Funding cost reduction through derivative life cycle automation and risk limitation – Can smart derivative contracts be the game changer?

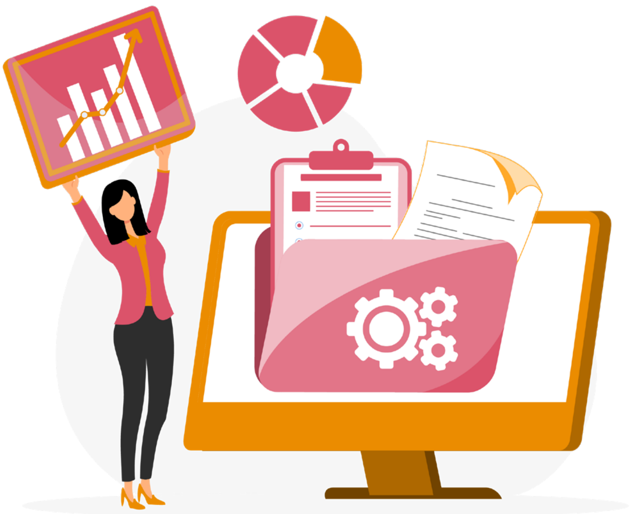
pwc

Executive summary

By enabling instant termination through derivative life cycle automation and pre-funded variation margins, smart derivative contracts can remove counterparty credit risk from bilateral over-the-counter (OTC) derivative trades, reducing funding costs, operational costs and capital requirements. An initial estimation under simplified assumptions for a conservative example indicates a potential funding cost reduction of up to several basis points by replacing the initial margin based on ISDA SIMM with the funding costs for smart derivative contracts. For each product category considered, the degree to which funding costs can be saved depends on the current availability of post-trade risk reduction techniques, the typical length of the margin period of risk, and the availability of other offsetting smart derivative contracts as well as the funding rates and duration. In addition, the removal of counterparty credit risk also frees up capital, which can in turn be used to fund new trades: an avenue for potentially vast additional revenue which is, however, difficult to estimate.

Being particularly suited Being particularly suited for the automation of transactions, distributed ledger technology presents a promising approach for the implementation of smart derivative contracts by providing added benefits such as transparency, immutability and operational resilience. Regulators are interested in the concept of smart derivative contracts based on distributed ledger technology and are encouraging its exploration in testing environments, otherwise known as "sandboxes".

PwC invites all interested parties to participate in a benchmark study and further conversations aimed at exploring the potential funding and operational cost impact of smart derivative contracts.



Background: Counterparty credit risk and its costs

No matter how large and trustworthy the counterparty, every trade comes with a certain level of counterparty credit risk. This risk is currently largely mitigated by the posting and receiving of collateral. Posting collateral is costly by construction. Collateral that the posting party would rather not keep for its own use is unlikely to be valuable enough to fulfil its function. The actual costs of posting collateral, however, are somewhat difficult to estimate. Theoretically, any collateral posted could be put to productive use elsewhere. In practice, any estimate of opportunity cost must take into account the type of collateral. Take the example of cash collateral: Its opportunity cost can be thought of as the spread between the overnight rate offered by the central bank issuing the currency in question and the return the bank would be able to achieve with it. In practice, it is typically represented by an internal borrowing rate. The trading desk posting cash as an initial margin is charged said borrowing rate by the treasury department. For bonds, estimation becomes harder. If they were not posted as collateral, some of them might simply be sitting on a bank's balance sheet or could otherwise be used to raise capital at cheap rates in the repo market.

Innovation in the financial system is (very often) about finding ways to decrease and optimise the amount of collateral required for the same level of stability. Any alteration to the current system and practices that ensures the same level of stability while using less and/or cheaper collateral can potentially free up immense amounts of capital. Needless to say, such alterations are often vastly profitable for the parties who can implement and take advantage of the innovation.

The smart derivative contract: Origins and key elements

One such innovative proposal has been developing in academic papers since at least 2018.[1] Emerging is an ever-clearer blueprint for a type of smart derivative contract (SDC) which removes counterparty credit risk from the system by limiting the scope of potential defaults to certain pre-funded amounts and to single contracts as opposed to whole counterparties. Importantly, this alteration also potentially greatly enhances the speed at which defaults can become known to the non-defaulting counterparty.

In the following chapters, the basic concepts will be illustrated using the example of a fixed-floating interest rate swap following the implementation logic presented in the paper "Smart Derivatives Contract - Detaching Transactions from Counterparty Credit Risk" (Fries and Kohl-Landgraf, 2018). Many additional implications and complications can arise depending on the product category. Some of the most interesting ones are sketched out in the conclusion.

