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DETERMINANTS OF THE DISTRIBUTION OF EURODOLLAR DEPOSITS IN OFFSHORE FINANCIAL CENTRES

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Abstract

This note studies determinants of the distribution of Eurodollar deposits across different offshore financial centres (OFC). After controlling for the size of economy and other variables, we find that time zone is one of the most important determinants in Eurodollar deposit market shares. Specifically, as the number of time zones from New York City of these centres increases, their market shares of Eurodollar deposits would decrease, and vice versa. Another important determinant is the share of foreign exchange market turnover. Also, better quality of the legal and regulatory framework and greater portfolio inflows would result in larger Eurodollar deposit market shares. In addition, trade linkage between the US and the OFC in question is also important. The findings suggest that Hong Kong's ability to attract renminbi liquidity in the future depends on its ability to further strengthen its attractiveness as a business centre for global financial institutions and for agglomeration of transactions in other major currencies. The strong economic links between Hong Kong and the Mainland will continue to benefit the development of renminbi (RMB) business in Hong Kong. The time zone of Hong Kong, being the same as that of Shanghai, should not be an obstacle to our ambition of becoming the premier offshore renminbi centre.

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[1] This project was initiated by Dong He and conducted under his guidance. Comments by Cho-hoi Hui are also gratefully acknowledged..

I. INTRODUCTION

Hong Kong has rapidly developed as the premier offshore RMB business centre in recent years. In particular, a turning point occurred in 2010 when a series of path-breaking measures were introduced. These measures include the expansion of RMB trade settlement pilot scheme in June 2010 and the amended Clearing Agreement in July 2010.[2] As an indicator of the rapid development, the RMB deposits in the Hong Kong banking system reached RMB 588.5 billion by the end of 2011, an 86.9% increase over the end of the preceding year. This pool of RMB liquidity provides the basis for a wide range of RMB products and services in the offshore RMB market in Hong Kong, which is also known as the CNH market.

Supportive policy measures are definitely pivotal to Hong Kong's RMB business, notably during the early stage of market development. First, these measures give Hong Kong a *first-mover advantage* over other potential competitors.[3] Secondly, these measures help reduce legal and regulatory uncertainties.[4]

However, the sustained growth and development of an OFC *in the longer term* cannot solely depend on government support. The success of any OFC hinges ultimately on its capability to provide essential economic functions: it allows a separation of currency from country risks, and offers a more convenient location of service to some investors and fund-raisers for considerations of legal and regulatory structures, language, and time zone.[5] The predominant position of Hong Kong as an offshore RMB centre therefore cannot be taken for granted, and to policymakers as well as market participants, understanding the determinants of Hong Kong's capability to provide such essential economic functions is important.

Since Hong Kong's RMB banking business is still in its early stage of development, available data are not sufficient for conducting any in-depth quantitative analysis for the determinants of a successful offshore RMB centre. In this paper, we therefore draw insights from the development of the Eurodollar market. Admittedly, there are crucial differences between the two cases, notably in terms of regulatory regimes and the role of the US dollar as a major vehicle currency for international trade and financial transactions. Nonetheless, the continuing internationalisation of RMB and

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[2] Vice-Premier of the State Council Li Keqiang announced additional supportive measures to further facilitate Hong Kong's offshore RMB business during his visit to Hong Kong in August 2011. For earlier policy measures, please refer to *Half-Yearly Monetary and Financial Stability Report*, September 2010, Hong Kong Monetary Authority.

[3] Hong Kong's RMB banking business started in 2004 when the People's Bank of China began to provide clearing arrangements for local RMB business.

[4] In particular, the HKMA issued a circular on 11 February 2010 to elucidate the supervisory principles and operational arrangements regarding the RMB business in Hong Kong. Under these principles, banks and other financial institutions are able to offer a wide range of RMB businesses in Hong Kong that do not involve RMB funds flowing back to the Mainland.

