Romania

Advisory Services for the Establishment of a Framework for the Use of Derivatives and the Execution of Swap Transactions in Romania (P156803)

# Output No. 3b
# Derivatives Post-Trade Processes

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**Acronyms**

| | |
|---|---|
| BIS | Bank for International Settlements |
| CCS | Cross Currency Swap |
| CSA | Credit Support Annex |
| COA | Chart of Account |
| COSO | Committee of Sponsoring Organizations |
| DeMPA | Debt Management Performance Assessment |
| DMU | Debt Management Unit |
| EDP | Excessive Deficit Procedure |
| EMIR | European Market Infrastructure Regulation |
| ESA | European System of Accounts |
| FASB | Financial Accounting Standards Board |
| FIFO | First-in First-out |
| FTE | Full Time Equivalent |
| FVO | Fair Value Option |
| FVTPL | Fair Value Through Profit and Loss |
| GAAP | Generally Accepted Accounting Principles |
| GDTPD | General Directorate of Treasury and Public Debt |
| IA | Independent Amount |
| IFRS | International Financial Reporting Standards |
| IPSAS | International Public Sector Accounting Standards |
| IRS | Interest Rate Swap |
| ISDA | International Swaps and Derivatives Association |
| MoPF | Ministry of Public Finance |
| MTDS | Medium-Term Debt Management Strategy |
| MTM | Mark-to-Market |
| NACK | Not-Acknowledged |
| NAV | Net Asset Value |
| NDS | Non-Deliverable Swap |
| OCI | Other Comprehensive Income |
| OIS | Overnight Index Swap |
| OTC | Over-the-Counter (Bilateral Transaction) |
| RAS | Reimbursable Advisory Services |
| sFTP | SSH File Transfer Protocol |
| SWPM | Bloomberg Swap Manager |
| SSI | Standard Settlement Instructions |
| STP | Straight-Through Processing |
| SWPM | Bloomberg Swap Manager |
| TPA | Third Party Administrator |
| UTI | Unique Trade Identifier |

# 1. Introduction & Summary of Recommendations

## 1.1. Background

This Reimbursable Advisory Services (RAS) engagement on the Establishment of a Framework for the Use of Derivatives and the Execution of Swap Transactions in Romania (P156803; task managed by John Balafoutis, World Bank Group) is intended to support the Ministry of Public Finance (MoPF)'s efforts in designing suitable policies and operational frameworks for using hedging instruments (e.g., cross currency and interest rate swaps) as part of the MoPF's public debt management strategy.

The MoPF and the World Bank Group (WBG) entered into a RAS agreement on September 30, 2016 for the WBG to provide technical assistance that is aimed at identifying and closing the gaps in the MoPF's policies, procedures and technical execution capacity for using hedging instruments. The WBG's main counterpart in the MoPF is the General Directorate of Treasury and Public Debt (GDTPD).

The project builds on a prior RAS engagement to assist the MoPF in bringing its debt and cash management practices in line with those of other European Union (EU) countries, and aims to provide additional flexibility to the MoPF in managing its currency and interest rate exposures associated with its public debt portfolio.

The following six components have been identified as key areas of priority for this technical assistance program:

1. Component A: Legal
2. Component B: Pricing and Valuation
3. Component C: Risk Management
4. Component D: Execution
5. Component E: Post-Trade Processes
6. Component F: Training

This report sets out the key operational aspects and options for pre- & post-trade processes as agreed under Component E. It particularly focuses on those operational aspects which are likely to have an impact on key derivatives trade lifecycle events ranging from trade booking, reviews, and documentation as well as valuation and accounting implications.

It follows previous visits by the WBG staff to Bucharest from March 27-31, 2017 and October 23-27, 2017, and by the MoPF staff to Washington, D.C. from June 12-20, 2017 and July 10-18, 2017. The WBG would like to thank staff in the MoPF for their support and hospitality; and for the open and detailed discussions throughout.

It was prepared by Nhi Nu Huyen Nguyen, Mehdi Tabdiliazar, Olga Akcadag, Patrick Cheng, and Weihua Jiang, all WBG staff. The authors wish to thank Qian Li and Wei Chen, also of the WBG, for reviewing this report.

It is based on review of materials prepared by the project team, publicly available information from the official websites of Romania, findings from the WBG and MoPF missions to Bucharest and Washington DC respectively, as well as WBG reports and private industry research.

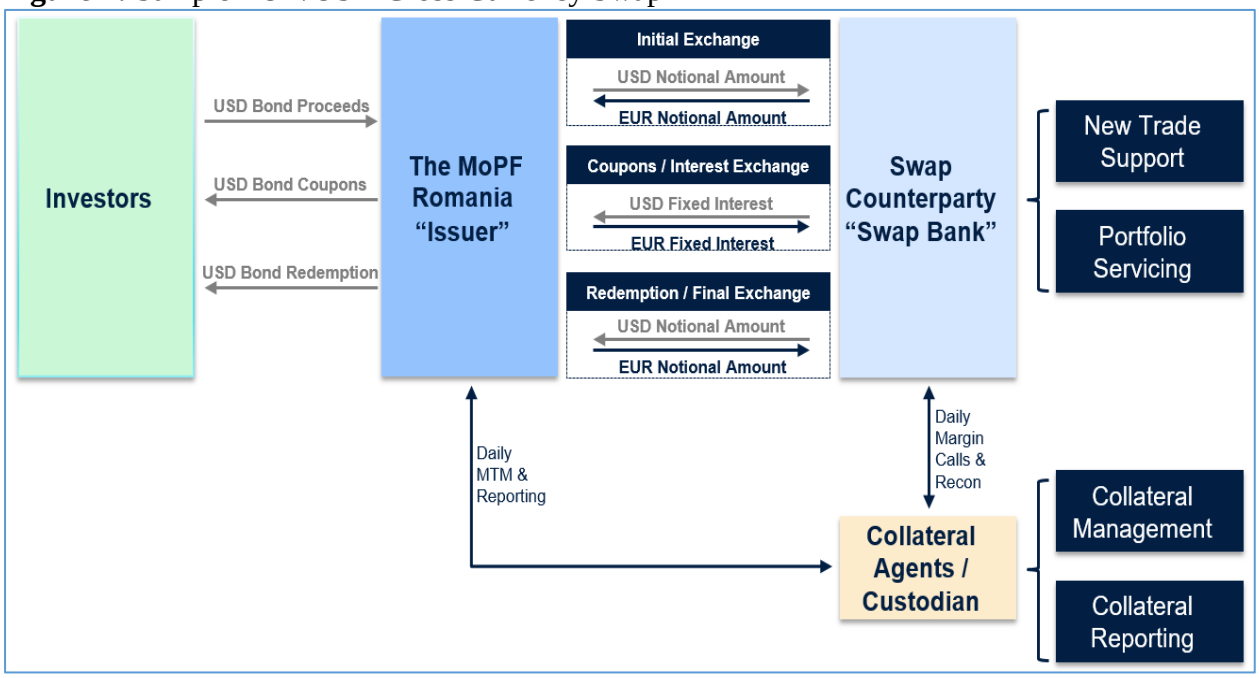
### 1.2. The Context

Romania has been tapping the U.S. Dollar Eurobond market since its debut U.S. Dollar-denominated Eurobond issue in 2012. Currently there are 4 series of U.S. Dollar-denominated Eurobonds in the market with maturities of February 2022, August 2023, January 2024, and January 2044, and total outstanding of USD 5.75 billion, which remains unhedged.

Considering the Romanian Lei's high correlation with EUR, the MoPF is considering to hedge its USD exposure into EUR as a more relevant funding currency. The authorities' medium-term debt management strategy (MTDS) for 2017–19 underpins the need for the use of hedging instruments as the country intends to tap the USD segment of the international capital markets on an opportunistic basis to extend the average maturity of the debt portfolio and diversify the investor base. By using cross currency swaps, the MoPF would be able to continue to tap in USD investor demand in the international capital markets at maturities up to 30 years while maintaining the currency exposure primarily in EUR.

Figure 1 below illustrates the mechanics of a sample EUR/USD cross currency swap that matches USD bond cash flows and converts them into equivalent fixed EUR payments.

**Figure 1:** Sample EUR/USD Cross Currency Swap




To this end, key considerations identified for the MoPF are organized into four groups of themes as follows:

1. **Hedging Strategies – Protection vs. Credit Implication**

    - These hedging instruments are very credit intensive, particularly for long tenors, so understanding the credit exposure and potential mitigants is a key area of focus for the MoPF, in order to strike the right balance between cost, credit capacity, cashflow and liquidity implications vs. level of protection.

2. **Legal**

    - Legal opinions will need to be obtained to confirm the authority, capacity and legal enforceability of the ISDA Master Agreement and Credit Support Annex (CSA) for swaps (also see Output 1: Legal of this RAS engagement).
    - It will require dedicated time and resources to negotiate the associated ISDA Schedule and Credit Support Annex with the selected swap counterparties.

3. **Operational**

    - The roles of Front, Middle, and Back Office functions should be defined, as well as the tools and booking / payment systems needed for the hedging program.

4. **Trade Preparation and Execution**

    - Executing cross currency swaps in large size can potentially adversely affect pricing if not managed properly.

Against this background, the general approach and options suggested in this report draw on the WB Treasury's own operational practices and on international best practices, targeted to the particular characteristics of the Romanian public debt market. However, inevitably, some of the approaches and recommendations presented in this report are not fully developed at this stage owing to a large number of external factors, and thus will require further analysis including market consultations and negotiations at the implementation stage.

The report sections below outline the team's recommendations on pre-trade, swap pricing, trade review considerations, collateral management and derivatives accounting, and a summary of the main recommendations is integrated with a detailed table in Section 1.4 below. An excerpt of the ISDA Best Practice Guidelines are presented in the Annex.

### 1.3. Overview of Swaps[1]

The origins of the swap market can be traced to the late 1970s, when currency traders developed currency swaps as a technique to evade British controls on the movement of foreign currency. The first interest rate swap was executed in 1981 between the WB and IBM. Since then, the swaps market has grown rapidly, and is now occupying a central position in derivatives markets.

A swap is an agreement between two or more parties to exchange sets of cash flows over a period in the future. The parties that agree to the swap are known as counterparties. The agreement defines the dates when the cash flows are to be paid and the way in which they are to be calculated. Usually the calculation of the cash flows involves the future value of an interest rate, an exchange rate, or other market variable. Therefore, the two most common and basic types of swaps are "plain vanilla" interest rate swaps (IRS) and cross currency swaps (CCS).

#### 1.3.1. Interest Rate Swaps

[1] Options, Futures, & Other Derivatives by John C. Hull, and Futures, Options & Swaps by Robert W. Kolb.

In a plain vanilla IRS, one party agrees to pay the other party cash flows equal to interest at a predetermined fixed rate on a notional principal for a predetermined number of years. In return, it receives interest at a floating rate on the same notional principal for the same period of time.

The notional principals are not exchanged, but instead, the principal plays a conceptual role in determining the amount of interest payments and is used as a base of computations for mark-to-market (MTM) valuation and accounting accruals. Generally, only the net payment, or the difference between the two obligations, actually takes place at each predetermined payment date.

IRS can be used to transform a liability from fixed rate to floating rate, or vice versa. They can also be used to transform an investment from fixed rate to floating rate, or vice versa.

### 1.3.2. Cross Currency Swaps

In a plain vanilla CCS, one party agrees to pay interest on a principal amount in one currency. In return, it receives interest on a principal amount in another currency.

CCS involves exchanging principal and interest payments in one currency for principal and interest payments in another. A CCS agreement requires the principal to be specified in each of the two currencies. The principal amounts are usually exchanged at the beginning and at the end of the life of the swap, they are also used as a base of computations for MTM valuation and accounting accruals. Usually the principal amounts are chosen to be approximately equivalent using the exchange rate when the swap is executed. When they are exchanged at the end of the life of the swap, their values may be quite different.

CCS can be used to transform a liability in one currency into a liability in another currency. They can also be used to transform an investment denominated in one currency to an investment in another currency.

### 1.3.3. Types of Swap Structures

Different swap structures can be used as interest rate swaps and or cross currency swaps:

1. **Fixed-to-Floating Swaps:** A Fixed-to-Floating IRS is an IRS for which settlement is in the form of periodic fixed interest payments against a stream of periodic floating interest payments over a given term until maturity. The interest rate payments are exchanged for a specified period based on a defined notional amount.

2. **Basis Swaps:** A Basis Swap is an IRS for which settlement is in the form of periodic floating interest payments against other periodic floating interest payments based on interest rate benchmarks over a term until maturity. The interest rate payments are exchanged for a specified period based on a defined notional amount.

3. **Non-Deliverable Swaps (NDS):** NDS typically refers to a non-deliverable CCS where the two legs include a major currency and a non-convertible currency. Periodic interest amount of the two legs are exchanged and converted into a major currency for net settlement after fixing. NDS can also refer to a non-deliverable IRS, with similar features to IRS, except that the interest rate cash flows are net settled in a major currency on fixing date.

4. **Overnight Index Swaps (OIS):** An OIS is an IRS for which settlement is in the form of periodic fixed interest payments against periodic floating interest payments based on an overnight rate being exchanged for a fixed interest rate over a term to maturity. The interest rate payments are exchanged for a specified period based on a defined notional amount. OIS are popular among financial institutions for the following reasons: (1) overnight index is considered to be a good indicator of the interbank credit markets, and (2) they are less risky than other traditional interest rate swaps.

### 1.3.4. Swap Terminology

| **Trading Conventions** | |
|---|---|
| Buyer (Payer) pays fixed interest rate and receives floating interest rate. | |
| Seller (Receiver) receives fixed interest rate and pays floating interest rate. | |
| **Key Economic Terms** | |
| **Spot Starting** | A swap whose Effective Date is 2 business days from the Trade Date (T+2). |
| **Forward Starting** | A swap whose Effective Date is anything after the Effective Date for a Spot Starting swap. |
| **Same Day Starting** | A swap whose Effective Date is the same as the Trade Date (T+0). |
| **Effective Date** | The first date from which fixed and floating interest amounts accrue. It is also referred to as the Start Date or the Value Date. The Effective Date of the Swap must be a business day subject to the appropriate Business Day Convention. |
| **Maturity Date** | The final date until which Fixed and Floating amounts accrue. |
| **Roll Day Convention** | The date used for determining all fixed and floating Reset Dates. Roll Days define the beginning and end of Fixed and Floating interest accrual periods. |

| **Fixed Leg Conventions** | **Floating Leg Conventions** |
|---|---|
| **Payment Frequency**<br>Monthly, Quarterly, Semi-Annually, or Annually. | **Reset Frequency**<br>Monthly, Quarterly, Semi-Annually, or Annually. |
| **Day Count Convention**<br>• Actual/360, Actual/365, 360/360, 30/360, 30E/360, Actual Fixed/365, Actual /366, or Actual/Actual. | **Day Count Convention**<br>• Actual/360, Actual/365, 360/360, 30/360, 30E/360, Actual Fixed/365, Actual /366, or Actual/Actual. |
| **Holiday Calendar**<br>• Applied in accordance with the country currency denoted for the instrument. | **Holiday Calendar**<br>• Applied in accordance with the country currency denoted for the instrument. |
| **Business Day Convention**<br>• Modified following with adjustment to period end dates. Business days in this convention must be valid business days for the countries denoted by the currency. | **Business Day Convention**<br>• Modified following with adjustment to period end dates. Business days in this convention must be valid business days for the countries denoted by the currency.<br>• If not, it will be the next day that is a business day on both calendars. |

| | |
|---|---|
| • If not, it will be the next day that is a business day on both calendars. | |
| **Fixed Rate**<br>• Interest rate yield or basis points on Trade Date. | **Interest Rate Benchmark**<br>• EBOR, BBSW, LIBOR, EURIBOR, CIDOR, PRIBOR, CIBOR2, BUBOR, TELBOR, NIBOR, BKBM, WIBOR, STIBOR, JIBAR, SAIBOR, TIBOR, CZEONIA, TRLIBOR, MOSPRIME |
| | **Floating Reset Dates**<br>• Dates utilized to determine the Floating Rate amounts for each interest accrual period during the Tenor of the contract. Except in the case of a Stub Period, the Reset Date is aligned with the floating rate frequency as determined. |
| | **First Period Fixing Date**<br>• For Spot Starting swaps, Interest Rate for the first interest period is fixed on the Trade Date, for both Floating and Fixed Rates.<br>• For Forward Starting swaps, the Fixed Rate for the first interest period is fixed on the Trade Date, and the Floating Rate for the first interest period is fixed 2 business days prior to the first floating payment date, taking into account agreed non-working days. |
| | **Stub Period Rate**<br>• For swaps with partial year Tenors, an interest period that is shorter than the standard underlying Floating index interest periods may occur between the Effective Date and the first or last Roll Date (knows as a Stub Period).<br>• In these cases, Interest Rate for such Stub Period is determined using linear interpolation based on the two index rates that surround the Stub Period. |

### 1.4. Summary of Recommendations

The table below brings together the recommendations of this report, followed by a more thorough explanation of each component. As mentioned above, timings in this table are highly uncertain at this stage and should be reviewed and ascertained during implementation.

| Recommendations | Responsible Units | Timing* |
|---|---|---|
| **Section 2: Pre-Trade Considerations** | | |
| • To proceed with the establishment of a derivatives hedging program, develop a project plan that identifies sequencing and | • Front and Middle Offices | • Short Term |

| | | |
|---|---|---|
| priorities, and defines the functional roles and responsibilities of all related stakeholders. | | |
| • Obtain the necessary organizational approvals for the staff resources and its segregating roles prior to trade execution. | • Front, Middle, Back Offices and Legal | • Short Term |
| • Establish a pre-trade timeline and procedures checklist to develop a role-based workflow. | • Middle Office | • Short Term |
| • Incorporate interactions with all related internal parties, i.e. Front Office, Middle Office, Back Office, Credit, Legal, IT, and Accounting, and external parties e.g., Swap Counterparties, Regulators, Collateral Agents, Custodians, and Fiscal Agents. | • Middle Office, with Front Office to support any external coordination | • Short Term |
| • Engage with Legal team to prepare for the ISDA Master Agreement and Credit Support Annex negotiations. | • Front, Middle Offices and Legal | • Short Term |
| • Formulate an acceptable credit risk framework to evaluate credit exposures against new swap counterparties. | • Middle Office | • Medium Term |
| **Section 3: Swap Pricing and Valuation** | | |
| • Contact other EU countries that are using FTI STAR for swap pricing and valuation to study their setup and challenges. | • Middle Office | • Short Term |
| • Automate market data flow from market data vendors to FTI STAR application. | • Middle Office | • Short Term |
| • Decide on Libor vs. OIS discounting based on FTI STAR application capabilities and discussions with other EU countries that are using FTI STAR. | • Middle Office | • Medium Term |
| • Provide Bloomberg Terminal access to Middle Office staff. | • Middle Office | • Medium Term |
| • Setup and validate various USD and EUR interest rate yield curves utilizing FTI STAR application. | • Middle Office | • Medium Term |
| • Put in place swap pricing and valuation framework for any existing and new market data. | • Middle Office | • Long Term |
| **Section 4: Trade Review Considerations** | | |
| • Provide the necessary static data and enforce the responsibilities at each stage of the derivatives trade lifecycle. | • Middle Office | • Short Term |
| • Brainstorm the trade review checklist and validate the necessary trade data entries in FTI STAR's derivatives trade capturing module. | • Front and Back Offices | • Short Term |
| • Decide whether to operationalize derivatives electronic affirmation platform, | • Front and Back Offices | • Short Term |

| | | |
|---|---|---|
| or to institute paper-based ISDA confirmation workflow. | | |
| • Engage swap counterparties (with signed ISDA MA) to confirm operational contacts and preferred methods for derivatives affirmations and pre-settlement confirmations. | • Back Office, with support from the Front Office | • Short Term |
| • Institute an agreeable Service Level Agreements (SLA) between the Front and Back Offices on trade booking and amendment processes, also SLA between Middle and Back Offices on settlement and collateral exchanges. | • Front, Middle and Back Offices | • Short Term |
| • Establish a robust monitoring process to alert Front and Back Offices on the credit events, which may affect the trading and settlement of the swap counterparty. | • Middle Office | • Medium Term |
| **Section 5: Collateral Management for Non-Cleared Derivatives** | | |
| • Form a dedicated and adequately staffed Collateral Management Operations. | • Middle Office | • Short Term |
| • Utilize the existing functionalities within FTI STAR Collateral Module to design a workflow with minimal manual intervention. | • Front, Middle, Back Offices and Collateral Custodian | • Short Term |
| • Put in place a CSA Data Depository. | • Middle Office | • Short Term |
| • Put in place procedures for new CSA onboarding, daily operations, dispute resolution and collateral fail resolution. | • Middle and Back Offices | • Short Term |
| • Identify the operational procedures for tracking the mark-to-market valuation of each derivatives to ensure accurate valuation is passed down to the payment systems for collateral margining purpose. | • Middle and Back Office | • Medium Term |
| • Move to daily margin calculation and portfolio reconciliation. | • Front, Middle, and Back Offices | • Medium Term |
| • Make use of robust technology for portfolio reconciliation and reporting. | • Middle Office | • Medium Term |
| • Consider collateral rehypothecation and optimization strategies as eligible collateral expands. | • Front and Middle Offices, Collateral Custodian | • Medium Term |
| • Conduct studies of Collateral Management solutions / technologies / vendors to either upgrade, replace, or outsource existing infrastructure. | • Front, Middle, Back Offices and Collateral Custodian | • Long Term |
| **Section 6: Accounting for Derivatives** | | |
| • Understand FTI STAR Accounting Module and its logic of setting up accounting rule. | • Back Office Treasury Accounting | • Short Term |

| | | |
|---|---|---|
| • Contact other EU countries who are using FTI STAR to share commonalities / similarities. | • Back Office and Central Accounting | • Short Term |
| • Determine Accounting principle in accounting for derivatives. | • Back Office and Central Accounting | • Short Term |
| • Determine the adoption of accounting and reporting standards. | • Back Office and Central Accounting | • Short Term |
| • Allocate reasonable amount of resources working at Back Office to monitor FTI STAR accounting sub-ledger. | • Back Office and Central Accounting | • Short Term<br>• |
| **Section 7: Operational Risk Management** | | |
| • Understand the front-to-end business processes together with the affected business units and process control units. | • Front, Middle and Back Offices | • Short Term |
| • Identify and categorize operational risks relating to the hedging activities. | • Front, Middle and Back Offices | • Medium Term |
| • Establish risk scales for each operational risk and validate the assessment results with subject matter experts and senior management for clearance. | • Middle Office | • Medium Term |
| • Determine key risk indicators to track and manage collateral and settlement risks. | • Middle and Back Offices | • Medium<br>• Term |
| • Monitor the assessed risks and report to senior management on a regular basis. | • Middle Office | • Medium Term |

