



DEUTSCHE BÖRSE
GROUP

The Global Derivatives Market An Introduction

White Paper

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Executive Summary

Derivatives are an important class of financial instruments that are central to today's financial and trade markets. They offer various types of risk protection and allow innovative investment strategies.

Around 25 years ago, the derivatives market was small and domestic. Since then it has grown impressively – around 24 percent per year in the last decade – into a sizeable and truly global market with about €457 trillion of notional amount outstanding.

No other class of financial instruments has experienced as much innovation. Product and technology innovation together with competition have fuelled the impressive growth that has created many new jobs both at exchanges and intermediaries as well as at related service providers. As global leaders driving the market's development, European derivatives players today account for more than 20 percent of the European wholesale financial services sector's revenues and contribute 0.4 percent to total European GDP.

Given the derivatives market's global nature, users can trade around the clock and make use of derivatives that offer exposure to almost any "underlying" across all markets and asset classes. The derivatives market is predominantly a professional wholesale market with banks, investment firms, insurance companies and corporates as its main participants.

There are two competing segments in the derivatives market: the off-exchange or over-the-counter (OTC) segment and the on-exchange segment. Only around 16 percent of the notional amount outstanding is traded on exchanges. From a customer perspective, on-exchange trading is approximately eight times less expensive than OTC trading.

By and large, the derivatives market is safe and efficient. Risks are particularly well controlled in the exchange segment, where central counterparties (CCPs) operate very efficiently and mitigate the risks for all market participants. In this respect, derivatives have to be distinguished from e.g. structured credit-linked security such as collateralized debt obligations that triggered the financial crisis in 2007.

The derivatives market has successfully developed under an effective regulatory regime. All three prerequisites for a well-functioning market – safety, efficiency and innovation – are fulfilled. While there is no need for structural changes in the framework under which OTC players and exchanges operate today, improvements are possible. Particularly in the OTC segment, increasing operating efficiency, market transparency and enhancing counterparty risk mitigation would help the global derivatives market to function even more effectively.

1 Introduction

Many associate the financial market mostly with the equity market. The financial market is, of course, far broader, encompassing bonds, foreign exchange, real estate, commodities, and numerous other asset classes and financial instruments. A segment of the market has fast become its most important one: derivatives. The derivatives market has seen the highest growth of all financial market segments in recent years. It has become a central contributor to the stability of the financial system and an important factor in the functioning of the real economy.

Despite the importance of the derivatives market, few outsiders have a comprehensive perspective on its size, structure, role and segments and on how it works.

The derivatives market has recently attracted more attention against the backdrop of the financial crisis, fraud cases and the near failure of some market participants. Although the financial crisis has primarily been caused by structured credit-linked securities that are not derivatives, policy makers and regulators have started to think about strengthening regulation to increase transparency and safety both for derivatives and other financial instruments.

This paper aims to contribute an objective and fact-based foundation to the ongoing debates concerning the global derivatives market. Chapter 2 defines derivatives as a category of financial instruments and explains their benefits. It looks at the market's development and functions and the role of European players. It then elaborates on the derivatives trading value chain and discusses the differences between OTC and on-exchange derivatives trading. Chapter 2 concludes with a review of competitive dynamics in the derivatives market. Chapter 3 discusses and assesses the prerequisites for a well-functioning derivatives market that benefits its users and the economy: effective risk mitigation, innovation and efficiency. Chapter 4 draws overall conclusions.

2 Fundamentals and Market Characteristics

Before discussing the prerequisites for a well-functioning derivatives market, it is useful to consider some fundamentals and characteristics of the market. First the basics of derivatives are explained (2.1). Then the size, growth and function of the derivatives market and the role of European players are discussed (2.2). This is followed by an explanation of the derivatives trading value chain (2.3). The chapter concludes with a review of competitive dynamics in the derivatives market (2.4).

2.1 Basics of derivatives

Derivatives are totally different from securities. They are financial instruments that are mainly used to protect against and manage risks, and very often also serve arbitrage or investment purposes, providing various advantages compared to securities. Derivatives come in many varieties and can be differentiated by how they are traded, the underlying they refer to, and the product type.

Definition of derivatives

A derivative is a contract between a buyer and a seller entered into today regarding a transaction to be fulfilled at a future point in time, for example, the transfer of a certain amount of US dollars at a specified USD-EUR exchange rate at a future date. Over the life of the contract, the value of the derivative fluctuates with the price of the so-called “underlying” of the contract – in our example, the USD-EUR exchange rate. The life of a derivative contract, that is, the time between entering into the contract and the ultimate fulfillment or termination of the contract, can be very long – in some cases more than ten years. Given the possible price fluctuations of the underlying and thus of the derivative contract itself, risk management is of particular importance.¹⁾

Derivatives must be distinguished from securities, where transactions are fulfilled within a few days (Exhibit 1). Some securities have derivative-like

characteristics – such as certificates, warrants, or structured credit-linked securities – but they are not derivatives.²⁾

This white paper focuses on the largest segment of the derivatives market: derivatives contracts for wholesale and professional users. The fundamentals explained in this document mostly apply to both wholesale and retail markets, although the share of retail users is negligible in most markets.³⁾ Derivatives contracts can be traded on derivatives exchanges but also bilaterally between market participants. The latter segment – i.e. the OTC segment – currently accounts for around 84 percent of the derivatives market (Exhibit 2).⁴⁾

Uses and users of derivatives

Derivatives make future risks tradable, which gives rise to two main uses for them. The first is to eliminate uncertainty by exchanging market risks, commonly known as hedging. Corporates and financial institutions, for example, use derivatives to protect themselves against changes in raw material prices, exchange rates, interest rates etc., as shown in the box below. They serve as insurance against unwanted price movements and reduce the volatility of companies’ cash flows, which in turn results in more reliable forecasting, lower capital requirements, and higher capital productivity. These benefits have led to the widespread use of derivatives: 92 percent of the world’s 500 largest companies manage their price risks using derivatives.⁵⁾

1) Risk management in the derivatives market is discussed in detail in Chapter 3, section 3.1.

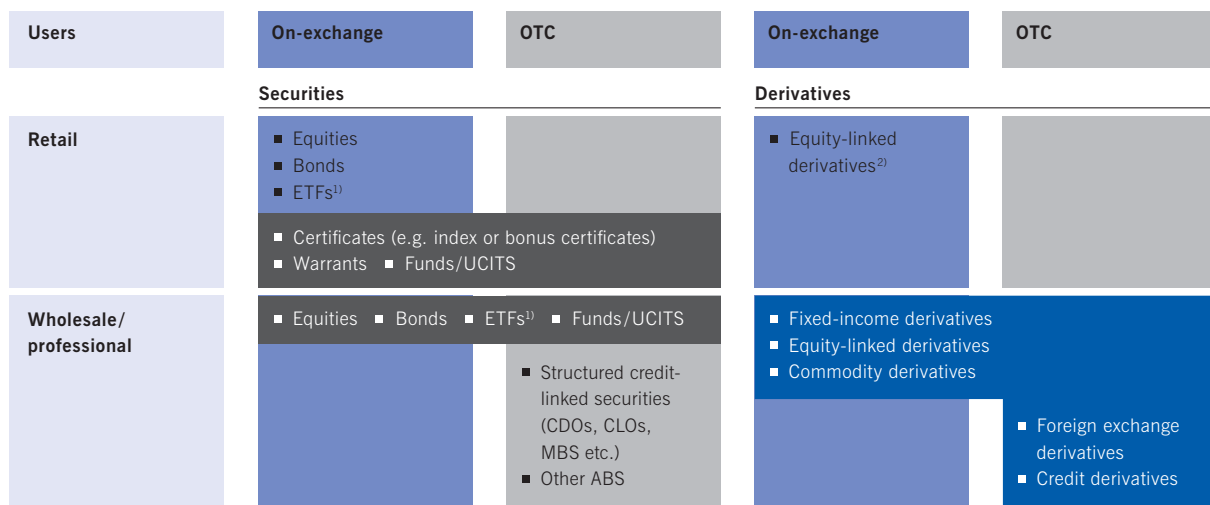
2) It is particularly important to note that structured credit-linked securities and other asset-backed securities, which originally triggered the financial crisis in 2007, are not derivatives.

3) Retail investors only play a role in equity-linked derivatives and then particularly in single-equity instruments (see International Options Markets Association 2006, p. 10). Assuming a market share for retail investors of 50 percent in single-equity derivatives and of 20 percent in equity-index derivatives, the total market share of retail investors is below 1 percent in terms of notional amount outstanding.

4) The difference between OTC and on-exchange derivatives is explained below.

5) See International Swaps and Derivatives Association 2003, p. 1.

Exhibit 1: Overview of financial instruments universe



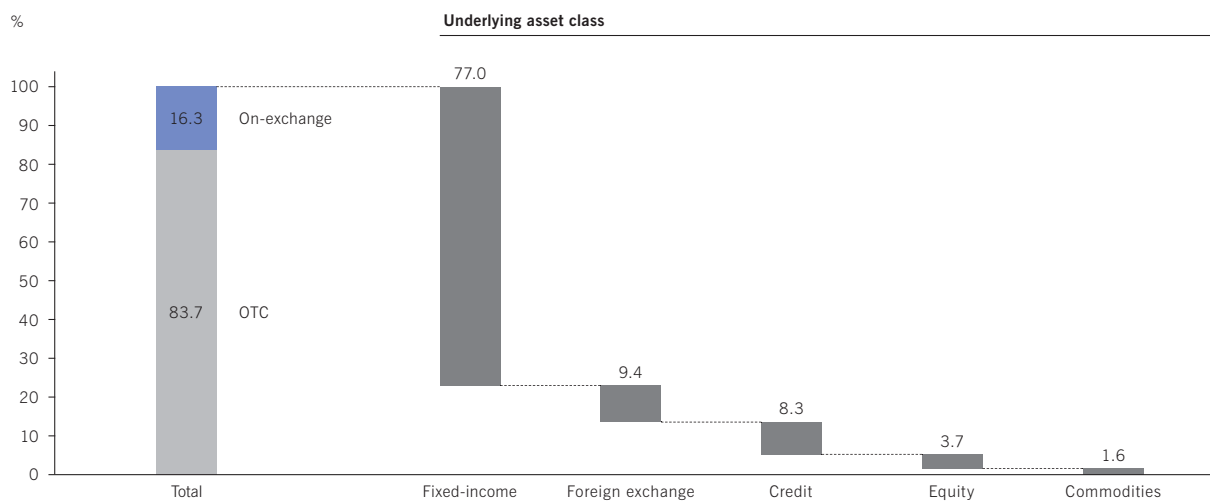
■ Focus of White Paper

1) Exchange-traded funds

2) Only relevant in few regions, e.g. equity options in US, the Netherlands and equity index futures and options in Korea; negligible in most of Europe

Exhibit 2: Breakdown of the global derivatives market – OTC versus on-exchange and by underlying asset class¹⁾

Notional amount outstanding as of June 2007



1) Exotic underlyings (e.g. weather, freight rates, economic indicators) account for less than 0.1 percent.

Source: BIS, WFE, FIA

The second use of derivatives is as an investment. Derivatives are an alternative to investing directly in assets without buying and holding the asset itself. They also allow investments into underlyings and risks that cannot be purchased directly. Examples include credit derivatives that provide compensation payments if a creditor defaults on its bonds, or weather derivatives offering compensation if temperatures at a specified location exceed or fall below a predefined reference temperature.

Benefits of derivatives make them indispensable to the global financial system and the economy

Derivatives

- provide risk protection with minimal upfront investment and capital consumption.
- allow investors to trade on future price expectations.
- have very low total transaction costs compared to investing directly in the underlying asset.
- allow fast product innovation because new contracts can be introduced rapidly.
- can be tailored to the specific needs of any user.

Derivatives have not only widened the investment universe, they have also significantly lowered the cost of investing. The total transaction cost of buying a derivatives contract on a major European stock index is around 60 percent lower than that of buying the portfolio of underlying shares.⁶⁾ If one compares the cost of gaining exposure to less liquid assets such as real estate, the cost differential between the derivative and the direct investment in the underlying is even significantly higher.