[5] These arguments are made in D. He and R. McCauley "Offshore markets for the domestic currency: monetary and financial stability issues", BIS Working Papers No. 320, September 2010.

liberalisation of Mainland's capital-account transactions suggest that these differences are likely to narrow in the coming years. The experiences of the Eurodollar market can therefore shed light on the issue and provide food for thought for further studies.

Against the above backdrop, we hypothesise two types of determinants for decisions of placing foreign currency deposits in an OFC. The first type is location-specific characteristics of the OFC itself. In particular, the time-zone factor of the OFC relative to the onshore market may be a significant determinant. Other relevant characteristics of the OFC include its legal and regulatory quality, turnover of foreign exchange markets and portfolio inflows. The second type is the economic integration between the OFC and the host country where the currency is issued.

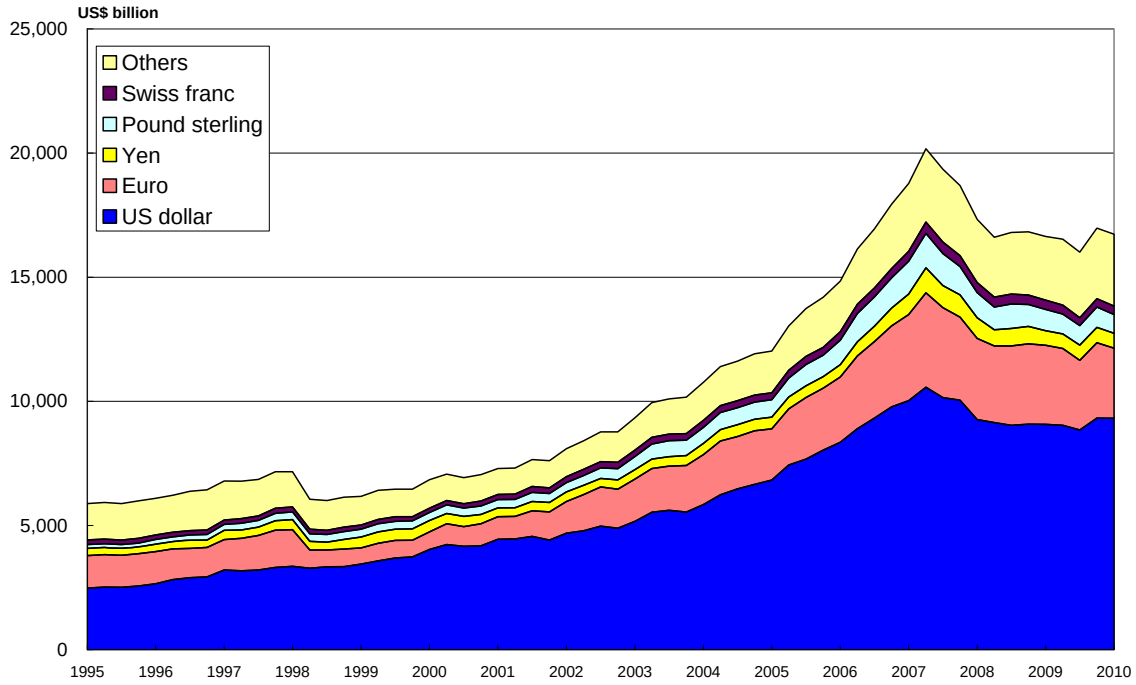
II. OVERVIEW OF OFFSHORE FOREIGN CURRENCY DEPOSITS

This section intends to give an overview of offshore US dollar deposits, including their pattern and distribution by the various offshore centres. However, as the data of US dollar deposits of individual countries are classified as "restricted" by the data source, Bank for International Settlements (BIS), we use the figures of all foreign currency deposits placed by foreign entities in individual countries as a reference. These data reflect to a large extent the pattern of offshore US dollar deposits, since the latter has been the dominant deposits in all offshore foreign currency deposits, accounting for more than half (55.7%) of the total at the end of 2010. It should, nevertheless, be pointed out that in the subsequent section of quantitative analysis, data of offshore US dollar deposits of individual countries are used in conducting the empirical estimation.

