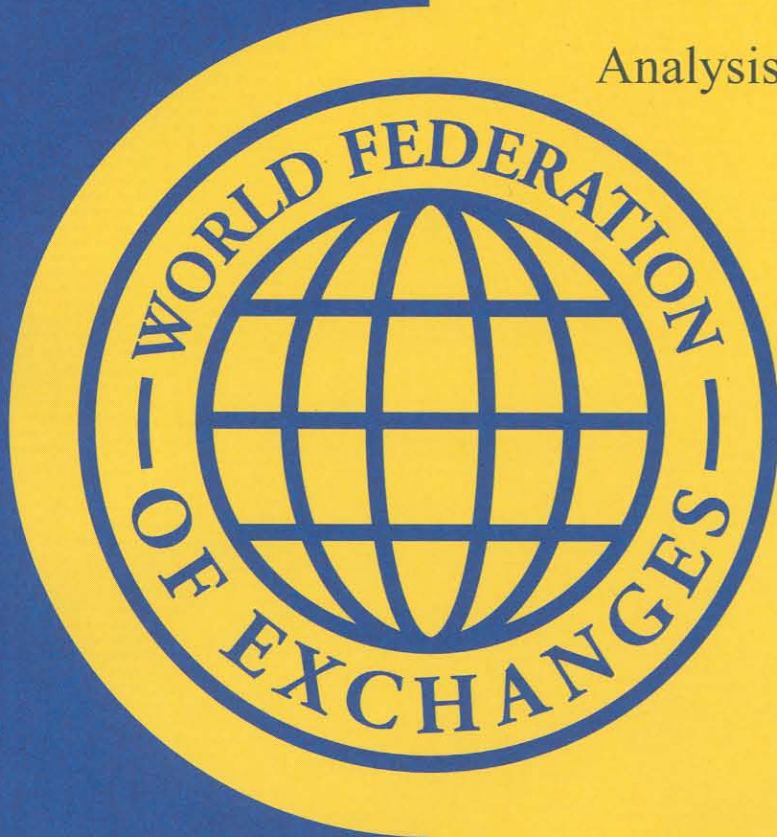


Equity derivatives and cash  
equity trading :

concentration and notional  
value comparisons.

Analysis of figures for 1995-2003



Commissioned by  
World Federation of Exchanges  
Written by Stephen Wells

December 2004



Every effort has been made to ensure that the information in this Survey is accurate at the time of printing, but the Secretariat cannot accept responsibility for errors or omissions.



## INTRODUCTION

In 2003, global equity derivatives exchanges saw a total of 5.6 bn equity (index and single stock) contracts traded, a rise of 34% on the 2002 figure of 4.2 bn contracts. The notional value of the 5.6 bn contracts was approximately \$50 bn. Global cash equity exchanges saw a total turnover of \$33.3 trillion<sup>1</sup>, a slight increase (0.9%) on the 2002 figure.

This report continues the analysis WFE provides of comparative developments in cash equity and equity derivatives markets and notes that in some regions, especially developing Asia, the growth of derivative markets has not entirely kept pace with evolution of cash markets.

The structure of the report is:

1. Regional development of equity derivatives markets <sup>2</sup>
2. Development of cash equity markets
3. Cash equity versus equity derivative volumes – update
4. Cross-sectional analysis of equity derivative notional values and cash equity values.
5. Concluding remarks

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<sup>1</sup> Otherwise expressed, \$33 trillion means \$ 33 000 000 million.

<sup>2</sup> As in last year's report, we note and adjust for the Korea Stock Exchange whose extremely high volumes of low notional value contracts cause distortions in the statistics which mask certain other interesting developments. In fact, this business is worth highlighting and analyzing.



## 1. REGIONAL DEVELOPMENT OF EQUITY DERIVATIVES MARKETS

In this section, we look at regional patterns of growth and have divided the global figures into regions based on geography and degree of financial market development.

The six regional groups are :

- Asia – developed
- Asia – developing
- Europe<sup>3</sup> – developed
- Europe - developing
- North America
- Latin America

Appendix A shows how exchanges are grouped by region, and Appendix B the key exchange data for participants in this study.

Table 1 shows the highlights of contract volumes by region for 2003:

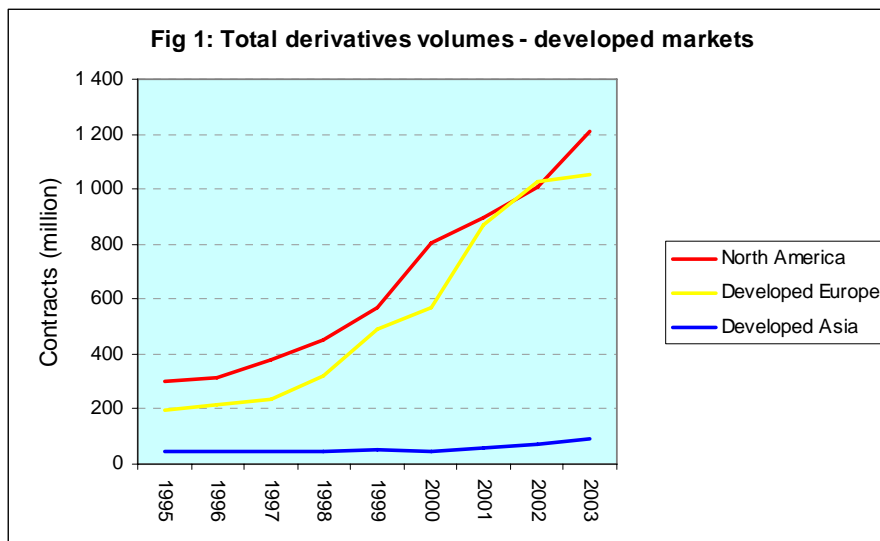
*Table 1 : Highlights of derivatives volumes 2003  
Key contract volume variations*