Derivatives also allow investors to take positions against the market if they expect the underlying asset to fall in value. Typically, investors would enter into a derivatives contract to sell an asset (such as a single stock) that they believe is overvalued, at a specified future point in time. This investment is successful provided the asset falls in value. Such strategies are extremely important for an efficiently functioning price discovery in financial markets as they reduce the risk of assets becoming excessively under- or overvalued.⁷⁾

Derivatives contracts are mainly designed for professional users. Exchange-traded derivatives contracts are typically in the range of €20,000 to €1 million notional.⁸⁾ Financial institutions and corporates therefore make up the majority of derivatives users – more than 90 percent for some underlyings⁹⁾ (Exhibit 3).

6) Comparison based on the exchange fees (direct costs), bid-ask spread and market impact costs (indirect costs) for gaining a €500,000 exposure to the Dow Jones EURO STOXX 50® portfolio

7) For a review of literature cf. Mayhew (2000)

8) With the notable exception of single stock options and future, which have a standard contract size of around €2,000 to €5,000

9) Based on estimates for the revenue split across customer categories of OTC derivatives dealers from McKinsey 2007

Example: Derivatives can eliminate uncertainty and reduce market risks

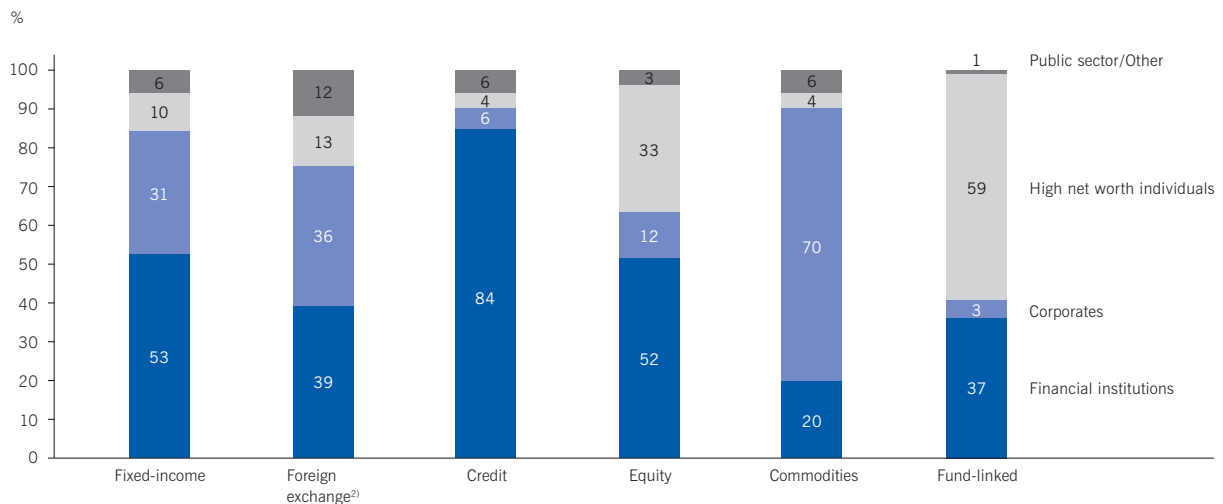
A European manufacturer sells solar modules to a Californian utility company for US\$15 million. The sale is agreed in January 2008 with delivery and payment scheduled for November 2008. In January, €1 equals US\$1.50, so the contract is worth €10 million. The manufacturer pays his material and labour costs in euros, so it is important that he protects himself against a fall in the US dollar relative to the euro. Therefore, he enters into a derivative contract on the US dollar with his bank as the counterparty. The contract gives him the obligation to sell US\$15

million at an exchange rate of US\$1.50 per euro to his bank in November 2008.

If the US dollar falls to US\$2 per euro by November 2008, the US\$15 million will only be worth €7.5 million to the manufacturer. The derivatives contract protects against this potential loss: the manufacturer receives €10 million from the bank in November 2008, as originally agreed, for the US\$15 million, despite the dollar's severe depreciation.

Exhibit 3: Customer breakdown of OTC derivatives dealers' revenues by underlying asset class

European revenues 2006¹⁾



1) Based on reported revenue split from McKinsey 2007 (partially estimated)

2) Including spot trading revenues

Source: McKinsey

Types of derivatives

Derivatives can be traded OTC or on exchanges. OTC derivatives are created by an agreement between two individual counterparties. OTC derivatives cover a range from highly standardized (so-called “exchange look-alike”) to tailor-made contracts with individualized terms regarding underlying, contract size, maturity and other features. Most of these contracts are held to maturity by the original counterparties, but some are altered during their life or offset before termination.

Derivatives can be differentiated along three main dimensions

- Type of derivative and market place: Derivatives can be traded bilaterally OTC (mostly individually customized contracts) or multilaterally on exchanges (standardized contracts).
- Type of underlying: Underlyings can be financial instruments themselves, physical assets, or any risk factors that can be measured. Common examples are fixed-income, foreign exchange, credit risk, equities and equity indices or commodities (Exhibit 2). Exotic underlyings are, for example, weather, freight rates, or economic indicators.
- Type of product: The three main types are forwards (or futures), options and swaps.¹⁰⁾ They differ in terms of their dependence on the price of the underlying.

¹⁰⁾ See glossary for a detailed explanation of forwards, futures, options and swaps.

Exchange-traded derivatives, on the other hand, are fully standardized and their contract terms are designed by derivatives exchanges. Most derivatives products are initially developed as OTC derivatives. Once a product matures, exchanges “industrialize” it, creating a liquid market for a standardized and refined form of the new derivatives product. The OTC and exchange-traded derivatives then coexist side by side.

The number of OTC-traded derivatives is unlimited in principle as they are customized and new contracts are created continuously. A broad universe of exchange-traded derivatives exists as well: for example, over 1,700 different derivatives are listed on the three major global derivatives exchanges (Chicago Mercantile Exchange, Eurex and Euronext.Liffe).¹¹⁾

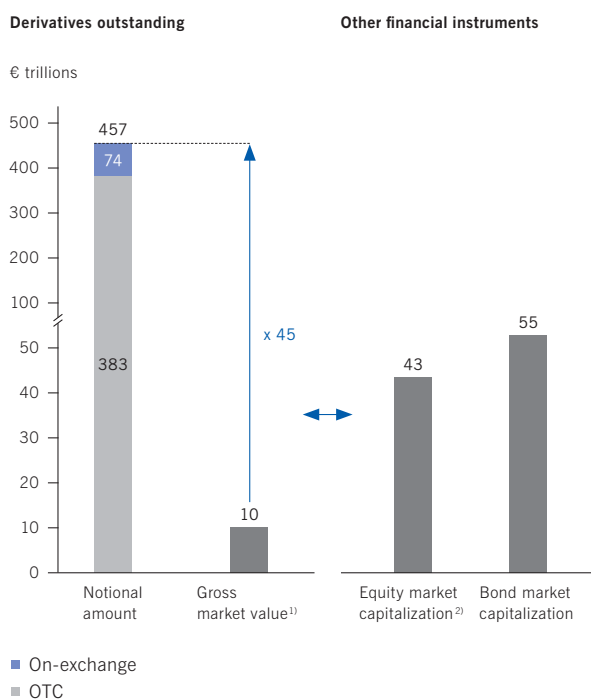
2.2 Development of the market and Europe’s role

The derivatives market has grown rapidly in recent years as the benefits of using derivatives, such as effective risk mitigation and risk transfer, have become increasingly important. Europe is by far the most important region for derivatives that have become a major part of the European financial services sector and a major direct and indirect contributor to economic growth.

¹¹⁾ FIA statistics for US and international exchanges, press statements by derivatives exchanges

Exhibit 4a: Size and growth of the global derivatives, equity and bond markets

June 2007



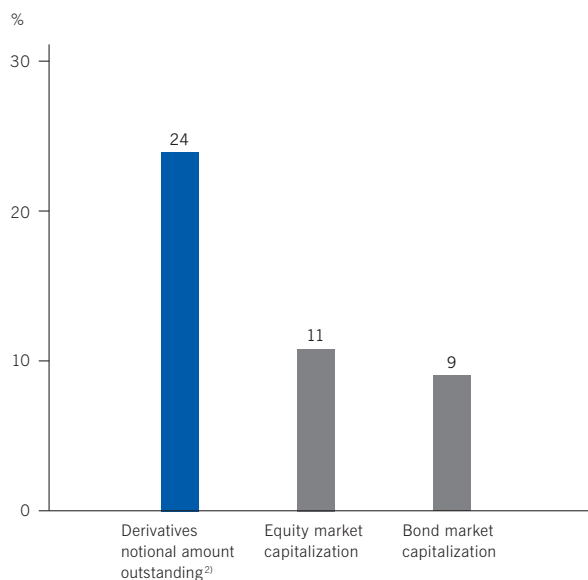
1) Gross market value defined as sum of the positive market values of all derivatives contracts outstanding (as defined by BIS); theoretic values for on-exchange segment estimated based on conversion factors for OTC products
2) As of December 2007
Source: BIS, WFE

Size and growth of the market

The derivatives market is the largest single segment of the financial market. As of June 2007, the global derivatives market amounted to €457 trillion in terms of notional amount outstanding.¹²⁾ By this measure, the derivatives market is more than four times larger than the combined global equity and bond markets measured by market capitalization. However, the estimated gross market values of all derivatives outstanding total only €10 trillion, which is markedly lower than the equity and bond markets with a market capitalization of €43 trillion and €55 trillion, respectively (Exhibit 4a).¹³⁾ The derivatives market is the fastest growing segment of the financial

Exhibit 4b: Average annual growth rate

1995–2007¹⁾



1) Based on historic USD-EUR exchange rates; growth rates would be similar based on USD values

2) Estimate excluding on-exchange commodity and single-stock derivatives
Source: BIS, WFE

sector: since 1995, its size has increased by around 24 percent per year in terms of notional amount outstanding, far outpacing other financial instruments such as equities (11 percent) and bonds (9 percent) (Exhibit 4b).¹⁴⁾

12) See BIS 2008; the notional amount of a derivatives contract refers to the value or nominal amount of the underlying to the derivatives contract; outstanding refers to open derivatives contracts that are held by market participants.

13) See BIS 2008 and WFE statistics (www.world-exchanges.org); the gross market value of a derivatives contract refers to the positive market value one side of a derivatives contract has, not considering negative market values the other side to the derivatives contract might have. In contrast to notional amount, gross market value reflects more the aggregated net risk position of market participants and is therefore significantly lower.

14) See BIS 2008 and BIS statistics (www.bis.org/statistics/derstats.htm).

As described, the OTC segment accounts for almost 84 percent of the market with around €383 trillion of notional amount outstanding.¹⁵⁾ Recently, however, the exchange segment has grown faster than the OTC segment. This is widely perceived to be a result of the increasing standardization of derivatives contracts which facilitates exchange trading. Other contributing factors are a number of advantages of on-exchange trading: price transparency, risk mitigation and transaction costs are among the most important (see chapter 3).¹⁶⁾

Global nature of the market

The OTC segment operates with almost complete disregard of national borders.¹⁷⁾ Derivatives exchanges themselves provide equal access to customers worldwide. As long as local market regulation does not impose access barriers,¹⁸⁾ participants can connect and trade remotely and seamlessly from around the world (e.g. from their London trading desk to the Eurex exchange in Frankfurt). The fully integrated, single derivatives market is clearly a reality within the European Union.

Taken as a whole, the derivatives market is truly global. For example, today almost 80 percent of the turnover at Eurex, one of Europe's major derivatives exchanges, is generated outside its home markets of Germany and Switzerland, up from only 18 percent ten years ago.

Europe's leading role within the derivatives market

Today, Europe is the most important region in the global derivatives market, with 44 percent of the global outstanding volume – significantly higher than its share in equities and bonds (Exhibit 5).¹⁹⁾

The global OTC derivatives segment is mainly based in London. Primarily due to principle-based regulation, which provides legal certainty as well as flexibility, the OTC segment has developed especially favourably in the UK's capital.²⁰⁾ The unrestricted pan-European provision of investment services, in

place since the introduction of the European Union's Investment Services Directive (ISD) in January 1996,²¹⁾ has strengthened the competitive position of Europe in the global market environment. Many European banks are currently global leaders in derivatives.²²⁾

Historically, large derivatives exchanges were almost exclusively located in the US.²³⁾ Strong European derivatives exchanges appeared only after deregulation and demutualization in the 1980s and 1990s. These European exchanges were more independent of their users, who had been less supportive of significant changes at US exchanges. They revolutionized trading by introducing fully electronic trading and by setting industry standards. Over the years European players have strengthened their position, increasing their global market share from 24 percent in 1995 to almost 40 percent in 2007.²⁴⁾ They are now among the largest exchanges worldwide in a sector where the biggest players are international exchange groups that offer trading globally.

