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Expansion of central clearing[1]

By the end of 2012, all standardised over-the-counter (OTC) derivatives will have to be cleared through central counterparties (CCPs). We estimate the financial resources that different CCPs would need to clear safely the full volume of interest rate swaps and credit default swaps currently held by major derivatives dealers. Our results suggest that these dealers already have sufficient unencumbered assets to meet initial margin requirements, but that a few may need to increase their cash holdings to meet variation margin calls in a timely way. We also find that the potential costs of individual or multiple dealer defaults for CCPs and their non-defaulting clearing members are likely to be small relative to their equity as long as CCPs factor into initial margin requirements the extent of tail risk and time variation in risk of different types of derivatives. Finally, clearing different types of OTC derivatives in a single CCP could reduce both margins and collective loss-absorbing resources.

JEL classification: G24, G28.

The nature of counterparty exposures in over-the-counter (OTC) derivatives markets is widely considered to have exacerbated the recent financial crisis. Trading in this market is decentralised, and exposures were often inadequately collateralised. Their bilateral character both led to the possibility of default cascades and made it difficult to assess the overall risks taken on by market participants.[2]

Clearing trades centrally can mitigate these structural weaknesses. This involves a central counterparty (CCP) standing between the parties to bilateral transactions and taking on their respective counterparty risks. The more transactions a well collateralised CCP covers, the less likely default cascades

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[2]   See, for example, Acharya and Bisin (2010), and Duffie (2009).

are and the more comprehensive a picture of the distribution of risks can be discerned.[3]

Given their financial stability objectives, authorities are promoting the expansion of central clearing. In September 2009, the G20 Leaders stated that all standardised OTC derivatives should be cleared through CCPs by the end of 2012. At present, central clearing covers approximately 50% of the $400 trillion of outstanding interest rate swaps (IRS), 20–30% of the $2.5 trillion of outstanding commodity derivatives and a little under 10% of the $30 trillion of outstanding credit default swaps (CDS).[4]

This reflects the importance of protecting CCPs, which lie at the heart of counterparty networks, against possible counterparty defaults. To this end, CCPs often demand more collateral on particular counterparty exposures than bilateral arrangements would, despite the multilateral netting benefits. They also require additional collateral from members of the central clearing system to help absorb any residual losses that counterparty defaults might generate. Several authors point out that bilateral clearing arrangements as a whole are significantly undercollateralised and do not take potential contagion effects into account.[5] Against this background, the systematic collateralisation required by CCPs internalises the overall costs of the financial instruments they clear.

In this article, we estimate the financial resources that two separate CCPs operating in different derivatives markets and their dealer members would need if central clearing were expanded in a prudent way to cover the full volume of IRS and CDS held by the major derivatives dealers. These estimates are constructed by considering how a hypothetical CCP might seek to protect itself against the counterparty risk of 14 major derivatives dealers (the "G14 dealers"), which hold hypothetical IRS and CDS portfolios that are representative of true portfolios in a number of ways.

We focus on both IRS and CDS because the G14 dealers hold large volumes of these derivatives, which is relevant from a financial stability perspective. Also, IRS and CDS have different risk characteristics, which can affect the resource requirements for central clearing.[6] In particular, the volatility of market values tends to vary more over time for CDS than IRS. And, at any moment in time, the distribution of possible changes in market values generally has a fatter tail – meaning changes that are "extreme" compared to "normal" changes occur more often – for CDS than IRS (Graph 1).

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[3] Norman (2011) claims that a meltdown of the global financial system after the collapse of Lehman Brothers in 2008 was avoided largely as a result of the already existing CCPs. CPSS (2007) provides a detailed description of the operation and benefits of CCPs in OTC derivatives markets. See also Heller and Hollanders (2010).

[4] These figures are notional amounts adjusted for the doubling of contract volumes that central clearing introduces by replacing contracts between two parties, say A and B, with one contract between A and a CCP and a second contract between the CCP and B. See FSB (2010).

[5] See, for instance, Singh (2010).