Region	Contract volume growth (m)	Exchange	Contract volume growth (m)
<i>North America</i>	203		
		Chicago Mercantile Exchange	+69
		International Securities Exchange	+93
<i>Latin America</i>	138		
		Bovespa	+86
		Bolsa de Buenos Aires	+50
<i>Developed Europe</i>	13		
		Eurex	+99
		Euronext	-79
<i>Developing Asia</i>	1,022		
		Korea Stock Exchange	+967
		National Stock Exchange of India	+30
		Taiwan Futures Exchange	+24

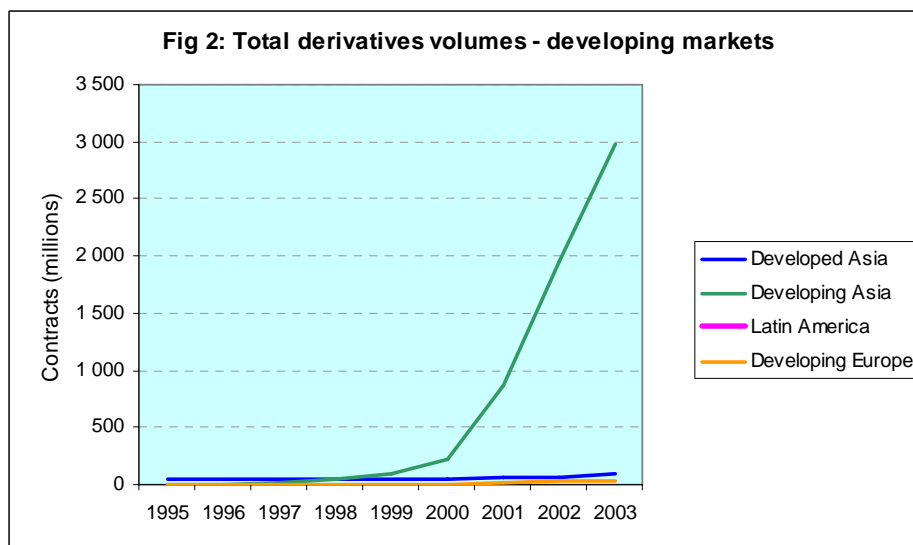
<sup>3</sup> Europe means European time zone, in order to accommodate Tel Aviv and Johannesburg Exchanges.



Figure 1 shows the growth in equity contract volumes over the period on developed markets. The US saw continued growth in equity contract volumes, especially at CME (+32 %) and ISE (+61 %). CBOE showed a small increase and AMEX a slight fall. In contrast, European volumes stagnated, with growth in stock option volumes at Eurex being offset by reductions in stock options at Euronext. Eurex also saw rapid growth in index futures. Developed Asia volumes are much lower than those in other markets (figure1) but continued to rise steadily (figure 3), with robust growth of 20 – 40 % on most developed Asian exchanges.

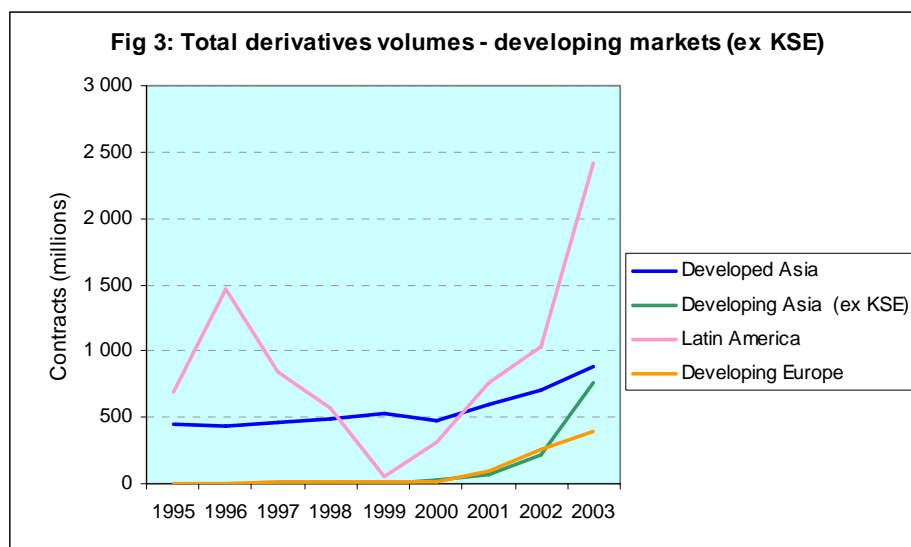


Among developing markets (figure 2), the Korea Stock Exchange again showed rapid growth (up 50 % to 2.9 billion contracts).





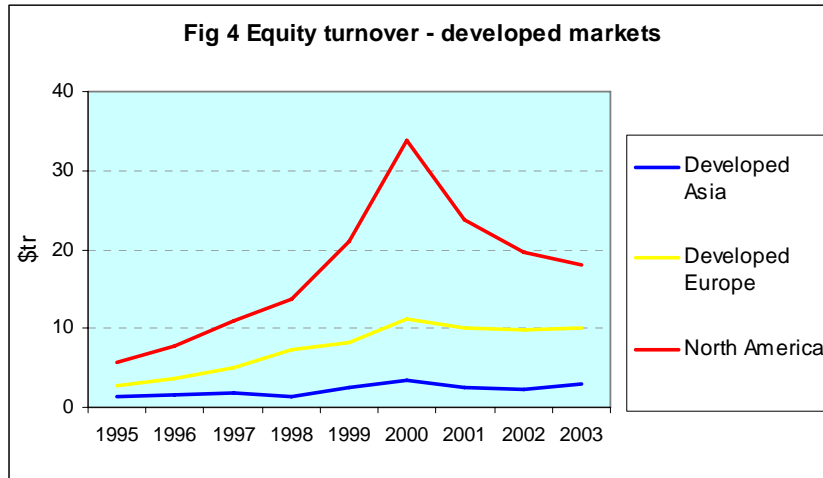
However, as in previous years, it is helpful first to take note of the Korea Stock Exchange numbers and then also to look elsewhere, to get a picture of other developments (figure 3), as otherwise the Korean numbers completely dominate the scene. South America saw continued rapid growth of stock options volumes at Bovespa (69 m contracts in 2001, 89 m in 2002 and 175 m in 2003). The Bolsa de Comercio de Buenos Aires, a new entrant in 2002, also saw a rapid rise in stock options volumes with 6 m contracts in 2002, rising to 55 m in 2003. Other developing market regions saw a strong growth, with developing Asia volumes – driven by growth in Indian derivatives – approaching the totals for developed Asian markets.