15) See BIS 2008.

16) "An important trend is the shift towards increasingly higher volumes of derivatives being traded on exchanges according to pre-established rules. The emergence of central clearing houses is removing the counterparty risk prevalent in OTC deals. Derivatives instruments are also being standardized, thereby facilitating electronic and exchange-based trading on set contracts." (European Capital Markets Institute 2006, p. 50)

17) Already in 1996, more than half of the trades were cross-border, emphasizing "the global nature of the market" (see BIS 1996, p. 2).

18) The United States continues to restrict the direct offering of certain services to US investors by foreign (derivatives) exchanges and clearing houses. This, however, is currently being reviewed in the debate of mutual regulatory recognition (see United States Securities and Exchange Commission 2007).

19) See BIS 2008 and WFE statistics (www.world-exchanges.org).

20) See City of New York/US Senate 2006.

21) The ISD is the predecessor of MiFID.

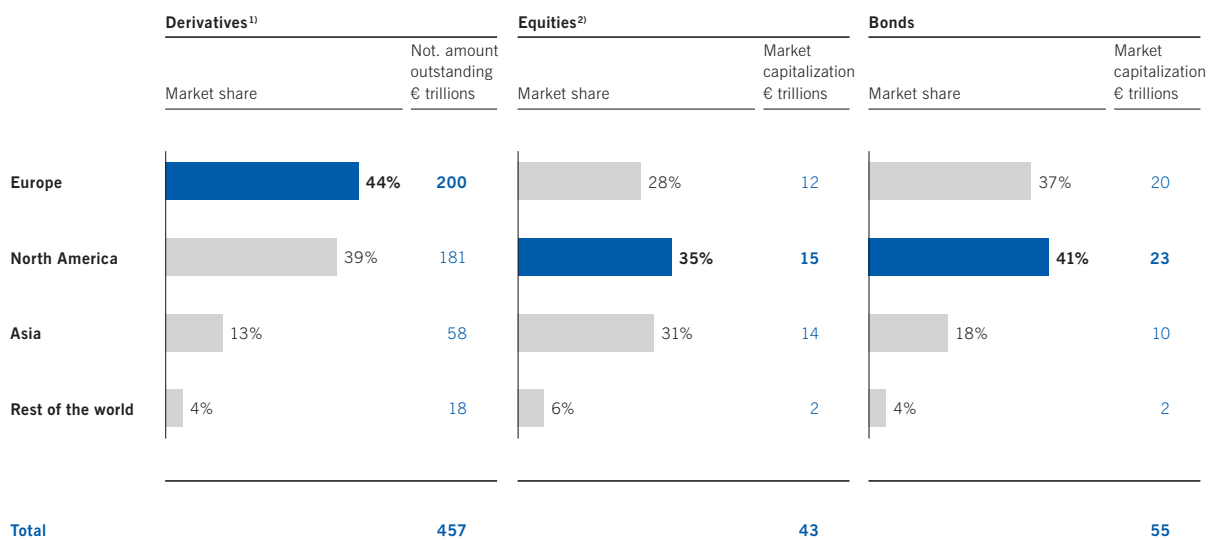
22) For example, in the Institutional Investor OTC Derivatives User Survey 2007, six European players feature in the top ten receiving almost 60 percent of the top ten votes.

23) Some US players like CME Group, NYMEX and NYBOT have their roots in the 19th century.

24) December 1995 vs. September 2007; in terms of notional amount outstanding; see BIS 2008 and BIS statistics (www.bis.org/statistics/derstats.htm).

Exhibit 5: Regional breakdown of the global derivatives, equity and bond markets

June 2007



1) Regional split for OTC derivatives according to underlying equity, currency of underlying interest rate, and currency of foreign exchange derivatives

2) As of December 2007

Source: BIS, WFE

From a user perspective, the location of an OTC trading desk or a derivatives exchange is usually irrelevant. From a more general viewpoint, however, the location of the market activity – trading desks, electronic OTC marketplaces, exchanges and clearing houses – does matter. The derivatives industry is an important and growing part of the financial services sector and generates economic growth, tax revenues and employment. Europe benefits in particular from its strong players in this segment. The contribution of European derivatives players to GDP was over €41 billion or about 0.4 percent in 2006.²⁵⁾ In 2005 the European derivatives industry accounted for more than 20 percent of the European wholesale financial services sector's revenues and over 20,000 jobs in Europe's financial centers.²⁶⁾

In addition, the derivatives industry has significant indirect impact, such as generating employment at related service firms.

The derivatives market also plays an important role for the European financial market and broader economy. It contributes to the increase of operational, information, price, valuation and allocation efficiency.²⁷⁾

25) Based on McKinsey 2007

26) The European wholesale financial services sector's economic activity is estimated to amount to almost €200 billion (see CEBR/City of London 2007).

27) See Tobin 1984, Bienert 1996 and Mayhew 2000.

The exchange segment makes an especially strong contribution to operational and price efficiency through its multilateral market organization, equal access and public disclosure of prices supported by appropriate regulation. Efficient financial markets lower the cost of capital, enable firms to invest, and channel resources to their most valuable uses. Studies show that efficiently functioning financial markets can increase real GDP growth considerably.²⁸⁾ These positive contributions of the derivatives market are especially significant in Europe, as its size relative to the rest of the financial market is much greater than in other regions.²⁹⁾ The ratio of derivatives notional amount outstanding to equity and bond market capitalization is 6.2 for Europe, compared to 4.8 for North America and just 2.5 for Asia.

Europe's leadership in derivatives has not gone unnoticed. The continued success of European OTC and exchange players has prompted reactions especially in the US. A highly acclaimed report by the City of New York and the US Senate concluded that the US runs the risk of being overtaken by Europe in the financial services industry. The report underlines that Europe is clearly leading in the derivatives market, which drives "broader trading flows and [...] the kind of continuous innovation that contributes heavily to financial services leadership."³⁰⁾ Proposed measures – in part already implemented – try to address the emerging shortcomings of the US vis-à-vis Europe in terms of "conditions for innovation, capital formation, risk management and investment in these [debt and derivatives] markets."³¹⁾

2.3 The derivatives trading value chain

Derivatives trading and clearing is organized differently for OTC and on-exchange derivatives. The main distinguishing feature is the multilateral market organization with the use of safe and efficient central counterparty clearing for derivatives being traded on exchanges.³²⁾

Functions in derivatives trading

The derivatives value chain can be broken down into derivatives pre-trading, derivatives trading and clearing (including the rare exercise of derivatives), and (also rare) payment and delivery (Exhibit 6). These functions are organized differently for OTC and exchange-traded derivatives. Broker-dealers (large investment or universal banks), exchanges and clearing houses are the main service providers along the value chain.

Pre-trading comprises the origination and channelling of derivatives orders to marketplaces for the execution of transactions.

Trading consists of the matching of buyers and sellers in derivatives contracts. Execution means that the buyer and the seller respectively enter into the derivatives contract.³³⁾ Often dedicated derivatives dealers constantly provide price offers for contracts. This is called market making³⁴⁾ and is also a part of trading.³⁵⁾

A derivatives trade creates an "open" derivatives contract. Derivatives clearing manages these "open" contracts until their termination, and is closely linked to derivatives trading as "open" contracts can be traded again and need to be managed throughout the contracts' – potentially very long – maturities.

28) See Carmichael/Pomerleano 2002, Levine 1997 and Domowitz/Steil 2002.

29) See BIS 2008, McKinsey Global Institute 2005 and WFE statistics (www.world-exchanges.org).

30) One of the reasons cited is Europe's innovativeness: "Europe is [...] the center for derivatives innovation". (City of New York/US Senate 2006, p. 56)

31) See City of New York/US Senate 2006, p. 54.

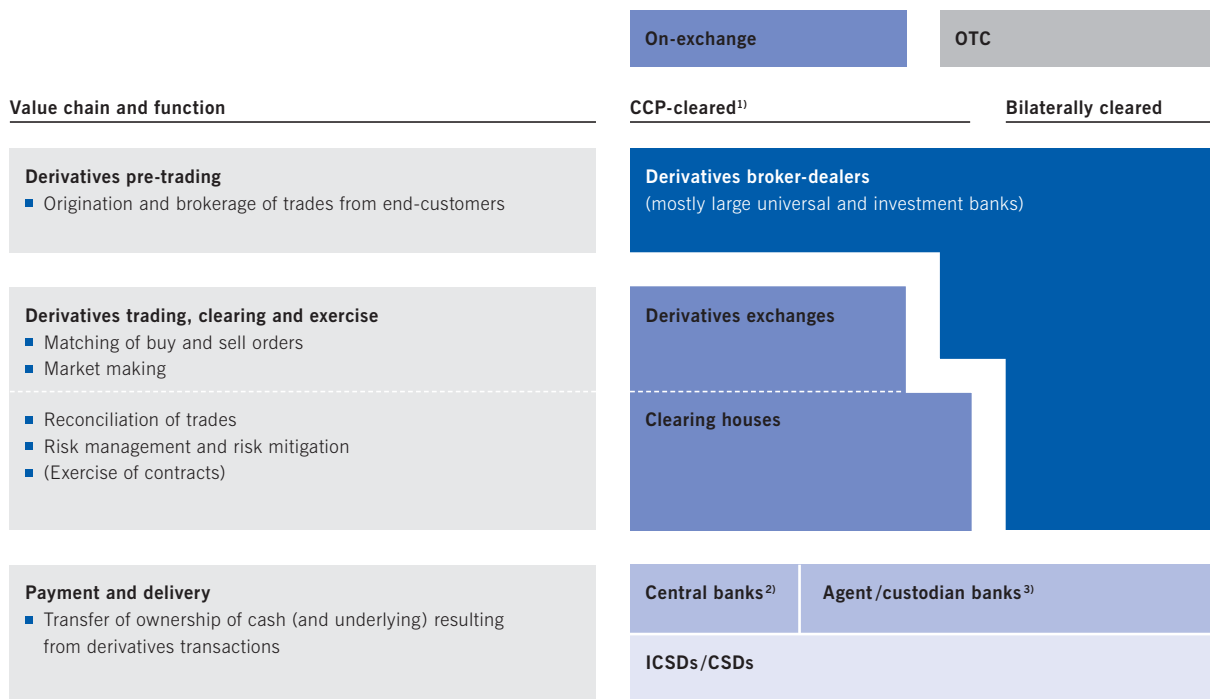
32) CCP clearing is also used to a minor extent for OTC-traded derivatives.

33) As derivatives contracts might already have a positive or negative value at the time when entered into, a payment between the two contractual counterparties might become necessary immediately after entering into the contract.

34) Market making is the systematic and large-scale provision of price offers for buyers and sellers of derivatives contracts. Derivatives dealers derive revenues from this activity from slight differences between prices for buying and selling.

35) Market data provision is often also considered a trading-related function but will not be discussed in greater detail here as it is not an essential function for understanding the derivatives trading value chain.

Exhibit 6: The derivatives trading value chain



1) Only a small portion (< 10%) of OTC derivatives is CCP-cleared.
 2) Payments via central bank money
 3) Payments via commercial bank money

An essential element of derivatives clearing is therefore position management, which deals with keeping track of open derivatives contracts. This usually also includes managing the risks present during the life of a contract. Part of derivatives clearing is also the termination of a derivatives contract, which can be triggered by four actions or events: (1) cancelling out the original contract with an offsetting contract, (2) giving up the contract to another trading party, (3) expiry, or (4) exercise – the only event that requires settlement.

Two alternatives exist for settlement: either exchanging the net value of the contract when exercised via a cash payment or the physical delivery of the underlying against the payment of the agreed price.

Most derivatives contracts are not settled physically or do not even foresee physical settlement, as is the case for interest rate, credit default swaps and most exotic derivatives. Only about 2 percent of all transactions (in terms of notional amount) are physically settled at Eurex.³⁶⁾

The organization of derivatives trading and clearing differs between the OTC and exchange segments (as shown in Exhibit 6), described in detail in the following paragraphs.

