

OTC FINANCIAL DERIVATIVES MARKETS IN ASIA AN INITIATIVE TOWARDS GLOBALISATION

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ABSTRACT

This paper attempts to review OTC derivatives markets, in 8 Asian economies, namely- China, Chinese Taipei, India, Indonesia, Korea, Malaysia, Philippines and Thailand. At the same time, it attempts to identify factors determining the OTC foreign exchange, derivatives turnovers. The simple bi-variate correlations of foreign exchange derivatives turnover, with some structural economic factors, that are generally associated with the growth of derivatives markets have been studied. The aim is to identify potential drivers of foreign exchange derivatives turnover, as a first step in a more rigorous econometric analysis.

The study shows that, activities in OTC derivatives markets are growing in these Asian economies and their share in global derivatives markets is increasing as well. The pace of activities in OTC interest rate derivatives, in these economies lagged behind that, of OTC foreign exchange derivatives activities. This reflects the lagging development and liquidity in the bond, and money markets in these economies in contrast to those, in advanced economies.

There has been major share of activities, in derivatives markets with reporting dealers, indicating relative immaturity of OTC derivatives markets, in these economies. About one-third of transactions in derivatives markets, in these Asian economies, related to cross-border. However, this is far below the level of cross border transactions, in advanced economies.

According to the study, financial openness, level of foreign exchange reserves and trade openness of the economies appear as main driving forces behind the activities and turnovers, in OTC foreign exchange derivatives markets.

KEYWORDS: Foreign Exchange Derivatives, Interest Rate Derivatives, Foreign Exchange Outright Forwards, Foreign Exchange Swaps, Currency Swaps

INTRODUCTION

The World Bank and IBM were among the first institutions, that in 1981 developed derivatives and swapped loans, of different currencies. Thereafter, highly customized interest rate and foreign exchange products were developed by leading financial institutions, which created the so-called over the counter (OTC) derivatives market. Further innovations led to the creation of new products, encouraged by little regulation and higher profit margins, in the oligopolistic markets dominated by the U.S. banks.

Financial derivatives markets, improve the resilience of the financial system, by allowing market participants to effectively manage risks. The global financial crisis (GFC) 2008 exposed the weakness in the structure of over the counter

(OTC), derivatives markets that had contributed to the build-up of systemic risk and potential for contagion, arising from the interconnectedness of OTC derivatives markets participants, and the limited transparency of the markets. In response to the financial crisis, the G-20 initiated a series of reforms designed to strengthen the regulation and oversight of the financial system, and tasked the Financial Stability Board (FSB), with coordinating the reforms and assessing their implementation.

Global OTC derivatives markets have been dominated by advanced economies, of North America and Western Europe. Except Japan, Hong Kong and Singapore, Asian economies lagged behind in trading activities, in global OTC derivatives markets. Now, some Asian economies are on path of globalization, though their OTC derivatives markets are still small in size in comparison of global OTC derivatives markets.

This paper looks at the rapidly growing market, for OTC derivatives in Asia. The study covers 8 Asian countries, called hereinafter Asia-8, namely- China, Chinese Taipei, India, Indonesia, Korea, Malaysia, Philippines and Thailand. Hong Kong and Singapore are excluded as outliers.

The Triennial Central Bank Survey of OTC derivatives market activity, published by the Bank for International Settlements, provides data on OTC derivatives market activities, on global as well as on an individual basis. Data on financial openness, trade openness and foreign exchange reserves, have been procured from International Financial Statistics, published by the International Monetary Fund.

This paper is organized as follows. The first section introduces the paper. The second section looks at the size, structure and growth of OTC derivatives markets, at global basis. The third section focuses on the OTC foreign exchange derivatives, in Asia-8, namely- China, Chinese Taipei, India, Indonesia, Korea, Malaysia, Philippines and Thailand. The section four looks at OTC interest rate derivatives markets in Asia-8. The fifth section attempts to identify factors underpinning the growth in OTC foreign exchange derivatives turnover. The final section concludes the paper.

