Over-the-Counter derivative markets

1.1 A comparative analysis of OTC and exchange-traded derivative markets

OTC derivatives are defined as contracts executed outside of the regulated exchanges whose value derives from the value of an underlying asset, reference rate, or index (CFTC, 1998).

The OTC and exchange-traded derivatives have distinctive characteristics that differ from each other creating appropriate venues for different types of market participants (Yallop, 2008, p. 4). Main trading-, market structure-, instrument and process- related characteristics of OTC derivatives and exchange-traded products are summarized, but are not limited to those presented below in the Table 1.1. This section shows in a structured way where the differences between the exchange-traded and OTC derivative markets are. It will provide knowledge to start to define the concept of OTC trading describing the main features of the market. The idea is clarifying how they differ from exchanges and why they are an alternative for derivatives trading.

Unlike exchanges, where trading is centralized on a floor, in OTC derivative markets trading occurs through telephone and computer linked networks that connect buyers with sellers with no physical contact while matching bids with offers (Hull, 2006, p. 2). Besides (i) the decentralization of trading and (ii) the different means used to trade, the OTC differ from exchange-traded markets in (iii) the type of markets where buyers and sellers interact; (iv) the nature of market sectors involved in transactions; (v) the volume of trades; and (vi) the expertise of market traders. Whilst exchanges operate under the order-driven principle of setting prices of stock by auction mechanisms, OTC markets are driven by the quotation principle where dealers are responsible to quote the stock prices[1] (Besley and Brigham, 2008, p. 99). Moreover, the volume of trade on OTC markets is much larger than in exchanges and is mainly directed to the wholesale sector where end users are typically major commercial corporations, important insurance companies, mutual funds, pension funds, governmental bodies, banks, individuals with significant assets and other big financial services providers (Yallop, 2008, p. 5;

[1] The quotation principle and the role of dealers as market makers are explained in Section 1.4.

Born, 1998). Hence, trade concentrates in derivatives users that are, in general, professional and experienced participants with comparable market knowledge, expertise and access to information (Yallop, 2008, p. 7). In contrast, exchanges suffer from "information asymmetry" as an inherent characteristic of its structure in which participants do not share the same market knowledge leaving those less experienced or knowledgeable parties at a disadvantage (Yallop, 2008, p. 7).

Other aspects inherent to the nature of OTC instruments and operational trading processes that contrast with the characteristics of exchange-traded derivatives are: (vii) the degree of standardization; (viii) the market liquidity; (ix) the intervention of regulatory authorities in the oversight of the markets; and (x) the transparency of prices of instruments traded.

Table 1. Characteristics of OTC derivatives vs exchange-traded products (1/2)

Criteria	OTC derivative market[2]	Centrally cleared OTC derivative market (in CCPs)[3]	Exchange-traded derivative market
Trading-related aspects			
i)Centralization of trading	No centralized	Centralized in Central Counterparty	Trading is centralized on a trading floor
ii) Means to trade	Trading through telephone and computer linked networks	Trading through electronic platforms and specialized trading systems	Trading through organized trading platforms
iii) Type of market	Market-maker (quotation driven)	Market-maker (quotation driven)	Auction market (order driven)
	Pre-trade prices are non-binding quotes	Pre-trade prices are non-binding quotes	Pre-trade prices are binding quotes

[2] It is important to mention that this column of the table refers to *pure OTC derivatives* that are not cleared by any type of Central Counterparty (CCP). Along the document the term *pure* will be used when a difference between cleared and non-cleared contracts is necessary to understand the context, if it is not explicit that the text refers to one of those markets, the reader should understand both markets are involved. Both are, however, regarded as OTC markets.

[3] Some of the points addressed for centrally cleared products are main topic for policy makers and authorities that are currently working on the new reforms to provide robustness to OTC derivatives markets. Therefore constant changes in regulative policies might change in the short term the status for some categories of centrally-cleared derivatives that are shown in the Table.

Table 1. Characteristics of OTC derivatives vs exchange-traded products (2/2)

Market structure -related aspects			
iv) Market sector	Wholesale market	Wholesale market	Retail and wholesale market
v) Trade volume	Mainly large trades	Mainly large trades	All sizes of trades
vi) Expertise in trading	Comparable knowledge, expertise between parties	Comparable knowledge, expertise between parties	Information asymmetry between market participants
vii) Standardization	In general, non-standardized contractual terms	Medium standardization on contractual terms	High standardization of products
	Tailored to specific needs	Tailored to specific needs	Trades limited to standardized contracts
	All possible features for products	Medium customization of contractual terms	Poor customization of contractual terms
	No automation and limited transparency in post-trading-process	Automated and transparent trading and post trading-process	Automated and transparent trading and post trading-process
Instrument & process-related aspects			
viii) Liquidity	Regarded as markets that add liquidity to exchange-traded derivatives. No formal measure of liquidity in place	Measures for asset's market liquidity through CCPs and trade repositories	Formal measures for asset's market liquidity through exchanges
ix) Regulative oversight	Instruments and entities are in most cases unregulated	Formal rules and mechanisms are in progress	Formal rules applied to instruments and market participants
	Self-regulation and reliance on "market practices"	Self-regulation, reliance on "market practices" and public sector regulation of CCPs	Self-regulation as well as public sector regulation of the exchanges and CCPs
x) Price transparency	No transparent price formation and discovery.	No automatic publication of transaction prices	Real-time transparent price formation and discovery

Source: This table was prepared partially by the author based on House of Lords, 2010 p. 6-36; Cecchetti, Gyntelberg and Hollanders, 2009, p. 48; and IMF, 2010, p. 1-26.

