of the opportunity cost of holding money, while the inflation rate is the “return” of holding goods. The last variable exp is the estimated sum of spending by Hong Kong visitors on the Mainland and those by Mainland visitors in Hong Kong. This variable is included to augment the money demand function to capture the impact of economic integration on the external demand for the Hong Kong currency.

The coefficient γ_1 is expected to be positive and can be interpreted as the income elasticity of money demand. The expected sign of γ_2 and γ_3 is negative, and that of γ_4 is positive. In our final model, the demand for currency (m) is modelled as a function of real private consumption expenditure (pce), the three-month time deposit rate (i_T), which is used to proxy the opportunity cost of holding cash (R_{own} is zero as cash is non-interest-bearing), and the variable exp , i.e. cross-border spending.⁵ Chart 8 illustrates pce and exp during the sampling period.

CHART 8

Private consumption (pce) and cross-border spending (exp)



The estimation is performed by using Johansen co-integration analysis with an error-correction model, which requires all the variables to be stationary in the first difference. Stationarity tests have confirmed these pre-requisites. The details of the estimation results are presented and discussed in the following paragraphs.

The co-integrating equation, which represents the long-run demand for the Hong Kong currency, is shown in Equation (1).⁶ By using a general-to-specific approach starting from four lags, an error-correction model characterising the short-term dynamics is obtained, and is summarised in Table 1. The term ecm_{t-1} represents the error-correction term, i.e. the deviation of m from the long-run equilibrium value implied by the co-integrating equation.

$$m_t = -3.55 + 0.355pce_t - 0.044i_{Tt} + 0.4exp_t \quad (1)$$

(1.40)* (-3.19)*** (4.18)***

Sampling period: 1984 Q4 to 2004 Q4

TABLE 1

Error-correction model for HKD currency

(dependent variable = Δm_t)		
	Coefficients	t-statistics
C	0.0985***	[10.19]
ecm_{t-1}	-0.1216***	[-3.52]
Δm_{t-1}	0.0101	[0.10]
Δm_{t-2}	-0.1975**	[-2.00]
Δpce_{t-1}	0.3005**	[2.31]
Δi_{Tt}	-0.0121***	[-2.71]

Adj R ²	0.85
Equation standard error	0.03
LM test for serial correlation	7.55 [0.11]
Jarque-Bera test for normality	1.56 [0.46]
White test for heteroskedasticity	22.79 [0.25]

⁵ The expected inflation rate, proxied by the five-quarter centred moving average of actual CPI inflation rates, was found to be statistically insignificant in the initial model, and was excluded in the final one.

⁶ Figures in brackets are t-statistics. The symbols, ***, **, and * represent statistical significance at 1%, 5%, and 10% respectively.

The results indicate a positive impact of real PCE and a negative effect of interest rates on the demand for cash. The long-run elasticity of real money with respect to PCE is 0.36. Taking this literally, a 1% increase in PCE would raise the real money demand by 0.36% in the long term. The semi-elasticity of the three-month time deposit rate is 0.044, meaning that a one-percentage-point increase in the rate would reduce real money demand by 4.4% in the long term. The variable *exp* is found to be statistically significant, suggesting that higher cross-border spending would increase the demand for the Hong Kong currency. For the short-run dynamics, the coefficient of the error-correction term suggests that around 12% of any deviation of *m* from the long-run equilibrium value would be “corrected” in the following quarter.