One more remark: SDCs are commonly discussed within the context of distributed ledger technology (DLT). DLT encompasses various forms of consensus mechanisms distributed across nodes, enabling both the storage of data and the definition of logics for its manipulation. In their genesis, the smart contracts described here are intrinsically tied to the framework of distributed ledger technology. However, their key functions are merely dependent on a fully automated derivative life cycle. After explaining the key elements independent of the specific technological implementation, the promises and downsides of DLT are discussed in a separate chapter (see "Automation, transparency and resilience: The promise of distributed ledger technology for SDCs").

Under the current bilateral OTC trading system, a significant amount of time can pass until it becomes clear that a margin call will not be honoured and that the counterparty is therefore in default.[2] In one prominent example, a large development bank transferred millions of euros to a collapsing investment bank even when it had become clear to many other market participants that the investment bank was in default. A first and unequivocally beneficial element of SDCs is that they automate the derivative lifecycle. They also determine fixed valuation and settlement times. At each settlement, contracts are valued automatically. Currently, automated settlement faces a challenge: Counterparties might use different valuation models. Resulting disagreements might have to be tracked to their source and resolved through discussions. To solve this problem, SDCs would contain contractual agreements both on which financial models should be used to value contracts and the exact kind of market data and data source these models would run on. Another problem under the current system is that product and margin cash flows are often not netted.

[1]See for example Fries and Kohl-Landgraf (2018), ISDA and King & Wood Mallesons (2018) and Delgado De Molina Rius and Gashier (2020).
[2]Germany seeks explanation of KfW Lehman transfer - https://www.reuters.com/article/kfw-lehman-ministry-idUSLH50480320080917

This is inefficient and induces settlement risk as margin payments might be made based on assumed product cash flows which could fail to materialise. SDCs solve this problem as well: The difference in valuation and any cash flows due under the contract itself are netted and the resulting amount is automatically transferred from one pre-funded margin account to the other. These pre-funded margin accounts exist for each SDC separately and are the crucial element enabling the removal of counterparty credit risk through automated termination (discussed below). As will become clear, their size determines the likelihood that an SDC will default.

The mechanics of an SDC are simplified below. Once an SDC has been traded, a daily settlement process is assumed. In these, product and margin cash flows are netted and exchanged between pre-funded margin accounts M for counterparties A and B. A settlement is successfully performed if both margin accounts contain sufficient funds. It follows the transfer of excess liquidity to each on-contract counterparty account. For the on-contract margin account which was depleted during settlement, the funds required to replenish it to the agreed M^* are requested from the relevant counterparty. If any margin account does not hold sufficient funds to complete the settlement, the contract is instantly terminated and a penalty P is paid out to the opposing counterparty.

