

IOMA Derivative trading: trends since 1998



**by Didier Davydoff
and Grégoire Naacke
IEM Finance**

May 2009



As of May 2009, the members of IOMA / IOCA were:

Athens Derivatives Exchanges	MEFF
Australian Securities Exchange	Mercado Mexicano de Derivados (Mexder)
BM&FBOVESPA	NYSE Euronext
Bolsa de Comercio de Buenos Aires	NYSE Liffe
Bolsa de Comercio de Santiago	NASDAQ OMX Group
Bombay Stock Exchange	National Stock Exchange of India
Borsa Italiana	Osaka Securities Exchange
Bursa Malaysia Derivatives	Oslo Børs
Bursa Malaysia Derivatives Clearing	Singapore Exchange
Canadian Derivatives Clearing	Taiwan Futures Exchange
Chicago Board Options Exchange	Tel-Aviv Stock Exchange
CME Group	Thailand Futures Exchange
Eurex Frankfurt	The Clearing Corporation
Eurex Zürich	The Options Clearing Corporation
Hong Kong Exchanges and Clearing	TMX Group
ICE Futures	Tokyo Stock Exchange
International Securities Exchange	Warsaw Stock Exchange
Johannesburg Stock Exchange	Wiener Börse
Korea Exchange	Zhengzhou Commodity Exchange
LCH.Clearnet	

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.



International Options Market Association (IOMA)

Derivative trading: trends since 1998

Table of Contents

Introduction	4
General trends in derivative trading	5
A- General growth.....	5
B - Contribution of new exchanges	6
C - Regional developments	8
On-exchange derivative trading v. cash equity	15
On-exchange derivative trading v. OTC trading	18
Key characteristics of the industry	20
A - Electronic trading v. outcry.....	20
B - Membership	21
Conclusion.....	23



Introduction

Each year, the World Federation of Exchanges collects data from derivative exchanges for the International Options Markets Association (IOMA) and the annual IOMA survey analyses details of the latest developments in trading activity. The present paper aims at presenting a broader view of general trends in the industry over the last 10 years.

Even though trading volumes established or even diminished in the last quarter of 2008, the tremendous growth of derivative exchanges remain the most striking characteristic of the last ten years. In order to understand the factors behind such growth, it is useful to compare derivative exchanges with two neighboring markets: underlying cash markets and OTC derivative markets. We will then try to isolate the different components of growth. Finally we will analyse some key developments within the industry relating to trading systems (outcry versus electronic) and the membership of markets.



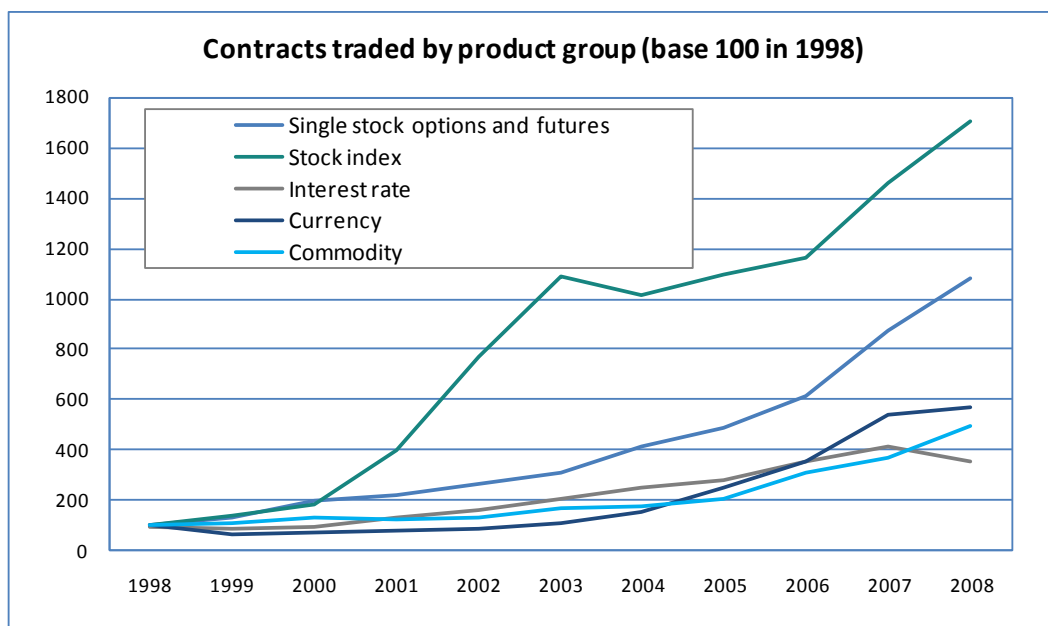
General trends in derivative trading

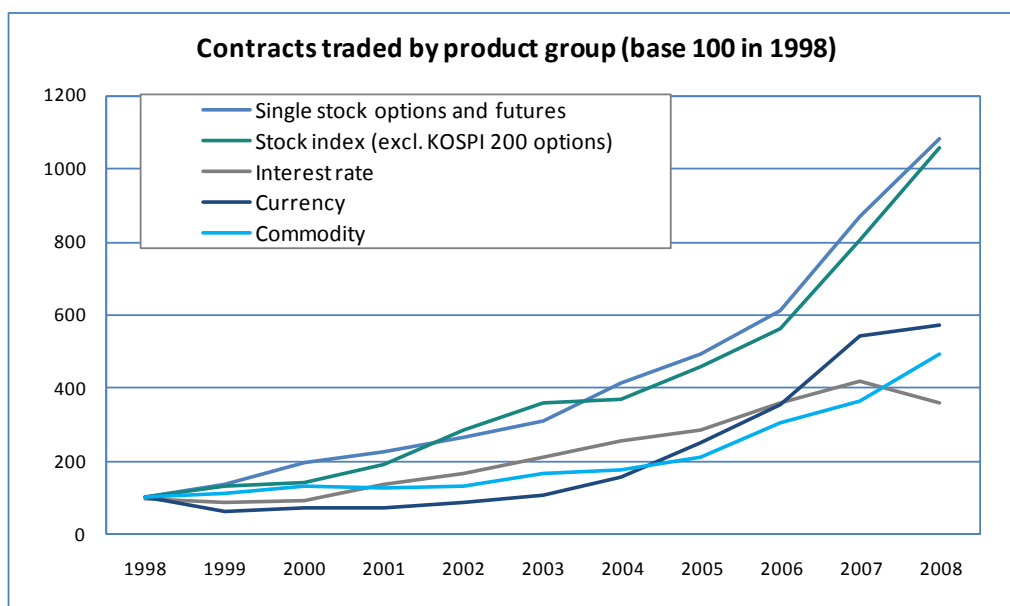
A- General growth

All groups of products (defined by their underlyings) showed an increase in their trading volumes between 1998 and 2008. The smallest increase observed was for interest rate products with volumes increasing 3.6 times, while stock index options and futures showed the largest rise with volumes increasing 17 times.

