

Over-the-counter (OTC) derivatives, central clearing and financial stability

By Arshadur Rahman of the Bank's Financial Market Infrastructure Directorate.⁽¹⁾

- Over-the-counter (OTC) derivatives markets have grown significantly over recent decades, and the United Kingdom is an important international centre for them. These markets facilitate the hedging of risk, but they can also give rise to complex exposures within the financial system.
- Following the financial crisis, policymakers have promoted reforms to these markets. These include the greater use of central counterparties (CCPs) to 'centrally clear' transactions, managing risk within the system.
- The concentration of risk within CCPs does however highlight other challenges, including the need for supervisory co-operation internationally. Authorities are working to address these issues.

Overview

Derivatives are contracts that derive their value from an underlying asset (equities for example) or reference price (such as interest rates). They can be used to mitigate a variety of financial risks. OTC trades are those transacted bilaterally between parties, as opposed to being executed on an exchange. The market for OTC derivatives has grown over the past two decades, and as of December 2014 stood at approximately US\$630 trillion in terms of outstanding notional value. When OTC derivatives are traded bilaterally, they involve the risk that a counterparty fails to meet their obligations under the contract. This risk can be mitigated by using a CCP to centrally clear the transaction. The CCP acts as buyer to every seller, and seller to every buyer, simplifying the network of exposures within the system.

Central clearing is therefore recognised as a key way to manage systemic risk. Following the financial crisis of 2007–09, G20 leaders agreed to reform the structure of OTC derivatives markets, requiring that contracts which are sufficiently standardised be centrally cleared. The United States and Japan have already implemented this 'clearing obligation' for certain interest rate and credit derivative contracts. The European Union is scheduled to do so in 2016. Approximately 50% of interest rate contracts and 20% of credit derivative contracts outstanding globally are now centrally cleared. The proportion of the flow of new contracts which is centrally cleared is higher still: since the introduction of the clearing obligation in the United States in 2013, for example, 80% of new interest rate contracts and 70% of new credit derivative contracts have been centrally

cleared. In managing risk in the financial system, CCPs do however concentrate risk within themselves. This will become an increasingly important consideration, since there is likely to be further migration towards central clearing, and more concentration of activity among a small number of CCPs and their users. While some of these CCPs are located in the United Kingdom, at the end of 2014 60% of the margin required to support transactions cleared by UK-based CCPs was provided by non-UK participants, underscoring the global nature of this activity.

Regulators around the world are addressing the increased concentration and cross-border nature of central clearing activity, by working together to ensure consistency of approach across jurisdictions based on robust regulatory standards. This is in terms both of the scope of the derivatives contracts which are captured by the clearing obligation, and also in the application of prudential requirements for CCPs. Market fragmentation may result if rules are not applied consistently in the different jurisdictions in which CCPs and their participants operate. Authorities also need to ensure that mechanisms are in place to mitigate the risk arising from extreme circumstances in which CCPs could experience financial or operational difficulties.

Overall, while there has been significant progress in improving the robustness of OTC derivatives markets over the past five years, there is work still to do. The Bank of England, along with other stakeholders, will continue contributing to this work.

(1) The author would like to thank Paul Alexander for his help in producing this article.

Introduction

Over-the-counter (OTC) derivatives markets have grown significantly over the past two decades, and constitute a systemically important component of financial services activity.⁽¹⁾ The use of central counterparties (CCPs) in OTC derivatives markets has also increased over this period. This is important because 'central clearing', as it is known, is a key way of managing risk within the system.

Previous *Bulletin* articles have explained the function of CCPs, and identified increased banking sector exposures to them.⁽²⁾ This article builds on these by exploring the increasing use of CCPs in the OTC derivatives market. It begins with an overview of OTC derivatives markets and how these have grown over time, before looking at the increased use of central clearing. It then considers factors affecting the regulatory decision to require certain contracts to be cleared via CCPs (the 'clearing obligation') and the outlook for a further increase in central clearing. The article concludes by discussing some of the policy implications of these developments.

Setting the scene: OTC derivatives and the CCPs that clear them

The financial crisis of 2007–2009 highlighted shortcomings in the identification and management of risk in OTC derivatives markets. There was a lack of transparency about the size of bilateral positions in OTC derivatives contracts. The combination of opacity and concerns over the adequacy of collateral, and counterparty risk management arrangements more generally, created an environment in which confidence could be lost rapidly.⁽³⁾ This ultimately contributed to significant market disruption in the aftermath of the collapse of Lehman Brothers and the near-collapse of AIG in September 2008, both of whom were major participants in OTC derivatives markets.

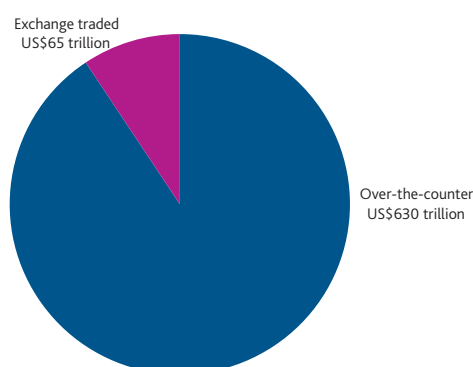
In response to the crisis, G20 leaders committed to reform the structure of OTC derivatives markets and to improve their transparency. It was agreed in Pittsburgh in September 2009 that all standardised OTC derivative contracts should be traded on exchanges or electronic trading platforms, where appropriate, and cleared through CCPs; and that OTC derivatives contracts should be centrally reported to bodies called 'trade repositories'.⁽⁴⁾ The Financial Stability Board (FSB) has been tasked with monitoring progress with the implementation of these reforms.⁽⁵⁾

What are OTC derivatives and how are they used?⁽⁶⁾

Derivatives are contracts that derive their value from an underlying asset (for example, equities or commodities) or reference price (for example, interest rates, foreign exchange

rates or credit indices). Derivatives can be split into two broad groups, based on how they are traded. Exchange-traded derivatives (ETDs) are highly standardised contracts traded on regulated exchanges. OTC derivatives, by contrast, are traded bilaterally between counterparties, and may have more bespoke terms. Central clearing of ETDs is a long-established practice, but central clearing of OTC derivative contracts only became widely available from the late 1990s.⁽⁷⁾ In terms of outstanding notional value (the nominal amount referenced in a contract to calculate the cash flows arising) **Chart 1** shows that the OTC derivatives segment is much larger, constituting around 90% of the overall derivatives market.

Chart 1 Composition of global derivatives contracts by trading arrangement as at the end of 2014^(a)



Source: Bank for International Settlements.

(a) By outstanding gross notional value.

Chart 2a shows that the notional value of outstanding OTC derivatives grew rapidly in the early 2000s, particularly from 2006 to 2008. The notional value is a measure of activity but not necessarily of economic exposure or of risk. The outstanding *market* value of contracts, shown in **Chart 2b**, is significantly lower. Following the onset of the financial crisis, the growth of the market slowed. As of end-2014, the market stood at approximately US\$608 trillion by gross notional value,⁽⁸⁾ or US\$20 trillion by market value.

By far the largest proportion of activity is in **interest rate derivatives**. These are contracts which are used to hedge against the risk of changes in interest rates. For example, a manufacturer with a variable-rate bank loan may seek to swap

(1) See Murphy (2009).