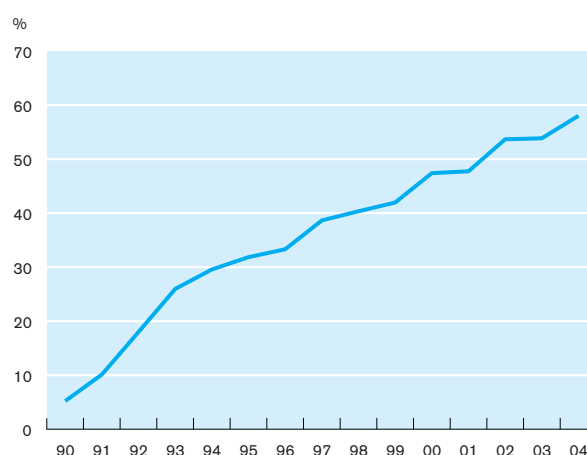
The external demand for cash can be estimated from the long-run relationship. In Hawkins and Leung (1997), it was assumed that external circulation of the currency on the Mainland was very limited before the mid-1980s. Likewise, we assume that external demand would be zero if the economic integration variable *exp* stayed at its end-1984 value, exp_{4Q84} . Based on this assumption, the share of external demand in total outstanding stock at time *t* can be expressed as:

$$1 - e^{[0.4(exp_{4Q84} - exp_t)]}$$

where 0.4 is the estimated coefficient of *exp* as in Equation (1), and *e* is the natural number (Appendix). Chart 9 shows the estimated share of external demand in outstanding stock. In particular, about 59%, or HK\$82 billion, of the total amount of Hong Kong dollars issued was due to external demand at the end of 2004.

CHART 9

Share of HKD currency due to external demand

**Approach 2: Deduction of local demand**

In the second approach, we first estimate the demand for the Hong Kong currency by using quarterly data from 1973 to 1984, assuming that there was no external demand at all during this period. As in the first approach, estimation is performed by using Johansen co-integration analysis. The estimated equation, i.e. Equation (2), is taken as the local demand for the currency.

$$m_t = -2.502 + 0.692 pce_t - 0.006i_{Tt} \quad (2)$$

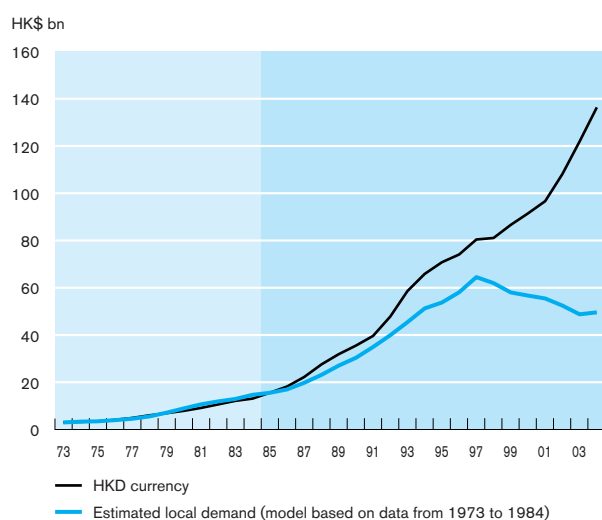
(19.92)*** (-2.28)**

Sampling period: 1973 Q1 to 1984 Q4

The results indicate that the long-run elasticity of real money with respect to PCE is 0.69. The semi-elasticity of the three-month time deposit rate is 0.006. By plugging the values of *pce* and *i_T* into Equation (2) for the period from 1985 to 2004, the fitted values of local demand for the Hong Kong currency are obtained. External demand is estimated as the difference between the actual values of the Hong Kong currency issued and the fitted values of local demand. Chart 10 compares the actual values of the currency issued with the fitted values of local demand, suggesting that 63% of the outstanding issued amount was due to external demand in 2004 Q4. It should be noted that the decrease in local demand in recent years was mainly due to a moderate decline in private consumption.

