

Currency Substitution: The Use of Hong Kong Dollars in Southern China

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Abstract

This paper studies the circulation of Hong Kong dollars in the Chinese Mainland. It first estimates the amount of Hong Kong dollars circulating in southern China in the last fifteen years. The regression analysis indicates that the growth rate of Hong Kongs foreign direct investment in China and the growth rate of trade volume between Hong Kong and China are some of the main determinants that contribute to the widespread use of Hong Kong dollars in southern China. The difference of real returns between Hong Kong dollar denominated assets and Chinese Renminbi denominated assets, however, has no effect on the amount of Hong Kong dollars circulating in China.

- **JEL Classifications:** E41, F36
- **Key Words:** Currency Substitution, Hong Kong Dollars, Hong Kong

I. Introduction

Currency substitution is an important issue in international macroeconomics because it is often regarded as a major contributing factor in the economic interdependence of countries. For instance, currency substitution has important impact on the exchange rate (McKinnon, 1982). In the face of exogenous changes in the expected rate of depreciation, Girton and Roper (1981) show that the exchange rate volatility increases with the degree of currency substitution. Furthermore, currency substitution may transmit the effect of monetary disturbances from one country to another (Miles, 1978). This paper attempts to

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add to the literature, by providing a theoretical and empirical analysis on the phenomenon of widespread use of Hong Kong dollars in southern China in the past fifteen years. This phenomenon of currency substitution has been becoming increasingly important with the increase of the economic integration between Hong Kong and southern China. For example, in 1997, China's exports to (imports from) Hong Kong were 24 per cent (5 per cent) of total Chinese exports (imports). For the foreign direct investment (*FDI*), 41.2 per cent of the foreign-capital actually used in China is from Hong Kong in 1997. In fact, the flows of goods and capital between southern China, Hong Kong, and Taiwan have been so rapidly expanded that they are often referred to as the "Greater China" in the literature (e.g. Ash and Kueh, 1993).

In this paper, the quantity of Hong Kong dollar circulating in southern China is estimated by exploiting the systematic relationship between cash to *GDP* ratio and time *trend* over the period 1985 to 1997, based on a similar methodology adopted by Barro (1977 and 1978). Then, we will examine whether the degree of the economic integration between Hong Kong and southern China and the degree of substitution between Hong Kong dollar and Chinese Renminbi in China is closely related.

In what follows, we provides a simple theoretical analysis and generates several testable hypotheses. Section 3 describes the estimation methodology and the data used for hypotheses testing. Section 4 presents the empirical results and tests the hypotheses derived from the theoretical section. The final section offers the conclusion.

II. Hypotheses

We first apply the transaction cost approach to analyse the supply of Hong Kong dollars in southern China. An important function of money is that money serves as the medium of exchange in market transactions. In other words, money facilitates trade in a complex economy by eliminating the need for the double coincidence of wants necessary for barter transactions. Among the different types of money available, an individual will choose the one that will incur him (her) the least transaction cost.

A Hong Kong businessman incurs a cost in converting Hong Kong dollars into Renminbi (RMB), the Chinese currency. Meanwhile, going to bank and waiting in the line is time-consuming and costly. Thus, a Hong Kong businessman often incurs less transaction cost by paying Hong Kong dollars which is widely used in southern China for his (her) purchases or business transactions. Indeed, Hong

Kong people are usually willing, wherever possible, to use Hong Kong dollars in China. Also, Hong Kong dollars are often preferred to Renminbi in southern China because a great many Hong Kong people working in southern China, have left their families back in Hong Kong. Therefore, they have a demand for Hong Kong dollars both for their own consumption and for their families. The conversion from Renminbi to Hong Kong dollars is not only costly, but also inconvenient and difficult because of China's exchange control policies.

For the past two decades, Hong Kong investors and businessmen have been playing a critical role that contributes to the success of China's "open door" policy and economic development (e.g. Sung, 1991). For example, by 1990, three to five million workers in Mainland China are reportedly working directly or indirectly for Hong Kong enterprises, compared with the total work force of about three million in the territory itself (e.g. Tsang and Cheng, 1997).

Thus, the increasingly close economic integration between Hong Kong and southern China have generated a strong demand for Hong Kong dollars in the region. Meanwhile, more and more Hong Kong dollars have flown into southern China mainly through the channels of Hong Kong's investment and trade activities in southern China. In summary, we have the following two hypotheses.