[6] As of end-June 2010, the total gross notional amounts of IRS and CDS held by the G14 dealers were almost 16 times and two times their total assets, respectively.
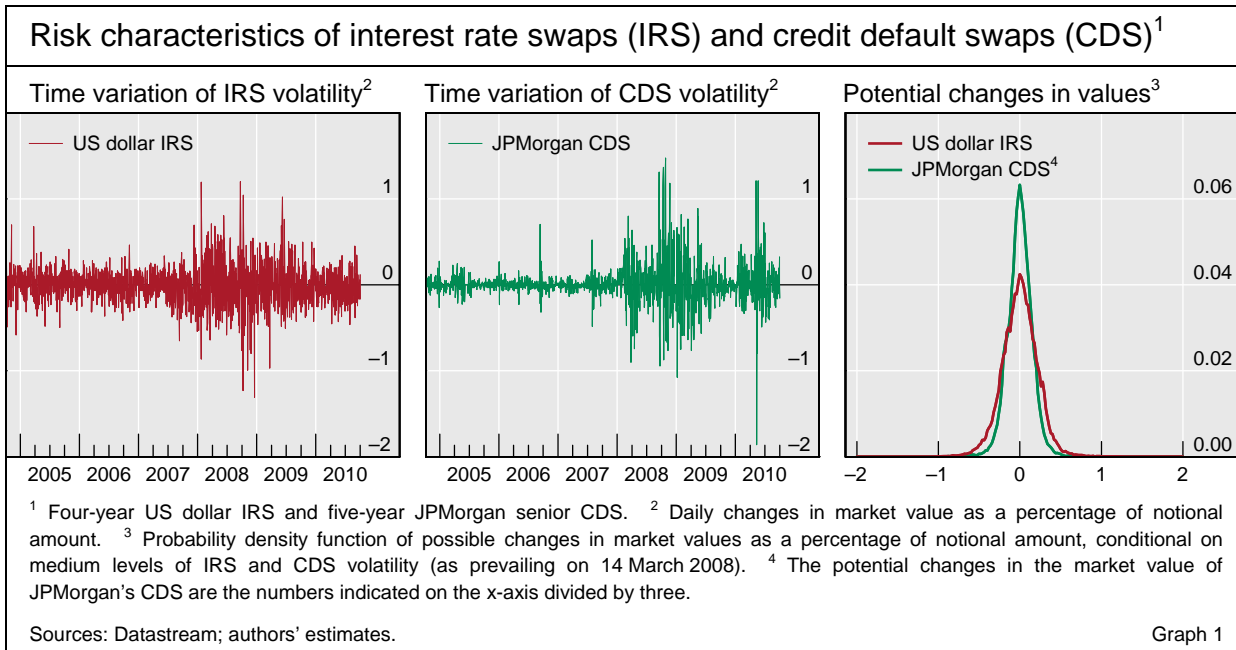
The article is structured as follows. In the next section we explain how CCPs manage counterparty risk, including by collecting collateral for initial margins, variation margins and non-margin buffers such as default funds. In the following section, we provide estimates of potential losses on hypothetical G14 dealer IRS and CDS portfolios. We then detail the resources needed by dealers to meet margin requirements consistent with these potential losses, as well as the additional resources that CCPs would need to handle any residual costs of individual or multiple dealer defaults. In the following section, we suggest that CCPs could reduce risks to these non-margin resources by ensuring that initial margins are set in a way that takes into account time-varying volatility and fat-tailed risk distributions. We close by showing that, when these techniques are adopted, expansion of central clearing within or across asset classes can reduce the resources needed by dealers and CCPs.

CCP risk management practices[7]

CCPs manage counterparty risk through participation constraints ...

CCPs typically rely on four different controls to manage their counterparty risk: participation constraints, initial margins, variation margins and non-margin collateral.

A first set of measures are participation constraints, which aim to prevent CCPs from dealing with counterparties that have unacceptably high probabilities of default.

... initial margins ...

The second line of defense is initial margins in the form of cash or highly liquid securities collected from counterparties. These are designed to cover most possible losses in case of default of a counterparty. More specifically, initial margins are meant to cover possible losses between the time of default

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[7]   See, for example, CPSS-IOSCO (2004) for a detailed description of the risk controls of CCPs.

of a counterparty,[8] at which point the CCP would inherit its positions, and the closeout of these positions through selling or hedging. On this basis, our hypothetical CCP sets initial margins to cover 99.5% of expected possible losses that could arise over a five-day period. CCPs usually accept cash or high-quality liquid securities, such as government bonds, as initial margin collateral.

As the market values of counterparties' portfolios fluctuate, CCPs collect variation margins, the third set of controls. Counterparties whose portfolios have lost market value must pay variation margins equal to the size of the loss since the previous valuation. The CCP typically passes on the variation margins it collects to the participants whose portfolios gained in value. Thus, the exchange of variation margins compensates participants for realised profits/losses associated with past price movements while initial margins protect the CCP against potential future exposures. Variation margins, typically paid in cash, are usually collected on a daily basis, although more than one intraday payment may be requested if prices are unusually volatile.

... variation margins ...

Finally, if a counterparty defaults and price movements generate losses in excess of the defaulter's initial margin before its portfolio can be closed out, then the CCP would have to rely on a number of additional ("non-margin") resources to absorb the residual loss. The first of these is a default fund. All members of the CCP post collateral to this fund. The defaulting dealer's contribution is used first, but after this other members would incur losses. The default fund contribution of the defaulting dealer would be mutualised among the non-defaulting dealers according to a predetermined formula. Some additional buffers may then be available, such as a third-party guarantee or additional calls on the capital of CCP members. Otherwise, the final buffer against default losses is the equity of the CCP.

... and non-margin collateral

In order to calculate initial and variation margins, CCPs rely on timely price data that give an accurate indication of liquidation values. Clearing OTC derivatives that could become unpredictably illiquid in a closeout scenario could impose an unacceptable risk on the CCP.

Table 1 summarises the risk management practices of SwapClear, ICE Trust US and ICE Clear Europe, which are currently the main central clearers of IRS and CDS.

Potential losses on IRS and CDS portfolios[9]

The resources required to clear centrally all IRS and CDS depend on the potential losses that the portfolios of all IRS and CDS market participants could generate. Both markets are dominated by the G14 dealers. Transactions between G14 dealers account for around 70% of outstanding IRS, while transactions between dealers (most of which involve at least one G14 dealer)

We construct hypothetical portfolios for the major derivatives dealers ...

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8 Specifically, the last time that the defaulting dealer's portfolio was valued and variation margins were exchanged.