³⁶⁾ Eurex internal analysis for first quarter of 2008

The central counterparty

A CCP acts as a buyer to all sellers and a seller to all buyers. As the CCP assumes the counterparty risk of all trading parties it must protect itself so that it can always fulfill its obligations. Different lines of defense are commonly established to achieve this: daily compensation of losses (and gains), liquidation of open positions when a trading party is in default, collateralization of maximum expected daily losses, a clearing fund, support from a highly rated guarantor and finally the clearing house's equity capital.

The daily compensation of all losses and gains by the trading parties ensures that no trading party runs up losses over the life of its contracts that it cannot cover in the end. If a trading party cannot compensate its losses during or after a trading session all its contracts can be automatically closed out by entering offsetting contracts.

If a trading party defaults, all its open positions are liquidated to prevent the defaulting trading party potentially running up further losses. Collateral, which is pledged to the clearing house, serves to cover any losses that cannot be compensated by the trading party. The amount of collateral is based on the net market risk the trading party is exposed to from all its open contracts. For this, the CCP must regularly calculate the market risk resulting from each trading party's position.³⁷⁾

A clearing fund is usually established as a further line of defense. If the aforementioned two arrangements (automatic liquidation of open positions and collateralization) are still not sufficient to honour obligations to other trading parties when one trading party defaults, these obligations are fulfilled from this fund. All trading parties must contribute to the clearing fund and often even replenishment requirements exist.

A further line of defense can be a guarantee from a highly rated credit insurer or bank that steps in if the CCP runs low on funds.

Finally, if even the clearing fund arrangement or guarantees are not sufficient to cover the losses from failing trading parties the clearing house's equity capital serves as a last line of defense. Combinations of these lines of defense make it almost impossible for the CCP to default, thereby eliminating counterparty risk for all trading parties. CCPs usually have the highest creditworthiness in the market, close to the creditworthiness of sovereign states. In addition, by being integrated with exchanges' trading processes, manual errors or errors from the delayed handling of trade confirmations can be avoided or at least minimized.

37) Market risk is discussed in more detail in chapter 3, section 3.1.

On-exchange derivatives trading value chain

Derivatives broker-dealers originate and collect orders from their customers. These are then forwarded to derivatives exchanges for execution. The exchanges are central marketplaces where all orders are collected and matched. Trading parties usually remain anonymous. Matched orders either add new open contracts, alter the counterparties of existing open contracts or offset existing open contracts. Clearing houses that step in between the two trading parties as a CCP provide clearing for all trades and position management of all open contracts. The clearing house nets all offsetting open derivatives contracts of each trading party across all other trading parties (multilateral netting) and serves as a CCP to each trading party guaranteeing the fulfillment of each contract. The box above explains the measures that CCPs use to achieve a very high degree of safety.

As the clearing house keeps track of all trading parties' open contracts it also receives exercise requests and serves as a middleman to the other counterparty of a contract being exercised. It usually also generates the settlement instructions for the payments resulting from derivatives contracts and, if necessary, the required physical transfer of the underlying asset.

OTC derivatives trading value chain

In the case of OTC derivatives, broker-dealers forward originated orders to their own derivatives desks and through them – if required – to other derivatives dealers. Trading then takes place by two trading parties bilaterally agreeing a new contract. These contracts can be tailored completely to the specific needs of the two contractual parties; or they are identical to standardized exchange-traded contracts (so-called “look-alikes”). Secondary trading usually does not take place in OTC contracts given their high degree of customization. Instead, offsetting contracts are entered into to cancel existing contracts economically. Electronic and multilateral OTC marketplaces have been established to help find a suitable transaction partner for common OTC contracts,

such as interest rate swaps or foreign exchange transactions, where some degree of standardized contract parameters already exist (often referred to as “plain vanilla” contracts).

Each trading party/derivatives dealer is responsible for the clearing and position keeping itself and must keep track of its open contracts and risk position. Netting and collateralization are measures to mitigate counterparty risk also for OTC derivatives. In the OTC segment netting and collateralization happens mostly on a bilateral-only basis. Only for some sufficiently standardized OTC products, clearing houses offer CCP clearing services with multilateral netting as well. SwapClear is an example of OTC clearing services for interest rate swaps. While bilateral netting agreements are in place for virtually all OTC trades, collateralization was used for approximately 59 percent of OTC transactions in 2007.³⁸⁾ CCP services are currently used only for an estimated 16 percent of all interest rate swap transactions.³⁹⁾

Settlement of derivatives transactions works similarly for the exchange and OTC segments. Payments resulting from derivatives transactions are concluded between the trading parties (in the case of exchange-traded derivatives also the CCP). Payments are carried out via central bank accounts, which are used only by some CCPs, or via commercial bank accounts. In the rare case of physical settlement, custodian banks, ICSDs or CSDs provide the transfer of ownership of securities.⁴⁰⁾

38) See International Swaps and Derivatives Association 2007.

39) See BIS 2007a.

40) These custody service providers and the services they offer are described in more detail in Deutsche Börse Group 2005.

Revenue distribution in derivatives trading and clearing

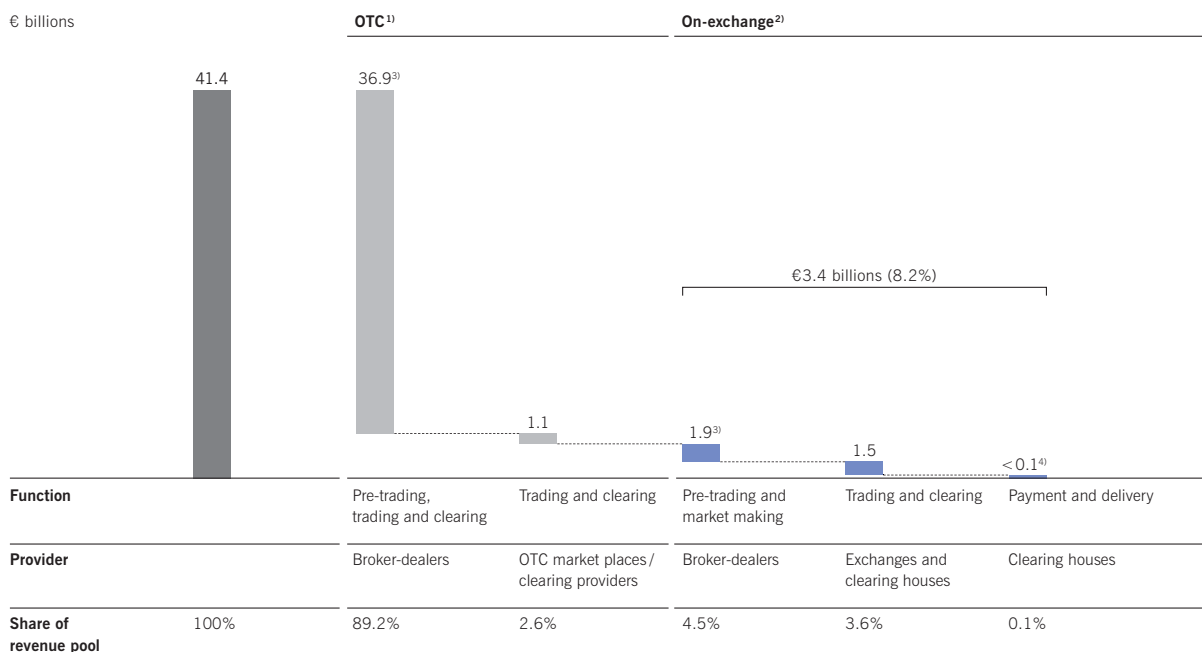
Revenues from derivatives trading and clearing can be broken down along the value chain functions only for the exchange segment. For the OTC segment, broker-dealers are the main players and provide service across the entire value chain in an integrated way. In Europe, OTC broker-dealers capture the largest share of the total revenues pool: 89 percent (around €37 billion). The on-exchange segment accounts only for about 8 percent (roughly €3.4 billion) of the total European revenue pool. Thereof, pre-trading and market making provided by broker-dealers make up €1.9 billion. On-exchange trading

and clearing constitutes €1.5 billion, while revenues from payment and delivery (i.e. physical settlement) are negligible amounting to less than €0.1 billion.⁴¹⁾ Providers of electronic trading and clearing services in the OTC segment earn almost as much (€1.1 billion) as regulated derivatives exchanges and clearing houses in the exchange segment (Exhibit 7).

41) Based on McKinsey 2007

Exhibit 7: Breakdown of European derivatives revenues by value chain function and providers

2006



1) No functional breakdown possible for OTC segment

2) Trading and clearing revenues of BME, EDX, Eurex, HELEX, IDEM, Euronext.Liffe, LME, OMX, Oslo Boers and LCH.Clearnet; payment and delivery assumed to account for 3 percent of on-exchange derivatives trading, clearing, payment and delivery revenues based on own estimates

3) Broker-dealer, pre-trading and market making data for EMEA (Europe, Middle East, and Africa) based on McKinsey 2007

4) Not including revenues of agent/custodian banks and (I)CSDs as those are not separable into cash/derivatives transactions related

Source: Annual reports, McKinsey

2.4 Competition in the global derivatives market

The derivatives market is highly competitive. Generally, there are two indications for competition in a market: new market entries and customer choice. The derivatives market scores high on both. New players regularly enter the market and customers can choose between many substitute products across both its segments.

Market entries

The derivatives market can be characterized as highly dynamic with plenty of market entries. There are no legal, regulatory or structural barriers to entering the derivatives market.⁴²⁾ Almost all derivatives exchanges across the world have been created during the last three decades only.⁴³⁾

The United States was home to the first wave of equity options exchange foundations in the 1970s in the wake of academic breakthroughs in options valuation and the introduction of computer systems. The CBOE was founded in 1973, the American Stock Exchange, Montreal Exchange and Philadelphia Stock Exchange started options trading in 1975 while the Pacific Exchange commenced options trading in 1976.

A second wave of new derivatives exchanges occurred in the 1980s and early 1990s in Europe.⁴⁴⁾ During that time a financial derivatives exchange was established in almost every major Western European financial market – the most important ones being London with Liffe in 1982, Paris with Matif in 1986, and Frankfurt with DTB in 1990.⁴⁵⁾ Most of these organizations formed their own clearing houses.⁴⁶⁾

In recent years, new derivatives exchanges have started to compete with existing derivatives marketplaces. For instance, ISE commenced trading in 2000 and became the market leader in US equity options trading together with CBOE in 2003. In 2004, BOX successfully entered US equity options trading.

ICE, founded in 2000, is an example of successful market entry into the commodity derivatives market. Recently, two plans have been announced to establish further derivatives trading platforms in the United States and Europe with the ELX and project “Rainbow”, which aim to compete with established marketplaces.

In such a dynamic market, the already large number of derivatives exchanges (Exhibit 8) is likely to continue growing.

42) This is only partly the case for the equity options segment in the US, where exchanges require SEC approval. Here, ISE and BOX have been the only two market entries since 1976.

43) The most noteworthy exceptions are CBOT (founded in 1848 – since 2007 a part of CME Group), NYMEX (founded in 1882) and CME (founded as the Chicago Butter and Egg Board in 1898 – reorganized as CME in 1919); a relevant European exception is LME (founded in 1877).

44) Three derivatives exchanges were already established earlier in Australia (1960 and 1976) and Hong Kong (1976).