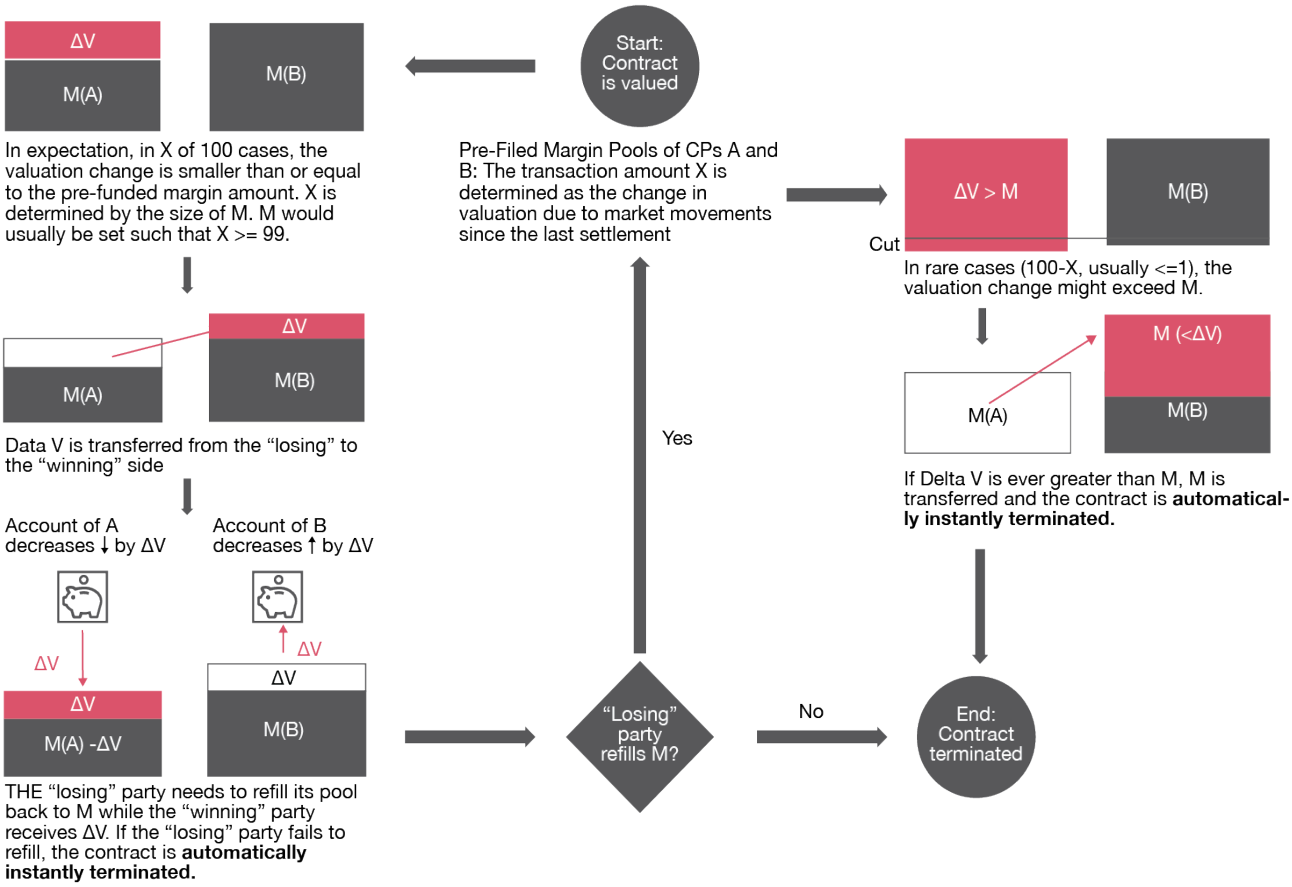


Exhibit 1: The SDC settlement cycle including possible automated instant terminations

If the counterparty does not replenish its pre-funded margin account, the contract is instantly terminated.

Replacement risk reduction or elimination

A bank is exposed to replacement risk if and when a counterparty defaults on a trade. Replacement risk represents the risk that, to enter into a similar trade, a higher price (or less favourable conditions) will have to be accepted under current market conditions. It is currently mitigated through the posting of initial margins. This risk becomes more pronounced the more time passes between the default and the moment at which the bank manages to replace the trade (margin period of risk). This is especially important in the scenario where the bank has hedged a trade perfectly by concluding another exactly inverted trade. The trades cancel each other's market risk, leaving the bank with no exposure. If the counterparty to one such hedged trade is in default, the bank is exposed to the full risk resulting from the other, and it needs to re-hedge as fast as possible. The earlier the bank knows about the default, the faster it can re-hedge and the less the market can move against it. SDCs replace the concept of a counterparty default with the automated termination of a single contract, ensuring that banks know they need to re-hedge the second the contract terminates. Thus, by minimising the margin period of risk, SDCs greatly reduce replacement risk and, therefore, the amount of collateral to be posted for initial margins. This benefit can be extended almost indefinitely: If preferred by the contracting parties, SDCs could settle much more frequently than daily.

The margin period of risk is reduced through automated termination, guaranteeing instant knowledge of defaults

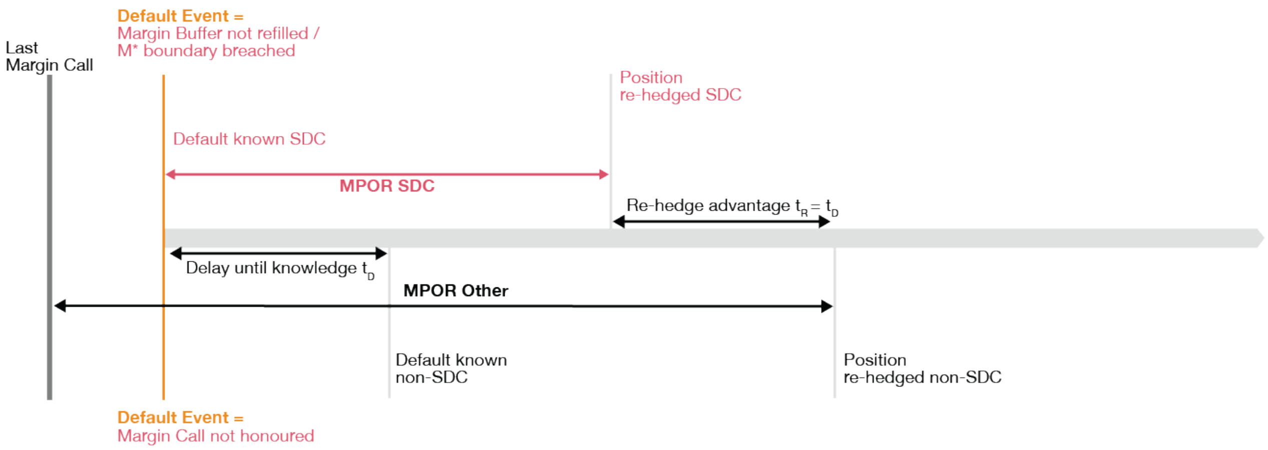


Exhibit 2: Margin period of risk: Traditional world versus new SDC world (1/2).

