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Offshore Trading of Hong Kong Stocks: Migration of Trading or a Growing Pie?

A study prepared for the SFC by

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Executive Summary

1. At the request of the Securities & Futures Commission (SFC) of Hong Kong, the Sandra Ann Morsilli Pacific-Basin Capital Markets (PACAP) Research Center studied the price behavior of Hong Kong stocks that trade in London and New York. The study focuses on the causes and effects of this offshore trading.

2. Hong Kong stocks trade in New York in the form of the American depositary receipts (ADRs). With the exception of New York Stock Exchange-listed stocks, New York trades are mainly retail-level transactions in the over-the-counter (OTC) "pink sheet" market. The OTC daily volume of Hong Kong stocks (in terms of both the number of shares traded and the dollar value of the shares traded) is usually low. In aggregate, trading volume of Hong Kong stocks in ADRs has largely been generated by the efforts of U.S. brokers for U.S. individual investors' diversification rather than taking away trading activity from Hong Kong. As a result, this study's major focus is on the perceived drift of trading to the more important offshore market in London.

3. London trading volume for 18 selected sample stocks with active trading in London has been steadily rising, increasing from an average of 13 per cent of Hong Kong volume in 1991 to 35 per cent of Hong Kong volume for the 10-month period ending March 1996. However, approximately 14 per cent of reported London volume is in fact Hong Kong volume by London transactors, which allows adjustment of the ratio of 35 per cent to 32 per cent. The London Stock Exchange (LSE) official and the market makers interviewed suggest that trades reported to the LSE during hours it is not open are most probably trades being executed on the Stock Exchange of Hong Kong.

4. The predominant transactors of Hong Kong stocks on the LSE are the institutional clients of market makers. According to London market makers, these clients account for 98 per cent of the London volume, which indicates that no retail market for Hong Kong stocks exists in London. A large proportion of their trading consists of program trading and index fund trading, with a minor portion being information-based trading. While different market makers cite different proportions, it appears that over 50 per cent of the London trades in Hong Kong stocks are ordered by British institutional investors. The majority of the remaining trades are ordered by American and continental European institutional investors. This "client-driven" trading triggers market makers to transact for the purpose of maintaining their desired level of risk exposure.

5. London market makers state their primary purpose is to meet the needs of their (predominantly British) clients. They cite three main reasons why trades of Hong Kong stocks take place in London: first, one apparent reason is the time-zone difference. Portfolio managers want to trade during their normal trading hours rather than wait. Second, a number of market makers made a point that easier accessibility of capital to support large institutional trades is an important factor, leading institutional investors to transact in London rather than Hong Kong. Third, the existence of the stamp duty in Hong Kong is blamed. At present, the stamp duty is paid on all London transactions when they are cleared through Hong Kong. Two points are observed

regarding the stamp duty: London market makers consider the stamp duty an extra cost and feel dissatisfied about it; and they believe the stamp duty does not help create a "level playing field" because they feel others do not necessarily pay.

6. The magnitude of overall transactions costs is not an important factor which determines where Hong Kong stocks trade. The New York OTC market for Hong Kong stocks exhibits large transactions costs ranging from one per cent (for large trades through a discount broker) to as high as 10 per cent. With an average bid-ask spread of 1.71 per cent taken into account, the magnitude of transactions costs in London is no less than that in Hong Kong. Easy access to capital and the time-zone difference, however, make the London market a convenient place to trade.

7. A time series analysis of trading volume in Hong Kong and London suggests that: (i) there has been a substantial increase in London trading volume; (ii) this increase has not come at the expense of the Hong Kong trading volume; and (iii) increased demand for Hong Kong stocks by the U.K., U.S., and continental European institutional investors explain the increase in London volume.

8. The belief that offshore trading increases Hong Kong price volatility and jeopardizes the systemic stability of the Hong Kong market is unfounded. After the firm size effect and the liquidity effect are controlled, price volatility is not different between two groups of Hong Kong stocks: one group with significant London volume and another with insignificant London volume. One important exception is the nontrading period (close-to-open) return variance. The 18 sample firms show significantly lower volatility during the overnight nontrading period in Hong Kong. This implies that London trading facilitates the price discovery process of Hong Kong stocks, without jeopardizing the systemic stability of the Hong Kong market.

9. Market liquidity does not differ between the two groups of Hong Kong stocks after the firm size effect and the turnover effect are controlled. This leads to the conclusion that London trading does not negatively affect either price volatility or market liquidity in the home market.

10. The fact that offshore trading exhibits very little impact on Hong Kong market volatility and liquidity is consistent with the London and New York market markers' view that the Hong Kong market is efficient and that Hong Kong is the major market for price discovery of Hong Kong stocks. Closing prices in Hong Kong usually serve as benchmark prices for London and New York market makers. In addition, no discernable impact in volatility and liquidity is consistent with the observation that offshore trading in London and New York does not impair the price discovery process of Hong Kong stocks on the Hong Kong market.

Offshore Trading of Hong Kong Stocks: Migration of Trading or a Growing Pie?

1. Introduction

1.1 **Scope of the Project and Terms of References:** In September 1995, the Securities and Futures Commission (SFC) of Hong Kong noted "[t]here has been an observable trend of trading of Hong Kong-listed securities moving offshore in recent years." Subsequently, the SFC contracted with the Sandra Ann Morsilli Pacific-Basin Capital Markets (PACAP) Research Center of The University of Rhode Island to undertake a study to analyze the causes and the effects of this drift, in particular the role of the relative competitiveness of different markets in this migration. As delineated by the SFC, the focus of this report is on: (i) the pattern of the drift of trading, relative sizes and trends; (ii) relative transactions cost in the Hong Kong, London, and New York markets and its importance in relation to the factors of drift; (iii) the effects of offshore trading on volatility and liquidity of Hong Kong-based stocks in Hong Kong; and (iv) other relevant observations. Under the SFC's terms of reference, the principals of this study visited Hong Kong, London, and New York to conduct extensive interviews with market makers, portfolio managers, stock exchange officers, and other market participants in these three cities. These in-depth interviews (each was usually over one-hour in length) provided great insight into the issue of migration. These interviews were followed by questionnaires to obtain further details from London and New York market makers. Only actively traded securities, as identified by several market makers in London, were included in the London questionnaire. Similarly, only actively traded New York ADRs were included in the New York questionnaire. The list of financial institutions that the principals visited for interviews is shown in Appendix A.

1.2 **Organization of the Report:** Section 2 of this report summarizes the analysis of the "migration" to London and New York. This section incorporates information obtained from interviews with market makers and financial markets experts in Hong Kong, London, and New York, and from the questionnaires. Additionally, in-depth statistical analyses were conducted to substantiate the findings obtained from the discussions and surveys. Section 3 examines the impact of offshore trading on price volatility and market liquidity in Hong Kong. This analysis is conducted to examine the efficiency of the price formation process in light of overnight trading in London and New York. The last section presents a summary of relevant observations and policy recommendations for the SFC.

2. The Drift of Hong Kong Trading Activities to Offshore Markets

2.1 **Sample Selection:** For the purpose of this study, the SFC provided the PACAP Research Center with an initial list of 34 companies. This sample consists of many of the largest (in terms of both market capitalization and net sales) Hong Kong companies. The firms in this list were selected based on the 1991 Hong Kong and London trading data originally compiled by the Stock Exchange of Hong Kong (SEHK). Many of the securities in this sample, however, did not have significant trading volume in London in recent years. For the purpose of this study, we defined significant volume as being securities which had London volume equal to or greater than 10 per cent of their volume on the SEHK or securities which the London market makers we visited identified as having significant LSE volume. In addition, some firms have been delisted from the SEHK (the notable examples are the Jardine Group companies). Further, HSBC Holdings' predominant trading market is the London Stock Exchange (LSE) as it is a part of the LSE's Footsie 100. Consequently, the initial sample was pared to eighteen (18) firms that have significant LSE trading volume. The 18 sample stocks, along with the initial list of 34 stocks, are shown in Appendix B.

2.2 **Selection of Matching Firms in the Control Group:** To highlight the impact (if any) of offshore trading on market volatility and liquidity of these firms, a control group of Hong Kong stocks with little or no offshore trading was created. The motivation for introducing the control group is to provide a contrast between firms with and without significant offshore trading. If there is a drift of trading activities to an offshore market, and if offshore trading affects the price discovery process in Hong Kong, an examination of the price behavior of these two stock groups will highlight the different effects. In the creation of the control group, special efforts were made to identify the firms with comparable size and turnover that were in the same industries as the 18 firms. However, it was impossible to identify control group firms with comparable firm size (as measured by market capitalization) and turnover in the same industry as the sample firms because of a skewed distribution of market capitalization and trading value of SEHK-listed stocks. For example, the largest 20 of the 542 SEHK-listed stocks accounted for 70 per cent of total market capitalization and 67 per cent of total SEHK trading value in 1995. Therefore, industry classification was the primary consideration for the selection of control group firms, followed by firm size and trading volume. In particular, significant differences in market capitalization and trading volume are observed between the 18 firms in the sample and 18 firms in the control group. Subsequently, as discussed in Section 3, special care is exercised to control for firm size and liquidity effects before a meaningful comparison is made between the two groups of stocks. A list of the 18 stocks in the control group is also presented in Appendix B. The 36 stocks examined by this study represents an important segment of all SEHK-listed stocks.

