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Expert Analysis Chapter

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Trends in the Derivatives Market and How Recent Fintech Developments are Reshaping this Space

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Some of the key developments that are currently reshaping the derivatives market are: (i) the use of smart contracts; and (ii) the implementation of digital asset referencing derivatives.

In this chapter, we cover the potential benefits that these technologies bring, some of the challenges that remain as obstacles to their widespread use, and the work that industry bodies are doing to facilitate their adoption in the market. We also briefly discuss some of the legal uncertainties and potential litigation risks arising from these developments.

Use of Smart Contracts

As the market continues to develop, market participants are showing ever-increasing interest in smart contracts. This interest stems from a growing body of evidence that, as detailed further below, their use in appropriate circumstances can bring with it significant efficiencies and benefits.

In response to this enthusiasm, industry bodies such as the International Swaps and Derivatives Association (**ISDA**) have been working with its market participants on the development of technology-enabled solutions (including the use of smart contracts), which will allow a fundamental reshaping of the derivatives infrastructure. ISDA's view is that these solutions should improve operating efficiency, reduce operating costs and risk, and increase both quality and transparency of data.

What is a "smart contract"?

There is no universally accepted definition for "smart contract", but this term is commonly used to refer to legal contracts (or elements of legal contracts) being represented and/or executed by software. The term "smart" refers to the fact that some elements of a smart contract are automatic and self-executing pursuant to pre-defined conditions.

The market is evolving to differentiate a "smart legal contract" from a smart contract code. A smart legal contract is a legally enforceable contract in which some or all of the contractual obligations are performed automatically by a computer program. A smart contract code, on the other hand, would not necessarily form part of a smart legal contract, but would constitute a piece of code (or programming language) designed to provide for the execution of certain tasks by a machine. The latter could indeed simply automate the performance of a natural language contract.

Potential advantages of smart contracts

- **Increased operational efficiencies** – with contracts capable of being executed immediately following the completion of a condition, delays and errors associated

with the human processing of contracts and information can be avoided. Furthermore, the terms of the contract can also be automatically adjusted and updated if necessary, reducing the possibility of delay and error that would be present in a manual process.

- **Reduction in performance risk** – in a traditional contract, there is a promise to be fulfilled in the future and the risk that it may not take place. The use of automated code in a smart contract can, assuming that the code is accurate and produces its desired effect, reduce the risk of non-performance by a counterparty.
- **Reduced costs** – the elimination of intermediaries can also cut the costs they introduce into the process of actioning a contract.
- **Transparency** – if the smart contract utilises blockchain technology, the parties to a smart contract will have access to the same single source of information simultaneously, removing the possibility of deliberate or accidental manipulation of terms and discrepancies.
- **Security** – smart contracts are most often encrypted and, as above, when the smart contract is based on blockchain technology, the data becomes immutable, with anyone seeking to make changes needing to alter the entire chain to change a single record.
- **Decentralised finance (DeFi)** – as further detailed below, smart contracts could possibly be used for the issuing, servicing, trading and settling of various digital asset-based derivatives, opening up the possibility for new opportunities and innovative products in the digital asset derivatives space.

Latest developments in the derivatives market

ISDA has undertaken a significant amount of work in recent years to facilitate the use of smart contracts across the derivatives industry. This includes:

- (i) The issuance of the Common Domain Model (the **CDM**), the latest version of which (ISDA CDM 2.0) was published in 2019. The CDM is a standardised solution aimed at providing market participants with a common digital representation throughout the lifecycle of a derivatives transaction. In its first two phases, the CDM provides for the representation of certain events in a machine-readable format with a focus on interest rate and credit derivatives, including an initial representation of equity swaps products and the ISDA Credit Support Annex for initial margin. It is expected that, in its next phases, the CDM will be further developed to incorporate models for foreign exchange (**FX**) transactions.

To aid the use of the CDM, ISDA published its 2021 ISDA Interest Rate Derivatives Definitions (the first to be published in a natively digital format). They were specifically drafted so that the definitions use formulae instead of legal narrative to describe concepts such as day-count fractions and interpolation so as to allow them to be more easily machine readable. The intention is also that, in time, the mechanics of the definitions will also be available via open-source code and aligned with the CDM in order to allow them to be consistently interpreted by automated systems.