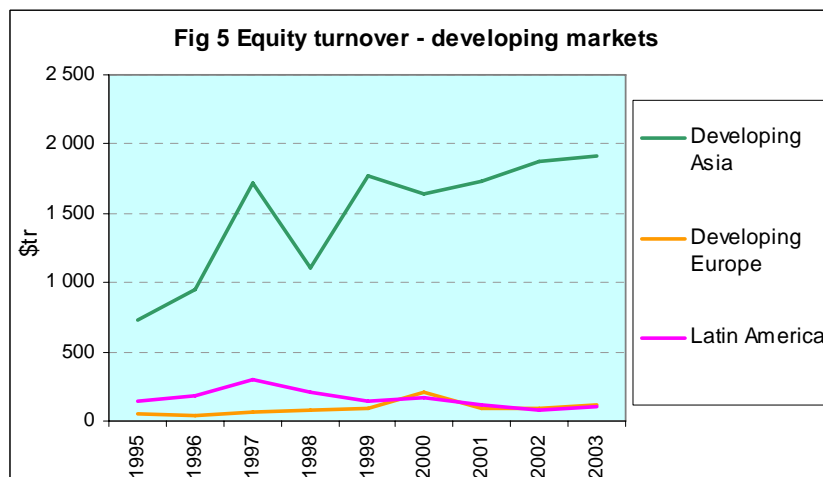
## 2. DEVELOPMENT OF EQUITY CASH MARKETS

Developed markets saw a continuation of recent trends with continued falls in the US market volumes – NYSE saw a 6 % reduction, which was larger than the fall in the previous year; but Nasdaq’s fall in volumes was slower in 2003 than in the year before. Developed European markets saw a small recovery, bringing them back to the levels of 2001, but still 10 % below the peak in 2000. To put this into a longer term context, developed Europe equity cash turnover in 2003 was the third highest ever. Most developed European exchanges saw steady volumes or slight growth, though the London Stock Exchange experienced a 10 % fall.

Developed Asia benefited from a sharp recovery, growing 33% in 2003 with big increases seen by the Tokyo, Hong Kong and Australian exchanges. Australian market volumes have risen every year since 1995.



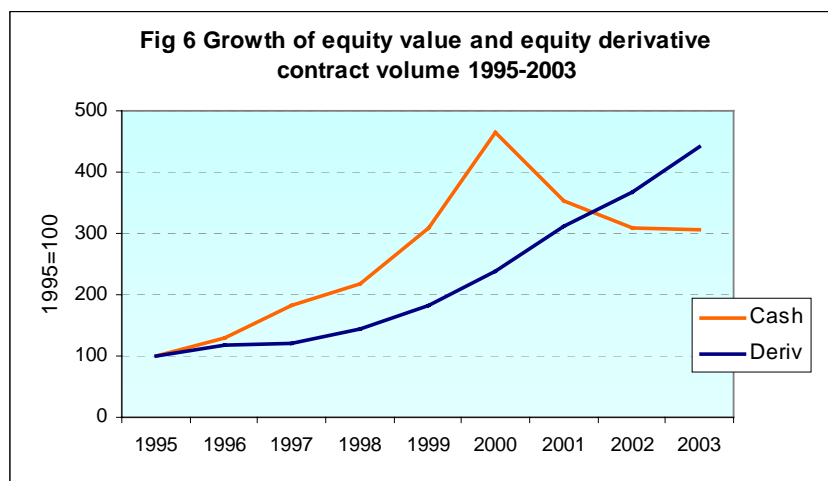
Developing markets were generally growing in 2003, with developing European and Central/South American volumes starting to recover from sharp falls in volume in 2001 and 2002 (fig 5). Developing Asian markets were, in total, less affected by the technology shares slump in 2001, or the problems with emerging markets in 2001/2002. However, the regional total is strongly influenced by the continued growth of the National Stock Exchange of India and the Chinese markets. Other developing Asian markets saw big falls in volumes in 2001, from which they have recently been recovering.



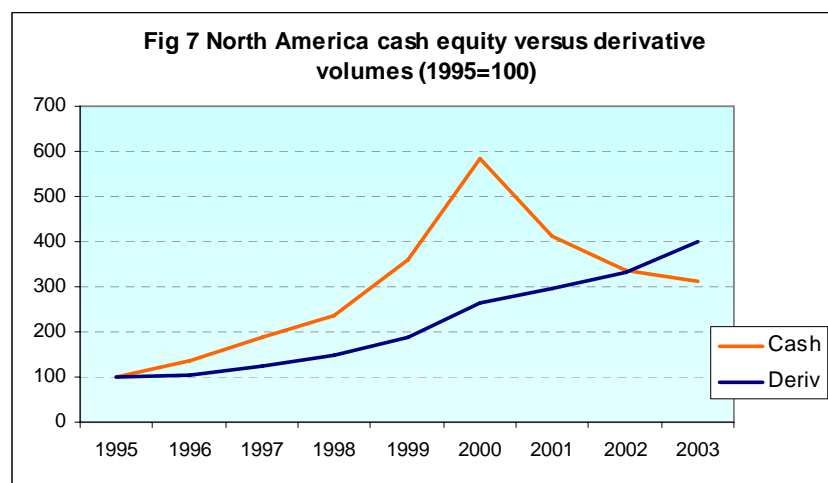


### 3. CASH EQUITY VERSUS EQUITY DERIVATIVE VOLUMES - UPDATE

Globally, cash equity market volumes continued to decline. But this trend was showing signs of bottoming out, with 2003 only slightly down on 2002 (Figure 6). Equity derivatives volumes continued to boom, increasing at roughly the same rate as in previous years.