2.3 **ADR Trading of Hong Kong Securities:** Hong Kong stocks trade in New York in the form of American depositary receipts (ADRs). An ADR is a negotiable certificate that represents a fixed number of home (Hong Kong) market shares. These home market shares are deposited in a depository bank in the United States and the ADRs are issued by that depository bank. From the perspective of the issuing Hong Kong company, allowing ADR issuance facilitates the process of selling shares in the U.S. market,

broadens the market of eligible investors, simplifies the overseas listing process, and accommodates large overseas offerings. From the investor's perspective, ADRs allow easier expansion of portfolios internationally. ADR issues are quoted in and pay dividends in U.S. dollars, settlement is identical to that of U.S. securities, and ADRs eliminate costly global custodian fees.[1] Appendix C of this report presents an overview of ADRs. As of December 1996, only three SEHK-listed securities (APT Satellite Holdings Limited, Hong Kong Telecommunications Limited, and Asia Satellite Telecommunications Holdings Ltd.) trade on the New York Stock Exchange (NYSE).[2] The remainder of Hong Kong ADRs trade over-the-counter (OTC) and trading results are reported daily on "pink sheets." The OTC trading of Hong Kong ADRs in New York has two distinct characteristics: thin trading and retail-level trading. Although over 80 ADR programs have been established for Hong Kong stocks, their trading volume is very thin. For example, during the 10-month period (June 1995 - March 1996), the New York trading volume of 18 sample stocks presented in Table 1 was small, amounting to only 3.08 per cent of Hong Kong volume. When Hong Kong Telecom, whose New York volume is 17 per cent of Hong Kong volume, is excluded from the sample, this ratio is lowered to 2 per cent.[3] On an individual firm level, for Hong Kong stocks traded over-the-counter, daily volume (in terms of both the number of shares traded and the dollar value of the shares traded) is usually quite low, suggestive of little institutional involvement. New York market makers indicate that the New York OTC trading activities of Hong Kong ADRs have been, and will remain, at retail-level with insignificant institutional participation.[4] Further, considering the high OTC transactions costs (discussed in paragraph 2.8), no drastic increase in trading volume is expected. Nevertheless, the New York ADR market has a strong potential to develop into a liquid and low cost market with active participation by large institutions, as evidenced by the two Hong Kong stocks cross-listed in NYSE and Hong Kong. The current demand for OTC Hong Kong ADRs in New York is the result of promotional efforts by brokerage houses in New York and there is no indication that this demand has taken away trading volume from the Hong Kong market.[5] Consequently, this study's analysis focuses on the perceived "drift" to London.

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[1] See Lopian (1996), Sanford (1996), and J.P. Morgan (1996).

[2] The NYSE provided the following list of nine Hong Kong companies which trade on the NYSE:

Company	Listing Date
Amway Asia Pacific Ltd.	December 15, 1993
APT Satellite Holdings Limited	December 17, 1996
Brilliance China Automotive Holdings Limited	October 9, 1992
Ek Chor China Motorcycle Co., Ltd.	June 29, 1993
Hong Kong Telecommunications Limited	December 8, 1988
Renaissance Hotel Group N.V.	September 27, 1995
Asia Satellite Telecommunications Holdings Ltd.	June 18, 1996
China Tire Holdings Limited	July 15, 1993
Tommy Hilfiger Corporation	September 23, 1992

However, Brilliance China Automotive Holdings Limited, Ek Chor China Motorcycle Co., Ltd., and China Tire Holdings Limited are the early "Bermuda shares" of Chinese companies listed on the NYSE in 1992 and 1993. The shares of APT Satellite Holdings Limited began to trade on the NYSE and SEHK in December 1996. Our examination of the NYSE-listed "Hong Kong" companies indicates that: (i) Hong Kong Telecommunications Limited and Asia Satellite Telecommunications Holdings Ltd. are cross-listed between the SEHK and the NYSE; and (ii) the remaining three companies (Amway Asia Pacific Ltd., Renaissance Hotel Group N.V., and Tommy Hilfiger Corporation) are not listed on the SEHK. The parent company of Renaissance Hotel Group N.V., the New World Development Corp., however, is listed on the SEHK.

[3] During the same period, the ratio of London to Hong Kong volume ranges from 24 to 35 per cent for the 18 sample firms.

[4] In contrast, institutional investors seem to favor the Hong Kong stocks cross-listed on NYSE and SEHK as indicated by their trading volume. Trading value of Hong Kong Telecommunications Limited and Asia Satellite Telecommunications Holdings Ltd. on the NYSE amounted to US$890 million and US$301 million in 1996, respectively. The figure for Asia Satellite Telecom was only for the second half of 1996 because its listing date on the NYSE was June 18, 1996.

[5] Reverse migration (away from New York to Hong Kong) is observed for Hong Kong Telecom. During 1995, average monthly volume of Hong Kong Telecom on the NYSE was 4.87 million ADRs, while during 1994, 1993, and 1992 the corresponding mean monthly figures were 9.14, 12.48 and 10.73 million shares.

Table 1
Relative Trading Volume of Hong Kong Stocks
(June 1995 - March 1996)

Sample Firms ADR Volume	SEHK Volume (million shares)	ADR/SEHK (million shares)	LSE Volume (ratio %)	LSE/SEHK (million shares)	(ratio %)
Bank of East Asia	5.50	435.80	1.26	72.42	16.62
Cathay Pacific Airways	9.99	511.38	1.95	132.66	25.94
Cheung Kong (Holdings) Ltd.	17.26	1,037.99	1.66	282.75	27.24
China Light & Power Co.	34.56	625.69	5.52	187.53	29.97
Citic Pacific Ltd.	n.a.	894.94	n.a.	446.83	49.93
Hang Seng Bank Ltd.	n.a.	378.00	n.a.	137.44	36.36
Henderson Land Development	n.a.	495.45	n.a.	103.11	20.81
Hong Kong & China Gas	16.00	993.49	1.61	371.58	37.40
Hongkong Electric Holdings	14.39	488.07	2.95	181.65	37.22
Hong Kong Telecom	482.48	2,824.49	17.08	1,285.31	45.51
Hopewell Holdings	212.20	4,242.59	5.00	1,690.93	39.86
Hutchinson Whampoa	8.28	1,085.94	0.76	412.21	37.96
Hysan Development	0.44	416.03	0.10	131.57	31.63
New World Development	1.86	738.45	0.25	237.43	32.15
Sun Hung Kai Properties	12.81	604.48	2.12	230.04	38.06
Swire Pacific Ltd. 'A'	7.89	449.98	1.75	251.02	55.78
Wharf (Holdings) Ltd.	8.10	742.04	1.09	280.26	37.77
Wheelock and Co., Ltd.	n.a.	448.66	n.a.	88.71	19.77
Whole Sample		**3.08**		**35.30**	

Notes: 1. n. a. denotes not applicable.
2. The reported figures are computed for the period from June 1995 through March 1996 due to data limitations of ADR volume.

2.4 **Comparison of Trading Activities in Hong Kong and London:** Table 2 presents trading volume for each of the sample firms as reported by the LSE and the SEHK during the five-year period from 1991 through 1995. Table 2 also reports the ratio of LSE to SEHK volume for each sample firm for each year.[6] Two important observations can be made from this table. First, reported LSE volume as a proportion of SEHK volume varies widely from firm to firm, ranging from 10 per cent or less for several firms to over 30 per cent for others. Second, London trading volume has increased over time for most firms. Reported trading in London as a proportion of Hong Kong volume increased substantially from 13 per cent in 1991 to 38 per cent in 1995. Aggregate monthly trading volume in both London and Hong Kong for the 18 sample firms and the ratio of LSE to SEHK trading volume are graphically illustrated in Figures 1(a) and 1(b), respectively. During this five-year period, LSE volume in these 18 securities increased, on average, at a rate of about 8 million shares per month (or by about 1.25 per cent per month). In contrast, during the same five-year period, SEHK volume in these securities increased, on average, at a rate of about 5.5 million shares per month (or by about 0.50 per cent per month). The ratio of LSE to SEHK volume over time has increased. This ratio has risen significantly from October 1992. During September 1992, volume in these securities on both the LSE and SEHK was unusually low. In contrast, the volume in Hong Kong doubled in October, while the volume more than quadrupled in London. Over the subsequent months volume in Hong Kong was (roughly) at its pre-September level, while London volume increased from its pre-September levels.[7]

[6] In all the analyses, the LSE volume presented is the "buy" side volume which corrects for the double-counted buy and sell volume of the same transaction [See Nikami (1994), Nikko Research Center Report (1994), Koizumi (1995), and Lohse and Kansas (1996)].

[7] These changes were likely the result of two political events. First, during September there were large concerns about British-Chinese negotiations about funding of Hong Kong's new international airport. Second, there was increased concern that President Bush would not be re-elected and that Clinton would be tougher on China (in terms of trade). In October, the trade dispute was resolved, reducing the chances of a U.S.-China trade war, and likely reducing uncertainty.

