ISDA Safe, Efficient Markets

ISDA Legal Guidelines for Smart Derivatives Contracts: Interest Rate Derivatives

Contents

Disclaimer 3
Introduction 4
The IRD Market 5
    Cleared versus uncleared IRDs 6
    Exchange-traded versus OTC IRDs 7
    Market evolution 7
Building the foundation for Smart Derivatives Contracts 9
    Standardization 9
    Digitization 11
    Distribution 12
Constructing Smart Derivatives Contracts for IRDs 14
Valuations and Calculations 16
    Calculation of interest amount 16
    Issues for technology developers to consider 17
Settlement 26
    Settlement 26
    Early Termination Provisions 27
Clearing 29
    CCP Rules 30
    Client clearing arrangements 31
    CCP discretion in respect of cleared products 32
Reporting 34
Conclusion 36
Acknowledgement 37

Disclaimer

These guidelines discuss legal issues from time to time. These discussions are intended to provide general guidance, not legal advice, and to promote a better understanding of the basic principles that underpin documentation produced by the International Swaps and Derivatives Association ("ISDA"). In practice, the law relating to derivatives transactions and the legal documentation that governs them are complex, may change over time due to evolving case law and new regulations, and may vary substantially from jurisdiction to jurisdiction.

In presenting this material, an assumption is made that certain terms in ISDA documentation relevant to interest rate derivatives ("IRDs") are capable of being (and may currently be) represented in computer code or performed by or on a technology platform. For example, payments-related provisions that require one party to pay another an amount that is calculated on the occurrence of a certain event may be suited to codification or automated processing. It is also assumed that some provisions of such ISDA documentation may not be as well suited or efficient to code and will remain as written in the contract.

These guidelines do not represent an explanation of all relevant issues or considerations in a particular transaction, technology application or contractual relationship. These Guidelines do not constitute legal advice. Parties should therefore consult with their legal advisors and any other advisor they deem appropriate prior to using any standard ISDA documentation. ISDA assumes no responsibility for any use to which any of its documentation or any definition or provision contained therein may be put.

Unless otherwise defined or the context otherwise requires, capitalized terms used in these guidelines have the meanings given to them in the relevant ISDA document.

Introduction

Since the organization was formed in 1985, ISDA has consistently sought to promote efficiencies and cost-savings through improvements to processes for the settlement and management of lifecycle events related to a variety of derivatives products. Today, as new technologies are developed and implemented across the financial sector, the derivatives industry is increasingly seeking to achieve even greater efficiencies and cost-savings through the deployment of such technologies.

In response, ISDA has published a series of *Legal Guidelines for Smart Derivatives Contracts* intended to support technology developers and other key stakeholders in the development of smart derivatives contracts by explaining the core principles of ISDA documentation and raising awareness of the important legal and regulatory issues that must be considered when technology solutions are deployed in the context of derivatives trading.

This paper focusses on the application of such technology solutions to the IRD market. These guidelines will:

- Provide high level background on the IRD market;
- Outline ISDA's strategy for developing and delivering greater standardization and digitization of legal documentation used to trade IRDs;
- Identify opportunities for the potential application of smart contract technology to IRDs; and
- Highlight important issues for technology developers to consider when designing technology-enabled solutions for trading and processing IRDs and associated processes.

A number of technology-based initiatives working towards greater standardization and automation of the IRD market have already been developed and implemented, including the electronic trading and execution of IRDs and the application of data analytics, including pre-trade transaction cost analysis, which are discussed in more detail below.

However, there are opportunities to build on this further by harnessing new technologies, like smart contracts and distributed ledger technology ("DLT"), to provide scalable, cost-efficient and more accurate technology solutions within the derivatives market.

While the intention of this paper is not to specify or recommend any particular approach or to address any particular technological application or project, these guidelines do suggest steps that should be taken to ensure the design and implementation of new technology solutions are consistent with existing legal and regulatory standards. These guidelines also highlight areas where further industry collaboration will be required to identify existing areas of legal and regulatory uncertainty and to develop solutions.

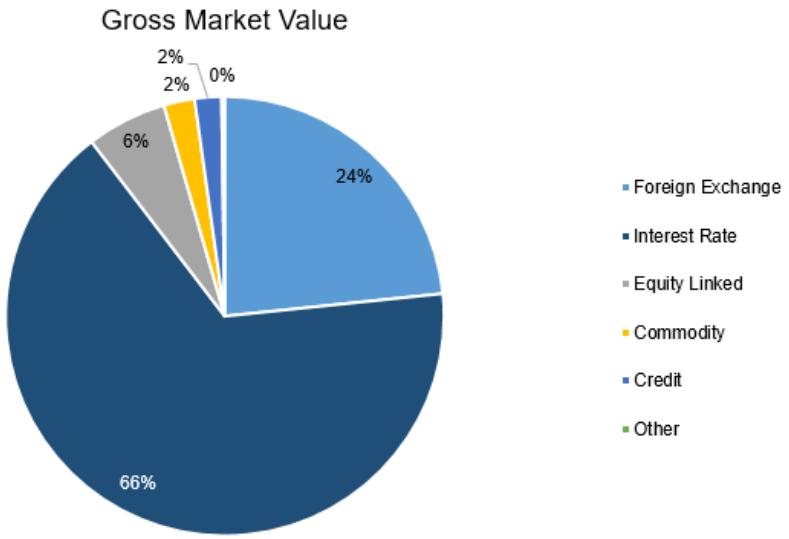
The IRD Market

The IRD market encompasses a wide variety of products, the key characteristic of which is that the payment flows under (and therefore the value of) the derivatives contract is primarily determined by reference to one or more specified interest rates. IRDs can be utilized, amongst other things, by organizations to hedge their exposure to interest rate risk, including under financing arrangements (such as loans or debt instruments) which typically reference interest rates. IRDs may also be used to acquire interest rate exposure for investment purposes.

The IRD market is by far the most liquid derivatives market, accounting for 66% and 80% of the OTC derivatives market by gross market value and gross notional amounts outstanding, respectively, as at the end of December 2018.[1] This translates as approximately $6.4 trillion by gross market value (see Figure 1) or $436,837 trillion of exposure measured by gross notional amount outstanding (see Figure 2). By way of comparison, the next largest derivatives market, FX, had $90 trillion gross notional outstanding as at the end of 2018. The relative size of the IRD market means that there is significant opportunity for technology developers to create scalable solutions that can have a significant impact on the broader derivatives market.

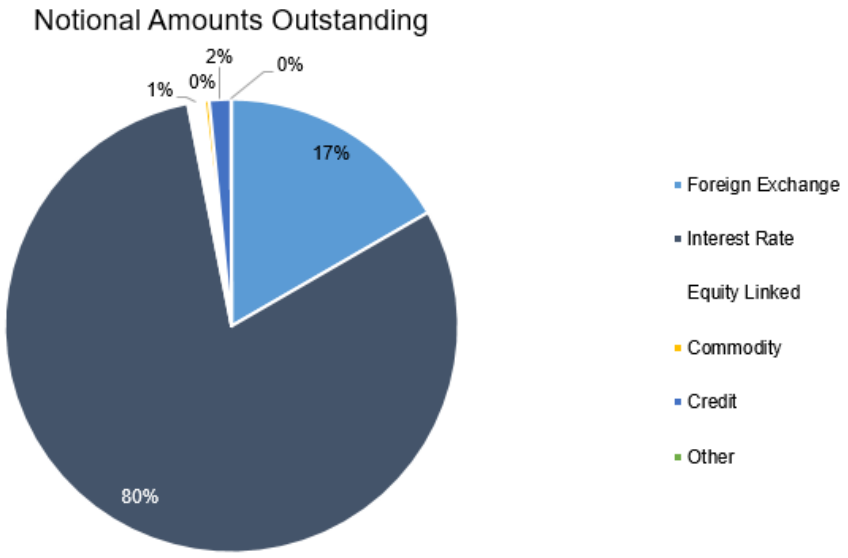
Equally however, technology developers should be mindful given the potentially far-reaching impact of such initiatives, that the design of any solutions for automating aspects of IRD trades should be carefully monitored and strongly stress-tested before implementation to ensure they are robust and suitable to be used as a market wide approach. An incremental approach to adoption of new technologies and constructing strong governance frameworks around the digitizing process would also be encouraged.

Figure 1



[1] This was down from 80% at the end of June 2014. See Bank for International Settlements, "Statistical release: OTC derivatives statistics at end-December 2018" available at: https://www.bis.org/publ/otc_hy1905.pdf

Figure 2



Cleared versus uncleared IRDs

A high proportion of IRDs are centrally cleared through central counterparties ("CCPs") following market reforms in response to the global financial crisis. Between 2009 and 2015, the proportion of OTC IRDs that were centrally cleared increased from 36% to 60%.[2] According to the Bank for International Settlements, "*by end-December 2018, the share of outstanding OTC derivatives cleared through central counterparties remained near 75% for interest rate contracts*."[3] The rules of the relevant CCP, which often incorporate the same ISDA definitions as used in non-cleared derivatives to an extent, will govern the legal framework and operations related to the cleared IRDs. It is generally acknowledged however, that with cleared products, CCPs retain broad discretion, enabling them to take certain actions, in the context of default management, for example. The impact and relevance of this for implementation of new technology in the cleared IRD market has been analysed below.