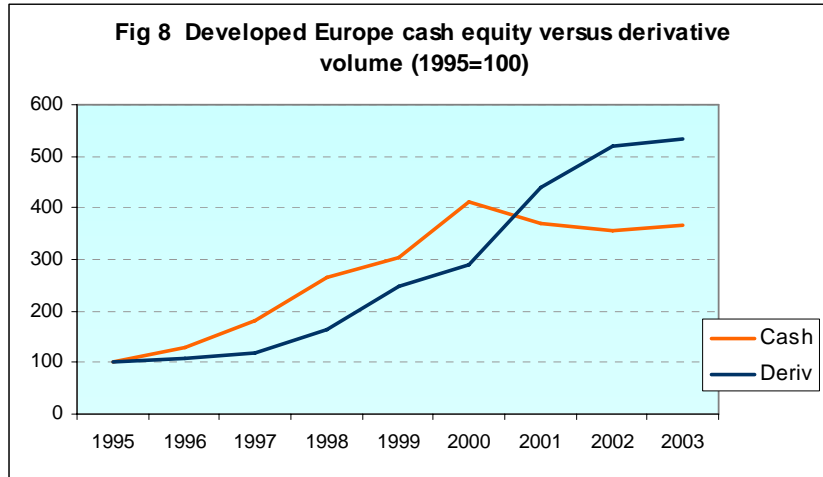


The cash market volume decline continued in North America, but derivatives volumes grew strongly.

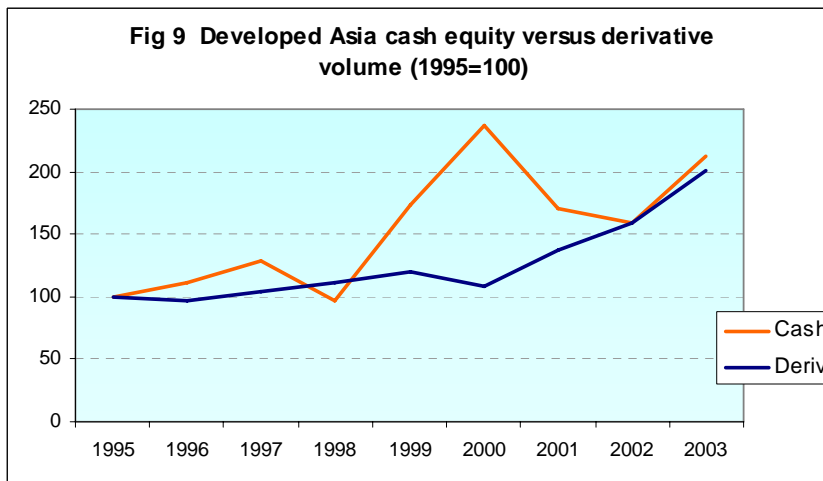




Developed European markets witnessed a slight recovery in cash market volumes, and a marked slowing of derivative volume growth, driven, as we have noted above, by the 25 % fall in individual stock option business on Euronext.

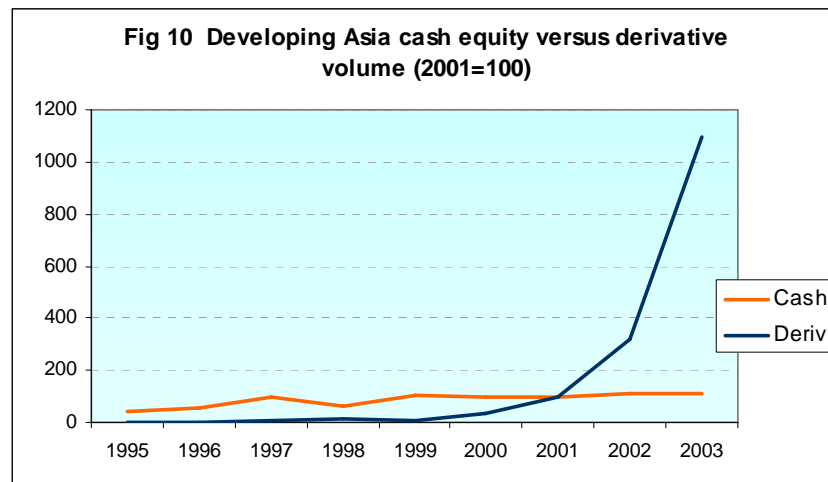


Developed Asia saw a recovery in cash volumes after the sharp decline from 2000 (figure 9). Derivative volumes have grown more strongly since 2000, and in 2003 grew at roughly the same rate as the cash market.





Developing Asian markets have experienced a rapid rise in derivative volumes (figure 10), considerably outstripping equity market turnover growth (kindly note that there is a different base year). But the derivatives growth remains narrowly based in the Indian, Taiwanese and Korean markets, the last one for this section being excluded from the analysis.



#### 4. CROSS-SECTIONAL ANALYSIS

In this section, we examine the economic size of equity derivative markets. Contract volumes provide a useful basis for looking at derivatives markets over time but, as the example of the Korea Stock Exchange shows, may give a misleading picture across markets.

The measure we use instead is the notional value of derivatives traded – essentially the underlying value of the asset represented by each contract multiplied by the number of contracts traded. This measure has some faults – in particular it overstates the economic value of a far out-of-the-money option – but it is the best available guide for understanding this business.