Part of the growth recorded for index derivatives is due to the tremendous success of KOSPI 200 options. 3.9 billion options on the KOSPI 200 index were traded in 2008, representing two thirds of the global volumes recorded by all derivative exchanges. Even though the notional value of individual KOSPI 200 options is lower than the average notional value of index options traded on other exchanges, the Korea Exchange also dominates in terms of the overall notional value traded. The case of KOSPI 200 options is so specific that it raises statistical difficulties. Therefore, we decided to present both figures, including and excluding the Korea Exchange when necessary.

When KOSPI 200 options are excluded, the growth of equity index derivatives appeared to be parallel to that of individual equity derivatives: both segments of the market show volumes traded increased eleven times, a growth that is lower than KOSPI 200 options, although it remains considerable.





B - Contribution of new exchanges

The following table shows the respective contributions to the overall growth of exchanges already offering in 1998 a given group of products on the one hand, and of exchanges newly offering these products on the other.

Contribution of existing and new exchanges to the growth of derivative trading (millions of contracts traded)						
	Equity options	Equity futures	Index options	Index futures	LTIR options	LTIR futures
(1) Vol. in 1998	623	-	196	172	75	421
(2) Add. trading 2008/1998: (3) + (4) - (5)	3 745	1 059	3 881	2 114	96	900
(3) Of which ex. already present in 98	2 541	-	3 613	1 819	108	884
(4) Of which new exchanges	1 204	1 059	268	295	0	20
(5) Of which ex. that exit the market	-	-	-	-	12	4
(6) Vol. in 2008: (1) + (2)	4 368	1 059	4 077	2 286	171	1 322
Number of exchanges active in that market						
Number of exchanges in 1998	26	0	47	44	18	29
Number of exchanges in 2008	27	19	30	30	7	16



Equity options was the group of products with the largest volume of trading in 1998 and they were still in top position ten years later, in 2008. It is also for that group of products that new exchanges, which either did not exist in 1998 or included equity options in their offer between 1998 and 2008, contributed the most to the growth: of the 3.8 billion additional contracts recorded in 2008 as compared to 1998, one third were traded on new exchanges when compared to 1998. The largest is the International Securities Exchange founded in 2000 and where almost one billion equity options were traded in 2008¹. 27 exchanges offered equity options in 2008, close to the 26 exchanges already present in 1998. However, behind the stability of the number of exchanges, only 18 of them existed in 1998: the eight new exchanges were offset by the nine exchanges that exited the market or were integrated within groups of exchanges (such as NYSE Euronext).

Equity futures show a very different picture, as they did not exist in 1998. This group of products is new for all 19 exchanges present in this segment.

Index options are the products that showed the most growth, with a contract volume increasing 21 times between 1998 and 2008. Here, new entrants contributed no more than 7% to the overall growth. However, a single player, the Korea Exchange is the main contributor responsible for the increase in the number of contracts to 3.9 billion (2.7 billion more options traded on the KOSPI 200 index in 2008 than in 1998). The Korea Exchange accounted for 16% of global volumes in 1998, and more than two thirds in 2008. Excluding Korea, the contribution of new entrants would represent 23% of the growth. Index options are the most frequently listed products in the world with 30 exchanges including them in their offer. Nine new exchanges appeared in this segment, the largest in 2008 being the National Stock Exchange of India. However, the consolidation of the industry reduced from 47 to 30 the number of exchanges recording trading volumes in 2008.

Volumes of **index futures** increased 13 times between 1998 and 2008. The contribution of new exchanges is of the same order of magnitude as for index options. But the contribution of exchanges already present in 1998 was lower for index futures (2.1 billion contracts) than for index options (3.9 billion contracts). The average size of index futures contracts is higher than that of index options, and the overall notional value of traded index futures was 10% higher than that of index options. Finally, there were as many exchanges offering index futures (30) as index options in 2008. However, both lists of exchanges are not completely identical: reflecting the split of jurisdictions between options and futures, four US exchanges list index options without listing index futures. Symmetrically, four relatively small exchanges are present in the index futures segment, and not on the index options, the largest being the Turkish Derivatives Exchange (40 million contracts in 2008).

¹ Note that for the purpose of this calculation, we do not consider exchanges acquired by other exchanges as new exchanges, even when their name and their trading processing were completely transformed. For example, NYSE ARCA is considered as the continuation of the Pacific Stock Exchange as it was acquired by Archipelago in 2005, a group acquired in turn by NYSE Group in 2006.



Finally, the **long term interest rate segment** could be considered as a more mature segment, although the number of options traded doubled while the number of futures traded tripled, reflecting an industry that was still growing, at least until 2007.

All exchanges active on LTIR options in 2008 already existed in 1998 and the recorded volumes are the smallest among all groups of products. The number of exchanges offering LTIR options decreased from 18 in 1998 to 7 in 2008. The withdrawal of exchanges from this market had little impact (negative 12 million) contracts on the global activity in this group of products. In other words, those exchanges already recorded low volumes in 1998.

The number of exchanges offering LTIR futures also decreased, from 29 to 16 in the last ten years. Six new exchanges introduced LTIR futures contracts in their offer (the largest volumes being recorded by the Korea Exchange in 2008), but nine other exchanges with relatively low levels in 1998 withdrew. However, it should be noted that the size of LTIR contracts is much higher than that of equity-linked derivatives. As a result, LTIR options record the highest notional value of trading among all groups of products (280 000 billion US dollars in 2008).

C - Regional developments

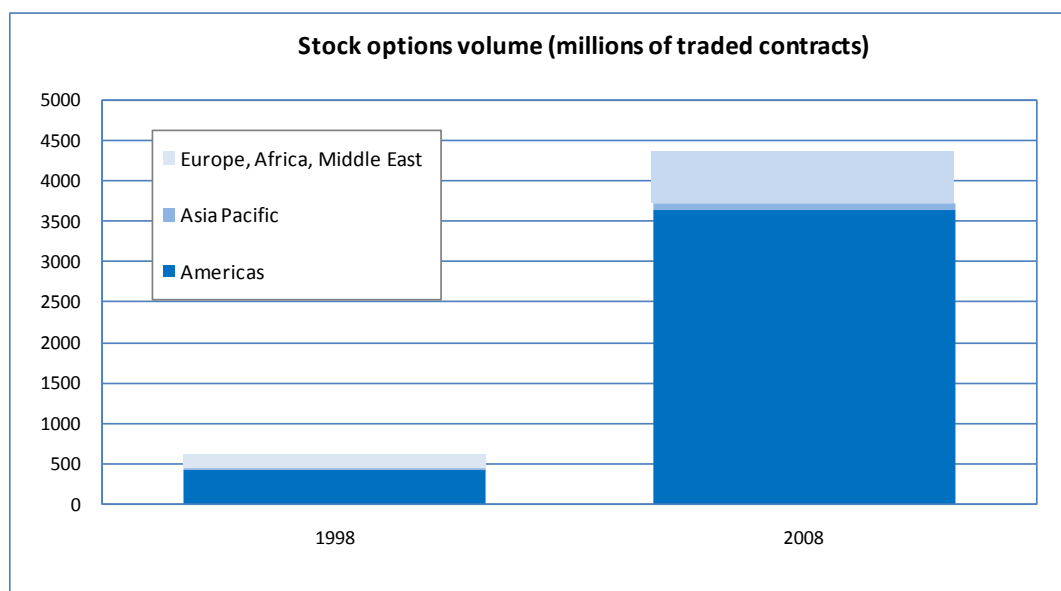
The main region that contributed to the growth of **equity options** over the last ten years was the Americas, and more specifically the United States. The Americas increased their dominance at the expense of the Europe, Africa, Middle East region. Part of this trend can be explained by the growth of ETF options in the United States, products that, in many instances, are substitutes for index options: if ETF options were not taken into account, the relative weight of the Americas in global equity option trading would be 80% instead of 83%.