Whereas parties trade instruments with relatively simple structure on exchanges, in OTC derivative markets dealers provide flexibility to buyers and sellers customizing the product in order to satisfy individual budget and risk coverage needs (Yallop, 2008, p. 4). The lack of standardization and the possibility of trading with any type of underlying index, maturity and pay off structures allow product customization that benefits financial and commercial companies (Schinasi, Craig, Drees and Kramer, 2000, p. 12).

In general, OTC derivative markets dealers improve liquidity of derivatives market by buying low and selling high allowing counterparties to trade at the bid and ask prices they quote; however it is hard to assess the liquidity for a particular OTC traded product given the lack of information transparency and opaque price discovery functions of OTC markets (Duffie, Li and Lubke, 2010, p. 10; Austin and Nolan, 2010, p. 1). Another important feature of OTC markets is its lack of formal regulation (Schinasi, Craig, Drees and Kramer, 2000, p. 31). The complexity of structures and sophisticated counterparties involved in transactions where trade volume and price are opaque make it difficult to maintain regulation that could provide investors with a robust protection against all kind of risks or could encourage in high level market efficiency.

From the aspects mentioned above it is already possible to see the big picture of OTC markets in comparison to those products traded on exchanges. It is now also possible to distinguish how the overall structure of the financial system could benefit from the presence of OTC derivatives as an alternative market. One of those benefits is related with the fact that OTC derivative markets enable companies to have access to products that might not be available on exchanges or if so, might entail unnecessary costs, a high number of requisites and/or a high degree of standardization inappropriate for the necessities or risk profile of the company. Moreover, OTC platforms and networks set up the infrastructure of a market for companies that do not trade on a regular basis or do not meet the capital requirements to be registered on an exchange platform. Thanks to the bilateral trading nature of OTC markets, organizations are also able to choose more carefully their counterparties and determine terms in which they want to trade (House of Lords, 2010, p. 95-96).

In brief, instead of regarding the relationship between OTC derivative markets and exchanges as competitive, it should be considered symbiotic (Yallop, 2008, p. 4). OTC derivative markets fill the gaps of exchanges and vice versa by offering products with different price levels, maturities, settlement procedures, and risk profiles that are addressed by different sectors of the market and cover different types of needs.

1.2 Types of instruments and underlying assets in the OTC derivative markets

The categories of derivative products have not only different characteristics but also diverse complexity of structures. The information presented below that includes key aspects of derivatives according their instrument and underlying asset should improve the understanding for the following sections where general and specific issues around one asset category arise.

The financial derivatives instruments that are traded on the OTC markets are classified in three basic forms: *forwards, options and swaps*. *Forwards* are contracts that obligate the holder to buy or sell an asset for a predetermined delivery price at a predetermined future time[4] (Hull, 2006, p. 4). The difference between a forward and a future contract lies in the means of trading; while a future agreement is a standardized contract written by an exchange, a forward contract is traded on OTC markets where the parties involved in the transaction specify and delimit the characteristics of the contract (House of Lords, 2010, p. 11). It should be noted that forwards exist for any kind of asset class used as underlying for future contracts (House of Lords, 2010, p. 11).

Other types of instruments are *options* which are commonly traded on both, exchanges and OTC markets (Hull, 2006, p. 6). OTC options differ from those traded on exchanges in the extend they are tailor-made; that is, the option might have unusual maturities, specific underlying assets, more complex terms or involve payoffs in different currencies (House of Lords, 2010, p. 11). There are two basic categories of options: *put* and *call options*. Whereas a call option gives its holder the right to purchase an asset for a specific price, known as exercise or strike price, a put option gives its holder the right to sell an asset before or on the expiration date for a specific price (Bodie, Kane and Marcus, 2008, p. 49). The options differentiate from futures and forwards in two main aspects. The first one refers to the fact that options extend to the holder the right, but no obligation of buying or selling the underlying asset (Hull, 2006, p. 7). The second one is related with the cost that future and forward contracts entail in comparison to option's

[4] In a forward contract the party assumes a *long position* with the agreement of buying the underlying asset and the other party assumes a *short position* when he agrees to sell the asset for the price specified on the contract (Hull, 2006, p. 4).

costs. Unlike forwards and futures, the holder of the option has to pay an initial price for the implicit right of buying or selling (Hull, 2006, p. 7).

The most common OTC derivative instruments are swaps that are traded in all major markets and currencies (Spence, 1999, p. 55). *Swaps* are agreements that exchange cash flows in the future according to a prearranged formula (Hull, 2006, p. 149). The dates when cash flows are to be paid and their calculation method are specified on the contract terms, as well as the variables involved in the calculation such as the interest rate, exchange rates or other market variables that need to be taken into consideration for trading. Swaps differ from forwards and futures in the way cash flows are exchanged (Hull, 2006, p. 147). The cash flow exchange of forward and future contracts takes place on a future date while the cash flow exchange in swaps is done on several dates (Hull, 2006, p. 147).

The type of instrument and their structural characteristics are not the only criteria to differentiate categories of derivatives. According to the underlying asset, the OTC derivative markets can be catalogued into *foreign exchange-, interest rate-, equity linked-, commodity contracts and credit derivatives*[5] (BIS, 2010, p. 13). The two classifications according the form of the instrument and the kind of asset from which the product derived its value are important to understand the components of the overall structure of the OTC market.