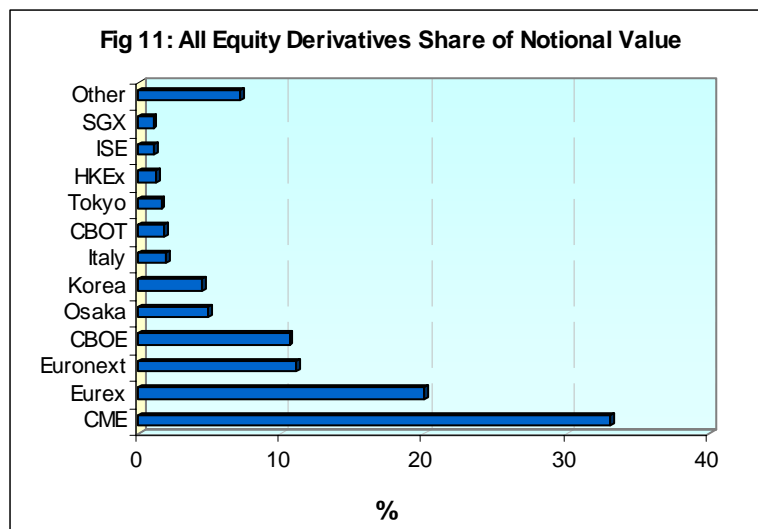
The analysis looks at two questions:

- a. Concentration of economic impact
- b. Relationship of cash to notional value



**a. Concentration**

In a previous report written one year ago, we noted the concentration of business in the interest-rate product market. Overall, looking to the notional value of all equity derivatives suggests a picture that is not too far different to that for interest-rate products (figure 11). The top three exchanges represent 64 % of the total, the top five 80 %, and the top ten 90 %. This is not too surprising, since the top four are the two major US derivative exchanges and the two largest cross-border European derivative exchanges.

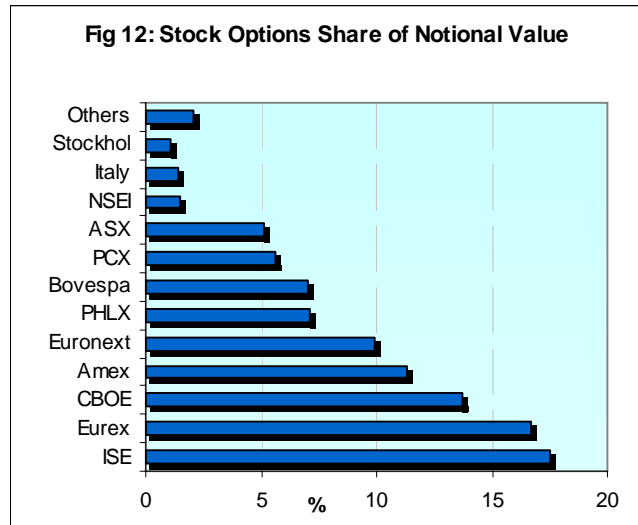


However, we commented in last year’s report that the markets for different types of derivatives are different:

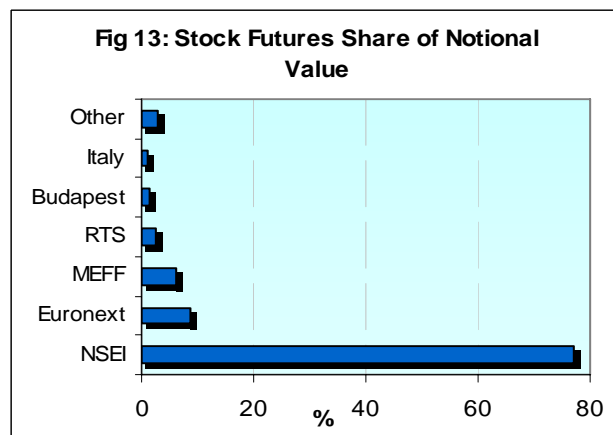
- options tend to be more a retail product than futures are
- index products are more used for risk-management, while single stock products tend to be more speculative.



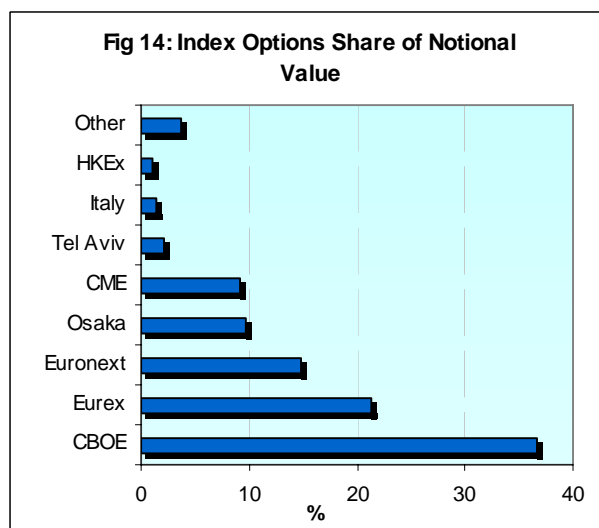
Figure 12 shows the pattern for stock options. Again, the two largest cross-border European exchanges are in the top five representing 26 % of the total, but the major US options exchanges collectively represent 55 %. Outside Europe and the US, only two exchanges – Bovespa and ASX – represent more than 1 % of the total of stock option notional value.



Stock futures are a new development and few exchanges offer them. National Stock Exchange of India has been particularly successful with stock futures contracts, and its notional value represents nearly 4/5ths of the total for these derivatives.

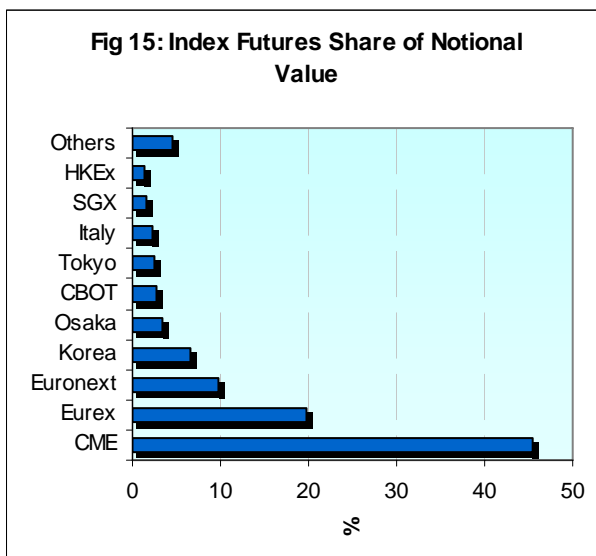


Index derivatives make up the vast majority of equity derivative notional values (over 99 %). The notional value of index derivatives is dominated by the major US and European exchanges. In index options (figure 14), CBOE, Eurex and Euronext together represent 73 % of the total, and the eight largest exchanges represent 96 % of contract volumes (CBOE, Eurex and Euronext are 62 % of the total – excluding Korea Stock Exchange for the moment).