9 The methodology outlined in this section is described in more detail in Heller and Vause (2011).

Risk management of selected central counterparties			
Central counterparty	SwapClear	ICE Trust US	ICE Clear Europe
Owned by	LCH.Clearnet Group Ltd	IntercontinentalExchange Inc	IntercontinentalExchange Inc
Market segment	Interest rate swaps	North American credit default swaps	European credit default swaps
Participation requirements	Equity of $5 billion and a credit rating of A or equivalent[1]	Equity of $5 billion and a credit rating of A or equivalent[1]	
Basis of initial margins	Largest seven-day decline in portfolio market value over past 1,250 trading days	Large five-day decline in portfolio market value, derived from a combination of stress tests and a proprietary model that captures "dynamics of the asymmetric distribution of credit spreads and co-movement amongst CDS products"[2]	
Basis of variation margins	Daily change in portfolio market value[3]	Daily change in portfolio market value[3]	
Basis of default fund	Potential losses from default of single largest clearing member or simultaneous defaults of second and third largest clearing members, as derived from historical and theoretical stress tests[4]	Potential losses from default of "multiple large counterparties", as derived from a combination of stress tests and a proprietary model (as above)	
Size of default fund	$0.9 billion as of February 2011[5]	$3.2 billion as of December 2010	$2.0 billion as of December 2010
Equity	$0.4 billion as of December 2010	$2.8 billion as of December 2010	

[1] Plus other requirements including certain operational and risk management capabilities. [2] The model takes into account possible default, changes in CDS premia and interest rates as well as additional costs that may be incurred when liquidating large portfolios. [3] Intraday variation margin calls may be made in special circumstances. [4] Plus any losses from affiliates of these clearing members and the five lowest-rated members of LCH.Clearnet, who are assumed to also default in these circumstances. [5] This fund is shared by all central clearing operations of LCH.Clearnet. The contribution from SwapClear is $0.2 billion.   Table 1

account for around 85% of outstanding CDS.[10] We construct hypothetical portfolios of IRS and CDS for the G14 dealers and estimate potential losses on these portfolios and, hence, the resources required to clear them with a CCP. A lack of data prevents similar calculations being made for non-dealers, although we offer some rough estimates in a related working paper.[11]

... with a number of real-world characteristics ...

While dealers' IRS and CDS portfolios are proprietary, we can construct representative hypothetical portfolios based on some assumptions. In particular, we require sums across dealers of positions in individual derivatives to match those recorded in trade repositories as of 30 June 2010.[12] Similarly, we require sums across derivatives positions of individual dealers to match those recorded in dealers' financial reports and regulatory filings as of the same day. In addition, we require high degrees of overlap, on average,

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[10] These figures also adjust for double-counting (see footnote 4).

[11] Despite the relatively small scale of non-dealers' outstanding positions, the resource requirements to clear these are larger than those required to clear dealers' outstanding positions. This is because non-dealers often have much larger net positions relative to gross positions than dealers. Further details are provided in Heller and Vause (2011).

[12] In particular, TriOptima's Interest Rate Repository for IRS and the Depository Trust & Clearing Corporation's Trade Information Warehouse for CDS.

between the various long and short positions of individual dealers to reflect the fact that dealers intermediate client trades. These were calibrated on the basis of discussions with market participants and helpful disclosures by one particular dealer in its regulatory filings.

Some additional assumptions further constrain our hypothetical CDS portfolios. In particular, we assume that if, after trading with clients, a dealer has a net short position in a certain category of single-name CDS then it hedges this exposure with a net long position of equal magnitude in a related CDS index or other multi-name CDS. Hence, we require that any net short positions in single-name CDS referencing North American companies are matched by net long positions in multi-name CDS referencing North American companies, and similarly for European companies. In addition, in accordance with supervisory requirements, we do not allow dealers to have CDS positions referencing themselves or their affiliates, so these positions are constrained to be zero.

We reduce the number of IRS and CDS in our hypothetical portfolios to keep the analysis manageable and, in some cases, because of a lack of adequate price data. This applied to around 5% of G14 dealers' IRS holdings and about 35% of their CDS holdings. Remaining positions are scaled up, however, so that our hypothetical portfolios remain as large in value as actual portfolios.