[5] See Annex-D*. OTC derivatives according type of underlying asset* for more details about each category.

1.3 Development and status quo of OTC markets

During the last decades different situations have influenced the development and widespread of OTC derivative markets. It is acknowledge they have grown significantly in the last years and constitute the biggest market for derivatives nowadays[6] . The content of this section will be useful to address key aspects in the evolution of OTC markets and to identify those categories of derivative products that carry significant importance in the overall OTC organization due to the size of their markets.

Before describing the *status quo* of these derivative markets and discussing which indicators measure size and risk exposure, the following paragraphs are used to describe the development of OTC markets with a retrospective review that will provide the reader with sufficient information about the circumstances that triggered the intensive growth of the market.

1.3.1 Development of OTC markets over the years

The major development of the modern forms of OTC derivatives took place during the last three decades of 20th century (Yallop, 2008, p. 6). On late 70s, the important academic advances on onwards, the development of the swap market in the early 80s and the evolution of the assets management industry gave a boost to the use of OTC derivatives (Yallop, 2008, p. 6).

Schinasi, Craig, Drees and Kramer (2000, p. 16) addresses three main historical circumstances that explain how OTC markets were shaped under the interests of financial institutions and multinational companies. Firstly, he affirms the interest rate market grew out of the desire to take advantage of fixed and floating interest rates in the bank system. In an early stage of the evolution of the interest rate market, banks and other financial institutions matched bids and offers for a fee but this schema changed over the years with the intervention of international investment banks that managed accounts with large positions including their own account profiting from the disparity of interest rates (Schinasi, Craig, Drees and Kramer, 2000, p. 16).

The second historical example that encouraged a rapid growth of OTC derivatives is based on the environment of federal policies that multinational companies faced

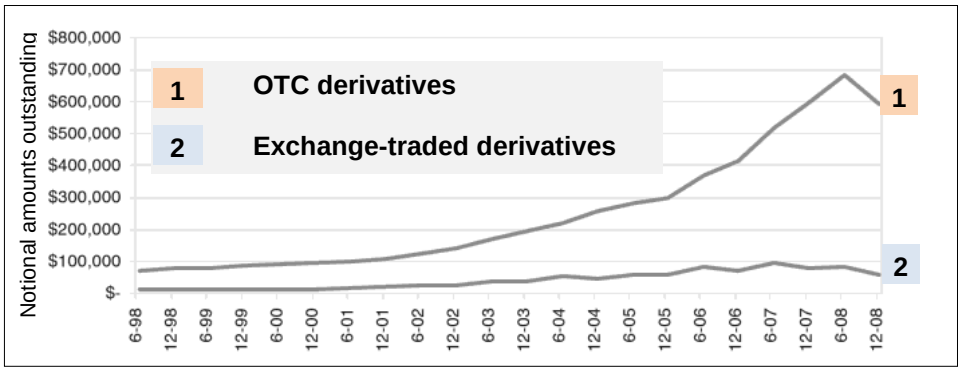
[6] See in Annex-A. Figure 13. *OTC vs. exchange-traded derivative market size -In USD billion-*

that discouraged capital outflows from foreign currencies investments (Schinasi, Craig, Drees and Kramer, 2000, p. 16). In the 70s, borrowing dollars was more expensive in the UK than in the US as consequence of the introduction of taxes in foreign exchange transactions (Schinasi, Craig, Drees and Kramer, 2000, p. 16). In order to avoid tax payments and greater costs of borrowing, multinational corporations opened parallel back-to-back loans that allowed them to borrow and lend dollars in the US and sterling in the UK simultaneously (Schinasi, Craig, Drees and Kramer, 2000, p. 16). This practice became more popular among multinational corporations and encouraged the development of a solid foreign exchange market.

The third and last argument that Schinasi, Craig, Drees, and Kramer (2000, p. 16) uses to justify the development of credit derivatives is the credit risk bulk itself that was primary consequence of the increase of leveraged positions across companies[7].

Over the years, derivatives have grown in response to demands for low-cost means of taking credit exposure (Gregory, 2010, p. 133). By 1990, the entire OTC market had already a greater market share in comparison to those derivatives traded on exchanges. This disparity grew in following years until present as it is shown in Figure 1.

Figure 1. Outstanding notional amount of exchange-traded and OTC derivatives



Source: www.emeraldinsight.com [Accessed 15 January 2011]

[7] Even though the first trade with credit derivatives took place more than 30 years ago, it was not until 1991 when they were introduced in the OTC markets and since then have increased until now its popularity between market participants (Smithson, 1998, p. 312).

However the market did not have always the same interest that authorities and market participants show nowadays in the origins and implications of such a rapid growth with almost no restraints. It was until 1998, with the turbulence in the mature of financial markets, when the financial world turned around to appreciate the rapidly changing structures of OTC markets (Mathieson and Schinasi, 2001, p. 26). They started to discuss about the influence that high leveraged OTC derivative positions had on the crisis on late 90's that shook the entire financial system[8]. The efforts done during that decade were the key to define the issues that nowadays represent the big focus and hot topics of discussion for regulative authorities[9].

Indeed, the bulk of OTC market growth over the last years was not only driven by the wide range of contract structures that derivatives offer to market participants, the opportunity to profit from interest rates, the back-to-back loans to borrow and lend currency in different countries at the same time, but it was also driven by the modernization of commercial and investment banking and the internationalization of new technologies and information systems that allow a more rapid and efficient information flow between traders.