This gives rise to certain additional issues when considering the use of smart contract technology (as set out in more detail below). In addition to, or as a result of, the differences between the legal terms governing the contracts, the processes and payment or delivery flows for cleared IRDs can significantly differ from those which are not cleared. Some of these divergences are operational in nature and do not affect the essential fungibility of cleared and non-cleared trades. For example, a bank with a cleared IRD in which it pays a floating rate and receives a fixed rate may consider itself entirely hedged from market risk if it has also executed an equal and opposite non-cleared

[2] See European Commission, "Speech by Vice-President Dombrovskis on EMIR REFIT" available at: https://europa.eu/rapid/press-release_SPEECH-17-1225_en.htm

[3] This breaks down into 74% for USD and EUR IRDs, and 84% and 81%, respectively, for JPY and GBP IRDs as at the end of December 2018. See Bank for International Settlements, "Statistical release: OTC derivatives statistics at end-December 2018" available at: https://www.bis.org/publ/otc_hy1905.pdf

trade in which it receives the same floating rate and pays the same fixed rate. Others, however, may be more substantive, meaning that the trades would have to be viewed as different pools of risk. This is usually the result of deliberate and informed choices. It would be a bad outcome for market participants to find they have to administer divergent pools of risk without intending to do so. This interaction and potential for divergence will need to be considered in relation to the deployment of any technological solution to the cleared IRD market.

Exchange-traded versus OTC IRDs

A number of IRDs (such as futures) can also be traded on specific exchanges ("exchange-traded derivatives" or "ETDs"), rather than bilaterally between counterparties. [4] Note that discussion of ETDs is beyond the scope of these guidelines.

Market evolution

Notwithstanding the very high level of standardization in the OTC IRD market, the market is also characterized by its flexibility and continuous innovation. Market participants are able to source highly bespoke IRDs, with features that allow them, for example, to hedge seamlessly the risk of an equally bespoke cash product, such as a complex loan or a security. Initiatives to digitize aspects of the IRD market will need to take this level of flexibility into account.

In addition, markets and market practices evolve continuously in response to a range of inputs, from clients' changing needs to regulatory dynamics. New products are developed and old products occasionally fall out of use. From time to time, the standard definitional booklets provided by ISDA are amended by ISDA (there are 70 'supplements' amending the 2006 ISDA Definitions to date), replaced (ISDA is currently working on the 2020 Interest Rate Definitions) or diverged from by parties on a bilateral basis through specific elections in their trade confirmations. With respect to the replacement of a set of definitions, there is often a very significant period (potentially decades) in which some market participants continue to trade under the old definitional booklet for some of their trading relationships while using the newer booklets for others. Enhancing the efficiency of the IRD market and ensuring that the digitization process continues to facilitate innovation will therefore require innovators to account for the evolution of this market and avoid building products that may only work for the market as it exists today. To do otherwise would raise the risk of products quickly becoming obsolete,

Given the expansive cross-jurisdictional nature of the IRD market and the number of participants involved in the process (e.g., counterparties, external data providers, benchmark administrators, CCPs, other FMIs and payment providers), consideration must also be given to

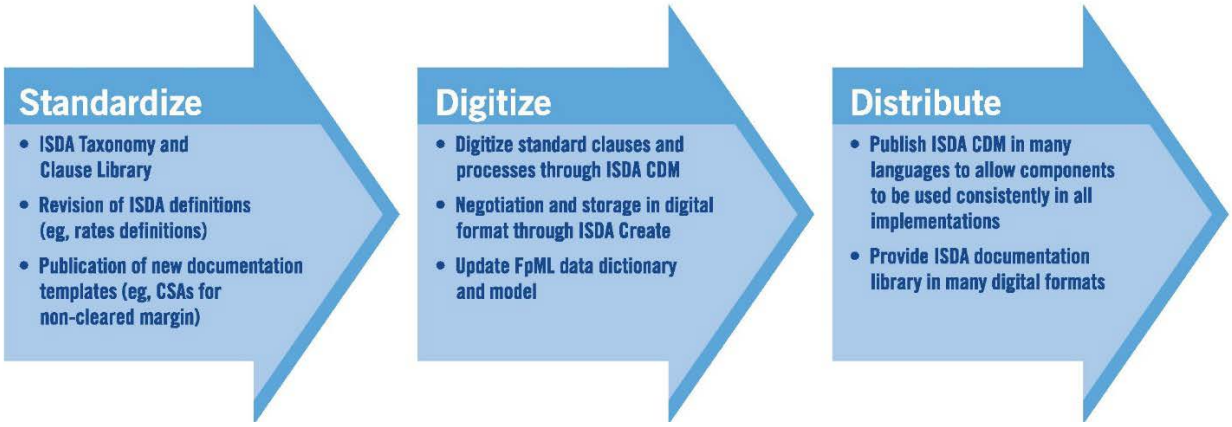
[4] ETDs should not be confused with OTC derivatives which are traded on specific trading venues, such as SEFs, MTFs or OTFs, but remain bilateral contracts directly between trading counterparties without the interposition of an exchange or clearing house (and so are commonly referred to as bilateral OTC derivatives). For this purpose, ETDs do not include OTC derivatives that are traded on trading venues other than exchanges and cleared at a CCP.

building interoperability across systems used by different market participants and across different jurisdictions (for instance, in the context of considering appropriate messaging and data formats to adopt).

Building the foundation for Smart Derivatives Contracts

ISDA's strategy for delivering enhanced legal documentation standards which can then be used to facilitate the development of smart derivatives contracts involves three key elements to consider: **standardization**, **digitization** and **distribution**. Each of these are discussed in turn below.

Figure 3



Standardization

In September 2016, ISDA published a white paper entitled "*The Future of Derivatives Processing and Market Infrastructure*"[5] which identified challenges facing market participants across all parts of the derivatives market and proposed a number of potential solutions. The white paper identified further standardization of documentation as a key contributor to evolving and improving the derivatives ecosystem.[6] Further developing common legal and documentation standards also provides a foundation upon which new technologies, such as smart derivatives contracts, can be developed and implemented.

ISDA is currently engaged in a number of initiatives aimed at enhancing or increasing standardization in ISDA documentation used to trade derivatives products, including IRDs, as discussed below.

IRD Definitions

The majority of IRDs in the market incorporate the 2006 ISDA Definitions[7] by referencing them in their specific trade confirmations or in the Schedule to the ISDA Master Agreement under which they have been traded. These definitions include product-level terms specific to the IRD market and developed by ISDA in consultation with market participants. They include detailed provisions

[5] See ISDA, "The Future of Derivatives Processing and Market Infrastructure", available at: https://www.isda.org/2016/09/15/the-future-of-derivatives-processing-and-market-infrastructure/

[6] Additionally, the paper notes the importance of standardization of data (e.g., through product and trade identifiers) and processes (through the development of the ISDA Common Domain Model).

[7] Some legacy IRDs incorporate the previous version of these definitions - the ISDA 2000 Definitions.

relating to the key features and lifecycle events of IRDs, such as those related to the calculation and payment of interest rate amounts under an IRD. Relevant provisions are applied, disapplied or amended in the confirmation for the relevant trade.

ISDA is currently developing, in consultation with various market participants, a revised IRD Definitions booklet (the "2020 Definitions"). Alongside updating certain provisions of the 2006 ISDA Definitions (for example, to reflect structural changes in the derivatives market that have taken place since 2006), a key driver for the project has also been to make the standardized IRD definitions more technology-friendly. Various techniques have been implemented, in consultation with technology developers, to make the provisions easier to codify and automate. Amongst other things, the following approaches have been adopted:

- simplifying and standardizing sentence and paragraph structures (e.g., by making sentences shorter and splitting detailed paragraphs into multiple limbs);
- streamlining definitions (e.g. by deleting duplicate definitions);
- using formulaic expressions where possible (e.g., in the context of day count fractions and compounding provisions); and
- using binary or conditional language that can more easily be understood and converted into code by technology developers.

ISDA intends to publish the new 2020 Definitions in the second half of 2020 and will work with CCPs to consider their impact with respect to cleared OTC derivatives[8].

ISDA Clause Library Project

The ISDA legal architecture and considerations set out in the *ISDA Legal Guidelines for Smart Derivative Contracts: The ISDA Master Agreement*[9] will also be relevant to the IRD market. Whilst the ISDA Master Agreement (and related ISDA published documentation used to document IRDs, as described above) is standardized, market participants do negotiate and amend these bilaterally. There are, however, certain amendments which are made, and provisions added to, ISDA Master Agreements on a relatively regular basis. However, the exact drafting used by market participants often differs based on differences in drafting style, rather than commercial intent.

The ISDA Clause Library Project[10] will develop a list and definitions of clauses that are present in or commonly added to the ISDA Master Agreement. It also seeks to create model wording for variants of such clauses, and to provide the basis of a legal agreement data model for the ISDA Master Agreement. This project promotes industry standardization, building a strong basis for scalable, automatic, technology-driven solutions, while recognizing and allowing for customization and the inclusion of bespoke provisions as parties deem necessary.

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8 It is likely that following publication of the 2020 Definitions, both the new and old definitions will continue to be used by market participants in parallel for some time.