(2) See Nixon and Rehlon (2013) and Liu, Quiet and Roth (2015).

(3) See Murphy (2013).

(4) See G20 Communiqué, September 2009; www.treasury.gov/resource-center/international/g7-g20/Documents/pittsburgh_summit_leaders_statement_250909.pdf.

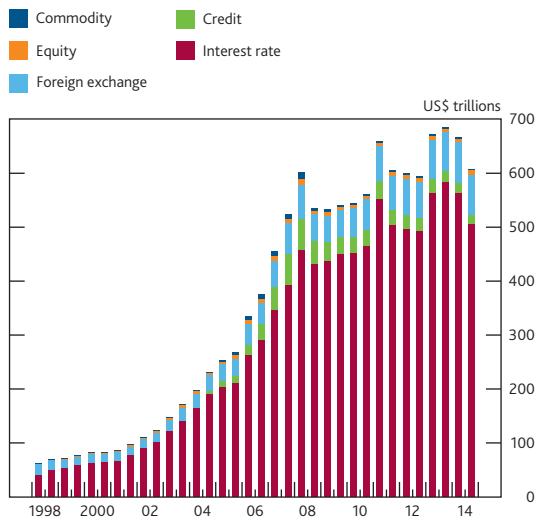
(5) For further detail on the FSB's work, see www.financialstabilityboard.org/what-we-do/policy-development/otc-derivatives/ and for the latest progress report on the reforms to derivatives markets, see www.financialstabilityboard.org/wp-content/uploads/OTC-Derivatives-Ninth-July-2015-Progress-Report.pdf.

(6) For further detail on how derivatives can be used, see the International Swaps and Derivatives Association's (ISDA's) information brochure; www2.isda.org/attachment/NjQ3Mw==/ISDA%20FINAL%202014.pdf.

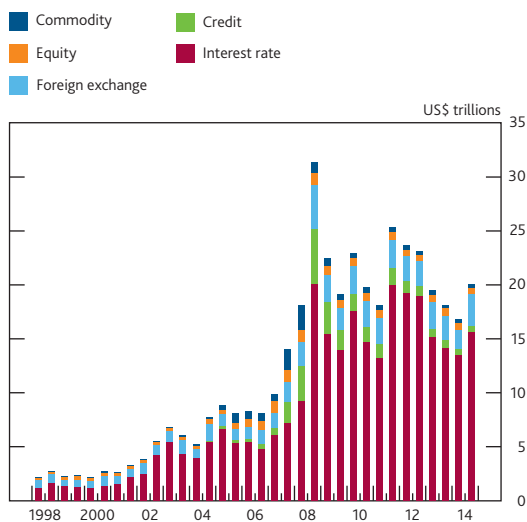
(7) See Norman (2011).

(8) This total excludes contracts which have not been allocated to one of the five main asset classes, which increases the total to around US\$630 trillion.

Chart 2 Size of global OTC derivatives markets
(a) By outstanding gross notional value



(b) By outstanding market value of contracts



Source: Bank for International Settlements.

the variable (and therefore uncertain) interest payments under the loan arrangement for fixed-rate interest payments, to allow it to better plan its future payment obligations. The next largest proportion of activity is in foreign exchange (FX) derivatives, followed by credit derivatives. These are contracts which are used to protect against the default of a particular entity or group of entities to which the contract buyer may be financially exposed. For example, a bank may seek to protect itself against the default of a firm or group of firms to which it has extended loans. The annex to this article provides more detail on the different types of derivative contracts.

What are CCPs and what is central clearing?

OTC derivatives transactions necessarily involve counterparty credit risk. This is the risk that one counterparty fails to meet its obligations to the other. In that case, the non-defaulting

party is exposed to losses due to adverse price movements in the value of the portfolio until it is able to replace the defaulter with a new counterparty.⁽¹⁾ This risk is particularly important in OTC derivatives contracts because they may have a term of many years.

CCPs mitigate and manage counterparty risk within the system by ‘clearing’ transactions: in effect, they stand as the buyer to every seller and the seller to every buyer within a centrally cleared market, thereby simplifying the network of exposures within the system and reducing their size via ‘multilateral netting’.⁽²⁾ Reflecting these arrangements, each market participant has only an aggregate counterparty exposure to the CCP. This can be preferable to multiple exposures across a range of other, possibly less creditworthy, counterparties. However, this does concentrate risk within the CCP itself.

A CCP manages the counterparty credit risk that it faces in a number of ways. First, it applies strict membership criteria to would-be direct participants, known as ‘clearing members’. It then requires clearing members to provide ‘margin’ (collateral) in the form of cash or other liquid assets to offset the risks related to the exposures to each member. These exposures arise from transactions undertaken by the clearing member both on its own behalf and from transactions it undertakes on behalf of its clients. Clearing members in turn collect margin from clients to manage their own counterparty exposure. CCPs calculate margin very conservatively to cover potential losses in the event of a counterparty default.⁽³⁾

Margin is provided in two forms: ‘initial margin’ is posted at the beginning of a transaction to cover potential future adverse changes in the value of the contract, and is recalculated on a regular basis. Additional ‘variation margin’ is posted to cover actual adverse changes in the market value of the contract during its life. CCPs generally also require clearing members to contribute to a mutualised default fund, which protects the CCP in the event that the margin it holds is insufficient to cover losses on the positions of a defaulting member.

The United Kingdom as a major international centre for OTC derivatives activity and central clearing

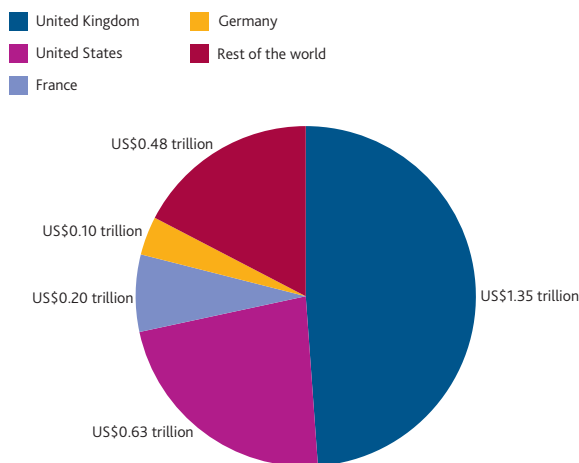
According to data collected by the Bank for International Settlements (BIS), the United Kingdom is the single largest global venue for OTC derivatives activity: it accounts for

(1) For further detail, see Hull (2009) and Norman (2011).
 (2) When Party A and Party B trade a set of contracts, they can agree to net the exposures which arise (‘bilateral netting’), but the net exposure cannot be further netted against Party A’s exposures to Party C. When all contracts in a market are cleared through a CCP, the CCP can go further and net the exposures which arise from Party A’s transactions with all its original counterparties, to a single net exposure (‘multilateral netting’). For further detail on this process, see Nixon and Rehlon (2013).
 (3) The calculation is conservative partly because the same methodology is applied to all participants — that is, it is not reduced for some participants by factoring in the estimated likelihood of default.