1.3.2 Current market size, gross market values and gross credit exposure

The Bank of International Settlement[10] (BIS) releases three-year and semi-annual statistics of OTC market positions that describe market growth and the evolution of market in comparison to data from previous report periods. The statistical study shows data based on three indicators that help market participants to monitor the behavior and development of financial markets: *notional amounts outstanding, gross market values* and *gross credit exposure*. Whereas the *notional amounts outstanding* are understood as the gross nominal value of all deals concluded and not yet settled on the reporting date, *gross market values* are calculated as the sum of the total gross positive and negative market value of contracts hold by

[8] Long Term Capital Management, hedge fund management firm contributed in a great manner to the crisis on late 90's with high leveraged OTC positions (Mathieson and Schinasi, 2001, p. 26).

[9] Refer to the publication of the Committee on Payment and Settlement Systems (CPSS) *New development in clearing and settlement arrangement for OTC derivatives* (2007) where six issues that concern authorities since 1998 until now are explained with detail.

[10] The Bank of International Settlement is an international organization that fosters international monetary and financial cooperation and serves as a bank for central banks (BIS, 2010). See more under www.bis.org.

institutions at the reporting date (Marcus and Tshikali, 2010, p. 263; BIS, 2010, p. 9). If it is true that both indicators are used to observe the evolution of OTC markets over the years, they measure different aspects of the derivative markets. The notional amounts outstanding reflect the size of the market and they are used as a reference to compare the trade volume of different derivative categories (Marcus and Tshikali, 2010, p. 264). Nonetheless, they should not be interpreted as the real risk exposure in OTC transactions due to those notional amounts in the BIS statistics are not truly at risk[11] (Schinasi, Craig, Drees and Kramer, 2000, p. 9). In contrast, *gross market values* quantify all open contracts that are either in a current gain or loss position and would be converted, if settlement takes place, into claims on counterparties when the gross market value is positive, or dealers' liabilities to its counterparties if the market value is negative (Segoviano and Sing, 2008, p. 6; Marcus and Tshikali, 2010, p. 264). The positive gross market values are interpreted as the *gross credit exposure* (BIS, 2010, p. 9). Since gross market values are an estimate of replacement values evaluated at the reporting date, gross market values provide a more accurate measure of the current scale of financial risk transfer in OTC derivative markets than notional amounts (Marcus and Tshikali, 2010, p. 264).

For the purpose of this section that includes the current dimensions of the OTC derivative market, notional amounts outstanding will be used to measure the size of markets, and gross market values data will provide a general overview of the total replacement cost at the reporting date. The relevance of notional amounts outstanding and gross market values relies on the fact that these three indicators have suffered constant changes over the last years due to a wider use of risk management practices. This particular point constitutes part of the discussion of Chapter 2 where the particular reduction of gross market exposure is the consequence of the widespread of risk management practices.

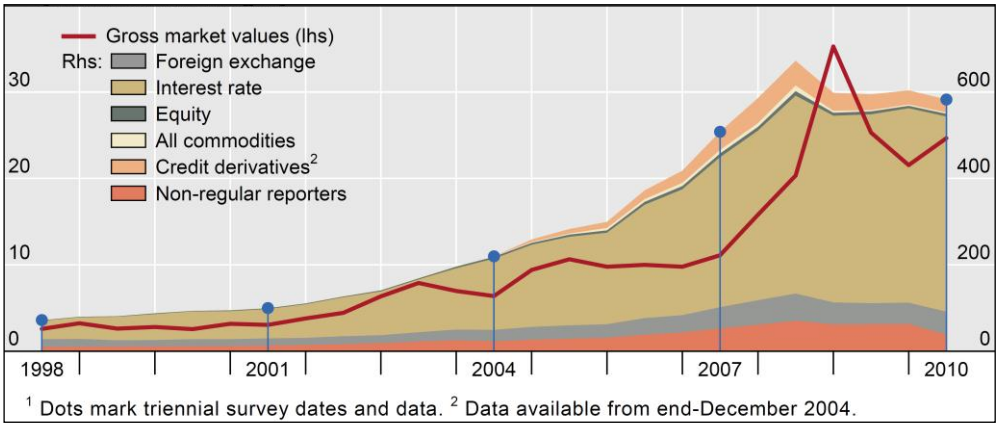
In 2010, the OTC market was already eight times greater than the amounts outstanding of derivatives traded in exchanges (BIS, 2010, p. 13). Last year,

[11] Marcus and Tschikali (2010, p. 264) state that the amounts at risk must be understood as a function of the price level or volatility of the referenced index, the duration and liquidity of contracts, creditworthiness of counterparties and possible exchange of principal.

according to information of the *Triennial and Semi-annual Central Bank Surveys* that report positions in global OTC derivatives markets, the *nominal amount outstanding* of the OTC market was 582.6 trillion dollar as of end-June 2010[12]. This amount represents a 15% growth according data collected in 2007 (BIS, 2010, p. 2). Figure 2 shows the growth of OTC derivative markets across the different categories of underlying assets during the last twelve years. Interest rate contracts were the main driver of the increase in notional amounts and reached a value of 478 trillion dollar from which only interest rate swaps account for 367.5 trillion dollar leaving far behind other categories of derivatives (BIS, 2010, p. 13).