9 See ISDA, "Legal Guidelines for Smart Derivatives Contracts: The ISDA Master Agreement" available at: https://www.isda.org/a/23iME/Legal-Guidelines-for-Smart-Derivatives-Contracts-ISDA-Master-Agreement.pdf

10 ISDA members can listen to a webinar explaining the ISDA clause library here: https://www.isda.org/2018/10/23/isda-clause-library-project-webinar/

Smart contract technology applications that look to automate certain provisions of the legal documentation applicable to IRDs will need to take account of the clauses developed by this project, which will be drafted to comply with the ISDA Master Agreement architecture and legal framework.[11]

The ISDA Clause Library Project is expected to be completed for the ISDA Master Agreement in early 2020 and will be expanded to capture certain ISDA credit support documentation by Q3 2020.

Digitization

Digitization of documentation will allow the key commercial and operational terms within legal agreements to be more closely aligned with and consistent with the operational and business processes they support, allowing for increased automation of those processes.

ISDA has developed a number of initiatives aimed at increasing digitization of documentation and products, including IRDs. Some of these are considered in further detail below.

ISDA Create

ISDA and Linklaters have developed an online contract negotiation and distribution service called "ISDA Create". ISDA Create is an online solution that allows firms to produce, deliver, negotiate and execute derivatives documentation completely online. The ISDA Create platform encourages greater standardization through the development of standardized templates, building on the framework created by the ISDA Taxonomy and Clause Library, and facilitates digitization by also capturing, processing and storing data from negotiated documents, providing users with a complete digital record of their documentation and creating a 'golden source' for legal agreement data thus reducing the need for manual documentation analysis and reconciliation.

ISDA Create currently allows firms to electronically negotiate and execute initial margin documentation. ISDA Create will be extended to other ISDA documents over time. As discussed in the section above, the terms of these documents will be relevant in understanding and determining a party's legal obligations under a specific IRD transaction.

The ISDA Common Domain Model

The ISDA Common Domain Model ("ISDA CDM") creates a common, digital representation of the events and processes that occur during the life of a derivatives trade. ISDA developed the ISDA CDM as a response to the lack of such a standard convention between market participants, which had resulted in inefficient and overly manual processes, requiring the reconciliation of trades and giving rise to greater costs and operational risk.

[11] See Clack, C, McGonagle, C, "Smart Derivatives Contracts: the ISDA Master Agreement and the automation of payments and deliveries (2019)" for further discussion of how terms within the ISDA Master Agreement may impact upon individual derivatives transactions available here: https://arxiv.org/pdf/1904.01461.pdf

ISDA published the ISDA CDM 2.0 in March 2019 and provides a full version of the ISDA CDM for IRDs (amongst other products). The ISDA CDM 2.0 is accessible to all market participants, including non-ISDA members.[12]

Development of the ISDA CDM is widely regarded as the first step towards scalable, automatable solutions for the IRD market, and the use of smart contract technology.

Financial Products Markup Language

ISDA also manages the Financial Products Markup Language ("FpML"), an open source standard language for the electronic dealing and processing of OTC derivative trades.[13] Market participants can utilize FpML for a number of purposes, including between participating entities to communicate trade details, within an entity in order to share the details of a particular trade and between a participating entity and outside firm who is providing a service related to the relevant trade. It can also be applied to a wide variety of information related to the trade, including pre-trade processes (such as checks against credit limits and eligibility for clearing), execution and post-trade reporting (amongst others).

As with the ISDA CDM, FpML provides a standardized basis from which technology can be applied to the IRD market. A number of types of IRDs are supported by FpML, including swaps, swaptions and forward rate agreements and FpML provides a common language for communicating in connection with these IRDs. Smart contract technology can utilize and expand upon this, integrating this language into automated trade processes to ensure interoperability and consistency with the existing framework.

IRD Definitions

ISDA is also developing a digital version of the 2020 Definitions. Amongst other things, the benefit of having a digital version is that at any given point in time, it presents a consolidated and up-to-date view of the definitions, rather than having multiple updates published separately as supplements (as is the case with the current 2006 Definitions). Situations where users who are not familiar with the definitions rely on older versions of the book can therefore be avoided. The online version is also being designed to increase accessibility and make updating the 2020 Definitions easier in the future, but it is also expected to have various built-in functionalities and capabilities (e.g., appropriate versioning, click-throughs and links) to facilitate a more user-friendly experience.

Distribution

ISDA will publish the digitized expression of these standard clauses in ISDA documentation and their supporting processes through the ISDA CDM to allow these components to be used to drive

[12] Further details on the ISDA CDM 2.0 can be found at: https://www.isda.org/2019/03/20/isda-publishes-cdm-2-0-for-deployment-and-opens-access-to-entire-market/.

[13] Further details on FpML can be found at: https://www.fpml.org/.

consistent implementation.[14] A consistent and transparent framework provides a basis from which technology can be applied to each trade process, building on the relevant common digital representation of each event.

This framework will provide technology developers with an interoperable industry standard, allowing them to focus on creating and implementing technology solutions aimed at achieving greater efficiencies and cost-savings through automation.

Technology developers can then deploy automated business logic in a way that draws upon the ISDA CDM to facilitate specific functionality. One example of the application of smart contract technology which utilizes and extends the ISDA CDM would be for market participants to utilize a common underlying digital representation for the calculation of floating rate interest amounts under an IRD to design and run a process which automatically carries out a calculation (possibly taking necessary data from external sources, such as the relevant interest rate which is published on a particular screen) and makes the payment in accordance with such calculation and digital representation.

[14] For example, ISDA is working with Digital Asset to develop an open-source reference code library that will help derivatives market participants adopt the ISDA CDM available at: https://www.isda.org/2019/04/09/digital-asset-and-isda-introduce-tool-to-help-drive-adoption-of-isda-cdm/.

Constructing Smart Derivatives Contracts for IRDs

In October 2018, ISDA and King & Wood Mallesons jointly published a white paper entitled "*Smart Derivatives Contracts: From Concept to Construction".*[15]

This paper proposed a practical framework for the construction of smart derivatives contracts.

As part of this framework, the paper suggests that the first step toward the construction of a smart derivatives contract is the selection of those parts of a derivatives contract for which automation would be:

- **Effective**, which involves determining which parts of a contract it is possible to automate; and
- **Efficient**, which involves determining which of those parts where there is sufficient benefit in automating.

Effective Automation

In 2017, ISDA and Linklaters jointly published a white paper entitled "*Smart Contracts and Distributed Ledger – A Legal Perspective.*"[16]

This paper notes that derivatives are fertile territory for the application of smart contracts and DLT because their main payments and deliveries are typically operational in nature and thus heavily dependent on conditional logic. As result, they are highly suitable to being machine automated or analysed in some way.

The *Smart Derivatives Contracts: From Concept to Construction* paper notes that there are examples throughout the 2006 ISDA Definitions of such operative clauses, including Section 5.1 which sets out how to determine the fixed amount payable by the fixed rate payer. The paper then illustrates how this provision can be expressed in a more formalized form, broken down into components for representation as functions (within the ISDA CDM) and then combined with other functions into templates for use with particular derivatives products, such as IRDs.

Development of the 2020 Definitions and, in particular, ISDA's work to ensure that certain provisions are made more prescriptive so that they better lend themselves to the application of conditional logic will increase opportunities for the effective automation of IRDs.

Efficient Automation

There are a number of areas within the IRD market where greater automation can deliver considerable efficiency benefits.

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[15] See ISDA's Whitepaper on "Smart Derivatives Contracts: From Concept to Construction" available at: https://www.isda.org/a/cHvEE/Smart-Derivatives-Contracts-From-Concept-to-Construction-Oct-2018.pdf

[16] See ISDA, Smart Contracts and Distributed Ledger: A Legal Perspective" available at: https://www.isda.org/a/6EKDE/smart-contracts-and-distributed-ledger-a-legal-perspective.pdf

First, as mentioned above, the operational processes involved in valuing, calculating and settling payment and delivery obligations are likely to lend themselves well to automation and to deliver real efficiencies and cost-savings as compared with existing payment infrastructures.

Additionally, the impact of regulatory change on the IRD market – particularly mandatory clearing and transaction reporting – has caused firms to implement new or amended processes across the front-to-back transaction lifecycle in order to ensure ongoing regulatory compliance. There are opportunities for greater efficiencies and cost-savings in these areas, some of which can be achieved through greater automation.

These guidelines will discuss each of these areas below, identifying opportunities for greater automation and highlighting key considerations for technology developers who are creating technology solutions in response.

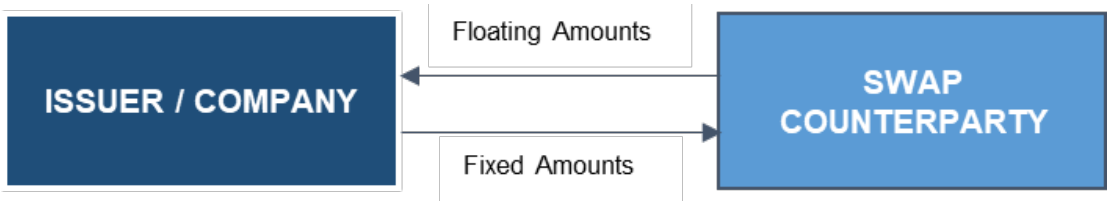
Valuations and Calculations

Calculation of interest amount

A key trade process in the context of IRDs is the calculation of an interest amount which is payable under the IRD. As a calculation is based on various inputs, this provides a compelling use-case for automation, given that the process is easily translatable into code (particularly, and as mentioned above, in the context of calculation of fixed and floating rate interest amounts).