According to the BIS locational banking statistics, offshore foreign currency deposits totalled US$16.7 trillion at the end of 2010, registering sustained growth at a compound annual rate of 9.3% during 2000-2010 (Chart 1). However, the outbreak of the global financial crisis had an impact on the growth momentum of these deposits, peaked at US$ 20.2 trillion in March 2008 but moderated subsequently.

These offshore foreign currency deposits have clustered in major financial centres. The UK alone accounted for 30.2% of the foreign currency deposits at the end of 2010 (Table 1). Other major destinations are developed markets in Western Europe and the Asian-Pacific region, with the notable exceptions of Cayman Islands and Bahamas that are widely regarded as tax-haven OFCs. Taken together, the top 10 destinations accounted for 75.5% of these offshore deposits. It is noteworthy that the market shares are changing over time, with Australia, Netherlands, the UK and Sweden gaining shares. In terms of sector composition, the bulk of these deposits (70.6%) was held by foreign banks, and foreign non-bank sector accounted for the remaining 29.4% (Chart 2).

Chart 1: Global Offshore Deposits Denominated in Foreign Currencies



Note: Prior to the launch of the euro in 1999, euro-denominated deposits refer to the total amount of deposits denominated in former currencies of Eurozone members.

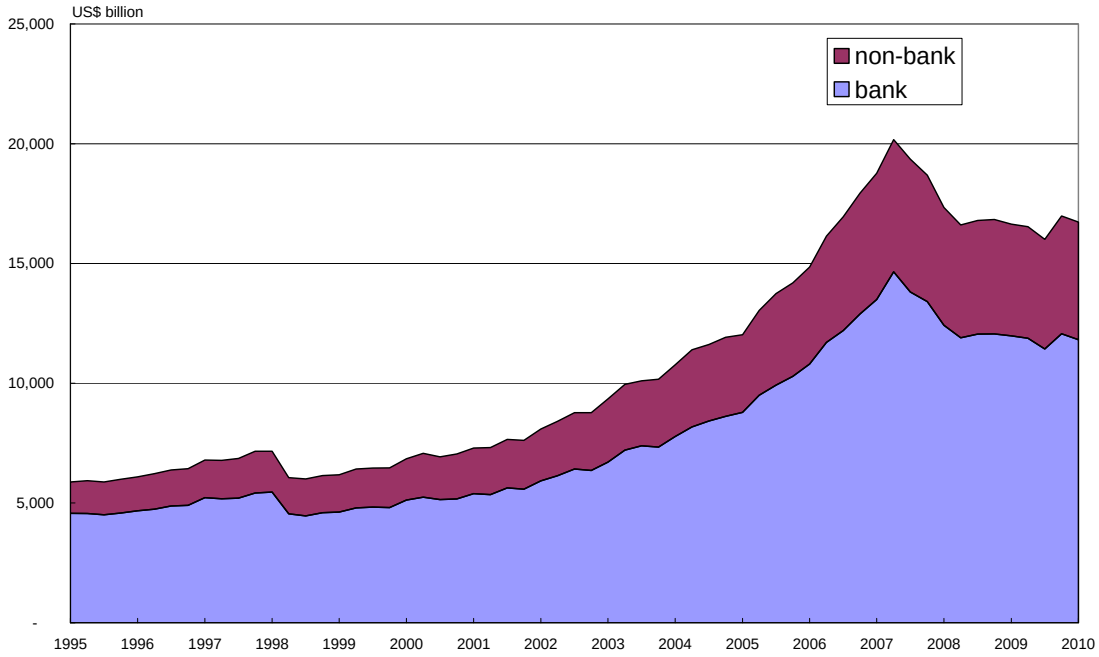
Source: BIS

Table 1: Major Destinations of Offshore Deposits Denominated in Foreign Currencies

