

The BIS framework for monitoring financial derivatives

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1. Overview

The BIS compilation of statistics on global financial derivatives follows market practice in distinguishing two broad functional categories: the statistics provide quarterly data on exchange-traded derivatives and semiannual data on over-the-counter (OTC) derivatives activity. The data on exchange-traded derivatives are obtained from market sources, while those on OTC derivatives are based on a BIS survey of central banks in major financial centres, which in turn collect the data from reporting dealers. The statistics measure the size and structure of global derivatives markets and help to monitor their development over time.

The remainder of this article is organised as follows. The second section looks at the size, structure and growth of exchange-traded derivatives data at an aggregate level. The third section focuses on OTC derivatives, comparing the triennial and semiannual BIS surveys. The fourth section discusses the reporting of derivatives positions in the BIS banking statistics. The final section provides a comparison of BIS OTC survey data with newly available market data.

2. Exchange-traded derivatives

Exchange-traded derivatives are standardised contracts, defined by the specialised exchanges on which they are traded. Since the exchange acts as an intermediary to all transactions, these derivative markets are relatively straightforward to track; most of the exchanges publish “open interest”, ie the number of contracts outstanding and not effectively unwound (liquidated) by an offsetting trade, as well as contract turnover. The BIS collects these data from specialised market data providers, which cover more than 80 derivatives exchanges worldwide.

The instruments and risks covered by the BIS are futures and options on interest rates, currencies, equities and commodities, with a geographical breakdown by location of exchange between North America, Europe, Asia-Pacific and “other” regions. Following market practice, the BIS publishes the number of contracts outstanding and traded in each market risk category. Because turnover in terms of number of contracts is not affected by valuation effects such as movements in exchange rates, this is a good measure of activity on a single exchange over time.

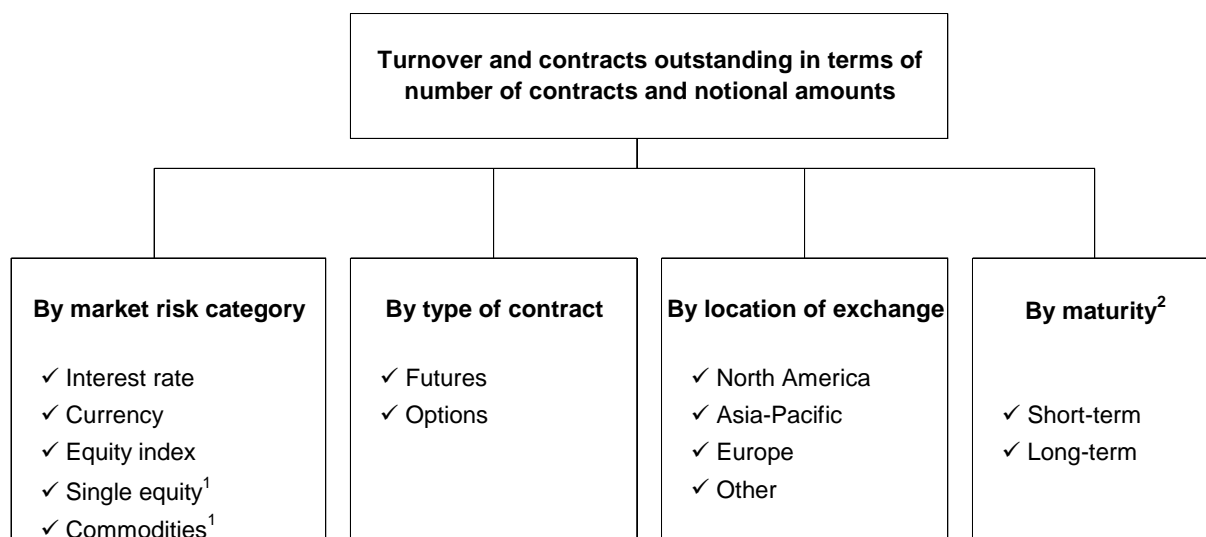
For global and regional aggregates, however, since contract sizes differ between exchanges, this measure is supplemented by notional principal amounts calculated by the BIS. For each contract type on each exchange, the notional principal is calculated as the number of contracts multiplied by the face value of the derivative instrument. These amounts are then converted to US dollars to facilitate aggregation and comparison across all exchanges worldwide. In the case of equity index derivatives, the face value is calculated as the product

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of the contract multiplier (a defined money amount) and the underlying index value in index points. This requires tracking and maintaining a growing list of stock indices.²

Figure 1

Disaggregation of exchange-traded derivatives statistics



¹ Number of contracts only. ² Interest rate contracts only.