Global OTC Derivatives Markets

The over the counter (OTC) derivatives global markets, daily average turnover, including both foreign exchange and interest rate derivatives, increased from \$ 1224 billion in April, 1998 to \$5642 billion in April, 2013 indicating more than a fourfold increase over the period. Diagram 1 shows growth of global OTC derivatives turnover, during 1998-2013. Global interest rate derivatives turnover, accounted for 40% of total OTC derivatives markets. This in contrast to global exchange traded derivatives markets, where about a two-third of the activities is accounted by interest rate derivatives markets.

Figure 1: OTC Derivatives Turnover: Global and Asia-8
(Daily averages in April, in billions of U.S. dollars)

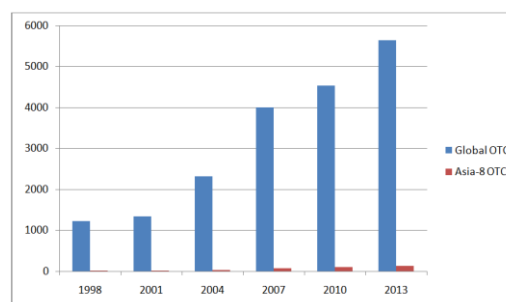


Table 1, shows growth and composition of OTC foreign exchange derivatives turnover, in global markets. Global OTC foreign exchange derivative's daily average turnover, which was \$ 959 billion in April, 1998, rose to \$ 3299 billion in April, 2013 recording more than a threefold increase during the period.

In terms of instruments, foreign exchange swaps comprise the lion's share of turnover (over 70%), followed by outright forwards (20%), options (8%) and currency swaps (2%).

Turning to the involvement of traders, in trading foreign exchange derivatives in global markets, the share of trade with other financial institutions- such as pension funds and hedge funds- increased, substantially from 19 percent in April, 1998 to 49 percent in April, 2013. At the same time, the share of trade with reporting dealers (usually primary dealers- commercial and investment banks) declined from 64 percent in April, 1998 to 42 percent in April, 2013. The share of trade with non-financial customers steadily declined from 17 percent in April, 1998 to 9 percent in April, 2013. Factors underpinning the shift towards trading with financial customers include the increasing active pursuit of carry trades and other short term strategies (Mihaljek and Packer (2010)).

Counter parties to foreign exchange derivatives trades, are increasingly from different jurisdictions. The share of cross border transactions was about 60 percent, in total foreign exchange derivatives trades, while trades with local dealers comprised 40 percent share.

In terms of currency composition, 87 percent of trades (double currency) in OTC foreign exchange derivatives trade were in U.S. dollar, followed by the Euro, Japanese Yen, Great Britain Pound and Australian dollar.

Table 1: Global Foreign Exchange OTC Derivatives Turnover
(Daily averages in April, in billions of U.S. dollars)

Instrument/ Mode	1998	2001	2004	2007	2010	2013
Outright forwards	128 (13)	130 (15)	209(16)	362 (16)	475 (19)	680 (20)
Forex swaps	734 (77)	656 (77)	954 (73)	1714 (74)	1759 (71)	2228 (68)
Currency swaps	10 (1)	7 (1)	21 (2)	31 (1)	43 (2)	54 (2)
Options & other products	87 (9)	60 (7)	119 (9)	212 (9)	207 (8)	337 (10)
Total	959 (100)	853 (100)	1303 (100)	2319 (100)	2483 (100)	3299 (100)
With reporting dealers	614 (64)	503 (59)	713 (55)	966 (42)	1027 (41)	1395 (42)
With other financial institutions	178 (19)	235 (28)	422 (32)	945 (41)	1142 (46)	1626 (49)
With non-financial customers	167 (17)	115 (13)	168 (13)	408 (17)	314 (13)	278 (9)
Total	959 (100)	853 (100)	1303 (100)	2319 (100)	2483 (100)	3299 (100)
Local	415 (43)	342 (40)	479 (37)	854 (37)	792 (32)	1325 (40)
Cross-border	544 (57)	511 (60)	824 (63)	1465 (63)	1791 (68)	1974 (60)
Total	959 (100)	853 (100)	1303 (100)	2319 (100)	2483 (100)	3299 (100)
USD*	87	90	88	86	85	87
EUR*	----	38	37	37	39	33
JPY*	22	24	21	17	19	23
GBP*	11	13	16	15	13	12
AUD*	3	4	6	7	8	9

Note: 1. Adjusted for local and cross border inter-dealer double counting (i.e. 'Net-net' basis).