The Asia Pacific region grew at a pace similar to that of the Americas but starting from a much lower level. The main contributors to growth in that region were Hong Kong Exchanges.

In Europe, the Compound Annual Growth Rate (CAGR) was not as strong as in the other two regions, but it was still high (14%). The main contributor to growth was Eurex.

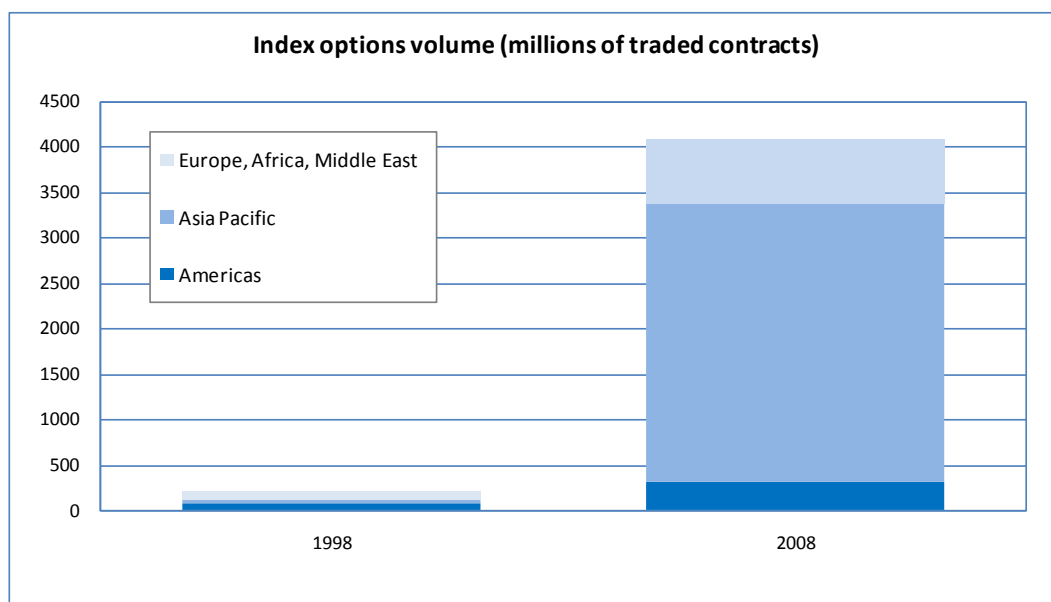


Stock options volumes (millions of traded contracts)					
	Volumes traded in 1998	Volumes traded in 2008	Compound Annual Growth Rate (CAGR)	Regional breakdown in 1998	Regional breakdown in 2008
Americas	439	3646	24%	70%	83%
Asia Pacific	10	84	23%	2%	2%
Europe, Africa, Middle East	174	638	14%	28%	15%
Total	623	4 368	21%	100%	100%



The most striking phenomenon when we look at the development of index options is the sharp increase of Asia through KOSPI 200 options in Korea, which allowed the Asia Pacific region to represent three-quarter of global volumes.

Index options volumes (millions of traded contracts)					
	Volumes traded in 1998	Volumes traded in 2008	Compound Annual Growth Rate (CAGR)	Regional breakdown in 1998	Regional breakdown in 2008
Americas	75	310	15%	38%	8%
Asia Pacific	40	3057	54%	20%	75%
Europe, Africa, Middle East	81	710	24%	41%	17%
Total	196	4 077	35%	100%	100%

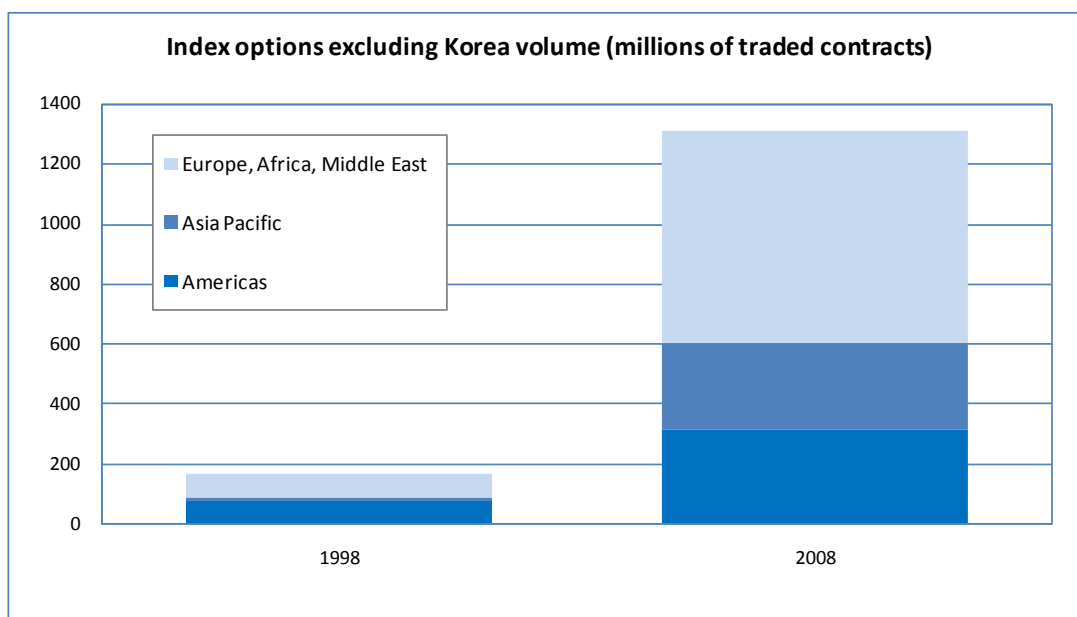


If the Korean figures are removed then the Asia Pacific region is still the one with the highest growth rate by far. Asia has almost caught up with Americas thanks to the tremendous growth of the National Stock Exchange of India and of TAIFEX in Taiwan. However, as mentioned above, part of the decrease in the United States market share in index options is offset by the growth of ETF options in that country.