3. Over-the-counter (OTC) derivatives

3.1 Overview

Over-the-counter derivatives are traded privately between two counterparties, without intermediation through an exchange. The contracts are not necessarily standardised and can be tailored to fit the exact economic needs of the counterparties entering into the transaction in terms of shedding or taking on risk. Trading information on these individual contracts is collected from major derivatives traders by central banks, which transmit the data to the BIS for aggregation and publication. The central banks and the BIS conduct two OTC surveys: the Triennial Central Bank Survey of Foreign Exchange and Derivatives Market Activity and a regular semiannual survey of positions in the global OTC derivatives market. Both surveys share the same format and cover the notional amounts outstanding and gross market values of foreign exchange, interest rate, equity, commodity and credit derivatives traded in OTC markets, and both refer to the worldwide consolidated positions of reporting dealers.

All published BIS figures are adjusted to remove double-counting of trades between reporting institutions, since by definition these positions are reported twice in the raw data. While notional amounts outstanding are adjusted by halving positions vis-à-vis other reporting dealers, adjusted gross market values are obtained by adding the total gross positive market value of all dealer contracts to the absolute value of the gross negative market value of their

² Notional amounts are not provided for single equity and commodity contracts. The exchange-traded derivatives are published at www.bis.org/statistics/extderiv.htm.

contracts with non-reporting counterparties. Data are reported to the BIS in US dollars, with positions in other currencies being converted into US dollars at the exchange rate prevailing at the end of each reporting period.

3.2 Comparing the triennial and semiannual surveys

3.2.1 Amounts outstanding³

The triennial survey is the more comprehensive, covering more than 400 market participants (head offices) in a total of 47 jurisdictions. It thus serves as benchmark for the semiannual survey, which is currently based on data from 59 major dealers in the G10 countries and Switzerland.⁴ Amounts outstanding are reported on a consolidated global basis by reporting dealers' head offices.

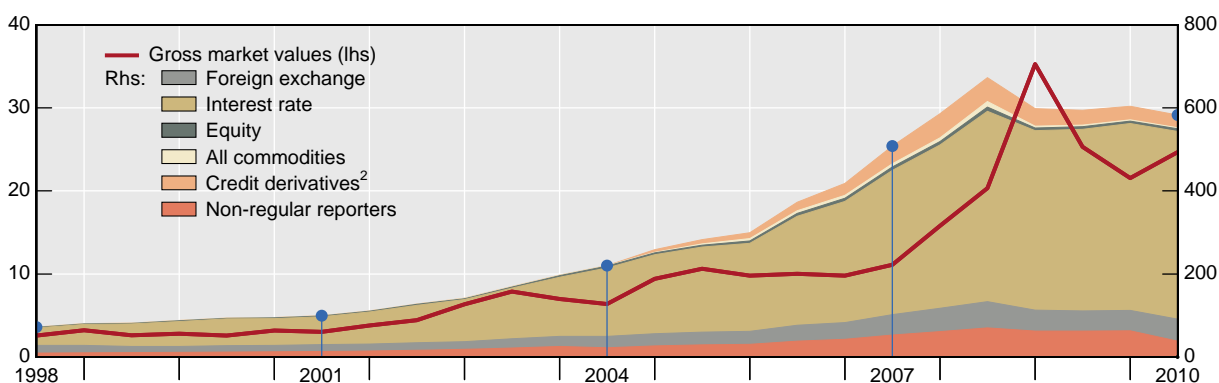
The triennial survey is also more comprehensive in covering some instruments not included in the semiannual survey, in particular credit derivatives other than credit default swaps (CDS), other FX and interest rate products and derivatives on other underlying market risk categories.