2. Figures in parentheses represent percentages.

3. (*) indicates the percentage share, double counting, of the currency in global foreign

Exchange turnover including spot, outright forwards, foreign exchange swaps,

Currency swaps, options & other products.

Source: Bank for International Settlements, *Triennial Central Bank Survey*, Various Issues.

The composition and growth of global OTC interest rate derivatives, activities are shown in table 2. Global OTC interest rate derivatives daily average turnover, increased from \$265 billion in April, 1998 to \$ 2343 in April, 2013. The growth of global OTC interest rate derivatives was more than eightfold during the period, far ahead of three and a half fold increase in OTC foreign exchange derivatives turnover.

In terms of interest rate instruments, interest rate swaps comprised major share of turnover (over 60%). The share of forward rate agreements in total turnover, increased from 28 percent in April, 1998 to 32 percent in April, 2013. In contrast to swaps and FRAs, the share of options steadily declined from 14 percent in April, 1998 to 7 percent in April, 2013.

There is a paradigm shift in the composition parties, making transactions in global OTC interest rate derivatives markets. The share of financial institutions in interest rate derivatives trades, increased from 34 percent in April, 1998 to 58 percent in April, 2013. While at the same time, the shares of reporting dealers and non-financial customers declined from 56 percent and 10 percent to 35 percent and 7 percent, respectively.

Majority of OTC interest rate derivatives trades, in global markets were cross-border transactions. The share of local transactions in total OTC interest rate derivatives trades, declined from 50 percent in April, 1998 to 45 percent in April, 2013.

Table 2: Global OTC Interest Rate Derivatives Markets Turnover
(Daily Averages in April, in billions of U.S. dollars)

Instrument/ Mode	1998	2001	2004	2007	2010	2013
FRA's	74 (28)	129 (26)	233 (23)	258 (15)	600 (29)	754 (32)
Swaps	155 (58)	331 (68)	620 (60)	1210 (72)	1272 (62)	1415 (61)
Options & other products	36 (14)	29 (6)	171 (17)	217 (13)	182 (9)	174 (7)
Total	265 (100)	489 (100)	1025 (100)	1686 (100)	2054 (100)	2343 (100)
With Reporting Dealers	150 (56)	323 (66)	494 (48)	800 (47)	896 (44)	816 (35)
With other financial institutions	86 (34)	142 (29)	450 (44)	747 (44)	937 (46)	1354 (58)
With non-financial customers	27 (10)	25 (5)	79 (8)	136 (8)	221 (11)	169 (7)
Total	265 (100)	489 (100)	1025 (100)	1686 (100)	2054 (100)	2343 (100)
Local	133 (50)	207 (42)	414 (41)	564 (34)	756 (37)	1065 (45)
Cross-border	132 (50)	282 (58)	609 (59)	1120 (66)	1298 (63)	1274 (55)
Total	265 (100)	489 (100)	1025 (100)	1686 (100)	2054 (100)	2343 (100)

Note: 1. Single currency interest rate contracts only.

2. Adjusted for local and cross-border inter-dealer double counting (i.e. 'Net-net' basis).

3. Figures in parentheses represent percentages.

Source: Bank for International Settlements, *Triennial Central Bank Survey*, Various Issues.

OTC Foreign Exchange Derivatives Markets in Asia-8

The daily average turnover of OTC foreign exchange derivatives in Asia-8, which was \$8.26 billion in April, 1998, rose to \$98.842 billion in April, 2013, registering a twelve-fold increase during this period. This was far higher than the growth of turnover of OTC foreign exchange derivatives at global level.