In Europe, the CAGR has also been very strong over the last ten years. The growth in Europe was mainly driven by the Dow Jones STOXX 50 options traded on Eurex, where 84% of the European index options were traded in 2008.

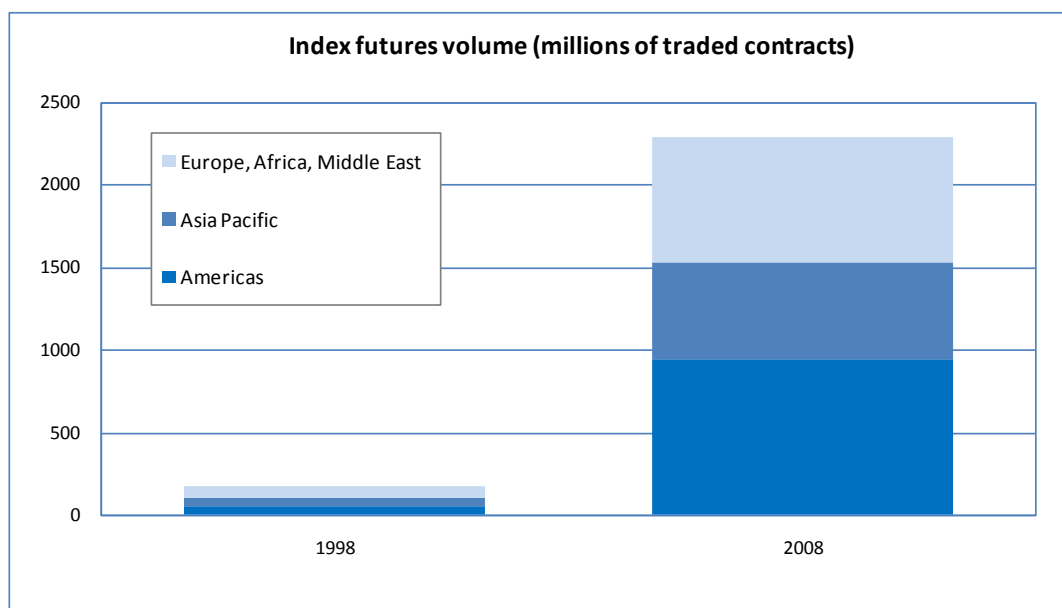
Index options volumes, excluding Korea (millions of traded contracts)					
	Volumes traded in 1998	Volumes traded in 2008	Compound Annual Growth Rate (CAGR)	Regional breakdown in 1998	Regional breakdown in 2008
Americas	75	310	15%	46%	24%
Asia Pacific	8	290	44%	5%	22%
Europe, Africa, Middle East	81	710	24%	50%	54%
Total	164	1 311	23%	100%	100%

Index options trading also increased rapidly in Europe



Index futures trading developed in all the geographical zones. The most rapid growth was recorded in the Americas, where the CME Group maintains an overwhelming domination following the merger with CBOT. The two other regions grew at a similar and rapid pace. The main contribution to growth came from Eurex in Europe and from the National Stock Exchange of India and Osaka Stock Exchange in Asia.

Index futures volumes (millions of traded contracts)					
	Volumes traded in 1998	Volumes traded in 2008	Compound Annual Growth Rate (CAGR)	Regional breakdown in 1998	Regional breakdown in 2008
Americas	53	941	33%	31%	41%
Asia Pacific	49	583	28%	29%	26%
Europe, Africa, Middle East	70	761	27%	41%	33%
Total	172	2 286	29%	100%	100%



LTIR derivative trading grew slower than equity-linked products in the last ten years. It remains marginal in Asia, where only two exchanges, the Tokyo Stock Exchange and the Australian Securities Exchange, still include LTIR options in their offer.

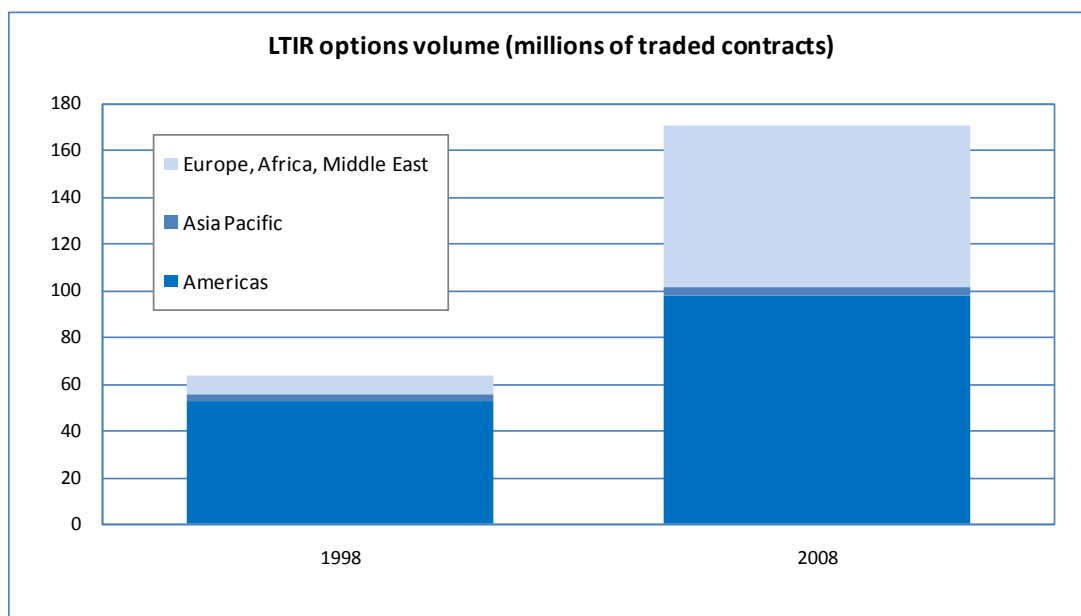
In Europe the concentration process has been dramatic: 16 exchanges active in LTIR options trading in 1998 were replaced by only one in 2008 (Eurex). This trend has been accompanied, or was the result of a concentration of trading on derivatives with German underlyings, the other government debts being highly correlated to the German one. The Johannesburg Stock Exchange is the only other remaining player in the region. But this region is the only one where LTIR option trading grew in the same order of magnitude as other derivatives.