Graph 1 combines amounts outstanding reported in the triennial end-June survey data (blue dots on vertical lines) with the more frequent semiannual survey data. The data from the non-regular reporters, ie the reporting centres that participate only every three years (36 in 2010), and the data from smaller non-regular reporters in the G10 countries and Switzerland are shown as "non-regular reporters". Their contribution to total semiannual amounts outstanding between the major survey dates is extrapolated based on their contribution to the most recent triennial survey total, as measured every three years.

Graph 1

Global OTC derivatives market

Triennial and semiannual surveys, notional amounts outstanding,¹ in trillions of US dollars



¹ Dots mark Triennial Survey dates and data. ² Data available from end-December 2004.

Source: BIS.

³ See BIS (2010).

⁴ Australia and Spain will contribute from end-2011. The concentration of derivatives trading in G-10 countries is confirmed by Davies (2009), who notes a recent slight trend to increase exposures to emerging market countries and financial centres.

The “non-regular reporters” contributed about 7% to the global OTC derivatives market in terms of notional amounts outstanding in June 2010. This is quite a marked decline from their 12% share in the 2007 survey and is caused mainly by two factors: first, a number of non-regular reporters moved to regular reporting status, due to mergers and changes in ownership, and second, other non-regular reporters dropped out of the reporting due to reduced business volume.

Notional amounts outstanding provide useful information on the structure of the OTC derivatives market but should not be interpreted as a measure of the counterparty credit exposure (CCE) of these positions. While no single comprehensive measure of this type of risk exists, a useful concept is the cost of replacing all outstanding contracts at the prevailing market prices, ie their gross market value. The market value of a derivative records the cost of replacing the contract with an equivalent new contract at current market prices.

Because derivatives contracts are zero-sum in nature, for every contract one counterparty will be in the money and the other will be out of the money. The gross market value measures, for every contract, the positive replacement cost from the perspective of the in-the-money counterparty. As such, it provides an indication of current counterparty exposure. Market values are typically much smaller than notional amounts. In the case of CDS, for example, this is because they reflect the difference between the present values of anticipated future premiums and default-linked payments. Default probabilities may be estimated to be small or expected flows conditional to default may be expected to be low.⁵

Counterparty risk is reduced by bilateral netting and collateral arrangements. While comprehensive data on the collateral held against positions in OTC derivatives are not available⁶, the semiannual BIS survey does ask reporting dealers to state, in addition, the market value of their positions after taking into account enforceable bilateral netting arrangements. For the major dealers reporting semiannually, this figure increased by 34% to \$3.6 trillion (15% of the gross market value of outstanding positions) in 2010, compared with \$2.7 trillion or 24% of gross market values in 2007. Reasons for the smaller growth in gross credit exposures than in gross market values include the increased use of central counterparties and wider use of legally enforceable netting clauses in standard contract documentation. These changes are probably the result of heightened concern about counterparty credit exposures in the wake of the financial crisis.

3.2.2 Additional data on counterparty breakdown of CDS positions⁷

The latest semiannual survey introduces additional information on the importance of central counterparties (CCPs) in the CDS market. At end-June 2010, about 11% of CDS positions were vis-à-vis a CCP. This relatively low share reflects the large amount of non-standard CDS contracts covered in the BIS survey, which are not easily traded with CCPs. In terms of market value, contracts with CCPs account for only 4% of the total value of CDS. The discrepancy between their shares of notional amounts and market values could reflect the fact that CDS indices, which are popular products cleared by CCPs, are often less volatile than other CDS, such as single-name CDS, because of the diversification benefits of the former. Approximately twice as many multi-name as single-name contracts are traded with CCPs.

⁵ See Vause (2010) for an in-depth discussion of counterparty risk and contract volumes in the credit default swap market.

⁶ Some data on collateral are available from <http://www2.isda.org/functional-areas/research/surveys/margin-surveys/>.