In terms of foreign exchange instruments, the OTC derivatives markets in Asia-8 have converted to global markets' pattern. Foreign exchange swaps comprise a major share of turnover (71%), followed by outright forwards (22%), options (6%) and currency swaps (1%).

As far as traders involved in foreign exchange derivatives markets in Asia-8 are concerned, the picture is quite different from that of global markets. The share of trade with reporting dealers (general commercial banks and investment banks) has been about 62 percent of turnover. The share of trade with non-financial customers varied between 29 percent and 16 percent during 1998-2013. The share of trade with other financial institutions hovered around 20 percent, which was far below the level prevailing in advanced economies. This reflects immaturity in derivatives markets in Asia-8 and low level of involvement of financial institutions- such as pension funds and hedging funds in foreign exchange derivatives markets.

Table 3: OTC Foreign Exchange Derivatives Turnover in Asia-8
(Daily averages in April, in millions of U.S. dollars)

Instrument/ Mode	1998	2001	2004	2007	2010	2013
Outright forwards	1761·(21)	2879·(26)	6934·(30)	14857·(25)	17872·(25)	21477·(22)
Forex swaps	5972·(72)	7141·(66)	13284·(59)	37268·(63)	49317·(68)	6997671
Currency swaps	70·(1)	100·(1)	738·(3)	1842·(3)	1594·(2)	1634·(1)
Options & other products	457·(6)	776·(7)	1741·(8)	5566·(9)	3865·(5)	5755·(6)
Total	8260·(100)	10889·(100)	22697·(100)	59534·(100)	72648·(100)	98842·(100)
Local	4169·(51)	7141·(66)	14378·(63)	38346·(64)	53075·(73)	67689·(69)
Cross-border	4091·(49)	3748·(34)	8319·(37)	21188·(36)	19573·(27)	31153·(31)
Total	8260·(100)	10889·(100)	22697·(100)	59534·(100)	72648·(100)	98842·(100)
With reporting dealers#	59	69	57	63	50	62
With other financial institutions#	12	12	20	19	22	22
With non-financial customers#	29	19	23	18	28	16
Total	100	100	100	100	100	100
CNY*	0	0	0	0	1	2
INR*	0	0	0	1	1	1
IDR*	0	0	0	0	0	0
KRW*	0	1	1	1	1	1
PHP*	0	0	0	0	0	0
MYR*	0	0	0	0	0	0
THB*	0	0	0	0	0	0
NTD*	0	0	0	0	0	0
Total	0	1	1	2	3	4

Note: 1. Adjusted for local inter-dealer double-counting (i.e. 'Net-gross' basis).

2. Figures in parentheses represent as percentages to turnover in Asian-8 countries.

3. # indicates the percentage composition of foreign exchange derivatives turnover in Asian-8 countries.

3. (*) indicates the percentage share of the currency in global foreign exchange turnover,

Including spot, outright forwards, foreign exchange swaps, currency swaps, options & other products.

Source: Bank for International Settlements, *Triennial Central Bank Survey*, Various Issues.

In terms of geographical jurisdiction of counter parties, the markets in Asia-8 are not converging towards the pattern in global markets. The share of cross-border transactions in turnover of foreign exchange derivatives has been about 30 percent, which is just opposite the pattern prevailing in global OTC foreign exchange derivatives markets. The

majority of trade in Asia-8 has been local transactions.

The share of Asia-8 countries' currencies in global OTC foreign exchange derivatives markets is increasing over the years. The share of these countries' currencies in global foreign exchange derivatives daily average turnover, which was almost nil in April, 1998 rose to 4 percent in April, 2013.

Table 4 shows the geographical distribution of OTC foreign exchange derivatives turnover in Asia-8 region. The share of Asia-8 in global OTC foreign exchange derivatives turnover rose from 0.6 percent in April, 1998 to 2.4 percent in April, 2013. The fastest growth of OTC foreign exchange derivatives turnover was recorded in China, where the daily average turnover rose to \$ 21.103 billion in April, 2013 from \$ 0.943 billion in April, 2007. In case of Korea, the turnover increased from \$ 1.046 billion in April, 1998 to \$ 27.681 billion in April, 2013. The turnover of OTC foreign exchange derivatives in India, which was \$ 1.227 billion in April, 1998, increased to \$ 15.811 billion in April, 2013. The markets in Chinese Taipei, Malaysia, Thailand, Philippines and Indonesia also recorded growth in the turnover of OTC foreign exchange derivatives.