By the other hand, *gross market values* grew 120% in the last three-year period reaching 25 trillion dollar at the end-June 2010, that compared to the 11 trillion dollar reported in the previous period, represent a considerable sign of credit risk growth (BIS, 2010, p. 2). They reached their highest point during the financial turmoil in 2008 as consequence of the bankruptcy of Lehman Brothers (BIS, 2010, p. 2). Nevertheless, after Lehman's default, values started move to their pre-crisis levels and have now a slightly trend to new increases (BIS, 2010, p. 2).

Figure 2. Global OTC derivative market -in USD trillion-



Source: BIS, 2010. p. 1

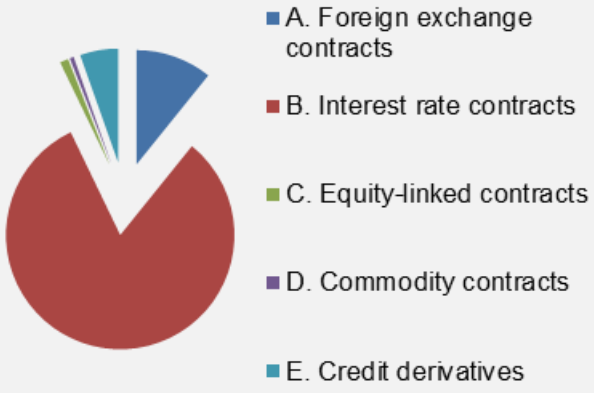
As it was mention at the beginning of this section, gross market values are the appropriate indicator to gauge risk exposure in the different categories of types of underlying asset. According to released data the gross credit exposure at the end-

[12] See in Annex-B Table 5. *Global OTC derivative* markets.

June 2010 was $3.6 trillion dollar (BIS, 2010, p. 2). Consequently from 582.6 trillion dollar of total amounts outstanding only 0.62% represents the gross market exposure at report time which represents the losses in which a party would incur if a credit event takes place. Finally, the following figure shows the structure of the OTC derivative markets as of end-June 2010 where, according to the data, the interest rate contracts hold the greatest share, followed by the foreign exchange and credit derivatives contracts. Hence, it can be deducted that any regulatory change or wider use of risk management practices that affect directly or indirectly the size and/or the risk exposure of any of those markets would have a significant influence on the overall financial structure of derivatives.

Figure 3. Market share of OTC derivatives market in 2010 -in USD trillion-

	Notional amounts outstanding	Gross market value
GRAND TOTAL	**582,655**	**24,673**
A. Foreign exchange contracts	62,933	3,158
B. Interest rate contracts	478,093	18,508
C. Equity-linked contracts	6,868	796
D. Commodity contracts	3,273	492
E. Credit derivatives	31,416	1,708
F. Other derivatives	72	12
GROSS CREDIT EXPOSURE		**3,578**



Source: BIS, 2010, p. 16

1.4 Market participants involved in OTC transactions

In OTC derivative markets there are different market participants that benefit from a wide variety of derivative products. They differentiate from each other according the purposes of their trading (McDonald, 2006, p. 3). This section focuses on the three broad categories of traders that use derivatives for *hedging, speculation and arbitrage* purposes (Hull, 2006, p.p. 8). It presents a short description of the role of dealers and derivative agents that explain the way they connect buyers with sellers in OTC marketplaces to emphasize their importance in trading.

Hedging refer to the action of investing in an asset to reduce the overall risk of a portfolio (Bodie, Kane and Marcus, 2008, p. G-6). By hedging, traders use OTC instruments that are equal and opposite in price sensitivity to an underlying cash, physical position or money rate with the intention to offset[13] the potential loss in the underlying asset with a commensurate gain in the derivatives position (House of Lords, 2010, p. 94). Through the use of forwards, hedgers can neutralize the risk by fixing the price of the underlying asset that they will pay on a future date. Similar to the protection offered by forwards, by entering into an option contract, hedgers will protect themselves against price fluctuations but they will still be able to reap the benefits from favorable prices movements (Hull, 2008, p. 11). Important is to make emphasis on the fact that hedging do not eliminate the risk implicit in the underlying asset, but helps to reduce and transfer the risk to others in order to avoid exposure to unexpected events (Siddaiah, 2009, p. 159). Whilst financial firms use interest rate swaps to hedge the differences between interest rates of their assets and liabilities, non-financial companies use them to hedge interest rate risks of corporate debt or protect themselves from the risks that the normal course of their business entails[14] (Kambhu, 2004, p. 1).

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[13] Schinasi, Craig, Drees and Kramer (2000, p. 9) define the concept of *offsetting* as the act of extinguishing the risky position by taking an opposite position.

[14] For example, through the use of OTC derivatives, importing and exporting companies can protect themselves from inconvenient variations in exchange rates, producers can safeguard their profits from adverse prices fluctuations or rises in the cost of manufacture and managers can hedge portfolio risks protecting their investments against unexpected fluctuations that affect the value of their securities (House of Lords, 2010, p. 95).

The second group of market participants is s*peculators* that use OTC derivatives to bet on the future direction of a market variable (Hull, 2006, p. 8). Speculators play a fundamental role by providing more liquidity to the OTC derivative markets. They contribute to the market liquidity by taking the other side of hedging positions of commercial market participants (House of Lords, 2010, p. 95). While hedgers attempt to offset risk of adverse movements in the price of an asset, speculators use their expertise, experience and market knowledge to take a position in the market and obtain advantages from market fluctuations (Hull, 2006, p. 11). Even though speculators could find in forwards and options an opportunity to obtain the desired type of leverage, entering into an option has different implications for speculators than entering into a forward contract in terms of potential gains and losses[15] (Hull, 2006, p. 14).