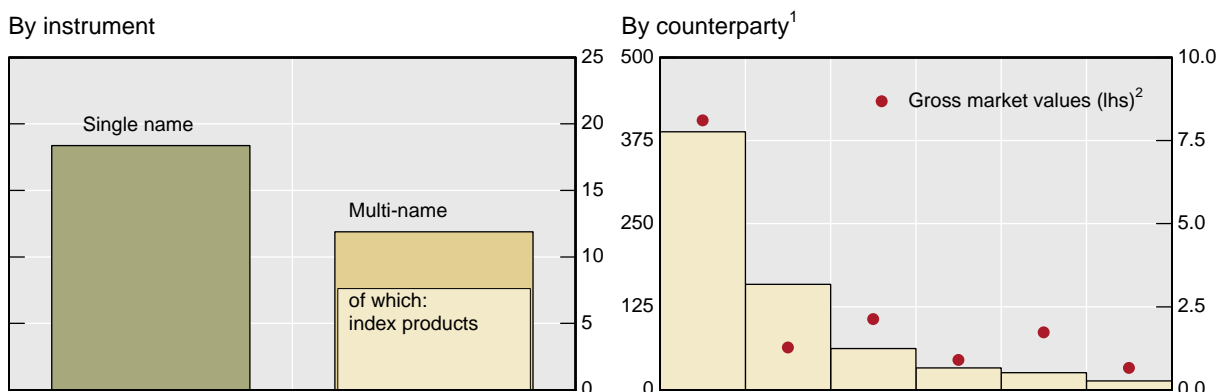
⁷ As recommended by the Committee on the Global Financial System (2009).

Index products as a subset of multi-name CDS instruments are now also reported separately (Graph 2, left-hand panel).

Graph 2

Credit default swaps, newly introduced categories

Notional amounts outstanding at end-June 2010, in trillions of US dollars

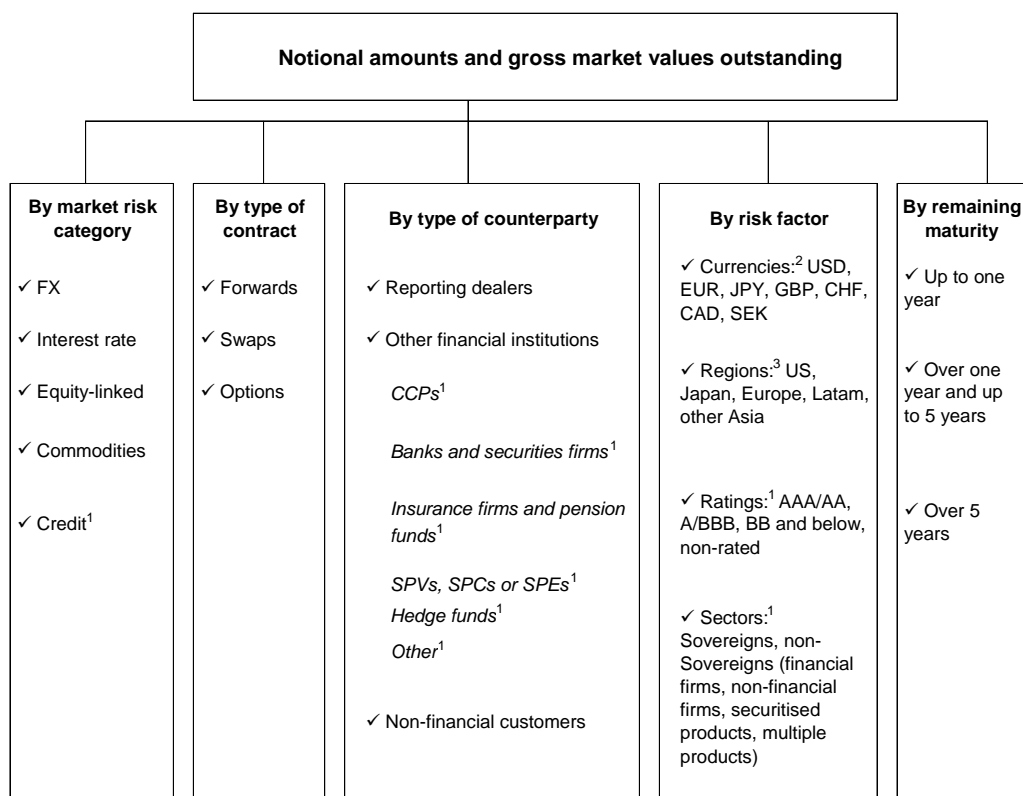


¹ Detailed breakdown of other financial institutions: A = banks and securities firms; B = central counterparties; C = other residual financial customers; D = hedge funds; E = special purpose vehicles (SPVs), corporations (SPCs) or entities (SPEs); F = insurance and financial guaranty firms. ² In billions of US dollars.