* Note: Short Term (3 months to 1 year), Medium Term (1 to 3 years), Long Term (3 to 5 years)

## 2. Pre-Trade Considerations

A derivatives program is typically organized with respect to functional roles and responsibilities with a Front, Middle, and Back Office structure. Internal controls are provided by Accounting, Credit, and Operational Risk Management units. Segregation of responsibilities into specific working groups enables the program to run efficiently and help reduce operational risk. Depending on organizational structure and resource availability, typical responsibilities include:

1. **Front Office:** Negotiation, pricing, execution & trade booking, liquidity management, and collateral optimization.

2. **Middle Office:** Pre-trade solutions, trade support, valuation, collateral management, and options monitoring.

3. **Back Office:** Debt service, rate fixing, trade verification, accounting and reconciliation.

Several internal procedures must be established prior to trading with a new swap counterparty. Clearly defining pre-trade procedures and establishing a role-based workflow is an essential necessity to onboard a new swap counterparty efficiently and in accordance with governance safeguards. Although not directly responsible for fulfilling all aspects of the required procedures, Operations (within GDTPD, the Middle Office with the help of the Back Office) is in a key position to coordinate among the various internal and external actors.

Establishing a pre-trade timeline and procedures checklist will assist Operations in ensuring all pre-trade requirements are properly met. Figure 2 below illustrates the interactions of all relevant internal parties, i.e. Front Office, Middle Office, Back Office, Credit, Legal, Information Technology (IT), and Accounting. External coordination such as with the Swap Counterparties, Regulators, Collateral Agents, Custodians, and Fiscal Agents should also be considered. Figure 2 also demonstrates key players and steps needed to onboard and begin trading with a new counterparty, where:

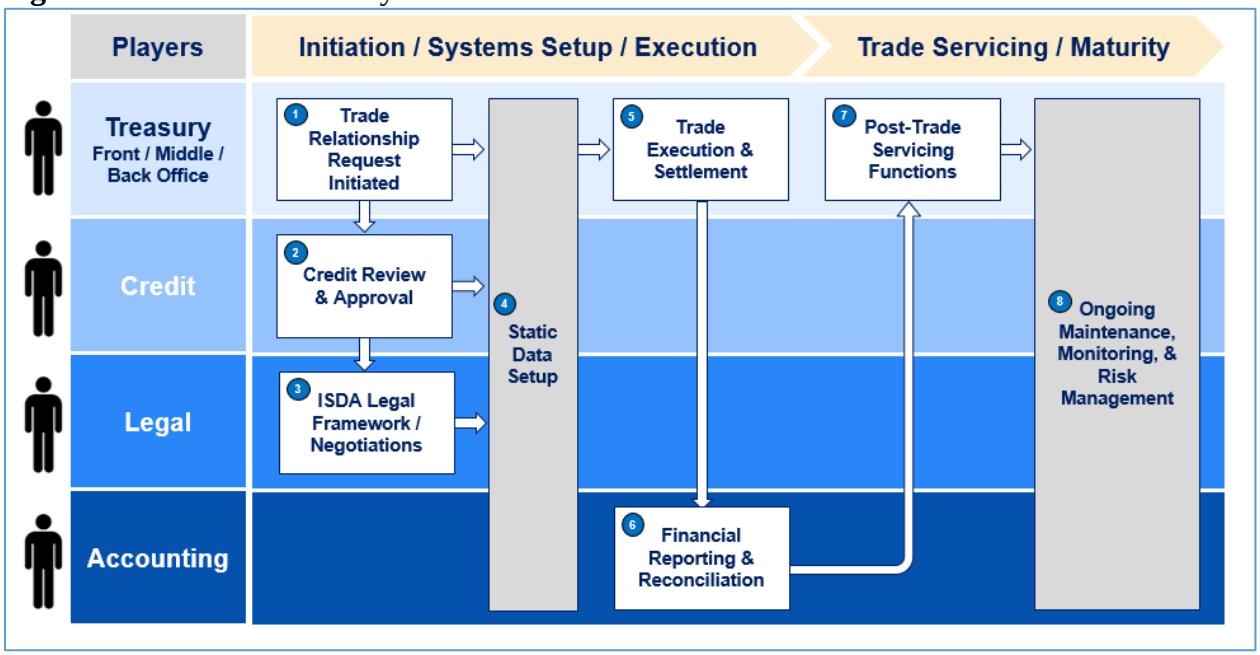
- **Trade Execution Staff:** Employees entering into OTC (Over-the-Counter) derivatives trades housed in the Front Office, including: traders, marketers, sales, trade assistants, structurers, and business managers.

- **Trade Capture Staff:** Employees, whose primary function is to book, amend, and release all trade events into the trade capture and operations systems, should be housed in the Front Office. Additional responsibilities may include liaising with Back Office to investigate queries and Unrecognized Trades, static data maintenance, options exercise and expiry monitoring, and calculating coupon and fee payments.

- **Settlement Staff:** Employees from the Back Office performing settlement functions, including pre-matching, investigation and reconciliation of settlement fails, and cash settlement breaks.

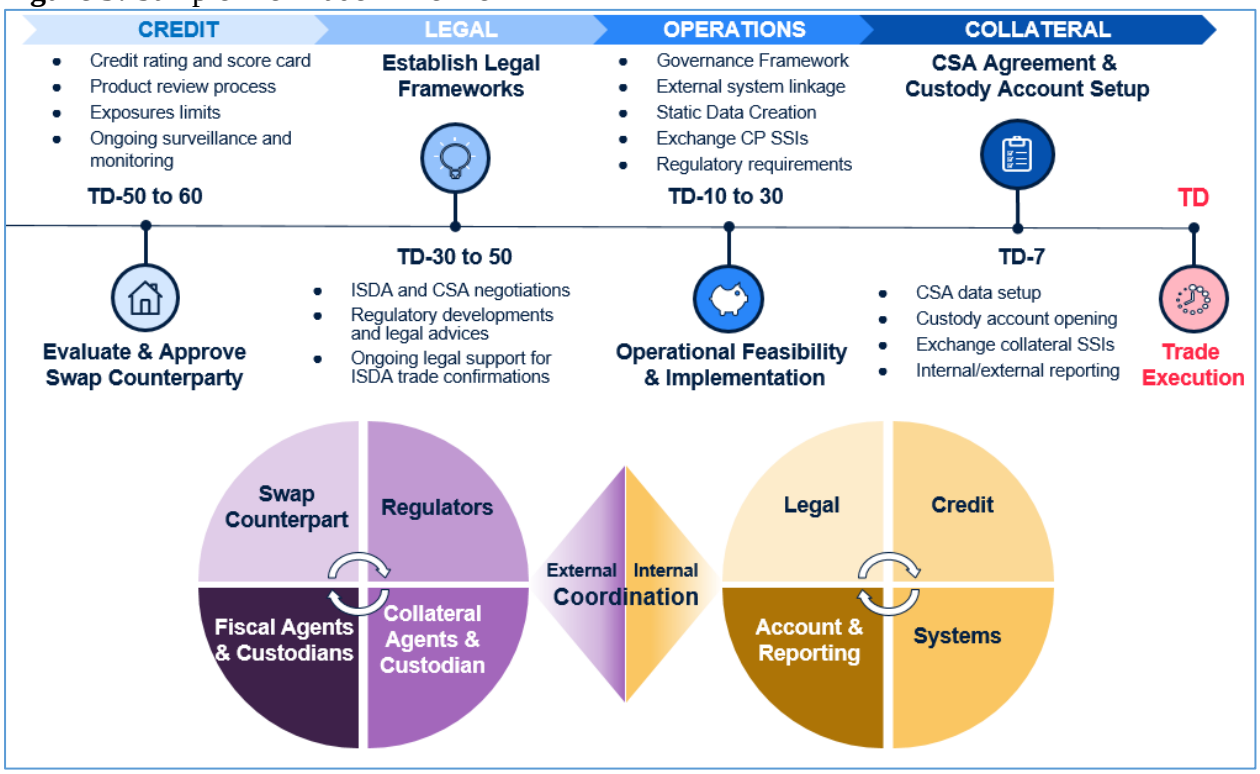
- **Third Party Administrators (TPAs):** TPAs, typically external entities, handle Middle and Back Office functions. TPAs also use third parties to provide independent valuations for trades, including OTC portfolios and clearing advisory. Typically used by buy-side firms with large trading volumes.

**Figure 2:** Pre-Trade Summary



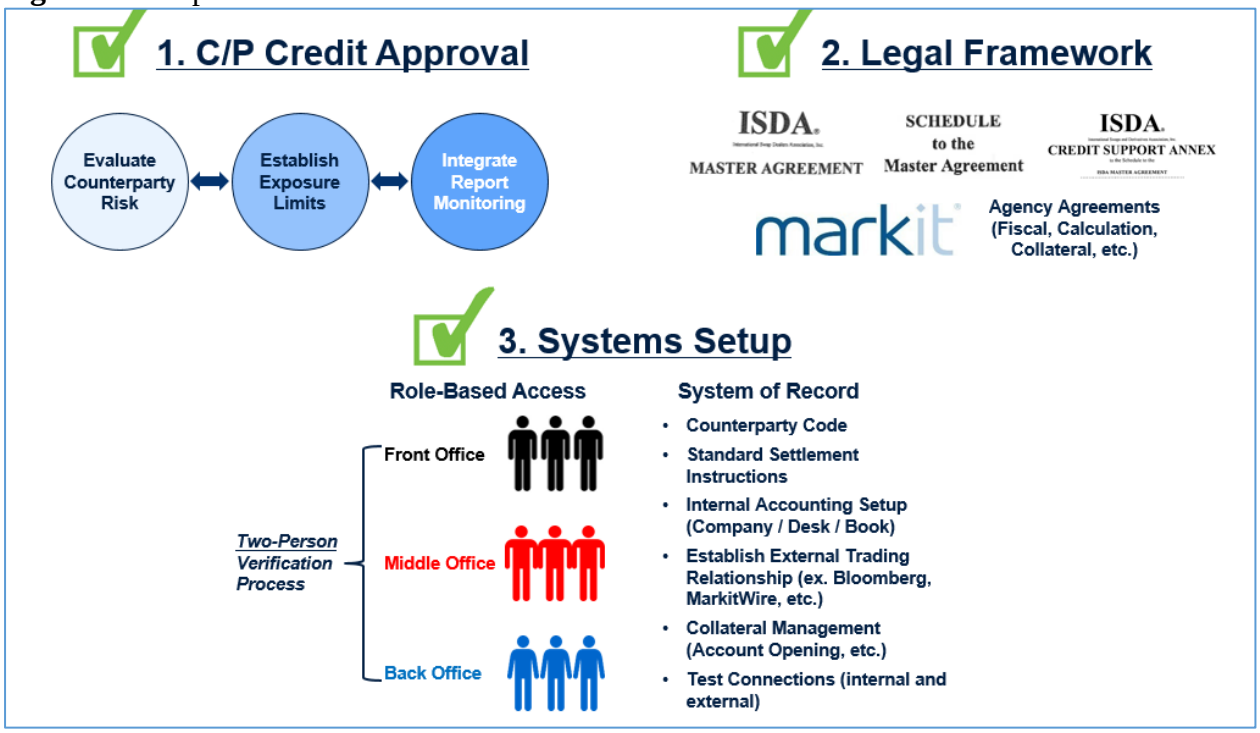

A sample pre-trade timeline and procedures checklist is provided below in Figures 3 and 4, and a more thorough explanation of each component follows.

**Figure 3:** Sample Pre-Trade Timeline




Note: TD means Trade Date

**Figure 4:** Sample Pre-Trade Procedures Checklist




## 2.1. Counterparty Credit Approval

Before any trading can take place with a new counterparty, the Credit department or unit (Credit) must approve the trading relationship and clearly define its limitations. Considerations include, but are not limited to:

- Evaluating counterparty risk,
- Establishing aggregate exposure limits, and
- Formulating credit policy and monitoring credit conditions.

Credit should conduct a full review of a counterparty's credit quality, on a regular basis, by evaluating its default and liquidity risks, both of which contribute to a counterparty's inability to make payment which results from potential credit default and liquidity problems. Internal metrics as well as third-party research, such as ratings agency reports, should aid in the decision to grant a trading relationship.

Credit should also establish aggregate exposure limits for each counterparty and ensure all reporting channels reflect up-to-date and accurate exposures. By imposing total credit limits, the magnitude of losses resulting from default scenarios can be lessened. Imposing credit limits provides necessary trading limitations that can protect the wellbeing of the institution should an individualized or macro-related crisis occur. The exposure limits should reflect several factors including the counterparty's credit quality and the volatility of the underlying traded instrument.

Credit has the primary responsibility to monitor credit conditions between counterparties and communicate changes to credit policy, i.e. halting trading, changing limits, or stopping payment outflows to the counterparty etc. These changes must be distributed quickly to all stakeholders.

Back, Middle, and Front Offices should be part of Credit's monitoring reports distribution list, and teams should consistently review such reports for any significant changes. Without efficient internal credit reporting mechanisms in place, the institution may be exposed to significant and costly risks.

### 2.2. Legal Framework

In parallel with obtaining credit approval, Operations should coordinate with Legal, Middle and Front Offices to put in place the framework under which all swap transactions will be documented. The market standard documentation is provided by the International Swaps and Derivatives Association (ISDA). Three documents comprise the critical framework for swaps and derivatives:

- ISDA Master Agreement,
- ISDA Schedule to the Master Agreement, and
- ISDA Credit Support Annex.

The ISDA Master Agreement outlines standard terms that are applicable to derivatives transactions with the counterparty. Although the Master Agreement does not include all legal terms and conditions that Legal normally would include in contracts, these definitions can be amended from time to time in the form of ISDA Supplements. Amendments, however, do not take place in the ISDA Master Agreement — which contains boilerplate language. Instead, amendments are captured in the ISDA Schedule to the Master Agreement.

The ISDA Schedule to the Master Agreement accompanies the ISDA Master Agreement and is a negotiable contract. Terms exclusive to the Schedule include termination event definitions — the conditions by which either party can exit or terminate the swap. It is critical that Legal coordinate with Credit to define applicable termination events (downgrade

scenarios, default types, etc.) in accordance with Credit's risk tolerance concerning the counterparty.

In conjunction with the Schedule, the ISDA Credit Support Annex is a negotiable document that stipulates the terms and conditions by which two parties are required to post collateral to each other. This document specifies terms such as eligible collateral, threshold limits, minimum transfer amounts, independent amounts, haircuts to posted collateral, collateral substitutions, valuation frequency, notice and transfer times, rehypothecation and interest terms, and dispute resolution procedures. The terms of the CSA should be thoroughly discussed with Credit and updated conventions should be incorporated. For instance, although cash often has been considered preferred collateral, this preferential status has been under scrutiny as central banks have implemented negative interest rate policies in the last few years. As a result, ISDA issued a Negative Interest Rate Protocol in 2014 to allow counterparties to amend CSA terms to correct for these market anomalies.

Other third-party agreements also should be executed prior to trading. These typically include:

- Fiscal Agency Agreements,
- Custodial Agreements, and
- Protocol & Collateral Management and Trading Platforms.

Fiscal Agency Agreements explicitly define primary fiscal agent functions for the MoPF's Eurobond issuances, including:

- **Issuing Function:** Issues securities to the market and receives corresponding payments from the Dealer on the Issue Date.

- **Paying Function:** Accepts payments from the issuer and then distributes principal and interest to bondholders.

- **Registrar Function:** Maintains registered security holder records and transfers from one holder to another.

- **Transfer Function:** Maintains records and sends out proxy materials and other communications to owners.

- **Exchange Function:** Instructs the execution of conversion or exchanges of securities.

- **Calculation Function:** Processes and disseminates coupon rate fixing or redemption information.

Although these fiscal agency roles will likely continue to be performed by the selected dealer bank at each Eurobond issuance, the MoPF should ensure that the selected dealer bank is willing and able to take on these roles, especially in light of the MoPF's new swaps program. For example, information provided by the fiscal agent should be cross-checked against those provided by the swap counterparty. For instance, if the confirmation states that the counterparty will be the calculation agent for the swap, the MoPF should compare the calculations provided by the swap counterparty against the calculations provided by the fiscal agent on the related bonds. This comparison allows for independent validation of the underlying instruments and provides a system of checks and balances.

Custodial Agreements are contractual and fee-based services in which the custodian affirms trade instructions from the customer against the depository. Primary services include:

- **Safekeeping Function:** Maintains the safety of assets held at the custodian's / sub-custodian's facility or outside depository.
- **Settlement Function:** Reviews trade instructions from depository and matches the information to client instructions.
- **Security Servicing Function:** Prices and executes interest and principal payments, corporate actions, etc.
- **Segregate Accounts Function:** Maintains records and controls to ensure assets kept separate from assets of the custodian.
- **Global Custody Function:** Provides services for cross-border securities transactions via sub-custodians in local markets.
- **Record Keeping & Reporting:** Accepts payments from the issuer and then distributes principal and interest to bondholders.

Custodial Agreements for collateral related services should be included in the documentation and cover essential custodial functions. The custodian not only should agree to maintain the safety of the assets but ensure that segregated accounts are being maintained. The custodian should also provide security servicing functions and assist with settlement related to substitutions, rehypothecations, etc.

Finally, third-party vendor agreements including Protocol & Collateral Management and Trading Platforms should be established to ensure the transaction lifecycle from trade execution to trade termination is fully met. All agreements with third party vendors, must adhere to the framework established by Legal. These agreements often are written as contracts between dealer banks or end-users and may be tailored to commercial banking standards. Thus, Legal should review and amend these documents to fit the MoPF's overall legal framework.