By way of illustration, we have considered the process by which the floating leg of a simple fixed-to-floating interest rate swap is calculated below. These are derivative transactions under which streams of fixed or floating rate payments are exchanged for each other at regular payment intervals of the life of the contract. The payments due from each party are usually determined by applying a fixed or floating rate to a specified "notional amount" or "calculation amount" for a series of successive "calculation periods", starting on the effective date of the swap and ending on its termination date.

Figure 4



The Floating Amount in respect of a given Calculation Period is calculated as follows:

Floating Amount = *Calculation Amount* x *Floating Rate + Spread* x *Floating Rate Day Count Fraction*

The Calculation Amount (i.e., the notional amount) and the applicable Spread for the swap will be chosen by the parties as such in the IRD trade terms. A brief explanation of the other key terms is set out below.

a) "**Calculation Period"** is the period during which interest accrues on the notional amount of the swap.

b) "**Day Count Fractions**" are conventions which help determine the actual amount of interest due for a particular period given an agreed interest rate. The interest rate is usually given on a per annum basis, so interest determination would be straightforward if the interest period was a calendar year. However, this is often not the case and day count fractions help apportion the interest rate to reflect the length of the actual interest period

(e.g. a month). Different day count fractions can be used, and Section 4.16 of the 2006 ISDA Definitions provides details on specific day count fractions.

c) "**Floating Rate**" for any given Calculation Period is determined by reference to what is termed "**Rate Options**". The ISDA 2006 Definitions offers a menu of terms as possible Rate Options for parties to choose from, which reflect conventions that operate in the financial markets. For example, if "USD-LIBOR-Reference Banks" is the chosen Rate Option, the floating rate will be determined by reference to quotations provided by four major banks in the London inter-bank market for deposits in US dollars. Parties can however, also specify bespoke Rate Options for their trades in the trade confirmations, although this is fairly uncommon.

d) "**Payment Date**" means the date on which the interest is payable under the relevant IRD in respect of the immediately preceding Calculation Period. If the IRD is for hedging purposes, the intention is often for this to match the interest payment dates on the related loan/debt instrument (where the derivative is linked to an underlying loan/debt instrument).

e) "**Period End Date"** means the last day of the Calculation Period. Successive Calculation Periods run from one Period End Date to (but excluding) the next. The dates may be specified in the IRD documentation, but Payment Dates typically also serve as Period End Dates.

Issues for technology developers to consider

However, there are a number of complex factors which need to be considered when looking to apply smart contract technology to the valuation and calculation process.

Taking the calculation of a floating rate interest amount for a specific interest calculation period in a typical IRD as an example, we examine a number of these issues in greater detail:

(i) *Data inputs from external sources*

The Floating Rate applicable to that Calculation Period under the 2006 ISDA Definitions is typically based on the rate published on a particular screen. For example the "USD-LIBOR-BBA" floating rate is based on the rate which appears on the Reuters Screen LIBOR01 Page as of 11:00 a.m. (London time) on the relevant date while 'USD-LIBOR-BBA-Bloomberg is based on the rate which appears on Bloomberg Screen BTMM as of 11:00 a.m. (London time) on the relevant date[17].

[17] Note that, although ICE Benchmark Administration took over administration of LIBOR from the British Bankers Association (BBA) in 2014, the rates are still labelled using 'BBA'. This is a good example of the evolution of a key input that digitization ought to be able to reflect. ISDA has been unable to update the definition, however, because of the number of systems which would require updating among market participants and infrastructure providers. The name will be amended as part of the update to the 2020 Interest Rate Definitions.

A key disruption event for IRDs is the unavailability of the applicable floating rate on the screen on which it is published.

This has been the subject of very significant market and regulatory scrutiny over the past few years and, as described in the next section, the fallbacks that would apply are changing. Under the 2006 ISDA Definitions as at the date of this paper, however, and using "GBP-LIBOR-BBA" as the example, where the applicable rate is not available on the referenced screen, the rate will be determined on the basis of rates at which deposits in GBP are offered by the "Reference Banks" at 11:00 a.m. (London time) on the relevant date to prime banks in the London interbank market for the relevant duration and a representative amount. In order to determine this, the party acting as calculation agent will request a quotation from each Reference Bank. If at least two quotations are provided, the rate will be the arithmetic mean of those quotations. If fewer than two quotations are provided, the rate will be the arithmetic mean of the rates quoted by major banks in London, selected by the calculation agent.

For other floating interest rates (e.g. the "UK Base Rate"[18], which is the bank rate set by the Monetary Policy Committee of the Bank of England), the fallback is for the calculation agent to determine the rate in a commercially reasonable manner.

The approach being considered under the 2020 Interest Rate Definitions (currently being drafted as an update to the 2006 ISDA Definitions and therefore subject to change), moves away from making a specific screen the basis for a rate source, and is expected to set out, for example, only one price-source-agnostic LIBOR floating rate definition. It will therefore be up to the counterparties to select their preferred price source as part of administering the contract (rather than as part of the contractual terms). Temporary disruption provisions are being considered and new permanent cessation fallbacks included in the definitions.

Technology developers should consider to what extent technological systems and operations will be able to detect when a screen rate has become unavailable and provide for the necessary fallback when this takes place. The exact fallback will differ depending on the specific floating rate used, as, potentially, can the process. It may be that market participants will require the ability to halt the automatic processes in order for manual intervention to determine the alternative rate or for the calculation agent to make the necessary determinations.

This use of screen rates may offer a specific use-case for third party oracles or external data sources in the automation process. Smart derivatives contract models in the context of IRDs are likely to involve the use of such data providers. Careful consideration must be given to the choice of such data providers, as a fully automated process will rely on them for accurate data.

Therefore, whilst automating the link between these oracles and the systems used for calculating the floating rate interest amount could provide significant benefits, a key issue

[18] The Floating Rate Option for the UK Base Rate is defined in Supplement 33 to the 2006 ISDA Definitions, Section 7.1(w)(xvii) available at: https://www.isda.org/a/58MDE/Supplement-33-UK-Base-Rate-and-COP-Amendment-publication-version.pdf.

will be how the relationship between the oracles and those systems should be managed. A mechanism will need to be included to provide for an alternative where there is an interruption in the feed from the oracle due to, for example, a technology or coding error (including in relation to reliance on a specified oracle), whether this is a fallback to manual processes or an alternative screen mechanism Careful consideration will have to be given to how such risks can be mitigated and/or resolved subsequently.

In the digitization of an IRD, fallbacks (and the relevant oracles linked to the fallbacks) will either be coded and agreed to as part of the smart contract, or parties might agree that a certain level of discretion is still necessary. In all cases, the extent to which an IRD smart contract would rely on calculation agent discretion will be driven by a combination of factors, of which market consensus surrounding identification of relevant oracles will be one.

(ii) *Day Count Fractions*

A day count fraction is applied to apportion an annual interest rate to reflect a shorter interest calculation period e.g. 3 months.

A number of different standardized day count fractions have been developed often in order to match day count fraction conventions used in products which derivatives are used to hedge. For example, some of these day count fractions are based on the convention that for the purposes of calculating how much interest is payable in an interest period, a year consists of 360 days or 365 days (regardless of whether the calculation period falls in a leap year). In some conventions, a month is similarly assumed to be 30 days long rather than counting the actual number of days in the month during which the calculation period falls.

The market standard day count fraction for a particular trade will often depend on the jurisdiction, market or currency in question but conventions are not binding on market participants, who may choose to deviate from them. Conventions also evolve over time. This potential variance will need to be considered when developing any technological tool used to calculate IRDs, as it would need to be a buildable and easily adaptable solution.

(iii) *Business Days and Business Day Conventions*

Whether a particular day is a ‘business day’ is relevant in a number of instances in relation to the calculation of interest payments. For example, the “Period End Date”, which is the final day of an interest period (and the first day of the next interest period), will often need to be a business day as the interest will be payable on that day. Payments cannot be made unless the banks responsible for clearing the payments are open.

Business Day Conventions are used to adjust days that fall on a non-business day. For example, if the “Preceding Business Day Convention” applies to a particular day which falls on a non-business day, the day for payment (or other specified purpose) moves to the immediately preceding business day. There are two other standardized business day conventions specified in the 2006 ISDA Definitions. The 2006 Definitions may apply a particular Business Day Convention automatically unless a different Business Day

Convention is expressly agreed to apply instead by the parties. In other instances, no Business Day Convention will apply unless one is specifically nominated by the parties as part of executing the trade. Another complexity that the market is grappling with in the context of Business Days and Business Day Conventions is the effect of an unscheduled bank holiday or closures (e.g., the Bush national day of mourning) for derivative transactions. ISDA is consulting with members on how such events should be treated and the outcome is expected to be included in the 2020 Definitions. Smart contracts technology will also have to take such circumstances into account.

Another level of complexity is that the relevant 'business days' will depend on a variety of factors, including the currency of the IRD and the location of the parties. For example, a trade denominated in US Dollars may specify that New York Business Days are the relevant type of Business Day. In the 2006 ISDA Definitions, parties have the ability to specify, in respect of a specific transaction or transactions, the jurisdictions which are relevant for this purpose or, if no jurisdictions are so specified, the relevant jurisdictions for the purposes of 'business days' will apply largely depending on the currency of the payment obligation.

As well as "Period End Dates", business days and business day conventions will be relevant to the "Reset Date", which may apply once or more than once during an interest calculation period depending on whether the parties wish to reset the applicable interest rate once or multiple times during such calculation period. These concepts will also be relevant to determining the interest payment date (to the extent this is separated from the end of the interest calculation period).