Table 2
Annual Trading Volume of Sample Firms
(1991-1995)

	LSE	SEHK	LSE/SEHK
	(in million of shares)		(%)
Bank of East Asia			
1991	5.89	137.88	4.27
1992	15.98	365.34	4.37
1993	38.32	382.86	10.01
1994	42.95	382.66	11.22
1995	54.11	487.36	11.10
Cathay Pacific Airways			
1991	57.76	568.46	10.16
1992	243.04	718.39	33.83
1993	198.73	767.53	25.89
1994	179.09	511.39	35.02
1995	137.74	561.30	24.54
Cheung Kong (Holdings) Ltd.			
1991	177.09	1,270.43	13.94
1992	178.26	1,502.61	11.86
1993	363.05	1,421.93	25.53
1994	372.37	1,397.12	26.65
1995	315.31	1,224.32	25.75
China Light & Power			
1991	108.66	434.90	24.99
1992	183.49	516.85	35.50
1993	305.09	486.69	62.69
1994	276.53	651.54	42.44
1995	260.60	675.51	38.58
Citic Pacific Ltd.			
1991	20.06	2,621.42	0.77
1992	31.16	1,756.55	1.77
1993	291.56	1,051.44	27.73
1994	230.11	959.08	23.99
1995	414.65	913.25	45.40
Hang Seng Bank Ltd.			
1991	28.25	261.16	10.82
1992	34.61	437.57	7.91
1993	74.36	585.78	12.69
1994	108.73	471.58	23.06
1995	154.11	473.90	32.52
Henderson Land Development Co., Ltd.			
1991	97.87	486.24	20.13
1992	109.40	433.64	25.15
1993	148.79	419.94	35.43
1994	71.06	403.28	17.62
1995	90.06	512.34	17.58
Hong Kong & China Gas Co., Ltd.			
1991	48.32	342.39	14.11
1992	142.17	606.15	23.46
1993	168.28	712.37	23.62
1994	175.63	748.13	23.48
1995	420.29	1,002.63	41.92
Hongkong Electric Holdings Ltd.			
1991	89.45	464.24	19.27
1992	203.94	596.79	34.17
1993	291.88	690.00	42.30
1994	219.56	676.79	32.44
1995	218.23	552.71	39.48

Table 2 (Continued)
Annual Trading Volume of Sample Firms
(1991-1995)

	LSE	SEHK	LSE/SEHK
	(in million of shares)		(%)
Hong Kong Telecom			
1991	398.52	1,069.29	37.27
1992	644.00	1,495.12	43.07
1993	1,264.83	2,072.10	61.04
1994	1,459.83	2,384.40	61.22
1995	1,522.96	2,633.90	57.82
Hopewell Holdings Ltd.			
1991	96.29	1,117.45	8.62
1992	229.84	3,115.87	7.38
1993	486.86	3,092.53	15.74
1994	590.44	2,951.13	20.01
1995	1,570.13	3,676.04	42.71
Hutchinson Whampoa Ltd.			
1991	158.04	1,053.90	15.00
1992	363.49	1,705.78	21.31
1993	526.67	1,998.83	26.35
1994	384.80	1,356.48	28.37
1995	447.68	1,165.85	38.40
Hysan Development Co., Ltd.			
1991	39.81	1,223.98	3.25
1992	53.02	415.63	12.76
1993	108.37	469.47	23.08
1994	63.94	438.51	14.58
1995	119.37	498.17	23.96
New World Development Co., Ltd.			
1991	155.13	748.48	20.73
1992	253.26	835.62	30.31
1993	226.74	753.56	30.09
1994	166.38	817.56	20.35
1995	216.43	837.57	25.84
Sun Hung Kai Properties Ltd.			
1991	108.21	530.44	20.40
1992	122.07	765.11	15.95
1993	151.50	708.67	21.38
1994	167.95	832.96	20.16
1995	190.91	646.47	29.53
Swire Pacific Ltd. 'A'			
1991	119.02	499.86	23.81
1992	242.86	546.95	44.40
1993	301.41	557.07	54.11
1994	252.48	547.62	46.11
1995	232.69	518.52	44.88
Wharf (Holdings) Ltd.			
1991	74.70	561.68	13.30
1992	148.38	619.96	23.93
1993	318.00	831.44	38.25
1994	250.07	776.22	32.22
1995	259.97	831.76	31.26
Wheelock and Co., Ltd.			
1991	77.15	314.38	24.54
1992	108.44	562.62	19.27
1993	125.70	691.65	18.17
1994	130.72	584.91	22.35
1995	130.83	534.93	24.46
Aggregate Trading Volume and Average Ratio of LSE/SEHK for Whole Sample			
1991	**1,783.33**	**13,706.62**	**13.01**
1992	**3,307.05**	**16,996.59**	**19.46**
1993	**5,390.49**	**17,693.85**	**30.47**
1994	**5,142.60**	**16,891.35**	**30.45**
1995	**6,756.08**	**17,746.59**	**38.07**

Figure 1(a)
SEHK and LSE Monthly Volumes for Sample Firms

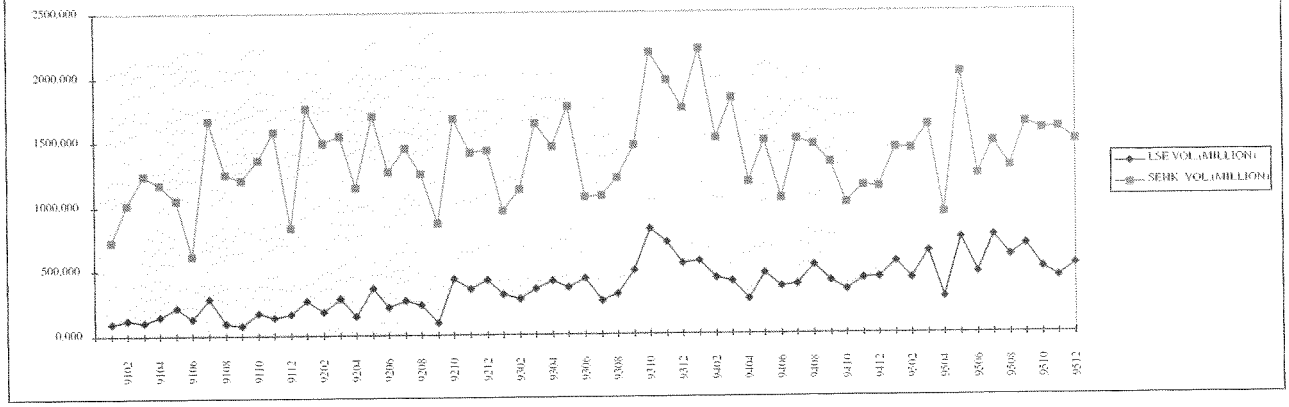
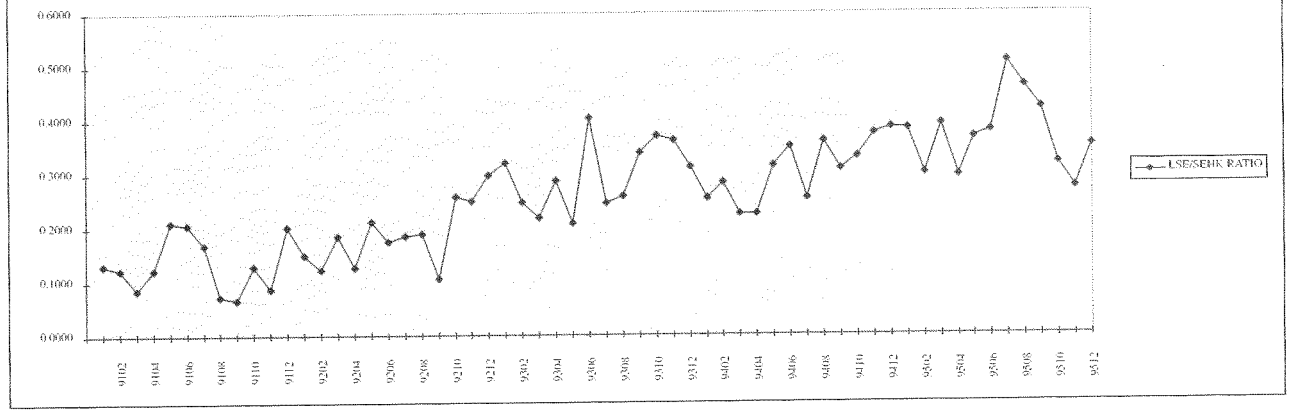


Figure 1(b)
Ratio of LSE/SEHK Monthly Trading Volume for Sample Firms



2.5 **Further Analyses of London Trading of Hong Kong Stocks:** Given the analysis presented thus far, there is clear-cut evidence that Hong Kong securities in London experienced significant trading volume and that this volume has increased through time. This is in stark contrast to the light volume in New York. Thus, it is important to understand the nature of LSE trading. In this regards, the following questions are relevant: (i) who are the transactors? (ii) why do they trade in London as opposed to Hong Kong? and (iii) what are the implications for the price discovery processes in Hong Kong? The first two questions are covered in this section while the last question is addressed in Section 3 of this report. In April and May of 1996, principal London market makers of Hong Kong-based securities, portfolio managers of an international mutual fund, and the chief economist of the LSE were interviewed. Subsequently, questionnaires which covered much of the same material, as was discussed during the interviews, were sent to 15 principal market makers dealing in Hong Kong securities.