H1: The amount of Hong Kong dollar in China increases as the number of businessmen (or *FDI*) in China increases.

H2: The amount of Hong Kong dollar in China increases as the trade volume between HK and China increases.

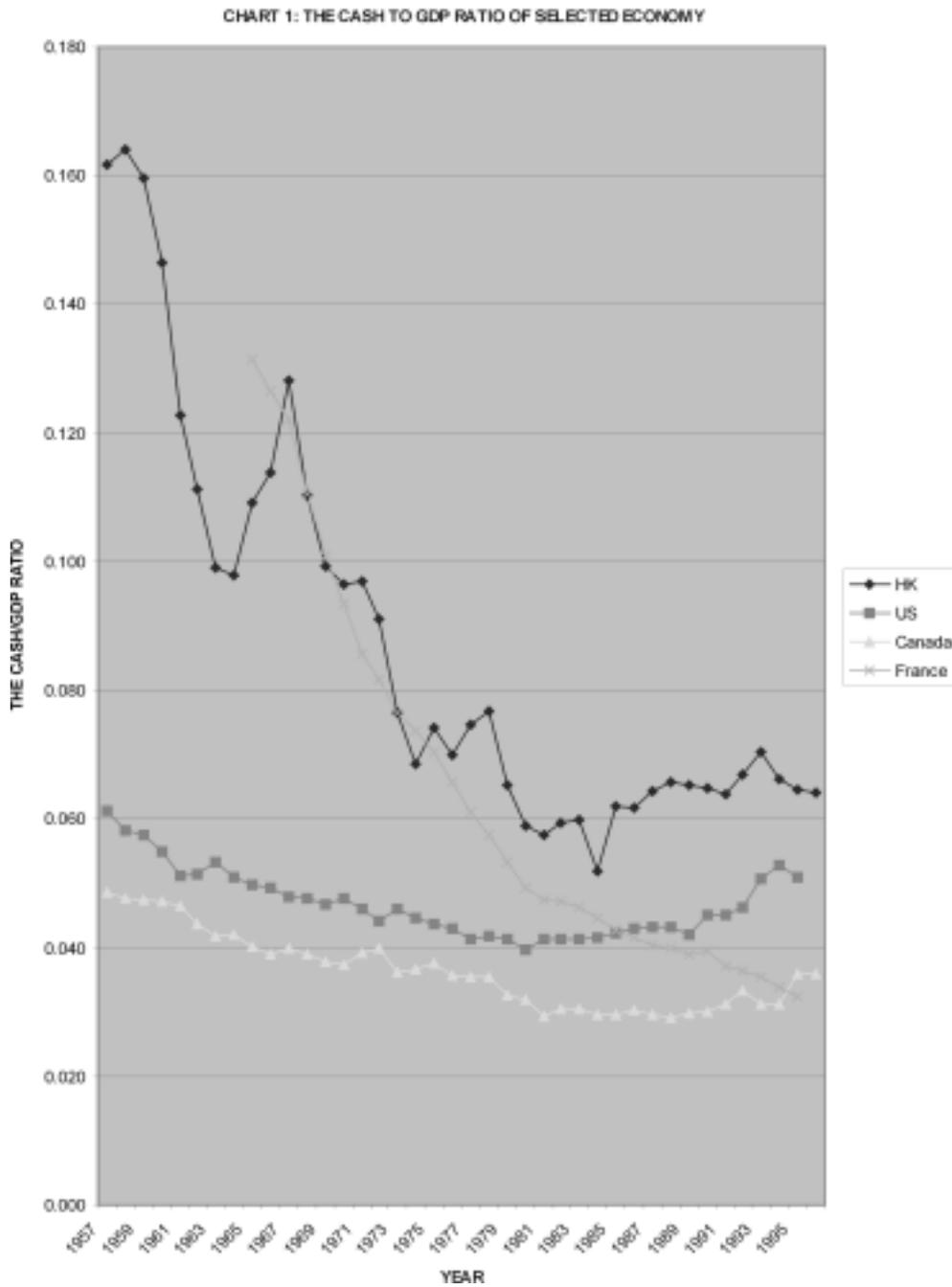
Furthermore, it is a theoretical possibility that the purpose of holding Hong Kong dollars and financial assets denominated by Hong Kong dollars is to provide a vehicle for higher returns of investment or/and the diversification of financial risks for the people in Mainland China, particularly considering that the development of the financial markets in China is still in the early stage. So, we have the following hypothesis.