	Dec-2010 US$ billion	Share (%)	Dec-2000 US$ billion	Share (%)	Annual Growth (%) 2000-2010
All countries	16,732.4	100.0	6,845.7	100.0	9.3
United Kingdom	5,052.3	30.2	1,855.4	27.1	10.5
Cayman Islands	1,795.4	10.7	745.2	10.9	9.2
France	913.4	5.5	363.2	5.3	9.7
Singapore	838.3	5.0	425.6	6.2	7.0
Germany	828.2	4.9	495.2	7.2	5.3
Japan	777.0	4.6	333.5	4.9	8.8
Switzerland	713.8	4.3	594.4	8.7	1.8
Netherlands	678.0	4.1	199.2	2.9	13.0
Australia	517.8	3.1	94.0	1.4	18.6
Hong Kong	517.1	3.1	279.0	4.1	6.4
Bahamas	484.3	2.9	283.2	4.1	5.5
Sweden	391.3	2.3	78.7	1.1	17.4

Source: BIS

Chart 2: Sector Distribution of Global Offshore Deposits Denominated in Foreign Currencies



Source: BIS

III. ECONOMETRIC MODEL

A cross-country panel data model is estimated[6] to identify and quantify the determinants of the distribution of Eurodollar deposits. The dependent variable DEPSHR is the market share of bank deposits denominated in US dollar of a non-US country received from foreign entities. The baseline econometric model is as follows, with the parentheses after the definitions of the explanatory variables representing the expected signs of the coefficients:

$$DEPSHR_{i,t} = \beta_0 + \beta_1 GDPSHR_{i,t} + \beta_2 TZONE_i + \beta_3 USTRADE_i + \beta_4 INSQ_{i,t} + \beta_5 PORTFL_{i,t} + \beta_6 FXTURN_{i,t} + \varepsilon_{i,t}$$

Where

DEPSHR	The market share of offshore bank deposits denominated in US dollar
GDPSHR	Gross domestic product share of a country to world total (+)
TZONE	The number of time zones away from New York[7] (?)
USTRADE	Share of US total external trade (+)
INSQ	World Bank score of legal and regulatory quality[8] (+)

[6] Since some of the explanatory variables are time-invariant, a random effect panel model is used to conduct the estimation.

[7] For example, UK = 5, Hong Kong = 13, and Mexico = 1

PORTFL	Share of total world portfolio investments inflows (+)
FXTURN	Share of total foreign exchange market turnover (+)
ε	Error term[9]

Among the explanatory variables, GDPSHR is included to control for the size of the economy, since a larger economy tends to receive more deposits. This is also consistent with the gravity model, which is the standard working model in the international economics literature. The variable USTRADE is included to capture the economic linkage between an OFC and the US. The remaining explanatory variables, namely TZONE, INSQ, PORTFL and FXTURN, are location-specific, which are included to measure various aspects of the deposit recipient country that may attract Eurodollar deposits, such as institutional quality, the number of time zones away from New York, and the depth of its foreign exchange market and portfolio inflows.

The sign of TZONE is to be empirically determined since both signs are plausible from a theoretical point of view. On the one hand, home bias means US residents tend to place US dollar deposits closer to the US. In addition, markets of similar time zones usually have overlapping trading hours, which can facilitate cross-market financial transactions. On the other hand, country risk diversification[10] suggests that considerable amounts of US dollar deposits could be held in regions far away from the US. It is worth noting that in many financial centres eurodollar deposits are largely held by non-US residents. For the remaining explanatory variables, their signs are expected to be positive.

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[8] This score captures perceptions of (1) the extent to which agents have confidence in and are abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, the courts, as well as the likelihood of crime and violence and (2) the ability of the government to formulate and implement sound policies and regulations that permit and promote private-sector development.

[9] The error term can be decomposed into two components as follows: $\varepsilon_{it} = v_i + e_{it}$, where the first component captures the time-invariant country-specific factors not reflected in the list of explanatory variables and the second component captures all the remaining factors.

[10] While the depositors bear the currency risk of the US dollar, they do not bear the country risk of the US. Instead, they bear the country risk of the country where the dollar deposits are placed.