Source: BIS.

Figure 2

Disaggregation of semiannual central bank OTC derivatives statistics



¹ Credit defaults swaps only. ² Foreign exchange and interest rate derivatives only. ³ Equity-linked derivatives only.

The CDS counterparty breakdown for contracts with other financial institutions has also been expanded. In particular, special purpose vehicles (SPVs) and hedge funds are broken out for the first time. In the past, this breakdown had been used only by a subset of reporters, so that data for these sub-categories in June 2010 are not directly comparable with those of previous periods. In the current period, CDS contracts with hedge funds and SPVs account for about 5% and 4% respectively of total notional amounts outstanding with other financial institutions.

3.3 Comparing exchange-traded and OTC data

3.3.1 Amounts outstanding

The amounts outstanding reported in the triennial and semiannual surveys are not directly comparable with those in the exchange-traded data in terms of exposure. The data for exchange-traded products refer to open interest, equivalent to the sum of positive net positions in each contract across traders. That is, for each trader, any negative position in a given contract is netted against his positive position, and positive net positions are then summed across traders. For exchange-traded contracts, it is perfectly reasonable to net in this way because, unlike OTC contracts, exchange-traded contracts have standardised size and settlement dates and the same counterparty, ie the exchange.

By contrast, the triennial and semiannual survey data refer to gross positions. For example, a trader wishing to close a position in an outright forward would not usually terminate the existing contract, but enter into a new and offsetting contract. The gross amount outstanding would double, even though the net exposure is now zero. On an exchange, the open interest would fall to zero in this case, while the amount outstanding in the BIS survey would double.⁸ Thus, while one might encounter an aggregation of exchange-traded and OTC derivatives outstanding, simply adding up amounts outstanding in the two sectors would be misleading with respect to the relative significance of the two markets.

The gross reporting of amounts outstanding is informative, however. A significant aspect of counterparty risk concerns during the recent crisis was that the major dealers are important counterparties to one another. Although inter-dealer exposures are often small on a net basis, they can be large in gross terms, and there were concerns that agreements to net obligations across contracts might not be enforceable in the event of default, although such concerns were not realised in the case of the Lehman bankruptcy.⁹

3.3.2 Turnover

In contrast to amounts outstanding, turnover on exchange-traded products is comparable to OTC turnover reported in the triennial survey. Turnover on exchange-traded products does not count contracts bought or sold on the exchange separately, but only one transaction between the buy and sell side. By definition, there is no inter-dealer double-counting and thus exchange-traded turnover is comparable to the netted¹⁰ OTC survey turnover.

OTC derivatives are relatively more important in emerging market economies (EMEs) than in advanced economies. In EMEs, derivatives are traded in almost equal proportions over the counter and on exchanges (Graph 3, centre and right-hand panels). By comparison, in advanced economies almost two thirds of derivatives are traded on exchanges (right-hand panel) and 38% over the counter (centre panel). The relative size of the exchange-traded

⁸ See King and Mallo (2010) for a detailed guide to the triennial survey.

⁹ See Vause (2010).