Table 4: OTC Foreign Exchange Derivatives Turnover in Asian-8
(Daily averages in April, in Millions of U.S. Dollars)

Country	1998	2001	2004	2007	2010	2013
China	0 (0.0)	----	0 (0.0)	943 (0.0)	11170 (0.4)	21103 (0.5)
Chinese Taipei	1522 (0.1)	1667 (0.1)	4633 (0.3)	6727 (0.2)	10255 (0.3)	16667 (0.4)
India	1227 (0.1)	1847 (0.2)	3459 (0.2)	23927 (0.8)	13866 (0.4)	15811 (0.4)
Indonesia	1038 (0.1)	533 (0.0)	1357 (0.1)	1320 (0.1)	1253 (0.0)	1674 (0.0)
Korea	1046(0.1)	4041(0.3)	10071 (0.6)	18616 (0.6)	25446 (0.9)	27681 (0.7)
Malaysia	798 (0.0)	894 (0.1)	854 (0.0)	1814 (0.1)	3331 (0.1)	6069 (0.2)
Philippines	403 (0.0)	605 (0.1)	342 (0.0)	1255 (0.0)	2896 (0.1)	2141 (0.0)
Thailand	2226 (0.2)	1302 (0.1)	1981 (0.1)	4932 (0.2)	4431 (0.1)	7696 (0.2)
Total	8260 (0.6)	10889 (0.9)	22697 (1.3)	59534 (2.0)	72648 (2.3)	98842 (2.4)

Note: 1. Adjusted for local inter-dealer double-counting (i.e. 'net-gross' basis).

2. Figures in parentheses represent as percentages to the global turnover.

Source: Bank for International Settlements, *Triennial Central Bank Survey*, Various Issues.

The OTC foreign exchange derivatives turnover in Korea comprised 0.7 percent share of global OTC foreign exchange derivatives markets turnover. China followed Korea having 0.5 percent share of global turnover. India and Chinese Taipei cornered 0.4 percent share of global turnover each. Thus, Asia-8 OTC foreign exchange derivatives markets are on the path of globalisation. The derivatives markets in Asia-8 remain small as compared to advanced economies. Though Asia-8 economies are moving towards globalisation of their derivatives markets, if we compare the derivatives turnover as percentage of GDP, the ratio is far below in Asia-8 economies as compared to that of advanced economies.

The trading of OTC foreign exchange derivatives in Asia-8 has conversed towards global markets' pattern in terms of instruments and currencies but not in case of counterparties involved in trading.

OTC Interest Rate Derivatives Markets in Asia-8

Table 5 shows geographical distribution of OTC interest rate derivatives turnover in Asia-8 during 1998-2013. The share of Asia-8 in global OTC interest rate derivatives daily average turnover rose from nil in April 1998 to 0.9

percent in April 2013. The activities in OTC interest rate derivatives markets in Asia-8 region are mainly taking place in only in China, Korea and India, albeit with a small share in global markets. The growth of OTC interest rate derivatives markets in Asia-8 lagged behind that of OTC foreign exchange derivatives markets. The interest rate derivatives markets in Asia-8 are much smaller than the foreign exchange markets, with the daily average turnover of \$ 26 billion in April 2013. The share of OTC interest rate derivatives turnover in the total OTC derivatives turnover in Asia-8 region is about 20 percent, remaining 80 percent comprised of OTC foreign exchange derivatives.