2.6 **Who are the Transactors at the LSE?:** The predominant transactors of Hong Kong securities on the LSE are the institutional clients of market makers. These clients account for at least 98 per cent of the London volume of Hong Kong-based firms, which indicates that there is *no* retail market for these securities in London. According to the market makers, a large proportion of this trading is program trading and index fund trading. However, some of it is information-based trading. The market makers indicate that their *primary* purpose is to serve the needs of their clients and the trades are "client-driven." Also, it appears that over 50 per cent of the LSE transactions in Hong Kong securities are

ordered by British institutional investors, with significant proportions being ordered by American and other European institutional investors. In addition, the consensus is that institutional trading, especially program trading and index trading, has been increasing over time. Further, as a consequence of this "client-driven" trading, market makers subsequently transact to maintain their desired level of risk exposure. Thus one "client-driven" trade may cause several subsequent market maker initiated trades for inventory management purposes. In order to examine, and to substantiate, the assertions made by the London market makers, two further analyses were performed. First, an analysis of the number of trades per month and the average size of each trade during 1991-1995 period was performed. The results are presented in Table 3. During the period from 1991 to 1993, on average, total monthly trades per security increased from 96 per month to 223 per month, with average trade size increasing from £83,000 to £199,000. Alternatively, on average, in 1991 there were about five trades per day per security, while in 1993 there were, on average, about 10 trades per day per security, with the average value of each trade increasing appreciably during this period. Subsequent to 1993, trading seems to have stabilized at about 9-10 trades per day per security, although the average value per trade seems to have continued to increase (to about £237,000 per trade in 1995). Clearly, the results in Table 3 are consistent with relatively large but infrequent trades by institutions in these securities. They are also consistent with empirical data indicating that during 1991-1993 security returns of the Hang Seng Index dwarfed those of the comparable New York, Tokyo and London indices. Thus portfolio managers in London may have simply been attracted to the market with the highest returns. The second set of analyses focused on market maker participation in these trades. The market maker participation ratio was calculated for each firm for each month from January 1995 through March 1996. This ratio is defined as:

$$\frac{\text{(Market Maker Purchases) + (Market Maker Sales)}}{\text{Total Purchases and Sales}}$$

where purchases and sales are both in share units. The denominator is twice the total conventional volume, as reported in earlier tables. The results are presented in Table 4. On average, the market maker participation ratio is about 45 per cent. The ratios for NYSE-listed firms is around 10 per cent or less.[8] A market maker participation ratio of 50 per cent would be consistent with market makers, on average, being on either the buy side or the sell side of each trade. The ratios tend to be quite stable across securities and across time. These results are consistent with the market makers' assertion that on the LSE, purchases and sales are made to accommodate clients. The results, however, do not show much trading between market makers.

[8] See Hasbrouck and Sofianos (1993).

Table 3
Average Trade Size of Hong Kong Stocks on LSE
(1991-1995)

	Bargains Per Month	Mean Trading Volume per Bargain (thousand shares)	Mean Trading Value per Bargain (thousand pounds)
Bank of East Asia			
1991	8	58	74
1992	35	38	96
1993	84	38	120
1994	72	50	153
1995	70	64	130
Cathay Pacific Airways			
1991	66	73	60
1992	125	162	149
1993	152	109	106
1994	106	140	147
1995	91	127	124
Cheung Kong (Holdings) Ltd.			
1991	195	76	103
1992	179	83	133
1993	281	108	252
1994	300	104	319
1995	295	89	270
China Light & Power Co.			
1991	107	85	129
1992	214	71	175
1993	304	84	288
1994	265	87	289
1995	232	94	281
Citic Pacific Ltd.			
1991	3	557	82
1992	26	101	95
1993	174	139	212
1994	159	121	228
1995	213	162	281
Hang Seng Bank Ltd.			
1991	22	47	107
1992	44	66	357
1993	93	67	345
1994	128	69	330
1995	177	72	344
Henderson Land Development Co., Ltd.			
1991	101	81	74
1992	111	82	105
1993	174	71	137
1994	105	56	214
1995	110	68	240
Hong Kong & China Gas Co., Ltd.			
1991	63	64	51
1992	138	86	88
1993	116	121	187
1994	102	143	186
1995	160	219	222
Hongkong Electric Holdings Ltd.			
1991	62	119	105
1992	125	136	182
1993	192	127	204
1994	154	119	248
1995	161	113	226
Hong Kong Telecom			
1991	157	211	167
1992	241	223	198
1993	536	197	248
1994	451	270	405
1995	411	309	411

Table 3 (Continued)
Average Trade Size of Hong Kong Stocks on LSE
(1991-1995)

	Bargains Per Month	Mean Trading Volume per Bargain (thousand shares)	Mean Trading Value per Bargain (thousand pounds)
Hopewell Holdings Ltd.			
1991	37	220	53
1992	77	249	106
1993	110	370	201
1994	173	285	176
1995	208	629	286
Hutchinson Whampoa Ltd.			
1991	197	67	72
1992	296	102	141
1993	459	96	196
1994	312	103	283
1995	345	108	327
Hysan Development Co., Ltd.			
1991	14	241	73
1992	46	96	84
1993	76	119	181
1994	76	70	134
1995	106	94	137
New World Development Co., Ltd.			
1991	104	124	103
1992	187	113	137
1993	218	87	163
1994	191	73	170
1995	212	85	179
Sun Hung Kai Properties Ltd.			
1991	146	62	94
1992	167	61	140
1993	206	61	221
1994	215	65	294
1995	235	68	306
Swire Pacific Ltd. 'A'			
1991	300	33	50
1992	431	47	125
1993	455	55	189
1994	379	56	259
1995	365	53	240
Wharf (Holdings) Ltd.			
1991	98	63	46
1992	141	87	100
1993	307	86	177
1994	261	80	207
1995	253	86	174
Wheelock and Co., Ltd.			
1991	44	147	56
1992	51	179	116
1993	82	128	152
1994	114	95	143
1995	126	87	91
Whole Sample			
1991	**96**	**129**	**83**
1992	**146**	**110**	**140**
1993	**223**	**115**	**199**
1994	**198**	**110**	**232**
1995	**209**	**140**	**237**

Table 4
Market Maker Participation Ratios on LSE
(January 1995 - March 1996)

Sample Firms	Mean (%)	Standard Deviation (%)
Bank of East Asia	45.71	4.56
Cathay Pacific Airways	43.02	7.22
Cheung Kong (Holdings) Ltd.	43.57	5.04
China Light & Power Co.	48.14	2.52
Citic Pacific Ltd.	45.08	4.57
Hang Seng Bank Ltd.	47.68	2.22
Henderson Land Development Co., Ltd.	46.42	3.20
Hong Kong & China Gas Co. Ltd.	46.84	4.73
Hongkong Electric Holdings Ltd.	45.50	4.96
Hong Kong Telecommunications	47.74	2.71
Hopewell Holdings Ltd.	48.77	1.43
Hutchinson Whampoa Ltd.	44.63	2.97
Hysan Development Ltd.	47.74	2.32
New World Development Co., Ltd.	43.03	5.25
Sun Hung Kai Properties Ltd.	44.24	4.86
Swire Pacific Ltd. 'A'	45.46	2.79
Wharf (Holdings) Ltd.	47.23	3.56
Wheelock and Co., Ltd.	37.89	6.77
Whole Sample	**45.48**	**3.98**

2.7 **Why Do Trades Of Hong Kong Stocks Take Place In London Rather Than Hong Kong?:** A number of reasons were offered by London market makers. First, there is the time zone issue. Portfolio managers in London, continental Europe, and North America wish to trade during their normal work hours. An increasing number of non-Asian portfolio managers are committing an increasing amount of capital to Asian (including Hong Kong-based) securities. These portfolio managers want execution now, not later. The clients frequently want immediate execution of their program trades and information-based trades. From our interviews, we would assign a weight of 0.45 to this need. Second, a strong consensus emerges regarding the availability of capital in Hong Kong necessary to support large institutional trades. London market makers point out that capital to support large institutional trades is more accessible in London than Hong Kong. They indicate that clients are demanding more capital investment. They are selling several days' worth of volume outside of Hong Kong because it is easier than selling in Hong Kong. Institutions find it easier to quickly lay off, or take a position, in London than in Hong Kong. From our interviews, we assign a subjective weight of 0.30 for this reason. Third, there is frequent mention of the stamp duty in Hong Kong. While, without exception, all market makers claim that they pay the stamp tax on all transactions (which must clear in Hong Kong), they feel that others do not. Irrespective of whether or not all are paying the stamp duty, there is still great dissatisfaction with it. The stamp duty is viewed as an impediment to further growth of the Hong Kong market. In contrast, there is no stamp duty for foreign stock trading in London. This reason is assigned a weight of 0.25. Finally, there are some concerns with certain aspects of the Hong Kong market. Specifically, there are concerns with illiquidity and illegal trading activities such as "front-running" and "rat-trading" in Hong Kong, and a feeling that in Hong Kong "we're not playing on a level playing field," as one market maker stated.