- (ii) Over the past few years, ISDA has published a series of papers focused on providing *Legal Guidelines for Smart Derivatives Contracts*. These papers set out ways in which derivatives contracts may be modernised and automated through the use of blockchain technology and other fintech developments, beginning with an *Introduction* to the subject in January 2019.
- (iii) On 23 June 2020, ISDA launched the ISDA Clause Library, which sets out standardised drafting options for frequently negotiated provisions within the ISDA Master Agreement. The database is expected to improve the efficiency of contract negotiation and facilitate the digitisation of legal documentation. The ISDA Clause Library has since been expanded to include ISDA's collateral documentation.
- (iv) On 21 January 2021, ISDA made the ISDA Master Agreement and ISDA Clause Library digitally available for the first time via ISDA Create. ISDA Create allows users to produce and agree documentation online, as well as store legal data from these documents.
- (v) On 22 November 2022, ISDA launched Digital Regulatory Reporting (DDR) 1.0. DDR intends to support compliance with Commodity Futures Trading Commission (CFTC) swap data reporting rules. Using the CDM, DDR can transform interpretations of CFTC amendments into code and allows market participants to view industry interpretations of regulation.
- (vi) On 26 January 2023, ISDA published new standard documentation for the trading of digital asset derivatives along with an accompanying white paper, the ISDA Digital Asset Derivatives Definitions. This has created a standard contractual framework around the ISDA Master Agreement in the hope that setting out standard provisions will aid the assessment of market risk and the contractual obligations involved, creating greater certainty for market participants.

ISDA has acknowledged the challenges in implementing the use of smart contracts (and other technology-enabled solutions) in the derivatives space and has established a number of internal committees and industry-wide working groups to focus on technology-related topics. These include the ISDA Legal Technology Working Group, the ISDA Smart Contracts/DLT Legal Working Group, the ISDA CDM Design Working Group and the ISDA Clause Library Project.

Issues and challenges to be considered from a buy-side perspective

It is promising that a number of jurisdictions have turned their attention to the interaction of smart contracts with the existing legal system. To take England and Wales as an example, the Law Commission has recently expressed its view that English law is able to facilitate and support the use of smart legal contracts without the need for any statutory reform. However, there are a number of issues and challenges that will need to be considered by ISDA in its discussions with market participants to facilitate the transition of the derivatives market towards the use of smart contract code and smart legal contracts.

Scope of automation: operational and non-operational clauses

The main payment and delivery obligations in respect of a derivatives transaction are dependent on conditional logic, so these would be well placed for being represented into a smart legal contract. However, not all clauses are susceptible to being automated and self-executed. Certain legal terms are subjective in nature and would produce ambiguity if represented in smart contract code.

The materials produced by ISDA relating to the use of smart contracts in the derivatives space suggest that when determining which parts of a derivatives contract are susceptible to automation, it is helpful to distinguish between operational and non-operational clauses. Operational clauses would generally contain conditional logic so would be more susceptible to automation, whereas non-operational clauses would more likely relate to the wider contractual relationship between the parties, proving to be more resistant to automation.

Issues with legal validation

In order to ensure that a smart legal contract produces its intended legal effect, it may be prudent for parties to obtain "legal validation" of its automated provisions (or smart contract codes) by a lawyer. However, this presents its own challenge and would require the lawyer in question to understand the programming language. It follows that there is the need for programmers to work in collaboration with lawyers to leverage their legal insight into which parts of the ISDA documentation framework would be legally effective if converted into an automatable form. ISDA is expected to play an important role in facilitating this work.

It will be challenging for non-operational clauses that include some degree of subjective interpretation (e.g. where a party is required to act in good faith or in a commercially reasonable manner) or those that are more complex in nature (e.g. when an event of default is linked to the occurrence of a specific event outside the contractual relationship and that is not easily asserted) to be legally validated.