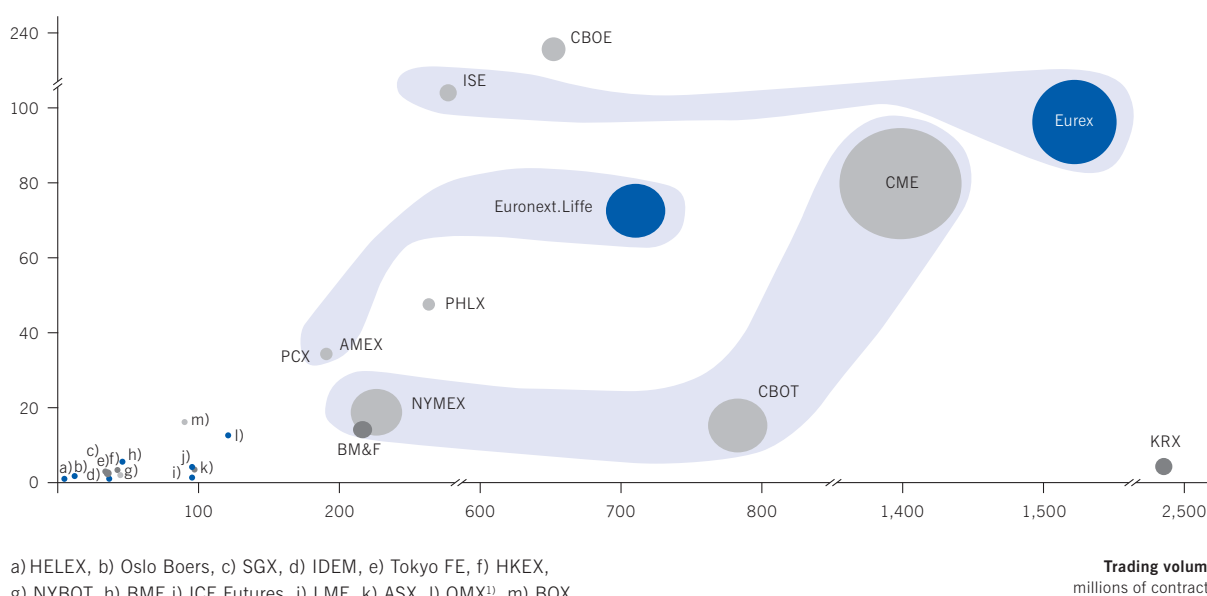
45) Liffe (since 1992 when merged with the London Traded Options Market) was founded as the consequence of currency controls being removed in the UK in 1979. Matif and MONEP were absorbed in 2000 in the formation of Euronext between the Amsterdam, Brussels and Paris exchanges and later merged with Liffe, when Euronext acquired Liffe in 2002. DTB was merged with SOFFEX in 1997 to form Eurex. Further foundations are OM in Sweden in 1985, MONEP in 1987, SOFFEX in 1988, in 1989, Oslo Bors' derivatives market in 1990, and IDEM in 1994

46) Trading on Euronext.Liffe is cleared by LCH.Clearnet.

Exhibit 8: Global derivatives exchanges

2006

Outstanding contracts
millions



a) HELEX, b) Oslo Boers, c) SGX, d) IDEM, e) Tokyo FE, f) HKEX,
g) NYBOT, h) BME i) ICE Futures, j) LME, k) ASX, l) OMX¹⁾, m) BOX

Trading volume
millions of contracts

- European players
- US players²⁾
- Other players
- ⊙ Revenues 2006³⁾

1) Derivatives revenues estimated assuming that derivatives account for 35 percent of trading and clearing revenues

2) Revenues of AMEX, PCX and BOX estimated assuming average revenue per traded contract, open interest for US options exchanges based on OCC data and market shares

3) Derivatives trading and post-trading revenues

Source: WFE, annual reports

Away from the developed markets, related activities in emerging markets are also intensive. Three derivatives operations have commenced trading in the Middle East since 2005: Dubai Gold and Commodities Exchange, Kuwait Stock Exchange, and IMEX Qatar. India saw four new derivatives exchanges set up between 2000 and 2003: National Stock Exchange of India, Bombay Stock Exchange, MCX India, and NCDEX India. China has seen the establishment of two derivatives exchanges since 2005: Shanghai Futures Exchange and China Financial Futures Exchange.

Banks are also constantly entering new product segments: Goldman Sachs, for example, has invested heavily into the commodity derivatives segment in recent years. BNP Paribas has successfully developed the OTC equity derivatives segment. There are numerous successful market entries into the OTC segment such as ICAP or GFI, which provide trading services via electronic platforms, or of clearing service providers such as Liffe's Bclear, LCH.Clearnet's SwapClear or Intercontinental Exchange's OTC clearing services.

Newly established derivatives exchanges are competing for energy and emission rights trading. Three major exchanges are providing electricity derivatives trading and clearing in Europe:⁴⁷⁾ Nord Pool, Powernext, and EEX. Competitive trading and clearing of European carbon emission allowances (EU allowances or EUAs) started on EEX and ICE in January 2005 when the European Union Gas Emission Trading Scheme (EU ETS) was launched.⁴⁸⁾ Bluenext, a joint venture of NYSE Euronext and Caisse des Dépôts, has been offering comparable EUA derivatives since April 2008, directly competing with established EUA marketplaces.

Choice for users

This dynamic market offers users choice falling into three categories: (a) choice between different OTC dealers within the OTC segment, (b) choice between the OTC and on-exchange segments for many contract types, and (c) choice between different derivatives exchanges.

Consider the example of the European manufacturer introduced in section 2.1 that needs to sell US dollars at a specific USD-EUR exchange rate at a future date. He can approach different banks offering foreign exchange transactions and ask for the exchange rate that they will offer to buy the US dollars on a specific day in November 2008, and will choose the bank making the best offer to him.

This choice among multiple OTC dealers is available to all professional users of OTC derivatives across all product categories. According to the Bank of England 95 percent of the total transaction volume is split among 20 different OTC derivatives broker-dealers. Moreover, for many OTC products there are standardized alternatives available on-exchange that fulfill the same economic purposes. For example, both an interest rate swap with a maturity of five years – a classic OTC product – and an exchange-traded future on a five-year government bond offer protection against interest rate changes over a time horizon of five years.

Similarly, OTC derivatives dealers offer forward transactions on any equity index for all maturities that users could request. Derivatives exchanges offer futures (the on-exchange equivalent of a forward transaction) on many equity indices as well – although, only for a fixed set of maturity dates. Both products can be used for the same purpose of obtaining exposure to the same underlying equity index.

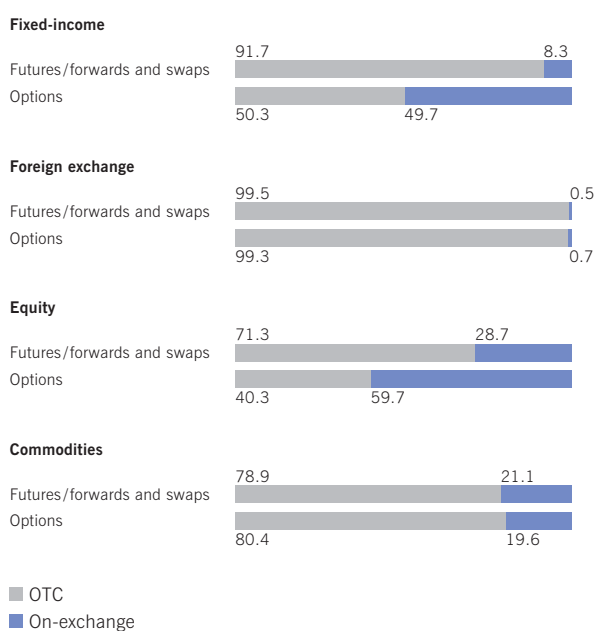
User preference between the OTC and exchange segments is reflected in the relative market shares of OTC and exchange-traded notional amounts for the major categories of derivatives products (Exhibit 9): the exchange segment has a noticeable market share in all product categories except for foreign exchange and credit derivatives. It is especially successful in fixed-income and equity options, capturing more than half of the respective notional amounts outstanding.

47) All of these also provide trading services in spot electricity, that is immediate (usually next-day) supply and demand in electricity.

48) Carbon emissions allowance derivatives products traded on ICE are developed and marketed by ECX.

Exhibit 9: Market share of OTC and on-exchange segment by underlying class and product category¹⁾

June 2007, in percent



1) In terms of notional amount outstanding; credit derivatives not shown
(market share of on-exchange segment negligible)

Source: BIS, WFE

For all derivatives categories exchanges face competition from the OTC segment. This is recognized by competition authorities. The Office of Fair Trading (the UK's domestic competition commission), for instance, concluded in 2002 that OTC trading provides a competitive constraint to derivatives exchanges on prices and services.⁴⁹⁾

Within the exchange segment, users also have a choice between different providers. To give some examples, ICE and EEX are competing for trading in European carbon emission allowances. The two major players in oil contracts are the NYMEX and ICE.

Many exchanges list similar or even identical products. Eurex, for example, could capture and maintain 10 to 25 percent of the market share in Dutch and French equity options. Often however, one exchange attracts a very large share of the trading in a specific product as it can offer more liquidity than other exchanges and hence lower bid-ask spreads.

Occasionally, if an exchange holds most of the liquidity in a derivative other exchanges will try to capture market share by providing better services or lower prices or both. For example, from 1996 to 1999, Eurex managed to attract significant share of trading in futures on long-term German government bonds away from Liffe due to lower total transaction costs (including internal costs of market participants) connected with highly efficient electronic trading.⁵⁰⁾

49) See Office of Fair Trading September 2002, on proposed acquisition of Liffe by Euronext.

50) DTB, Eurex's predecessor, commenced offering trading of Bund Futures in 1990. From 1996 to September 1999 DTB/Eurex managed to capture almost the entire trading volume in Bund Futures up from around 30 percent volume share in September 1996 (see Book 2001).

3 Imperatives for a Well-Functioning Derivatives Market

To deliver maximum benefits to its users and to the economy, the derivatives market must meet three prerequisites: derivatives trading and clearing must be safe, the market must be innovative and it must be efficient.

Market participants, policy makers and regulators should support the providers in the derivatives market to ensure these prerequisites. This chapter assesses for each prerequisite the situation today, and lays out potential measures to further improve the functioning of the market and to further increase the benefits to its users and ultimately the entire economy.

3.1 Safety and effective risk mitigation

There are wanted and unwanted risks in the derivatives market. Both the OTC and exchange segments have arrangements in place to mitigate unwanted risks, although these are inherently more effective in the exchange segment.

The main reason for using derivatives is to gain exposure to a “wanted” risk. This usually is a market risk that either could compensate for an opposite risk (hedging) or that an investor wants to benefit from for investment purposes – via the positive evolution of market prices. However, as with other financial instruments, there are also “unwanted” risks associated with derivatives trading that investors seek to avoid. These unwanted risks are counterparty, operational, legal and liquidity risks.⁵¹⁾

The different risks that market participants face can ultimately lead to systemic risk, that is, the failure of one counterparty having adverse effects on other market participants, potentially destabilizing the entire financial market. A primary concern of all stakeholders, including regulators, is to limit systemic risk to the greatest extent possible.

Examples: Risk categories in the derivatives market

Consider the European manufacturer described in section 2.1. He faces the risk that the US dollar depreciates against the euro. An increase in the USD-EUR exchange rate would result in fewer euros for his future dollar revenues. He wants an opposite exposure by entering into a forward contract that allows him to sell dollars at a specific exchange rate. The value of this contract will change with the exchange rate. This is a wanted market risk.

If the manufacturer is not paid by the Californian utility, he may himself get into liquidity problems and may not be able to pay the US\$15 million he owes his bank in November 2008 as agreed. This is an unwanted counterparty risk for the bank, which in principle only wanted to assume the exchange rate risk, a market risk.

Due to a backlog of entering foreign exchange derivatives transactions into the bank’s systems, the bank might not have full transparency over its overall risk position. This is an unwanted operational risk.

As the derivatives contract comes due, the manufacturer might refuse to pay the US\$15 million to the bank if the dollar has actually appreciated and he would get a better exchange rate in the market. If the contract’s legal terms do not give the bank a clear claim to demand fulfillment of the derivatives contract, the bank faces an unwanted legal risk.

If the sale of the solar modules is cancelled, the manufacturer might want to sell his forward contract. If he cannot find a buyer, he might be forced to sell the contract below its fair market value as there are no buyers who want to buy at the fair market price. This is an unwanted liquidity risk.

51) See glossary. For a detailed description of the different risk categories see Group of Thirty – Global Derivatives Study Group 1993.

Risk mitigation in the derivatives market

To fulfill its role of protecting against risks and providing the means for investing, the derivatives market itself must be safe and mitigate unwanted risks effectively.⁵²⁾

The derivatives market has arrangements in place to mitigate unwanted risks that arise from conducting derivatives transactions. From a practical point of view these arrangements have proven successful – the unwanted risks in the derivatives market have been reduced to a tolerable level. Even when failures of market participants have occurred, they have not seriously affected other market participants.

The OTC and exchange segments have taken different approaches to mitigate unwanted risks.

Counterparty risk

The scale of aggregated credit risks varies significantly between the OTC and exchange segments. If no counterparty risk mitigation mechanisms were in place in both segments, the required regulatory capital for counterparty risk would be around €400 billion in the OTC segment and €90 billion in the exchange segment.⁵³⁾ This is not surprising given the large differences between the two markets in the notional amount outstanding.