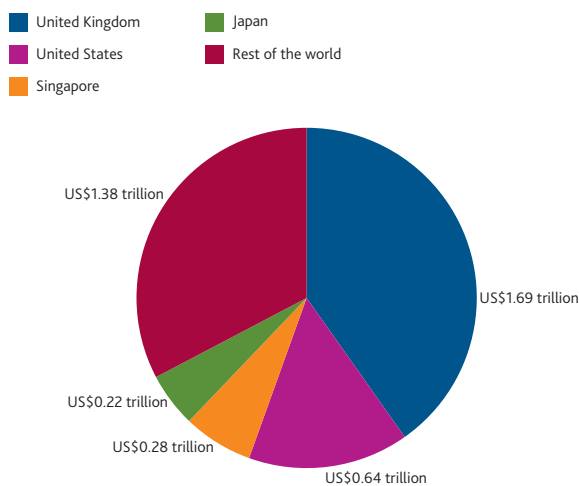
almost half of all global activity in interest rate derivatives, and over a third of global activity in foreign exchange derivatives contracts (Chart 3).⁽¹⁾ The United Kingdom is also a major centre for the central clearing of OTC derivatives contracts: it is home to four CCPs, which between them account for most of the cleared activity in OTC interest rate derivatives globally, and a substantial proportion of the cleared activity in the other asset classes.⁽²⁾

Chart 3 Average daily turnover by notional value of global OTC derivatives in April 2013

(a) Interest rate derivatives



(b) FX derivatives



Source: Bank for International Settlements.

The size of the UK market and the systemic importance of some of the CCPs within it make it essential for the Bank of England to understand and monitor the risks arising from this sector. The Bank is the supervisor of UK CCPs, and in fulfilling this function it works closely with other authorities in regulatory colleges (see Supervisory co-operation section later). The Bank's Financial Policy Committee (FPC) considers risks to the UK financial system more broadly, including from outside the core banking system. It intends to conduct an in-depth analysis of the derivatives market during 2016.⁽³⁾

How has central clearing of OTC derivatives contracts changed over time?

The clearing obligation

The largest jurisdictions have implemented the G20 commitment that standardised OTC derivatives contracts should be centrally cleared, by establishing legal requirements for central clearing of specified types of transaction. In Europe, the framework for this 'clearing obligation' is established by the European Market Infrastructure Regulation, commonly known as EMIR, which was enacted in August 2012.⁽⁴⁾

It is the responsibility of the European Securities and Markets Authority (ESMA) to propose which products should be subject to mandatory clearing. This must then be approved by the European Commission, Council and Parliament.⁽⁵⁾ In the United States, the relevant provisions are detailed within the Dodd-Frank Act, and enforced by the Commodity Futures Trading Commission (CFTC) and the Securities and Exchange Commission (SEC).⁽⁶⁾

The OTC derivatives contracts currently offered for central clearing may come from any of the five asset classes shown in Chart 2, but by far the largest in terms of notional values cleared are the interest rate and credit derivative asset classes. Chart 4 shows that the proportion of the outstanding stock of derivatives transactions in these two asset classes that are centrally cleared has increased over recent years. As of December 2014, it is estimated that around 50% of the overall market for interest rate and 20% of the overall market for credit derivatives were centrally cleared. The FX asset class, while larger than the credit asset class and the second largest overall, contains very few contracts that are currently offered for central clearing by CCPs: as a proportion of overall FX activity, the amount centrally cleared is estimated to be less than 1%.⁽⁷⁾

Chart 4 shows the proportion of the stock of historical transactions that have been centrally cleared. When looking only at the flow of new transactions, the proportion of centrally cleared activity is notably higher. Chart 5 shows the proportion of the flow of new contracts that are centrally cleared in the United States (where the clearing obligation has

(1) Location was determined as being the location of the sales desk of the reporting entity; where no sales desk was involved in a deal, the trading desk was used to determine the location of deals.

(2) The four CCPs located in the United Kingdom are: CME Clearing Europe Limited, ICE Clear Europe Limited, LCH.Clearnet Limited and LME Clear Limited.

(3) See Bank of England *Financial Stability Report*, July 2015; www.bankofengland.co.uk/publications/Documents/fsr/2015/fsrfull1507.pdf.

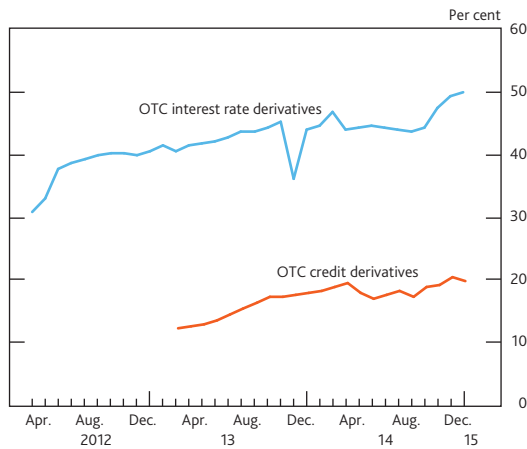
(4) For further detail on the EMIR implementation timetable, see www.fca.org.uk/firms/markets/international-markets/emir.

(5) See ESMA webpages on the clearing obligation; www.esma.europa.eu/page/OTC-derivatives-and-clearing-obligation.

(6) See Dodd-Frank Act, available at www.sec.gov/about/laws/wallstreetreform-cpa.pdf.

(7) See BIS (2013), 'Triennial survey', available at www.bis.org/publ/rpfx13.htm and ForexClear.

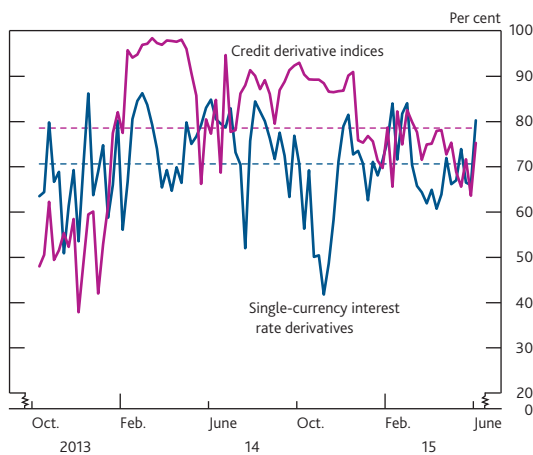
Chart 4 Proportion of the outstanding stock of OTC interest rate and credit derivatives that is centrally cleared^(a)



Sources: DTCC trade information warehouse reports and Bank calculations.

(a) When calculating the proportion of centrally cleared activity, the volume in respect of the two novated (CCP-intermediated) contracts (that is, buyer-CCP and CCP-seller) is halved, to represent the original buyer-seller transaction and avoid inflating the numerator.

Chart 5 Percentage of new OTC derivatives transactions centrally cleared in the United States^(a)



Source: Financial Stability Board.

(a) Dashed lines represent the average percentage cleared over the observation period.

been in place since 2013) as a percentage of weekly aggregate transaction volumes. Between 2013 Q4 and 2015 Q2, on average, 80% of new interest rate derivatives and 70% of new credit derivative index contracts were centrally cleared.

Which contracts are (or will be) subject to the clearing obligation?