IV. DATA

Quarterly data of offshore deposits denominated in US dollar[11] placed in 29 BIS-reporting economies[12] (except the US itself) for the period 1995-2010 are selected for the empirical analysis. In order to be comprehensive, the sample covers both advanced and emerging-market economies from Europe, North America, South America and the Asian Pacific region. The selection of the time period is subject to data availability. Regarding the explanatory variables, the data sources consist of cross-country datasets of the BIS, International Monetary Fund (IMF) and World Bank.

V. EMPIRICAL FINDINGS

Table 2 presents the major empirical findings, which are subdivided into three cases: (1) Eurodollar deposits from all sectors; (2) Eurodollar deposits from the banking sector and (3) Eurodollar deposits from the non-bank sector. In summary, after controlling for the size of the economy, it is found that the following determinants are significant in attracting Eurodollar deposits to an OFC from foreign entities:

- Number of time zones away from New York
- Quality of legal system and regulatory framework
- Foreign exchange market turnover
- Inflows of portfolio investments
- Trade linkage with the US

The sign of the coefficient of time-zone factor is found to be negative, suggesting that the further away from New York, the less likely for an OFC to attract Eurodollar deposits. In other words, our empirical study found that the benefits brought by being in similar time zones (e.g. overlapping trading hours) outweigh those of far-away time zones (e.g. risk diversification). In order to test whether these benefits of time zones apply basically to foreign depositors, we have re-estimated the model with the market share of Eurodollar deposits from *local* depositors. The results, which are reported in Appendix 2, show that the time-zone factor was not significant, suggesting that this factor is only relevant for foreign depositors.

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[11] Since data on offshore US dollar deposits of individual countries are classified by the BIS as "restricted", the data are used in this study only for internal quantitative analysis and not for publication.

[12] The economies are Australia, Austria, Bahrain, Belgium, Brazil, Canada, Chile, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Ireland, Italy, Japan, Luxembourg, Mexico, Netherlands, Norway, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland, Turkey and United Kingdom. Since the US dollar deposit data of Singapore and Bahrain are not available from the BIS dataset, their market shares of Eurodollar deposits are proxied by their shares of foreign currency offshore deposits.

Table 2: Major Results of the Econometric Analysis

	Dependent Variable: Market Share of External US Dollar Liabilities of Banks from Foreign Entities		
	All Sectors	**Banking Sector**	**Non-Bank Sector**
Explanatory Variables			
Time Zone	-0.2278 **	-0.2204 **	-0.2082 **
	(-4.81)	(-4.12)	(-3.57)
GDP Share	0.2221 **	0.4959 **	1.0120 **
	(4.18)	(8.92)	(12.3)
Trade with the US	0.2548 **	0.2451 **	0.2241 **
	(7.19)	(6.39)	(4.79)
Legal & Regulatory Quality	0.1201 **	0.1316 **	0.1221 **
	(4.08)	(4.17)	(2.75)
Portfolio Investment Inflows	0.2249 **	0.3886 **	0.1060 *
	(5.91)	(9.80)	(1.70)
FX Market Turnover	0.3192 **	0.1578 **	0.3627 **
	(19.8)	(9.08)	(11.65)
Constant	0.9691	0.5460	0.4021
	(1.62)	(0.83)	(0.48)
Adjusted R squared	0.4338	0.3661	0.6371
Number of observations	766	766	766

* Statistically significant at 90%
** Statistically significant at 95%

Note: The bracketed figures are t-statistics.

The coefficients of other determinants are positive, indicating that they contribute positively to OFCs' Eurodollar deposit market shares. The results are in line with our prior expectation that an active foreign exchange market, large portfolio inflows, sound quality of legal and regulatory framework, and economic integration with the onshore market are factors that depositors consider when they place their deposits offshore.

The empirical findings can facilitate a better understanding about the worldwide distribution of offshore deposits. In the case of the Eurodollar market, using external liabilities in all foreign currencies as a reference, London has 30% of these external liabilities, and the Cayman Islands is the second largest: 11% of the total[13]. We can interpret that what works well for the Cayman Islands is being in the same time zone as New York City, and what works well for London is being the most important foreign exchange market. This is consistent with the hypothesis that London capturing a significant share of Eurodollar deposits is due to the agglomeration of global financial institutions and the externalities generated by the predominant use of US dollar as the currency vehicle in foreign exchange transactions.