Importantly, the attractiveness of SDCs grows as the market for them becomes more liquid. In the special case where a bank is able to perfectly hedge an SDC with an inverted SDC, the margin period of risk and, accordingly, the initial margin are reduced to zero. The key driver behind a bank's losses in the case of a contract termination due to a large market move is that it will usually have an open, opposing trade with another counterparty which it needs to continue honouring. If this opposite trade was concluded as an SDC on the exact same but inverted conditions as the initial trade, the second contract will automatically terminate as well.[3]

If a (set of) trade is perfectly hedged using only SDCs, the MPOR (and initial margin) is zero

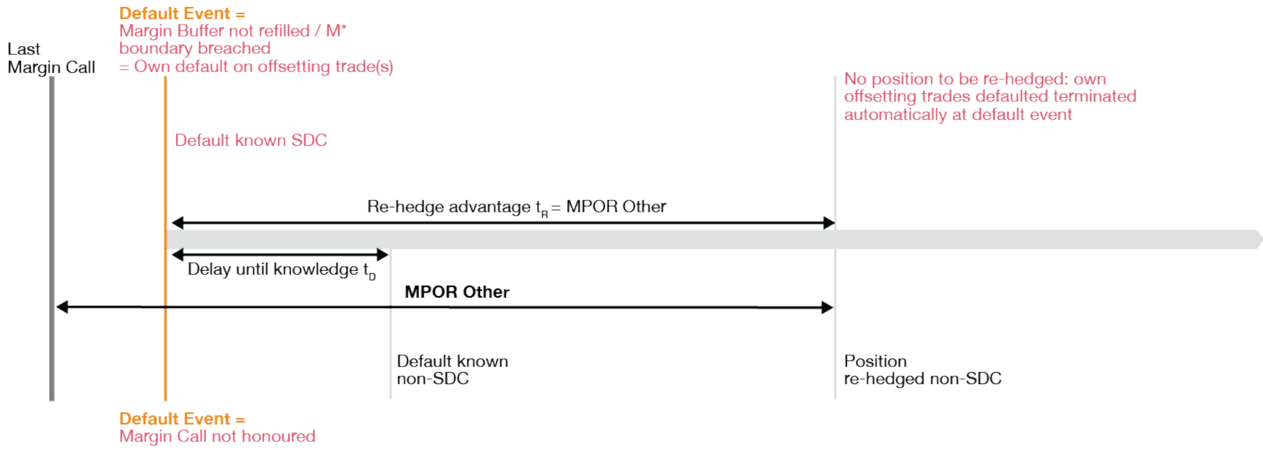


Exhibit 3: Margin period of risk: Traditional world versus new SDC world (2/2).

A very important point to note is that through this mechanism, SDCs change the nature of the financial products they represent. By insisting that margin amounts be pre-funded, the range of market movements applicable to the contract is limited. This limitation is exacerbated the less liquid the market for SDCs is. When a bank can hedge one SDC with another, things are manageable. However, if a bank needs to hedge an SDC with a traditional, OTC derivative, things change. In such a case, the bank might face the full, unbounded losses above and beyond the SDC limit if the trade takes a sharp turn in one direction. Exhibit X showcases how a bank might profit or suffer from large market moves depending on the combination of SDC and non-SDC trades it has concluded.

[3]Please note that technically the triggering of an SDC termination does not distinguish between a large market move or actual counterparty default. However, for the exemplary case a large market move will always cause both contracts to be terminated.