To assess which contracts should fall under the clearing obligation, regulators may start by considering contracts that are already offered for central clearing by CCPs. Alternatively, they may first assess the market as a whole to see which contracts are sufficiently liquid and standardised to justify the imposition of a clearing obligation.⁽¹⁾ In Europe, ESMA’s broad objectives include the reduction of systemic risk. It will consider various criteria when selecting classes of OTC

derivatives for mandatory clearing, including their degree of standardisation, their volume and liquidity, and the availability of fair, reliable and generally accepted pricing information. These are important factors in the CCP’s ability to value contracts, and sell the positions into a liquid market in the event of a clearing member default. It is of critical importance that CCPs are able to effectively risk-manage the classes of derivatives that are subject to the clearing obligation. The Bank has contributed to ESMA’s determination process, by analysing large volumes of confidential transaction-level data on various interest rate, credit and FX derivatives, to assess the liquidity of these contracts and their consequent suitability for the clearing obligation.

To date, regulators around the world have focused on four main interest rate derivatives contracts and one main type of credit default swap (CDS) contract for the clearing obligation.

- ‘Plain vanilla’ interest rate swaps (IRS) — contracts to swap a fixed interest rate cash flow for a variable (or ‘floating’) rate one on some notional principal amount;
- Basis swaps — contracts to swap two cash flows, both of which are based on floating rates;
- Forward rate agreements (FRAs) — short-term contracts that specify the interest rate that will apply to the borrowing/lending of a notional principal amount starting at some point in the future;
- Overnight index swaps (OIS) — short-term IRS contracts in which the floating payment is based on an index rate for daily overnight unsecured lending; and
- CDS index contracts — these provide protection against the default of any member of a list (or index) of entities, known as ‘names’. These differ from CDS covering only individual entities, known as ‘single name’ contracts.

The annex to this article provides further details on the different types of contracts.

Table A summarises the scope of the clearing obligations of the United States, Japan and the European Union (EU). The former two have already been implemented, and the latter is currently in the process of being ratified.⁽²⁾ Japan was the first jurisdiction to implement a clearing obligation, focusing on yen-denominated contracts. The US regime began in early 2013 and covers a much wider range of contracts, denominated in any of the four most globally liquid currencies — US dollar, euro, sterling and yen. The EU, which is due to

(1) Factors which regulators should consider are set out in the International Organization of Securities Commissions’ ‘Requirements for mandatory clearing’, 2012; www.financialstabilityboard.org/2012/02/cos_120202/.
 (2) http://europa.eu/rapid/press-release_IP-15-5459_en.htm?locale=en.

Table A Clearing obligations for the United States, Japan and the EU^(a)

Jurisdiction	Asset class	Effective from	Currencies ^(b)	Maturities
United States	IRS	11 March 2013	USD, EUR, GBP, JPY	28 days–50 years (30 years for JPY)
	Basis			
	FRA		USD, EUR, GBP	3 days–3 years
	OIS			7 days–2 years
CDS indices	USD, EUR	Mainly 5 years, some 3, 7, 10 years		
Japan	IRS	1 November 2012	JPY	Up to 30 years
	Basis	1 July 2014	JPY/EUR	Up to 10 years
	IRS			
	Basis			
CDS indices	1 November 2012	JPY	5 years ^(c)	
EU	IRS	2016	USD, EUR, GBP, JPY	28 days–50 years (30 years for JPY)
	Basis			
	FRA	USD, EUR, GBP	3 days–3 years	
	OIS		7 days–3 years	
	CDS indices	<i>In consultation</i>	EUR	5 years
	IRS		SEK	28 days–15 years
			CZK, DKK, HUF, NOK, PLN	28 days–5 years
			SEK	3 days–2 years
FRA		NOK, PLN	3 days–1 year	

(a) The complete list of clearing obligations already in place around the world also includes: China (IRS), Korea (IRS) and India (FX Forwards).

(b) Currency abbreviations: USD = US dollar, EUR = Euro, GBP = Pound sterling, JPY = Japanese yen, SEK = Swedish krona, CZK = Czech koruna, DKK = Danish krone, HUF = Hungarian forint, NOK = Norwegian krone and PLN = Polish zloty.

(c) For Japanese CDS index contracts, maturity is not specified in primary legislation, but currently only five-year contracts are centrally cleared.

begin implementation of the clearing obligation from 2016, could capture an even wider range of contracts, subject to the outcome of a consultation on clearing contracts denominated in a broader set of European Economic Area (EEA) currencies.⁽¹⁾

Under EMIR, once the clearing obligation takes effect, it will be phased in. CCP clearing members will be required to centrally clear all transactions involving designated contracts from six months after the rules take effect, large financial companies which are not clearing members within twelve months, smaller financial firms within 18 months and any other firms subject to the clearing obligation within three years. This represents a significant expansion in the range of firms who centrally clear their transactions, with some, such as non-financial companies engaging in non-hedging activity above certain thresholds, being required to centrally clear for the first time.

Looking ahead: what factors will affect further migration towards central clearing?

The outlook for further migration to central clearing

Central clearing is likely to increase over the next few years, driven by general market practice (that is, firms progressively streamlining their arrangements for operational convenience), the introduction of the clearing obligation in the EU, and, as explained below, increased margin and capital costs in respect of non-centrally cleared transactions. However, it will probably not increase to cover 100% of the overall market. As mentioned earlier, there will always be a certain proportion of contracts that are inherently unsuited to central clearing because they are not sufficiently standardised and liquid.

Contracts that are not centrally cleared (because in the absence of an applicable clearing obligation, market participants have either chosen not to clear through a CCP, or cannot do so because no CCPs offer to clear the contract) will be subject to new bilateral margin requirements. These are due to be phased in from September 2016.⁽²⁾ They will be set to mitigate bilateral counterparty risk on these contracts and to incentivise (or at the least not undermine) central clearing. In addition, most FSB member jurisdictions have made changes to their prudential frameworks to require higher capital requirements for non-centrally cleared derivatives — this was also part of the original G20 commitment of 2009.

The FSB has analysed the extent to which outstanding OTC derivatives may be capable of being centrally cleared. **Chart 6** shows that of the interest rate derivatives transacted by 16 large dealers, plain vanilla IRS contracts are the most 'clearable', and the most cleared, followed by FRAs. Currently, just over US\$90 trillion of IRS contracts (or roughly half the market) is centrally cleared. The analysis suggests scope for a further increase in central clearing.⁽³⁾ Notional values traded in CDS contracts are much lower than in interest rate contracts, and the proportions currently centrally cleared are also lower: approximately US\$0.9 trillion of European corporate index contracts and US\$0.5 trillion of American corporate index contracts are centrally cleared (or 37% and 41% respectively). More complex contracts such as

(1) www.esma.europa.eu/system/files/esma-2015-807_-_consultation_paper_no_4_on_the_clearing_obligation_irs_2.pdf.