In addition to hedgers and speculators, *arbitrageurs* constitute the third category of derivative traders covered in this section. According to Hull (2006, p. 14) arbitrage involves locking in a riskless profit by simultaneously entering into transactions in two or more markets. Schleiffer and Vishny (1997, p. 1) affirm, from a theoretical perspective, that such arbitrage requires no capital and entails no risk. Basically, arbitrageurs' activity consists in buying securities with a low price and reselling them for a higher price with the natural outcome of a zero net future cash flow and an upfront profit (Schleiffer and Vishny, 1997, p. 1). In this way, arbitrage represents one of the key mechanisms that links derivative prices to spot prices[16] and contributes to market efficiency (Chance and Brooks, 2010, p. 327). They do so by take advantage when derivative prices are not in line with spot prices and making profitable business that accelerate the price adjustment and drive prices back to their theoretical levels (Chance and Brooks, 2010, p. 327).

While hedgers are financial and non financial companies, speculators and arbitrageurs are generally specialized financial firms and investors with previous market experience that interact in the OTC market though dealers and derivatives

[15] Potential losses for speculators in a forward contract tend to be larger than those obtained from options since possible losses in options are limited to the price paid for the contract (Hull, 2006, p. 14).

[16] Spot prices are prices for immediate delivery (Hull, 2006, p. 756).

agents. Dealers are defined by the Financial Industry Regulatory Authority (FINRA, 2010) as any person or company in the business of buying and selling securities for his or her own account[17]. The US Securities and Exchange Commission (US SEC, 2010) clearly differentiates traditional dealers and derivative agents that are also known as brokers. The main difference between dealers and derivatives agents is that dealers use to trade their own account while derivative agents solicits and executes derivatives transactions for the account of others (US SEC, 2010).

The role of dealers and brokers is crucial for the OTC market. Their main function consists in quoting prices on a bid and ask basis that are used as indicator for the price at which they will be willing to buy and/or sell certain quantity of securities (Schug, et al., 2005, p. 37). It is important to mention that the profits of both are done by buying at the low wholesale price and selling at the higher retail price (McDonald, 2006, p. 3). Subsequently, the spread between bid and ask prices is the main part of their profits.

In 2009, there were identified five major corporations that had in their hands the control of 90% of the all derivatives transactions[18] (Abbott and Drawbaugh, 2009). This supports the idea that OTC markets tend to concentrate trading in a few number of market participants which consequently increases the systemic importance of major dealers and brokers.

1.5 Set of risks in OTC derivative markets

Market participants face manly three types of risks when trading with derivatives: counterparty credit risk, market risk and operational risk. Although wrong way risk might be not considered a separate category of risk and sometimes regarded as a type of counterparty credit risk, this section will dedicate a few paragraphs to describe in which extent wrong way risk establish a close relationship between market risk and counterparty credit risk due to the high impact it has on the functioning of the OTC markets.

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[17] Dealers are also known in OTC transactions as *market makers* due to the effect of making a market when buying and selling for their own account (Mayo, 2008, p. 50).

[18] JP Morgan Chase & Co, Bank of America Corp, Citigroup Inc, and Goldman Sachs Group Inc. (Abbott and Drawbaugh, 2009).

1.5.1 Counterparty credit risk

Counterparty credit risk is considered more critical than other type of risks due to it exacerbates the effects of financial meltdowns and failures (Jorion, 2007, p.p. 453). Benhamou (2007, p. 50) describes the counterparty risk as the risk that counterparty fails completely or partially in the fulfillment of a contract. In the OTC market, the counterparty credit risk represents the risk of losses from default, typically as consequence of counterparty insolvency (BIS, 1998, p. 11).

Segoviano and Singh (2008, p. 5) state that counterparty credit risk can be calculated through the estimation of two variables: (i) the exposure of the financial system to a particular institution that could default; and (ii) the probability of the counterparty default (BIS, 1998, p. 11). The gross credit exposure, as it was explained in Section 1.3, equals the difference that results from subtracting the negative from the positive gross market values; only if the outcome is negative the exposure is zero (BIS, 1998, p. 12). Although the potential future exposure is more difficult to estimate than current exposure values, there are several statistical approaches that can be used for such purposes (BIS, 1998, p. 12). Most of the statistical methods and models that attempt to outline the behavior of counterparty credit risk are higher in complexity than those used to calculate market risk because they take more risk factors into account that entail different nature and origin (Jorion, 2007, p. 453). In this area, Value at Risk models (VaR) play an important role. They are defined by Linsmeier and Pearson (1996, p. 3) as a statistical measure of possible portfolio losses due to normal market movements and are used to describe the magnitude of the likely looses on a portfolio. VaR models are the fundamental basis for those new approaches to measure credit risk that have been developed in the last years.

The identification and measurement of counterparty credit risk has at present extreme importance for financial and non-financial business because it enables the management and diversification of risk in an appropriate manner to avoid financial losses (Jorion, 2007, p. 453). Counterparty credit risk has become a focus point for policy makers that regulate OTC derivative markets. One of the objectives of the OTC regulation is to avoid the concentration of high levels of counterparty credit risk in a few number of systemic important market participants to avoid the spread

of systemic risk. Counterparty credit risk transforms into a systemic risk when the default of a major counterparty in the market creates a massive effect that affect the stability of the financial condition of its counterparties (Duffie, Li and Lubke, 2010, p. 5). Other situations that could create confusion in the OTC markets and increase systemic risk occur when a possible default of a weak market participant motivates its counterparties to avoid potential losses through the reduction of exposure accelerating, in some way, its default (Duffie, Li and Lubke, 2010, p. 5).