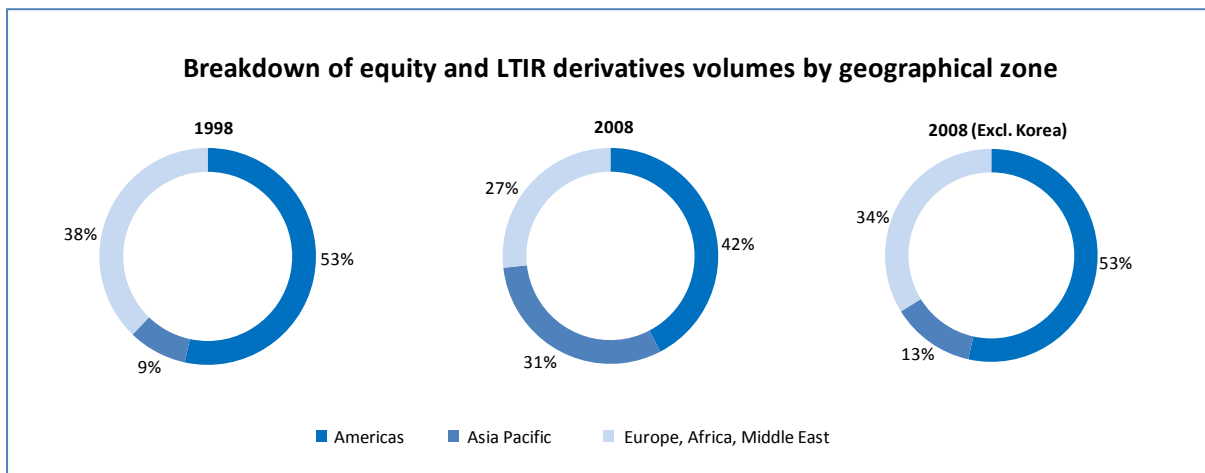
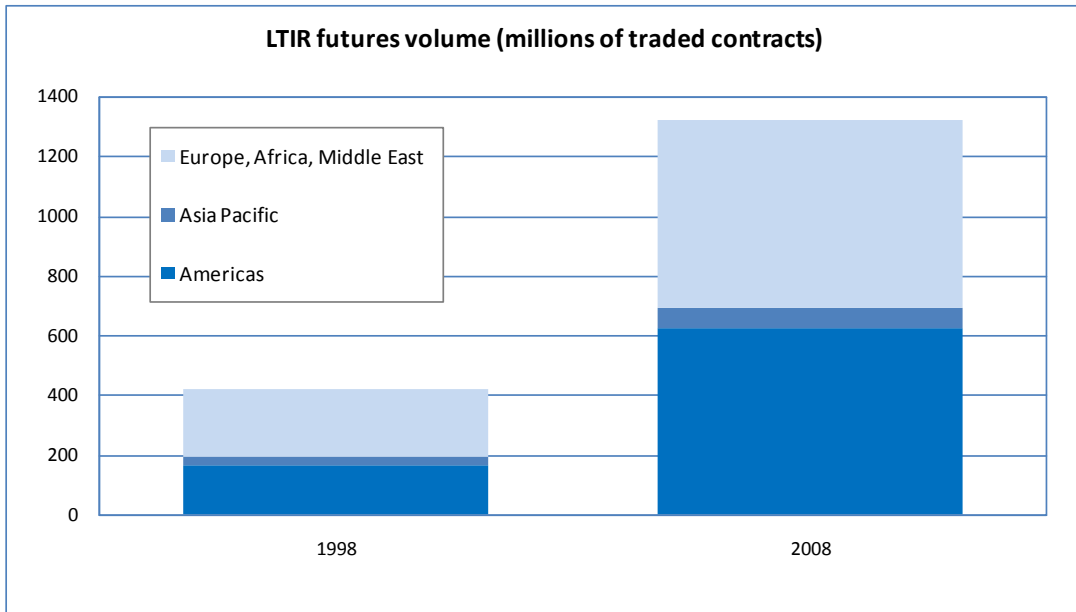
In the Americas, the growth of LTIR futures has been more than twice as strong as options. That region gained market share for the latter products, while it lost its overwhelming dominance for the latter. The CME group emerged as the largest player in the Americas, followed by the Montreal Stock Exchange and Mexder.



Long term interest rate options volumes (millions of traded contracts)					
	Volumes traded in 1998	Volumes traded in 2008	Compound Annual Growth Rate (CAGR)	Regional breakdown in 1998	Regional breakdown in 2008
Americas	53	98	6%	83%	57%
Asia Pacific	3	4	4%	4%	2%
Europe, Africa, Middle East	8	69	24%	13%	40%
Total	63	171	10%	100%	100%

Long term interest rate futures volumes (millions of traded contracts)					
	Volumes traded in 1998	Volumes traded in 2008	Compound Annual Growth Rate (CAGR)	Regional breakdown in 1998	Regional breakdown in 2008
Americas	167	626	14%	40%	47%
Asia Pacific	27	67	9%	7%	5%
Europe, Africa, Middle East	223	629	11%	53%	48%
Total	418	1 322	12%	100%	100%







On-exchange derivative trading v. cash equity

This section compares trading volumes on cash equity markets and equity-linked derivative markets. Since the average size of contracts changes over time, cash equity trading and equity-linked derivative trading have to be compared in value, rather than in volume.

The value of options trading is equal to the value of premiums exchanged, data that is requested in IOMA annual questionnaires. However, using that information for that purpose would raise two difficulties: firstly, it is not applicable to futures, whereas index futures represent a major part of equity-linked derivative trading; secondly, several large exchanges do not provide this data.

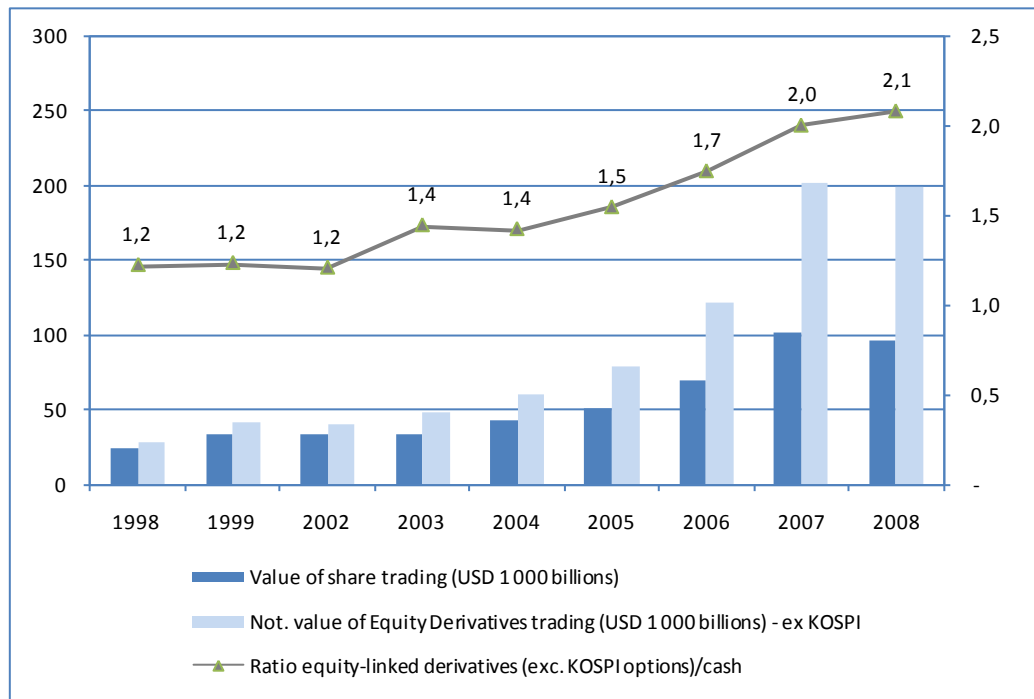
We therefore decided to use the “notional value” of derivative trading. This data does not represent cash payments on derivative markets, but its evolution (rather than its absolute level) can legitimately be compared to the evolution in value of cash equity trading. As for options premium, this data is not provided by all exchanges, but those exchanges which do provide it represent more than 96% of trading volumes, except for equity options. Equity options are the largest segment of the market in terms of contracts traded, but account for no more than 4% in the total notional value of trading. Overall, available notional values of trading represent 85% of total trading of equity-linked derivatives in the world.