We then combine these hypothetical portfolios with estimates of potential changes in the market values of their constituents to derive potential portfolio losses. We use a statistical model when estimating potential changes in the market values of portfolio constituents to help ensure that the range of possible changes at any moment in time varies with recent changes in a manner consistent with the past. This allows potential portfolio losses and central clearing resources to be made conditional on prevailing levels of volatility of IRS and CDS. In addition, we fit a continuous probability distribution function to our potential changes in market values of portfolio constituents. This draws on results in extreme value theory which find that rarely observed extreme changes can be predicted using a particular probability distribution function fitted to less extreme observations. This helps us to estimate the risk of portfolio losses exceeding initial margins, which seldom occurs in practice. We also aim to reflect in our estimates appropriate co-movements in the market values of portfolio constituents. These are based on historical correlations, but with the degree of co-movement allowed to rise or fall depending on whether changes are extreme or non-extreme. This has a bearing on the non-margin resources that central clearing might require, as it affects the likelihood that the portfolios of different dealers could simultaneously generate margin shortfalls.
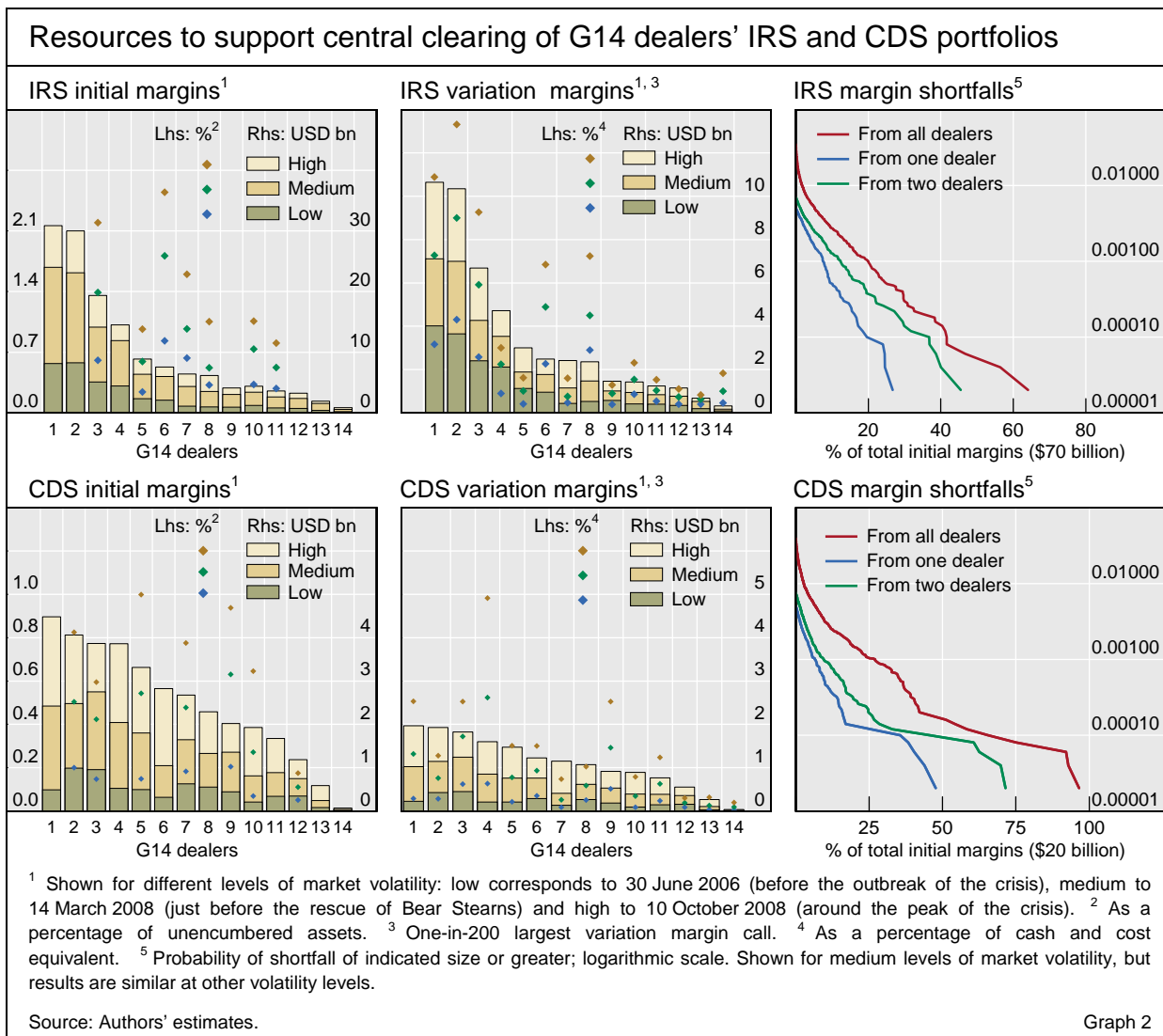
... and model potential losses on these portfolios

Resources needed to support central clearing of IRS and CDS[13]

Graph 2 shows the initial margin requirements and the worst-in-200-days variation margin calls of our hypothetical CCP. It also contains the non-margin funds that might be needed to clear the hypothetical IRS and CDS portfolios of the G14 dealers.

Appropriate initial margins vary with market volatility ...

As shown in the left-hand panels of Graph 2, estimated initial margins can vary significantly with prevailing levels of market volatility, especially for CDS. The upper left-hand panel shows, for example, that Dealer 7 would need to post $2.1 billion of collateral to clear its hypothetical IRS portfolio in an environment of low market volatility, similar to that prevailing before the recent financial crisis. This would grow by around 50%, to $3.2 billion, if volatility increased to the "medium" level seen early in the crisis, just before the rescue of Bear Stearns. And it would grow by around 150%, to $5.3 billion, if volatility increased to the "high" level seen at the peak of the crisis, amidst the negative market reaction to the US Troubled Asset Relief Program (TARP) and before

Resources to support central clearing of G14 dealers' IRS and CDS portfolios

[1] Shown for different levels of market volatility: low corresponds to 30 June 2006 (before the outbreak of the crisis), medium to 14 March 2008 (just before the rescue of Bear Stearns) and high to 10 October 2008 (around the peak of the crisis).   [2] As a percentage of unencumbered assets.   [3] One-in-200 largest variation margin call.   [4] As a percentage of cash and cost equivalent.   [5] Probability of shortfall of indicated size or greater; logarithmic scale. Shown for medium levels of market volatility, but results are similar at other volatility levels.

Source: Authors' estimates.   Graph 2

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[13] All the results in this article are based on 50,000 samples from the probability distribution functions fitted to potential changes in market values of portfolio constituents.

government recapitalisation of banks began in the United Kingdom. In comparison, the bottom left-hand panel shows that initial margin requirements for the hypothetical CDS portfolio of Dealer 7 would increase by around 160% or 325% from $0.6 billion if the prevailing level of market volatility increased from low to medium or high. The total initial margins that the CCP requires clearing members to post are $33 billion (low), $70 billion (medium) and $105 billion (high) for IRS and $6 billion (low), $20 billion (medium) and $35 billion (high) for CDS.