In index futures, CME, Eurex and Euronext represent 75% of the global notional value and the top 10 represent 95%.



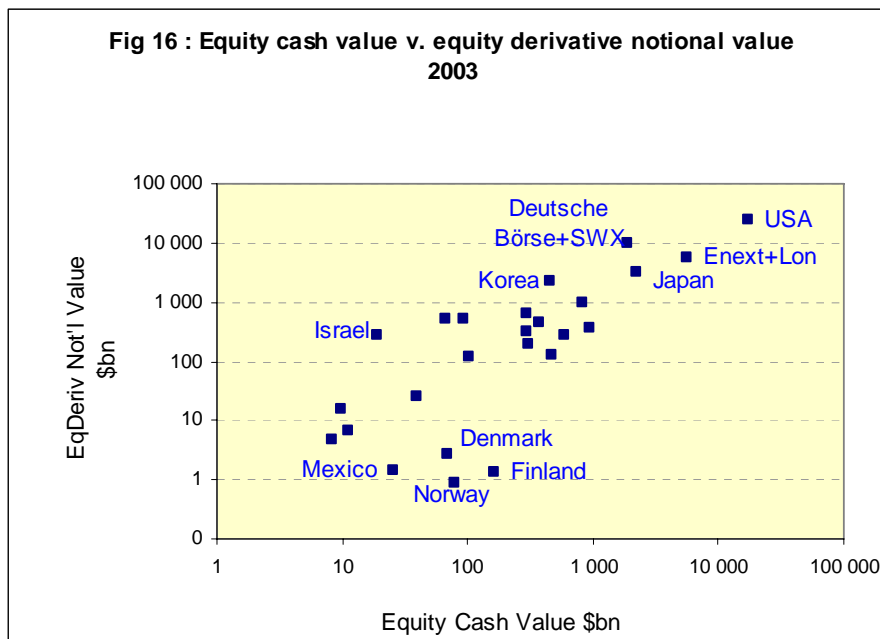
It is apparent from these results that the big four exchanges (CBOE, CME, Eurex and Euronext) have established or retained dominance of the global market as measured by notional value. However, there are important parts of the derivatives business where other exchanges have established positions of significant economic impact.

***b. Relationship of equity cash turnover to derivative notional value***

Figure 16 maps equity cash turnover for 2003 against notional value of equity derivative turnover by market, using a log scale. The mapping of exchanges is not one-for-one as:

- a number of derivative exchanges offer products where the underlying cash business takes place on more than one equity exchange:
  - Euronext trades derivatives on both Euronext and London Stock Exchange equities
  - Eurex covers derivatives on Swiss and German equities.
- one equity exchange's stocks are traded in derivative form on several derivative exchanges, as in the US.

Data and the ratios of derivatives to cash for each market are shown in appendix B.



The mapping shows a strong link between equity cash and derivative notional value turnover. Indeed, the relationship is close to one for one – a dollar of equity trading is associated with a dollar of equity derivatives trading. There are a number of outlier markets where this rule does not work:

- More derivatives than cash equity :
  - Korea – already noted and discussed further below
  - Israel,
  - Eurex/Deutsche Börse, Virt-X
- Less derivatives than equity
  - Scandinavia (except Sweden),
  - Mexico

But generally, the pattern is clear – a high level of cash trading tends to be associated with a high level of derivatives trading (notional value). This does not, of course, prove a causal relationship, but it does tend to confirm that active derivatives markets certainly do not harm cash markets.

Figure 16 does not show the markets where there is no equity derivatives activity. In the 2002 report, we noted the low level of derivatives market development among Asian developing markets. It is worth summarising the equity volumes in smaller and developing markets, and the level of development of equity derivatives found there. Table 2 shows equity volumes in smaller and developing markets together with the level of development of equity derivatives markets. Developing Asian markets are highlighted in the left-hand column, and markets with significant derivative markets are highlighted in the right-hand column.



*Table 2: Small and developing equity markets – underlying volumes and derivatives markets*

Exchange	Equity turnover 2003 (\$Us m)	Equity turnover 2002 (\$Us m)	Equity derivative market?
Malta Stock Exchange	47	48	No
Bourse de Luxembourg	414	496	No
Colombo Stock Exchange	765	319	No
Bolsa de Lima	1 140	1 187	No
Philippine Stock Exchange	2 673	3 093	No
Bolsa de Buenos Aires	3 078	1 277	Recently started
Tehran Stock Exchange	4 668	2 071	No
Bolsa de Santiago	6 647	3 011	No
Budapest Stock Exchange	8 270	5 908	Yes
Warsaw Stock Exchange	9 663	7 811	Yes
Wiener Börse	11 135	6 109	Yes
Jakarta Stock Exchange	14 652	13 050	No
Tel-Aviv Stock Exchange	19 115	12 676	Yes
Bolsa Mexicana	25 868	32 286	Small index futures market
Athens Exchange	39 672	23 462	Yes
Irish Stock Exchange	44 074	33 270	No
Kuala Lumpur Stock Exchange	52 233	32 923	Small index futures market
Bovespa	66 428	46 300	Yes
Copenhagen Stock Exchange	67 959	53 262	Yes
Oslo Børs	78 202	56 127	Yes
BSE Mumbai	89 110	68 539	Yes
JSE South Africa	101 127	70 740	Yes
Stock Exchange of Thailand	102 421	41 289	No
Shenzhen Stock Exchange	140 287	140 661	No
National Stock Exchange India	202 865	128 535	Yes
Shanghai Stock Exchange	255 965	211 644	No

*The exchanges highlighted in yellow are located in Asia-Pacific. The “yes” response in the right hand column points out which of these smaller and developing equity markets also operate derivatives segments.*

The table shows clearly that while many developing Asian markets are of similar or larger size than similar markets elsewhere, the level of equity derivatives markets is lower than apparently successful derivative markets in other countries. The clear exception is India, where the National Stock Exchange of India has successfully developed an equity derivatives market. The same is true of the South Korean, and to a lesser extent the Taiwanese markets, which are both larger and more developed than the other markets in the table.