(iv) *Compounding*

Under the 2006 ISDA Definitions, it is possible to apply "Compounding" when calculating floating rate interest amounts. This can apply in a number of different ways:

(a) *Straight compounding* – Under this methodology, both the floating interest rate (which usually resets daily) and applicable spread are compounded throughout the relevant interest calculation period on the frequency specified by the parties. This compounded rate is applied to the relevant calculation amount for that interest rate calculation period.

(b) *Flat compounding* – Under this methodology, for each 'compounding period' which occurs during the relevant interest calculation period, an interest amount is determined which is then the 'calculation amount' to which the rate and spread are applied for the next compounding period.

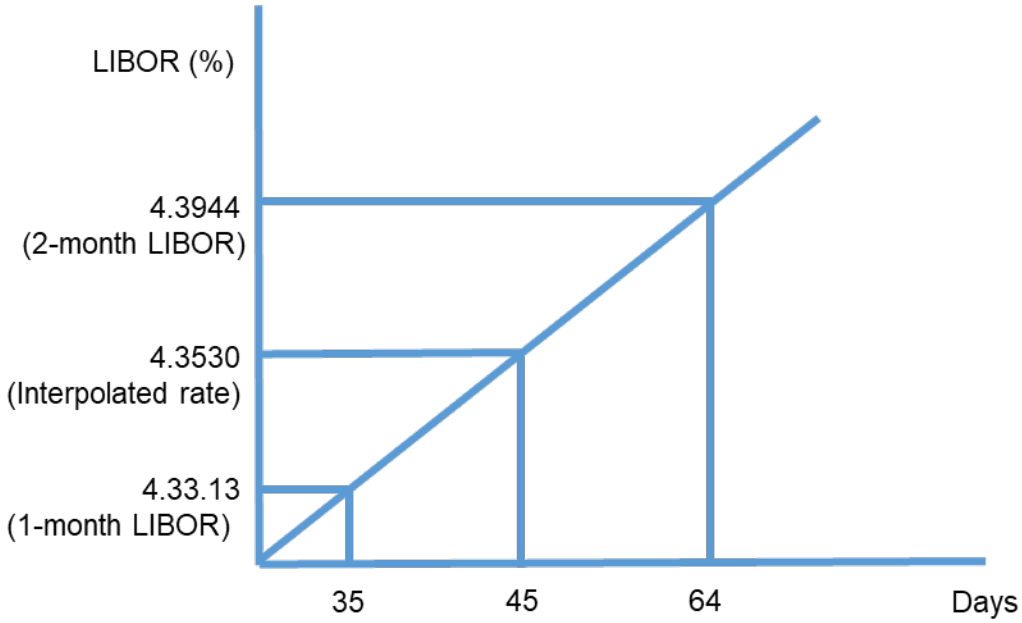
(c) *Spread exclusive compounding* – This methodology works in much the same way as straight compounding, except that the spread is not compounded.

Each of these options contains a number of variables, including the number of 'compounding periods' which occur during the relevant interest calculation period (the end of each period is, by default, subject to a business day convention) and day count fractions applicable to the relevant compounding period.

(v) *Interpolation*

Interpolation may be applied in circumstances where the specified floating interest rate does not have the same maturity as the relevant interest calculation period under the IRD. Linear interpolation involves using the rates available for the next shorter and next longer maturities and interpolating the relevant rate for the IRD by reference to the point between those periods that the duration of the interest calculation period for the IRD falls.

Figure 5



(vi) *Calculation Agent discretion*

Consideration will need to be given to the position where there is an issue with the automated calculation process, including where an unforeseen issue arises – for example a sudden bank holiday on which the key market is closed and no business day convention is specified or deemed to apply; a rate does not publish when expected; some question of interpretation of the 2006 ISDA Definition arises because of particular circumstances which have not been encountered previously. It is often the case for an IRD that the party designated as the 'calculation agent' will step in to help determine the interest amount in circumstances where there are issues e.g. if the screen rate is unavailable and quotes must be obtained from major banks, the calculation agent may be the one to select those entities. The calculation agent may also in some circumstances determine the applicable rate acting in good faith and a commercially reasonable manner. It is possible that digitising the calculation process will remove the need for this fallback (or reduce the likelihood of it being needed), removing some of the discretion which remains in this process. This will depend on how these technological tools look to provide solutions in situations where

issues arise, and where responsibility will fall if the issue arises with the digital systems themselves.

(vii) *Collateralized transactions*

Developers will also need to have regard to the collateral arrangements that are linked to the trade and appreciate how calculations of the total amount of collateral that is required to be transferred from time to time, which will be determined by the provisions in the relevant collateral agreement, interacts with and differs from the calculation methodologies in respect of the transaction itself, which are set out in the ISDA Master Agreement.

Collateral may need to be transferred or returned as the value of the collateralized obligations and/or the value of the collateral transferred fluctuates. Developers will need to provide a mechanism that allows the parties to control which obligations they are seeking to collateralize. It is common for parties to exclude certain transactions from contributing to the total collateralized exposure, either because there is no regulatory requirement to exchange collateral for those transactions, or the parties otherwise agree that those trades should be excluded. This would need to be reflected in any smart derivatives contract system design.

The mechanism for determining the amount of collateral that needs to be transferred varies depending on the nature of the ISDA non-regulatory margin documentation being used (e.g., the NY CSA, the English CSD or the English CSA).

The considerations that are relevant for collateral arrangements are set out in detail in the *ISDA Legal Guidelines for Smart Derivative Contracts: Collateral*[19].

(viii) *Hedging*

IRDs are used by a wide variety of market participants for hedging purposes, in particular to hedge their exposure to interest rate fluctuations as a result of other borrowings or debt issuances.

A key concern in the IRD market has been to avoid any basis risk between the IRD and underlying financial instrument which is being hedged. The application of smart contract technology to the IRD market will need to consider this key purpose and automated processes will need to be developed in a way which does not give rise to such basis risk.

Basis risk may arise in a number of ways, including (i) differences between any part of the interest calculation methodology, (ii) differences in the fallbacks which apply where a calculation cannot be made or (iii) the timings for payment of interest amounts. These differences would result in inconsistencies between the interest amounts payable under the IRD and related financial instrument, or result in unmatched payment flows, in all cases exposing the market participant to unforeseen interest rate risks.

A number of the market conventions described in these guidelines for the calculation of interest amounts (e.g. business day conventions, day count fractions), and the discussion

[19] See ISDA, Legal Guidelines for Smart Derivatives Contracts: Collateral" available at: https://www.isda.org/a/VTkTE/Legal-Guidelines-for-Smart-Derivatives-Contracts-Collateral.pdf

around fallbacks, apply widely in the financial markets (including to financial instruments that IRDs would look to hedge). Maintaining these conventions in automated systems is therefore important to avoid adding basis risk into the market, particularly where there is interaction between IRDs which utilize smart contract technology and instruments that the IRDs hedge which may not utilize this technology (or which may use other, but not directly interoperable technologies).

(ix) *Benchmarks and interest rate reform*

A significant area of focus in the IRD market are the recent global initiatives with respect to the reform of interbank offered rates ("**IBORs**") and certain other benchmarks and, in some cases, the expected discontinuation of these rates due to concerns over their robustness and accuracy. IBORs in particular are referenced in many IRDs. Financial authorities globally are advocating for, and ISDA (and other trade associations) and market participants are preparing for, the use of alternative rates which are deemed more robust, known as nearly risk-free rates ("**RFRs**"). In relation to certain IBORs, for example, Japanese Yen TIBOR and EURIBOR, a "multiple rate" approach is being taken which involves the use of RFRs in some cases (e.g. hedging general interest rate risk) whilst also retaining the existing IBOR (following reforms to the underlying methodology to improve the IBOR's integrity, accuracy and robustness), at least in the short term. In other cases, for example in relation to USD LIBOR, CHF LIBOR and GBP LIBOR, the IBOR is likely to cease to be published in the relatively near future and the markets and products which currently reference those IBORs will need to transition to the relevant RFR. The transition from IBORs to RFRs has significant implications. Payments under an IRD, the value of an IRD and the operations and systems used in respect of an IRD, are all capable of being impacted by a change in reference rate. For IRDs which cannot or will not transition to RFRs prior to the discontinuation of the relevant IBOR, public/private sector and industry working groups are developing contractual provisions which set out what to do in the event that an IBOR is discontinued, known as "fallbacks".

Focusing on "fallbacks" specifically, existing fallbacks in derivatives documentation are not expected to operate effectively in the context of permanent discontinuation of an IBOR, because in most cases they rely on quotations from major banks which are unlikely to be available in such circumstances. ISDA intends to publish amendments to the definitions of key IBORs in the 2006 ISDA Definitions which provide for new fallbacks following the permanent cessation of the IBOR. The amended definitions will include a fallback to the relevant RFR adjusted to account for the fact that the RFR is not a term rate (which the IBORs are) and to account for the lack of an interbank credit spread within the RFR.

ISDA is also aiming to publish an industry protocol (which is a mechanism used in the derivatives market to facilitate amendments to existing transactions on a multilateral basis) to incorporate these amendments into existing (or "legacy") transactions that incorporate the 2006 ISDA Definitions, the 2000 ISDA Definitions or the 1991 ISDA Definitions and to include these new triggers and fallbacks in existing ISDA Master Agreements, ISDA credit support documents and certain non-ISDA documents which otherwise reference a relevant IBOR.