Nevertheless, it seems unlikely that G14 dealers would have much difficulty finding sufficient collateral to post as initial margin. The diamonds in the left-hand panels show collateral requirements relative to dealers' unencumbered assets, with different colours again representing different levels of market volatility. Even the requirements based on high levels of volatility do not exceed 3% of the unencumbered assets of any dealer for which it was possible to estimate this figure. Although many unencumbered assets held by dealers do not presently qualify as acceptable collateral for initial margins, some of these could be swapped for assets that do qualify.

<div style="float:right">... but seem affordable, even under high volatility</div>

By contrast, dealers may need to increase the liquidity of their assets as central clearing is extended. The centre panels of Graph 2 show similar patterns in potential variation margin calls as prevailing levels of market volatility change. In the worst case, variation margins could be several billions of dollars, which would have to be paid in cash within a day. These margin calls could represent as much as 13% of a G14 dealer's current holdings of cash and cash equivalents in the case of IRS. A five-day sequence of large variation margin calls that could be expected with a probability of one in 200 would equate to around 28% of current cash and cash equivalents in the worst case.

<div style="float:right">Some dealers may need more cash to help pay variation margins</div>

These results also have direct implications for the liquidity provisions of CCPs, as they would have to pay variation margins in the case of default of a clearing member. Access to central bank funds in distressed circumstances would help to ensure that CCPs could make substantial variation margin payments in a timely manner.

The potential non-margin resources that our hypothetical CCP might require are shown in the right-hand panels of Graph 2. These panels indicate the total losses in excess of initial margins that the CCP would be exposed to if certain dealers were to default whenever they contributed to these margin shortfalls. The blue lines show the losses that a default fund and other non-margin resources would have to absorb if the dealer capable of generating the largest margin shortfalls were to default whenever it experienced such a shortfall. The green lines show equivalent losses for the two dealers capable of generating the largest margin shortfalls.[14] The red lines show the losses to be absorbed by non-margin resources if all dealers contributing to margin

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[14] These also happened to be two of the three dealers required to post the largest initial margins.

shortfalls were to default in such circumstances.[15] To facilitate comparison across IRS and CDS, these potential losses are scaled by the total initial margins paid by all dealers to control for the different size and riskiness of the two sets of cleared portfolios.

As a proportion of total initial margins, our hypothetical CCP would require more non-margin resources to clear CDS than IRS, reflecting the greater tail risk of CDS. With a probability of one in 10,000, non-margin resources at risk from the failure of one particular dealer, two particular dealers or any dealer with sufficiently adversely affected portfolios would respectively be 20%, 37% and 42% of total initial margins for IRS, and 36%, 46% and 65% of total initial margins for CDS. If prevailing levels of volatility were high, these figures would equate to $21 billion, $39 billion and $44 billion for IRS, and $13 billion, $16 billion and $23 billion for CDS. By comparison, the G14 dealers contributing to default funds had equity of around $1.5 trillion as of 30 June 2010.

An important consideration for financial stability is that CCPs should be able to cope with multiple simultaneous defaults, as well as the default of the single largest clearing member. Experience from the recent financial crisis suggests that multiple dealers suffering large losses and defaulting at around the same time is within the realm of possibility. Given the scale of clearing members' equity relative to the resources that a CCP would need to protect itself against multiple dealer defaults, it seems both prudent and feasible to collect these resources via default fund contributions. Indeed, the standard-setting bodies for CCPs are currently considering whether to require that CCPs' financial resources should provide protection against default of the two clearing members that could potentially cause the largest credit exposures. The current international standards only require CCPs to protect themselves against the failure of the single participant to which they have the largest exposure.[16]

Determination of adequate initial margins

The results also suggest two lessons that could help CCPs to ensure that the initial margins that they collect are adequate.

First, CCPs could benefit from raising and lowering initial margin requirements as levels of market volatility change, or, in order to dampen undesirable procyclical effects, setting stable initial margins according the highest level of market volatility. The left-hand panels of Graph 2 show that appropriate initial margins can vary significantly with prevailing levels of volatility, and Graph 3 shows that prevailing levels of volatility can change markedly over time periods as short as a few weeks, especially for CDS. As discussed above, G14 dealers appear to have enough unencumbered assets to meet initial margin requirements commensurate with even the highest levels of

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[15] The red lines therefore show the maximum losses that the CCP could incur. This would only occur if all dealers holding positions that were adversely affected by price movements defaulted.

[16] See CPSS-IOSCO (2004), Recommendation 5 and CPSS-IOSCO (2011), Principle 4.

Volatilities of swap rates and CDS premia[1]

Daily changes, in basis points

— Swap rates
— CDS premia

The vertical lines represent 30 June 2006 (lower volatility before the recent financial crisis), 14 March 2008 (medium volatility just before the rescue of Bear Stearns) and 10 October 2008 (high volatility around the peak of the crisis).

[1] Median of 36 interest rate swap volatilities and 196 CDS premium volatilities.

Sources: Datastream; authors' estimates.   Graph 3

market volatility, while non-margin resources could be put at greater risk by not varying initial margins. This is illustrated in Graph 4, which shows in the left-hand panel how daily changes in the market value of an index of North American CDS (in blue) compare with a fixed initial margin requirement intended to cover 95% of losses over time (in purple) and a variable initial margin requirement intended to cover 95% of possible losses at each moment in time (in red). The variable margin requirement tends to rise ahead of the largest losses. This reduces the size of the largest shortfalls compared with those associated with the fixed margin requirement, as shown in the right-hand panel. Furthermore, it avoids clustering of margin shortfalls. Losses exceed the fixed initial margin on 16% of trading days between mid-2008 and mid-2009, which is significantly higher than the intended 5%.