H3: The amount of Hong Kong dollar in China increases as the difference of expected returns between Hong Kong dollar denominated assets and Chinese Yuan denominated assets increases.

III. Estimation Methodology and Data Description

Prior to the estimation of the quantity of Hong Kong dollars circulating in

Chart 1. The Cash to GDP Ratio of Selected Economy



southern China¹ for the past decade, we need to examine the relationship between cash and nominal income in Hong Kong and those of developed and developing economies. The cash (in circulation) to nominal income (*GDP*) ratio in Hong Kong over the period 1954 to 1997 was reproduced in Chart 1. It is interesting to find that there is a strong downward trend between 1954 and 1984, and then an upward shift from 1984. The cash to *GDP* ratio was as high as 19.1 per cent in 1954 but continuously fell to 5.2 per cent in 1984; then recovered to 7.1 per cent in 1993 and slid again to 6 per cent in 1997.

From Chart 1, we found that the relationship between cash and nominal income in Hong Kong is very similar to those in various developed and developing

Table 1. The Real return of Hong Kong Dollar and the real change of Renminbi (RMB), 1978-97

Year	Exchange Rate (HK/Yuan)	Real Change in Exchange Rate	Real Return from Holding HK Currency
1978	2.9709	12.45	-3.95
1979	3.2798	8.4	6.10
1980	3.3212	-4.74	16.34
1981	3.2468	-4.64	16.24
1982	3.3557	1.45	3.79
1983	3.9526	16.29	-8.55
1984	2.8178	-23.03	29.27
1985	2.4516	-18.18	17.98
1986	2.0974	-16.96	15.76
1987	2.0879	-2.01	2.31
1988	2.1007	-9.99	10.85
1989	1.6535	-28.84	27.50
1990	1.4927	-1.55	2.91
1991	1.4404	4.71	-3.27
1992	1.3458	-2.34	1.28
1993	1.3317	-5.46	0.98
1994	0.9163	-44.08	40.85
1995	0.9297	-4.23	4.05
1996	0.9329	0.52	0.51
1997	0.9359	-4.78	8.61

Note: Real Change in RMB = Nominal change Inflation Rate (China)+Inflation Rate (HK)

Negative sign represents RMB Devaluation.

Real Return from Holding HK Dollar = Interest Rate (HK)-Interest Rate (China)-Real Change in Exchange Rate.

¹Although some of the HK dollar currency is circulating in Macau and possibly some in neighboring countries, the amount consists only a small portion and can be neglect.

economies which displays a high degree of stability over long period of time except under major economic changes or disturbances². Thus, it is reasonable to assume that the cash to nominal income ratio in Hong Kong follows the trend and gradually converges to a certain level over a long period of time. This pattern partly reflects the impact of technology on modern banking. This includes the widespread use of cheques, credit cards, “smart” cards and electronic banking (cyber banking), which have become popular since the mid 80s, and have greatly reduced the demand for cash.

The deviation from the trend after 1984 can thus be explained as the change in the amount of Hong Kong dollars circulating outside Hong Kong. Since the amount of Hong Kong dollars circulating in Macau has been fairly stable³ in the past decades, the increase in the cash to nominal income ratio in the past decade may be primarily due to the increased in Hong Kong dollars circulating in Mainland China, especially Guangdong in southern China.

The cash to nominal income (C/GDP) ratio in Hong Kong is estimated over the period from 1954 to 1984 with the following equation:

$$\left(\frac{C}{GDP}\right) = \beta_0 + \beta_1\left(\frac{1}{trend}\right) + \varepsilon \quad (1)$$

where $trend = 1$ for the year 1954, $= 2$ for 1955, and so on, and ε is a stochastic term with the usual properties. The equation is then used to extrapolate the value of $\left(\frac{C}{GDP}\right)$ for the period 1985 to 1997. The deviation of estimated $\left(\frac{C}{GDP}\right)$ from the actual value of $\left(\frac{C}{GDP}\right)$ is used to calculate the change in Hong Kong dollars circulating in southern China over the period 1985 to 1997.