In addition, even if legally validated, there is a risk that the smart contract code will produce terms at the transaction confirmation level that are inconsistent with terms in the ISDA Master Agreement (or schedule). Appropriate mechanisms for resolving any consequent conflicts will need to be considered.

Issues with automation

Not all provisions, when automated, would produce the same effect as if complied with in their original form (i.e. in natural language) without automation.

By way of example, upon the occurrence of an event of default under a derivatives contract, the non-defaulting party would have the right to terminate the outstanding transactions. Under normal circumstances, under a non-automated contract, there are a range of factors that the non-defaulting party would take into account before pulling the trigger – these tend to be subjective and include commercial considerations, the relationship context at the time of the event, and the nature of the default. It would be difficult to cater for these factors when translating event of default provisions into programming language. In practice, the occurrence of an event of default under a smart legal contract would usually be self-automated, so it would automatically trigger the termination of any outstanding transactions.

ISDA has proposed to work with its members to select provisions within the ISDA documentation framework that are best suited for automation – their goal is to select provisions that can be automated without changing their legal effect.

Interaction with third-party data and platform providers

Where a smart derivatives contract involves the use of external, third-party data sources (sometimes referred to as “oracles”), there may be risks posed by data inaccuracies, whether caused by error or deliberate manipulation – particularly if hacking is involved.

For instance, smart derivatives contracts for FX derivatives will use an external data source to determine FX rates. In a situation where payment or delivery is automatically triggered by data from an external source (e.g. if automation involves any straight-through processing), the prospective apportionment of liability in the event of a third-party data failure should be considered.

In addition, consideration should be given to what alternate mechanism should be used where there is a breakdown in communication between the third party and the smart contract, due to, for example, a software programming bug or a coding error on the part of the third party. This could be with recourse to manual input.

ISDA has also identified cryptocurrency as an area of concern when considering interaction with third-party platforms. On 26 January 2023, ISDA published a white paper specifically looking at the legal risk questions that come with holding cryptocurrency in exchanges or intermediaries and, specifically, the possible issues that may cause for netting and collateral enforceability. These considerations were built upon in a further white paper published by ISDA on 3 May 2023. This white paper focuses on how digital assets held through intermediaries will be affected by the insolvency of the intermediary. ISDA identified that, from a US and English law perspective, private legal concepts such as trusts, existing insolvency regimes and rules requiring segregation of assets all act as protections for digital assets held with intermediaries. However, the white paper also highlights that issues surrounding which governing law applies and which courts have jurisdiction to enforce claims still require significant consideration. As cryptocurrency is an area that still lacks significant regulation, these ISDA white papers offer insights to market participants to ensure that they are aware of different market risks. In this paper, ISDA suggests that development of contractual standards will be crucial in providing clarity in this area.

Complex and bespoke derivatives contracts

Certain derivatives contracts can be heavily negotiated and customised to apply to bespoke arrangements made between the parties. The level of customisation might vary depending on counterparty type and product complexity. Examples of highly customised arrangements include total return swaps, longevity swaps and other structured finance products that will likely be made under a wide set of documents forming the overall derivatives architecture where various levels of obligations apply across different parts of the documentation. It would be challenging to translate these interlinking obligations into programming language in a straightforward manner.

The recent regulatory developments in the derivatives space (which follow a global trend since the global financial crisis) have also contributed to the complexity of certain derivatives contracts; e.g. there is an increase in the use of third-party custodians when implementing collateral arrangements to deal with certain margin requirements, and there are additional layers of complexity arising from the need for certain over-the-counter derivatives transactions to be centrally cleared. Technology can provide greater clarity for these regulatory complexities and DDR is an example of this. By using code to set up a framework that makes industry interpretation of CFTC rules widely available, DDR promotes consistency as market participants are always able to refer to the same industry standard.

Laws affecting contractual performance

Certain laws might have the effect of interrupting the performance of contracts – e.g. where a provision under a specific contract is rendered void, or where a contractual stay is applied to a party in financial distress under the applicable regulatory regime. How would smart legal contracts interact with these laws? This is another issue to be considered by ISDA in its discussions with market participants.