Additionally, as a governmental agency, certain legal restrictions regarding reporting, etc. may not be applicable to the MoPF. These exemptions should be included in the third-party vendor agreements so that trades executed with counterparties include the appropriate legal framework. For instance, if the MoPF decides to utilize the MarkitWire platform, their onboarding setup and legal documentation should explicitly show clearing exemptions when affirming trades.

### 2.3. Systems Setup

Proper internal system setup is vital to ensure appropriate user access, system functioning, and financial reporting. Operations should coordinate with Information Technology and Accounting teams to establish correct system configurations.

From a top-down perspective, the configuration should begin in accordance with the legal framework and integrate reporting considerations further downstream. For instance, after legal documentation is in place, the internal booking system should be updated with the counterparty's information e.g., legal entity name, branch address, and standard settlement

instructions, etc. Although financial reporting does not distinguish between individual counterparties, accounting books should be streamlined by reporting channels. This includes allocating books to one work program and identifying key members of the trading team who should be given access to these books. Middle and Back Office staff should have access to all books and entities.

When providing system access, the system should accommodate role-based access controls. For example, as illustrated in Figure 5, if the execution function is part of the duties of the Front Office, staff in this department should not be able to verify their trades as well. Instead, Middle or Back Office staff should have the exclusive access right to move a trade from pending status to verified status. Vice versa, Middle and Back Office staff should not have the systems access to book a trade, as this access resides exclusively with the Front Office.

**Figure 5:** Systematized Segregation of Job Duties (i.e. Role-Based Access Controls)


This point cannot be understated as smaller operations with less staff may be inclined to allow users multiple roles for the sake of efficiency. The role-based approach enables proper access for each user and systematizes on-paper trading policies. Procedures for establishing role-based access controls include:

1. **Define Roles:**

    - Identify job functions,
    - Identify applications and systems related to each job function,
    - Identify the specific permissions for each job function,
    - Define roles and assign role owners, and
    - Identify and implement applicable organizational policies.

2. **Assign Roles:**

    - Determine job functions for individual, and
    - Assign relevant roles.

3. **Manage Roles:**

    - Review role permissions and onboard new applications,

- Identify areas for efficiency and roles no longer needed, and
- Modify / create new roles and delete unnecessary roles.

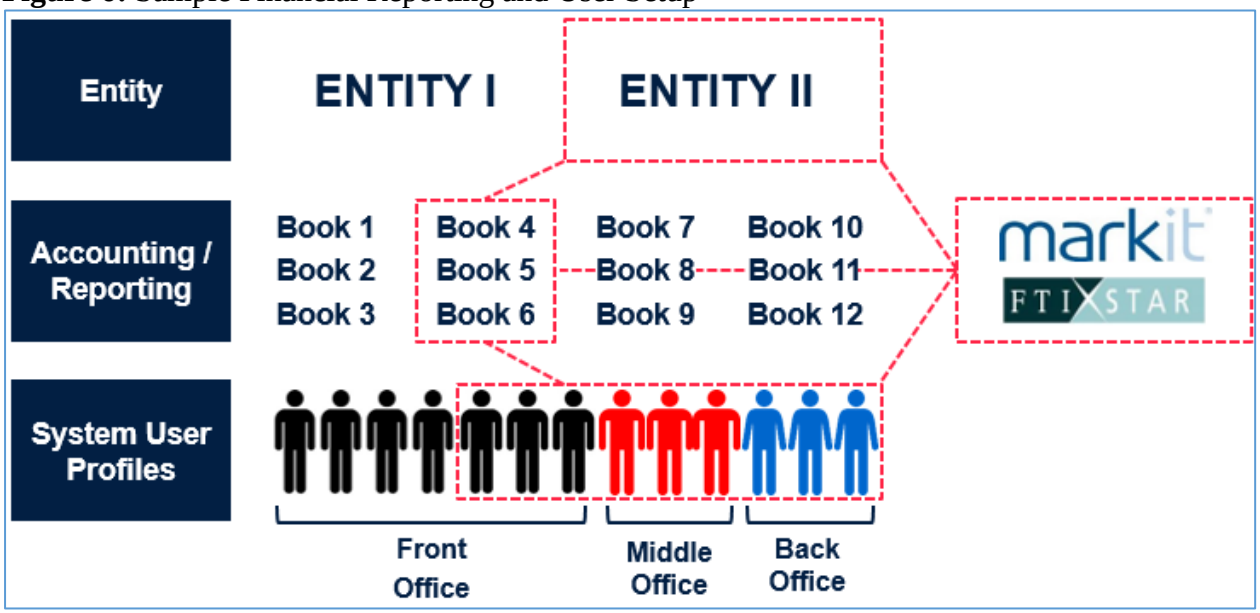
4. **Audit Roles:**

- Periodically re-certify role definitions and compositions,
- Modify / create new roles and delete stale roles as needed,
- Periodically re-certify role assignments, and
- Reassign users or remove roles from users as needed.

When a trade is booked, it should be flagged such that it flows to downstream systems appropriately. This requires aligning the needs of robust accounting and reporting, which can be accomplished by assigning the appropriate reporting books to particular users and entities.

The Issuing Entity, Book, and User system profiles all should align with given responsibilities to limit the misreporting of trades. Utilizing books helps not only with reporting needs but with valuation processes. Figure 6 below illustrates this relationship.

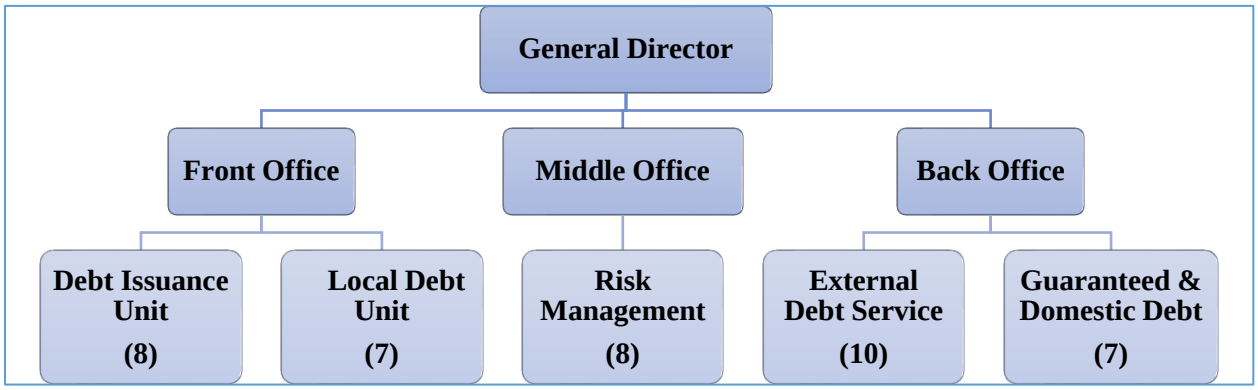
**Figure 6:** Sample Financial Reporting and User Setup




## 2.4. Current Arrangements and Issues Arising

The GDTPD's core debt management responsibilities are currently organized with a Front, Middle, and Back Office structure, following international best practice. There are currently 40 staff in post, as of July 2017. The GDTPD's organizational structure with headcounts in each unit is illustrated in Figure 7 below.

**Figure 7:** GDTPD Organizational Structure




Although public debt management coordination structures and processes are largely in place, previous reports and discussions with some members of the GDTPD have drawn attention to a number of challenges related to institutional arrangements, and the numbers and skills levels of staff. The recommendations of this report will likely put further pressure on resources and the skill base. There are other challenges arising from lengthy approval processes currently in place that may likely have an impact on execution timelines and related trade lifecycle events**.**

Systems setup will unlikely require any major modifications or new system investments, and likely only be limited to creating new procedures, database support, and communication channels etc., as indicated above in the Summary of Recommendations section. As the number of transactions increases over time, enhanced processing capabilities may be needed to minimize the potential risk of human error. At the moment, FTI STAR appears to have much of these capabilities, but its extent has yet to be tested with transactions.

## 3. Swap Pricing and Valuation

### 3.1. Swap Valuation Overview

As explained in greater detail in Section 1, a swap is an agreement to exchange one set of future cash flows for another. Cash flows are for a defined period and if needed can be customized. There are many different types of swaps: currency, interest rate, commodity and credit default swaps etc. For the purposes of this document we will only focus on pricing and valuation of cross currency and interest rate swaps.

#### 3.1.1. Pricing of Cross Currency Swaps

To price and value a cross currency swap properly, each leg's cash flow needs to be projected and discounted using appropriate swap yield curves and discount factors depending on each market as well as preference for LIBOR or OIS discounting. For example, to value USD/EUR Fixed-Fixed cross currency swap illustrated in Figure 8 internally, swap yield curves and discount factors listed below need to be setup and generated utilizing FTI STAR application. We will discuss best practices for building each yield curve in more detail in sections to follow.

**LIBOR Discounting:**

- **EUR 3M EURIBOR:** EUR 3M EURIBOR discount factors (zero rates) to discount the EUR leg cash flow.
- **USD 3M LIBOR:** USD 3M LIBOR discount factors (zero rates) to discount the USD leg cash flow.
- **USD/EUR Basis Curve:** USD/EUR basis spread points to build on top of USD 3M LIBOR to discount the USD leg cash flow (assuming EUR as funding currency).

**OIS Discounting:**

- **EUR OIS Curve:** EUR OIS discount factors (zero rates) to discount the EUR leg cash flow.
- **USD OIS Curve:** USD/EUR basis adjusted USD OIS discount factors (zero rates) to discount the USD leg cash flow.

Let's assume the MoPF issues a 5-year USD 10 million 3% fixed rate bond paid semi-annually. This USD liability can be converted into EUR by entering into a Fixed-Fixed USD/EUR cross currency swap. At inception, the MoPF pays USD 10 million raised from the bond issuance to the swap counterparty, and receives EUR 8.4 million (based on the spot FX rate at inception). During the life of the swap, the MoPF pays 0.15% interest on the EUR notional (EUR 8.4 million) annually to swap counterparty, and receives 3% interest on the USD notional (USD 10 million) semi-annually from the swap counterparty to pays to the bond investors. At maturity, the MoPF receives the USD 10 million from the swap counterparty and redeems the bond at par. The MoPF pays back EUR 8.4 million to the swap counterparty. In the end, the MoPF are effectively converting the USD bond (liability) into a synthetic EUR bond (liability).

Bloomberg Swap Manager (SWPM) is a tool that can be utilized to price over-the-counter derivatives contracts, so users can accurately quantify your market exposures for a wide range of vanilla and exotic interest-rate swaps and other derivatives. Using an exhaustive list of pre-trade analytical tools, user can analyze and update curves and cash flows, as well as perform risk and scenario analyses for the entire deal or individual legs.

Figures 8 and 9 below illustrate this Fixed-Fixed cross currency swap setup and associated cash flows using Bloomberg Swap Manager "SWPM <GO>".

**Figure 8:** CCS Example on SWPM

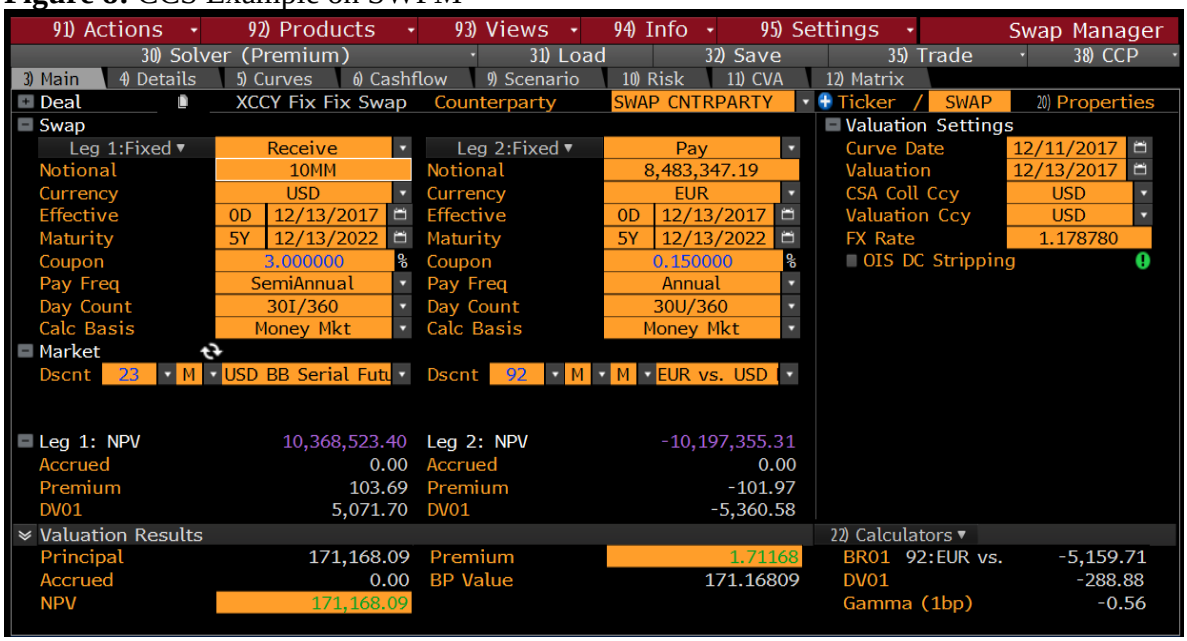
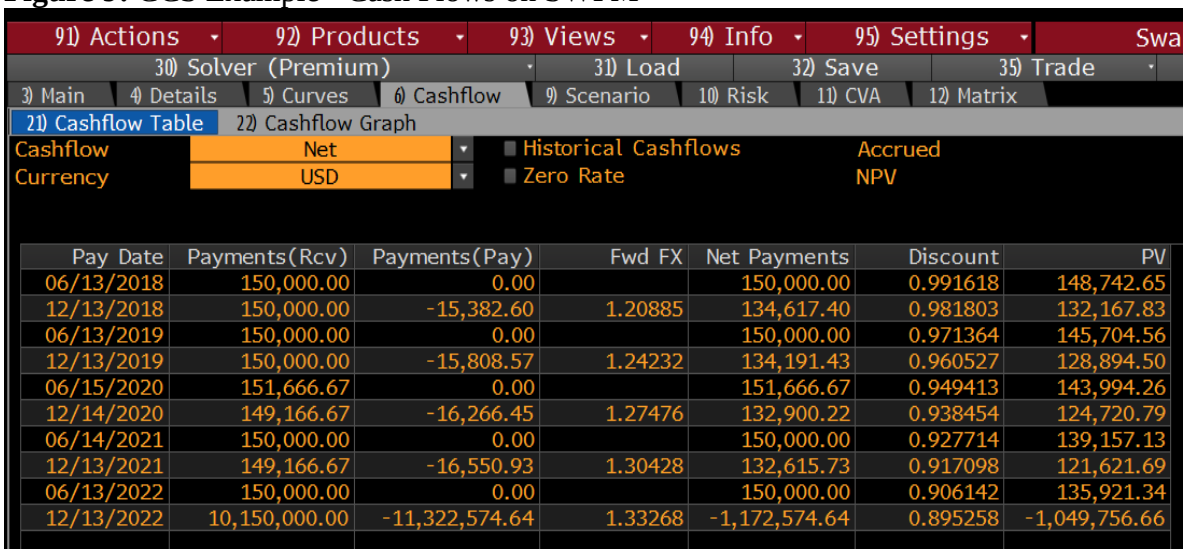



**Figure 9:** CCS Example - Cash Flows on SWPM




| Pay Date | Payments(Rcv) | Payments(Pay) | Fwd FX | Net Payments | Discount | PV |
|---|---|---|---|---|---|---|
| 06/13/2018 | 150,000.00 | 0.00 | | 150,000.00 | 0.991618 | 148,742.65 |
| 12/13/2018 | 150,000.00 | -15,382.60 | 1.20885 | 134,617.40 | 0.981803 | 132,167.83 |
| 06/13/2019 | 150,000.00 | 0.00 | | 150,000.00 | 0.971364 | 145,704.56 |
| 12/13/2019 | 150,000.00 | -15,808.57 | 1.24232 | 134,191.43 | 0.960527 | 128,894.50 |
| 06/15/2020 | 151,666.67 | 0.00 | | 151,666.67 | 0.949413 | 143,994.26 |
| 12/14/2020 | 149,166.67 | -16,266.45 | 1.27476 | 132,900.22 | 0.938454 | 124,720.79 |
| 06/14/2021 | 150,000.00 | 0.00 | | 150,000.00 | 0.927714 | 139,157.13 |
| 12/13/2021 | 149,166.67 | -16,550.93 | 1.30428 | 132,615.73 | 0.917098 | 121,621.69 |
| 06/13/2022 | 150,000.00 | 0.00 | | 150,000.00 | 0.906142 | 135,921.34 |
| 12/13/2022 | 10,150,000.00 | -11,322,574.64 | 1.33268 | -1,172,574.64 | 0.895258 | -1,049,756.66 |

### 3.1.2. Pricing of Interest Rate Swaps

To price an interest rate swap properly similar to cross currency swaps, each leg's cash flow needs to be projected and discounted using appropriate swap yield curves and discount factors depending on the market as well as preference for LIBOR vs. OIS discounting. For example, to price a EUR/EUR Fixed-Float interest rate swap illustrated above, following yield curves need to be setup in FTI STAR application internally. We will discuss how to build each curve in more detail in sections to follow.

**LIBOR Discounting:**

- **EUR 3M EURIBOR:** EUR 3M EURIBOR forward rates to project floating leg's forward cash flows.
- **EUR 3M EURIBOR:** EUR 3M EURIBOR discount factors (zero rates) to discount cash flows of both legs.

**OIS Discounting:**

- **EUR 3M EURIBOR:** OIS adjusted (using dual curve stripping techniques) EUR 3M EURIBOR forward rates to project floating leg's forward cash flows.
- **EUR OIS Curve:** EUR OIS discount factors (zero rates) to discount cash flows of both legs.

Let's assume the MoPF issues a 5-year EUR 10 million EURIBOR 3M floating rate bond paid quarterly. This EUR floating bond can be converted into EUR Fixed rate bond using an interest rate swap. At inception or at maturity, there is no exchange of notional. During the life of the swap, the MoPF would pay 0.202% interest on the EUR 10 million semi-annually to the swap counterparty and receive EURIBOR 3M interest on the same notional quarterly. Ultimately, the MoPF can effectively convert the EUR floating bond (liability) into a synthetic EUR fixed bond (liability).

Figures 10 and 11 below illustrate this Fixed-Float interest swap setup and associated cash flows using Bloomberg Swap Manager "SWPM <GO>".