The most common means of mitigating counterparty risk are netting and collateralization of counterparty risk exposures. In the OTC segment, these lead to the theoretic regulatory capital required being reduced by around 70 percent to approximately €120 billion. For example, 76 percent of the counterparty risk exposure arising from OTC transactions is subject to bilateral netting agreements and the total amount of collateral posted in relation to OTC derivatives transactions is around €1,200 billion.⁵⁴⁾

Central counterparties, as detailed in section 2.3, provide multilateral netting across all trading parties and are well protected against default as they use several lines of defense against their counterparty risk exposure.⁵⁵⁾ As a consequence, the use of CCPs reduces the trading parties' regulatory capital for credit risk from derivatives transactions to zero – irrespective of whether the transaction is OTC or on exchange.⁵⁶⁾

Taking into account all lines of defense, CCP clearing is safer than bilateral clearing in terms of counterparty risk. No major clearing house has ever come close to being in financial difficulty, while there have been cases of individual derivatives dealers that defaulted.⁵⁷⁾

52) This section does not discuss how market risks or unwanted risks that arise internally for institutions engaging in the derivatives market, are or should be managed. These topics are, for example, addressed by the work of the Financial Stability Forum (see Financial Stability Forum February 2008).

53) This assumes that all market participants were banks subject to Basel capital adequacy standards. In fact banks held almost 90 percent of OTC derivatives in terms of notional amount outstanding in June 2007 (see BIS 2007b). Estimates are based on the BIS current exposure method for credit risk estimation and Basel II capital adequacy standards assuming probability of default of 0.5 percent and loss-given default of 30 percent (see BIS 1998, BIS 2005a and BIS 2005b).

54) See BIS 2007b and ISDA 2007. For comparison, the aggregated amount of collateral provided to the world's four largest CCPs (CME Clearing, Eurex Clearing, LCH.Clearnet and OCC) is about €170 billion, with collateral calculated as margin deposits and default funds at fair value (including bank guarantees and letters of credit); see 2006 annual reports of Deutsche Börse Group, LCH.Clearnet Group, CME Holdings and OCC.

55) See BIS 2007a.

56) See BIS 2005a Annex 4 and BIS 2007a.

57) See Bliss/Papathanassiou 2006.

Operational risk

The key to minimizing operational risk is to minimize manual handling and interference in derivatives trading and clearing processes, and to design reliable electronic processes.

Both the OTC and exchange segments use automated processing. The exchange segment is fully automated across trading and clearing. Derivatives exchanges and clearing houses usually have fully automated interfaces resulting in seamlessly integrated processes.

The OTC segment uses automated processing solutions primarily for standard products.⁵⁸⁾ Newly introduced, exotic, less liquid or complex OTC derivatives are usually handled manually, with resulting delays and risks of errors. By December 2007, only 20 percent of OTC equity derivatives were processed electronically compared to about 44 percent of OTC interest rate derivatives and 91 percent of credit derivatives.⁵⁹⁾

Operational risk events do occur more often in the OTC segment but they have not resulted in the complete failure of players with the exception of outright fraud.

Legal risk

Legal risk is principally addressed by using standardized derivatives contracts and agreements. It is particularly important that netting agreements work in case of default, that is, that they are not impaired by insolvency procedures and other creditors' claims.

The OTC segment achieves this through the use of standard "master agreements", which are developed under the leadership of its industry associations, such as the ISDA. The master agreements are supported by legal opinions from leading law firms in all relevant jurisdictions. This "self-regulatory" solution provides sufficient legal certainty to a large part of the OTC derivatives segment. As a result, legal disputes concerning derivatives contracts arise in the OTC segment only occasionally.

Derivatives exchanges offer almost only standardized derivatives contracts.⁶⁰⁾ They alone – in close coordination with the clearing houses that serve as CCPs for the exchange – design these contracts assisted by respective legal support. All contracts are subject to one chosen and known jurisdiction. Together with legally binding rules for participating in the trading and clearing of derivatives, this ensures that legal uncertainty for on-exchange derivatives is negligible.

Liquidity risk

Most exchange-traded derivatives and standard OTC derivatives, such as foreign exchange forwards and interest rate swaps, are very liquid. Market participants can expect to find a party to trade with at a fair price. Liquidity risk is higher in smaller or exotic OTC derivatives sub-segments or new, not yet established exchange-traded derivatives segments.

Illiquidity is almost not a problem in the exchange segment and rarely a problem in the OTC segment. However, in situations where the entire financial market is under stress, such as since the start of the financial crisis in 2007, bilateral trading in the OTC segment can be difficult as there are fewer potential trading parties available for transactions. This can be aggravated by the lack of credible price information, as details of OTC transactions are not disclosed to other trading parties and the public. Finally, trading parties might be dependent on a particular OTC derivatives dealer to unwind positions if necessary. As a consequence, illiquidity tends to be a bigger problem in the OTC than the on-exchange segment,⁶¹⁾ which has proven highly liquid even throughout the recent financial crisis.

58) See BIS 2007a.

59) See Markit 2007; the substantial progress in electronic processing of credit derivatives is partly due to regulatory pressure.

60) With the exception of e.g. flexible options and other similar instruments, which leave certain contract parameters open for customization

61) See Bliss/Papathanassiou 2006.

Implications for systemic risk

Despite the failures of individual market participants, the stability of the derivatives market as a whole has never been threatened so far. In particular the exchange segment with the mandatory use of CCPs contributes to this. If one market participant fails, CCPs shield all other market participants from any adverse effects. A domino effect, whereby other market participants fail and the crisis becomes systemic is extremely unlikely if the CCPs are set up in a way that makes their failure close to impossible. On the other hand, if a CCP failed, all market participants using that CCP would be adversely affected and might fail themselves, increasing the chances of a systemic crisis.

CCPs must therefore be made as immune to failure as possible,⁶²⁾ and certainly so far, they have proven resilient. By contrast, the largely bilateral nature of the OTC segment means that the failure of a major derivatives dealer would affect multiple other market participants. This might well result in a systemic crisis.⁶³⁾

CCP clearing offers two further advantages:

(1) The CCP has a consolidated risk perspective on each trading party and across all trading parties as a whole. This makes it easier to identify (early warning) and address excessive risk taking by individual market participants as well as overall market imbalances and allows early intervention.

(2) On-exchange derivatives trading produces publicly available price and transaction data, which makes risks and market trends transparent to all market participants and regulators.

Assessment

The unwanted risks in the derivatives market are well controlled and reduced as far as possible, especially by using CCP clearing services. There are, nevertheless, some ways in which the effectiveness of risk mitigation in derivatives markets could be further improved. As the BIS report on OTC clearing concludes, CCPs are central to an improved risk mitigation in the OTC segment.⁶⁴⁾

- Legal certainty for derivatives contracts could be improved by establishing a common international regulatory and legal framework for OTC contracts and harmonizing insolvency rules.
- In the derivatives market, transparency on market and counterparty risks and price discovery, as well as safety could be improved by offering incentives such as capital reliefs to players in the OTC segment for disclosing prices and using CCPs.⁶⁵⁾
- Agreeing and adhering to common CCP standards⁶⁶⁾ internationally would make the safety and reliability of CCPs more comparable and understandable, and ensure that risk standards do not become a parameter of competition between CCPs, which might erode the level of security they offer.

The economic benefits of further eliminating unwanted risks, however, could be offset by significantly higher costs for eliminating these risks and should hence be analyzed in detail.

62) See BIS 2007a.

63) This was a key driver of the FED's decision to guarantee certain parts of Bear Stearns' portfolio when Bear Stearns was sold to JP Morgan Chase in March 2008.

64) See BIS 2007a.

65) According to BIS 2007a, the use of CCPs has the potential to significantly mitigate credit, operational, legal and liquidity risks.

66) In this area the CPSS and the IOSCO published their "Recommendations for Central Counterparties" containing 15 headline recommendations in November 2004.

3.2 Innovation

Across the board, the derivatives market has been highly innovative. Indeed, product and technology innovation have driven the impressive growth of the market. European players have been central to this, leading innovation in both fields.

Product innovation

Product innovation can take many different forms, for example, the creation of a derivative on a new underlying or a new product type with different payoff characteristics. New derivatives are usually first introduced for OTC trading. Here, the liberal regulatory environment and new business opportunities foster product innovations.⁶⁷⁾ Lead times to introduce a new product in the OTC segment are comparably short due to the low set-up costs in the OTC segment and the fact that there is no need to register and issue securities. European players are especially renowned for their innovativeness. They constantly score high in user rankings.⁶⁸⁾ Examples of recent OTC product innovations are exotic interest rate and credit derivatives.

Exchanges usually pursue a different approach to product innovation. Only products that can be standardized and are suitable for electronic trading can be introduced on exchanges. A close link between trading and clearing ensures that products developed by exchanges can be handled by the risk management systems of the CCP and are eligible for straight-through processing.⁶⁹⁾ Only seamless integration allows new derivatives products to be introduced swiftly.

Product innovation and introduction is thus significantly more costly on-exchange, and exchanges have to be more selective in product development. Nevertheless, derivatives exchanges are highly innovative. Globally, the top three derivatives exchanges (Eurex, CME and Euronext.Liffe) have introduced more than 800 new products since the beginning of 2005, increasing the number of total products available to users by more than 80 percent.⁷⁰⁾

Product innovation is a critical driver of overall market growth as the following examples illustrate:

- CDSs were introduced as an OTC instrument in the mid-1990s as a way of enabling market participants to manage their exposure to credit risk. Driven by the CDS segment the credit derivatives segment has grown at more than 70 percent per year from €135 billion in 1996 to €37 trillion in June 2007.⁷¹⁾ Today, credit derivatives account for about 8 percent of the total derivatives volume. Only very recently, in 2007, attempts have been made to introduce them to on-exchange trading.⁷²⁾
- Derivatives on carbon emission allowances (for example, EUAs) are one of the newer product innovations introduced by derivatives exchanges. Today's market in EUAs is still relatively small with about €24 billion traded in 2006, which is however three times as much as the trading volume in 2005. Recent increases, for instance, in the trading of EUA futures on EEX, have prompted EEX to also introduce options on EUA futures. But already new underlyings are added in the emissions segment of the market: besides EEX and Eurex, which have offered derivatives on CERs since March 2008, Barclays Capital in the OTC segment, and ICE and Bluenext recently announced plans to enter this segment.

67) See Partnoy 2001.

68) The Institutional Investor Magazine End User Survey 2007 ranked Deutsche Bank top, and further five European banks among the top ten. Moreover, BNP Paribas received the Equity Derivatives House of the Year 2007 award by Risk magazine and Deutsche Bank was voted the Best FX Derivatives Provider 2007 by Global Finance magazine.

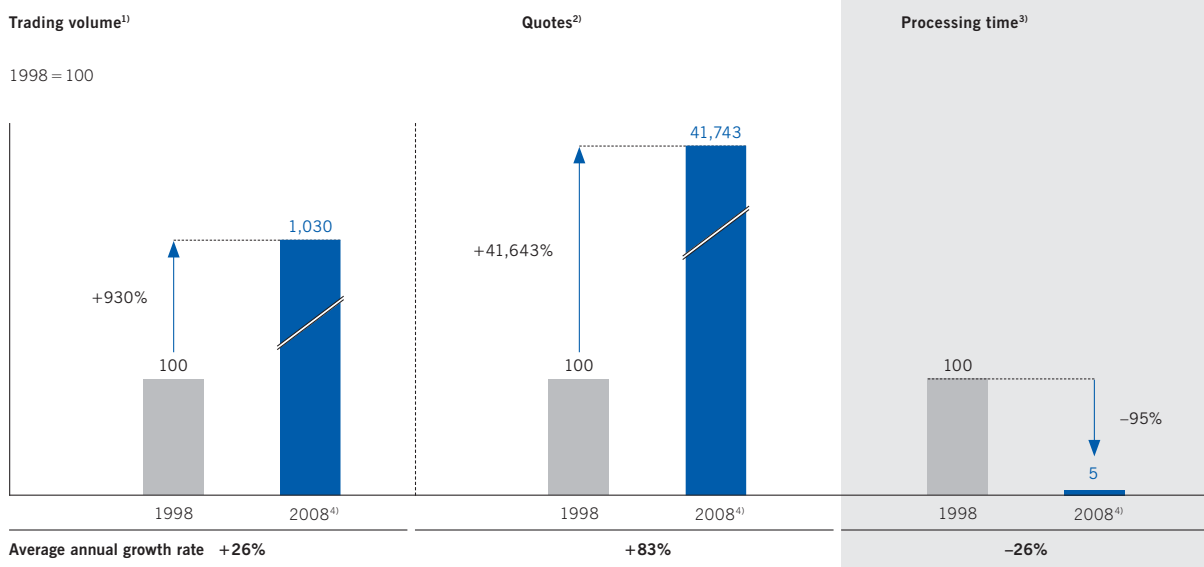
69) STP is the seamless fully automated, electronic handling of – in the case of derivatives trading – derivatives orders, contracts and open positions across all functions and providers along the derivatives value chain.