Whichever is the origin of systemic risk, it is fundamental for authorities to prevent any spread of such contagious effects that could trigger failure of large OTC derivative market players. However, if it is considered that the OTC markets have features on an oligopoly it makes it difficult for financial regulators to avoid the concentration of counterparty risk.

1.5.2 Market risk

Market risk, also known as price risk, is defined by Chisholm (2010, p. 207) as the potential losses that result from changes in market variables such as stock price, currency rates, interest rates, etc. It can be analyzed on a portfolio basis by taking into account the offsetting positions in a particular underlying category and calculating the correlation between the risk factors within that type of underlying asset (BIS, 1998, p. 13). Once net exposure is known, the excess of risk is hedge with the use of other derivatives less exposed to market variations (Terblanche, 2006, p. 54).

Market risk can be also measured using tools such as VaR models. In contrast to counterparty credit risk, market risk can be easily managed through the buy or sale of high liquid positions that are sensitive to changes in relevant risk factors (BIS, 1998, p. 13). The measurement of market risk is relevant because any change in the market circumstances that affect the exposure of underlying to market risk might increase simultaneously counterparty credit risk exposure.

1.5.3 Wrong way risk

According to Schinasi, Craig, Drees and Kramer (2000, p. 24) risks on portfolios with derivative positions are often misinterpreted and miscalculated. Even though VaR models are the basis of a risk management revolution, they might not take into consideration the confluence of market and existent credit risk (Jorion, 2007, p.

453; Schinasi, Craig, Drees and Kramer, 2000, p. 24). Jorion (2007, p. 525) states that there are certain types of trades where market risk amplifies the exposure to counterparty credit risk[19]. The correlation of market and credit risk is known as *wrong way risk*[20] (D´Hulster, 2001, p. 1). Wrong way risk is defined as a type of risk that occurs when exposure to counterparty is adversely correlated to the credit quality of that counterparty (D´Hulster, 2001, p. 1). In other words, it should be understood that wrong way risk arises when the default risk and credit exposure increase together (SunGard, 2009).

In brief, wrong way risk is a focus of concern for banks and financial regulators because small changes in the market can provoke large increase in credit exposure and default risk non-proportional to the magnitude of the original cause affecting high leveraged companies (Schinasi, Craig, Drees and Kramer, 2000, p. 24). The importance of addressing and measuring wrong way risk lies in the potential that this risk has accelerated companies' defaults and has led to unexpected losses in times of financial stress.

1.5.4 Operational risk

Operational risk is defined as the potential losses that result from human errors and failures in operational procedures and systems (Chisholm, 2010, p. 207). Operational risk concentrates in weaknesses of operational trading processes. In this sense, the critique to the OTC derivative markets focuses on the inefficiencies of the post-trade processing[21] where the huge volume of contracts to process in a short period of time and the high manual work load can lead to a considerable increase of outstanding confirmations[22] (CPSS, 2007, p. 16-21). Significant portion outstanding of 90 days or more days were reported by dealers in 1998 (CPSS,

[19] This can be explained using a hypothetical example: if US stock suffers a significant fall in prices as consequence of market risk which deteriorates the company's ability to pay, the probability of default will consequently increase and the volume of potential losses in case of default will rise sharply (Schinasi, Craig, Drees and Kramer, 2000, p. 25).

[20] The ISDA (D´Hulster, 2001, p. 1) categorized the wrong way risk in two types, general and specific wrong risk where specific is seen as a consequence of poorly structured transactions and general as the risk that arises when credit quality counterparty is correlated with macroeconomic variables that have influence on the value of traded derivatives.

[21] See Annex-C. *Operational trading process in OTC markets to* obtained more information in general about the process flows in OTC derivative transactions.

[22] According to the CPSS (2007, p. 17) outstanding confirmations are understood as the volume of confirmations that have been sent to a counterparty but not yet finalized or signed.

2007, p. 17). The situation got worse with the growth of unconfirmed contracts in following years until the problem became more evident between 2002 and 2005 when all asset classes increased their backlogs in outstanding confirmations[23] (CPSS, 2007, p. 17).

The increase of backlogs in outstanding confirmations is relevant for the risk management because it represents an important source of operational risk and counterparty credit risk. A high volume of outstanding confirmations may entail *operational risk* for the following reasons: it may facilitate for errors in the books and records of a firm to go undetected and uncorrected; or it might lead to payment breaks and other problems along the trade-life cycle of a derivative contract (CPSS, 2007, p. 18). The failure to confirm transactions increases *counterparty credit risk* because it may jeopardize[24] the enforceability of contracts (CPSS, 2007, p. 18). This would increase substantially the losses with the default of counterparty. Although the failure to confirm a transaction in writing would not necessarily mean unenforceability[25], it might become important to have a written confirmation in place if a dispute arises where the details of the agreement need to be known and proved within a short period of time to avoid greater losses (CPSS, 2007, p. 18).

Another source of operational risk and counterparty credit risk lies on the design of a risk model. Model risk then is one of the types of operational risks that denote the risk of model failures and the resultant financial losses (Das, 2006, p. 423). It has increased its relevance on the financial world with the emergence of new complex derivative products that are based in models with complicated structures (Das, 2006, p. 423).