**Figure 10:** IRS Example on SWPM

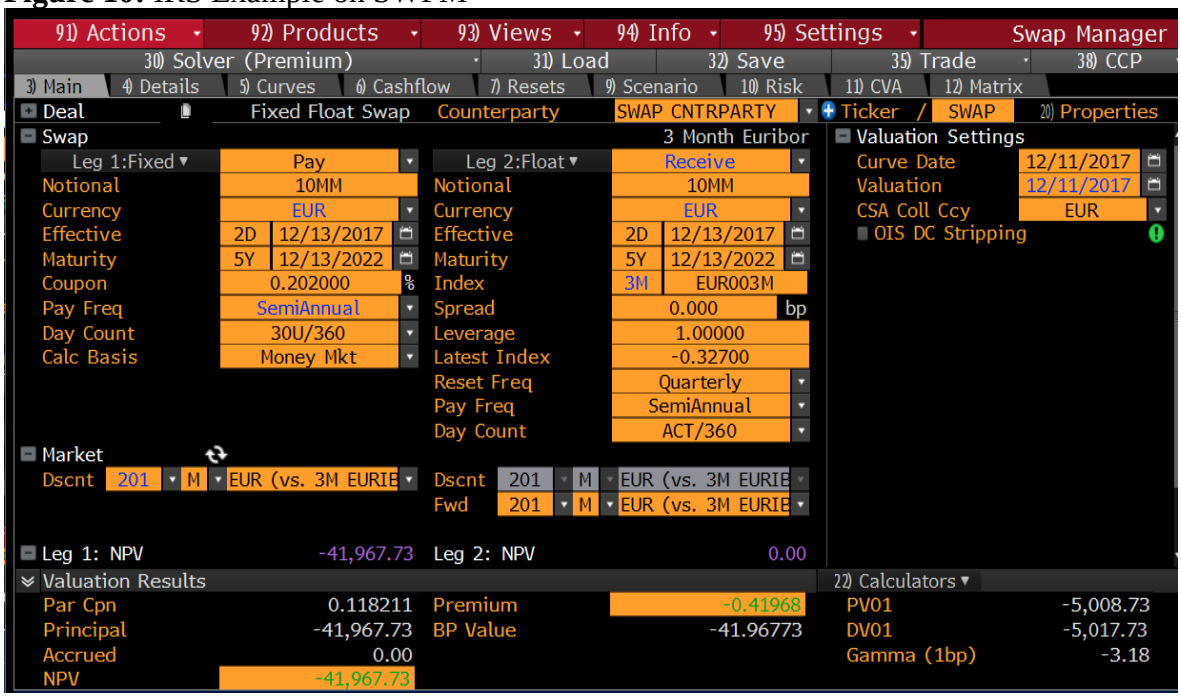
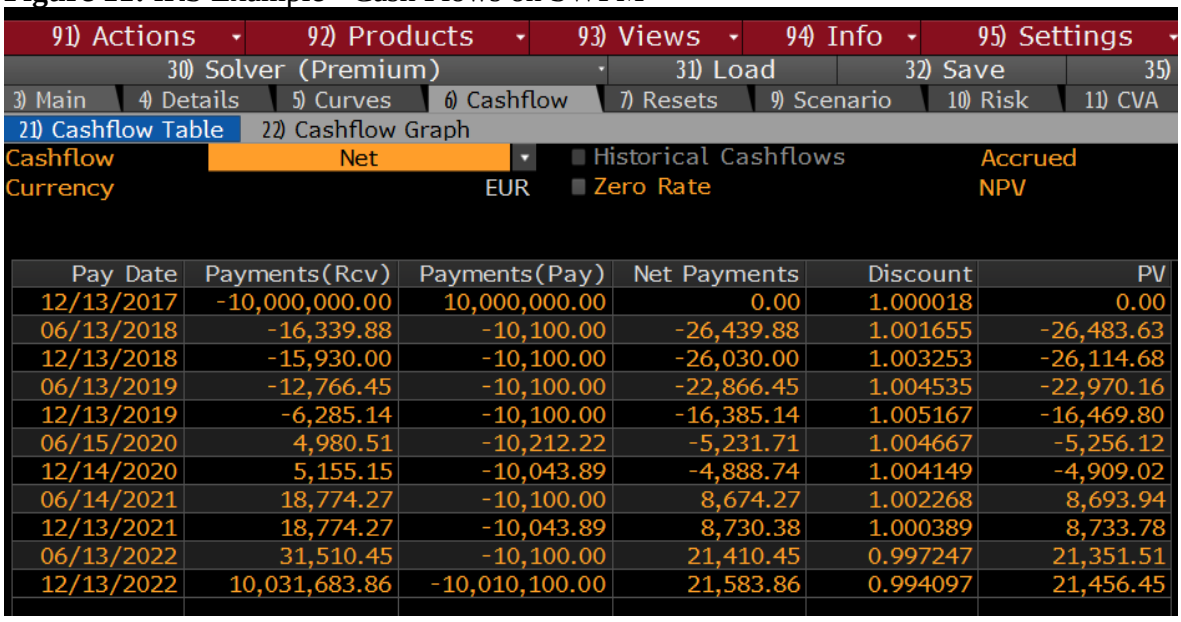



**Figure 11:** IRS Example - Cash Flows on SWPM




| Pay Date | Payments(Rcv) | Payments(Pay) | Net Payments | Discount | PV |
|---|---|---|---|---|---|
| 12/13/2017 | -10,000,000.00 | 10,000,000.00 | 0.00 | 1.000018 | 0.00 |
| 06/13/2018 | -16,339.88 | -10,100.00 | -26,439.88 | 1.001655 | -26,483.63 |
| 12/13/2018 | -15,930.00 | -10,100.00 | -26,030.00 | 1.003253 | -26,114.68 |
| 06/13/2019 | -12,766.45 | -10,100.00 | -22,866.45 | 1.004535 | -22,970.16 |
| 12/13/2019 | -6,285.14 | -10,100.00 | -16,385.14 | 1.005167 | -16,469.80 |
| 06/15/2020 | 4,980.51 | -10,212.22 | -5,231.71 | 1.004667 | -5,256.12 |
| 12/14/2020 | 5,155.15 | -10,043.89 | -4,888.74 | 1.004149 | -4,909.02 |
| 06/14/2021 | 18,774.27 | -10,100.00 | 8,674.27 | 1.002268 | 8,693.94 |
| 12/13/2021 | 18,774.27 | -10,043.89 | 8,730.38 | 1.000389 | 8,733.78 |
| 06/13/2022 | 31,510.45 | -10,100.00 | 21,410.45 | 0.997247 | 21,351.51 |
| 12/13/2022 | 10,031,683.86 | -10,010,100.00 | 21,583.86 | 0.994097 | 21,456.45 |

### 3.1.3. Mark-To-Market

Unlike equity or bonds where there are active trading prices or quotes, OTC derivatives do not have fair values readily available on exchanges or brokers. Therefore, there is a need to mark to market and value swaps per current prevailing market's interest rates, FX rates, etc. To mark to market and price swaps, it is essential to forecast and discount future cash flows of swap's each leg to come up with the net present value of the swap. The swap's net present value is the sum of the present value of each leg and is used in the collateral management process, accounting and financial reporting as well as the portfolio's performance

measurement. To mark to market swaps internally, interest rate yield curves and discount factors need to be setup and generated utilizing FTI STAR's functionalities.

### 3.2. Curve Construction and Market Data

The interest rate (IR) curve is an object which allows one to calculate a discount factor for every date with the curve range in the future thus providing us with the risk free present value of a unit of currency at that date. While in some situations one can construct an IR curve which considers an additional discount due to risk of default of the counterparty, this document leaves the discussion of default or credit risk out. (For a discussion of credit risk, see report under Output 2a of this RAS engagement). Another use of for IR curve is to calculate projected forwards rates between two dates in the future. An example of such use is a construction of payments of a floating leg of an IR swap which pays quarterly an amount of interest equal to 3-month LIBOR rate on a given notional amount.

Interest rate curve setup is achieved through a series of steps. The very first step is to identify which curves need to be setup. Identifying the forward curves needed is relatively simple in the case of the MoPF, at least in the beginning, as the forward curves needed in the FTI STAR application are different tenors of EUR EURIBOR and USD LIBOR curves. Forward curves that need to be used for each swap trade are also identified on the term sheet of each trade. Identifying which discount curves to be used, however, can be more challenging, particularly choosing between LIBOR discounting vs. OIS discounting. Prior to the 2008 financial crisis, LIBOR discounting was the market norm. Since then, however, the market has moved more toward OIS discounting. EUR OIS curve will be discussed in more detail in section 3.2.6.

Market best practice for fully collateralized swaps is to have both LIBOR and OIS curves setup to allow the flexibility of comparing and analyzing one method over another, but to use OIS discounting for mark to market, accounting and collateral management purposes. However, if there are system limitations to setting up and applying OIS discounting internally, to start off, swap trades can be discounted using LIBOR curves with the understanding that OIS-LIBOR spread needs to be monitored and when this spread becomes large enough (in times of high volatility) adjustments need to be made to swap valuations.

The next steps are to identify the type of the market instruments that comprise the curve, specifying the points on the curve where market data (rates / prices / spreads) are captured and finally setting up the curve interpolation and smoothing methodologies that control curve generation. In setting up swap yield curves, the inputs should cover the complete term structure (short, middle, long term parts) and the longest point on the curve needs to be longer than the longest end date expected on the swap.

#### 3.2.1. Curve Construction

To start building any yield curve the very first step is to investigate and research segments and market data that our desired yield curve need to contain. In USD and EUR interest rate markets, the prevailing market practice for constructing LIBOR/EURIBOR swap curves is to use deposits for the short end of the curve, futures for the middle part and then swap rates for the long end of the curve. The selection of the instruments is based on factors such as liquidity, appropriateness and relevance. Most of the large institutions now use sophisticated valuation systems which take various market quoted instruments as input and optimize the construction of various tenured curves (for example, 1M, 3M, 6M and 12M tenured curves).

In the next sections, as an example, we will look at EUR EURIBOR 3M curve construction in detail. In general, instruments that will be used in curve constructions are as follows:

**Cash or Deposit Rates:**

- Usually cover the short-term part of the curve,
- Securities present in the market are available up to a year, but they are most often used for curve construction up to the tenor of the curve, and
- Tenor is usually 3-month or 6-month; the longer the tenor, the larger the credit premium.

**IR Futures/FRAs:**

- Pick up where the first group ends,
- Futures/FRAs available in the market may overlap with swaps, and
- Up to users to decide when to switch.

**IR Swaps:**

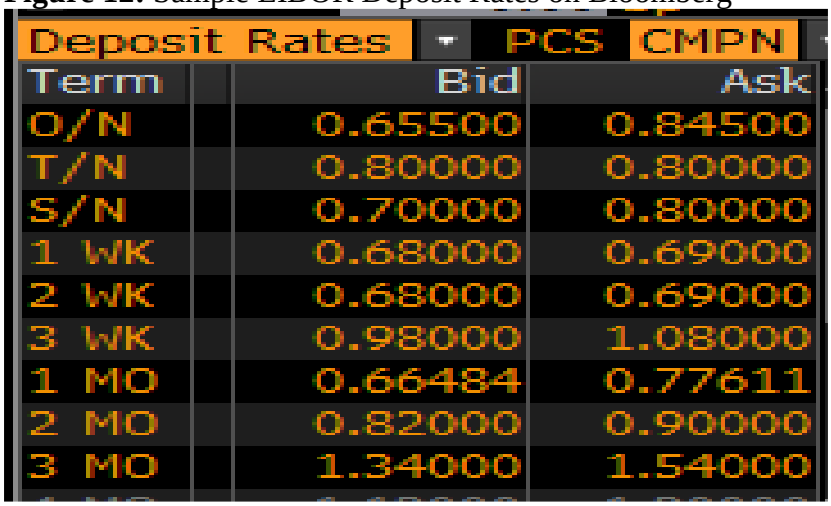
- Cover from where futures / FRAs end to longest maturity of IR swaps, and
- Tenor should be consistent throughout three groups.

### 3.2.2. Market Data

After deciding on segments and structure of the yield curve, market data for each data point need to be pulled directly into FTI STAR application from one of the market data providers such as Reuters or Bloomberg. To have the most accurate and updated swap valuation the most recent market data for the current day should be pulled from market data providers. For USD and EUR LIBOR / EURIBOR markets, as we discussed preciously, swap yield curve needs to have three segments. Therefore, money market rates, futures prices as well as swap rates need to be imported to FTI STAR application using already built-in system capabilities.

For LIBOR money market deposit rates, there are two sources of market data: broker data, which is quoted continuously by interdealer brokers based on the trades occurring on their systems; and official LIBOR quotes reported once a day by the relevant authorities based on polling a group of dealers. While both target the same underlying rate, the rates are different even when observed at the same time because the broker systems report actual trades rather than polled rates, and the differences in which banks contribute to the quotes in each case. Both interest rate futures prices and interest rate swap rates market data are widely available from market data providers such as Reuters or Bloomberg and can be pulled directly to FTI STAR application (Figures 12 and 13).

**Figure 12:** Sample LIBOR Deposit Rates on Bloomberg



Deposit Rates | PCS | CMPN

| Term | Bid | Ask |
|---|---|---|
| O/N | 0.65500 | 0.84500 |
| T/N | 0.80000 | 0.80000 |
| S/N | 0.70000 | 0.80000 |
| 1 WK | 0.68000 | 0.69000 |
| 2 WK | 0.68000 | 0.69000 |
| 3 WK | 0.98000 | 1.08000 |
| 1 MO | 0.66484 | 0.77611 |
| 2 MO | 0.82000 | 0.90000 |
| 3 MO | 1.34000 | 1.54000 |

**Figure 13:** Sample 10 Year Swap Rates on Bloomberg

USD SWAP SEMI 30/360 10Y | Order Book | Settings | All Quotes

14:21:12 | Receive | Pay | BGL | Filter By | All

| PCS | Firm Name | CCP | Bid | Ask | BSz(MM) | ASz(MM) | Time |
|---|---|---|---|---|---|---|---|
| CBBT | SwapTrader Comp | OTC | 2.4150 | 2.4180 | x | | 14:21 |
| CTSD | Citadel Secs SD | OTC | 2.41400 | 2.41800 | 120 | 120 | 14:21 |
| CAUS | Credit Agricole | OTC | 2.4146 | 2.4176 | 100 | 100 | 14:21 |
| RBQS | RBC US IRS | OTC | 2.4143 | 2.4173 | 75 | 75 | 14:21 |
| GSDS | Goldman IRS | OTC | 2.41550 | 2.41750 | 25 | 25 | 14:21 |
| NCSD | NATIXIS SWAPS | OTC | 2.4166 | 2.4176 | 112 | 112 | 14:20 |
| BCSU | BARCLAYS BANK | OTC | 2.39300 | 2.43300 | 15 | 15 | 14:20 |
| MSSW | Morgan Stanley | OTC | 2.41500 | 2.41800 | 125 | 125 | 14:19 |
| CSSW | CREDIT SUISSE INTL | OTC | 2.41600 | 2.41800 | 30 | 30 | 14:19 |
| HSBC | HSBC Bank | OTC | 2.41500 | 2.41900 | 25 | 25 | 14:19 |
| BMOF | Bank of Montreal | OTC | 2.4140 | 2.4190 | 75 | 75 | 14:13 |
| MUSI | MUFG Securities | OTC | 2.4140 | 2.4200 | 69 | 69 | 14:12 |
| CMPN | Composite(NY) | OTC | 2.4150 | 2.4169 | x | | 14:21 |
| BLC | Bloomberg (Calc) | OTC | 2.4143 | 2.4185 | x | | 14:21 |
| BGN | Bloomberg BGN | OTC | 2.4142 | 2.4180 | x | | 14:21 |
| LAST | Last Update | OTC | 2.4137 | 2.4175 | x | | 14:21 |
| BKSP | Bank Sinopac IRS | OTC | 2.4120 | 2.4199 | x | | 14:21 |
| TPRA | TP Rates | OTC | 2.3990 | 2.4390 | x | | 14:21 |
| CBA | CBA Swaps | OTC | 2.4090 | 2.4240 | x | | 14:20 |

### 3.2.3. EURIBOR 3M Curve Example

As a practical example of material that we have discussed in previous sections, let's say we need to build EURIBOR 3M swap yield curve internally using FTI STAR application and sourcing market data from one of the market data providers. Very first step is to decide on which market data segments our yield curve needs to contain. To assist us making this decision we can utilize Bloomberg's ICVS or SWDF functions and choose country Euro, then select EUR vs. 3M EURIBOR (Figures 14 and 15).

**Figure 14:** <ICVS> GO


| Currency | Country | Curve Number | Curve |
|---|---|---|---|
| CAD | CANADA | 4 | CAD (vs. 3M CDOR) |
| CAD | CANADA | 135 | CAD vs. USD Basis |
| CAD | CANADA | 147 | CAD OIS |
| CAD | CANADA | 292 | CAD vs. EUR Basis |
| CAD | CANADA | 330 | CAD (vs. 1M CDOR) |
| CAD | CANADA | 401 | CAD Cashflow CSA Curve(s) |
| CHF | SWITZERLAND | 21 | CHF (vs. 6M LIBOR) |
| CHF | SWITZERLAND | 93 | CHF vs. USD Basis |
| CHF | SWITZERLAND | 234 | CHF OIS |
| CHF | SWITZERLAND | 254 | CHF (vs. 3M LIBOR) |
| CHF | SWITZERLAND | 293 | CHF vs. EUR Basis |
| CHF | SWITZERLAND | 340 | CHF (vs. 1M LIBOR) |
| CHF | SWITZERLAND | 418 | CHF Cashflow CSA Curve(s) |
| EUR | EUROZONE | 45 | EUR (vs. 6M EURIBOR) |
| EUR | EUROZONE | 201 | EUR (vs. 3M EURIBOR) |
| EUR | EUROZONE | 232 | EUR (vs. 1M EURIBOR) |
| EUR | EUROZONE | 133 | EUR OIS |
| EUR | EUROZONE | 92 | EUR vs. USD Basis |
| EUR | EUROZONE | 314 | EUR (vs. 12M EURIBOR) |
| EUR | EUROZONE | 403 | EUR Cashflow CSA Curve(s) |
| EUR | EUROZONE | 391 | EUR EIOPA UFR Curve |

**Figure 15:** <SWDF> GO

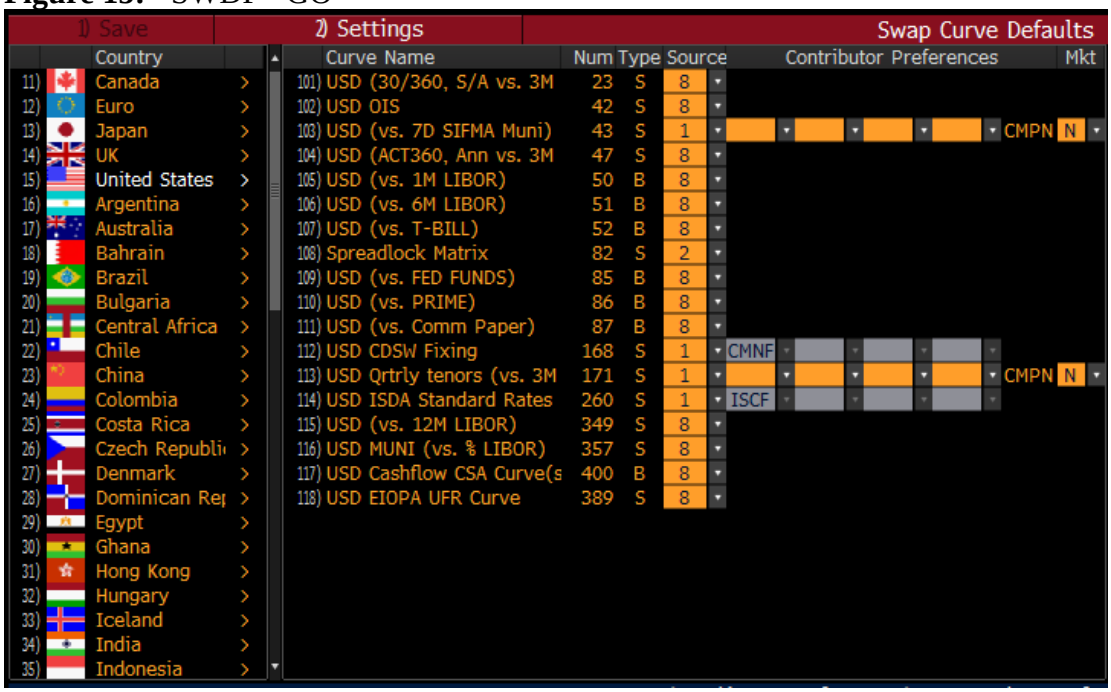
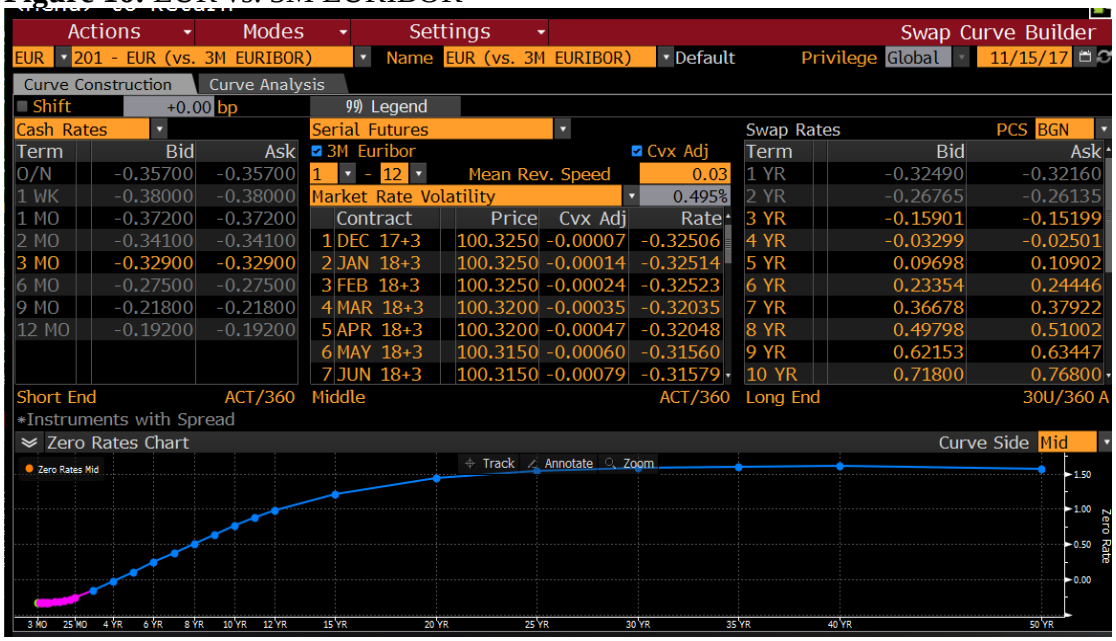


**Figure 16:** EUR vs. 3M EURIBOR




Looking at EUR EURIBOR 3M curve on Bloomberg terminal using SWDF function guides us on how internal EUR EURIBOR 3M curve needs to be setup. Mainly it shows us we need to have three segments of market data: money market rates, futures prices and swap rates. Internal EUR EURIBOR 3M curve setup using FTI STAR application does not need to have exact same tenors and maturities as Bloomberg's EUR EURIBOR 3M curve, but it should have same market data segments. For example, money market rates do not have to go out to 12 months' maturity as shown in Figure 16 above and it can only go up to 6 months' maturity, however our internal curve needs to have same three segments as shown above.