Historical losses on a CDS index versus fixed and time-varying initial margins[1]

Time profile of margin shortfalls, as a percentage of notional amount

— Five-day losses
— Fixed initial margin[2]
— Time-varying initial margin[3]

Distribution of margin shortfalls, in per cent

☐ Fixed initial margin[2]
☐ Time-varying margin[3]

Shortfall (% of notional amount)

[1] In particular, the CDX.NA.IG index of North American investment grade corporate CDS.   [2] Set equal to the 95th percentile of actual losses between October 2004 and September 2010.   [3] Set equal to the 95th percentile of possible losses given the contemporary volatility of the CDX.NA.IG premium as estimated by a GARCH model (see Heller and Vause (2011) for more details).

Sources: Datastream; authors' estimates.   Graph 4

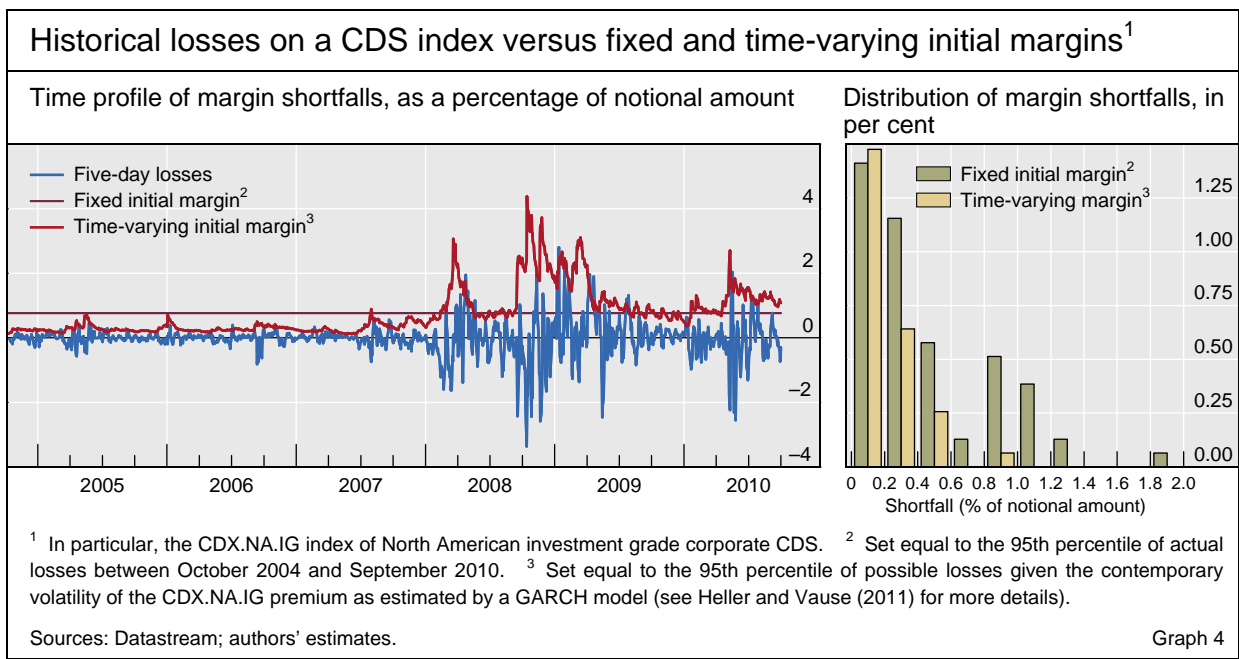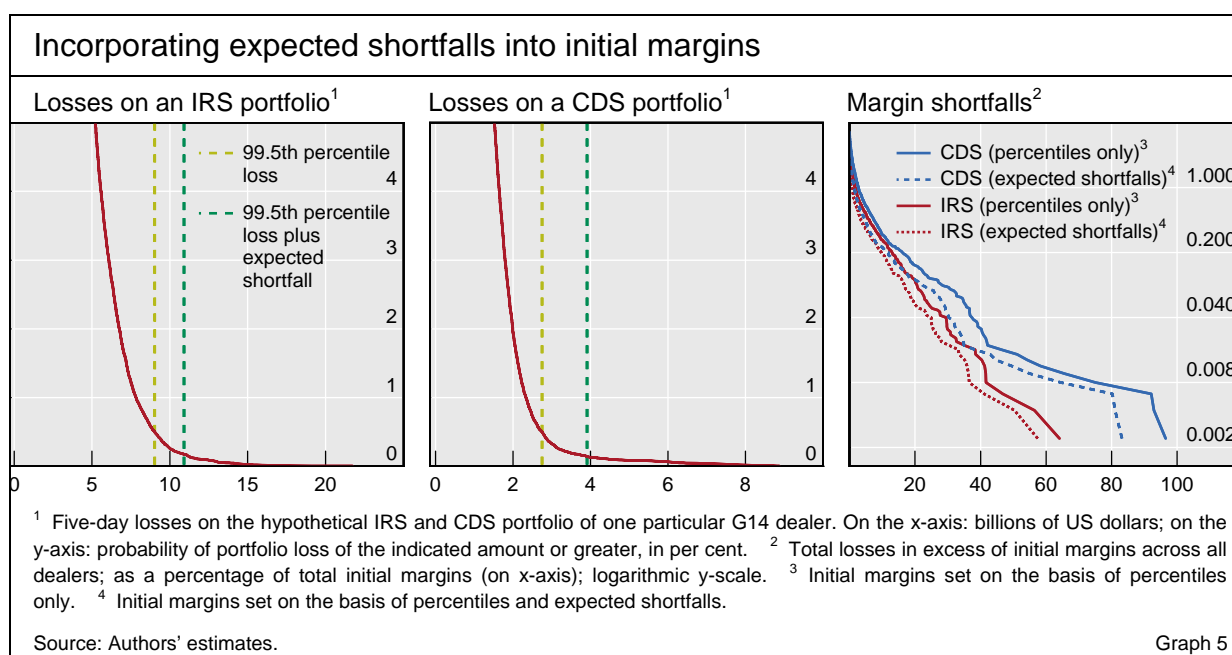Note that while CCPs can benefit from varying initial margin requirements with changes in market volatility, such a policy could also lead to undesirable procyclical repercussions.[17] It could, for example, boost the cost of borrowing assets that CCPs would accept as collateral and encumber more of dealers' other assets in the process whenever market volatility increased. This could lead dealers to unwind other positions, potentially exacerbating the increase in volatility and, hence, margin requirements. Such feedbacks could be avoided, while protecting CCPs to at least the same degree, by fixing initial margins at levels commensurate with high volatility. For much of the time, however, this would of course encumber more collateral at the CCP than under a time-varying regime.