2008	Notional value of traded contracts		Representativeness of exchanges for which notional value of trading is available
	In billion USD	Structure in % of total notional value traded	
All Equity-linked derivatives	242 628 567	100%	85.1%
Equity options	9 281 438	4%	62.2%
Stock futures	2 320 319	1%	99.7%
Stock index options	110 000 445	45%	99.5%
Stock index futures	121 026 365	50%	96.6%

The graph below shows the trend in share trading, equity-linked derivative trading and the ratio of derivative trading to share trading.

- From 1998 to 2002, fluctuations of cash and derivative trading mainly reflected ups and downs in equity prices. During this period, the ratio of derivative trading to cash trading did not change.

- From 2003 to 2007, a rapid expansion of cash and derivative trading was observed and the growth of derivative trading was more rapid than the one of cash trading: the ratio of derivatives to cash trading rose from 1.2 to 2.0.
- In 2008 a stabilization of volumes on both markets happened.

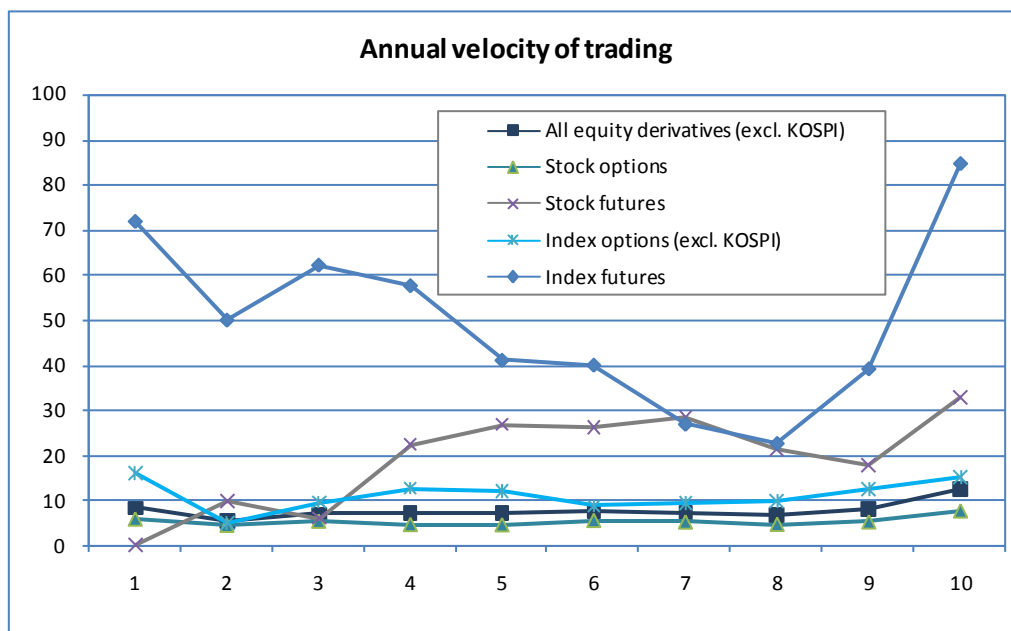


How could the increase in the ratio of derivative trading to cash trading between 2002 and 2007 be explained?

Firstly, it is interesting to note that all products have contributed to growth while the breakdown of trading volumes has not substantially changed.

Breakdown of trading volumes in equity-linked products (excluding KOSPI 200 options)		
	1998	2008
Equity options	6.3%	4.6%
Stock futures	0.0%	1.2%
Stock index options	33.7%	33.6%
Stock index futures	59.9%	60.6%

A second interesting observation is that the growth of derivative markets cannot be explained by a more intense intra-day trading that might have resulted from the development of algorithmic trading. The following graph shows that the overall velocity of trading in equity-linked products did not significantly increase². The annual velocity of trading oscillated around 7 from 1999 to 2007. It rose to 13 in 2008, but the move was due to the fall of the open interest at the end of 2008, rather than increased traded contracts. The rise in the apparent velocity of trading at the end of 2008 was especially large for index futures, and more precisely on the CME, where the open interest was down 42% on 2007 (and CME open interest accounted for almost three quarters of the overall open interest on index futures in the world).



The above analysis demonstrates that the increase of derivative trading was not generated by market players artificially multiplying trades: the increase in trading activity was parallel to the increase of open interest. The growth of derivative markets was not generated by any internal dynamic of trading: it meets the needs of investors and other economic agents willing to hold positions for a certain period of time. The growth of derivative markets in the last 10 years is the result of a broader use of hedging and speculative instruments. Hedge funds certainly contributed to the growth, but the fact that volumes were still high after the crisis in the autumn of 2008 shows that other market participants are now persistently active.

² We calculate the velocity of trading as the ratio of the annual volume of contracts traded to the average of the open interest at the beginning and at the end of the year.