Now that we decided which market data we need for EUR EURIBOR 3M swap curve, we need to setup same curve in FTI STAR using same segments, decide how many data points is needed for each segment and finally pull the market data for each data point using either RICs for data pulled from Reuters or Bloomberg IDs for data pulled from Bloomberg.

### 3.2.4. Cross Currency Basis Swap Spreads

Cross currency basis swap is an agreement between two counterparties trading floating rate payments in their respective currencies. Each leg is a floating leg, one leg (usually USD) is LIBOR flat (i.e. no spread) the other leg is LIBOR / EURIBOR + spread. This spread is called cross currency basis spread.

Theoretically, since both legs pay LIBOR equivalent rates, the swap should have a zero value with no spread on either side. After all each side represents a floating leg whose present value is 1. However, in practice, there are relative funding costs in the different currencies over the lifetime of the swap and therefore the market is charging a premium for transferring assets or liabilities from one currency to another. Therefore, for cross currency swaps this basis impact needs to be take into consideration when discounting cash flows.

Following the same example as Section 3.1.1, and assuming the funding currency is EUR, to value the fixed-to-fixed USD to EUR cross currency swap correctly, the EUR vs. USD basis spread curve needs to be also setup internally using the FTI STAR application and be added as a spread on top of USD 3M LIBOR discount rates. Fortunately, EUR vs. USD basis

spreads are widely quoted in the market and can be pulled directly into FTI STAR application like other market data. We will discuss EUR vs. USD basis spread curve setup in more detail in Section 3.2.5.

As you can see illustrated in Figures 17 and 18, cross currency basis spread levels can vary greatly depending on cross currencies involved as well as time horizon. Obviously the larger the spread, the bigger the impact of this basis adjustment on cross currency swaps valuation and mark to market impact.

**Figure 17:** CC Basis Spreads Summary

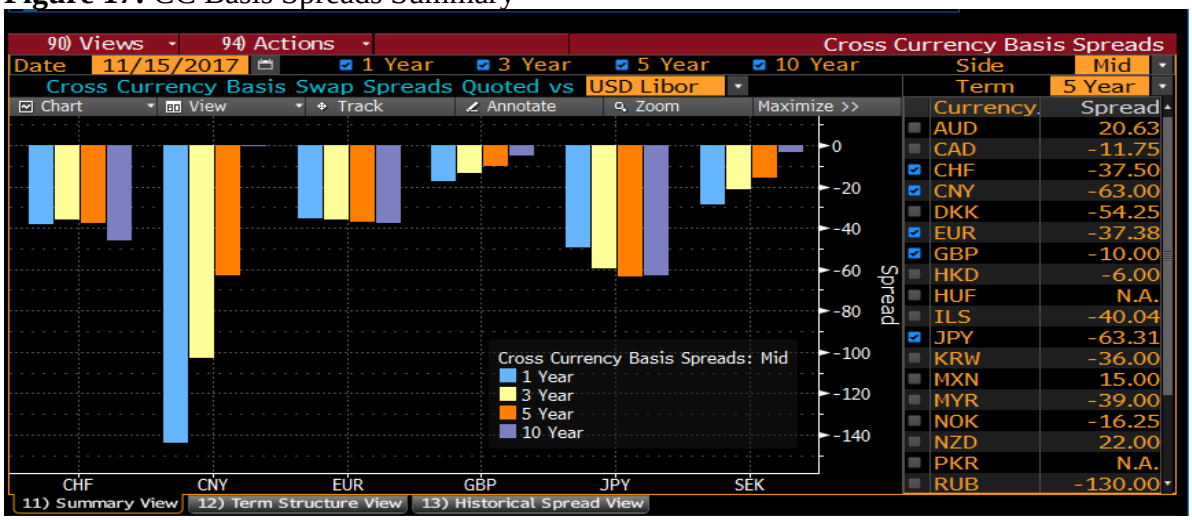
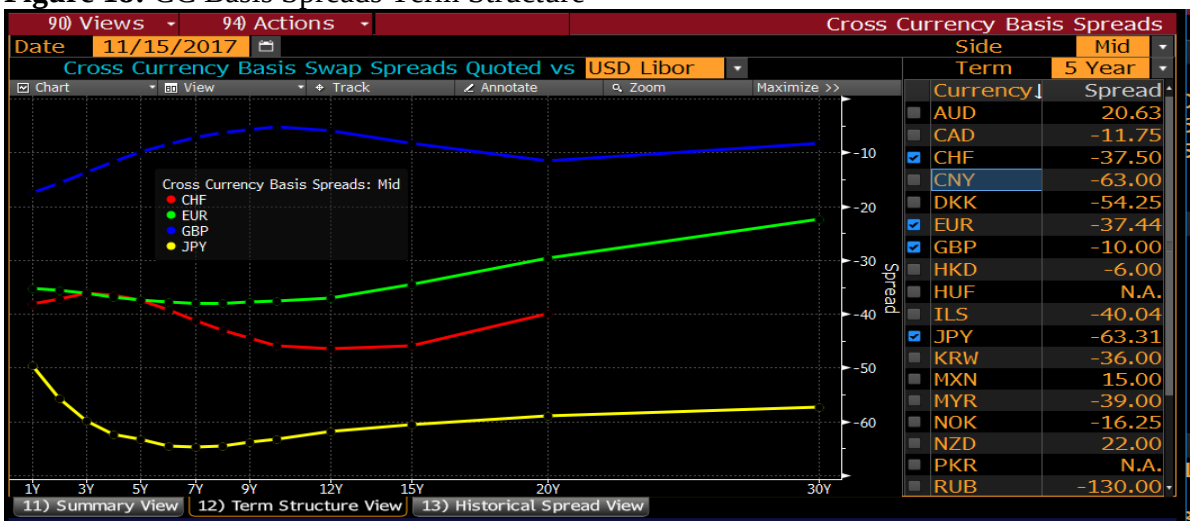



**Figure 18:** CC Basis Spreads Term Structure

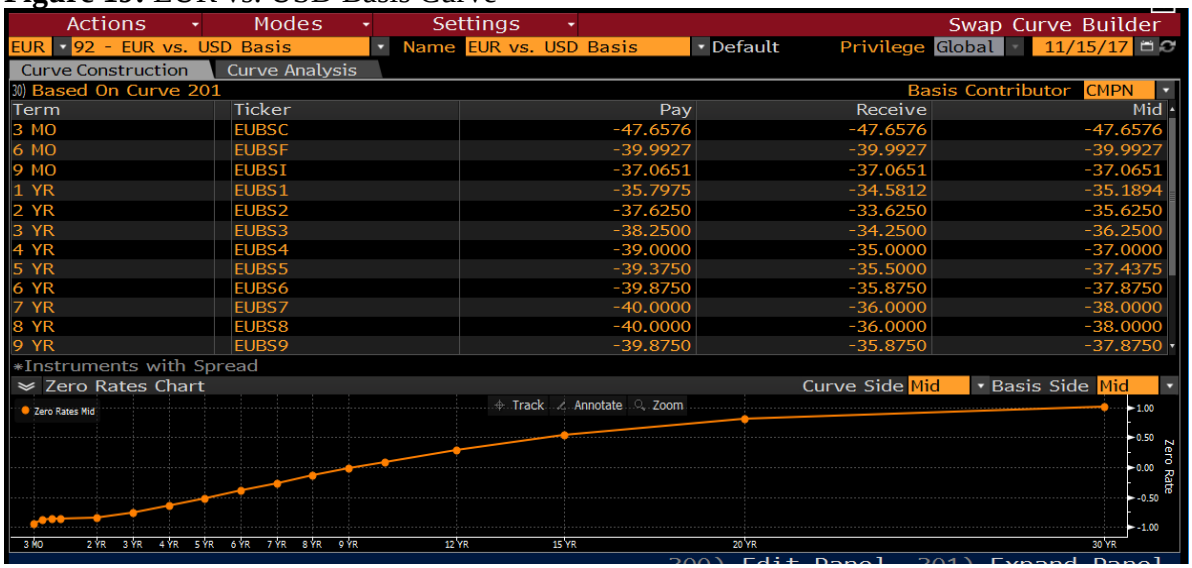



### 3.2.5. EUR VS. USD Basis Curve Example

Like EUR EURIBOR 3M curve example illustrated in Section 3.2.3, to start building internal EUR vs. USD basis yield curve, Bloomberg's ICVS or SWDF functions can be utilized. First bring up either ICVS <GO > or SWDF <Go> functions and then choose EUR -> EUR vs. USD Basis curve. Here, as one can clearly see on Figure 19, EUR vs. USD basis spread over EUR EURIBOR 3M for different terms is clearly available in the market and can be pulled

directly from either Reuters or Bloomberg and setup in FTI STAR application as a spread curve over USD 3M LIBOR curve assuming swap funding currency is EUR.

**Figure 19:** EUR vs. USD Basis Curve



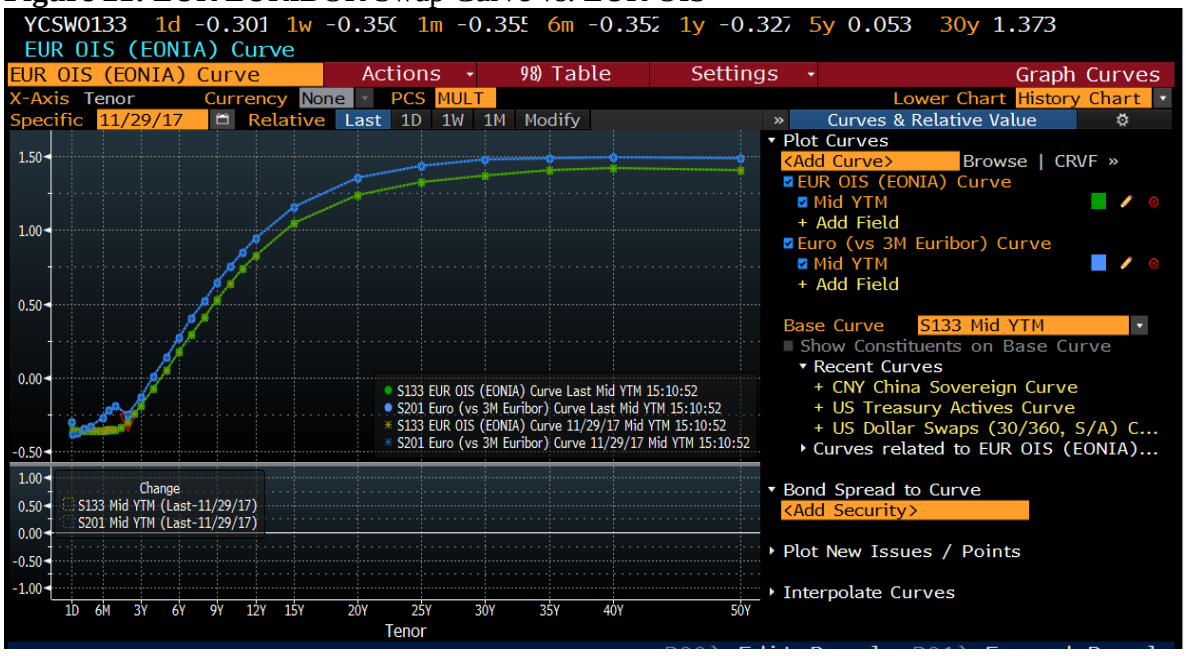

### 3.2.6. EUR OIS Curve

Traditionally, practitioners have used LIBOR and LIBOR-swap rates as proxies for risk-free rates when valuing derivatives. This practice has been called into question by the credit crises that started in 2007. Now, many banks consider that overnight indexed swap (OIS) rates should be used as the risk-free rates when collateralized portfolios are valued. Overnight indexed swaps are interest rate swaps in which a fixed rate of interest is exchanged for a floating rate that is the geometric mean of daily overnight rate. The floating side is designed to replicate interest that would be earned from rolling over a sequence of daily loans at the overnight rate. Overnight rate utilized for USD is the Effective Federal Funds rate, for EUR the Euro Overnight Index Average (EONIA) and for GBP the Sterling Overnight Index Average (SONIA).

As one can see in Figures 20 and 21, the EURIBOR-OIS 3-month spread is less than 50 bps in normal market conditions. However, this spread widened significantly between October 2007 and May 2009 and it was rarely lower than 100 bps during this period. It peaked at over 450 bps in October 2008.

**Figure 20:** Historical EURIBOR-OIS 3M Spread Curve


**Figure 21:** EUR EURIBOR Swap Curve vs. EUR OIS




To properly implement OIS curves internally, the FTI STAR application needs to have the capability to build various curves simultaneously utilizing dual stripping techniques and use multiple curve instruments during curve bootstrapping. For example, when projecting EUR EURIBOR forward rates under EURIBOR discounting vs. OIS discounting, one would expect a difference in the forward levels. This difference is a function of the levels of EURIBOR vs. OIS basis spread. In addition to dual stripping capability, FTI STAR also

needs to have the functionality to generate basis adjusted OIS curves for cross currency swap using FX forward rates and basis swaps. Considering documentation on FTI STAR bootstrapping methods was not shared, if OIS/DC capability exists in FTI STAR it needs to be validated and tested.

Even though OIS discounting is more complex than LIBOR discounting, building OIS curves internally can still be started using same steps and procedures discussed in sections above. Here again, as one can see in Figures 22 and 23, Bloomberg's ICVS and SWDF functions can be very useful in illustrating that OIS curves consist of two segments, overnight rate and EUR OIS swap rates. Please note currently for USD and EUR, OIS rates are not widely available in the marketplace beyond the 10-year maturity. Therefore, in order to support OIS/DC stripping, the OIS curve needs to be extended beyond the 10-year maturity by harnessing USD Fed Funds and EUR EONIA basis swap quotes.

**Figure 22:** EUR OIS Curve SWDF Function

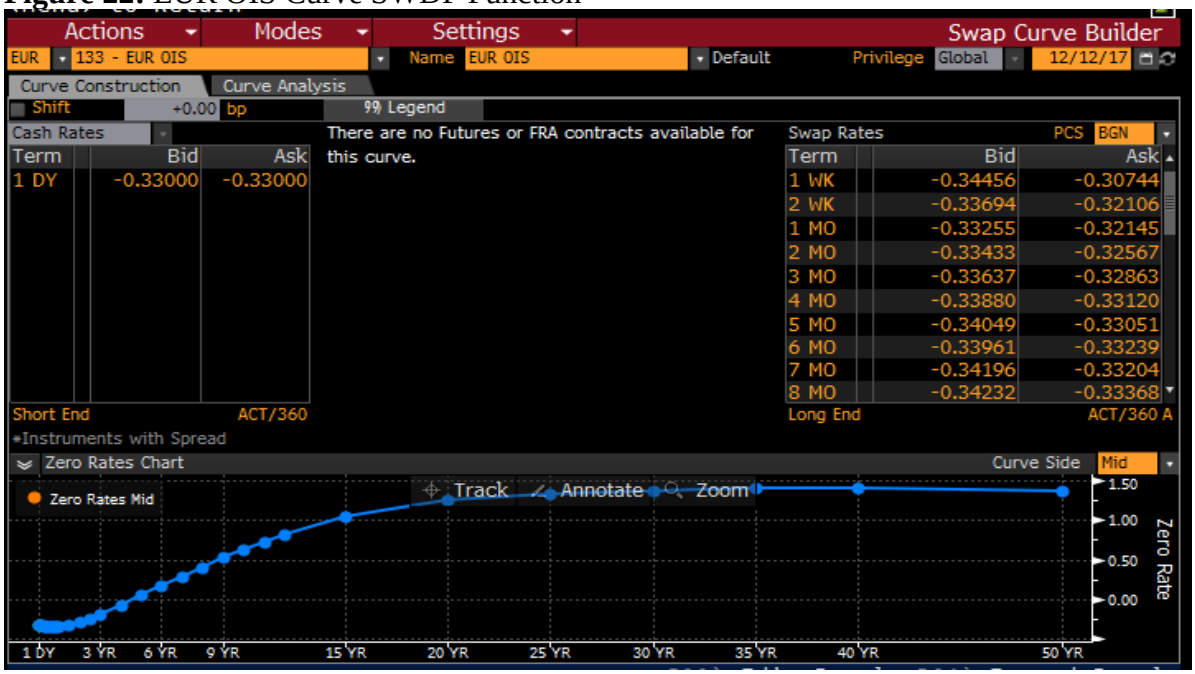
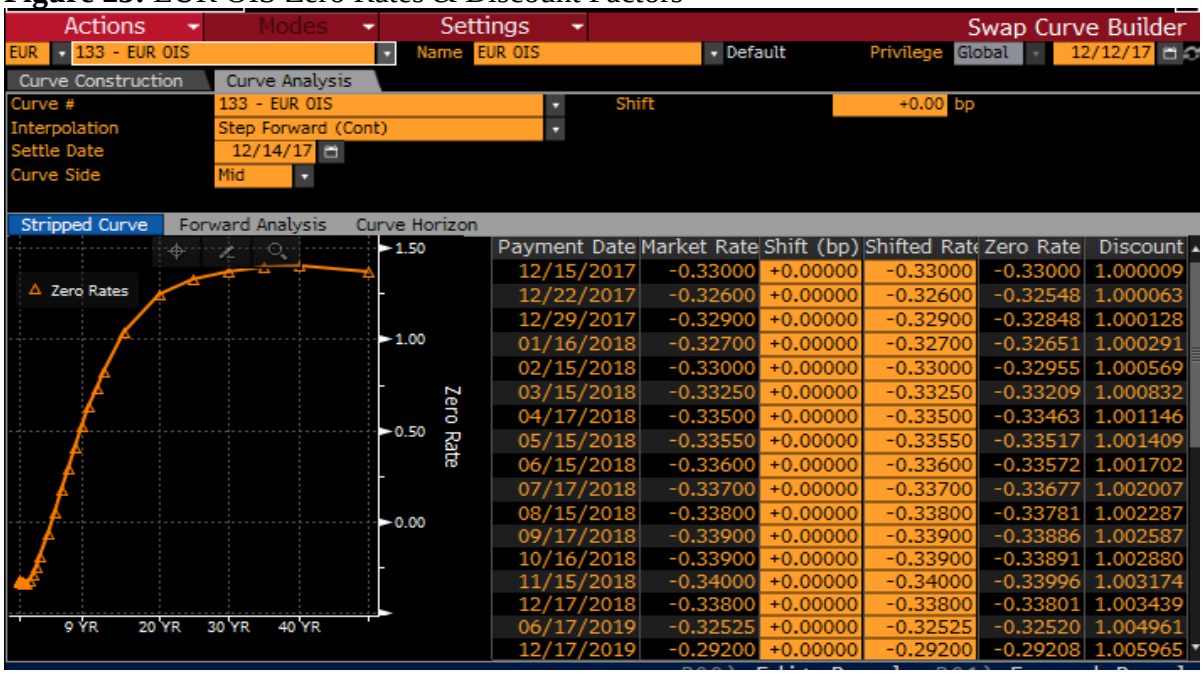


**Figure 23:** EUR OIS Zero Rates & Discount Factors




### 3.2.7. Curve Bootstrapping and Interpolation

Curve bootstrapping is a process of creating a curve object which would correctly price a set of given instruments by producing correct discount factors and forward rates. As mentioned in Section 3.2.2 commonly three segments of market data (cash or deposit rates, IR Futures and IR swaps) are used in curve bootstrapping in LIBOR / EURIBOR USD and EUR markets. There is no single correct way to link deposit, futures and swap interest rates to construct the complete swap term structure; however, several fundamental characteristics and conventions should be followed, to ensure yield curve validity. The derived yield curve should be consistent and smooth, and should closely track observed market data points.