ISDA has also produced the ISDA Benchmarks Supplement and a protocol (the ISDA 2018 Benchmarks Supplement Protocol) which includes certain triggers and fallbacks to facilitate compliance with the EU Benchmarks Regulation[20].

Interest rate reform remains an area of significant importance and uncertainty. Whilst there are a number of relevant global and ISDA initiatives, the precise position which the legal documentation and IRD market will ultimately take is yet to be determined. The exact triggers for fallbacks (and in particular whether and how a "pre-cessation" trigger based on a regulatory announcement that an IBOR is no longer representative should be included in addition to the permanent cessation trigger) are not confirmed, nor are the exact fallbacks that will apply.

Key issues for technology developers will be how the systems and technology manage:

(a) **A relevant IBOR cessation**: the exact trigger for this may be difficult to automate and may therefore require some manual monitoring. However, this may present an opportunity for the development of more complex oracles beyond data sources that already exist for simple pieces of data. For example, announcements by a regulator or committee could be linked to particular platforms that function as automatic triggers, which calculation platforms can be designed to recognize for triggering a fallback.

(b) **Determining the appropriate fallback**: this will depend on what provisions the parties have applied to the IRD (e.g. whether any of the relevant ISDA protocols apply) and it may not necessarily be clear what the relevant fallback will be at the time the IRD is entered into. For example, the 'generic' fallbacks under the ISDA Benchmarks Supplement would be subordinate to the specific IBOR fallback, if effective and incorporated into the relevant IRD.

(c) **The adjustment of the RFR to replace a term rate**: there are different possible approaches which could be taken by market participants (and depending on whether the IBOR fallback protocol applies), particularly in terms of providing some separation between the time at which the interest amount is calculated and when it is paid. Automated systems for the calculation and payment of interest amounts under IRDs would need to be able to adjust to accommodate these options.

(x) *Harmonised interpretations*

Although it is important to appreciate the level of variation in IRD trade processes (and the requirement for developing complex command chains as a result), the overarching takeaway for IRDs is that the fundamentally mechanical nature of these processes as well as the level of standardization in the market means that as a class, they lend themselves more easily to automation and digitization than many other complex or bespoke financial products. Therefore, there are significant benefits that can be gained from further

[20] Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on indices used as benchmarks in financial instruments and financial contracts or to measure the performance of investment funds and amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014.

automation and the application of smart contract technology to payment calculation processes for IRDs, particularly in terms of cost savings, speed and scalability.

However, it will have to be considered to what extent harmonized interpretations of these terms are possible and desirable. Whilst harmonization is preferable in general as it leads to greater standardization and predictability in the market, it is a crucial prerequisite to digitization and automation. Market participants have developed individual methods and preferences for various stages of the calculation process (e.g., discount factors that apply to determine the settlement amounts upon termination) and may be keen to retain discretion in this regard. However, whilst there is clearly merit in retaining some element of individual discretion in performing the calculations since it allows for a more fact-dependent response to a particular event, this also makes it difficult to implement standardized market-wide approaches in a way that is beneficial for digitization. Discretion should therefore be maintained for business processes where users disagree about the right outcomes or methods, to preserve the value of bespoke negotiated outcomes to handle edge cases and individual user risks. However, where different language is used to describe the same business process or calculations, this should be standardized and automated where possible.

Settlement

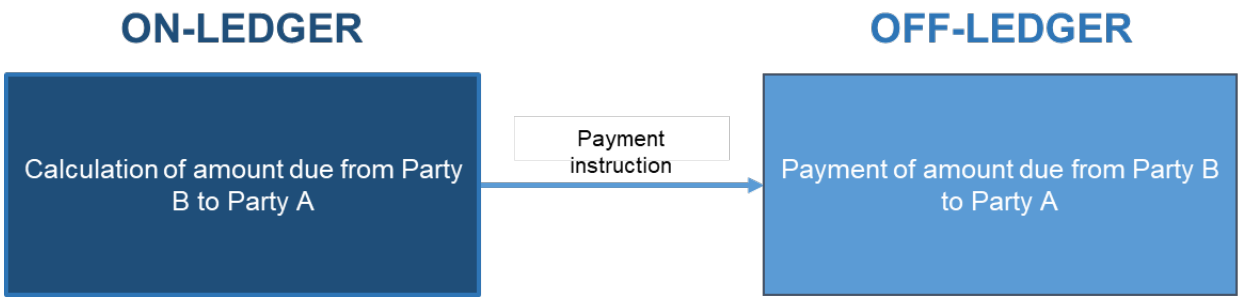
In addition to using smart derivatives contracts to automate certain aspects of the valuation and calculation process, it is also possible to use this technology (potentially using DLT) to automate settlement of any amounts or deliveries that are determined to be due and payable.

Settlement

In considering the use of DLT in this context, it is useful to recall the distinction made in the *ISDA Guidelines for Smart Derivative Contracts: Introduction*[21] between different types of potential DLT implementation that are capable of supporting smart derivatives contracts.

In the context of the IRD market, a 'light chain' system would allow market participants to exchange information in relation to the IRDs in a more automated, digitized way, and carry out certain trade processes (for example, calculation of interest amounts) through technological means. In this case, the ledger recorded by way of DLT would in effect serve as a messaging system between the participants in the run-up to payment, with settlement being effected through the existing banking system (such as for a traditional IRD today). The parties' payment obligations would be recorded on the ledger, but the actual payments would take place off-chain. The parties would need to, for example, use an existing payment system to initiate the relevant transfers of cash.

Figure 6

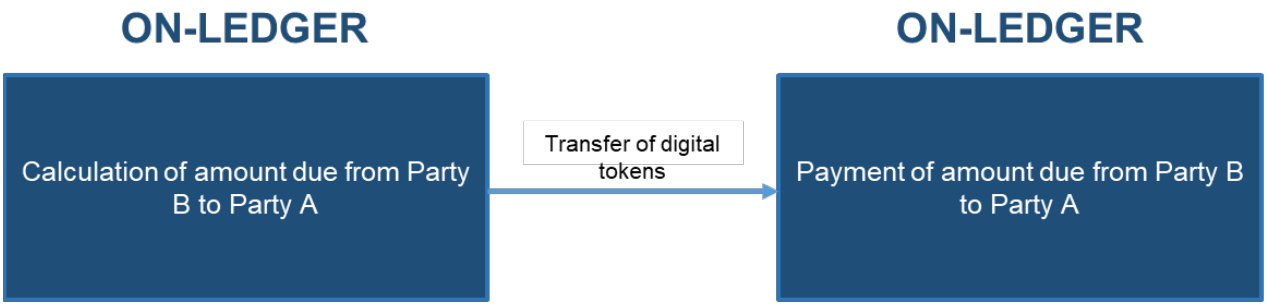


A 'heavy chain' system would be a settlement system in itself, through which payments would flow and, to the extent the IRD is collateralized, collateral could potentially also be transferred and held. In this scenario, digital assets would be constituted on the ledger itself (either in native form or as representations of real-world assets) and the ledger would also facilitate and record their transfer for parties to meet their payment or delivery obligations. Both the obligations of the parties

[21] See ISDA, Legal Guidelines for Smart Derivatives Contracts: Introduction available at: https://www.isda.org/a/MhgME/Legal-Guidelines-for-Smart-Derivatives-Contracts-Introduction.pdf

and the transfers of value (including of collateral, where applicable) would be recorded or occur (as applicable) on the ledger, without the need for external payment or settlement systems.[22]

Figure 7



As described in the ISDA Guidelines, the approach taken will have an impact on the considerations technology developers should keep in mind. Where external systems are being used to effect payments, the need to accurately identify payment flows and address the interoperability of systems will be significant. The identification and timing of payment flows under IRDs will be impacted by a number of the issues already discussed in this paper, including the application of business days and business day conventions to interest payment dates, complexities around the calculation of the interest amounts to be paid and potential fallbacks/disruption events. Divergences between outcomes on and off-ledger would have to be addressed. For example, where a payment is recorded to have been made on the ledger but settlement off-ledger has not been executed, the parties will need to ensure that there is a robust reconciliation mechanism capable of addressing such scenarios. Ultimately, a robust, clear and enforceable legal solution will be key to achieving legal certainty in such situations.

Where the DLT platform is designed to house a settlement system as described above, using digital or dematerialized assets to meet payment or collateral obligations, the system or platform design may have an impact on the laws governing operations involving the asset itself.

Early Termination Provisions

General considerations that should be taken into account in the context of close-out and early termination provisions have been considered in detail in the *ISDA Legal Guidelines for Smart Derivative Contracts: The ISDA Master Agreement*[23].

[22] For further discussion of these issues, see the Bank for International Settlements' Committee on Payments and Market Infrastructures paper on wholesale digital tokens (December 2019) available at: https://www.bis.org/cpmi/publ/d190.pdf

[23] See ISDA, Legal Guidelines for Smart Derivatives Contracts: The ISDA Master Agreement" available at: https://www.isda.org/a/23iME/Legal-Guidelines-for-Smart-Derivatives-Contracts-ISDA-Master-Agreement.pdf

Uncleared IRDs (in particular, swaps) may contain optional early termination ("OET") or mandatory early termination ("MET") provisions. The trigger of these provisions results in termination of the IRD prior to its stated maturity, and, in some circumstances, cash settlement of the IRD (i.e. payment of an amount by one party to the other, designed to represent the transaction's value to that party as at the time of termination). In the case of OETs, one party will have the right to exercise the termination provisions on one or more specified dates. METs will occur automatically on the specified date.