Table 5: OTC Interest Rate Derivatives Turnover in Asia-8
(Daily Averages in April, in Billions of U.S. Dollars)

Country	1998	2001	2004	2007	2010	2013
China	----	----	----	----	2 (0.1)	13 (0.5)
Chinese Taipei	0 (0.0)	0 (0.0)	2 (0.1)	1 (0.1)	2 (0.1)	1 (0.0)
India	----	0 (0.0)	1 (0.1)	3 (0.2)	3 (0.1)	3(0.1)
Indonesia	----	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Korea	0 (0.0)	0 (0.0)	1 (0.1)	5 (0.2)	11 (0.4)	8 (0.3)
Malaysia	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Philippines	----	----	0 (0.0)	0 (0.0)	1 (0.0)	0 (0.0)
Thailand	----	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.0)	1 (0.0)
Total	0 (0.0)	0 (0.0)	4 (0.3)	8 (0.6)	20 (0.7)	26 (0.9)

Note: 1.Single currency interest rate contracts only.

2. Adjusted for local inter-dealer double-counting (i.e. ‘net-gross’ basis).`

3. Figures in parentheses represent as percentages to global turnover.

Source: Bank for International Settlements, *Triennial Central Bank Survey*, Various Issues.

The overall activity in interest rate derivatives markets in Asia-8 nevertheless remains low relative to advanced countries: Asia-8 markets turnover is 0.9 percent of the global total, versus 2.4 percent for foreign exchange derivatives turnover. This asymmetry probably reflects the lagging development and liquidity of bond and money markets in Asia-8 relative to those in advanced economies. This indicates that bond and money markets are still under-developed in Asia-8 region.

The relative immaturity of OTC interest rate derivatives markets in Asia-8 is also apparent in the degree to which trading still takes place with reporting dealers (about two-thirds). In contrast, only 30 percent of trading takes place with reporting dealers in OTC interest rate derivatives markets in advanced economies.

Determinants of OTC Foreign Exchange Derivatives Turnover

To determine potential drivers of OTC foreign exchange derivatives turnover, data spanning from 1998 to 2013 have been collected. The panel data set covers 8 Asian economies (Asia-8) over six Triennial Surveys conducted since 1998. Hong Kong and Singapore are excluded as outliers. The dependent variable is daily average turnover of OTC foreign exchange derivatives (outright forwards, Foreign exchange swaps, currency swaps, options and other foreign exchange derivatives) measured in billions of U.S. dollars in country i (i = 1,---,----,---,8) in April at Triennial Survey year t (t = 1998, 2001,2004, 2007, 2010 and 2013). The independent variables are financial openness, trade openness and foreign exchange reserves measured in billions of U.S. dollars in country i (i = 1,---, ---, ---, 8) at Triennial Survey year t (t = 1998, 2001, 2004, 2007, 2010, 2013).

The following relationship is tested to identify potential factors determining the foreign exchange derivatives turnovers:

$$Y_{it} = a + b X_{it}$$

Where, Y: Daily average turnover of OTC foreign exchange derivatives turnover,

X: Independent variable, i.e. financial openness, trade openness and foreign exchange Reserves.

The financial openness has been measured by the aggregate of foreign assets and liabilities of the economy. The trade openness has been measured by the total of exports and imports of the economy. Since the daily turnover of OTC foreign exchange derivatives depends on past and forthcoming events, annual values have been considered in case of independent variables, i.e. financial openness, trade openness and foreign exchange reserves.

The statistics of the variables are given in Appendix 1. Appendix 2 gives correlations among the variables considered in the study. It is apparent that there is high degree of multi-collinearity among the variables, particularly between financial openness and foreign exchange reserves. So, it is advisable not to use multiple regression analysis to identify the potential determinants of turnover of the OTC foreign exchange derivatives.

The simple bi-variate correlations have been studied to identify the factors determining the turnovers of OTC foreign exchange derivatives. The objective of test is to identify potential drivers of the OTC foreign exchange derivatives turnovers as a first step in a more rigorous econometric analysis.

The results are shown in table 6.

Table 6: Determinants of Foreign Exchange Derivatives Turnovers in Asia-8

Determinant	Level Form			Log Form		
	b	p-value	R ²	b	p-value	R ²
XM	0.0028	0.01	0.14	0.73	0.00	0.40
AL	0.0021	0.00	0.23	0.80	0.00	0.49
FXR	0.0015	0.01	0.14	0.63	0.00	0.46

In the above table, XM: trade openness, AL: financial openness and FXR: foreign exchange reserves.