... and the potential for extreme losses, which vary by asset class

Second, CCPs could benefit from basing initial margins not only on high percentiles of possible losses but also on the size of the losses in excess of these percentiles. One way to do this could be to set initial margins equal to a particular high percentile of possible losses plus the "expected shortfall" associated with these high-percentile losses. Expected shortfalls measure the expected loss given that losses are of at least a particular size. The left-hand and centre panels of Graph 5 show possible losses on hypothetical IRS and CDS portfolios for one of the G14 dealers, with the 99.5th percentiles of these losses and the corresponding expected shortfalls marked by vertical lines. The graphs are typical in that they show larger expected shortfalls relative to 99.5th percentile losses for CDS than for IRS, reflecting the greater tail risk of CDS.

The right-hand panel of Graph 5 shows the total margin shortfalls that our hypothetical CCP could expect to face depending on how it set initial margins. The solid red and blue lines show the total margin shortfalls when initial margins are set equal to the 99.5th percentiles of IRS and CDS portfolio losses

Incorporating expected shortfalls into initial margins

Losses on an IRS portfolio[1]   Losses on a CDS portfolio[1]   Margin shortfalls[2]

[1] Five-day losses on the hypothetical IRS and CDS portfolio of one particular G14 dealer. On the x-axis: billions of US dollars; on the y-axis: probability of portfolio loss of the indicated amount or greater, in per cent.   [2] Total losses in excess of initial margins across all dealers; as a percentage of total initial margins (on x-axis); logarithmic y-scale.   [3] Initial margins set on the basis of percentiles only.   [4] Initial margins set on the basis of percentiles and expected shortfalls.

Source: Authors' estimates.   Graph 5

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[17]   The issues of procyclicality and feedback loops are, for instance, discussed in more detail in CGFS (2010) and CPSS-IOSCO (2011).

for each dealer. These are the same as the red lines in Graph 2. The dotted red and blue lines then show total margin shortfalls when initial margins are set equal to the 99th percentile loss plus the associated expected shortfall of each dealer's IRS or CDS portfolio. Incorporating expected shortfalls into initial margin requirements helps to ensure that tail risks are taken into account and, hence, are less likely to deplete non-margin resources. It also facilitates the adoption of consistent CCP risk management practices across different segments of the derivatives market. This could help CCPs operating in different market segments to allocate margin and non-margin resources between them in the event that they chose to interoperate.[18] Even after incorporating expected shortfalls into initial margin requirements, however, a sizeable gap remains between the total margin shortfalls (relative to total initial margins) that could be expected with very low probabilities for CDS and equivalent shortfalls for IRS. CCPs clearing CDS may wish to make an adjustment to default fund contributions to ensure that this is taken into account.

Expansion of central clearing can economise on collateral

We next consider the scope for economies in margin and non-margin resource requirements as central clearing is expanded, both within and across market segments.

<div style="float:right">Expanding central clearing can economise on collateral ...</div>