70) The number of new products introduced since 2005 by the top ten exchanges amounts to more than 7,000. Figures are based on FIA statistics for US and international exchanges (2004 to 2007), OCC New Listings and Statistics for Equity Options and press statements by derivatives exchanges.

71) In terms of notional amount outstanding; see BIS statistics (www.bis.org/statistics/derstats.htm) and British Bankers' Association 2006.

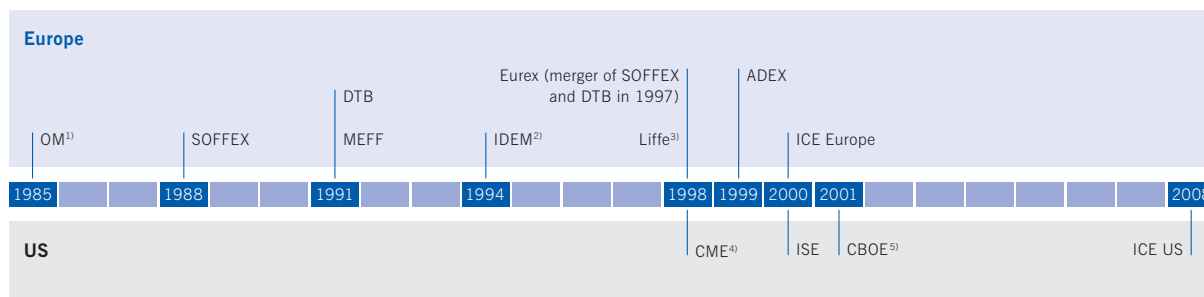
72) Eurex, for example, has been offering three exchange-traded CDS index products, since March 2007, that reference to iTraxx® indices of the most liquid European credit default swaps on individual companies.

Exhibit 10: Trading technology evolution – Eurex example



1) Based on average daily values
 2) A quote is the simultaneous entry of a (limit) buy and (limit) sell order for an Eurex derivatives product. See glossary for more detailed explanation.
 3) Per transaction
 4) Based on data for January and February 2008
 Source: Eurex

Exhibit 11: Introduction of fully electronic trading at major derivatives exchanges



1) Fully electronic trading system for options introduced
 2) Electronic trading in index futures
 3) System for after-hour electronic trading (Automated Pit Trading, APT) introduced in 1989
 4) System for after-hour electronic trading introduced in 1992
 5) Retail Automatic Execution System (RAES) launched in 1984
 Source: Press, exchanges' websites

Technological innovation

Technological innovations have contributed significantly to greater efficiency in the derivatives market. Through innovations in trading technology, trades at Eurex are today executed much faster than ten years ago despite the strong increase in trading volume and the number of quotes (Exhibit 10). These strong improvements have only been possible due to the constant, high IT investments by derivatives exchanges and clearing houses.

These changes have made a major contribution to the development of new trading styles and strategies and hence new business models for market participants. Algorithmic trading now accounts for around one-third of total volume on many derivatives exchanges.⁷³⁾

Trading systems that can process transactions within fractions of a second are the latest step in the automation of exchanges that started with the introduction of electronic trading in the mid-1980s. European derivatives exchanges have been at the forefront of this “revolution”. They introduced fully electronic trading well before their US counterparts (Exhibit 11). Moreover, European exchanges also significantly improved the organizational model for trading in the course of becoming fully electronic with, for instance, the electronic central limit order book.⁷⁴⁾

In recent years, the OTC segment has also become increasingly automated with the emergence of new electronic OTC trading platforms. Examples include ICAP, GFI, Tradition and Tullett Prebon. Major technological innovations have not just been achieved at the trading layer: CCP clearing had already been invented and introduced in the on-exchange derivatives segment early in the 20th century with the Chicago Board of Trade Clearing Corporation. Years after this CCPs were introduced for selected OTC derivatives and for securities markets.

Drivers of innovation

Competition is the major driving force behind these product and technology innovations. Every product innovation is an opportunity for exchanges and broker-dealers to compete for new trading volumes. Consequently, even product segments that have been introduced recently are heavily contested. Meanwhile, technological innovations can often be a good way to enter a market. Electronic trading helped Eurex win the market for derivatives on long-term German government bonds (Bund Future) – the benchmark in European fixed-income markets, which had been served mainly by UK derivatives exchange Liffe before 1996.⁷⁵⁾

Not surprisingly, innovations in the derivatives market can be costly and lengthy: OTC broker-dealers are estimated to invest at least €20 million per new product introduction. It took LME several years to develop its steel derivatives contracts. As most of these product innovations do not enjoy patent or intellectual property protection, innovators try to establish an early lead but must constantly further innovate to maintain their market leadership.

73) See Eurex 2008.

74) Other elements include transparent price discovery, pre- and post-trade anonymity, enhancing liquidity and seamless integration of trading and clearing, increasing efficiency and reducing operational risks.

75) See footnote 52.

Assessment

Two factors are vital to maintain or even enhance the innovativeness of OTC and exchange players. In this regard, it is important to:

- maintain an innovation-friendly regulatory environment that promotes the swift migration of product and technology innovations between both segments.
- continue to ensure that successful innovations pay off in both segments. OTC as well as exchange players must be able to achieve adequate returns on their investments in innovation.

3.3 Efficiency

The efficiency of the derivatives market has increased significantly in recent years. This is true both in terms of cost efficiency and price efficiency. The exchange segment has proven particularly efficient due to the standardization of exchange-traded derivatives, available economies of scale and its complete automation.

Cost efficiency refers to costs associated with trading derivatives from a customer's perspective. These are transaction costs that exchanges and intermediaries charge explicitly as well as implicit transaction costs that are included in the derivatives transaction price, e.g. spreads that market makers receive in both the OTC and the on-exchange segment. In Europe customers paid about €41 billion to broker-dealers, derivatives exchanges, clearing houses and electronic OTC marketplaces in 2006 to participate in the derivatives market.

Price efficiency refers to the quality of price discovery and is typically measured by the spread between the price that a buyer needs to pay and the price a seller receives when selling (the bid-ask spread). The lower the spread between bid and ask prices, the better the price efficiency.

However, there is not sufficient data transparency to calculate cost efficiency independently from price efficiency. Bid-ask spreads will always be driven by both. As an approximation, total transaction costs can be used. They include all costs that customers pay. For the exchange segment this is the sum of revenues of derivatives broker-dealers (of exchange-traded derivatives), exchanges and clearing houses; for the OTC segment it is the revenues of broker-dealers (of OTC derivatives), OTC marketplaces and clearing providers.

Total transaction costs can be compared for both segments by dividing these revenues by the notional amount traded on-exchange and OTC, respectively.⁷⁶⁾ The comparison is facilitated by normalizing the transaction costs to a notional amount traded of €1 million.

In Europe, total transaction costs for the exchange segment are €7.0 per €1 million notional amount traded. This is approximately eight times less expensive from the customer's point of view than the OTC segment, where it costs €55 to trade a similar amount of notional (Exhibit 12).

Three factors explain that difference. First, exchanges generate economies of scale from their sheer trading volume – almost four times the volume traded over the counter. Second, products traded on exchanges are processed in a fully automated way across the value chain reaching into the back offices of market participants, while a large share of OTC products is processed manually, which is more costly. And third, on-exchange products are completely standardized, which reduces processing costs. On-exchange processing therefore also reduces market participants' internal handling costs.

⁷⁶⁾ See BIS statistics (www.bis.org/statistics/derstats.htm) and McKinsey 2007.

Efficiency is likely to improve in the OTC segment as electronic trading platforms become more prevalent. This trend may even be accelerated by the fact that OTC platforms do not bear the same level of regulatory cost but may provide comparable automation benefits as exchanges. Examples include Currenex in the US or 360T in Germany.

Data on the bid-ask spread development underlines that the efficiency of derivatives exchanges has been particularly high for many years. For many of the most liquid products (or so-called global benchmark products) at the globally leading derivatives exchanges, such as the Bund Future at Eurex, bid-ask spreads have been constantly close to their potential minimum level since the late 1990s.⁷⁷⁾ Two central functions of financial markets, operational and price efficiency, are clearly well served in the exchange segment.

Assessment

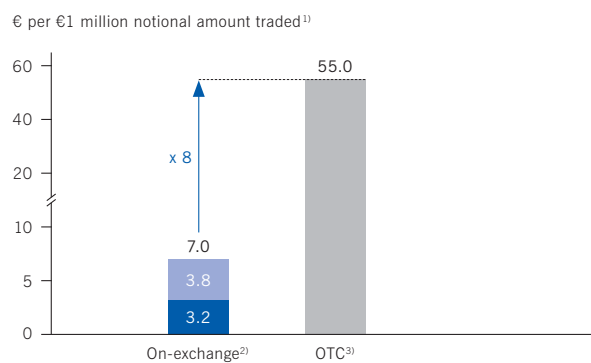
Innovation and competition for customer order flows are the driver of continuous improvement of market efficiency. To increase efficiency even further for the entire derivatives market, several actions could be pursued:

- Provide incentives to further automate OTC trading by moving a greater share of standard OTC products to electronic OTC platforms (or alternatively to derivatives exchanges)
- Integrate OTC derivatives trading with clearing houses providing CCP services to the OTC derivatives segment, such as SwapClear, Bclear and RepoClear, to also achieve more automation and resulting efficiency gains in OTC derivatives clearing (besides the resulting risk mitigation improvements)

⁷⁷⁾ The potential minimum bid-ask spread is determined by the smallest possible price increment (tick size).

Exhibit 12: Total transaction costs for end customers per €1 million notional amount – on-exchange vs. OTC

Estimates for Europe 2006



- Pre-trading and market making (broker-dealers)
- Trading and clearing (exchanges and clearing houses)

1) Explicit (trading and clearing fees) and implicit (bid-ask spread from market makers) costs for both sides of a transaction

2) Broker-dealer data for EMEA; European derivatives exchanges and clearing houses

3) Based on broker-dealer revenue data for EMEA; notional amounts traded based on BIS data for interest rate and foreign exchange derivatives scaled up to reflect total market (fixed-income and foreign exchange derivatives account for 78 per cent of market in terms of amounts outstanding)

Source: BIS, WFE, annual reports, McKinsey

4 Conclusion

The derivatives market is very dynamic and has quickly developed into the most important segment of the financial market. Competing for business, both derivatives exchanges and OTC providers, which by far account for the largest part of the market, have fuelled growth by constant product and technology innovation. The competitive landscape has been especially dynamic in Europe, which has seen numerous market entries in the last decades. In the process, strong European players have emerged that today account for around 44 percent of the global market in terms of notional amount outstanding.

The derivatives market functions very well and is constantly improving. It effectively fulfills its economic functions of price efficiency and risk allocation. The imperatives for a well-functioning market are clearly fulfilled:

- The exchange segment, in particular, has put in place very effective risk mitigation mechanisms – mostly through the use of automation and CCPs.
- For its users, the derivatives market is highly efficient. Transaction costs for exchange-traded derivatives are particularly low.
- Innovation has been the market's strongest growth driver and has been supported by a beneficial regulatory framework especially in Europe.

Overall, it is clearly desirable to preserve the environment that has contributed to the impressive development of the derivatives market and the success of European players in it. There is thus no need for any structural changes in the framework under which OTC players and exchanges operate today. However, some aspects of the OTC segment in particular can still be improved further. Safety and transparency, and operational efficiency could be enhanced along proven and successful models helping the global derivatives market to become even safer and more efficient.

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Glossary

Agent bank A bank, either a local bank or a foreign bank branch, that acts on behalf of a foreign investor's custodian (entity that performs custody services).

Asset-backed security A → security whose payments are linked to a portfolio of assets such as receivables.