The first variable which comes in mind to explain the turnover of foreign exchange derivatives is financial openness, i.e. the size of external assets and liabilities. The derivatives are used to hedge exchange rate risk in the value of assets and liabilities. There is a strong positive relationship between the two variables in the sample. A 10 percent higher holdings of external assets by Asia-8 countries are associated 0.021 percent (of holdings of external assets and liabilities) higher turnover of foreign exchange derivatives. The results are statistically significant even at 0% level of significance. The correlation holds for both levels and growth rates. A 10 percent growth of holdings of external assets and liabilities is associated with 8 percent growth of foreign exchange derivatives turnover.

The second variable that suggests itself intuitively when we think of explaining the turnover of foreign exchange derivatives is gross trade flows (trade openness). The traditional role of derivatives as a hedge against exchange rate risk and demand for foreign exchange to settle cross border transactions, make the turnover of foreign exchange derivatives dependent of gross trade flows. There is indeed positive relationship between the two variables in the study, 10 percent higher gross trade flows are associated with 0.028 percent (of gross trade flows) higher daily turnover of foreign exchange

derivatives, which is statistically significant at 1% level of significance. When we study the relationship in terms of growth rates, more strong relationship holds: 10 percent growth of gross trade flows is associated with 7.3 percent growth of foreign exchange derivatives turnover.

The third variable considered in determining the turnover of foreign exchange derivatives is the level of foreign exchange reserves. The build-up in the foreign exchange reserves supports the initiatives of liberalisation of many of the controls- capital or others- and thereby eventually influencing the activities and turnover in foreign exchange derivatives markets. There is strong positive relationship between turnover of foreign exchange derivatives in Asia-8 and foreign exchange reserves level in Asia-8. A 10% higher level of foreign exchange reserves is associated 0.015 percent (of foreign exchange reserves level) higher daily turnover of foreign exchange derivatives, which is statistically significant at 0% level of significance. When we study the relationship in terms of growth rates, more strong relationship holds: 10 percent growth of foreign exchange reserves is associated with 6.3 percent growth of foreign exchange derivatives turnover.

The variables studied above viz., financial openness, trade openness and foreign exchange reserves level, are potential drivers of turnover of foreign exchange derivatives. There is further scope to include more structural variables in the model and use advance econometric methods to confirm the variables determining the turnover of foreign exchange derivatives, instead of employing simple bi-variate correlations.

CONCLUSIONS

Though still small in size in comparison of global OTC derivatives markets, growth of derivatives markets in Asia -8 remains more rapid than in advanced economies. China, Korea and India are promising derivatives markets in the region. The foreign exchange derivatives are by far the most commonly traded instruments. The OTC derivatives markets in Asia-8 have by far not converged with global derivatives markets in terms of counter parties involved in trades and geographical jurisdiction of transactions. Money markets and bond markets are still underdeveloped in Asia-8. The OTC derivatives markets are immature in Asia-8. The growth of OTC foreign exchange derivatives in Asia-8 seems to be influenced by financial openness, trade openness and foreign exchange reserves level in the economies.

The following conclusions are drawn on basis of present study:

- Daily average turnover in Global OTC derivatives markets registered more than four-fold increase between April, 1998 and April, 2013. The increase was far more, about eight fold, in case global interest rate derivatives in comparison of a three-fold increase in global foreign exchange derivatives turnover. Global interest rate derivatives turnover accounted for 40% of total OTC derivatives markets. In terms of instruments, foreign exchange swaps comprise the lion's share of turnover (over 70%), followed by outright forwards (20%), options (8%) and currency swaps (2%).
- The turnover of OTC foreign exchange derivatives in Asia-8 registered an eight-fold growth between April, 1998 and April, 2013. This was far ahead of growth of turnover of OTC foreign exchange derivatives at global level. The share of Asia-8 in global OTC foreign exchange derivatives turnover rose from 0.6 percent in April, 1998 to 2.4 percent in April, 2013.
- The growth of OTC interest rate derivatives markets in Asia-8 lagged behind that of OTC foreign exchange derivatives markets. The share of OTC interest rate derivatives in total OTC derivatives in Asia-8 is about 20

percent; remaining 80% comprised of trade in OTC foreign exchange derivatives. This shows that the bond and money markets are still under-developed in Asia-8 region. The share of Asia-8 in global OTC interest rate derivatives daily turnover rose from nil in April 1998 to 0.9 percent in April 2013.