The market convention has been to use several interpolation techniques to generate a complete term structure that closely mimics the observed market data for swap valuation. The most prevalent algorithms for interpolation used in practice to create a swap term structure includes linear interpolation and cubic splines. However, considering FTI STAR currently has only one preset interpolation method and there is no flexibility to alter this method, best approach initially would be to test and validate the FTI STAR interpolation method to generate zero rates and discount factors and compare the interpolation results with same market data on Bloomberg terminal using SWDF <GO> curve analysis function. In the next section, we will discuss swap pricing and valuation testing in more details.[2]

[2] As part of the March 2018 mission conducted in Bucharest, various USD and EUR LIBOR and OIS swap interest rates curves needed to price EUR and USD interest rate and cross currency swaps were successfully set up and tested in FTI Star, and the results were compared to Bloomberg's SWPM.
As a result of this mission and the study visit to Belgian Debt Agency, it was discovered that FTI Star has a system limitation to set up and generate cross currency OIS discounting curves. Thus, OIS discounting can only be done for interest rate swaps. Cross currency swaps should be LIBOR discounted instead until this issue is resolved in FTI Star. It was also agreed that OIS-LIBOR spreads need to be monitored regularly due to this limitation.

### 3.3. Swap Pricing and Valuation Testing and Validation

Every time a new swap yield curve is set up in the FTI STAR application, the next and very important step is to test the new swap yield curve and validate the FTI STAR application to ensure it is generating forward zero and discount factors as expected and the swaps valued internally are valued in line with third party and independent price sources, such as Bloomberg terminal's SWPM function or dealer quotes.

To compare and validate zero and discount rates generated by FTI STAR, Bloomberg's SWDF function can be utilized again. For example, for the new yield curve EUR EURIBOR 3M discussed on Section 3.2.3, one can start by looking at SWDF <GO> -> EURO -> EUR EURIBOR 3M yield curve -> curve analysis. As one can see in Figure 24, Bloomberg's EUR EURIBOR 3M zero rates and discount factors for various dates in the future are shown on the Curve Analysis Tab. Start validating a couple of zero rates and discount factors for various maturity dates in the future, for example 12/2018 and 12/2023 in this case and compare them to the rates generated by the FTI STAR application for the same time period with the expectation that the future dates and rates do not need to match exactly but they must be relatively close to each other to give us confidence that the internal curve is set up correctly.

**Figure 24:** 3M EURIBOR Curve Analysis

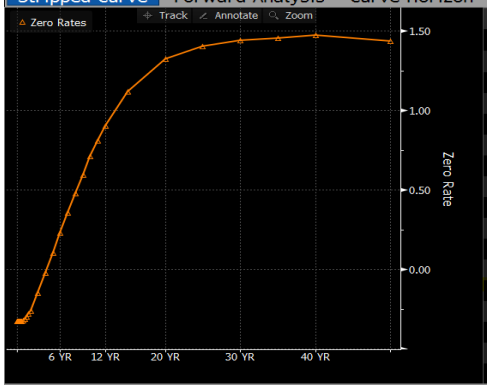
Actions | Modes | Settings | Swap Curve Builder

EUR | 201 - EUR (vs. 3M EURIBOR) | Name EUR (vs. 3M EURIBOR) | Default | Privilege Global | 12/05/17

Curve Construction | Curve Analysis

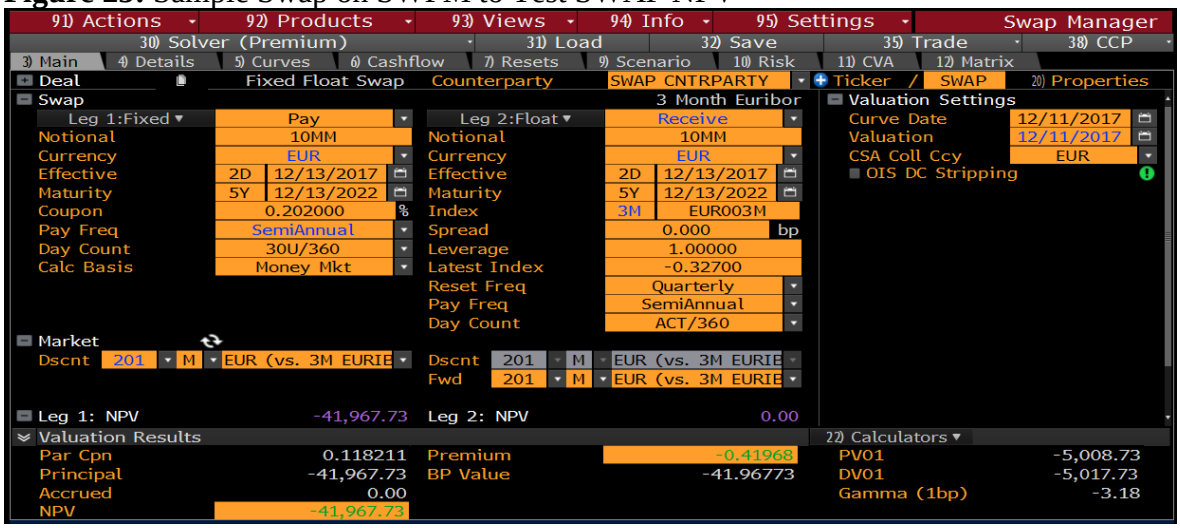
Curve # 201 - EUR (vs. 3M EURIBOR) | Shift +0.00 bp
Interpolation Step Forward (Cont) | OIS DC Stripping Yes
Settle Date 12/07/17 | Index Fixing EUR003M -0.32600%
Curve Side Mid

Stripped Curve | Forward Analysis | Curve Horizon




| Date | Market Rate | Shift (bp) | Shifted Rate | Zero Rate | Discount |
|---|---|---|---|---|---|
| 03/07/2018 | -0.32600 | +0.00000 | -0.32600 | -0.32600 | 1.000816 |
| 03/21/2018 | -0.32502 | +0.00000 | -0.32502 | -0.32475 | 1.000940 |
| 04/18/2018 | -0.32009 | +0.00000 | -0.32009 | -0.32399 | 1.001182 |
| 05/16/2018 | -0.32018 | +0.00000 | -0.32018 | -0.32457 | 1.001437 |
| 06/20/2018 | -0.32028 | +0.00000 | -0.32028 | -0.32582 | 1.001751 |
| 07/18/2018 | -0.32040 | +0.00000 | -0.32040 | -0.32382 | 1.001993 |
| 08/15/2018 | -0.31552 | +0.00000 | -0.31552 | -0.32373 | 1.002236 |
| 09/19/2018 | -0.31570 | +0.00000 | -0.31570 | -0.32474 | 1.002551 |
| 12/19/2018 | -0.30626 | +0.00000 | -0.30626 | -0.32101 | 1.003328 |
| 03/20/2019 | -0.28197 | +0.00000 | -0.28197 | -0.31328 | 1.004044 |
| 06/19/2019 | -0.22283 | +0.00000 | -0.22283 | -0.29948 | 1.004609 |
| 09/18/2019 | -0.16382 | +0.00000 | -0.16382 | -0.28115 | 1.005026 |
| 12/18/2019 | -0.09495 | +0.00000 | -0.09495 | -0.25837 | 1.005267 |
| 12/07/2020 | -0.14600 | +0.00000 | -0.14600 | -0.14635 | 1.004403 |
| 12/07/2021 | -0.02200 | +0.00000 | -0.02200 | -0.02233 | 1.000894 |
| 12/07/2022 | 0.10200 | +0.00000 | 0.10200 | 0.10206 | 0.994913 |
| 12/07/2023 | 0.22800 | +0.00000 | 0.22800 | 0.22902 | 0.986368 |

**Figure 25:** Sample Swap on SWPM to Test SWAP NPV




After zero and discount rates are validated at the curve level, next step is to validate the swap valued internally using FTI STAR vs. swap valued on Bloomberg's SWPM <GO>. To do so a test swap trade with the exact same terms such as start date, end date, notional, indices on each leg and other financial details must be setup and priced both on FTI STAR as well as on Bloomberg's SWPM application. The NPV value calculated using FTI STAR application should be close and in line to the NPV value calculated using Bloomberg's SWPM function. Please note that for this validation to be accurate the discount and forward curves used on the test swap internally using FTI STAR should be the same as discount and forward curves used on Bloomberg's SWPM function in Figure 25.

### 3.4. Current Arrangements and Issues Arising

Based on the demo presented by the FTI STAR representative, various interest rate yield curves mentioned in sections above can be set up in the FTI STAR application and must be utilized to price swaps internally. In addition, presently, the MoPF's only source of market data is an excel document provided by FTI STAR staff to pull in some very limited market data points from Reuters. This excel document is then used to load market data to FTI STAR application which is mostly used for cash flow forecasting. FTI STAR application has the capability to automatically pull in market data directly from market data providers such as Reuters or Bloomberg and it can be functional after initial analysis and setup is completed. Bearing in mind the importance of underlying market data in swap valuation, and the MoPF already having the necessary licenses to use this functionality, the FTI STAR application must be utilized to bring in market data. Furthermore, current excel spreadsheet usage is limited by the vendor, meaning no new market data can be added, plus the excel spreadsheet has no access control rules and can be corrupted easily. All these factors indicate very high operational risks of the current excel spreadsheet method which should be discontinued.

Considering Romania's MoPF currently does not trade any swaps, there is no internal swap pricing and valuation framework in place. Therefore, as the MoPF starts trading swaps, there needs to be clear documentation on any new interest rate curve setup, detailing yield curve segments, market data source and implementation steps. Having clear documentation and framework in place ensures interest rate curves are consistent across various swap types and different staff members can refer to these documents to understand how each curve is set up and used in swap valuation.

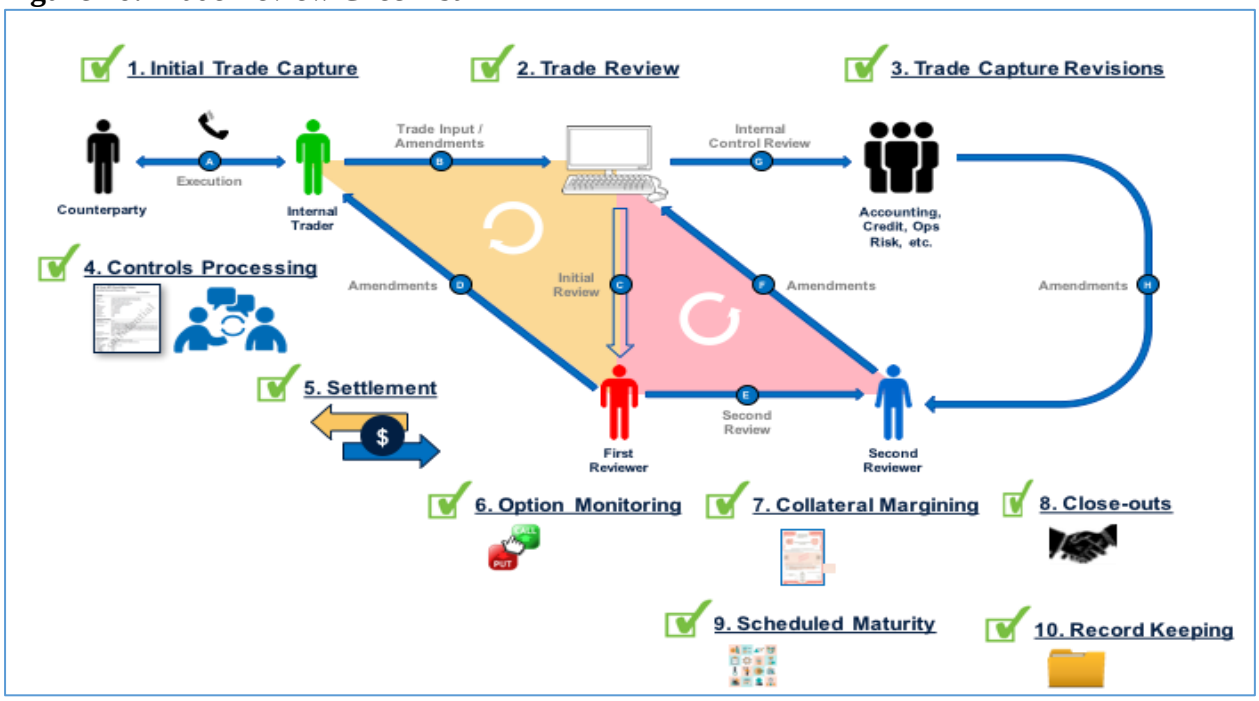
Finally, in addition to staff training on swap valuation concepts and procedures, staff responsible for swap pricing and valuation need to have access to a Bloomberg terminal. Without access to a Bloomberg terminal, it would be extremely challenging to research setting up new curves, testing and validating SWAP NPVs, as well as researching in a time-sensitive manner any pricing issues that would arise when counterparties challenge the MoPF's swap NPVs.

## 4. Trade Review Considerations

This section provides an overview of key trade processing lifecycle events and Best Practice recommendations for OTC derivatives trades, and has been excerpted and adapted from an earlier published ISDA Whitepaper[3] on Trade Processing Lifecycle Events. These Best Practices are intended to guide market participants in managing their operational functions to help foster efficient and orderly markets, which the MoPF can use to model an operationally-sound derivatives program. The steps may vary depending on each institution's organizational structure, product usage and staffing capacity.

The starting point for the Trade Review is to establish the scope of the review based on bilateral OTC derivatives trade processing lifecycle events. As illustrated in Figure 26 below, these should include:

**Figure 26:** Trade Review Checklist




### 4.1. Initial Trade Capture

Once a transaction has been executed, both parties to the trade must enter the full terms of the transaction into their respective trade capture systems.

The trade capture system should provide:

- Robust, accurate, reliable, real-time information related to credit risk, market risk and position exposure management.

[3] OTC Commodity Derivatives Trade Processing Lifecycle Events, April 2012, ISDA.

- Trade support functionality to enable processes such as position verification, broker recaps, counterparty affirmations, confirmations, settlements, collateral margining, and financial control.

Bilateral OTC trades are entered manually into the trading application by the trader, marketer or trading assistant, who are typically assigned to the Front Office. Proper segregation of responsibilities requires that trade capture is not performed by anyone who has access to confirmation or settlement systems. It should be noted that a trade typically is legally binding upon verbal or written confirmation of swap execution, i.e. not when a trade is recorded in an internal booking system.

### 4.2. Trade Review

Trade Review should be conducted as soon as background documents (deal recap, final term sheets, etc.) have been provided by the trader. The first reviewer (within GDTPD, from the Middle Office with the help of the Back Office) should check key data fields in the internal booking system against the final terms. Discrepancies should be reported to the trading team promptly for correction or terms should be amended if errors are found in the counterparty's documentation.

The internal system should be able to make note of trade versions, and maintain an audit log to track changes made to trades.

Trades verified in the first review process should be reviewed by a second reviewer, who typically resides in the Back Office.

### 4.3. Trade Capture Revisions

Economic revisions can arise from any post-trade capture control processes, including during the risk management and position verification processes, or the dealer recaps, counterparty affirmation and confirmation or settlements processes. Modifications to any existing transaction details recorded should always be done at the trade capture level, and not within the downstream processing environment. Economic revisions will typically have an impact on downstream processing, such as the need for a revised confirmation or a revised invoice being raised.

Non-economic revisions can also arise from post-trade capture. Examples include an incorrectly identified dealer, or a re-modeling of a transaction for internal purposes, where such re-modeling maintains the original economic intent of the transaction without altering the terms of the trade as agreed between the two parties. Non-economic trade capture revisions will typically have minimal impact on downstream processing.

### 4.4. Controls Processing

#### 4.4.1. Dealer Recap & Internal Approvals

Dealer recap process typically occurs on T or T+1 for standardized plain vanilla trade types, but may take place on a longer time frame for the more structured trade types.

Dealer should send a written recap of the economic details of the trade to the Front Office by either email or another electronic platform.

Simultaneous verification of trade details is performed by each of the two contracting parties to validate the accuracy of their trade capture to gain confidence that the economic details of the trade are correctly understood and reflected in the official records of the parties concerned. We have seen ability of parties to download their own dealer recaps from a web portal, and increasingly the available use of electronic affirmation platforms.

This process often serves as the earliest point of risk mitigation in correctly securing the economic details of the trade. As part of the record keeping process, all internal approvals should be reviewed and kept. Signatures of designated managers should be included on all transactions.

### 4.4.2. Counterparty Affirmation

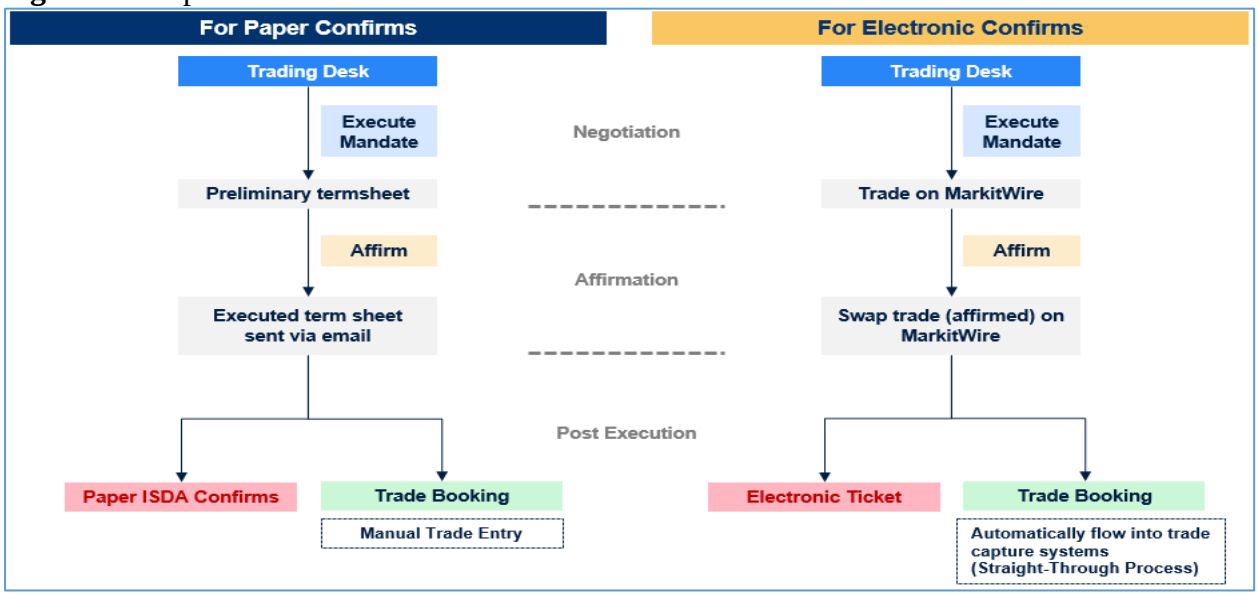
Affirmation is the process by which two counterparties verify that they agree the primary economics of a trade. Counterparty affirmation typically occurs on T or T+1 depending on counterparty's internal organization and processes.

The affirmation process may be done by telephone, voice recording, email or electronic platform.

Verbal affirmation process may be done only for transactions that are traded direct (i.e., non-brokered transactions) and which are not confirmed with the counterparty by means of electronic matching. Some counterparties choose not to participate in the verbal affirmation process because their internal structural organization of resources' responsibilities does not support this lifecycle event.