In addition to time zone and foreign exchange turnover, active portfolio inflows as well as a sound legal system and high quality regulatory framework are important location-specific determinants. These are areas that Hong Kong has competitive strengths for years and needs to continue to maintain.[14]

The result also suggests that the decision to place Eurodollar deposits in a particular location is significantly influenced by the economic linkage between the host country of the currency and the OFC in question. In this respect, Hong Kong is likely to enjoy continued advantage over other OFCs given its much closer economic ties with the Mainland economy (notably in terms of cross-border trade and financial services), and the economic integration is likely to continue to increase.

The relative importance of these determinants can be assessed by re-estimating the model and leaving out one explanatory variable each time. It was found that if foreign exchange market turnover is left out, the adjusted R squared decreases by 0.24 compared with the full model. For time zone and trade with the US, the decreases are 0.12 and 0.11 respectively. There are no notable decreases for the remaining variables. Therefore, in terms of explanatory power, foreign exchange turnover is by far the most important, followed by the time-zone factor.

We also assess the effect of these determinants by computing the change of the Eurodollar deposit market share in response to a hypothetical one standard deviation (SD) change in each explanatory variable. It was found that foreign exchange turnover and time zone have again the largest effect on Eurodollar deposit market share. One standard deviation change in these factors is associated with 2.6 and 0.9 percentage-point changes respectively in the market share, much larger than those of other determinants.

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[13] Note that individual countries' shares of offshore deposits denominated in US dollar are restricted data.

[14] Appendix 1 provides a quick comparison between Hong Kong, Singapore and London based on the determinants found in this study.

VI. CONCLUSION

The empirical results indicate that time zone is one of the most important determinants in Eurodollar deposit market shares. Specifically, as the number of time zones from New York City of these centres increases, their market shares of Eurodollar deposits would decrease, and vice versa. Another important determinant is the share of foreign exchange market turnover. Also, better quality of the legal and regulatory framework and greater portfolio inflows would result in larger Eurodollar deposit market shares. In addition, trade linkage between the US and the OFC in question is also important. The findings suggest that Hong Kong's ability to attract renminbi liquidity in the future depends on its ability to consolidate and further strengthen its attractiveness as a place to do business for global financial institutions and to agglomerate transactions in other major currencies. The strong economic links between Hong Kong and the Mainland will continue to benefit the development of RMB business in Hong Kong. The time zone of Hong Kong, being in the same as that of Shanghai, should not be an obstacle to our ambition of becoming the premier offshore renminbi centre.

Appendix 1: Attributes of a Successful RMB Offshore Centre: a Comparison of Hong Kong, Singapore and London

This appendix compares the attributes of Hong Kong, Singapore and London of a successful RMB offshore centre.

In terms of the time-zone factor, Hong Kong and Singapore are obviously in a strong position since both economies are located at the same time zone as the Mainland. On the contrary, London is eight hours away from the Mainland, and therefore the trading hours of its financial markets largely do not overlap with those of the Mainland.

Compared with Singapore, Hong Kong's equity market turnover (Table A1) and inflows of portfolio investments (Table A2) are consistently ahead by a wide margin, suggesting that it is unlikely for Singapore to catch up in the near future. The only area that Hong Kong lags behind Singapore is foreign exchange market turnover (Table A3), but the gap between the two has been narrowing in recent years.

Table A1: Equity Market Turnover
(Average monthly turnover, US$ billion)

	Hong Kong	Singapore	UK	USA
2005	48.09	10.24	472.87	1490.65
2006	89.16	15.83	632.09	1994.70
2007	230.90	33.51	860.48	2651.98
2008	188.94	23.19	548.03	3377.08
2009	166.80	21.47	397.87	1849.73
2010	184.60	24.93	350.59	1928.03
2011	183.70	24.90	384.53	2014.38

Sources: World Federation of Exchanges

Note: Equity market turnover includes trading of shares, investment funds, securitised derivatives, exchange-traded funds but excludes trading of bonds. For the US and UK, the turnovers refer to those of the New York Stock Exchange and London Stock Exchange respectively.