- In terms of foreign exchange instruments, the OTC derivatives markets in Asia-8 have conversed to global markets' pattern. Foreign exchange swaps comprise major share of turnover (71%), followed by outright forwards (22%), options (6%) and currency swaps (1%).
- The share of cross border transactions in turnover of foreign exchange derivatives in Asia-8 has been about 30 percent, which is just opposite the pattern prevailing in global OTC foreign exchange derivatives markets. Majority of trade in Asia-8 has been local transactions.
- As far as traders involved in foreign exchange derivatives markets in Asia-8 are concerned, the picture is different from that of global markets. The share of trade with reporting dealers (generally commercial banks and investment banks) has been about 62 percent of turnover of foreign exchange derivatives. The share of trade with non-financial customers varied between 29 percent and 16 percent during 1998-2013. The share of trade with other financial institutions hovered around 20 percent, which far below the level prevailing in advanced economies. This reflects immaturity in derivatives markets in Asia-8 and low level of involvement of financial institutions- such as pension funds and hedging funds in foreign exchange derivatives markets.
- The share of Asia-8 economies' currencies in global OTC foreign exchange derivatives markets is increasing over the years. The share of these countries' currencies in global OTC foreign exchange derivatives, which was almost nil in 1998 rose to 4 percent in 2013.
- The fastest growth of OTC foreign exchange derivatives turnover was recorded in China, where daily average turnover rose to \$ 21.103 billion in April, 2013 from \$ 0.943 billion in April, 2007. In case of Korea, the turnover increased from \$ 1.046 billion in April, 1998 to \$ 27.681 billion in April, 2013. The turnover of OTC foreign exchange derivatives in India, which was \$ 1227 billion in April, 1998, increased to \$ 15.811 billion in April, 2013.
- The trading of OTC derivatives in Asia-8 has conversed towards global markets' pattern in terms of instruments and currencies but not in case of counterparties involved in trading.
- The relative immaturity of interest rate derivatives markets in Asia-8 is also apparent in the degree to which trading still takes place with reporting dealers (about two-third). In contrast, only 30 percent of trading takes place with reporting dealers in advanced economies.
- The activities in OTC interest rate derivatives markets in Asia-8 region are mainly taking place in only in China, Korea and India; albeit with a small share in global interest rate derivatives markets.
- The factors, namely- financial openness, trade openness and foreign exchange reserves level, seem the drivers of turnover of OTC foreign exchange derivatives. There is further scope to include more structural variables in the model and use advance econometric methods to identify variables determining the turnover of foreign exchange derivatives, instead of employing simple bi-variate correlations.

- Derivatives in Asian region are becoming more and more global. In addition to Hong Kong and Singapore, where an increasingly large share of OTC derivatives trades involving the foreign currencies are taking place, Asia-8, particularly Korea, China and India are also on globalisation path.

APPENDICES

Appendix 1: Descriptive Statistics

	FXT (US \$ bn)	XM (US \$ bn)	AL(US \$ bn)	FXR(US \$ bn)
Mean	5.940	600	1008	306
Median	2.061	292	418	100
Max	27.681	4666	9901	3821
Min	0.403	61	80	13
Std Dev	7.460	981	1734	703
Skewness	1.58	3.02	3.79	3.95
kurtosis	4.34	11.5	18.2	18.2
Jarque-Bera	22.64	21.01	552.8	563.9
Observations	46	46	46	46

Appendix 2: Correllogram

	FXT	XM	AL	FXR
FXT	1.00	0.37	0.48	0.37
XM		1.00	0.78	0.76
AL			1.00	0.99
FXR				1.00

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