Under the 2006 ISDA Definitions, the cash amount payable by the party which is 'out-of-the-money' (i.e. the party who would have to pay the value of the transaction to the party which is 'in-the-money') under the IRD when these provisions apply will be (i) an amount agreed between the parties or (ii) if the parties are unable to agree an amount by a specific deadline (which can differ depending on the specific IRD), in accordance with the "Cash Settlement Method".

There are a number of different "Cash Settlement Methods" which the counterparties may choose to apply and the specific process to follow will depend on which method is chosen. Some methods will require a calculation which is similar to that for a close-out of transactions under the ISDA Master Agreement, although the calculation agent will determine the relevant amount on the basis of quotations from certain reference banks (or, in certain circumstances depending on the number of quotes received, by the calculation agent in good faith and using commercially reasonable procedures). Other methods require a calculation on the basis of (i) the present value of an annuity based on certain future payments under the IRD and applicable discount factors and (ii) a combination of quotations obtained from participants in the market and applicable FX rates.

These calculation methodologies are complex, requiring inputs from multiple sources and different calculations to be made depending on these inputs. They are also being updated as part of the 2020 Definitions project.

Clearing

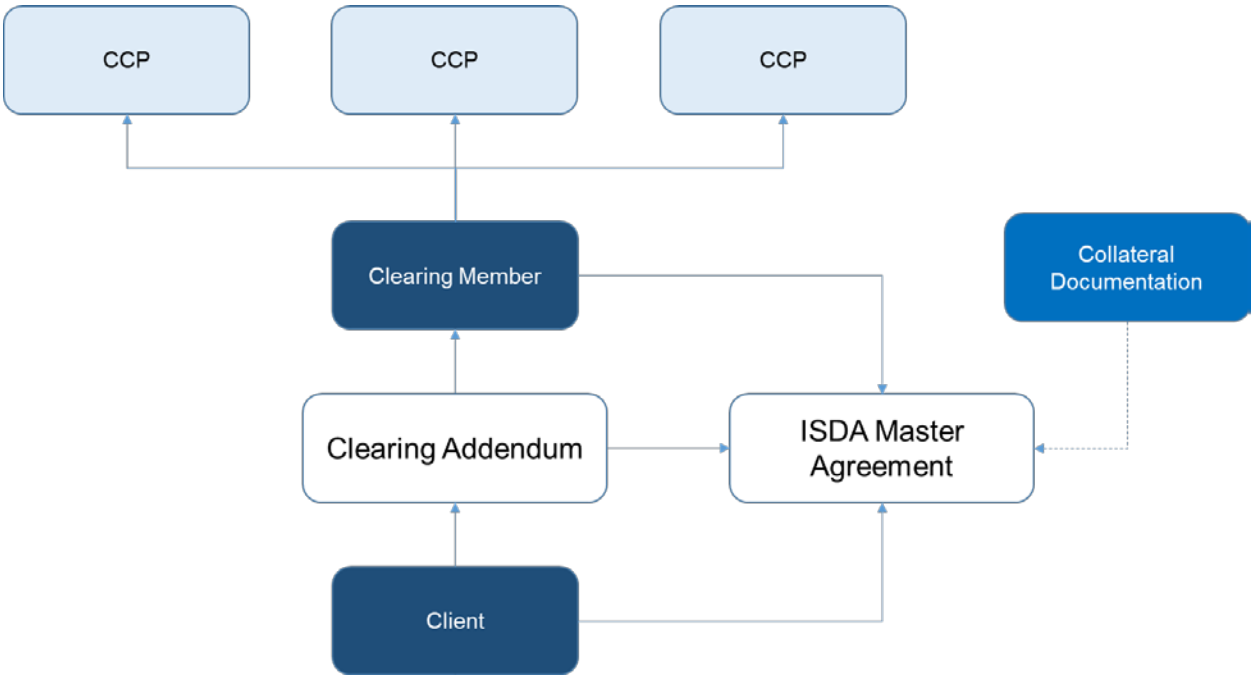
A large proportion of the IRD market is centrally cleared, and technology developers should be aware of special considerations which apply in this part of the market.

Cleared IRDs will include the following legal relationships:

(i) *Relationship between the CCP and the clearing member:* This will be governed by the rules of the CCP.

(ii) *Relationship between the clearing member and underlying client:* This will not be relevant to all cleared IRDs, but will be relevant to arrangements where a clearing member of a CCP clears an IRD on behalf of an underlying client (whether directly or indirectly). Cleared transactions will generally be entered into using some form of clearing agreement. The clearing agreement typically takes the form of an addendum or module to it. ISDA has published the ISDA-FIA Client Cleared OTC Derivatives Addendum for these purposes. Figure 8 represents a stylized example of a typical clearing model.[24]

Figure 8



Each of these legal relationships is considered in turn.

[24] It is important to note that different clearing models exist in different jurisdictions, and the above example may not accurately represent the documentation structure or content that might be used in all scenarios.

CCP Rules

The mechanics of these IRDs, and the legal principles which apply to them, are primarily governed by the rules of the CCP. These rules typically give CCPs significant discretion (as discussed further below) and broad powers to make amendments to the rules. For example, CCPs have developed internal systems and models to calculate required margin from clearing members, contributions from clearing members to the default fund based on possible losses the CCP may suffer and transaction valuations leading to settlement of payments flows under IRDs. Calculations are generally made by the CCP and amounts paid to or by the clearing members on prescribed timelines, or as additionally requested by the CCP. The economic terms of the cleared IRD may incorporate a number of elements of the ISDA 2000 Definitions or ISDA 2006 Definitions, particularly around the inputs to the calculation of floating rate interest amounts.

In the context of interest rate reform, some CCPs have already indicated that they expect to follow the approach adopted by ISDA in respect of fallbacks for the IBORs for non-cleared transactions in the rules applicable to cleared transactions. The points noted elsewhere in these guidelines will also need to be considered in a cleared IRD context. The CCPs also use interest rates (i) to value products, and (ii) to calculate the interest payable on collateral they hold (such as cash collateral). In anticipation of the discontinuation of certain IBORs, many CCPs have amended their rulebooks to allow the CCPs to make amendments to their eligibility criteria (i.e. the products which are eligible for clearing) at short notice. Further, the CCPs could opt to close-out all transactions referencing the relevant IBOR that are already being cleared. The rulebooks have also been amended to introduce new RFRs.

Smart contracts technology has the potential for creating more streamlined and integrated processes for clearing and settlement of derivatives. Presently, these processes are somewhat fragmented, with manual input and intervention required at various stages of the trading and post-trading clearing and settlement cycle for cleared derivatives. There is scope for further automating the flow of information between participants involved in this process, particularly given the high level of standardization that is already present in cleared IRD transactions.

Technological solutions should take into account interoperability considerations, as CCPs, as with other market participants in this space, have specific systems, platforms and processes that they use.

In addition to developing platforms that facilitate better interaction between external systems and CCPs, there is also an opportunity here for CCPs and other market infrastructure providers (such as Central Securities Depositories or “CSDs”) who are looking to migrate or upgrade their systems to consider deploying smart contract technology and DLT to simplify processes and achieve efficiencies by reducing the amount of manual intervention required. Some CCPs and CSDs have already started to explore such opportunities in partnership with technology firms. It is acknowledged however, that for regulated financial market infrastructures to adopt or incorporate such technologies in their own platforms will likely be a slow and gradual process.

Client clearing arrangements

There are a number of industry standard documents which can be used to document the legal relationship between a clearing member and its client. The mechanics of the documents and the legal architecture will depend in part on the client clearing model being used:

(i) Principal model (typical for Europe): Under this model, there will be a separate back-to-back IRD between the clearing member and the client. The legal documentation will typically ensure that this IRD mirrors the trade between the clearing member and the CCP, particularly in terms of close-out triggers and payment flows. The intention is for the clearing member to act as a riskless principal.

(ii) "Agency" model (typical for the US): Under this model, the clearing member typically acts as an "agent-trust" of the client but is liable as principal for the client's obligations under the IRD vis-a-vis the CCP.

There are certain elements of this relationship where further automation and digitization would be beneficial – for example, the ability to automatically modify and book a client transaction to reflect the entry into, and any relevant modification of, the transaction between the clearing member and the CCP (to ensure that these remain aligned). Similarly, processes such as the automatic pass-through of margin from the client to the CCP could be streamlined through the application of technology, although it should be noted that there will not necessarily be a direct correlation between payments (including of margin) between a clearing member and a CCP, on the one hand, and a clearing member and its clients, on the other hand, as payment flows between a CCP and the clearing member may be net across the transactions of different clients and gross for each client. In addition, clearing members may call clients for a broader range of margin and may retain margin where margining at the CCP is on a net omnibus basis.

However, technology developers should ensure that the wider legal framework is kept in mind. For example, when looking at the possible application of smart contract technology to the termination of an IRD, the way that these termination rights are often restricted by reference to the market at which the transaction between the CCP and clearing member is terminated will be difficult to fully automate. Similarly, many of the standard ISDA Master Agreement provisions (to the extent still relevant to the particular trading relationship) are often adjusted – for example, the ability to suspend payment and deliveries upon the occurrence of an event of default or potential event of default may be disapplied with respect to the client (although not for the clearing member). This creates a complicated legal structure through the interaction of the CCP rules, underlying trading documentation (such as the ISDA Master Agreement), client clearing documentation and specific trade details.