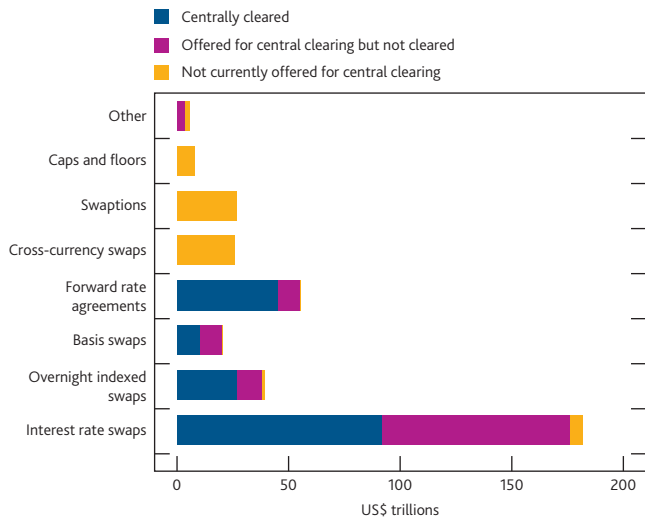
(2) See Bank for International Settlements and the International Organization of Securities Commissions' 'Margin requirements for non-centrally cleared derivatives', March 2015; www.bis.org/bcbs/publ/d317.htm.

(3) It should be noted that the FSB has drawn this data from a range of sources. Estimates of how many additional contracts can be cleared assume there are no confounding contractual, legal or other issues.

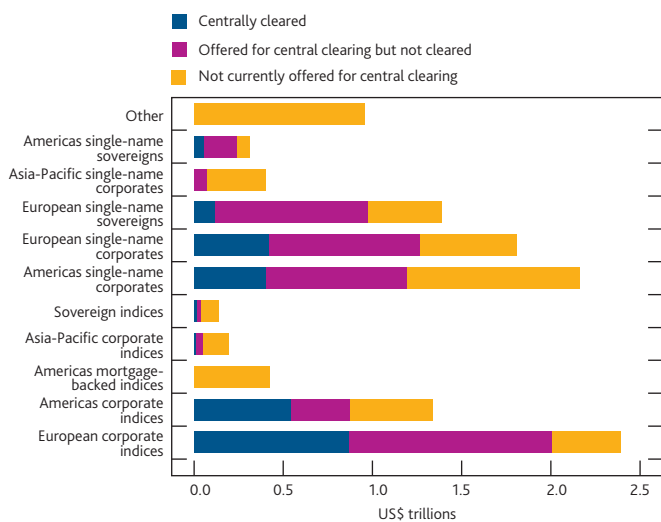
cross-currency swaps and cap/floor contracts within the interest rate asset class (see annex) are generally less standardised and more challenging to risk manage for CCPs, so they are not presently offered for central clearing.

Chart 6 Actual and potential central clearing of OTC derivatives by product type
Outstanding notional amounts at end-June 2015

(a) Interest rate derivatives — large dealers



(b) Credit derivatives — all counterparties^(a)



Source: Financial Stability Board.

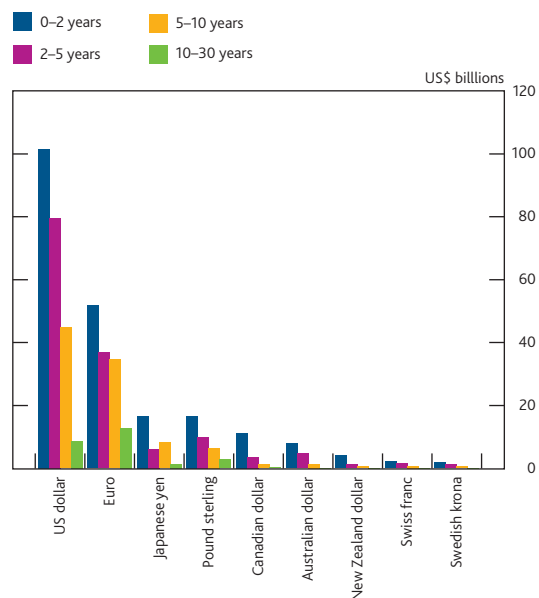
(a) Contracts specifying the Americas refer to both North and South American markets.

Overall, this analysis implies that there is potential for the majority of plain vanilla IRS contracts, OIS, basis swaps and FRAs to be centrally cleared, along with a sizable proportion of CDS index contracts on European and American corporate entities. Single-name corporate CDS contracts appear to also have potential for increased central clearing, although in practice this is challenging because the aggregate outstanding notional values comprise a large number of individual contracts on different single names, each of which may have limited liquidity.

Indicators of liquidity include the size and depth of the market in a specific contract. This can be measured in a number of ways, including the average daily number of trades and trade volumes (measured in notional values traded, or outstanding at a given point in time). Additional measures include market concentration, which is concerned with whether there are a sufficient number of active market participants to enable a CCP to exit a derivatives position inherited from a defaulting clearing member.

Contracts have specific features that will affect their liquidity. Among the most important are the currency of denomination and contract maturity. **Chart 7** shows that centrally cleared activity for IRS contracts as measured by notional value traded is concentrated at shorter maturities of up to five years. The most liquid contracts by currency are those denominated in US dollars, followed by euros. CDS markets are even more concentrated, both by maturity and by currency: five-year contracts are the most actively traded, and most contracts are denominated either in euros or US dollars, with less trading in other currencies.⁽¹⁾ Therefore, when considering a given contract for the clearing obligation, regulators also need to determine which specific currencies and maturities are sufficiently liquid and therefore appropriate to capture under the obligation.

Chart 7 Average daily notional value traded for IRS contracts cleared during 2014 in LCH SwapClear



Sources: LCH.Clearnet and Bank calculations.

Other likely market trends in central clearing over the medium term

Further migration towards use of CCPs

While central clearing is likely to increase, this may not be entirely reflected in the outstanding notional values at CCPs

(1) See Benos, Wetherilt and Zikes (2013) for an examination of the CDS market.

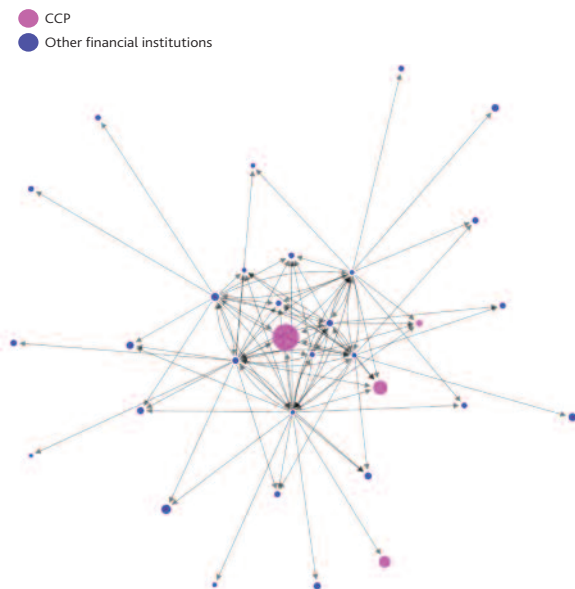
because of the impact of trade compression. This is a tool to reduce outstanding exposures through cancelling trades that result in offsetting positions. It is therefore useful to look at daily trading activity alongside outstanding notional values for a more accurate sense of centrally cleared activity.

Market concentration among CCPs and their clearing members

A small number of CCPs clear most of the available OTC derivatives activity due to economies of scale in the provision of clearing services — for example, the greater scope for netting. This makes those CCPs systemically important. Furthermore, there are a relatively small number of clearing members for these CCPs, and fewer still that offer client clearing.⁽¹⁾ Those clearing members that do offer client clearing become more important within the system because non-clearing member firms would otherwise be unable to access central clearing, hindering their ability to undertake OTC derivatives transactions (especially if these contracts become subject to the clearing obligation).