Liquidity concerns

Once the market has moved to address most of the key concerns that are set out in this chapter, it is likely that only the largest and most sophisticated market participants will be able to start using smart legal contracts. The smaller or less sophisticated players, including many buy-side entities, might find it more challenging and costly to adapt their processes to the new “reshaped” derivatives market.

It is clear, therefore, that a number of challenges remain to be addressed before widespread use of smart contracts in the derivatives space can take hold. However, steps towards adoption are being taken. For example, at the end of 2021, Vanguard, State Street and Symbiont partnered to complete the margin calculation process for a live trade of a 30-day FX forward contract using Symbiont’s distributed ledger technology (**DLT**). They have stated that they hope that this will enable the underlying FX forward contracts to be digitised and automated into a smart contract, with the expectation being that the use of smart contracts and blockchain technology could minimise counterparty risk in the FX forward currency market by around 80 per cent compared to the existing standard. Vanguard has since announced its intention to utilise DLT across its funds that utilise FX forwards throughout 2022. Trials and attempts at implementation such as this will no doubt be watched by other market participants with great interest.

Derivatives Referencing Digital Assets

As the importance, adoption and legal recognition of digital assets has grown, naturally so too has the market for derivatives products referencing them. Bitcoin futures trading was first supported by US-regulated exchanges in December 2017, which brought with it the first influx of institutional investment in digital assets by allowing such institutional investors to obtain synthetic exposure to them and thereby avoid the need to establish custody capabilities. There are now approximately 20 futures commission merchants (**FCMs**) in the US that support listed derivatives referencing digital assets, and indeed even the most established and traditional institutions such as Goldman Sachs have started trading products tied to Bitcoin and Ethereum. Outside the US, less stringently regulated offshore digital asset derivatives exchanges have proved popular with retail investors.

The growth in the industry is undeniable, with institutional cryptocurrency funds attracting record inflows in 2021. Investment products tied to cryptoassets registered \$9.3 billion in inflows during 2021 (an increase of \$2.5 billion from 2020), with Bitcoin funds attracting \$6.3 billion worth of this capital according to data released by CoinShares.

Despite this growth, however, the size of the market for derivatives referencing digital assets such as cryptocurrency remains dwarfed by traditional currency markets. The vast majority of this limited trading so far has been in Bitcoin and Ethereum futures and options listed on centralised exchanges such as CME, with those being far and away the most popular choices for institutional investors. Because of this focus on Bitcoin and Ethereum from the biggest players, even though there are thousands of digital asset tokens in circulation, existing derivatives

reference only a fraction of these. It is, however, expected that a wider variety of products and reference assets will emerge as volumes rise and the market matures. Indeed, 37 new products were launched in 2021 and it is not unreasonable to expect that the menu of digital asset referencing products available to investors will eventually mirror traditional instruments.

Trends in the market and problems to be resolved

- (1) **DeFi** – whilst traditional markets are beginning to embrace digital asset derivatives, in parallel a “shadow” financial system has been emerging that utilises blockchain technology and smart contracts to offer financial products (including digital asset derivatives) to investors. Widespread use of this technology has the potential to lower transaction costs and increase the speed of execution, introducing the possibility of it beating out more traditional offerings in the long term and leading to novel products being offered, such as DeFi options vaults.
- (2) **Regulation** – generally, regulators have so far sought to fit digital assets and the derivatives that reference them within the existing legal and regulatory framework, though approaches do vary. The UK Law Commission has taken the view that digital assets fit within the existing concept of property in English law and that smart contracts operate in a sufficiently similar way to traditional contracts, such that English law is able to facilitate and support their use without reform, whilst also commenting on some of the more unique challenges they do raise. In the US, regulators have also sought to continue an approach consistent with their regulation of other derivatives and have prohibited those that cannot be squared with that framework (including those traded on less stringently regulated foreign exchanges). This has notably included the CFTC fining Kraken \$1.25 million in September 2021 for failing to register as an FCM and illegally offering margined retail commodity transactions in digital assets, though consultations have been launched in an effort to better accommodate the emergence of digital assets. The EU has become one of the first to introduce a comprehensive regulatory framework for cryptoassets with the introduction of the Markets in Crypto-Assets Regulation (**MiCA**). The aim of MiCA is to further innovation in this sector in the EU by improving investor confidence through offering them greater protection and seeking market stability. China, on the other hand, has continued to clamp down on digital assets altogether, with measures introduced by regulators extending to a prohibition on the cross-border provision of digital asset derivatives into China.
- (3) **Bilateral derivatives and standardisation** – when digital asset derivatives were first traded, there was no standardised approach to documentation that could be readily used, resulting in legal negotiations acting as a significant burden on developing the market and a consequent lack of bilateral derivatives contracts. As further detailed below, however, industry bodies have now begun to turn their attention to standardisation in this space with the hope of improving transparency and liquidity. One of the most recent examples of market development is the ISDA Standard Definitions for Digital Asset Derivatives, which create a standardised approach and contractual framework for the ISDA Master Agreement. The ability to refer to standard contractual provisions not only creates greater efficiency but allows parties to better assess their contractual risk and obligations.