2.8 **Transactions Costs in Hong Kong, London, and New York:** The magnitude of transactions costs does not seem to be an important factor in determining where Hong Kong stocks trade. The New York OTC market for Hong Kong ADRs exhibits the largest transactions costs, ranging from one per cent (for large size trades through a discount broker) to as high as 10 per cent.[9] In a quote-driven market like the LSE, the bid-ask spread represents the most important component of transactions costs. During the 15-month period from January 1995 through March 1996, the ratio of bid-ask spread to the average of the bid and ask quotes was measured for the 18 sample stocks based on the best quotes reported by the LSE at the market open. Ideally, an effective spread would have been a better indicator of transactions costs since it determines price concession versus the bid-ask spread.[10] However, this was not done for several reasons. First, the transaction time for SEHK stocks provided in the LSE data is not accurate due to the time lag between the transaction time and reporting time.[11] Thus, it is impossible to measure exactly the synchronized transaction price and bid-ask spread at the actual time of the transaction. Second, all LSE transactions are recorded in pound sterling and bid-ask spreads are reported in Hong Kong dollars. This would lead to measurement errors in translating actual transaction price using daily exchange rates observed only once a day. Third, for some days, there are no market-maker spreads provided or they are incomplete.[12] As summarized in Table 5, the daily average of the "best" spread ranges from 0.83% for Hong Kong Telecom to 6.19% for Hong Kong & China Gas. Mean [median] spread is 1.71% [1.57%], which is approximately three times greater than the estimate of 0.50% by the SEHK.[13] In contrast, in an order-driven market like the SEHK, the important component of transactions costs is the brokerage commission. According to recent summary statistics documented by the PACAP Research Center, the average commission charged by the SEHK member brokers ranges from 0.25% to 0.35%. With 0.30% stamp duty per round-trip transaction and other special levies included, the average Hong Kong transaction cost is approximately one-half of the bid-ask spread at the LSE.[14] As a result, transactions costs do not represent a crucial factor which dictates where trading of Hong Kong stocks occurs. As London market makers suggest, easy access to capital and the time-zone difference make the London market a convenient place to trade.

[9] This does not apply to NYSE-listed stocks, APT Satellite Holdings Limited, Hong Kong Telecommunications Limited, and Asia Satellite Telecommunications Holdings Ltd.

[10] A popular measure of the effective spread is defined by 2*|Transaction Price - (Ask Price + Bid Price) / 2| / (Ask Price + Bid Price) / 2. See Huang and Stoll (1995) and Rhee and Wang (1996).

[11] In practice, in discussions with LSE personnel, this time entry is invariably *after* the transaction occurred, and it is not possible to determine, for any transaction, how long the lag between actual transaction and data entry is.

[12] We observe that actual transactions are frequently outside of "best" bid and asked prices for at least two reasons: First, market makers are required to give a firm bid and ask quotes for transactions of up to a certain number of shares. Most of the transactions are for a greater number of shares which would likely result in a trade outside the bid-ask spread. Second, most transactions are with a market maker who is trading to facilitate a client's objectives. Such trades will be made in relation to that market maker's bid-ask spread, which will rarely be the "best" bid and ask quotes and thus will be wider than the reported spread.

[13] See "Going Global, But How Far?" in *The Securities Journal* (September 1993), 4-9.

[14] In London retail investors pay brokerage commission which is negotiable. Given the average size of transactions of 18 Hong Kong stocks, an average commission per trade is estimated at about 0.20 per cent. In London, there is no explicit commission other than bid-ask spread for institutional trades.

Table 5
Bid-Ask Spreads of Sample Firms
(January 1995 - March 1996)

Sample Firms Number of	Mean (%) Observations	Median (%)	Standard	Deviation (%)
Bank of East Asia	n.a.	n.a.	n.a.	n.a.
Cathay Pacific Airways	288	1.75	1.75	0.49
Cheung Kong (Holdings) Ltd.	294	0.98	0.98	0.27
China Light & Power Co.	294	1.02	1.04	0.26
Citic Pacific Ltd.	294	1.38	1.40	0.38
Hang Seng Bank Ltd.	278	4.28	3.47	3.72
Henderson Land Development Co., Ltd.	292	0.96	0.95	0.28
Hong Kong & China Gas Co., Ltd.	271	6.19	5.00	4.51
Hongkong Electric Holdings Ltd.	293	1.31	1.29	0.40
Hong Kong Telecommunications	290	0.83	0.74	0.45
Hopewell Holdings Ltd.	n.a.	n.a.	n.a.	n.a.
Hutchinson Whampoa Ltd.	292	0.98	0.99	0.27
Hysan Development Ltd.	286	1.87	1.83	0.58
New World Development Co. Ltd.	294	1.19	1.11	0.45
Sun Hung Kai Properties Ltd.	293	0.99	1.01	0.24
Swire Pacific Ltd. 'A'	294	0.95	0.98	0.24
Wharf (Holdings) Ltd.	294	1.00	0.96	0.34
Wheelock and Co., Ltd.	289	1.70	1.56	1.18
Whole Sample		**1.71**	**1.57%**	**1.41**

Note: n.a. denotes not applicable.

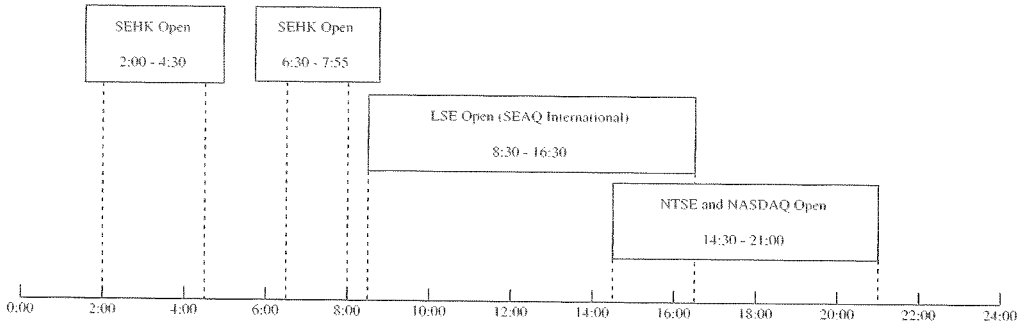
2.9 **Overstatement of the Reported London Volume:** Although London trading volume has been increasing, some London market makers suggest that a substantial portion of London volume is in fact Hong Kong volume by London transactors. This is possible because LSE trading data do not distinguish between on and off market transactions. Without access to the clearing and settlement data, it is difficult to compile empirical evidence in support of this suggestion. Even though it is a crude approximation, time-stamped London transaction data (from January 1995 through March 1996) were used to estimate the magnitude of this volume in question. As illustrated in Figure 2, there are five distinct time intervals within the 24-hour period: (i) the interval during which the Hong Kong market alone is open; (ii) the interval during which the London market alone is open; (iii) the interval during which both the London and New York markets are open; (iv) the interval during which the New York market alone is open; and (v) the rest of the time interval. Since irrespective of where London dealers actually transact they must report that trade to the LSE, the time distribution of reported trades provides a good indication of where these reported London trades actually took place. As summarized in Table 6, trading volume in each of the time intervals is: 14 per cent of total daily trading volume when the SEHK alone is open, 52 per cent when the LSE alone is open, 9 per cent when the NYSE alone is open, and 22 per cent when both the London and New York markets are open. Based on these volume statistics, we assume that approximately 14 per cent of *reported* London volume is in fact Hong Kong volume by London transactors.

Table 6
Distribution of Reported LSE Trades among Hong Kong, London and New York Markets (January 1995-March 1996)

Month	Proportion of Reported LSE Trades when Only: SEHK Open (%)	Only LSE Open (%)	LSE & NYSE Open (%)	NYSE Open (%)
9501	8.27	62.64	17.02	5.11
9502	3.45	61.62	20.93	10.20
9503	5.97	58.46	20.93	10.83
9504	22.03	57.30	15.35	4.48
9505	19.69	51.01	21.53	6.63
9506	23.04	47.65	23.42	5.63
9507	42.46	32.26	21.44	3.05
9508	19.79	40.74	29.75	9.29
9509	12.52	48.66	29.37	8.64
9510	13.42	49.23	26.96	5.54
9511	6.43	59.55	21.95	9.70
9512	6.00	52.30	24.97	13.65
9601	7.76	44.71	19.14	21.47
9602	6.00	57.16	18.58	16.52
9603	10.89	58.74	18.17	10.79
All Months	**13.85**	**52.14**	**21.97**	**9.44**

Note: Proportions of reported trades do not add up to 100% because some trade times are reported when no market is open.

Figure 2
Trading Hours in Hong Kong, London and New York Relative to London Time



2.10 **No Drift of Trading Volume from Hong Kong to London:** To examine whether the increase in London trading volume was the result of migration of trading activities from Hong Kong, two approaches were adopted. First, a regression model is used, in which *changes* in LSE volume are regressed on *changes* in Hong Kong volume. For the aggregate sample on average, a change (either an increase or decrease) in SEHK volume of one million shares corresponds to roughly a change in LSE volume of 250,000 shares, showing a significant statistical relation between trading volume in the two exchanges. This suggests that trading volume in the two markets is in response to similar factors. Similar results are obtained from the regressions for individual firms. If migration of trading indeed existed, one

would expect a relatively insignificant relation between trading volumes in the two markets. The second approach is based on a time series model in which SEHK volume is regressed on time using monthly observations for 1991-1995.[15] The sixty residuals from this regression were obtained. Similarly, a time series regression of LSE volume on time was estimated for 1991-1995 and the sixty residuals from that regression were obtained. If, in a particular month, migration occurs, one might expect SEHK volume to be lower than that estimated, and the residual from the SEHK regression to be negative. If that volume has migrated to London, one might expect the residual for that month from the London time series regression to be positive. There were 34 negative residuals from the SEHK time series regression. Of the 34 corresponding London residuals, 25 were also negative. These results do not support the hypothesis of migration of trading, but rather that volume (or changes in volume) in the two markets is correlated. One empirical observation is also in support of no drift of trading volume between the two markets. As was discussed earlier, London trading volume does not exhibit an increase in the number of trades per day since 1993.