Chart 8 shows the significant derivative exposures between CCPs and other institutions within the UK financial system. From this, the central role played by individual CCPs is evident.

Chart 8 Significant derivatives exposures within the UK financial system as at end-June 2014.^{(a)(b)}



Sources: Prudential Regulation Authority and Bank calculations.

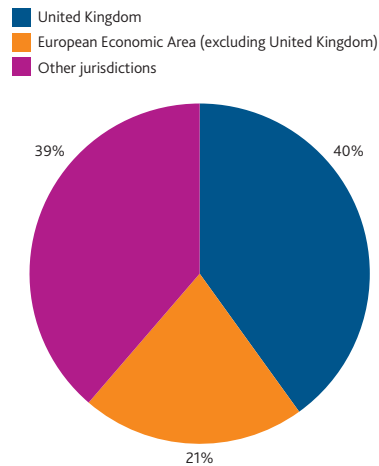
- (a) Each node represents a financial institution and the size of the node is scaled by the total amount of exposures to that institution.
 (b) Exposures are measured by current market values, net of collateral. For any two institutions in the network, the greater the exposures between them, the more closely they are positioned.

High degree of internationalisation

A large proportion of OTC derivatives activity takes place outside the home jurisdiction of the CCP clearing the relevant market, involving at least one overseas participant: **Chart 9** shows that the majority of initial margin requirements at

UK CCPs was accounted for by clearing members not located in the United Kingdom themselves, with 39% provided by clearing members based outside the European Economic Area.

Chart 9 Distribution of initial margin requirements at UK CCPs by location of clearing member (as at end-2014)



Sources: CME Clearing Europe, ICE Clear Europe, LCH.Clearnet Ltd, LME Clear and Bank calculations.

Given that so much OTC derivatives activity is cross-border by nature, the timing and scope of implementation of the clearing obligation in different jurisdictions is particularly important.

Policy implications: the systemic importance of CCPs and the internationalisation of central clearing

The growth of central clearing, the concentration of activity within a few CCPs and their clearing members, and the cross-border nature of much OTC derivatives activity all create challenges. Policymakers have worked to address these challenges both at national levels and internationally, via the FSB and other bodies such as the Committee on Payments and Markets Infrastructures (CPMI) and the International Organization of Securities Commissions (IOSCO). The challenges, and the responses of policymakers, are detailed in this section.⁽²⁾

Enhancing CCP resilience

The concentration of business in CCPs is increasing the systemic importance of many CCPs and creates the risk that

- (1) For example, there are currently 97 clearing members of LCH SwapClear and 21 members of ICE Clear Europe's CDS clearing service.
 (2) The developments identified in this section are closely related to the four safeguards for a resilient and efficient global framework for central clearing identified by the FSB in 2012: (i) fair and open access by market participants to CCPs, based on transparent and objective criteria; (ii) co-operative oversight arrangements between all relevant authorities, both domestically and internationally, that result in robust and consistently applied regulation and oversight of global CCPs; (iii) resolution and recovery regimes that ensure the core functions of CCPs are maintained during times of crises and that consider the interests of all jurisdictions where the CCP is systemically important; and (iv) appropriate liquidity arrangements for CCPs in the currencies they clear. See FSB's 'OTC derivatives markets reforms: third progress report on implementation', June 2012; www.financialstabilityboard.org/wp-content/uploads/r_120615.pdf.

they are perceived to be 'too big to fail'. International initiatives to address this risk have focused on establishing strong regulatory standards for CCPs, ensuring that they have recovery plans, and ensuring that authorities have resolution powers in the extreme event that a CCP nevertheless experiences distress.

Prudential standards

It is clearly critical that CCPs are subject to strong risk management standards. In 2012, regulators agreed new international standards for financial market infrastructures, including CCPs: the CPMI-IOSCO 'Principles for financial market infrastructures'.⁽¹⁾ These set strong requirements in areas such as credit and liquidity risk management and the eligibility of different asset types to serve as collateral. In Europe, the Principles were effected through the relevant requirements of EMIR, and in the United Kingdom they have been embedded in the Bank's supervisory approach to CCPs.⁽²⁾

Internationally, the work of authorities to promote CCP resilience is ongoing.⁽³⁾ For example, a review has been initiated of stress-testing arrangements across CCPs.⁽⁴⁾ Stress-testing methodologies are very important for the resilience of CCPs because they determine CCPs' estimates of the losses they could face in extreme but plausible circumstances, which in turn drive the size of CCPs' default funds.

CPMI and IOSCO have also issued standards to encourage greater transparency in the approach of CCPs in managing their risks. This highlights the important risk governance role played by clearing members, their clients, and other relevant parties. Increased transparency should allow these stakeholders to monitor the quality of CCP risk management.⁽⁵⁾

Recovery and resolution

While every effort should be made to minimise the risk of CCP failure, it is impossible to remove this risk entirely. And CCPs may fail for a variety of reasons unrelated to the default of a clearing member (for example, through failures in their IT systems or other operational infrastructure).

Regulators therefore also focus on recovery arrangements, which are intended to help the CCP remain viable even during periods of stress, so as to ensure continuity of critical clearing functions.⁽⁶⁾ To this purpose, CPMI and IOSCO have issued guidance on recovery arrangements for financial market infrastructures.⁽⁷⁾ Tools identified in the report (and already implemented in the United Kingdom) include CCPs' use of the right to call for additional funds from clearing members; haircutting (that is, applying a proportionate reduction of value to) a CCP's obligation to pay its clearing members variation margin; and, if necessary, terminating outstanding centrally cleared contracts to cap the CCP's exposure.

It is important that authorities also consider what action may be necessary in the event recovery measures prove to be insufficient. In such a scenario, however unlikely it is to arise, resolution might be necessary. The goal of a resolution regime is to ensure that critical clearing functions are maintained to support financial stability, without exposing public funds to loss.

The FSB has published guidance on the types of resolution tools that should be available to authorities.⁽⁸⁾ These are broadly similar to those which may be applied to banks — for example the power to transfer all or part of a failing CCP's activities to an acquirer, or temporarily to a 'bridge' entity. It is important that resolution authorities have a flexible toolkit in order to be able to respond to different circumstances. The UK resolution regime already covers CCPs and the European Commission is expected to bring forward proposals for an EU-wide resolution regime for CCPs in the near future.