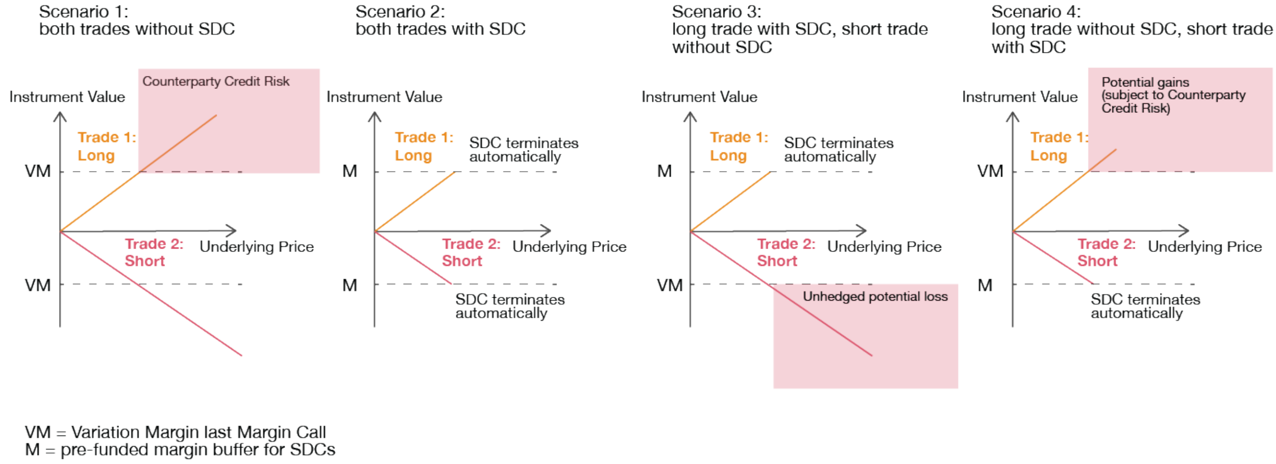


Exhibit 4: Different scenarios for large market moves given offsetting trades with SDCs and non-SDCs.

The American option problem

The mechanics through which SDCs decrease counterparty credit risk and replacement risk (i.e. pre-funded variation margins, a limited range of applicable market movements and instant termination) introduce new uncertainties. A reminder: After settlement, if the losing party does not replenish its pre-funded margin account, the contract is instantly terminated.

One example where a party might not "re-fill" its collateral pool is if it is in default. This, however, does not add uncertainty to the process as compared to current protocols. Rather, this is exactly where SDCs can add information: The window for a counterparty to re-fill its collateral pool is very short and a refusal to do so is noted instantly. The contract is terminated automatically, and the other counterparty can begin to try and re-hedge.

The second, more problematic scenario is that a counterparty refuses to re-fill because its internal valuation models, based on new information gained since concluding the contract, give the contract a negative valuation. The requirement to replenish the pre-funded margin account after settlement effectively gives each party an American option to terminate the contract shortly after each settlement. In order to disincentivise the use of this option, SDCs introduce a second, segregated type of collateral: the penalty premium *P*. This penalty premium should be calibrated such that it covers the value of the implicit cancellation option in all but the most extreme cases, making this option economically unfavourable to ever exercise. Of course, on markets where counterparties are known and interaction is repeated, exercising the implicit cancellation option also bears large reputational risks, such that its routine usage by large institutions seems unlikely even without the introduction of a penalty premium.

At first glance, by requiring this penalty feature, SDCs introduce a new source of funding costs compared to current bilateral OTC practice. However, while not initially conceptualised as an initial margin, *P* can be used in the event of an actual contract termination to cover the small but potentially non-zero replacement costs. This second feature of *P* further aids SDCs in being traded without the posting of any initial margin above and beyond *P*.

Estimating the SDC impact on funding costs

SDCs require both the penalty premium P and the maximum variation margin per settlement time M to be pre-funded. This contrasts with currently exchanged variation margins which become due only at settlement and can therefore be deployed productively between settlements. Another downside of SDCs is that they require the collateral for each contract—both the maximum loss per settlement period and the penalty premium (option value)—to be held in a separate account for each contract. This removes the option to apply currently available post-trade risk reduction techniques such as trade compression or novations. The posting of separate collateral for each contract also prohibits cross margining.

On the other hand, by removing counterparty credit risk from the system, SDCs can significantly reduce or even remove the need for initial margins to be posted under the following assumptions:

- Initial margins are posted to cover potential replacement costs
- Potential replacement costs are dependent on the margin period of risk
- The actual expected margin period of risk could be greatly reduced or even eliminated through the adoption of SDCs
- Regulatorily prescribed assumed margin periods of risk used to calculate initial margins (currently usually five to ten days) would be adjusted for SDCs to reflect the actually expected margin period of risk
- Any remaining replacement risk can be covered by P.

Under these assumptions, a broad range of the potential savings from SDC adoption can be given by considering some extreme cases:

The *best-case* scenario for SDCs is an institution that trades only in pairs of SDCs offsetting each other's risk. Thus, SDCs would completely eliminate both counterparty credit risk and replacement risk. Accordingly, it would neither post any initial margin nor be subject to other capital charges resulting from counterparty credit risk such as SA-counterparty credit risk.

It should be noted that exemptions from the posting of initial margins on these grounds are currently not acknowledged in practice by regulators. However, as discussed below, regulators are neither completely blind nor hostile to the concept of SDCs. An adaptation to current rules and enforcement practices acknowledging the counterparty credit risk reduction capabilities of SDCs does not seem impossible.

A comparison between the funding costs required by SDCs vs a hypothetically abolished initial margin is presented below. The calculations rely on simplified assumptions. The required margin buffer M is calibrated to keep the risk of contract termination due to extreme market movements at a 1% chance, similar to currently common variation margin practices. The underlying market movements are modelled to follow a normal distribution. The height of the penalty premium P is set as the Bachelier value of the embedded termination option, with around 14 days to expiration, comparable with the margin period of risk specified under ISDA SIMM.