Many derivatives users including major dealers and end users have been opting for Electronic Affirmations with a goal to process derivatives trade in a "straight-through processing" fashion. Figure 27 below illustrates paper versus electronic affirmations.

**Figure 27:** Paper vs. Electronic Workflows



The recommendation is to always have the trade affirmed, either verbally or electronically, (i) for the completeness of derivatives positions, and (ii) to adhere to regulatory rulings (Dodd-Frank[4] / EMIR[5]).

### 4.4.3. Confirmation (ISDA Legal Confirmations)

Confirmation is the process by which, either through electronic messaging or through the use of paper confirmations, the parties legally memorialize the terms of the trade. Confirmation is typically performed on T (trade date), or as soon as practical thereafter, and is typically handled by the Back Office.

The parties may confirm a transaction by matching electronically on a bilateral basis, or on a third-party vendor matching platform.

Paper confirmations may be created manually, systemically with some user interaction, or systemically with full straight-through-processing. They are legally binding by either:

- One party signing and returning the other party's confirmation (recommended),
- An exchange of confirmations between the parties,
- One party affirming their agreement to the terms of the confirmation by some means but without signing the confirmation, or
- One party implying their acceptance of the other party's confirmation by virtue of not having disputed it within a given specified timeframe.

Paper confirmations that are not executed and agreed by both parties may be an indication of disagreement on the terms of the trade, and in such case a verbal counterparty affirmation of the core economic trade details should occur between the parties pending the resolution of any legal, credit, or other provision(s) that remain under discussion.

Electronic matching is a process in which an intermediary compares the dealer's trade data submission with the institution's allocation instructions to determine whether the two descriptions of the trade agree. If the trade data and institution's allocation instructions match, an affirmed (electronic) confirmation is produced. This would eliminate the separate steps of producing a (paper) confirmation for the institution to review and affirm.

In April 2012, ISDA issued a report on the best practice guidelines for electronic matching and confirmation of the standardized OTC financial products (see Section 8. Annex). These Best Practices serve both to provide recommendations and a checklist for organizations new to the OTC derivatives markets, as well as act as a benchmarking tool for all market participants as they periodically review the efficacy of their operations.

The recommendations can help reduce processing costs, encourage systems' interoperability and increase operational scalability. The greater the number of transactions executed by the organization, the more important it is to implement these Best Practices.

[4] The Dodd-Frank Regulatory Reform Bill.
[5] The European Market Infrastructure Regulation.

### 4.5. Settlement

#### 4.5.1. Pre-Settlement Activity

Settlement requests can be triggered either electronically or manually, but in any event, should be done on a timely basis, on T or T+1, depending on counterparty's internal organization and processes.

Initial Exchange or Upfront Fees can arise from the product type or structure:

- Payment affirmation is exchanged between the parties either in the form of affirmation of settlement amounts or an exchange of invoices; and cash movements are effected for the value date after any discrepancies between the payment amounts calculated by each of the parties have been investigated and resolved.

- Best practices also dictate that settlement instructions that are input by one person (Maker) should be verified by a separate person (Checker).

Rate Fixing (or determination) can also arise prior to settlement. Rates can be taken in automated or manual fashions, and they must be input into a system or format that will ultimately be used for the purposes of trade valuation, collateral margining and cash settlement.

#### 4.5.2. Post-Settlement Activity

Once cash movements are effected, nostro account reconciliation of ledger entries against cash movement should be then performed by the Back Office. Discrepancies between cash and ledger entries are typically the result of:

- Failure to pay, under payment or over payment of agreed amounts,
- Inadvertent payment to a different legal entity, or
- Withholding of wire transfer fees.

Operations should investigate the discrepancies and resolve the matter via their individual organization's escalation controls, procedures and processes, but always with the goal of obtaining complete and accurate recording of cash movements (or exceptions) to the general ledger.

Some parties may request for payment netting where different derivatives settle on the same payment date and in the same currency.

### 4.6. Option Monitoring

Financially settled options are options that can be exercised automatically if, by comparing the reference price to the option strike price, the option is determined to be in-the-money. The automatic exercise results in a payment by the option seller to the option buyer of the cash settlement amount.

Physically settled options that are in-the-money at expiry result in the creation of a new transaction between the parties. The decision to exercise is based upon the value the option buyer places on the underlying product. Most physically settled options require the option buyer to notify the option seller (usually by recorded telephone) by an agreed cutoff time on

expiration date. Failure of the buyer to notify the seller by the cutoff time results in the option expiring worthless. Depending on the market convention for the product, a written notice of exercise delivered to the option seller by the option buyer may be required, and a confirmation may be generated for the new trade.

### 4.7. Collateral Margining

Margining is the process by which collateral calls are made and collateral is exchanged between counterparties based on mark-to-market position valuation and the terms of the credit agreement between them. For any trade included within the scope of the relevant collateral provisions, collateral margining commences the inclusion of that trade on T+1. The Collateral Management Operations processes are explained in greater details in Section 5 of this report.

Credit terms may be documented in a CSA or can be included in individual confirmations, which is called an ISDA Long Form Confirmations.

The credit terms always specify terms such as the frequency of valuation, timing of margin calls, types of eligible collateral, minimum amounts of collateral that can be transferred, and interest on collateral.

For bilateral (i.e., non-cleared) transactions, the parties send margin calls via email or fax, and acknowledgement is typically performed via email or telephone.

The ISDA Collateral Steering Committee has drafted both a Best Practices Whitepaper and a Dispute Resolution Procedure, available on the ISDA website (www.isda.org).

### 4.8. Close-Outs

#### 4.8.1. Terminations

At any time during the term of a transaction, the parties may agree to mutually terminate the transaction (e.g. end the trade early before its scheduled maturity date). The parties must agree on the terms, timing, and any payment relating to such termination. An ISDA-based termination agreement should be drafted and executed between the parties to memorialize this agreement.

#### 4.8.2. Assignments and Novations

At any time during the term of a transaction, the parties may agree that one or both parties may transfer their position (by means of an assignment or a novation, as appropriate) to another party, which may be either an affiliate or an external party. All parties to the transfer must agree to the terms and timing of the transfer by executing either an assignment agreement or novation agreement, as applicable.

The transfer agreement should be drafted so that the New Transactions are either (i) re-confirmed between the remaining parties by separate Confirmations, or (ii) considered to have been re-confirmed between the remaining parties by way of the transfer agreement.

### 4.9. Scheduled Maturity

A transaction matures naturally when it has completed its term and all obligations under the contract have been met. In this event, there is no impact on downstream processing.

### 4.10. Record Keeping

All pertinent documents should be properly filed and kept for the life of the transaction. Although electronic workflow systems have been able to digitize legal documents, it is advisable to store hard, paper copies, of transactions as a safeguard and for auditing purposes.

### 4.11. Potential Issues & Proposed Solutions

Several potential operational issues should be considered related to:

1. **Trade Execution Staff:**
    - **Enhanced reporting & analytical capabilities:** User typically sources the data from different sources, enriches the data, creates analytics on the data. There is extreme challenge for user to aggregate reports in an accurate and timely basis.

    - **Duplication of data entry:** Due to a number of systems involved in processing trade mandate and trade approvals, users typically re-type the same economics many times.

    - **Digital signature for execution agreements:** There are a number of areas in the Front Office process where the physical signature is captured. As a result, trade approvals sometimes are delayed from out-of-office staff.

    - **Challenges in Buy-back process:** Front Office staff face challenges when there are multiple tranches of bond issuances, combined with multiple underlying swaps.

2. **Trade Capture Staff:**
    - **Manual trade entry:** These data fields are sourced currently from different sources namely term sheet, transaction approval and investor communications.

    - **Duplication of data entry:** Due a number to systems involved in processing trade inputs and review, user typically re-type the same economics many times for control purpose.

    - **Multiple steps in validation:** There are number of steps in the Front Office process, which are manually validated and compared with, there is scope for automation of the validation and exception based processing (validation of transaction approvals vs. data entry in trade booking system, etc.).

3. **Settlement Staff:**
    - **Trade tracking mechanism:** The log is used to log trade economics along with assignment and some other data pulled from different systems, the data extract is a manual and cumbersome task.

- **Digital signature for confirmations:** There are a number of areas in the Front Office process where the physical signature is captured. As a result, trade approvals sometimes are delayed from out-of-office staff.

- **Corporate event tracking and terminations:** The Back Office takes responsibility of tracking the corporate events (e.g., bilateral amendments, partial unwinds, notional increases/decreases, novations and/or partial novations, option triggers or calls/puts) throughout the trade lifecycle. Manual track reporting and trade interventions are prone to errors and create operational risks.

- **Documentation retrieval:** Various trade documents are generated at different points in time. These documents are scanned and stored in the enterprise document management system, but are hard to search and to retrieve.

The most effective solutions to these issues would naturally need to be developed and prioritized on a case-by-case basis, subject to resource availability. Some general examples include (i) Improvements to the current process flows, and (ii) Adoption of industry Best Practices.

1. **Suggested improvements to the current process flows:**
   - **Adoption of straight-through (automation) processing capabilities:** Process areas where straight-through processing/automation capabilities can be easily adopted, for example generation of transaction approvals from final dealer term sheet.

   - **Elimination of instances of data duplication:** Process areas where data duplication and redundant steps can be eliminated; for example, have trade-booking process reside in a single system.

   - **Robust reporting capabilities:** Create single data repository and promote user-friendly interface.

2. **Adoption of industry Best Practices:**
   - **Evaluate practices used by market participants:** Support exception-based processing through dashboards and alerts, integration of workflow and document management, and adoption of digital signatures (this would be helpful if FTI Star is used).

   - **Promote system linkability:** Leverage out-of-the-box capabilities of your trade capturing system.

   - **Regulatory developments:** Prepare to meet regulatory requirements, even with exemption status, as your counterparts will be working with you to meet their regulatory requirements.

## 5. Collateral Management for Non-Cleared Derivatives

### 5.1. Collateral Management as a Counterparty Risk Mitigation Tool

When a party enters into an OTC derivatives transaction, its exposure to the counterparty risk is measured by the mark-to-market (MTM) value of the transaction. A positive MTM profile indicates that the party is exposed to the potential loss if its counterparty defaults. Collateral exchange, involving either cash or securities, has been established as a counterparty risk mitigation tool for decades with both parties agreeing on a Credit Support Annex (CSA) prior to transaction execution. The importance of an adequate Collateral Management practice has become more significant after the 2008 Financial Crisis. Daily collateral calls have become the market standard. Derivatives valuation is more standardized with the adoption of OIS, and most recently multi-curve, discounting methodology. Collateral Management in recent years has repositioned from a Back Office function to being an integral function that involves the trading desks, liquidity management, credit review and operations. There has been tremendous investment in technology and systems to automate and increase operational efficiency, as well as a higher focus on collateral optimization to reduce funding costs of collateral obligations and to increase profitability from collateral received.

**Key Concepts**

The CSA to the ISDA Master Agreement governs the terms or rules under which collateral is calculated, validated, and transferred between the counterparties in a derivatives transaction (also see Output 1: Legal of this RAS engagement). The CSA specifies the type of eligible collateral, threshold, notification cut-off time, valuation frequency and dispute resolution procedures. Standard terms pertinent to the Collateral Management Operations are:

1. **Mark-to-market** or **Exposure**: the price or value of each derivatives transaction, calculated as the netted NPV of the payable and receivable legs.

2. **Variation Margin**: daily marked-to-market uncollateralized exposure of the portfolio.

3. **Independent Amount**: an additional amount which is above the mark-to-market of a portfolio in the event of credit deterioration. The calculation methodology for the Independent Amount may vary; it can be a fixed amount or a percentage of the notional amount of the transaction or based on a customized formula as negotiated by the counterparties.

4. **Threshold**: the amount of unsecured credit risk that the counterparties are willing to accept before a collateral demand is made. Threshold can be credit rating based or Net Asset Value (NAV) based.

5. **Minimum Transfer Amount**: the smallest amount of currency value that is allowable for transfer as collateral. This can be a fixed number or credit rating based.

6. **Eligible Collateral**: the type of assets, cash and securities, each party can accept or post.

7. Collateral **Haircut** or **Valuation Percentage**: a percentage applied to the market value of the collateral, which reduces its value for collateralization purposes. The

Haircut protects the secured party from a drop in the market value between the margin call periods.

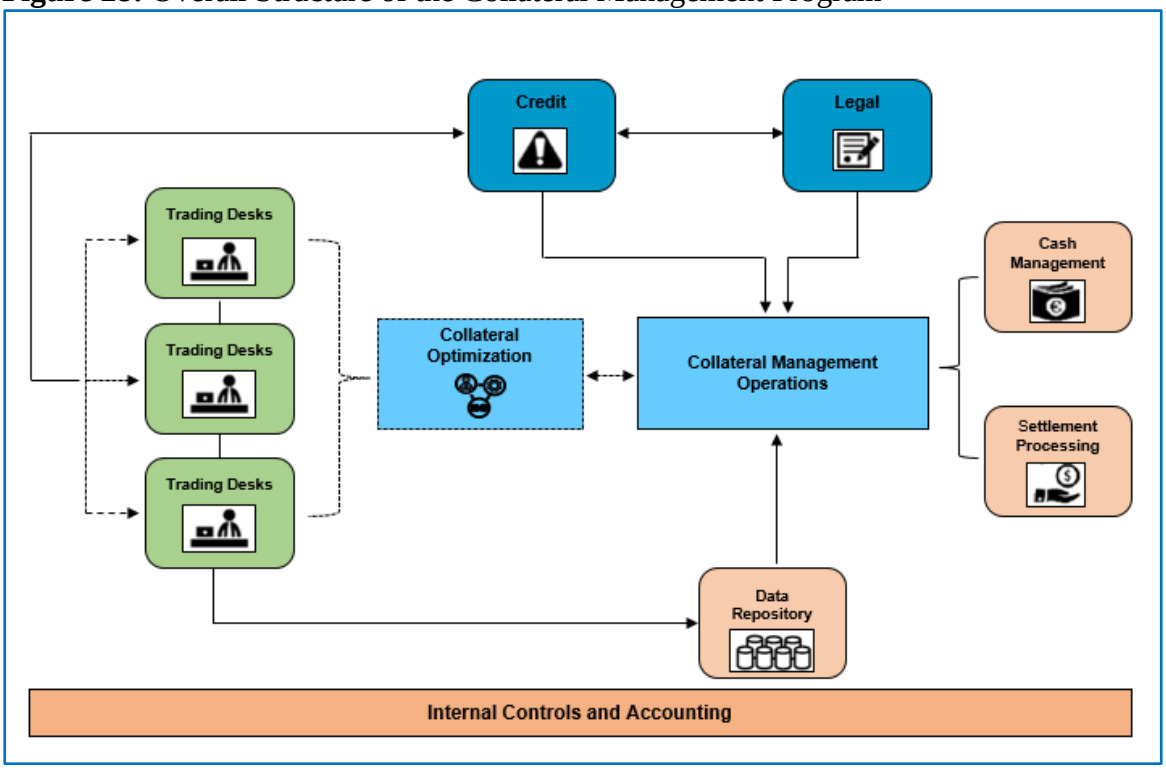
8. **Substitution:** the process initiated when the pledgor replaces one form of collateral with another form of collateral. The secured party is obligated to return the recalled collateral as soon as the replacement collateral has been delivered.

9. **Valuation Frequency:** determines the frequency that a portfolio is valued and margin call is issued. Before the 2008 Financial Crisis, monthly valuation was common. It is now market practice to perform daily valuation and margin calls.

### 5.2. Collateral Management Operations

Collateral Management functions typically reside in the Middle Office, with multiple touchpoints across the financial organization such as Credit, Legal, Front Office, Back Office, Accounting, and Information Technology (IT), as illustrated in Figure 28. Externally, the close coordination with Swap Counterparties, Collateral Agent, System Vendor, and Custodian is equally important. The Collateral functions can be performed in-house or outsourced to an external service provider; these models are further discussed in Output 3c of this RAS engagement.

**Figure 28:** Overall Structure of the Collateral Management Program




**Credit** is responsible for monitoring the credit condition of the swap counterparties and for communicating with the Collateral team of any market or credit event. These events have direct impacts to Collateral Management (e.g. Independent Amount might be triggered and Threshold is brought down to zero) and often require urgent actions to ensure that the institution is adequately protected against potential significant and costly risks. The like of the Lehman Brother bankruptcy highlights serious overnight risks and emphasizes the importance of an efficient credit monitoring and alert mechanism in coordination with a

robust Collateral Management practice. Credit is an instrumental partner with Legal during the CSA negotiation process, in providing guidance regarding authorized counterparties, selection of eligible collateral and their acceptable Haircut, and the Threshold and Minimum Transfer Amount matrix. Credit often relies on the Collateral team for frequent reporting of the portfolio-level exposure and collateral positions.

In consultation with Credit and the Front Office, **Legal** is responsible for drafting and negotiating new ISDA CSAs and amendments to the existing CSAs with swap counterparties. Legal is also responsible for reviewing and authorizing the Service Agreements and Custodian Agreements with external providers. While it is common that Legal, Credit, and Front Office actively participate in these negotiations, it is important that the Collateral team is engaged in the discussions to ensure operational feasibility.

Questions such as "Can the collateral system handle a customized Independent Amount calculation?", "Is the Collateral Agent able to support an index-linked interest term on cash collateral?", and "Can the Collateral Custodian settle emerging currencies?" should be addressed and cleared by Collateral team prior to the execution of the CSA. Collateral team often seeks Legal advice on the enforceability of the CSA terms or any formal disputes.

In addition to its participation in new counterparty selection and CSA negotiation, the **Front Office** is responsible for collateral funding and optimization, working more closely with the Collateral team than ever before. While there is a recent trend for some Tier 1 and Tier 2 banks[6] to establish a separate global collateral optimization team covering multiple products across the institution, it is practical for smaller scale institutions to structure this function within the Front Office. The Front Office should have real-time access to collateral balances and posting obligations for a timely and cost-effective funding and reinvestment decisions.

The **Middle Office**, where Collateral Management Operations often resides, is also responsible for market data management, discount curve construction, daily derivatives valuation, valuation model review and validation, in addition to the Collateral functions. The **Accounting** team is responsible for monthly and financial statement reporting of collateral held and posted, as well as any related interest income or expense.

The **Back Office** team plays a key role in setting up settlement instructions in the market and ensuring smooth settlement of collateral on T+1. The Back Office team also handles coupon claims for security collateral and post-settlement investigations.

Finally, one of the most important partners of the Collateral team is the Systems or IT team, whose responsibilities range from data generation and distribution, data integrity, system generated derivatives valuation, trade files creation, and trade files upload to the internal collateral platform or transmission to an external agent.

### 5.3. Collateral Onboarding

This section provides an overview of the key steps required when onboarding a new ISDA CSA and incorporates recommendations excerpted from the 2013 ISDA Best Practices for the OTC Derivatives Collateral Processes[7]. The steps may vary depending on each institution's

[6] Tier 1 includes between 20 and 25 global bank assets and/or capital markets price makers with daily trading volume exceeding 50,000 transactions. Tier 2 constitutes about 200 international and national banks and/or capital markets price takers with daily trading volume averaging 30,000 transactions.
[7] Best Practices for the OTC Derivatives Collateral Process, October 2013, ISDA.

unique structure, scale, products and whether the Collateral functions are performed internally or outsourced externally.

When onboarding new CSA agreements onto internal or external collateral systems, it is important to ensure that key procedures are followed and that tasks are completed accurately and in a timely manner, prioritizing where necessary, and aspiring to a two-to-three-day turnaround. A detailed onboarding checklist and procedure should be established. Both parties should ensure that adequate resources are allocated to the onboarding process to ensure that Collateral teams are operationally ready as soon as trading commences following the execution of the CSA.

### 5.3.1. CSA Terms Setup

#### Initial Setup of New Agreement

The terms of a newly signed CSA should be input into the Collateral Management systems promptly, following a dual-person review process. If the setup is done by an external service provider, Collateral team should have a procedure in place to verify and authorize the initial setup, which will remain locked until the agreement is amended with new terms. Once approved, the terms of the CSA should automatically feed into the collateral calculation system. CSA data pertinent to the Collateral process are as follows.