Central bank liquidity access

Liquidity management is first and foremost the responsibility of CCPs themselves. EMIR, following the CPMI-IOSCO Principles, establishes strong requirements for CCPs in this area. But central banks can also play an important role as the ultimate liquidity provider to CCPs, reflecting the systemic importance of the services they provide. In 2012 a group of major central banks adopted the policy that there should be 'no technical obstacles' to the provision of liquidity to a CCP that is fundamentally viable but experiencing a temporary liquidity need.⁽⁹⁾

In November 2014, the Bank widened access to its sterling facilities to include CCPs.⁽¹⁰⁾ This provides access to an account at the Bank, allowing CCPs to deposit sterling funds. It also means that CCPs experiencing a clearing member default can (if they fail to source funding from the market) use the margin posted with them by that member — or other

- (1) See the Committee on Payment and Settlement Systems (CPSS — the former name of CPMI) and the Technical Committee of the International Organization of Securities Commissions' 'Principles for financial market infrastructures', April 2012; www.bis.org/cpmi/publ/d101a.pdf.
- (2) See *The Bank of England's approach to the supervision of financial market infrastructures*, April 2013; www.bankofengland.co.uk/financialstability/Documents/fmi/fmisupervision.pdf.
- (3) Details on this can be found in the FSB's work programme; www.financialstabilityboard.org/wp-content/uploads/FSB-Chairs-letter-to-G20-April-2015.pdf.
- (4) See the Bank for International Settlements press release; www.bis.org/press/p150311.htm.
- (5) See CPMI-IOSCO's 'Public quantitative disclosure standards for central counterparties', February 2015; www.bis.org/cpmi/publ/d125.htm.
- (6) Extensive analysis has been conducted on how best to distribute losses between clearing members in the event that these exceed the pre-funded prudential resources of the CCP. For more detail, see Elliott (2013).
- (7) See CPMI-IOSCO's 'Recovery of financial market infrastructures', October 2014; www.bis.org/cpmi/publ/d121.pdf.
- (8) See the Annex to the FSB's 'Key attributes of effective resolution regimes for financial institutions', October 2014; www.financialstabilityboard.org/wp-content/uploads/r_141015.pdf.
- (9) See the FSB's 'OTC derivatives market reforms: third progress report on implementation', June 2012; www.financialstabilityboard.org/wp-content/uploads/r_120615.pdf.
- (10) See Bank of England press release; www.bankofengland.co.uk/publications/Pages/news/2014/144.aspx.

assets they may hold — as collateral to obtain sterling liquidity from the Bank. Using assets as collateral to obtain temporary funding may be preferable to the possible alternative of selling them off at a loss under volatile or illiquid market conditions.⁽¹⁾

Supervisory co-operation

CCPs clearing OTC derivatives may have clearing members from many different countries and may clear products denominated in a number of different currencies. The distress of such a CCP could therefore impact financial stability in other jurisdictions via losses incurred by institutions that provide critical services in that jurisdiction, or by disrupting financial market activity there. The authorities responsible for the supervision of clearing members and markets, and for financial stability more broadly in those jurisdictions, therefore have a legitimate interest in the soundness of such CCPs.

As home to global CCPs, the UK authorities have taken the initiative to establish regulatory 'colleges' consisting of a wide range of other international authorities.⁽²⁾ These colleges provide a vehicle for the sharing of information about those CCPs and the approach that the Bank is taking to their supervision, and for those authorities to input into the Bank's approach. In addition, within the EU, EMIR established regulatory colleges of relevant EU authorities for each EU CCP. Co-operation between authorities will also be important in the context of the preparation of resolution plans for CCPs.

Broader international co-ordination and timely implementation of consistent clearing rules

OTC derivatives transactions frequently involve counterparties from more than one jurisdiction. For these parties to be able to clear their transactions at the same CCP, the use of that CCP must be permitted in both jurisdictions, especially when central clearing of a transaction is mandated. If CCPs were unable to operate in certain jurisdictions, there would be a risk that clearing and trading activity more generally would become fragmented along geographical lines. That would have undesirable implications for access to markets and for market liquidity.

One approach has been to subject CCPs to dual regulation, whereby authorities in one jurisdiction require a CCP established in another jurisdiction to be subject to their own regulatory regime(s) as well as to the regulatory regime that applies in the CCP's home jurisdiction. However this approach carries costs: it is likely to involve some duplication of effort by regulators and it can also be burdensome for CCPs as, for example, they may be required to put in place different arrangements to meet regulatory requirements that have similar objectives but which are expressed differently. There is also a risk that regulatory requirements in different jurisdictions actually conflict, so that a CCP cannot simultaneously comply with both regimes. Recognising these

issues, G20 leaders have encouraged jurisdictions to 'defer' where appropriate to the rules of other jurisdictions.⁽³⁾

In the EU, EMIR establishes a regime based on the 'recognition' of other jurisdictions, provided certain conditions are met, primarily that they apply requirements for CCPs which are equivalent to those which are set in the EU. Where these conditions are met, ESMA will defer to the relevant non-EU authority in the supervision of CCPs from that jurisdiction.⁽⁴⁾

It is also desirable that authorities in different jurisdictions co-operate in considering which OTC derivatives products should be subject to a clearing mandate. EU and US authorities have committed to do this.⁽⁵⁾

Potential adverse impacts of CCP policies

As CCPs become more central to OTC derivatives markets, the risk increases that they could take actions which have the effect of imposing stress on other parts of the financial system. For example, under the CPMI-IOSCO Principles, CCPs are expected to consider the potentially adverse effects of the models they use to calculate clearing member margin requirements. This includes in particular the impact of procyclicality, whereby margin requirements may increase rapidly during periods of market stress. In such situations, CCPs may require their clearing members to post more margin due to worsening market conditions, but these conditions themselves may make it more difficult to source that additional margin, and also further reduce the value of the margin already posted, thus driving up margin requirements even more. Procyclicality can cause liquidity stress, because clearing members posting margin might have to find additional liquid assets precisely at times when they are least able to do so.⁽⁶⁾ EMIR carries requirements specifically designed to mitigate these risks, and the potential for macroprudential authorities to have a role in influencing CCP margin policies is also likely to be a subject of debate among policymakers in the coming years.⁽⁷⁾

(1) In addition, the Bank and the European Central Bank agreed to extend the standing swapline between them to facilitate the provision of multi-currency liquidity by both central banks to CCPs established in the United Kingdom and the euro area in March 2015 as part of a wider agreement on co-operative arrangements for CCPs. See Bank of England press release; www.bankofengland.co.uk/publications/Pages/news/2015/044.aspx.

(2) This puts into effect Responsibility E of the Principles, which requires authorities to co-operate with each other to promote the safety and efficiency of financial market infrastructures.

(3) Paragraph 71 of the September 2013 G20 Leaders' St. Petersburg Declaration stated: 'We agree that jurisdictions and regulators should be able to defer to each other when it is justified by the quality of their respective regulatory and enforcement regimes, based on similar outcomes, in a non-discriminatory way, paying due respect to home country regulation regimes.' For the full statement, see https://g20.org/wp-content/uploads/2014/12/Saint_Petersburg_Declaration_ENG_0.pdf.

(4) Further information on this approach can be found on ESMA's website; www.esma.europa.eu/page/Third-non-EU-countries.

(5) See the July 2013 'Path Forward' press release; www.cftc.gov/PressRoom/PressReleases/pr6640-13.

(6) For a more detailed examination of procyclicality, see Murphy, Vasios and Vause (2014).

(7) See for example the European Systemic Risk Board (ESRB) report on the efficiency of margin requirements under EMIR to limit procyclicality; www.esrb.europa.eu/pub/pdf/other/150729_report_procyclicality.en.pdf?3326abd623e59d361b84c385a69b6d04.

Conclusion

In the EU, the clearing obligation is expected to take effect from 2016, first covering interest rate derivatives. This will further increase the centrally cleared share of the OTC derivatives market, bringing about a further simplification of the network of exposures within the system.