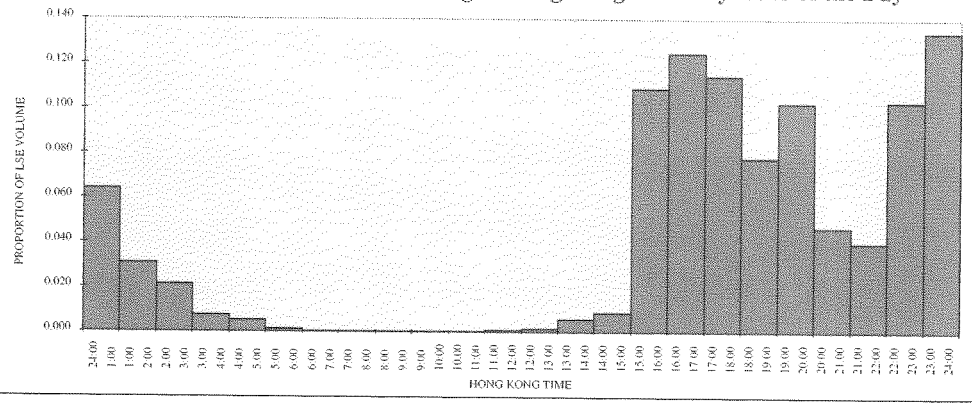
2.11 **London Trading at and after Hong Kong Close:** Trading on the SEHK only occurs for 3 hours and 55 minutes each day, 10:00 a.m. - 12:30 p.m. and 2:30 p.m. - 3:55 p.m. As reported in Table 7 and graphically illustrated in Figure 3, during the last one hour period prior to the SEHK closing, we observe about 11 per cent of all London trading of SEHK-listed securities. Similarly, during the one hour after SEHK closing (4:00 p.m. - 5:00 p.m. Hong Kong time), we observe over 12 per cent of all London trading of SEHK-listed securities. In addition, another 11 per cent of reported LSE trading of SEHK-listed securities takes place from 5:00 p.m. to 6:00 p.m. Hong Kong time. Apparently, London transactors are unwinding their prior day's trades before the Hong Kong market closes and the London market opens, as well as transacting as the London market opens. Given that London SEAQ International has official trading hours of 8:30 a.m. to 4:30 p.m. London time, but trading is permitted both before and after these hours, it would make sense to extend the Hong Kong trading session to provide London traders "real-time" access to the Hong Kong market.

[15] The time-series model is: SEHK volume$_t$ = a + b x Time + e_t.

Table 7
Distribution of Reported LSE Trades of Hong Kong Stocks by Hour of the Day
(January 1995-March 1996)

London Time		Hong Kong Time		Proportion of LSE Volume (%)
From	To	From	To	
24:00	1:00	8:00	9:00	0.02
1:00	2:00	9:00	10:00	0.03
2:00	3:00	10:00	11:00	0.04
3:00	4:00	11:00	12:00	0.09
4:00	5:00	12:00	13:00	0.15
5:00	6:00	13:00	14:00	0.58
6:00	7:00	14:00	15:00	0.85
7:00	8:00	15:00	16:00	10.91
8:00	9:00	16:00	17:00	12.46
9:00	10:00	17:00	18:00	11.44
10:00	11:00	18:00	19:00	7.78
11:00	12:00	19:00	20:00	10.23
12:00	13:00	20:00	21:00	4.68
13:00	14:00	21:00	22:00	4.00
14:00	15:00	22:00	23:00	10.32
15:00	16:00	23:00	24:00	13.40
16:00	17:00	24:00	1:00	6.40
17:00	18:00	1:00	2:00	3.08
18:00	19:00	2:00	3:00	2.12
19:00	20:00	3:00	4:00	0.74
20:00	21:00	4:00	5:00	0.51
1:00	22:00	5:00	6:00	0.13
22:00	23:00	6:00	7:00	0.03
23:00	24:00	7:00	8:00	0.02

Figure 3
Distribution of London Trading of Hong Kong Stocks by Hour of the Day



3. The Impact of Offshore Trading on Market Volatility, Liquidity, and Price Discovery in Hong Kong

3.1 **Offshore Trading and Systemic Risks in the Hong Kong Financial System:** Official trading of Hong Kong stocks on the LSE begins at 4:30 p.m. and ends at 12:30 p.m. (Hong Kong time), whereas Hong Kong stocks trade on the NYSE and the NASDAQ between 10:30 p.m. and 5:00 a.m. (Hong Kong time).[16] Due to offshore trading activities that regularly occur during nontrading hours, the SFC is concerned with volatility spillovers at the market opening. The SFC's concern appears to be triggered by the expected gaps between Hong Kong closing and subsequent opening prices, which may potentially reduce the effectiveness of the risk management system used by all participants. This may also create potential sources of systemic risk to the Hong Kong financial system. To examine the validity of this concern, average return variances are measured for two sets of companies, 18 sample firms and the 18 matching control group firms with insignificant offshore trading.

3.2 **Lower Volatility Induced by Offshore Trading:** Four measures of return variances were estimated using daily opening and closing prices during the 15-month period from January 1995 through March 1996: (i) open-to-open return variance; (ii) close-to-close return variance; (iii) open-to-close return variance; and (iv) close-to-open return variance. Table 8 summarizes the results.[17] The most striking result is that the sample firms consistently exhibit smaller variances than the control group firms in all four variance measures.[18] For example, close-to-open return variance, which is a volatility measure during the overnight non-trading period, of the control group is 1.66 times greater than that of the sample stocks. Open-to-open return variance of the control group stocks is 1.36 times greater than that of the sample group stocks. These results confirm that London trading during Hong Kong's nontrading period ***reduces*** rather than ***increases*** price volatility. These results are also consistent with the finding that higher volatility of the open-to-open returns than close-to-close returns is caused by the preceding overnight nontrading period, which implies that price volatility is reduced as the length of nontrading period is shortened.[19] Similar results have been documented for Hong Kong stocks using daily observations in 1989.[20] However, one can not conclude that return variances of Hong Kong stocks are smaller with London trading than without London trading unless one controls for two important effects which may affect return variances. It has been empirically documented that firm size and trading volume affect price volatility: the larger the firm size and trading volume, the smaller the volatility.[21] Therefore, the firm size and trading volume effects must be controlled before a meaningful comparison of price volatility between the two sets of stocks can be made.

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[16] There are at least one-hour variations depending on the U.K. winter hours and the U.S. summer hours. Further, trading in London can take place outside of the official hours.

[17] The Stock Exchange of Hong Kong does not release daily opening prices of listed stocks. The PACAP Research Center's PACAP Databases-Hong Kong, therefore, include only closing prices and volume data. The SFC extracted opening prices from the daily trade bulletin published by the SEHK. The SFC and the PACAP Research Center agreed that the price of the first automatching trade be used as the opening price. This will eliminate possible distortion introduced by late reporting of previous day trades and trades concluded outside the Hong Kong market.

[18] The variance measure used is the second moment of return distributions. Other measures of price volatility (squared returns and absolute values of returns) provide qualitatively identical results.

[19] See Amihud and Mendelson (1991).

[20] See Cheung, Ho, Pope, and Draper (1994).

[21] See Harris (1989) and Karpoff (1987).

Table 8
Average Return Variances
(January 1995-March 1996)

	Sample Firms (A)	Control Group Firms (B)	Ratio (B/A)
Open-to-Open Return Variance ($x10^3$)	0.35	0.47	1.36
Close-to-Close Return Variance ($x10^3$)	0.32	0.42	1.32
Open-to-Close Return Variance ($x10^3$)	0.25	0.33	1.33
Close-to-Open Return Variance ($x10^3$)	0.08	0.13	1.66

3.3 **The Impact of Firm Size and Trading Volume Effects on Volatility:** Significant differences in firm size and Hong Kong trading volume are noted between the 18 sample firms and the control group firms as shown in Table 9. Mean [median] firm size (as measured by 1995 year-end market capitalization of common equity) of the 18 sample firms is HK$73.06 [HK$56.28] billion as compared with HK$6.43 [HK$5.17] billion for the control group. Mean [median] daily trading volume is 4.49 [3.01] million shares for the 18 sample firms, while the comparable volume for the control group is 1.80 [0.82] million shares. Annual turnover ratio as measured by the number of shares traded to the number of shares outstanding, however, shows insignificant differences between the two sets of firms. Mean [median] turnover is 0.40 [0.37] for the sample firms which is compared with 0.43 [0.36] estimated for the control group. There is a significant difference in price per share between the two groups of firms [HK$30.42 vs. HK$10.29]. Using a cross-sectional regression approach, firm size and trading volume are controlled to compare the differences in price volatility between the two groups of firms.[22] As reported in Table 10, after the firm size effect and the liquidity effect are controlled, price volatility is no longer different between the sample and the control group. One important exception is close-to-open return variance. The 18 sample firms show significantly lower volatility during the overnight nontrading period in Hong Kong after adjustment for firm size and trading volume. This implies that

[22] The following regression model is used to examine differences in the volatilities between the two sets of firms:

$$STD_i = a_0 + a_1 DUMMY_i + a_2 SIZE_i + a_3 TURNOVER_i + e_i, \quad (1)$$

where STD_i is return standard deviation of stock i. STD_i is measured for open-to-open, close-to-close, open-to-close, and close-to-open returns; $DUMMY_i$ is an indicator variable which takes the value of 1 if stock i is one of the 18 sample firms and zero otherwise; $SIZE_i$ is measured by average market capitalization of stock i; $TURNOVER_i$ is the turnover ratio as measured by the ratio of the number of shares traded to the number of shares outstanding; and ei is random disturbance terms. The mean difference test in price volatility is conducted based on the statistical significance of estimated a_1 values.