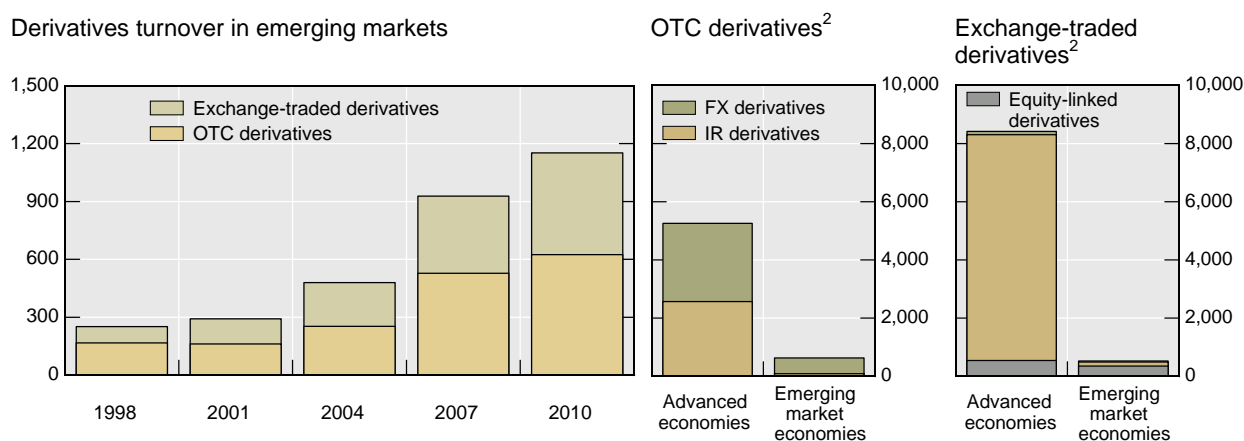
¹⁰ Netted for inter-dealer double-counting.

derivatives market in emerging markets is dominated by the derivatives exchanges in Brazil and Korea, which together account for nearly 90% of all emerging market turnover of exchange-traded derivatives. Trading of OTC derivatives is highly concentrated in Hong Kong and Singapore. The two financial centres together accounted for 69% of all OTC foreign exchange and 59% of all interest rate OTC derivatives turnover in EMEs in April 2010.¹¹

Graph 3

Derivatives turnover in advanced and emerging markets¹

Daily average turnover in April, in billions of US dollars



¹ OTC derivatives aggregates are adjusted for local inter-dealer double-counting, ie trades between reporting dealers located in the same countries were halved, and not corrected for intraregional double-counting, ie trades between reporting dealers located in different countries of the same region were not halved. OTC derivatives comprise FX and interest rate derivatives; exchange-traded derivatives comprise FX, interest rate and equity-linked derivatives. ² In April 2010.

Source: Triennial Central Bank Survey, Mihaljek and Packer (2010).

4. Derivatives in the BIS banking statistics

The BIS consolidated banking statistics collect data on credit exposures to foreign residents and include data on direct credit exposures arising from *all* derivatives contracts.¹² Direct exposures from derivatives contracts are the counterparty credit exposures (CCE) to foreign residents that arise from *all* derivatives contracts (ie in the banking or the trading book) that reporting banks have outstanding.

Specifically, counterparty credit exposures are the positive fair value, as of the report date, of all derivatives contracts with foreign residents. Net positive fair values – ie positive fair values less negative fair values (or zero, whichever is greater) – can be reported only for those contracts that are both with the same counterparty and covered under a legally enforceable netting agreement. This item measures the total exposures to foreign counterparties that a bank would have, were its derivatives contracts all to settle on the report date.

¹¹ This section draws on Mihaljek and Packer (2010), who discuss derivatives in emerging markets on the basis of the BIS survey data.

¹² In the consolidated statistics, “foreign” is defined relative to the country of the headquarters of the reporting bank (ie the lender). The consolidated statistics do not collect data on liabilities arising from derivatives contracts.

The consolidated statistics also collect data that reflect credit protection bought and sold using *credit* derivatives. A form of contingent credit exposure, credit protection on a foreign reference entity (ie borrower) that is *sold* using credit derivatives – is included in a separate item in the consolidated statistics called “**guarantees**.”¹³ This item also includes, indistinguishably, contingent credit exposures to foreign residents that arise from the provision of other types of credit guarantees, such as financial and performance standby letters of credit for foreign borrowers.