- (4) **Valuation** – the decentralised nature of cryptocurrencies and other digital assets becomes problematic when it comes to valuation of the assets underlying the transaction, which will ultimately determine payment obligations and close-out values. Whilst equities and other securities can often be valued on the basis of a single, dominant exchange, this is not necessarily the case for a digital asset and a consensus on valuation can therefore be more difficult to reach. Issues are also presented by a lack of liquidity or manipulation impacting prices on certain exchanges. Third-party valuation services can be utilised to provide a neutral arbiter, but their discretion in valuing the assets in the absence of a clear metric can introduce its own uncertainties.
- (5) **Disruption events** – there are some events that can affect digital assets that existing architecture was never intended to accommodate, e.g. forks and cyber-attacks. In the case of forks, which occur where, as a result of changes to the underlying technology or protocol, new versions of a relevant asset come into being, an entirely bespoke treatment may be required in the documentation. Additional prudence may also be required due to the volatility of the market and the enhanced risk of cyber-attack, with recent, high-profile thefts such as that which occurred at Poly Network highlighting the vulnerabilities that can be associated with the underlying asset.

ISDA

As previously stated, for a long time there was no standardised approach to documenting digital asset derivatives. Some market participants were using ISDA documentation with bespoke amendments, whilst others were using entirely bespoke documentation. This necessitated protracted negotiations between counterparties, reducing efficiency and transparency. This burden could ultimately lessen the appetite for digital asset derivatives.

In an effort to resolve this, ISDA launched a working group (the ISDA Digital Assets Legal & Documentation Group) to identify and consider the unique issues relating to digital asset derivatives, and to consider how these could best be approached and resolved prior to the introduction of market-standard definitions and documentation.

This work culminated in the publication of ISDA’s Contractual Standards for Digital Asset Derivatives, in which they suggested that the use of digital assets in conjunction with smart contract code could revolutionise financial markets by improving efficiency and accuracy through automation. ISDA also identified disruption events, valuation issues and further consideration of how digital assets could fit within the existing ISDA Master Agreement architecture as the three leading issues that needed to be resolved before standardised digital asset derivatives documentation could be produced.

ISDA has expressed a clear prioritisation of the development of legal standards to support the digital asset derivatives market in the year ahead, noting the need to facilitate greater automation, accommodate different technologies and integrate this into market infrastructure. One of ISDA’s first priorities is stated to be creating documentation for cash-settled products in native digital assets such as Bitcoin. Facilitating greater automation and standardisation is evident in the ISDA Standard Definitions for Digital Asset Derivatives. The definitions have been created using a controlled language structure that can be easily translated into code and therefore integrated with the

CDM and eventually fully automated as part of a smart contract. Currently, the definitions provided only cover non-deliverable forwards and options on Bitcoin and Ether but, with a flexible coding model, the hope is to expand this to other digital assets.

It should further be welcomed that ISDA's membership is expanding beyond traditional finance firms to incorporate institutions with more of a digital asset focus, with a cryptocurrency exchange joining as a member in late 2021. This should ensure that digital assets continue to receive attention and that the voice of the firms most heavily involved with them is heard across the spectrum of ISDA's work.