London trading enhances the price discovery process of Hong Kong stocks, without jeopardizing the systemic stability of the Hong Kong market.[23]

Table 9
Summary Statistics of Sample Firms and Control Group Firms
(At the end of 1995)

		Market Value (in million)	Price per share	Turnover	Daily Volume (in thousands shares)
A.	**Sample Firms**				
	mean	HK$73,059	HK$30.42	0.40	4,485
	median	56,279	27.44	0.37	3,014
	standard deviation	49,185	17.25	0.15	3,015
B.	**Control Firms**				
	mean	HK$6,429	HK$10.29	0.44	1,801
	median	5,165	7.13	0.36	818
	standard deviation	4,157	11.67	0.35	2,222

Table 10
Mean Difference in Volatility
(January 1995-March 1996)

	Open-to-Open Return Volatility	Close-to-Close Return Volatility	Open-to-Close Return Volatility	Close-to-Open Return Volatility
Estimated Indicator Variable Coefficient ($x10^{-2}$)	-0.16	-0.15	-0.09	-0.0021
(t-Value)	(-0.85)	(-0.87)	(-0.58)	(-2.05)*
Conclusion	No Difference	No Difference	No difference	Significant Difference

3.4 **Greater Liquidity Induced by Offshore Trading:** At least two dimensions are important when measuring market liquidity: one dimension is associated with the "price impact" of large order imbalances, while the other dimension is characterized by the "immediacy" of transacting at a minimum cost.[24] The former definition of liquidity is used in this study because the latter definition employs bid-ask spreads which are not available for the control group. For each stock, we calculate a liquidity ratio which is defined as the ratio of the sum of daily trading value to the sum of absolute price changes during the study period. This ratio measures the market's ability to absorb large order flows without significant changes in price, which is closely linked to market resiliency.[25] Thus, a liquid market is

[23] This conclusion is also supported by the examination of the first-order return autocorrelations as a measure of efficiency of the price discovery process. Although the 18 stocks with active London trading are characterized by a smaller number of price reversals than their counterparts with insignificant London trading, the differences in return autocorrelations disappear after the firm size and liquidity effects are controlled.

[24] See Hasbrouck (1991).

[25] See Kyle (1985), Naidu and Rozeff (1994), Massimb and Phelps (1994), Chang, Hsu, Huang, and Rhee (1996).

characterized by a small impact on market prices when large orders are executed. A low ratio indicates that a single large order may adversely affect price, while a high ratio indicates that volume shocks can be accommodated with a small price movement. As presented in Table 11, average measures of market liquidity are 61.36 and 6.98 for the sample and the control group, respectively. This implies that market depth of those stocks with active London trading is approximately 9 times greater than that of stocks with insignificant London trading. For the 9 smallest sample firms (sorted by market capitalization) and the 9 largest firms in the control group, average measures of liquidity are 35.86 and 10.33, respectively. However, a meaningful comparison of liquidity measures can be made only after any effects from firm size and trading volume are controlled.

Table 11
Average Liquidity Measure
(January 1995-March 1996)

Liquidity Measure	Sample Firms (A)	Control Group Firms (B)	Ratio (A/B)
Whole Sample ($x10^{-6}$)	61.36	6.98	8.79
Largest 9 Firms ($x10^{-6}$)	125.14	10.33	12.11
Smallest 9 Firms ($x10^{-6}$)	35.86	3.34	10.74

3.5 **The Impact of Firm Size and Trading Volume Effects on Liquidity:** A cross-sectional regression approach is used to control for the firm size effect and the trading volume effect on liquidity.[26] The regression results indicate that the difference between market liquidity disappears after the firm size effect and the liquidity effect are controlled. This leads to the conclusion that London trading does not adversely affect liquidity in the Hong Kong market. This result is consistent with market makers' view that: (i) the Hong Kong market remains the major market for price discovery no matter how large offshore trading volume has become in recent years; and (ii) closing prices in Hong Kong have served as benchmark prices for market makers in London and New York. This result is also consistent with the observation that many of the reported London trades are not, in fact, London trades. London market makers argue that a large portion of London trades represent, in fact, Hong Kong trading volume. Indeed, market makers, portfolio managers, and LSE representatives all argue that many of the *reported* LSE trades unwind the next day in Hong Kong, or are trades originating in London that take place in Hong Kong.

[26] The following regression model is used to examine differences in the liquidities between the two sets of firms:

$$LIQ_i = c_0 + c_1 DUMMY_i + c_2 SIZEi + c_3 TURNOVER_i + u_i, \quad (2)$$

where LIQ_i signifies the liquidity measure of stock i; $DUMMY_i$ is an indicator variable which takes 1 if stock i is one of the 18 sample firms and zero otherwise; $SIZE_i$ is measured by average market capitalization of stock i; $TURNOVER_i$ is the ratio of the number of shares traded to the number of shares outstanding; and u_i is random disturbance terms. The mean difference test in market liquidity is conducted based on the statistical significance of estimated c_1 values.

4. Major Findings and Policy Recommendations

4.1 **Major Findings:** The following major findings emerge from this study. First, with the exception of two NYSE-listed stocks, New York ADR trades of Hong Kong stocks are mainly retail-level transactions. New York trading volume is insignificant, accounted for only 3.08 per cent of Hong Kong volume during the 10-month period (June 1995-March 1996), and is expected to remain insignificant largely due to high transactions costs. OTC Trading volume of Hong Kong stocks in ADRs has largely been created by New York brokerage houses. No evidence is found which indicates the migration of trading from Hong Kong to New York. Second, London trading volume has been steadily rising, increasing from on the average 13% of Hong Kong volume in 1991 to 38% in 1995 for 18 selected sample stocks with active trading in London. The predominant transactors of Hong Kong stocks on the LSE are the institutional clients of market maker firms. They indicate that a large proportion of their trading consists of program trading and index fund trading with a minor portion representing information-based trading. This "client-driven" trading triggers market makers to transact for the purpose of maintaining their desired level of risk exposure. Third, London market makers cite three main reasons why trades of Hong Kong stocks take place in London: (i) the time-zone difference; (ii) easier accessibility of capital to support large institutional trades; and (iii) the stamp duty in Hong Kong. Fourth, the magnitude of transactions costs is not an important factor which determines where trade of Hong Kong stocks takes place since the magnitude of transactions costs is the smallest in Hong Kong. Fifth, the analysis of time series analysis of trading volume in Hong Kong and London suggests that no empirical evidence exists to suggest that the London volume has increased at the expense of the Hong Kong trading volume. The increase in London volume has been created by the increased demand for Hong Kong stocks by the U.S., U.K., and continental European institutional investors. Sixth, there is no evidence that volatility and liquidity in Hong Kong are adversely affected by offshore trading in London or in New York. Rather, the 18 sample firms show significantly lower volatility than the control group with little offshore trading during the overnight nontrading period in Hong Kong. This implies that London trading facilitates the price discovery process of Hong Kong stocks, without jeopardizing the systemic stability of the Hong Kong market. The fact that offshore trading exhibits very little impact on Hong Kong market volatility and liquidity is consistent with the London and New York market markers' view that the Hong Kong market is efficient and Hong Kong is the major market for price discovery of Hong Kong stocks. Closing prices in Hong Kong usually serve as benchmark prices for London and New York market makers.

4.2 **Hong Kong as an International Financial Center:** The recent trend has been toward increased globalization of financial markets and toward 24-hour trading. The Hong Kong market is in a unique position to take advantage of this trend. With this globalization trend in mind, the following policy recommendations are provided.

4.3 **Increased Capital Commitment by SEHK Members:** Numerous London market makers and the portfolio managers interviewed argued that there was insufficient capital in Hong Kong to support large institutional trades. In 1995, the average size of these trades was £237,000 which equates (roughly) to HK$2,995,000. We estimate that only about 0.50 per cent of all Hong Kong trades are at least this large. With the average size of these London trades increasing and the likelihood that their size and frequency may also increase, it is appropriate for SEHK members to increase capital commitment in Hong Kong to facilitate such trades occurring in Hong Kong rather than elsewhere.

4.4 **Extension of Hong Kong Trading Hours:** It is recommended that the extension of Hong Kong trading hours be considered. Because of cost implications for the SEHK, the Hong Kong Futures Exchange (HKFE), their members, and the clearing houses (the Hong Kong Securities Clearing Co., Ltd. and HKFE Clearing Corporation Ltd.), a straightforward extension of trading hours by one or two hours may not make much economic sense. However, the NYSE's off-hour trading in the form of crossing sessions may be a viable option to consider.[27] By scheduling two cross sessions, one for individual stocks similar to NYSE's cross session I between 4:00 p.m. - 5:00 p.m. and another for multi-stock baskets similar to NYSE's cross session II between 5:00 p.m. and 6:00 p.m., the Hong Kong market can provide "real time" access to London traders and market makers during London's heavy trading hours immediately after it begins trading at 8:30 a.m., GMT (or 4:30 p.m. in Hong Kong). The purpose of adding cross sessions is not to recapture the London volume in SEHK-listed stocks but to increase trading volume in both London and Hong Kong by providing a maximum overlapping trading hours between the two critically linked markets. Additionally, empirical evidence suggests that a shorter nontrading period lowers price volatility. Thus, an effective extension of Hong Kong trading hours by adding cross sessions will facilitate the price discovery process of SEHK-listed stocks.[28] For local Hong Kong brokers, the AMS second terminals can be readily utilized for crossing sessions. The cross sessions can facilitate program trades.