Managing the growing systemic importance of CCPs is critical. Ultimately, it will determine the effectiveness of the clearing obligation in mitigating systemic risk. Regulators around the world will therefore continue to promote strengthened

prudential and risk management standards for both CCPs and their users, in areas such as stress testing and margin requirements. Authorities will also continue their work to ensure that there are mechanisms in place in extreme circumstances where a CCP's viability is threatened.

The global nature of OTC derivatives markets also highlights the ongoing importance of co-operation between regulators. The Bank will continue to collaborate with other regulators and stakeholders, to ensure a timely and consistent approach to strengthening the global regulatory framework for OTC derivatives and central clearing.

Annex

What are OTC derivatives and which contracts can be centrally cleared?

OTC derivatives contracts fall into three broad types:

Swaps involve an agreement between two parties to exchange one series of cash flows for another. For example, the two parties might agree to exchange a set of fixed Japanese yen cash flows for a set of US dollar ones, or a set based on a fixed interest rate for those based on a floating rate.

Forwards involve an agreement between two parties to purchase a defined asset at a fixed price in the future. For example, the two parties might agree that one will buy a set amount of a commodity in a year's time at a price agreed today. **Futures** are standardised forwards, typically traded on a regulated exchange rather than over-the-counter (they therefore fall outside the scope of this paper).

Options are contracts that give the holder the right but not the obligation to buy or sell something at a fixed price in the future. **Swaptions** are options on the exchange of future cash flows.

There are many variants of these basic types, and they can be combined into a huge variety of structures. 'Exotic' derivatives are contracts that may encompass any of the previously mentioned structures, but which are more complex in terms of their payment calculation method and/or reference price. For example, a barrier option is a derivatives contract whose pay-off depends on whether or not the underlying price has reached or exceeded a predetermined level. Each of the five main asset classes has its own standard set of products taken from these types. These are detailed in the table below.

Table A1 Summary of main OTC derivative contract types^(a)

Asset class	Further detail on selected products
Interest rate	<ul style="list-style-type: none"> 'Plain vanilla' fixed-float interest rate swaps (IRS) are the most commonly traded contracts. These involve a market participant paying cash flows at a predetermined fixed interest rate on a notional principal amount for a fixed period (normally between one and 30 years), receiving in return a floating rate on the same notional amount over the same period. These contracts can be useful for firms seeking to replace a variable-rate debt obligation with a set of fixed interest payments. Basis swaps are the same as plain vanilla IRS, but use a floating rate for both payment legs of the contract. Cross-currency swaps are IRS contracts that involve exchanging cash flows in different currencies. Forward rate agreements (FRAs) are the second most common type of OTC interest rate derivative. An FRA is an agreement that a certain interest rate will apply to borrowing/lending a certain principal amount during a specified future period. FRAs tend to be shorter in duration (typically less than two years), with effective dates which may follow the contract trade date by several months. Overnight indexed swaps (OIS) are a type of IRS contract in which the floating payment leg is based on an index rate for daily overnight unsecured lending between commercial banks. These contracts are also typically shorter in duration, lasting up to 18 months. Caps and Floors allow a buyer to receive payments when the reference rate exceeds (Cap) or falls below (Floor) a certain threshold — these can be used to hedge (protect) against excessive fluctuations in interest rates.
Credit	<ul style="list-style-type: none"> Single-name credit default swaps (CDS) afford the contract buyer protection against the debt default of a reference entity, typically a corporate institution or a country (sovereign). Single-name corporates are the most numerous CDS contracts available by number of different contracts, but also among the least frequently traded. Index CDS contracts provide protection against any constituent members of the index; sovereign index contracts will often be grouped by geographical region (for example, Western Europe). Corporate index contracts may additionally be grouped by industry sector (for example, financial services). Another underlying reference source would be portfolios of residential mortgage-backed debt, which may be grouped into an index as is, or as is more often the case, split into 'tranches', or layers of debt based on the probability of repayment. Index CDS contracts are the most frequently traded CDS contracts. Total return swaps (and their indices) allow the contract buyer to receive any income generated by the underlying asset (typically an index of corporate names), rather than solely providing protection against the default of the asset.
Foreign exchange (FX)	<ul style="list-style-type: none"> Spot FX contracts allow counterparties to agree an exchange of currencies shortly after the trade date. In FX forward contracts, the exchange of currencies occurs at a deferred date. These are the most common FX contracts. Non-deliverable forwards (NDFs) are used to hedge the currency risk arising from less liquid or restricted currencies, with one leg usually denominated in US dollars. They are similar to FX forwards, except that rather than exchanging payments in the two different currencies, the net dollar value of both legs (including that of the less liquid currency) is paid. NDFs are the only OTC FX derivatives contracts that are currently offered for central clearing by CCPs — and the trade volumes are very small compared with FX forward contracts.
Equity	These are divided into various subtypes, based on how the return on the underlying equity is calculated (for instance, on its price, dividend or volatility), and whether the underlying equity is a single name, single index, or basket of equities. Certain equity index options and contracts for difference are centrally cleared, though volumes are limited.
Commodity	These are divided into various subtypes, based on the underlying commodity (such as metals, energy or agricultural produce), and whether they are a single commodity or an index of commodities. Certain commodity swaps and options are centrally cleared by some CCPs, though volumes are fairly small.

Sources: CME Clearing Europe, European Commodity Clearing, ICE Clear Europe, ISDA, LCH.Clearnet Ltd and LME Clear.

(a) Products in blue are currently offered for central clearing by CCPs.

References

- Benos, E, Wetherilt, A and Zikes, F (2013)**, 'The structure and dynamics of the UK credit default swap market', *Bank of England Financial Stability Paper No. 25*, available at www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper25.pdf.
- Elliott, D (2013)**, 'Central counterparty loss-allocation rules', *Bank of England Financial Stability Paper No. 20*, available at www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper20.pdf.
- Hull, J (2009)**, *Options, futures and other derivatives*, 7th edition, Prentice-Hall.
- Liu, Z, Quiet, S and Roth, B (2015)**, 'Banking sector interconnectedness: what is it, how can we measure it and why does it matter?', *Bank of England Quarterly Bulletin*, Vol. 55, No. 2, pages 130–38, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2015/q202.pdf.
- Murphy, D (2009)**, *Unravelling the credit crunch*, 1st edition, Chapman and Hall.
- Murphy, D (2013)**, *OTC derivatives, bilateral trading and central clearing: an introduction to regulatory policy, market impact and systemic risk*, 1st edition, Palgrave Macmillan.
- Murphy, D, Vasios, M and Vause, N (2014)**, 'An investigation into the procyclicality of risk-based initial margin models', *Bank of England Financial Stability Paper No. 29*, available at www.bankofengland.co.uk/financialstability/Documents/fpc/fspapers/fs_paper29.pdf.
- Nixon, D and Rehlon, A (2013)**, 'Central counterparties: what are they, why do they matter, and how does the Bank supervise them?', *Bank of England Quarterly Bulletin*, Vol. 53, No. 2, pages 147–56, available at www.bankofengland.co.uk/publications/Documents/quarterlybulletin/2013/qb130206.pdf.
- Norman, P (2011)**, *The risk controllers*, John Wiley and Sons.