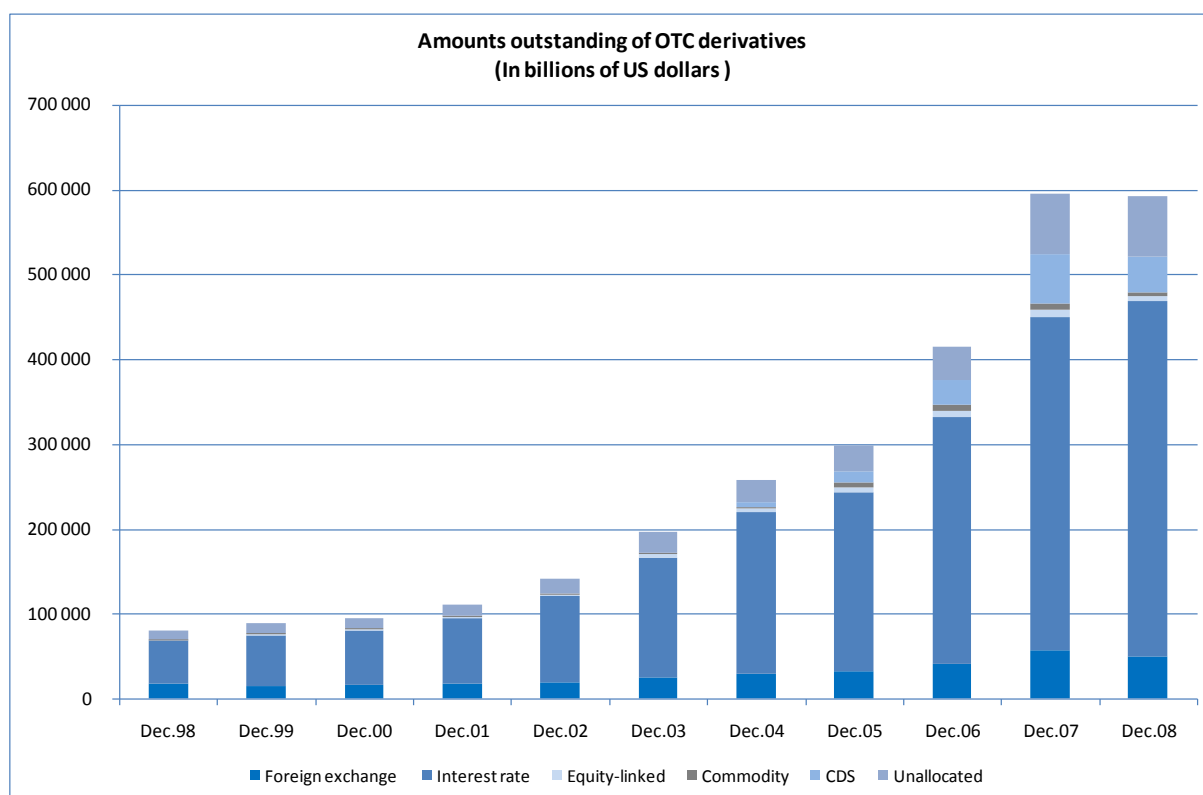
On-exchange derivative trading v. OTC trading

This section aims at comparing trends in OTC derivative trading and on-exchange trading.

Outstanding amounts of OTC derivatives grew very rapidly over the last ten years, at an average annual growth rate of 22%. The largest component of these positions is related to interest rate instruments (mainly interest rate swaps, other contracts being forward rate agreements and options).

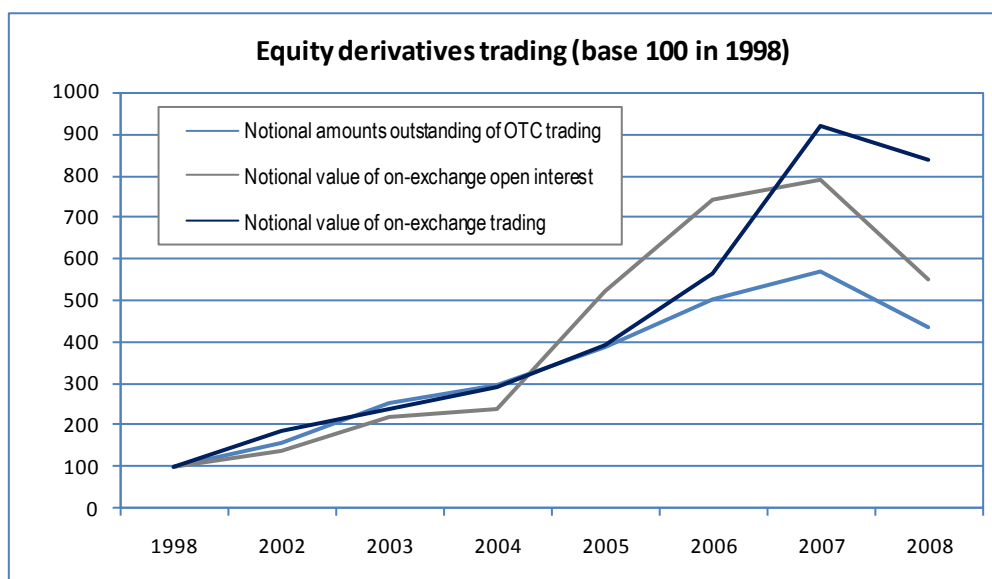
The CDS market became a very significant segment of the OTC market and reached an outstanding value close to US\$ 60 billion at end of June, according to BIS. It decreased to US\$ 42 billion after the Lehman Brothers' collapse and the crisis of the interbank market. The CDS market is still dependent upon email and voice channels and it suffers from very frequent errors (13% of CDS trades according to ISDA). Therefore exchanges can develop an offer in this market that actually solves many problems it encounters. The success of such offers will be eased by the standardization of contracts promoted by ISDA in March 2009.

Outstanding amounts of OTC derivatives		
December 2008	In billion USD	In %
Foreign exchange	49 753	8%
Interest rate	418 678	71%
Equity-linked	6 494	1%
Commodity	4 427	1%
CDS	41 868	7%
Unallocated	70 742	12%
Total contracts	591 963	100%



Turning to the comparison between OTC markets and on-exchange markets, caution is needed in the interpretation of statistics: only aggregate outstanding positions are available from OTC markets, and this data is different from the open positions recorded by exchanges. Indeed, outstanding positions on the OTC markets are gross positions: an operator willing to close a position has to take a symmetrical position and therefore increases the total outstanding positions on the market. Conversely, open positions on exchanges are net positions. Therefore, OTC outstanding amounts are more comparable to exchanges volumes than to open positions. In any case, the relative rate of growth of both markets, rather than their absolute levels, should be analysed.

OTC and on-exchange trading of equity-linked derivatives showed a similar pace of growth from 1998 to 2007. In the first half of 2008, all figures were still rising. But the contraction of the market that followed the collapse of Lehman Brothers translated into a sharp decrease of equity-linked OTC notional amount outstanding (-23% as compared to end of 2007) and of the notional value of on-exchange open positions (-31%). The smaller decrease on OTC markets can be explained by gross positions that have to be increased in a first step to close existing exposures, as explained above.



Key characteristics of the industry

A - Electronic trading v. outcry

Most derivatives markets are now fully electronic.

Electronic trading is also gaining an increasing share of the trading activity on the exchanges which have a trading floor (all of them being in the Americas). CBOE is launching a fully electronic market "C2". On CME Group the share of electronic trading is also growing regularly and the Comex contracts listed on NYMEX migrated successfully to the Globex platform.