CHART 10

Estimated local demand and outstanding HKD currency



Updating selected previous studies

By using Greenwood's "currency-to-GDP ratio approach" and extending the sampling period to 2004, the proportion of external demand at the end of 2004 is estimated to be 46%, a significant increase from the estimates of 18% at the end of 1989 and 25% at the end of 2001 that were based on the same method.⁷

TABLE 2

Comparing estimates of external demand for HKD

Method / Study	Estimates of External Demand for HKD Currency		Period
	Value (HK\$ bn)	In % of Total Currency in Circulation	
Currency-to-GDP ratio approach			
Greenwood (1990)	6	18	end-1989
Peng and Shi (2002)	25	25	end-2001
Ho, Shek and Shi (2005)	64	46	end-2004
Estimation of money demand with economic integration variable			
Hawkins and Leung (1997)	17	25	end-1994
Ho, Shek and Shi (2005)	82	59	end-2004
Deduction of local demand			
Ho, Shek and Shi (2005)	88	63	end-2004
Best-fit assumption approach*			
Peng and Shi (2002)	-	16	1972-2001
Ho, Shek and Shi (2005)	-	17	1972-2004

*Note: An average ratio for the entire sampling period.

Separately, we adopt the "best-fit assumption approach" in Peng and Shi (2002) by extending the sampling period to 2004. The average proportion of external demand between 1972 and 2004 is estimated to be 17%. Comparable estimates for the 1972-2004 period can be obtained from Approaches 1 and 2. By assuming that the ratio of external demand was zero between 1972 and 1984, and using the estimated proportions between 1985 and 2004, an average proportion for the entire period can be computed. The corresponding estimates for the 1972-2004 period from Approaches 1 and 2 are 15.4% and 14.6% respectively, roughly in line with the ones based on the "best-fit assumption approach".

These comparisons show that our findings are broadly consistent with those from earlier studies. Table 2 provides a summary of various estimates, suggesting a range of 46-63% of Hong Kong's currency at the end of 2004 was likely to be externally demanded. It is also clear that the ratio of external holdings has been rising in recent years.

⁷ The estimate of 18% at end-1989 is from Greenwood (1990), and that of 25% at end-2001 from Peng and Shi (2002).

It should be emphasised that the models presented in this paper are only for understanding the past and providing estimates of the scale of external demand within their respective sampling periods. They are not constructed to predict the future, which can be affected by structural factors that are not reflected in these backward-looking models.

V. Concluding remarks

Our analysis suggests that some 46% to 63% of the total stock of Hong Kong dollar currency was attributable to external demand at the end of 2004, representing a significant increase in the past few years. Although external demand for the currency has been growing steadily over the past two decades, it can be volatile. Latest data indicate that the amount of Hong Kong dollars issued rose moderately in 2005. This happened despite higher interest rates, which raised the opportunity cost of holding cash, and the expectations of a renminbi revaluation.

Over a longer term, the pattern of circulation of the Hong Kong currency on the Mainland can be influenced by a number of structural factors. These factors include continued economic integration between the Mainland and Hong Kong, further increase in the flexibility of the renminbi exchange rate, deepening financial reforms on the Mainland, the process of renminbi becoming a fully convertible currency, and possible introduction of new renminbi notes of larger denominations.

APPENDIX

Derivation of the proportion of external demand

As reported in Section IV, the logarithm of the long-run equilibrium value of the Hong Kong dollar currency issued is represented by Equation (1).

$$\begin{aligned}
 m_t &= -3.55 + 0.355 pce_t - 0.044 i_{Tt} + 0.4 exp_t & (1) \\
 &= f(pce_t, i_{Tt}, exp_t)
 \end{aligned}$$

We assume that external demand would be zero if the economic integration variable exp stayed at its end-1984 value, exp_{4Q84} . Thus, the theoretical value of local demand at any given time t , $local_t$, can be expressed in logarithm as follows.

$$local_t = f(pce_t, i_{Tt}, exp_{4Q84})$$

The proportion of local demand in total stock of the Hong Kong currency, also in logarithm, is given by subtracting m_t from $local_t$, i.e.

$$f(pce_t, i_{Tt}, exp_{4Q84}) - f(pce_t, i_{Tt}, exp_t) = 0.4 (exp_{4Q84} - exp_t)$$

This implies that the proportion of local demand in terms of ratio is:

$$e^{[0.4(exp_{4Q84} - exp_t)]}$$

and hence the proportion of external demand is:

$$1 - e^{[0.4(exp_{4Q84} - exp_t)]}$$

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