Porting is another area in which the potential for digitization and adoption of smart contracts can be considerable, although there are practical obstacles that will need to be considered and overcome, particularly in relation to partial porting, whether or not collateral is to be ported and where there is net omnibus margining. Porting is the process by which a client is entitled to transfer transactions they are clearing through one clearing member to another member (who has

agreed to accept the transactions) with the same CCP. Such transfers may take place in the context of a clearing member's default, where positions held by its clients would have to be transferred to a different clearing member, but client clearing agreements generally also permit porting in a business-as-usual scenario (provided certain conditions are satisfied). When porting of transactions takes place, a CCP will transfer affected transactions with the existing clearing member and to the transferee clearing member[25], accompanied by a transfer of the associated collateral balances (although the exact way in which this will occur varies slightly at different CCPs). At the same time, the client's clearing agreement with the transferor clearing member may be terminated and a separate arrangement with the transferee clearing member will be established. Once triggered by a client, the execution of the porting process itself can be largely mechanical in nature (although it can be complicated by the complexity of the client's cleared portfolio and the collateral holding arrangements at the CCP, particularly where only some of the transactions rather than the entire portfolio is being transferred). The process would therefore lend itself to automation, although it would require CCP involvement in the digitization process as porting effectively occurs at the level of the CCP.

CCP discretion in respect of cleared products

As noted, a key consideration in the cleared IRD market will be the extent of discretion afforded to CCPs. CCPs will have significant discretion to make determinations and make unilateral demands or take unilateral action both in a business-as-usual scenario and in the context of a clearing member default. This could include, amongst other areas, demands for additional margin or contributions to the CCP default fund (calculated by the CCP on the basis of certain parameters but with room for discretion or adjustment as to how the CCP makes those calculations) and managing the default process.

Technological solutions are most easily applied to processes that involve limited discretion, for example a calculation based on objective inputs or to make a payment provided that a certain objective criterion is met at a specified time on a specified date. Discretion fits less easily with these applications and technology developers, as is the case whenever discretion is exercised in respect of any aspect of a transaction, should therefore consider how their technological solution should account for the exercise of CCP discretion in the cleared IRD market. Likewise, clearing members reserve similarly broad discretions and powers when passing clearing risk onto their clients, so it cannot be assumed that an outcome at the CCP/clearing member level will necessarily be replicated at the clearing member/client level.

This may not ultimately prove to be a major obstacle however, developers will need to ensure that the technology is designed to identify situations where CCPs exercise their discretion to effect changes to their processes or requirements (and effective automated communication channels are maintained between the CCP and external platforms used by participants for this purpose)

[25] The precise legal mechanism involved in the transfer may vary.

and be flexible enough to accommodate any consequent changes required to trade terms (including collateral provisions).

A key example of CCP discretion arises in a clearing member default scenario. Typically, a CCP will have discretion to exercise a broad range of powers with respect to the contracts and margin of the defaulted clearing member (as opposed to, in an uncleared IRD scenario, the relatively simple termination of the IRD upon default by a counterparty). Such powers may include:

(i) *Hedging* – To reduce the market risk associated with a defaulted portfolio, the CCP may consider hedging its exposure by entering into offsetting transactions with non-defaulted clearing members. The CCP will have discretion about whether to take this action and the exact terms on which it does so.

(ii) *Auction* – The CCP may go through a detailed process to auction the defaulted portfolio to non-defaulted clearing members. The CCP may have discretion in terms of splitting up the defaulted portfolio into separate portfolios for auction purposes. CCPs will have different processes for running these auctions and different requirements imposed on non-defaulted clearing members around bidding for these portfolios.

(iii) *Loss attribution* – The CCP may also attribute any remaining losses it has suffered as a result of the default through a pre-defined waterfall, using default fund contributions made by clearing members and other sums. The exact waterfall will differ between different CCPs.

These processes and powers of CCPs are broad and are designed to give the CCP room to manoeuvre in what may be a significant time of turmoil in the financial markets. This discretion is therefore a feature of the cleared IRD market that technology developers will need to contemplate when considering the possible application of smart contract technology.

Reporting

A number of jurisdictions require the reporting of IRD details to certain authorized bodies, as part of initiatives to allow regulators to better understand and regulate the derivatives market as a whole. This can involve reporting under the same regulatory regime by both counterparties to the IRD, and the reconciliation of data received by the relevant authorized body to ensure that the reported trade details match and that the view the regulators have of the market is accurate.

Requirements regarding regulatory reporting of IRDs are detailed and precise. To take the requirements under EMIR[26] in the EU as an example, the details of each IRD entered into, modified or terminated and which has (in most circumstances) at least one EU counterparty will need to be reported to an EMIR registered or recognized trade repository. There are prescribed requirements in delegated legislation around the content and format of these reports, with a view to harmonization of standards and to reduce the need for reconciliation of data between trade repositories. This includes the use of specific identifiers (e.g. LEIs with respect to relevant parties such as the counterparty or CCP, or unique product identifiers to identify the derivative type), as well as detailed information around the fixed and floating payment legs of the IRD (including frequency, the rate referenced and the day count fraction applied).

Depending on the counterparties to the IRD, multiple regulatory reporting regimes may be relevant, each of which will have different detailed requirements. However, while significant differences still exist between different regulatory regimes (e.g., in the collection of data under EMIR and Dodd-Frank), regulators are working towards a goal of harmonizing the data and audit trail to reduce redundancies and inefficiencies.[27]

Consideration is already being given to the possible application of technology to regulatory reporting requirements. For example, ISDA are working with the UK Financial Conduct Authority, the Bank of England and participating financial institutions to explore how the ISDA CDM can support the digital regulatory reporting pilot for derivatives.[28]

Given the short timeframes for compliance with regulatory reporting requirements (under EMIR, reports must be made no later than the next working day), the ability to automate and streamline this process would be highly beneficial. Technology providers in this space will need to ensure that they are familiar with the detailed requirements requiring format and content of these reports. Liability for a failure to make the report, or errors in the report, will need to be carefully considered, as compliance with the regulatory reporting regime will ultimately remain with the market participant.

However, the requirement to protect data and information collected and to build separate silos to protect parties' confidential information from unauthorized disclosures would also have to be considered in this context. Only information that is permitted to be disclosed to each participant

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[26] Regulation (EU) No 648/2012 of the European Parliament and of the Council of 4 July 2012 on OTC derivatives, central counterparties and trade repositories Text with EEA relevance.

[27] See OICU-IOSCO Report, "Market Fragmentation & Cross-border Regulation" available at: https://www.iosco.org/library/pubdocs/pdf/IOSCOPD629.pdf

[28] A report on the deployment of https://www.isda.org/2019/05/21/isda-cdm-deployed-to-help-deliver-uk-digital-regulatory-reporting-pilot/

in the system (e.g., CCPs, regulators, brokers, parties) should be made available to them even where data is collected centrally. Technology developers should consider designing appropriate information barriers that can be integrated into the relevant platform to address this concern.

It would be beneficial if technological solutions are built with an eye on the other regulatory reporting regimes that may be relevant to market participants, to improve interoperability and remove the need to build multiple systems to comply with these requirements. This includes both multiple jurisdictional reporting regimes which may apply to IRDs, but also reporting regimes which apply to other similar products (such as securities financing transactions under SFTR[29]).

[29] Regulation (EU) 2015/2365 of the European Parliament and of the Council of 25 November 2015 on transparency of securities financing transactions and of reuse and amending Regulation (EU) No 648/2012.

Conclusion

These guidelines provide an overview of the existing legal framework for OTC and cleared interest rate derivatives and highlight areas in which there is significant scope for further digitization and adoption of new technologies which can lead to increased efficiencies. IRDs, in particular, present fertile ground for such initiatives as they are highly standardized derivative products. Many IRDs tend to be less complex or bespoke compared to equity or credit derivatives, for example, which means certain measures for automation and digitization can be implemented for such products with greater ease than for others. In fact, initiatives such as the ISDA CDM and Clause Library Project have specifically focussed on IRDs at the outset for this very reason.

Nonetheless, it is important to give careful consideration to the development of smart derivatives contracts in the context of IRDs given the size of the market and their widespread use by many different types of market participants. The paper discusses aspects that technology developers should have regard to in this respect and particularly in the context of the valuation/calculation process, where the greatest potential for increased automation and application of new technologies exists.

ISDA encourages members to contribute to this work to ensure their views are taken into account and that each of these various projects and initiatives benefit from broad-based market feedback and expert insight.

Members can participate in ISDA's work by joining the following working groups:

- **ISDA Legal Technology Working Group**: Established to promote greater standardization and digitization of ISDA documentation through the ISDA Clause Library Project.
- **ISDA Fintech Legal Working Group**: Established to raise and discuss areas of legal and regulatory uncertainty in the application of new technology (such as smart contracts, DLT, digital assets and AI) to derivatives trading.
- **ISDA CDM Design Working Group**: Established define a standard representation of derivatives trade events that are asset class and product agnostic, and to develop a common domain model across transaction and legal agreement data required for processing of such events.
- **ISDA Interest Rate Definitions Working Group:** Established to develop the 2020 Interest Rate Definitions.

Members can join these Working Groups through the My Committee Dashboard on the ISDA website: http://www.isda.org/committees.

If you have any questions on any of the issues raised in this paper, please contact ISDALegal@ISDA.org

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