To illustrate the scope for economies within a market segment, we consider a CCP clearing only multi-name CDS, a CCP clearing only single-name CDS and a CCP clearing all types of CDS. The first clears all the multi-name positions in our hypothetical CDS portfolios of G14 dealers. Similarly, the second CCP clears all the single-name positions in our hypothetical CDS portfolios. The CCP clearing all types of CDS operates as previously. Each of these hypothetical CCPs sets initial margin requirements equal to the 99.5th percentiles of portfolio losses.
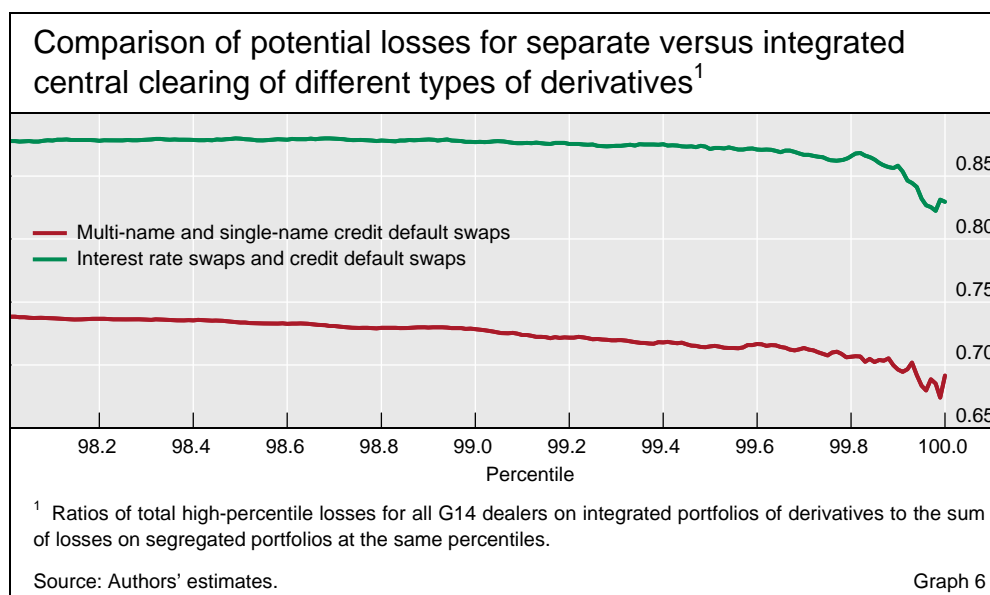
As the red line in Graph 6 shows, the total initial margin requirements of the integrated clearer are about 70% of those of the sum of requirements of the multi-name and single-name clearers. Variation margin calls are reduced by a similar scale factor. This reflects the hedging of certain single-name positions by particular multi-name positions in integrated CDS portfolios as well as some more general diversification benefits, as is typically found in broader portfolios.[19] Furthermore, these loss-reducing factors remain in evidence even for more extreme losses, as shown to the right of the vertical line marking the 99.5th percentile in the graph. This suggests little risk, for example, of hedges

<div style="float:right">... both within ...</div>

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[18] If a CCP that cleared IRS were to interoperate with a CCP that cleared CDS, the two CCPs would establish a single set of margin requirements of dealers based on their integrated IRS and CDS portfolios. They would then have to decide how to allocate these resources between them.

[19] In fact, dealers typically operate a larger number of hedging strategies, each of which involves fewer more-closely matched contracts than we were able to incorporate in our hypothetical portfolios. A single central clearer of all types of CDS may therefore require even fewer margin and non-margin resources relative to separate multi-name and single-name CDS clearers than suggested here.

Comparison of potential losses for separate versus integrated central clearing of different types of derivatives[1]

Multi-name and single-name credit default swaps

Interest rate swaps and credit default swaps

[1] Ratios of total high-percentile losses for all G14 dealers on integrated portfolios of derivatives to the sum of losses on segregated portfolios at the same percentiles.

Source: Authors' estimates.   Graph 6

breaking down for extreme changes in market values. An integrated central clearer of CDS could therefore also economise on non-margin resources by a factor of around 70% compared with separate clearing of multi-name and single-name CDS.

... and across derivatives markets

To illustrate the scope for economies in clearing resources across market segments, we consider separate and integrated central clearing of our hypothetical IRS and CDS portfolios. The potential economies are smaller in this case, as IRS and CDS are not natural hedges for one another. Nevertheless, there are still some economies, reflecting the greater diversification of the integrated portfolios compared with the IRS-only and CDS-only portfolios. As the green line in Graph 6 shows, losses on integrated portfolios are commensurate with around 85% of the sum of losses on IRS-only and CDS-only portfolios. This applies at, below and above the initial margin threshold, suggesting that margin and non-margin resource requirements could be reduced by around 15% if a single CCP cleared both market segments or if CCPs representing the two market segments interoperated.

It should be noted that our assumption of individual CCPs clearing different segments of the derivatives market might not be the final market structure that will emerge. At present, a number of central clearers operate in the CDS market, for example, with different operators focusing on clearing CDS within particular geographic regions. A fragmented market structure would generate opposite results to those of integration illustrated above. That is, total initial margins and default funds would increase because the benefits of multilateral netting would decline. One way to reintroduce the benefits of multilateral netting, however, would be to make the segmented CCPs interoperable. This would involve multiple CCPs setting single margin requirements and default fund contributions for each clearing member on the basis of the aggregate portfolios that they collectively clear, and subsequently dividing the resources between them. But this is not straightforward to implement. For example, competing CCPs may find it difficult to agree on the risk controls that are to be applied to inter-CCP positions. Also, linked CCPs

are required by regulators to hold more non-margin collateral than a fully integrated CCP.[20]

Conclusions

We find that major derivatives dealers already have sufficient unencumbered assets to meet initial margin requirements if central clearing were expanded to cover the full volume of their interest rate swap and credit default swap holdings. Some of them, however, may need to increase their cash holdings to meet variation margin calls with ease. Similarly, CCPs may need immediate access to plentiful funding to ensure that they could make variation margin payments in the event that they inherited such obligations as a result of the default of a clearing member. We also find that the potential costs of two simultaneous dealer defaults should be affordable to CCPs and their non-defaulting members. The precise volume of non-margin resources that CCPs should collect in anticipation of such costs depends on the prospects for multiple dealer defaults. To help ensure that non-margin resources are adequate to absorb all feasible losses, CCPs should factor into initial margin requirements the extent of tail risk and time variation in risk of different types of derivatives. Finally, we find that expansion of central clearing within or across segments of the derivatives markets could economise both on margin and non-margin resources.

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[20]   See CPSS-IOSCO (2011).

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