4.5 **Reduction or Elimination of Stamp Duty:** London market makers view the stamp duty as an impediment to the Hong Kong market developing to an international financial center. Either reduction or elimination of stamp duty may be considered.

4.6 **Encouraging Offshore Listing of Hong Kong-Based Stocks:** The evidence presented in this study suggests that offshore trading does facilitate the price discovery process. An argument can be made that when pertinent information relevant to one of these securities appears at a time when SEHK is closed, the price adjustment reflecting the new information in a liquid market is beneficial. Further, expanded listings to other countries can broaden investor interest in these securities, expanding and deepening the shareholder base. Non-U.S. companies experience an average decline of 114 basis points in the home market cost of capital after listing in the U.S.[29] From the SEHK's viewpoint, the most important consideration is the change in liquidity in the Hong Kong market after Hong Kong-based stocks are cross-listed offshore. Past empirical evidence indicates that the post-listing volume in the home market increases and stocks experience a significant reduction in bid-ask spreads in the home market largely due to the competition from the offshore market.[30]

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[27] In June 1991, the NYSE introduced two post-4:00 p.m. close crosses: crossing session I (CSI), which operates between 4:15 p.m. and 5:00 p.m., makes it possible to cross individual stocks at closing prices whereas crossing session II (CSII), which operates between 4:00 p.m. and 5:15 p.m., facilitates trading of multi-stock baskets (valued at US$1 million or more). For CSI, orders may be one-sided round-lots or two-sided crosses comprised of offsetting buy and sell orders and for CSII, only paired crosses are accepted.

[28] Chang, Rhee, and Tawarangkoon (1997) report favorable impacts of extended trading hours on market volatility, trading volume, and the speed of price adjustment.

[29] See Karolyi (1996).

[30] See Karolyi (1996) and Foerster and Karolyi (1996).

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APPENDIX A: LIST OF FINANCIAL INSTITUTIONS INTERVIEWED

During the study period, three principals of the PACAP Research Center visited various financial institutions of the public and private sectors. Their input and information have been of extreme value in completing this report.

Hong Kong:	Hong Kong Futures Exchange
	James Capel Asia Limited
	Morgan Grenfell Asia Securities (HK) Ltd.
	Nomura International (Hong Kong) Ltd.
	SBC Warburg (Hong Kong)
	Stock Exchange of Hong Kong
	Securities & Futures Commission
U.S.A:	Bank of New York
	J.P. Morgan
	New York Stock Exchange
United Kingdom:	HSBC Investment Bank Plc.
	ING Baring Securities Ltd.
	London Stock Exchange
	Morgan Stanley & Co. International Limited
	NatWest Securities Limited
	Nikko Research Center (London)
	Nomura International Plc
	Nomura Research Institute Europe Limited
	Prolific Asset Management Limited
	Robert Fleming Securities Ltd.
	SBC Warburg
	Wheelock NatWest Securities Co.

APPENDIX B: LIST OF SAMPLE FIRMS AND CONTROL GROUP FIRMS

Sample Firms	Control Group Firms
Bank of East Asia	Amoy Properties Ltd.
Cathay Pacific Airways	Chinese Estate Holdings Ltd.
Cheung Kong (Holdings) Ltd.	Cross-Harbour Tunnel Co., Ltd.
China Light & Power	Dah Sing Financial Holdings Ltd.
Citic Pacific Ltd.	Dickson Concepts (International) Ltd.
Hang Seng Bank Ltd.	Harbour Centre Development Ltd.
Henderson Land Development Co., Ltd.	Henderson Investment Ltd.
Hong Kong & China Gas Co., Ltd.	HKR International Ltd.
Hongkong Electric Holdings Ltd.	Hong Kong Ferry (Holdings) Ltd.
Hong Kong Telecom	Jardine International Motor Holdings
Hopewell Holdings Ltd.	Maanshan Iron & Steel Co., Ltd. 'H'
Hutchinson Whampoa Ltd.	Oriental Press Group Ltd.
Hysan Development Co., Ltd.	Pacific Concord Holding Ltd.
New World Development Co., Ltd.	Shaw Brothers (Hong Kong) Ltd.
Sun Hung Kai Properties Ltd.	Sino Land Co., Ltd.
Swire Pacific Ltd. 'A'	Tai Cheung Holdings Ltd.
Wharf (Holdings) Ltd.	Tsim Sha Tsui Properties Ltd.
Wheelock and Co., Ltd.	Wing Lung Bank Ltd.

Firms in the SFC's Initial List but Excluded from the Final Sample

CDL Hotels International Ltd.
Dairy Farm International Holdings
Great Eagle Holdings Ltd.
Hang Lung Development Co., Ltd.
Hongkong Land Holdings Ltd.
HSBC Holdings Plc.
Johnson Electric Holdings Ltd.
Lai Sun Garment (International) Ltd.
Mandarin Oriental International Ltd.
Shanghai Petrochemical Co. Ltd. 'H'
Shun Tak Holdings Ltd.
Sime Darby Hong Kong Ltd.
South China Morning Post (Holdings)
Television Broadcasts Ltd.
VTech Holdings Ltd.
Wah Kwong Shipping Holdings Ltd.

Appendix C: AN OVERVIEW OF AMERICAN DEPOSITARY RECEIPTS (ADRs)

C.1 **Introduction:** An ADR is a negotiable certificate that represents a fixed number of home (Hong Kong) market shares. These home market shares are deposited in a depositary bank in the U.S. and the ADRs are issued by that depositary bank. One ADR may represent one, ten, or some other number of home market shares (with the ratio being set to provide a "reasonable" price range for U.S. investors).

C.2 **Classification:** Three Types of ADRs are available: (i) unsponsored; (ii) sponsored; and (iii) private.

C.3 **Unsponsored ADRs:** Unsponsored ADRs are instruments in which the issuer essentially has no involvement. There are no disclosure obligations of the issuer. They are unregistered and unlisted. They are usually traded over-the-counter, and unsponsored ADRs are not a means of raising capital. At present, the U.S. Securities and Exchange Commission (SEC) requirements and stock exchange rules preclude any growth in unsponsored programs.

C.4 **Sponsored ADRs:** Three levels exist within sponsored ADRs: Level I, II, and III [See Lopian (1994) and Sanford (1996)].

Level I: Level I ADRs are initiated by the issuer, but are unregistered and unlisted. No disclosure obligations are required. Like unsponsored ADRs, they are not a means of raising capital. They trade on the OTC market, but not over National Association of Securities Dealer Automated Quotation System (NASDAQ) or on the organized exchanges such as the New York Stock Exchange (NYSE) and the American Stock Exchange (AMEX).

Level II: The issuer has chosen to list without an offering. Financial disclosure is required and reconciliation of the foreign market accounting to US GAAP is also required, but Level II ADRs are still not a means of raising capital. They trade at the NASDAQ, AMEX, and NYSE.

Level III: The issuer has chosen to list with an offering. Rigorous disclosure requirements and US GAAP reconciliations are imposed. Level III ADRs represent a valid means of raising capital. They usually trade at the AMEX and NYSE.

C.5 **Private ADRs:** Private ADRs allows private placements of to large institutional investors [usually less than five and known as qualified institutional buyers (QIBs)] under Rule 144(a). Private ADRs have been extensively used (since Rule 144(a) was adopted) by non-US companies to access the U.S. institutional market. They are subject to resale restrictions for at least two years before they may be sold to U.S. public investors. The Global depositary receipts (GDRs) are also one form of private ADRs. Private ADRs represent a valid means of raising fund.

C.6 **Number of ADRs:** As of 1995, there are 1,209 ADR programs, not including private ADRs:

Year	Number
1990	836
1991	886
1992	924
1993	986
1994	1,124
1995	1,209

C.7 **ADR Programs by Country:** Top five countries in the ADR programs are: United Kingdom (20%), Australia (16%), Japan (15%), South Africa (8%) and Hong Kong (6%).

C.8 **ADR Programs on NYSE, AMEX, and NASDAQ:**

Year	Number
1990	176
1991	186
1992	215
1993	256
1994	317
1995	357

C.9 **Benefits to ADR Issuers:** The benefits are: first, promotion of the issuer's US commercial activities without raising capital; second, access to the US market to raise capital and to attract financial analyst's coverage; and third, diversification of the issuer's shareholder base outside its home country.

C.10 **Benefits to ADR Investors:** From the investor's perspective, ADRs allow easier expansion of portfolios internationally. Issues are quoted in and pay dividends in U. S. Dollars, settlement is identical to that of U. S. securities, ADRs eliminate costly global custodian fees, and for institutional holders overcome certain legal obstacles to holding foreign securities (such as Section 17(f) and Rule 17f-5 of the Investment Company Act of 1940).