Under these assumptions, an institution could save up to around one basis points in funding costs simply by replacing the initial margin to be posted under ISDA SIMM with M and P. It should be noted that this is a very conservative example. Funding cost advantages increase both with duration and funding rates.

Funding Cost Comparison for 5yr IR Swap: SDC vs ISDA SIMM

Year fraction of 1 day: $\Delta t = 1/365$
Assumed 1 day hist. volatility: $\sigma = 0{,}07\%$
Swap delta: $\delta \approx 5$
1-year default probability of the SDC: $\mathrm{p} = 1\%$
IDF of the normal dist.: Φ^{-1}
Funding rate: $rf = 1.5\%$

$$M = -\Phi^{-1}\left(1-(1-p)^{\Delta t}, 0, \frac{\sigma}{\sqrt{\Delta t}}\right) * \ \delta \approx \mathbf{-1{,}43\%}$$

$$P = -Price\ of\ Bachelier\ option\ *\ \delta \approx \mathbf{-0{,}53\%}$$

$$(\boldsymbol{M}+\boldsymbol{P}) * \boldsymbol{rf} \approx \mathbf{-2.94}\ \boldsymbol{bps}$$

Calculation the IM funding cost from the 52 bps risk weight of the **ISDA SIMM** 5yr bucket, results in $\mathbf{-3.90}\ \boldsymbol{bps}$.

Core simplified **modelling assumptions** (not comprehensive):

- **Replacement costs are assumed to be zero** as the bank would have no outstanding opposite trade.
- **Margin buffer *M*** assumes a normal distribution for the 1-year default probability.
- **Penalty premium *P*** is calculated using a Bacheller option value which assumes a constant volatility term structure.
- **MPV at contract closure is zero.** Otherwise, premiums paid for the conclusion of the contract might have to be locked up in the same account as P.

A second, potentially even more powerful effect is the impact on capital requirements. While the reduction of initial margin has to be bought at the price of increased funding costs for M and P, capital savings are an unequivocal potential benefit of SDCs. Any reduction in counterparty credit risk can reduce the institution's level of risk-weighted assets, freeing up capital which can in turn be used to underwrite new, potentially profitable trades. In the EU, most institutions do so by using the standardised approach on counterparty credit risk. It allows for the recognition of netting and hedging effects in the calculation of risk-weighted assets from counterparty credit risk. As a consequence, the potential impact of a reduction in counterparty credit risk on capital requirements is inherently difficult to estimate and highly dependent on idiosyncratic institutional factors.

Factors influencing said potential include the specific asset classes an institution is trading in, the availability of offsetting trades in hedging sets, the amount and quality of collateral posted by the counterparty as well as the sensitivity and volatility of the underlying(s) for more complex or hybrid derivatives. Reliably estimating the potential reduction in required capital through the adoption of SDCs will therefore only be achievable through a thorough analysis of an institution's portfolio.

A *worst case* scenario for the funding costs impact of SDCs is a single SDC representing a trade in a highly standardised, large, but illiquid market for which an offsetting trade is concluded under the current conditions. Such an SDC would forego any potential reduction in funding costs resulting from from Post-Trade Risk Reduction usually available on large markets for highly standardised products. For instance, just by reducing the outstanding notionals, savings of around 1.3 basis points through compression alone for highly standardised products could be possible.[4] These 1.3 basis points would already offset most to all funding cost reductions achieved by an SDC.

Additionally, such an SDC would not fully eliminate replacement costs as its opposing trade would not automatically default at the same time as the SDC. Rather, this SDC would merely shorten the margin period of risk by the time that currently passes from the last margin call to the final declaration of default. However, due to the operational inefficiencies and potentially disruptive implications of declaring a counterparty as "in default", this delay can be quite significant. As an example, the initial margin currently posted under the ISDA SIMM methodology is designed to cover a margin period of risk of up to ten days. A large part, often more than half, of this time is not spent on actively searching for a new counterparty but rather on investigating and discussing the counterparty's potential default. In extreme cases, the delay between the last margin call and the declaration of default which, again, is abolished by SDCs, can exceed these ten days and even reach weeks.

[4] Calculated based on notional removed and funding costs saved as per https://www.lch.com/services/swapagent.

An interesting edge case would be having highly liquid products for which the time required to re-hedge after a default becomes imminent is currently very short. For these, replacing defaults with instant terminations might remove the largest part of the actual expected margin period of risk and therefore promise large savings in the initial margin under the above assumptions.

In addition to product standardisation, market size and liquidity, the trading venue being replaced is crucial as well. Since the benefits of PTRR are currently mostly available for cleared derivatives, SDCs would have an easier time competing with bilateral OTC trades. On the other hand, clearing trades in the current system comes with its own additional costs in the form of fees for non-members and default fund contributions as well as additional liability for members. SDCs might therefore be especially attractive to smaller players such as corporates that wish to conclude few trades and are currently deterred by high entry costs.