Bid-ask spread The difference between the best bid price and the best ask price for a security at a given time.

Broker A broker acts as an intermediary between buyers and sellers of derivatives or → securities, effectively channelling → orders to the market for execution and charges a commission for this service.

Broker-dealer A broker also acting as buyer or seller to transactions and thus becoming a principal party to a deal (often in the form of → market making). In the → OTC derivatives segment, broker-dealers usually act as → counterparty to end customers. As the broker-dealer – usually a large universal or investment bank – also assumes principal risk, commissions are higher than for pure brokerage.

Bund Future German government bond with a regular ten-year maturity at issuance. Eurex's Bund Future (→ future) is one of the most liquid exchange-traded fixed-income derivatives.

Cash settlement The final → settlement of a contract by the payment or receipt of a cash amount.

Central counterparty (CCP) Legal entity that acts as an intermediary between the parties to a securities or derivatives trade and is the seller to every buyer and the buyer to every seller, minimizing the default risk and facilitating → netting, without revealing the buyer's or seller's identity.

Central limit order book Market model where all → limit orders for a certain trading product are consolidated, displayed by their price limit and size, and matched according to pre-defined rules.

Central securities depository (CSD) An institution that performs, as a mere agent, → clearing, → settlement, custody, safekeeping and notary functions. In the derivatives arena CSDs only provide their services in the rare case of → physical settlement.

Certificate A structured and securitized product, e.g. in the form of a bearer bond, allowing an investor to participate in the performance of an → underlying. As → securities, certificates have to be differentiated from non-securitized derivatives.

Clearing In the case of derivatives, the management of open derivatives positions including their → netting. Termination of derivatives contracts is also part of derivatives clearing involving the establishment of final positions for → settlement. Mitigating the → counterparty risks on open derivatives positions is the most important aspect of derivatives clearing. As derivatives contracts can have very long lives, clearing plays a crucial role in the derivatives value chain and is considerably more complex than e.g. the clearing of cash equities.

Clearing fund One of the lines of defense of a clearing house. If one trading party cannot honour its obligations because of default, these can be covered by the clearing fund (in the unlikely case that the other lines of defense such as daily compensation of losses and → collateral are not sufficient). Clearing members have to contribute capital to the clearing fund.

Clearing margin Margin posted by a member of a clearing house.

Close-out (closing out) An open position is offset (closed out) by the execution of a transaction that is equal and opposite to that which established the open position.

Collateral Financial or other tangible assets pledged by a borrower to secure an obligation. If the borrower defaults, the collateral is used to fulfill the obligation.

Collateralization The use of → collateral to secure a transaction. Collateralization plays an important role to cover counterparty risk, e.g. in the on-exchange segment, collateral is pledged to → CCPs.

Collateralized debt obligation (CDO) A → security whose payments are linked to a portfolio of debt. Usually several classes (or tranches) of securities with different returns are created from a debt portfolio. Repayment for these classes differs in the case of borrowers in the portfolio defaulting on their debt. As securities, CDOs have to be differentiated from derivatives (contracts).

Collateralized loan obligation (CLO) A → CDO whose payments are linked to a portfolio of loans. As → securities, CLOs have to be differentiated from derivatives (contracts).

Corporate An industrial company or non-financial services firm.

Counterparty The opposite party to a financial transaction. Normally the counterparty of the buyer of a contract is the seller of that contract. In the case of → CCP-cleared derivatives, the clearing house acts as the → central counterparty to each party to a transaction, thereby removing → counterparty risk from the members.

Counterparty risk The risk that a → counterparty to a (derivatives) contract defaults and cannot (completely) fulfill its contractual obligations.

Credit default swap (CDS) A derivatives contract to transfer the → credit risk of underlying debt instruments (mostly bonds or loans). A CDS buyer receives credit protection. In the case of default, he or she will be compensated by the CDS seller (the seller either has to buy the debt instrument at its face value or has to pay the difference between value in the case of default and face value). In return for the credit protection, the seller receives periodic payments from the CDS buyer.

Default fund → clearing fund.

Exchange-traded fund (ETF) Mutual fund whose indefinitely dated shares can be bought or sold in continuous trading on the stock exchange, and which tracks the performance of the index on which it is based.

Exercise Calling for the fulfillment of an obligation arising from an → options contract. If the option buyer exercises a call (put) option the seller must sell (buy) the → underlying at the price specified in the options contract. So-called American options can be exercised during the whole life of the contract. European options can only be exercised at → maturity.

Exotic derivative A nonstandard derivative with e.g. an unusual pay-off structure.

Exotic underlying A nonstandard → underlying to a derivatives contract such as weather indicators, freight rates or economic indicators (e.g. the unemployment rate).

Expiration End of maturity of warrants and options. Also known as the expiry, or expiry date.

Forward (contract) A derivatives contract for the delivery or receipt of a specific amount of an → underlying, at a set price, on a certain date in the future.

Future (or futures contract) A standardized derivatives contract for the delivery or receipt of a specific amount of an → underlying, at a set price, on a certain date in the future. Futures are traded in the derivatives market.

Gross market value The aggregate market value of several derivatives contracts calculated by summing up the positive market value one side of each contract has.

Hedging The use of derivatives to reduce or protect against risk.

Interdealer-broker An intermediary facilitating transactions between different (→ broker-)dealers in the → OTC segment. In the derivatives market, the interdealer-broker segment has gained significantly in importance in recent years and is now – in terms of revenues – almost as large as the exchange segment.

International central securities depository (ICSD) A → CSD that settles trades in international → securities and various domestic securities, usually through direct or indirect (through local agents) links to local CSDs. In the derivatives arena ICSDs only provide their services in the rare case of physical settlement.

ISDA Master Agreement Model agreement for → OTC derivatives transactions developed by market participants led by the International Swaps and Derivatives Association (ISDA). The use of master agreements has significantly reduced the → legal risk in the OTC segment.

Legal risk The risk that claims resulting from a derivatives contract are legally disputed and cannot be enforced.

Limit order Buy or sell → orders, which are to be executed at their specified limit or better.

Liquidity risk The risk that a derivatives contract cannot be unwound at its fair value due to a lack of sufficient supply/demand in the market.

Margin deposit Cash or → securities deposited with a clearing house by trading parties of exchange-traded derivatives contracts. Margin deposits serve to protect the clearing house in case of the default of trading parties. The amount of margin required is calculated in relation to the market risk exposure of each trading party and covers the risk of adverse price changes that devalue the trading position.

Market maker A financial intermediary that offers to buy and sell → securities or derivatives by providing → quotes on a continuous basis. Thereby it is assured that parties wanting to trade find a → counterparty and liquidity is ensured. Large universal and investment banks often act as market makers (→ broker-dealer).

Market risk The risk that the price of a derivative changes because the price of the → underlying changes. Participants in the derivatives market want market risk exposure.

Maturity (maturity date) The date on which the final obligations defined in a derivatives contract are due.

Mortgage-backed security (MBS) A → security whose payments are linked to a portfolio of debt. As securities, MBSs have to be differentiated from derivatives (contracts).

Netting Offsetting buy and sell positions over a given period of time so that market participants only have to settle the balance. One of the functions and advantages of the → CCP. If two parties agree to net their positions, this is called bilateral netting. → Central counterparties even allow the netting of three or more parties' positions, which is called multilateral netting.

Notional amount Value or nominal amount of the → underlying of a derivatives contract.

Open interest Open derivatives positions either measured in terms of contracts or in terms of value.

Operational risk The risk that deficiencies in information systems or internal controls, human error, or management failure result in unexpected losses.

Option (or options contract) A derivatives contract giving the buyer the right to buy (call) or sell (put) a specific quantity of a specific → underlying, at a fixed price, on, or up to, a specified date. The seller is obliged to deliver or accept the asset, when the option is exercised (→ exercise).

Order A contractually binding request to other market participants to buy or sell a specific quantity of a financial instrument at a defined price.

Order book Contains all current orders for a certain product at a derivatives exchange or an → OTC trading platform.

Over the counter (OTC) Bilateral transactions between (two) trading parties that are not conducted on a regulated exchange. In the derivatives market, the over-the-counter segment is by far the largest part of the market.

Payment and delivery In the case of derivatives, the sole payment of cash to fulfill the obligation arising from a derivatives contract (→ cash settlement) or the payment of cash for an → underlying and the delivery of the underlying in return (→ physical delivery).

Physical delivery The settlement of a transaction through delivery of the → underlying against payment.

Pre-trading The gathering of → orders from trading parties and the channelling of these orders to the market. In both the → OTC and the exchange segment this function is mostly fulfilled by → brokers and → broker-dealers.

Quote The simultaneous entry of a limit buy and limit sell → order for a derivatives product at an exchange or another electronic marketplace. → Market makers provide quotes effectively establishing a market in a product.

Regulatory capital The capital that banks must maintain according to certain statutory rules (often based on the BIS' capital standards). The amount of regulatory capital required depends on the riskiness of the bank's assets. A bank active in the derivatives market must maintain certain regulatory capital to cover part of the exposure (mostly in the form of → counterparty risk) from its open positions.

Security An investment instrument, which offers evidence of debt or equity usually issued by a corporation, government or other organization.

Settlement → payment and delivery.

Straight-through processing (STP) In the case of derivatives, the fully automated, electronic handling of derivatives → orders, contracts and open positions across all functions and providers along the derivatives value chain.

Swap (contract) A derivatives contract under which the two → counterparties agree to exchange cash flows at future dates as stipulated in the contract.

Systemic risk The risk that the failure of one market participant has adverse effects on other participants, destabilizing the market as a whole.

Underlying The financial instrument, physical asset or variable upon which a derivatives contract is based.

Warrant A securitized form of a standardized → option. Warrants are almost exclusively traded by retail investors on specialized exchanges such as Scoach or Euwax.

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List of Abbreviations

ABS	Asset-backed security	ISD	Investment Services Directive
ADEX	Athens Derivatives Exchange	ISDA	International Swaps and Derivatives Association
AMEX	American Stock Exchange	ISE	International Securities Exchange
BIS	Bank for International Settlements	Liffe	London International Financial Futures and Options Exchange
BME	Bolsas y Mercados Españoles	LME	London Metal Exchange
BOX	Boston Options Exchange	Matif	Marché à terme international de France
CBOE	Chicago Board Options Exchange	MBS	Mortgage-backed securitization
CBOT	Chicago Board of Trade	MCX	Multi Commodity Exchange (India)
CCP	Central counterparty	Meff	Mercado Español de Futuros Financieros
CDO	Collateralized debt obligation	MiFID	Markets in Financial Instruments Directive
CDS	Credit default swap	MONEP	Marché des Options Négociables de Paris
CER	Certified Emissions Reduction	NCDEX	National Commodity and Derivatives Exchange India
CLO	Collateralized loan obligation	NYBOT	New York Board of Trade
CME	Chicago Mercantile Exchange	NYMEX	New York Mercantile Exchange
CPSS	Committee on Payment and Settlement Systems	NYSE	New York Stock Exchange
CSD	Central securities depository	OCC	Options Clearing Corporation
DTB	Deutsche Terminbörse	OM	<i>Swedish derivatives exchange</i>
ECX	European Climate Exchange	OMX	OMX Nordic Exchange
EDX	Equity Derivatives Exchange (London)	OTC	Over the counter
EEX	European Energy Exchange	PCX	Pacific Exchange
ELX	Electronic Liquidity Exchange	SEC	Securities and Exchange Commission
ETF	Exchange-traded fund	SOFFEX	Swiss Options and Financial Futures Exchange
EUA	European carbon emission allowances	STP	Straight-through processing
FED	Federal Reserve	UCITS	Undertakings for Collective Investments in Transferable Securities
FIA	Futures Industry Association	WFE	World Federation of Exchanges
GDP	Gross domestic product		
GFI	<i>Trading services provider</i>		
ICAP	<i>Trading services provider</i>		
ICE	Intercontinental Exchange		
ICSD	International central securities depository		
IDEM	Italian Derivatives Market		
IMEX	Internet International Business Exchange (Qatar)		
IOSCO	International Organization of Securities Commissions		

Published by

Deutsche Börse AG
60485 Frankfurt/Main
Germany
www.deutsche-boerse.com

Eurex Frankfurt AG
60485 Frankfurt/Main
Germany
www.eurexchange.com

Phone +49-(0) 69-2 11-0

April 2008
Order number 9010-2592

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