It is worth examining the barriers to development of successful derivatives markets. There are three kinds of obstacles: economic, lack of infrastructure, and regulatory.

### *Economic factors for successful derivative markets*

In purely economic terms, a well-functioning derivatives market requires:

1. Natural hedging demand – participants in the market whose business requires them to take exposures.
2. Speculative demand – intermediaries who do not have natural exposures, but take on exposures in the derivatives market. They are necessary to provide liquidity for natural hedgers.
3. An effective pricing mechanism in the underlying market which reflects genuine investor demand and is not subject to manipulation or sudden volatility caused by lack of liquidity.
4. An adequate supply of underlying assets.
5. Detailed knowledge among participants of the functions, possibilities and risks of derivatives

The mix of hedging and speculative demand is critical for successful markets. It is relatively easy to stimulate speculative demand – practically all markets have a natural class of intermediaries whose main purpose is short-term trading and who are interested in expanding the range of products for speculative trading. But often natural hedging demand in developing markets is lacking, because many developing markets do not have the institutional investors whose businesses require them to invest for the long-term and manage their risk in the meantime. In some cases, this role is taken on by foreign investors, but in the experience of many developing markets, foreign investors are short-term, speculative players - with some justification, perhaps, if the market regulation and quality is not such as to encourage long-term investment.

Both the Indian and the South Korean markets have resolved the lack of institutional investors question by developing extensive retail demand. In both countries, this has been strongly supported by internet usage to simplify access and reduce costs to retail clients. In those countries and in the Taiwanese market, retail clients provide the investment or hedging demand for derivatives. In fact, most retail trading is speculative in nature, which may raise long-term risk problems if genuine long-term investment institutions do not emerge to provide hedging demand. But for the present, the retail involvement is strong and has provided the basis on which to build derivative markets.

All WFE exchanges now have transparent and fair trading systems. Manipulation and abuse are addressed by the legal/regulatory systems to monitor and investigate breaches. So the remaining problem with the underlying assets is lack of liquidity – it is not possible to run a decent derivatives market where underlying assets are highly illiquid. But virtually every market now has



a number of stocks with reasonable liquidity which could form the basis for a derivative contract. They also have blue-chip indices with good underlying liquidity to form the basis for index contracts.

### ***Infrastructure factors***

Nowadays infrastructure is available relatively simply and relatively cheaply. The main requirements for a derivative market are a trading system and a clearing house. Both these technologies are well developed and available in scalable form. The main infrastructure challenges are:

- Integration of systems so that securities/derivative positions can be considered jointly when assessing margin requirements. This is not essential for launching a successful derivatives market, but it does bring substantial cost savings to participants, especially intermediaries and other active participants.
- Surveillance systems to detect market abuse – especially abuse that straddles the cash and derivative markets. This is complex to achieve, but exchanges have developed excellent tools, which are sold to other markets. It is vitally important that exchanges are equipped to assure market integrity.

### ***Regulatory barriers***

Knowledge of derivatives is not highly advanced in many developing markets. This is true of practitioners, and is perhaps even more acutely the case for regulators. In fact, one of the main barriers to development of derivatives markets - since the supply/demand and market/assets constraints, as we have seen above, are not so binding - is a caution among regulators caused by a failure to understand the nature of derivative markets, or at a minimum to be at ease with their functioning.

The strongest barriers to derivative markets are often regulatory. There are three linked reasons:

1. Statutory barriers
2. Failure to understand
3. Fear of short-selling



## 1. Statutory barriers

These fall into three types:

- Laws that specifically prohibit derivatives – or do not specifically permit them, which often comes to the same thing.
- Laws that do not clarify which entity has regulatory jurisdiction over derivatives – often this is linked to the legal definition of “securities”.
- Laws that prohibit gambling or make gambling contracts unenforceable – and where derivatives are not clearly distinguished from gambling.

Sometimes, the legal framework supports forward contracts where the norm is physical delivery at the time of expiry. But most exchange contracts can be cash-settled, and even if physical delivery is permitted, it is a very rare occurrence.

## 2. Failure to understand

Often the precise nature of derivative markets is not understood by regulators, and many misconceptions arise. Among these are:

- a) *Derivatives replace or bypass existing markets.* Evidence presented here and elsewhere suggests that derivatives enhance and supplement existing markets by providing hedging tools, additional opportunities for market users, and low-cost arbitrage opportunities.
- b) *Derivatives require physical delivery to have value or social usefulness.* In fact, the “insurance” or risk-transfer benefits which derivatives offer are achieved without physical delivery. Indeed, physical delivery can be difficult and costly, so requiring physical delivery can be a barrier to a market.
- c) *Derivatives fuel price speculation and lead to increased volatility.* In fact, by offering low-cost mechanisms for taking contrarian positions, derivatives reduce speculative volatility. In addition, the availability of hedging mechanisms makes it easier for liquidity providers to offset temporary imbalances caused by lack of liquidity.
- d) *Derivatives only benefit new entrants, especially foreign firms.* While it is true that foreign firms have often had an initial advantage over local firms because of their global expertise, the local firms are very quick to learn, and any supposed advantage is short-lived.
- e) *Derivatives cause a build-up of risks and exposures* that may cause systemic collapse. In practice, derivative settlements are always



tightly controlled by a clearing-house, ensuring that there are no settlement losses. This is not to say that individual participants may not make losses that are catastrophic for the entity – like Barings, etc. But this can and does happen with cash market trading, and if regulation of capital adequacy is effective, then this will not cause a systemic collapse.