In estimating derivatives prices, hedging positions, measuring the risk of trading positions or in any other valuation during derivative trading, quantitative models are commonly used to provide accurate information (Das, 2006, p. 423). Nevertheless, there is a possibility of human errors in the design of the complex structured models which could lead to incorrect results. Models that attempt to measure

[23] This was not the case for credit derivatives that got special treatment in 2005 (CPSS, 2007, p. 17).
[24] This term is usually used in this context to refer to the act of *"putting in danger or risk".*
[25] In some jurisdictions verbal contracts are consider as legally enforceable deals (CPSS, 2007, p. 18)

counterparty credit risk and lose sight of important risk factors reflect an incorrect picture of the real risk exposure leaving parties unprotected and exposed to greater losses in the occurrence of a credit event.

Even if operational processes are set to avoid backlogs or if models measure what they are supposed to measure, they might provide results far away from the reality if derivative prices are miscoded in systems or if the documentation is delayed or lost for any reason. Hence, operational risk turns difficult to quantify. Nevertheless there are plausible practices commonly used to restrain operational risks such as limiting and reserving against exposures, strengthening back office systems and automating trade-capture process[26] (Schinasi, Craig, Drees and Kramer, 2000, p. 26).

[26] As intent to provide the tools to create a robust operational infrastructure for market participants, ISDA publishes frequently documents whose content include best practices. However, ISDA best practices are just recommendations and do not constitute legal, accounting or financial advice, leaving to the judgment of each party the appropriate application of their content.

1.6 Summary of Chapter I

This section summarizes the information discussed along the past sections and attempts to reinforce the concept of OTC derivative markets in general integrating all relevant elements that were handled along Chapter 1.

OTC derivatives are defined as contracts executed outside of regulated exchanges whose value derives from the value of an underlying asset, reference rate, or index. The OTC and exchange-traded derivatives have distinctive characteristics that differ from each other creating appropriate venues for different types of market participants. Given such disparities between OTC and exchange-traded derivatives, the relationship between both derivative markets instead of being regarded as competitive, it should be considered symbiotic.

The financial derivatives instruments that are traded on OTC markets are classified in three basic forms: *forwards, options and swaps* and can be divided according their underlying asset category into *foreign exchange-, interest rate-, equity linked-, commodity contracts and credit derivatives*. Although the development of the OTC markets and current dimensions are not equal across instruments and underlying categories, it is acknowledge that they, altogether, have gained market share against exchanges becoming the largest market to trade derivatives in the world.

The circumstances that gave a boost to the rapid growth of OTC derivatives are academic advances on onwards on late 70s, the development of the swap market in the early 80s, the opportunity to profit from interest rates, the increase of back-to-back loans to borrow and lend currencies in different countries, the increment of credit risk in the financial market, the evolution of the assets management industry, the modernization of commercial and investment banking and the internationalization of new technologies and information systems.

The current dimensions of OTC markets are measured using mainly three variables: *notional amounts outstanding* that reflect the size of the market; gross *market values* that provide a more accurate measure of the current scale of financial risk transfer; and *gross credit exposure* that estimate the value of the contracts that, if settlement takes place, would be converted into claims on counterparties. These indicators make possible to appreciate the tremendous

amount of capital traded through this market and the portion that would represent the gross risk exposure of the overall notional amounts outstanding.

The BIS statistics display also information about each OTC derivative market that enables a comparison of market sizes between underlying assets. As a result, it is observed that the interest rate market holds the greatest share, followed by the foreign exchange and credit derivatives markets. Hence, any regulatory change or wider use of risk management practices that affect directly or indirectly the size and/or the risk exposure of any of those markets would have a significant influence on the overall financial structure of derivatives.

There are different types of actors that interact in OTC markets and benefit from the use of derivatives. Catalogued by their motives to trade there are three types of market participants: *hedgers, speculators* and *arbitrageurs.* While hedgers are financial and commercial firms that attempt to offset risks through the use of derivatives, speculators and arbitrageurs are, in its majority, financial corporations that seek some kind of profit by taking risk with higher yields while expecting a favorable market variable movement or by entering simultaneously into riskless transactions in two or more markets. Furthermore, dealers and brokers have an important role in the market. They are responsible to quote the bid and ask prices and obtain in recompense the profits from the spread. It should be noted that there is a trend in the OTC markets that concentrates high trading volume in a few numbers of dealers and brokers increasing their systemic importance.

Market participants face manly three types of risks when trading with derivatives: counterparty credit risk, market risk and operational risk. Counterparty credit risk is considered more critical than other type of risks due to it exacerbates the effects of financial meltdowns and failures. In the OTC market, the *counterparty credit risk* represents the risk of losses from counterparty default; the *market risk* is defined as the potential losses that result from changes in market variables; and finally *operational risk* is regarded as the potential losses that result from human errors and failures in operational procedures and systems. The correlation of market and credit risk is also known as *wrong way risk*.

In order to close this chapter it is important to mention that given the nature of derivatives traded through these venues, OTC markets are and will be a fundamental part of the overall structure of the financial system. The size of the markets, the high concentration of notional amounts and gross market exposure in a few categories of derivatives, and the systemic importance of some market participants that concentrate high counterparty credit risk enhance the potential damage that any disruption or misuse of derivatives could cause in coming years if the need of strengthening risk mitigation practices is ignored. Chapter 1 becomes then the starting point for a discussion of the alternatives that mitigate risk exposures and protect market participants against counterparty credit risk.