Table A2: Portfolio Investment Inflows
(US$ billion)

	Hong Kong	Singapore	UK	USA
2005	436.57	205.04	2,373.92	4,591.12
2006	580.51	262.88	3,140.51	5,972.36
2007	778.53	365.03	3,393.41	7,191.78
2008	557.12	283.88	2,426.25	4,267.87
2009	811.43	368.27	3,035.79	5,952.87
2010	928.94	398.76	3,252.01	6,738.00

Source: IMF Coordinated Portfolio Investment Survey (CPIS)

Table A3: Foreign Exchange Market Turnover
(Average daily turnover in April, US$ billion)

	Hong Kong	Singapore	UK	USA
2001	68.35	103.68	541.70	272.58
2004	105.99	133.64	835.28	498.64
2007	180.96	241.78	1,483.21	745.20
2010	237.57	265.98	1,853.59	904.36

Source: BIS Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity in 2010

Table A4: Rule of Law and Regulatory Quality[15]

	Hong Kong	Singapore	UK	USA	Median of all Countries in Data Set
2005	1.72	1.75	1.55	1.54	1.21
2006	1.76	1.69	1.76	1.60	1.24
2007	1.75	1.76	1.73	1.52	1.24
2008	1.76	1.81	1.67	1.57	1.25
2009	1.66	1.72	1.62	1.44	1.20
2010	1.72	1.75	1.76	1.50	1.27

Source: World Bank Worldwide Governance Indicators

Compared with London, equity market turnover, portfolio investment inflows and foreign exchange turnover of Hong Kong are significantly smaller than those of London.

Regarding the soundness of the legal system and quality of regulatory framework, perceptions-based indicators compiled by the World Bank suggest that Hong Kong, Singapore and the UK all have a high score by international standard (Table A4). Since their scores are quite close to each other, it is difficult to reach a clear-cut conclusion that one system is better than the other.

Finally, Hong Kong has strong trade linkage with the Mainland. Total bilateral trade between Hong Kong and the Mainland in 2010 totalled US$820 billion, which was significantly larger than those of Singapore (US$70.2 billion) and the UK (US$56.8 billion). Looking ahead, additional measures of the Closer Economic Partnership Agreement (CEPA)[16] would further facilitate the trade flows between Hong Kong and the Mainland.

[15] Please refer to Footnote 9 for more details about this score.
[16] For details, please refer to the Trade and Industry Department's CEPA website (www.tid.gov.hk/english/cepa/).

Appendix 2: Determinants of Market Shares of Eurodollar Deposits of Banks from Local Entities

	Dependent Variable: Market Shares of Eurodollar Liabilities of Banks from *Local* Entities		
	All Sectors	**Banking Sector**	**Non-Bank Sector**
Explanatory Variables			
Time Zone	0.0534	-0.1647	0.0324
	(0.55)	(-0.27)	(0.18)
GDP Share	1.0797 **	0.4467 **	0.3091 **
	(12.3)	(6.80)	(2.63)
Trade with the US	0.0603 **	0.1950 **	0.1737 **
	(2.41)	(4.94)	(3.12)
Legal & Regulatory Quality	0.2554 *	0.1898 **	0.3570 **
	(1.94)	(2.03)	(4.06)
Portfolio Investment Inflows	0.5750 **	0.4148 **	0.1902 **
	(8.78)	(9.09)	(3.41)
FX Market Turnover	0.1814 **	0.1776 **	0.2944 **
	(5.18)	(8.25)	(7.95)
Constant	-5.2885 **	-3.3616 **	-4.6705 **
	(-3.36)	(-3.15)	(-2.27)
Adjusted R squared	0.4219	0.3857	0.3117
Number of observations	798	798	798

** Statistically significant at 95%

Note: The bracketed figures are t-statistics.