The estimated quantity of Hong Kong dollars circulating in southern China is then used as the dependent variable in regression analysis. We will test our hypothesis by regressing the growth rate of Hong Kong dollars circulating in southern China ($GHKDC$) against some of the explanatory variables. This includes the growth rate of Hong Kongs foreign direct investment in China ($GRFDI$), the growth rate of trade volume between Hong Kong and China ($GRTRADE$), and the difference of the real returns between Hong Kong dollar

²It is well known that large amounts of US dollar currency circulate outside the United States, particularly in Latin American and in other trouble spots around the world. The same is true for Deutschmark circulate in Eastern Europe.

³Although Macau prohibits the use of foreign currency, Hong Kong dollar deposits at the banks in Macau exceeded demand deposits in Macau patacas by a ratio of 1.6 to 1 at the end of 1988 (according to an unofficial estimate).

denominated assets and Chinese Renminbi denominated assets (*DARETN*) over the period 1985 to 1997. All variables are measured in real terms.

All of the data used, except *DARETN*, are from the Hong Kong Annual Digest of Statistics, various issues. To calculate the difference of the real returns between Hong Kong dollar denominated assets and Chinese Renminbi denominated assets (*DARETN*), we first need to calculate both the real change of the Renminbi and the difference in deposit rates between Hong Kong and China.

From Table 1, we found that the Renminbi has experienced substantial depreciation against major currencies since China started its economic reform. From 1980 to 1992, the Renminbi devaluated 74 per cent versus the US dollar, 85 per cent versus the Japanese Yen⁴, 71 per cent versus the *ECU* and 60 per cent versus the Hong Kong dollar. The devaluation of China's exchange rate was, without doubt, to promote exports so as to improve China current account position. This includes the devaluation of Renminbi by 13.6 per cent in July 1986⁵, 21.2 per cent in December 1989, 57 per cent in November 1990⁶ and 33.4 per cent in January 1994.⁷ The average official exchange rates of Renminbi versus the Hong Kong dollar prevailing from 1978 to 1997 are shown in Table 1.

The real exchange rate changes of Renminbi relative to the Hong Kong dollar can be expressed as:

$$RS = S - (P_{HK} - P_C)$$

where *RS* is the change in real exchange rate, *S* is the change in nominal exchange rate, *P_{HK}* and *P_C* are the inflation rate of Hong Kong and China, respectively.⁸ Based on the above equation, a nominal devaluation will only be effective in increasing the real exchange rate (*RS*) if the inflation rate in Hong Kong (*P_{HK}*)

⁴The RMB exchange rates for all other foreign currencies are calculated according to their respective prevailing exchange rates with the US dollar.

⁵Trade liberalization in 1984 triggered a rush to imports doubling China's expenditure on the purchase of foreign merchandise from US\$ 21.4 billion in 1983 to \$42.2 billion in 1985. As exports rose just 23 percent, the result was an unacceptably large trade deficit of \$14.9 billion. To narrow this gap, the Chinese government mobilized trade policy as well as the administrative devices at its disposal. In July 1986, the Renminbi was devalued to US\$1=3.72.

⁶At year-end 1988, the average exchange rate at adjustment centers was almost 7 Yuan per US dollar compared with the official rate of 3.72 Yuan per US dollar. Subsequently, the official rate was devaluated twice (in December 1989 and November 1990) and in late 1990 it stood at 5.2 Yuan per US dollar, compared with the average rate of about 5.7 Yuan per US dollar.

⁷On January 1, 1994 China's dual exchange rates were unified at the rate of 8.72 Yuan per US dollar. The unification represents an effective depreciation of 31 per cent.

⁸Note that the real exchange rate changes are used as a proxy for expected changes. This assumption is based on the insight of the hypothesis of "rational expectations" (Muth, 1961).

Table 2. The estimate of Hong Kong Dollar circulating in Southern China

Year	$\left(\frac{C}{GDP}\right)$	$\left(\frac{\hat{C}}{GDP}\right)$	Residuals	Estimated HK\$ Circulating in China (in \$ m)	Estimated HK\$ Circulating in China (in 90\$ m)
1985	0.062	0.0519	0.010	2747.0	4110.6
1986	0.062	0.0530	0.009	2719.3	3918.6
1987	0.064	0.0537	0.011	4101.3	5427.0
1988	0.066	0.0540	0.012	5307.4	6407.1
1989	0.065	0.0539	0.011	5943.7	6392.0
1990	0.065	0.0536	0.011	6447.1	6447.1
1991	0.064	0.0532	0.011	7029.4	6453.3
1992	0.067	0.0527	0.014	11076.7	9243.4
1993	0.070	0.0520	0.018	16502.6	12691.8
1994	0.066	0.0509	0.015	15559.5	11197.8
1995	0.065	0.0494	0.015	16274.6	11419.9
1996	0.064	0.0504	0.014	16230.0	10754.1
1997	0.061	0.0509	0.010	13308.0	8230.9

Note: The $\left(\frac{\hat{C}}{GDP}\right)$ is projected base on Equation 2.