- f) *Derivatives make market abuse easier.* Derivatives certainly open new possibilities for market abuse, and so present new challenges for monitoring and surveillance. However, it is not apparent that markets that have successful derivative exchanges are more subject to market abuse than those that do not. It is easier to regulate markets that are open and transparent in comparison to unofficial markets for derivatives that often exist where exchange markets are not available.
- g) *Derivatives increase risk of scandal.* Regulators are not paid to take risks, and are unsurprisingly risk averse. Financial scams and scandals have an impact in the political world beyond the financial markets. Regulators that allow scandals to take place on their watch can lose their jobs. So scandals leave deep scars which last for a long time, leaving regulators very cautious and negative towards innovation. In fact, most of the scandals do not involve derivatives – which were not allowed at the time – and were attributable to weak regulation rather than anything else.

### 3. Fear of short-selling

Short-selling is universally banned in developing Asian markets. The real effect is not to prevent speculation but to damage the market by preventing profitable trading in bear markets, and by ensuring that market-making is practically impossible. (Sometimes inconsistently, market-makers are required to make continuous two-way prices). Derivatives naturally make such a ban pointless, since selling futures or options gives the same exposure as short-selling – and so regulators wishing to prevent short-selling will be unlikely to approve of derivatives markets.

When asked why they ban short-selling, regulators will typically mention the potential for market manipulation. But their main concern in our conversations seems to be fear of systemic risk brought about by settlement failure, which we have discussed above. Of course, despite the ban, short-selling still occurs, but in an unregulated and non-transparent form involving carry-over of unsettled positions, or unauthorised stock lending, both strategies that involve much greater risk than a regulated short-selling/stock borrowing structure, or the ability to use on-exchange derivatives to manage downside risk.



## 5. CONCLUDING REMARKS

This survey has covered several areas. Its main conclusions are:

- Derivatives market growth continues almost irrespective of equity cash market turnover growth. Since 2000, cash equity turnover has fallen in the developed markets, but derivatives turnover continued to rise steeply and steadily.
- Equity derivatives business, like interest rate derivatives, are highly concentrated. Using notional value as the measure, the two main US markets and the two cross-border European markets accounted for about 75 % of the total. This was most apparent in index derivatives, which make up 99 % of the notional value of equity derivatives. In single stock derivatives, other markets have established niches, and the dominance of the big four is less evident.
- Equity market volume and derivatives market notional value are strongly correlated – with a ratio of roughly 1:1 – but with significant differences between individual markets. Scandinavia (excluding Sweden) seems to have relatively smaller derivatives markets compared to their cash markets, while the Israeli, Korean and Eurex businesses seem large relative to their cash markets.
- A number of cash equity markets – particularly in developing Asia – do not have equity derivatives markets. Comparison of their cash market volumes with those that do have derivative exchanges shows that the markets without derivatives are of similar size. We are not convinced that market or infrastructure differences explain this, but suspect that regulatory barriers have effectively prevented the development of derivative markets in several developing Asian countries.

Stephen Wells  
December 2004



# Appendixes A and B



## Appendix A

Appendix A - Regional Groupings	
<b>ASIA DEVELOPED</b>	<b>EUROPE DEVELOPING</b>
Australian SE Hong Kong Exchanges & Clearing NZFOE Osaka Securities Exchange SFE Corporation Singapore Exchange TIFFE Tokyo SE	Budapest SE RTS Stock Exchange Warsaw Stock Exchange
<b>ASIA DEVELOPING</b>	<b>NORTH AMERICA</b>
Bombay Stock Exchange Korea Futures Exchange Korea SE Malaysia Derivatives Exchange National Stock Exchange of India TAIFEX Zhengzhou Commodity Exchange	AMEX Bourse de Montréal Chicago Board of Trade Chicago Board Options Exchange Chicago Mercantile Exchange International Securities Exchange <i>KCBOT*</i> NY Board of Trade NY Mercantile Exchange <i>NYSE*</i> Pacific SE Philadelphia SE/BOT <i>Toronto*</i> <i>Vancouver*</i>
<b>EUROPE DEVELOPED</b>	<b>CENTRAL/SOUTH AMERICA</b>
<i>AEX*</i> Athens Derivatives Exchange <i>BELFOX*</i> Eurex Euronext FUTOP HEX Italian Exchange JSE South Africa <i>LIFFE*</i> London Metal Exchange <i>MATIF*</i> <i>MONEP*</i> <i>Oporto*</i> Oslo Børs Spanish Exchanges (BME) Stockholmsboersen Tel-Aviv SE Wiener Börse	BM&F Bolsa de Comercio de Buenos Aires BOVESPA <i>BVRJ*</i> MexDer

*\* indicates exchanges that have merged, no longer trade derivatives or are not included with current figures for other reasons*



## Appendix B

### Equity cash turnover and equity derivative notional value turnover

Market	Cash equity (\$bn)	Equity derivative notional val. (\$bn)	Ratio Deriv/Cash
US exchanges	17,322,982	24,177,848	1.40
Deutsche Börse+SWX	1,909,689	9,993,959	5.23
Euronext+London exchanges	5,546,291	5,549,080	1.00
Japanese exchanges	2,221,254	3,254,854	1.47
Korean exchanges	459,035	2,265,169	4.93
Italian Exchange	820,642	980,627	1.19
Hong Kong Exchanges & Clearing	296,156	636,243	2.15
Singapore Exchange	91,928	525,729	5.72
Brazilian exchanges	66,428	505,73	7.61
Australian exchanges	371,97	445,907	1.20
Spanish Exchanges (BME)	933,06	367,026	0.39
Indian exchanges	291,975	315,626	1.08
Taiwanese exchanges	591,718	274,783	0.46
Tel-Aviv Stock Exchange	19,115	271,847	14.22
Stockholmsbörsen	303,291	190,727	0.63
Canadian exchanges	471,544	125,895	0.27
JSE South Africa	101,127	116,838	1.16
Greek exchanges	39,672	26,38	0.66
Warsaw Stock Exchange	9,663	15,542	1.61
Wiener Börse	11,135	6,893	0.62
Budapest Stock Exchange	8,27	4,838	0.59
FUTOP	67,959	2,755	0.04
MEXDER	25,868	1,451	0.06
HEX	165,622	1,351	0.01
Oslo Børs	78,202	910	0.01
<b>Total</b>	<b>32,224,596</b>	<b>50,058,008</b>	<b>1.55</b>



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