Share of electronic trading on exchanges having also a trading floor			
	2008	2007	2006
NYSE Amex Options (formerly American SE)	20%	20%	25%
Buenos Aires Stock Exchange	NA	NA	86%
BM&FBOVESPA	NA	NA	53% (BM&F only)
Chicago Board Options Exchange (CBOE)	62%	53%	70%
CME Group	80%	78%	72%
NYSE Arca Options (formerly Pacific SE)	70%	NA	NA
Philadelphia SE	NA	76%	63%



B - Membership

We report below the number of members for those exchanges who answered this question in the IOMA questionnaire. The number varies markedly across exchanges, depending on the size of each market and the types of eligible members. On markets such as CBOE, National Stock Exchange of India and NYSE Liffe, individual traders can become members of the exchange, while membership is reserved to institutions in most other markets.

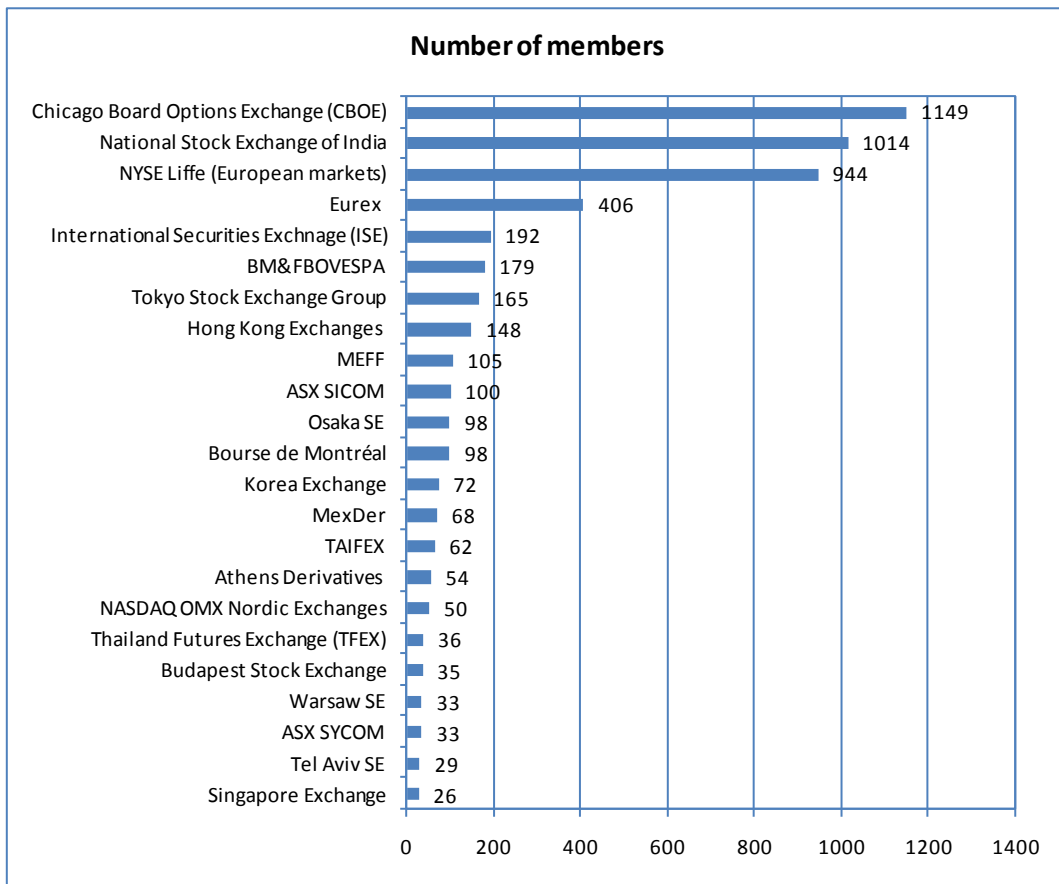
Since 2006 – the first year when this information was requested in the IOMA questionnaire – the average number of members has decreased because CBOE members have fallen from 2 002 to 1 149. But the median has increased.

Number of members of derivatives markets		
	2008	2006
Average	222	245
Average (excluding CBOE)	179	161
Median	98	68

Most exchanges do not admit buy-side institutions as members. Only two exchanges, TAIFEX and Hong Kong Exchanges, indicate that a majority of their members are buy-side institutions. However, even if buy-side institutions are not members of exchanges, and have no legal Direct Market Access (DMA), a number of them achieve the same result using order routing facilities to route orders to the market, and de-facto automatically to the central order book. Most exchanges are not able to measure the relative weight of DMA in the order flow. However BOVESPA reports a percentage of 17% of the trading value, MexDer 4% in equity index futures and 35% in equity options. MEFF estimates that the business brought by DMA represents around 25%.

Similarly, most exchanges cannot measure the relative weight of orders routed by hedge funds, as they have no access to the breakdown of their members' clients. But most of them indicate that they were active participants in the market, contributing, among other things, to the growth of algorithmic trading on electronic platforms. New statistics available from CME Group indicate that the top 25 hedge funds active on the market accounted for almost 9% of the volume traded on the market. But their volume decreased 32% in the fourth quarter of 2008 when compared to the third quarter of the same year³.

³ Source : CME Group, quoted in Burghardt and Acworth, *FIA Annual Volume Survey*, March 2009





Conclusion

Over the last ten years, the development of derivative trading was very impressive. Volumes increased 7.8 times and grew even more rapidly than volumes on cash markets, especially between 2003 and 2007, when equity markets were bullish.

The highest growth rate was observed for equity derivatives: volumes increased 13.5 times between 1998 and 2008 and in 2008 they accounted for 69% of the derivative trading volumes against 40% in 1998. The growth of equity derivatives has been stronger than the one of cash equity markets. The other products, namely interest rate, currency and commodity derivatives, also experienced rapid growth during this period: they grew respectively 5.7, 4.9 and 7.8 times.

Regarding regional development of derivative trading, the most striking phenomenon is the tremendous growth of Asia with the impressive development of KOSPI 200 Options. Apart from this particular product, Asia Pacific region also developed with the arrival of new stock exchanges. In Americas, equity options were very successful, particularly with options on ETFs and in Europe, index options experienced a strong growth mainly driven by Eurex.

In ten years, the industry of stock exchanges saw many changes. There have been a lot of mergers and acquisitions involving the biggest stock exchanges and new exchanges appeared.

In the recent years, electronic trading has gained an increasing share of the trading activity. Nevertheless, the analysis of the velocity of trading demonstrates that the increase of derivative trading was not mainly generated by the development of algorithmic trading. The growth of derivative markets is driven by an increasing use of its products by investors and other economic agents. Further developments are expected following the demand for safer markets by investors, market players and regulators, which should result in a transfer of a significant part of OTC trading to on-exchange trading.