In addition, the consolidated statistics collect data that reflect the effects – on the ultimate obligor or guarantor of a claim – of credit protection purchased via *credit* derivatives. Specifically, the consolidated statistics distinguish between the residency and sector of the immediate debtor counterparty of reporting banks and the residency and sector of the ultimate obligor. The latter is the counterparty ultimately responsible for servicing any outstanding obligations in the event of a default by the immediate borrower. The country of ultimate risk is generally defined as the country in which the guarantor of a financial claim resides or the head office of a legally dependent branch is located.¹⁴

If a reporting bank *purchases* protection against default in the credit derivatives market, then the country of ultimate risk is defined as the country in which the counterparty to the contract resides. The consolidated statistics collect this effect as an “**inward risk transfer**” into the country of the protection seller and an “**outward risk transfer**” from the country of the borrower. However, like “guarantees”, credit protection purchased via credit derivatives is combined, indistinguishably, with credit protection obtained through some other form of credit guarantee, such as a financial or performance standby letter of credit.

The country allocation of CCE is affected by (liquid) collateral held in the same way that the country allocation of loans would be affected. For example, CCE collateralised by US collateral would disappear from the statistics reported by US banks. CCE collateralised by foreign collateral would be reallocated to the country of the collateral, if that country differs from that of the counterparty.

Table 1

Reported item	Instrument	Risk mitigation	Valuation	Book	Ultimate risk country
1. Derivatives	All financial derivatives not included in 2. or 3.		Positive market value only	Banking and trading	Counterparty
2. Guarantees extended	Guarantees, including CDS	Credit protection sold by reporting bank	Notional	Banking and trading	Reference entity
3. Inward and outward risk transfers	Credit derivatives and other risk mitigants	Credit protection bought by reporting bank	Notional	Banking	Guarantor

¹³ The bulk of such exposures would typically reside in a bank’s trading book, since one would expect the banking book to contain only credit derivatives that are *hedged*, ie those that *purchase* credit protection, rather than sell it.

¹⁴ McGuire and Wooldridge (2005) discuss credit risk transfers in the BIS consolidated banking statistics.

Thus the derivative positions in the consolidated statistics on an ultimate risk basis provide an approximation of banks' derivative exposures to counterparties worldwide, excluding CCE in their home countries.

5. BIS derivatives data compared with new data sources

5.1 Depository Trust & Clearing Corporation (DTCC) data for CDS¹⁵

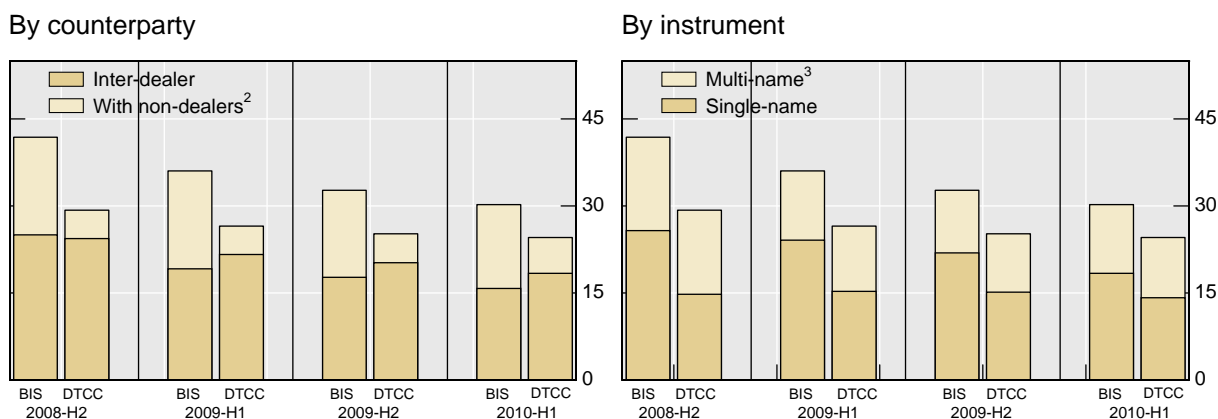
Recent developments in CDS markets have led to the availability of additional financial derivatives data sources. In conjunction with the well known ISDA market survey and the BIS semiannual central bank survey on OTC derivatives markets, these new sources can be used to monitor global market trends more closely. One source that has attracted much attention is the Depository Trust & Clearing Corporation (DTCC) data on CDS. DTCC stores OTC credit derivatives data in a global repository called the Trade Information Warehouse (TIW). It then performs post-trade processing functions such as automated calculation, netting and central settlement of payment obligations, as well as settlement of credit events such as bankruptcies. We examine the DTCC data and briefly compare them with the data from the BIS semiannual central bank survey on outstanding CDS.