Table 3. Results of the growth rate of Hong Kong dollars circulating in southern China

Dependent variable	Growth rate of Hong Kong dollar in China (<i>GHKDC</i>)	
<i>Coefficients of:</i>	<i>Eq. (1)</i>	<i>Eq. (2)</i>
<i>Constant</i>	-15.88 (-1.966) ⁺	-15.96 (-2.086) ⁺
<i>GRFDI</i>	0.166 (2.216) ⁺	0.157 (2.452) [*]
<i>GRTRADE</i>	0.839 (2.095) ⁺	0.869 (2.376) [*]
<i>DARETN</i>	0.197 (1.078)	-
<i>AR(1)</i>	-0.04	-0.04
<i>Adj. R-squared</i>	0.512	0.568
<i>Sum Sq. residual</i>	1136.44	1149.34
<i>F-statistic</i>	3.89	5.827
<i>D.W. stat.</i>	1.996	1.920

Note: *GRFDI*=Growth rate of real *FDI*, *GRTRADE*=Growth rate of trade volume with China, *DARETN*=the difference on real asset returns between Hong Kong and China.

Figures in parentheses are t-statistics.

*denotes statistically significantly different from zero at 5% level.

+denotes statistically significantly different from zero at 10% level.

goes up at a rate which is less than the rise in inflation of China, P_C .

Table 1 also shows the real exchange rate changes of Renminbi relative to the Hong Kong dollar. For most of the time during the study period, except for 1979, 1983, 1991 and 1996, the changes were negative and often of large magnitude,

meaning that the Renminbi exchange rate experienced a real depreciation versus the Hong Kong dollar. This appears to be a key reason why mainland residents would like to hoard Hong Kong dollars.

The expected real returns of holding Hong Kong dollar denominated assets are calculated as the difference between the interest rate of Hong Kong and that of China plus the real changes in Renminbi exchange rate (also shown in Table 3). That is:

$$RR_{HK} = r_{HK} r_C - RS_C$$

where RR_{HK} is the expected real returns from holding Hong Kong dollar denominated assets; r_{HK} is the interest rate in Hong Kong (12 months time-deposit rate) and r_C is the one-year time-deposit rate in China. The expected real returns from holding Hong Kong dollar denominated assets are consistently positive over the study period, except in 1978, 1983 and 1991. As a result, mainland residents are more willing to substitute Hong Kong dollars for Renminbi in order to hedge against inflation and exchange risk.

IV. Empirical Results

A. Estimate of Cash to GDP Ratio and the Trend Relation

The estimated $\left(\frac{C}{GDP}\right)$ and *trend* equation for the 1954-84 period is, with standard error in parentheses under the estimated coefficients,

$$\left(\frac{\hat{C}}{GDP}\right) = 0.0265 + 1.038\left(\frac{1}{trend}\right) \quad (2)$$

(0.345)

where $R^2 = 0.9513$, $F\text{-stat} = 19.35$, $DW = 1.601$, $AR(1) = 0.873$, $AR(2) = -0.1436$

This estimated $\left(\frac{C}{GDP}\right)$ and *trend* relation (Equation 2) is used to form projections of the cash to GDP ratio for the 1985-97 period. It is assumed that this ratio will follow the *trend* and gradually converge to a certain level over a long period of time due to the impact of technology on modern banking.

B. Estimating the Quantity of Hong Kong Dollars Circulating in Southern China

The quantity of Hong Kong dollars circulating in southern China can be viewed

as the deviation that can be obtained by exploiting the systematic relation between cash to *GDP* ratio and time *trend*. The measure of quantity of Hong Kong dollar circulating in southern China is obtained by multiplying the Hong Kong *GDP* by the deviation of estimated $\left(\frac{C}{GDP}\right)$ from the actual value of $\left(\frac{C}{GDP}\right)$ (i.e. the actual cash to *GDP* ratio less the anticipated portion.)