To large institutions, a fully functional infrastructure on which SDCs are traded regularly and efficiently would probably find its closest current analogue in swap agents like the one offered by LCH. Like an SDC platform, these are merely algorithms that enable standardised risk factor calculation and valuation and efficient payment processing for OTC derivatives. While offering many benefits of PTRR and cross margining, they do require the posting of initial margin.

Current operational challenges

Current collateralisation practices, especially in the bilateral OTC market, are often highly reliant on manual processing and reconciliation. Beyond inducing high costs and operational risks, these often present daunting challenges for the implementation of new technologies, keeping systems and people in a vicious cycle of workarounds and stressful periods of high workloads whenever volume peaks or problems occur. In a stable environment, small, steady improvements might add up to overcome some of these challenges. However, the environment is all but stable with new market developments and especially regulatory requirements disrupting operations with increasing frequency.

Beyond these well-known and often-lamented issues, the current state makes it hard to define with certainty when a counterparty is in default. As payments are nowhere near instantaneous, a standard delay of one day until a margin call is honoured is established market practice.

However, operational issues can often add up to several days. Payments might be directed to the wrong account, not processed due to system overloads or errors, or simply get stuck in an approval process because of unavailable important authorisers. On top of that, declaring another party in default is a complicated legal process. Nobody wants to get the lawyers involved when it still seems plausible that the other side is simply struggling with its operations. Consequently, it can take anywhere from several days up to weeks until one side to a trade finally decides to declare the other in default. Naturally, these potential delays complicate the estimation of the margin period of risk, both for industry participants and regulators.

Declaring a counterparty in default is in part complicated because it is a momentous decision. In a practical sense, it is often good that institutions have some legroom to account for operational issues. SDCs replace the concept of default with that of a termination. The automatic termination of an SDC does not necessarily have to produce doubts about the overall creditworthiness of the counterparty.

So, with SDCs, both factors—the elimination of operational delays in the collateralisation process and the disentanglement of extreme events in specific contracts from the overall trust in the affected counterparty—work together to enable instantaneous provision of information. This information in turn enables the very clear estimation of shorter margin periods of risk.

Declaring a counterparty in default is a significant shock. In some cases, extreme measures will be taken to prevent such a shock. As an example, in March 2022, nickel prices on the LME jumped by 270% over the course of three trading days.[5] Operations were disrupted as LME had to halt trading to allow affected counterparties to arrange sufficient liquidity and prevent defaults. Such defaults would have been especially problematic as many parties are involved not only in the nickel trade but participate on wider financial markets in general, and defaults would have caused ripple effects in other underlyings. In the final resolution, many derivatives were not paid out with the full amount they would have been if trading had not been halted. By terminating automatically in the case of extreme market movements in a specific underlying, SDCs can help prevent ripple effects without costly disruptions in trading.

As so often, there is no one-size-fits-all solution. SDCs relinquish the option to consider the impact of a potential default or contract termination, which can be very beneficial. Beyond price shocks such as the LME example, this option allows for restructurings and the search for new refinancing partners where counterparties are at risk of default without cancelling and potentially having to renegotiate outstanding contracts. Determining which kinds of transactions can do without this feature will be one of the interesting calibration exercises around SDC adoption.

[5] Independent Review of Events in the Nickel Market in March 2022 - https://www.lme.com/-/media/Files/Trading/New-initiatives/Nickel-independent-review/Independent-Review-of-Events-in-the-Nickel-Market-in-March-2022---Final-Report.pdf

Regulatory environment

In the EU, regulatory interest in and rulemaking on initial margins can be divided into two areas: the bilateral OTC business and cleared derivatives. One regulation clearly making this distinction is the European Market Infrastructure Regulation (EMIR). The EMIR introduces rules for risk mitigation, including the exchange of initial margin both for cleared and for non-centrally cleared derivative transactions. Importantly, the minimum margin period of risk to be covered by the initial margin under the EMIR is shorter for cleared derivatives (five days) than for bilateral OTC derivatives (ten days). It further imposes requirements for the mandatory clearing of certain derivatives through central clearing counterparties.

Take the bilateral OTC business first: From an industry perspective, ever-increasing initial margin requirements have long been a point of contention not only for financial institutions but also for corporates. Increasing initial margin requirements and associated funding costs have decreased the attractiveness of derivatives as hedges against risks originating from their business models. In these cases, solutions like SDCs can decrease funding costs for ongoing transactions and even (re)open whole market segments. Presumably, regulators would not only be open to such developments but also positively embrace them. After all, alongside its stability, they are concerned with the ability of the financial system to allocate and diversify risks originating in the real economy.