Legal Uncertainty and Potential Litigation Risks Resulting from the Above Developments

Whilst developments in this space herald an exciting opportunity for market participants, it is inevitable that the introduction of new technologies and paradigm of contractual obligations and performance is likely to lead, at least initially, to legal uncertainty and therefore litigation risk. The following are some examples of issues that may arise in that context.

Conflicts between natural language and smart contract code

As noted above, the process of “legal validation” seeks to ensure as far as possible that any smart contract code accurately implements the parties’ intentions. However, it may subsequently turn out that it does not do so for various reasons; for example, that the “legal validation” process was not properly carried out, or that an unexpected bug caused the software to perform in a way that could not have been expected. Whatever the reason, a dispute may arise as to what the legally operative term was, i.e. whether it was the smart contract code itself, or some other putative intention of the parties.

This uncertainty ought generally to be capable of being avoided by the expression of a clear choice by the parties as to the legal primacy of smart contract code or otherwise. One option would be for the natural language part of the contract to specify that a particular smart contract code is a mere method of performance of a particular natural language contractual term and that it is the latter that will constitute the contractual term, and not the former. The other option would be for the natural language part of the contract to specify that a piece of smart contract code shall constitute and define the relevant contractual term and that it shall have precedence over any accompanying natural language explanation or prior agreement between the parties. This has been explored by ISDA in its recent launch of new Standard Documentation and Definitions for Digital Asset Derivatives. The approach taken in this scenario has been to use a restricted form of natural language by creating a controlled language structure that can then be easily translated into code when needed.

Potential disputes are likely to arise in the absence of any such indication one way or another. This may be a more common occurrence amongst smart contracts involving non-sophisticated parties utilising DeFi where there may be no or very little natural language contractual terms accompanying the transaction in question, as opposed to transactions involving carefully negotiated contracts between sophisticated parties.

Interpretation

It may be thought that no particular issues relating to the interpretation of smart contract code should arise: either the natural language term defines the contractual term with the smart contract code being a mere method of performance, in which case the only thing to be interpreted is the natural language term in the usual way; or the smart contract code itself defines the contractual term, in which case, whatever it does will be deemed to have been the intention of the parties. Whilst this is a very neat picture, it may not reflect reality.

First, as noted above, the interaction and relative priority between any natural language term and the relevant smart contract code may not be all that clear. Secondly, it may not necessarily be correct that, by the parties agreeing that a piece of smart contract code shall define the contractual term, they have thereby agreed to whatever the code does, even if it leads to results that were completely unforeseen and unintended by the parties, considered both subjectively and objectively. Such an interpretation *may* be possible if there are clear words to that effect, but it is questionable how many parties would want to give so much primary consideration to the operation of code, which is susceptible to bugs and coding errors. Thirdly, smart contract code may be required to be interpreted so as to assess its interaction with other terms of the relevant contract and also the general law. For example, smart contract code may need to be interpreted to determine whether it would be in breach of applicable laws or regulations.

There then remains the question of what principles of interpretation should apply to smart contract code. In England, the Law Commission has suggested that the test of a “reasonable coder” should apply, i.e. to ask what a person with knowledge and understanding of code would understand the coded term to mean. However, different jurisdictions may take different approaches in this regard.

Remedies

Given the automated nature of smart contracts, not all traditional remedies may be effective against them. This is particularly so where smart contracts operate on public blockchains, which are immutable. For example, remedies such as rectification, rescission or termination may simply be impossible to implement.

There may be workarounds to achieve the same practical effect, e.g. entering into an “equal and opposite” transaction as a substitute for rescission. However, that difference of there being two transactions as opposed to a rescinded transaction may have legal significance in other respects and lead to unintended consequences, which may not be ideal. For termination, there may not be any plausible workaround and the parties may be forced to wait until the contract plays itself out to its conclusion.

Conclusion

There is little doubt that the widespread adoption of smart contracts and digital asset derivatives by market participants would revolutionise the derivatives market, particularly were the technologies to be used in tandem. However, as is plain to see from the above, the good work done so far by governmental and industry bodies will need to be continued and furthered before this potentially exciting new reality comes to pass.



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