The estimated quantity of Hong Kong dollars circulating in southern China is shown in Table 2. In 1985, the amount of Hong Kong dollars circulating in southern China is about HK\$2,747 million and increased continuously to HK\$16,275 million in 1995, then decreased to HK\$13,308 million in 1997.

C. Determinants of Hong Kong Dollars Circulating in Southern China

In testing our hypotheses, we will use the growth rate of Hong Kong dollars circulating in southern China (*GHKDC*) as the dependent variable. The growth rate of Hong Kong's *FDI* in China (*GRFDI*), the growth rate of trade volume between Hong Kong and China (*GRTRADE*), and the difference of real returns between Hong Kong dollar denominated assets and Chinese Renminbi denominated assets (*DARETN*) will be used as the explanatory variables in the estimation over the period of 1985 to 1997.

The estimated equation of the growth of Hong Kong dollars circulating in southern China over the period of 1985 to 1997 is shown in Table 3, with standard errors in parentheses,

From equation 1 in Table 3, we find that all explanatory variables are correct in sign as prior expected, but statistically significantly different from zero at 10 per cent level only for the growth rates of *FDI* (*GRFDI*) and the growth rates of trade volume with China (*GRTRADE*) respectively. The difference on real returns between Hong Kong dollar and Chinese Renminbi denominated asset (*DARETN*) is not statistically significantly different from zero. This implies that the differences on asset returns (*DARETN*) cannot be used to explain the growth of Hong Kong dollars circulating in southern China. In other words, the first two hypotheses (i.e. *H1* and *H2*) are confirmed by the empirical analysis, but the last hypothesis (i.e. *H3*) is rejected. The F-statistics for the three coefficients jointly is 3.89 (5 per cent critical value is 3.71), indicating that the model in general can be explained by the three variables in question.

We then re-estimate the equation by deleting the difference on asset returns between Hong Kong and China (*DARETN*) variable from the equation. We find that both the adjusted R-squares and F-statistic have improved. In addition, the t-

statistics associated with the growth rates of *FDI (GRFDI)* and the growth rates of trade volume with China (*GRTRADE*) variables under a null hypothesis of zero coefficients have increased from 2.216 and 2.095 to 2.452 and 2.376 respectively. Thus we can conclude that the difference on asset returns between Hong Kong and China (*DARETN*) has no effect on the growth rate of Hong Kong dollars circulating in southern China. This may be due to the fact that people in southern China prefer to hoard Hong Kong dollars in cash holdings or for transaction purposes rather than to interest yielding Hong Kong dollars denominated assets.

From equation 2, we found that the estimated coefficient of the growth rates of *FDI (GRFDI)* is 0.16 implying that for a one percent growth in Hong Kong *FDI* in China would lead an additional 0.17 per cent growth in Hong Kong dollars circulating in southern China. Between 1985 and 1997, the average real growth of Hong Kong's *FDI* in China is 26.4 per cent per year, this implies that on average an additional 4.5 per cent increase in Hong Kong dollars circulating in southern China each year. The estimated coefficient of the growth rate of trade volume with China (*GRTRADE*) is 0.87, implying that a one percent increase in trade volume between Hong Kong and China would contribute 0.87 per cent increase in Hong Kong dollars circulating in southern China. During the 1985-1997 period, the average real growth of trade volume between Hong Kong and China is 18.6 per cent; this implies that on average 16.2 per cent of Hong Kong dollars will be added to the circulation in southern China each year.

V. Conclusion

It is commonly observed that US currency have circulated widely in many countries with unstable currencies, high level of inflation or burdensome regulations. In the same way, Hong Kong dollars have circulated widely in Mainland China, particularly in the Guangdong province.

In this paper, we provide a theoretical and empirical analysis on the circulation of Hong Kong dollars in the southern China. The theoretical analysis provides explanations for the observed phenomenon of currency substitution. By applying the transaction cost approach, we find that the currency substitution between Hong Kong dollars and Chinese Renminbi results from the ever increasing economic integration between Hong Kong and the Chinese Mainland.

The empirical study first estimates the amount of Hong Kong dollars circulating in southern China over the period 1985 to 1997. The regression analysis indicates

that the growth rate of Hong Kong's *FDI* in China and the growth rate of trade volume between Hong Kong and China are some of the main determinants that contribute to the widespread use of Hong Kong dollars in southern China over the past fifteen years. The difference of real returns between Hong Kong dollar denominated assets and Chinese Renminbi denominated assets, however, has no effect on the growth of Hong Kong dollars circulating in southern China.

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