Second, let's look at the cleared business: For a while, regulators had been keen to move trading away from the more opaque, less standardised OTC world and towards central clearing houses. However, they are increasingly aware and wary of the threat that central clearing counterparties can pose as single points of failure. Such worries are exacerbated where clearing houses are domiciled outside the EU. New "active account" mandates which require EU market participants to clear at least a portion of their business in the EU are a noticeable reaction. SDCs could offer paths to standardisation and risk reduction without concentrating risk in potentially foreign single points of failure.

Automation, transparency and resilience: The promise of distributed ledger technology for SDCs

Distributed ledger technology (DLT) presents an evident and highly valuable potential for automating data processing throughout the derivative life cycle. It holds the promise of capturing the interest of industry stakeholders and regulators alike. Notably, it offers advantages such as transparency and the reduction of reconciliation efforts inherent in centralised databases. Regulators have exhibited a growing curiosity and interest in these innovations; both the ECB and FCA have initiated sandboxes—programmes in which DLT-based financial services can be tested by both established institutions and start-ups with the explicit consent and cooperation of the regulator. This includes the exploration and potential integration of fully automated smart derivative contracts under the watchful guidance and endorsement of regulators.

Implementing smart contracts on a DLT has many advantages, including

1. Transparency and Immutability: DLT, often based on blockchain technology, ensures transparency by recording all transactions in a secure and tamper-resistant manner. This feature is especially valuable for smart contracts, as it provides an auditable and verifiable history of all contract actions and changes.
2. Decentralisation and Trust: DLT eliminates the need for a central intermediary, fostering trust between parties. Smart contracts deployed on a decentralised network benefit from a distributed consensus mechanism that ensures parties adhere to the contract's terms without relying on a single controlling entity.
3. Efficiency and Automation: DLT enables self-executing smart contracts, automating processes and reducing the need for manual intervention and reconciliation.
4. Enhanced Security: DLT's cryptographic techniques provide robust security against unauthorised access and fraud. Smart contracts benefit from encryption and secure authentication, reducing the risk of cyberattacks and data breaches.
5. Global Accessibility: DLT operates on a global network, enabling seamless cross-border transactions and collaborations. This is particularly advantageous for financial products like smart derivatives, which often involve multiple parties across different jurisdictions.

However, market participants might still opt to introduce some elements of SDCs without going for the full DLT solution, given that there certainly are downsides:

1. Irreversible transactions: While immutability is a strength, it can also be a drawback. In cases of errors or disputes, reversing transactions becomes complicated without regressing to a central party.
2. Technical complexity: Developing and deploying smart contracts on DLT requires specialised technical knowledge.
3. Regulatory uncertainty: As DLT and smart contracts are relatively new technologies, regulatory frameworks and legal standards are still evolving. Regulatory sandboxes are a great opportunity in this regard.

In conclusion, DLT offers a range of benefits for smart contract implementation, including transparency, decentralisation, efficiency, security and global accessibility. However, challenges related to irreversible transactions, technical complexity, regulatory uncertainty and, of course, the integration of any new system into the current system landscape and processes remain. One solution might be the emergence of third parties providing the necessary infrastructure and technical knowledge similar to a clearing house or swap agent.

Conclusion and open points

In conclusion, new technological possibilities are often merely the stepping stone for advantageous adaptations to larger systems. Smart derivative contracts stand at the forefront of this transformation in financial markets, promising to ride the wave of recent innovations to reshape the rules of derivative trading. By automating critical elements of the derivative life cycle and precisely defining the scope of market movements covered by derivative contracts, SDCs offer a compelling vision for increased efficiency, reduced counterparty risk and enhanced transparency.

The current challenges of manual processing, reconciliation bottlenecks and uncertain default scenarios underscore the urgency of a more agile approach. SDCs are one step ahead of the next wave of operational enhancements. Their ability to instantaneously terminate positions during market upheavals not only shortens response times but also streamlines decision-making processes, eliminating the intricacies associated with traditional default declarations.

Furthermore, SDCs empower market participants by enabling a finer balance between market and credit risks. By replacing the concept of default with controlled termination, counterparty credit risk transforms into a more manageable form of market risk. This transformation has the potential to significantly enhance risk management practices and foster greater resilience in times of volatility.

However, it’s important to acknowledge that while SDCs offer transformative potential, a lot of work remains to be done both among industry stakeholders and in convincing regulators. As the cycles of crypto booms and busts have amply demonstrated, any new technology or alteration to the financial system bears the risk of unintended consequences and exploitation. Furthermore, the actual savings potential of SDCs is very institution-specific and its determination requires a precise and in-depth analysis.

Therefore, PwC invites all industry participants and other interested parties to engage in a conversation with our experts on all topics touched on in this paper. In particular, we are interested in whether or not your institution has looked into SDCs and what you think about the actual state of empirical parameters such as market sizes, liquidity, standardisation, the benefits of post-trade risk reduction and especially potential capital savings. Further interesting topics are the technical and organisational requirements to be considered for the use of SDCs.

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