In early November 2008, DTCC started weekly publication of aggregated data as part of efforts to address market concerns about the lack of transparency in CDS markets. The DTCC data are based on CDS records registered in the warehouse, while the BIS data rely on dealers' reports to national central banks.

Graph 4

Comparison of BIS and DTCC CDS data¹

Notional amounts outstanding, in trillions of US dollars



¹ The BIS sample includes reporting banks whose head office is located in a G10 country. ² The DTCC non-dealers category includes some inter-customer contracts. ³ Multi-name contracts include credit default tranches.

Sources: DTCC; BIS.

¹⁵ See Gyntelberg et al (2009).

One indicator of the size of global CDS markets is the gross notional amounts outstanding, available in both the BIS and DTCC datasets. By counterparty, the BIS data distinguish between reporting dealers, other financial institutions and non-financial customers. By contrast, the DTCC data identify as counterparties only dealers and non-dealers (customers). To facilitate comparison, we combine the two non-reporting counterparty groups in the BIS survey in a single aggregate non-dealer category (Graph 4, left-hand panel). In addition, for the DTCC data we include direct trades between non-dealers, which amount to only 0.1% of the total.

Initially, the DTCC and BIS data for the total gross amounts outstanding between dealers as of end-2008 matched almost perfectly. Since then, CDS amounts reported by DTCC have risen slowly and at end-June 2010 amounted to 117% of outstanding inter-dealer contracts in the BIS data (Graph 4, left-hand panel). The likely explanation for this difference is that DTCC covers somewhat more dealers.

The combined pattern across counterparties and instrument types suggests that a main reason for the differences between the two datasets may be that outstanding single-name contracts used in the more customised transactions between dealers and non-dealers (including other financial institutions) are covered more comprehensively by the BIS, but are increasingly also entering the DTCC database.

5.2 TriOptima Interest Rate Swaps¹⁶

The OTC Derivatives Interest Rate Trade Reporting Repository (IR TRR) launched by TriOptima in early 2010 is an important step towards improving transparency in the global OTC derivatives markets. The IR TRR collects data on all transactions in OTC interest rate derivatives from a group of 14 major dealers.

In April 2010, the IR TRR published its first monthly report summarising outstanding notional volumes at end-March 2010. The report provides a detailed breakdown of outstanding volumes by currency, maturity and type of contract. In contrast to the BIS data, the IR TRR does not publish information on market values or counterparty exposures.

The total amount outstanding of interest rate derivatives of the 14 participants in the new trade repository (13 of which are included in the sample of 59 dealers reporting to the BIS OTC derivatives statistics) at the end of June 2010 is very close to the market totals reported by the BIS statistics (Table 2).¹⁷ This suggests that market concentration is high and that the coverage of the IR TRR data is near comprehensive.

¹⁶ See Gyntelberg and von Kleist (2010).

¹⁷ The figures adjust inter-dealer positions to account for double-reporting and exclude cross-currency swaps.

Table 2					
OTC interest rate derivatives data comparison					
IR TRR			BIS		
	End-June 2010			End-June 2010	
Counterparty type	Notional amounts outstanding (USD billions)	% of total	Counterparty type	Notional amounts outstanding (USD billions)	% of total
Dealers	86,684	20	Dealers	132,128	29
CCPs	212,080	48	Other financial	282,027	62
Other counterparties	140,671	32	Non-financial	37,677	8
Total	439,435	100	Total	451,831	100

The trade repository data include \$9,836 billion of cross-currency swaps, which are classified as FX instruments in the BIS data. They are thus excluded from the IR TRR data column in this table.

Source: The detailed data are available on: <http://www.trioptima.com/repository.html>.

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