- **General Information**: includes agreement name and date, governing law, valuation agent, business centers, trading branches, and contact information.
- **Collateral Eligibility**: outlines Eligible Collateral (cash and security), valuation Haircuts, security collateral rating requirements, collateral ladder and concentration rules (if applicable).
- **Interest Terms**: indicates interest reference rates and payment period for cash collateral.
- **Margin Terms**: specifies Threshold and Minimum Transfer Amounts, credit ratings, Valuation Frequency, notification time, and business calendars.

#### CSA Data Management and Ongoing Maintenance

Recent regulatory changes require financial institutions to obtain a far more granular and accurate understanding of their CSAs and the terms agreed. Challenges[8] include:

- Missing documents or agreements being stored across teams in the organization, with sub-optimal tracking
- Documents not saved or digitized in a manner that enables detailed mining and retrieval across users
- Inaccurate CSA data held in Collateral systems causing errors in collateral pricing and credit risk measurement

[8] CSA Risk Review, eClerx, 2013.

- Manual data feed from CSA database and Collateral systems

It is important for organizations to put in place a comprehensive CSA data repository serving as a golden source for multiple internal users including Collateral Management Operations, Legal, Credit, Liquidity Management, CVA desk, etc. A periodic static data validation should be done by the Collateral team to ensure the completeness and integrity of the CSA terms.

### 5.3.2. Custody Account Setup

Concurrent with the CSA agreement setup, collateral custody accounts must be opened for all eligible markets with the chosen Custodian. Key considerations entailed in this process include:

- **Account Structure**: omnibus vs. segregated structure for cash and security collateral accounts.
- **Interests and Reinvestment**: interest rates offered by the Custodian and cash reinvestment options.
- **Corporate Actions**: handling of tax documentation and corporate actions (i.e. coupon payments).
- **Reporting and Access to Data**: daily position and settlement reporting; online real-time data access capability.

### 5.3.3. Systems Readiness

Prior to operationalizing a new collateral program or going live with a new trading entity and portfolio, a comprehensive testing must be conducted to ensure synchronization and correct mapping among all relevant systems, including trade booking and valuation, CSA and market data, collateral platform, downstream accounting and reporting system. The end-to-end testing should cover the following:

- Book and verify trades in test environment,
- Perform accounting and valuation batch run,
- Upload test trades to collateral system,
- Run collateral calculation and issue test margin call,
- Upload test trades to portfolio reconciliation platform, and
- Generate reports relevant to Collateral Management Operations

### 5.3.4. Counterparty Coordination

Once the new CSA has been onboarded and custody accounts are opened, prompt counterparty outreach and coordination are critical to ensure both parties are in a position to calculate and exchange collateral when the first trade is executed.

#### Exchange of Contact Information

Each institution should provide a group email address, phone number, and a primary operations contact to help streamline the data collection process when establishing new accounts. It is incumbent upon all institutions to maintain a current listing of daily contacts.

This should include primary, first escalation, second escalation, and portfolio reconciliation contacts.

**Exchange of Standard Settlement Instructions (SSI) Information**

Each institution should provide authenticated SSIs for all eligible collateral covered by the CSA. The verification and setup should be completed before the first exchange of collateral. Institutions are responsible for conforming to their own verification policy but as a minimum their process should include an independent call-back procedure.

**Exchange of Tax Document**

All relevant tax documentation should be in place prior to any collateral being exchanged to ensure that interests accrued on cash collateral balances or proceeds of security collateral (i.e. coupons) are not subject to withholding tax. Both parties should implement a monitoring mechanism to flag any existing tax documentation due to expire or any custody account not being documented with the proper tax form.

**Portfolio Reconciliation Handshake**

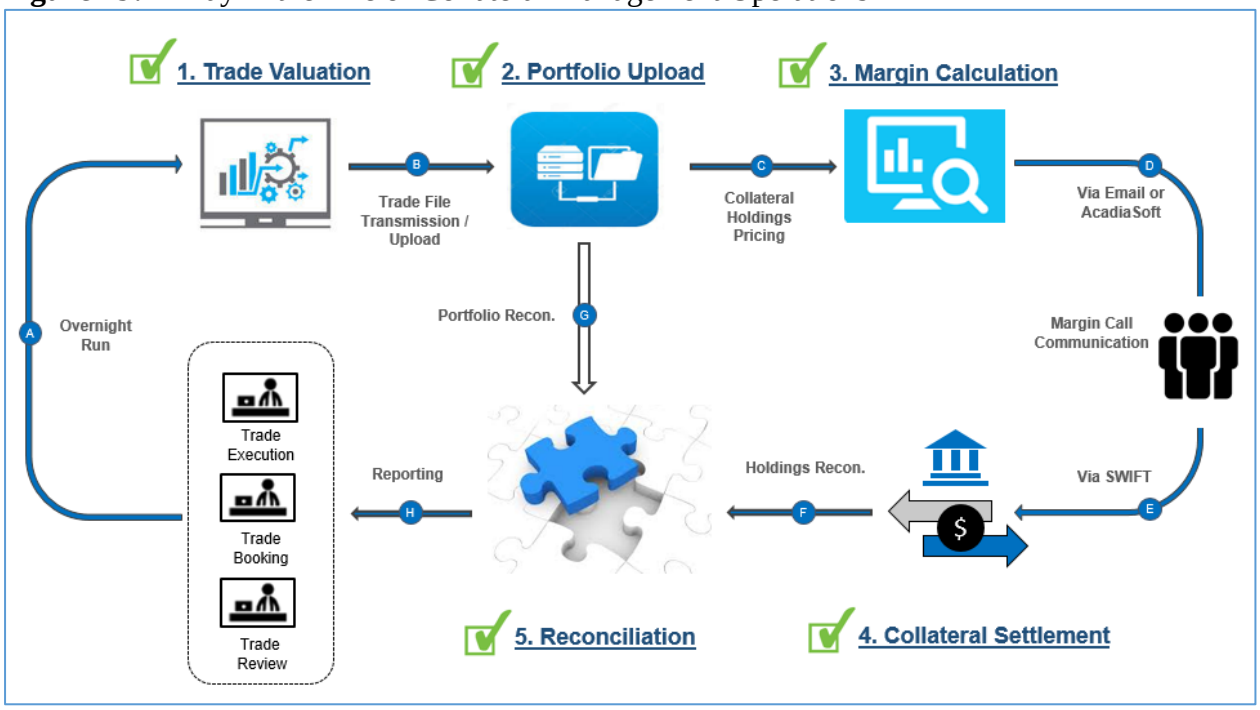
When commencing any new reconciliation relationship with the counterparty, or when reconciling for the first time, it is important that both parties share a responsibility to work cooperatively. The verification and handshake process should be completed before the first exchange of collateral.

Whether an in-house or outsourced solution is adopted, institutions should make use of reconciliation technology for reconciling their portfolios to facilitate bilateral involvement and transparency of results. Automated solutions significantly reduce the amount of resources necessary to reconcile portfolios and result in a more efficient, timely, and controlled process.

### 5.4. Daily Collateral Management Operations Workflow

Collateral Management comes into effect as soon as the first trade is executed. For bilateral OTC derivatives, the first margin calculation happens on T (trade date) plus one (T+1) using T close-of-business' mark-to-market data. It is common for smaller scale Collateral Management Operations to start out using available tools (e.g. excel spreadsheet, access database) and existing technologies. However, as volume picks up and a wider variety of products are collateralized, a Straight-Through Processing (STP) workflow is essential in reducing operational and financial risks due to manual intervention, improving efficiency and inventory management capabilities. Figure 29 provides an overview of a day in the life of the Collateral functions and its key controls.

**Figure 29:** A Day in the Life of Collateral Management Operations




### 5.4.1. Trade Valuation

Trade Valuation Frequency depends on the terms of the ISDA CSA. It is market practice to perform daily swap valuation and collateral management. All plain vanilla swaps should be valued automatically by the trade capture system. Some highly structured swaps and swaptions might need to be valued using a robust and specialized valuation system. At the end of the day, valuation data for all derivatives trade types must either flow directly to the margin calculation engine or be consolidated in one data repository for subsequent upload to the Collateral system.

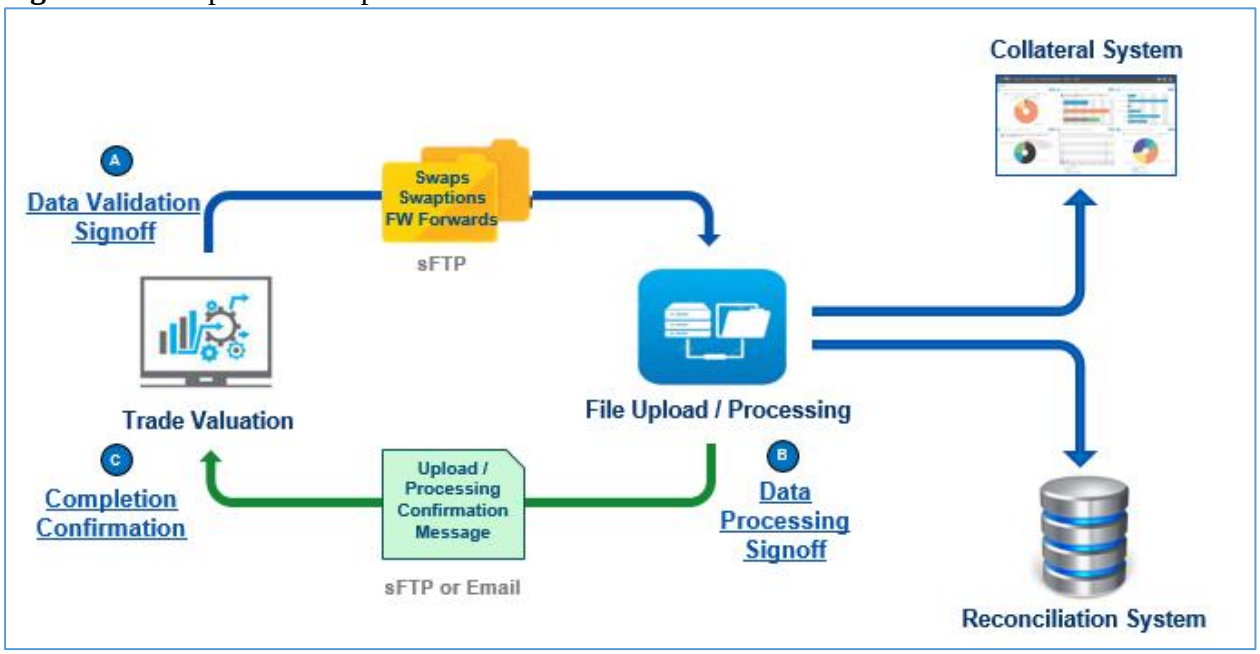
It is important to put in place a valuation review process prior to uploading the trade details and MTM values onto the Collateral system. This control is the first line of defense that ensures reasonableness of the valuation model and market data feed, as well as validating any anomaly in the MTM movement. A firm cut-off should be established for the valuation run / processing and review to avoid delay in the subsequent processes.

### 5.4.2. Trade File Upload to Collateral System

Trade data and MTM values should be uploaded to the Collateral system in an automated and timely manner. In the in-house model, the upload process should be done via the direct link between the trade capture and Collateral systems. The workflow should then indicate a completion vs. non-completion status. If outsourced to an external agent, trade data must be delivered via a secured transmission (e.g. sFTP / secure File Transfer Protocol) and automatically uploaded to the agent's system. Once the upload is complete, the Collateral team should receive an acknowledgement message (ACK / NACK, i.e. acknowledgement / negative acknowledgement) from the external agent; this acts as a control to ensure data integrity and security and to minimize the risk of call disputes. At a minimum, the ACK / NACK message should include process status, time stamp, and the number of trades and total MTM uploaded. The margin calculation relies on several data sources: trade and exposure data, collateral balances, CSA terms, and market data. Organizations should have in place

controls to measure the accuracy of such data, raise warnings and highlight potential missing, incomplete or unattributable data. Figure 30 below describes a sample flow of valuation data to the margin calculation and portfolio reconciliation systems.

**Figure 30:** Sample Trade Upload Flow




### 5.4.3. Margin Calculation, Issuance and Response

Once the trade data upload process is complete and confirmed, the margin calculation kicks off, preferably in an automated manner. It is critical for this process to be performed well ahead of the notification deadline for timely signoff and call issuance. This section incorporates recommendations excerpted from the 2013 ISDA Best Practices for the OTC Derivatives Collateral Processes[9].

**Margin Requirement Calculations**

The margin requirement should be calculated in accordance with the collateral agreement between the parties, and includes the mark-to-market (MTM) of the specific trades covered by the CSA, any Independent Amount (IA), the valuation / pricing of collateral previously held or posted and the application of threshold and minimum transfer amount. One example of the margin formula is as followed:

***Call Amount***
= Positive MTM + Counterparty IA – Counterparty Threshold – Collateral Held

***Delivery Amount***
= Negative MTM – Principal IA + Principal Threshold + Collateral Posted

For new trades, the MTM should be included in the margin calculation on trade date plus one. In the case of terminated or matured trades, the MTM for such trades should be included in

[9] Best Practices for the OTC Derivatives Collateral Process, October 2013, ISDA.

the calculation up until the settlement date. Any excess collateral as a result of the terminated or matured trades should be returned on final settlement date plus one.

Any trade that matches a derivatives product type that is covered by the ISDA Master Agreement and/or listed in the CSA should be included in the margin calculation. If the CSA is ambiguous with respect to foreign exchange trades and lacks differentiation between spot and forward transactions, it is common practice to exclude spot trades from the margin call calculation. However, it is best practice for parties to bilaterally agree on and reflect in the CSA the handling of FX spot trades.

**Margin Call Issuance and Response**

Margin calls must be issued by the notification deadlines outlined in the CSA; however, it is recommended for a call to be issued as early as possible. The call notification is typically communicated via email. However, faced with tremendous increase in margin volumes in recent years, market participants have been moving toward the use of electronic messaging platforms (e.g. AcadiaSoft MarginSphere) to streamline the margin call, substitution, and interest statement workflow.

In a margin call notification, the following minimum standard data fields should be included:

- **Principal and Counterparty Reference**: the party issuing the margin call vs. the party receiving the call.
- **Valuation Date**: close of business date for which the principal is issuing the margin call.
- **Total MTM:** net market value of the portfolio in the base currency.
- **Independent Amount:** required credit support in addition to the variation margin, in the base currency.
- **Threshold:** amount of exposure a counterparty will accept before issuing a margin, in the base currency.
- **Collateral Balance:** value of settled held and pledged collateral, in the base currency.
- **Collateral In-Transit Balance:** value of in-coming and out-going collateral that is pending settlement, in the base currency.
- **Minimum Transfer Amount:** minimum amount to pay / receive in the base currency.
- **Margin Requirement:** value of the requested collateral transfer in the base currency.

It is recommended that the margin call receiving party provides a response as soon as possible, and at the latest by close of business, including information such as response type, collateral amount, collateral type (e.g. USD / EUR cash, or security ID and par value), and settlement date. The response type can either be a full agreement, partial agreement, or a full decline. In the event of a partial agreement or a full decline, the receiving party must provide their net MTM in the response for immediate review of the dispute. If the MTM difference is deemed material, this will be followed by a thorough trade level reconciliation for immediate

resolution. If a party has agreed a delivery and is aware that it will be late in paying, every effort should be made to notify the receiving party to avoid unnecessary loss such as overdraft charges.

From time to time, a party may experience technical difficulties preventing them from answering margin calls within the accepted time frames. This should be communicated with the relevant counterparties as soon as possible. It can be assumed that a failure to respond by close of business on settlement day constitutes a failure under the terms of the CSA.

### 5.4.4. Collateral Settlement

As eligible collateral (cash and security) may varies for each CSA, an eligibility check must be done prior to booking of the agreed collateral movement. Ideally, the Collateral system should be able to flag any ineligible collateral that was entered. In addition, the system should have an alert mechanism if the corresponding settlement instructions are not in place for immediate system setup and update.

If the Collateral functions are outsourced to an agent, the booking, settlement, and post-settlement investigation of collateral movements are expected handled by the agent. It is recommended that the agent put in place an alert mechanism for the Collateral team to effectively monitor settlement status and track settlement fails.

In the in-house model, Collateral and Settlement teams are responsible for performing the eligibility check, booking collateral movements, releasing instructions (e.g. MT202 and MT210 for cash payment and receipt) to the collateral Custodian, and following up on any settlement fail. Procedures, such as system generated fail reports, should be actively reviewed by the Settlement Team. Failed collateral transactions should be resolved same day or the next available settlement date. Any consecutive and recurring fail should be escalated to operations managers in the Middle Office and Credit officers for effective counterparty risk monitoring.

A daily reconciliation of collateral holdings balances should be performed between the Collateral system and the Custodian. All discrepancies should be investigated and corrected promptly; any aged item should be escalated to the appropriate channel.

### 5.4.5. Portfolio Reconciliation

Whether using an in-house or outsourced solution, parties should make use of robust technology to reconcile their portfolios and to facilitate bilateral involvement. Automated solutions significantly reduce the amount of resources necessary to match and reconcile each and every trade, and result in a more efficient, timely and controlled process.

There are five main steps in this process:

- **Upload or Exchange of Information**: each party uploads portfolio to a common reconciliation platform, or exchanges trade files manually via email.

- **Matching**: check the trade details and find a match from the submissions made by other parties, either by using a unique trade identifier (UTI) or by using a match key.

- **Reconcile**: compare all trade fields from both side and calculate MTM differences.

- **Report Break**: highlight any differences between the trades (e.g. notional amount or trade date) and any MTM differences beyond a pre-determined threshold.

- **Resolve**: investigate differences with internal valuation team and Front Office; work with other parties to resolve differences; and escalate if necessary.

The majority of market participants are subject to strict rules by US and European regulators with regards to dispute resolution. While certain sovereigns, such as Romania, and multilateral development institutions are exempted from such regulations, their market counterparties are required to report any trades with material differences to the regulators. The below best practices regarding portfolio reconciliation and dispute resolution should apply to all parties:

- If margin call is calculated daily, portfolio reconciliation should be performed in the same frequency.

- There should be a designated team who is responsible for identifying, investigating, resolving and tracking any breaks and discrepancies (e.g. position break, or MTM differences). MTM differences can be caused by a number of attributes: trade booking accuracy, market data and FX rate input, discounting methodology, and system capability.

- Organizations should maintain the system capability to track aging collateral disputes on a calendar basis from two perspectives: the first being from their own exposure perspective and the second being the cumulative age of the dispute.

- A structured escalation framework must be established to ensure timely resolution, especially of any material differences that fall under the US Commodity Futures Trading Commission (CFTC) and the European Securities and Markets Authority (ESMA) rules.

### 5.5. Current Arrangements and Issues Arising

When introducing a new Collateral Management program into the current structure (Front, Middle, and Back Office structure), the governance surrounding team setup, team mandate and reporting must be designed, discussed and documented prior to going live. Given the MoPF's current organization and work program, the recommendations of this report may put further pressure on the MoPF's resources and its skill base.

- **Team Setup:** Considering the importance of Collateral Management as a counterparty risk mitigation tool, mainly responsible for effective management of collateral requirements, portfolio reconciliation, dispute resolution, and direct coordination with internal partners, market counterparties and custodians, it is market practice to set up Collateral Management as a dedicated and well identified new team. According to a survey of 14 Tier 1 and Tier 2 banks from several EMEA countries done by Deloitte in 2014[10], the in-house Collateral Management units comprise of about 6 full time equivalent (FTE) staff on average. If the functions are outsourced to an external agent, the team typical comprises of at least 2 FTE staff, depending on

[10] Collateral Management A Survey of the Current Practices and Trends in the Banking Industry, June 2014, Deloitte.

scale and volume, to ensure that the principal of having a Maker and a Checker, as described earlier, can be implemented.

- **Team Mandate and Reporting:** In addition to the traditional responsibilities as mentioned above, optimization of collateral assets with the focus on collateral rehypothecation and profitability has become an important task in the collateral management mandate. Even when the parties opt to exchange cash only, discussions surrounding effective liquidity and funding cost management, and reinvestment of the cash collateral are pertinent to a successful Collateral program.

  Collateral team reports to the Front Office, ALM team, Credit, Controllers, Risk Management and Back Office teams. Examples of the reported data are: CSA static data, portfolio level exposure and collateral holdings, collateral composition (asset types, currencies, ratings), interests arising from collateral, valuation breaks, and trend analysis of collateral disputes.

- **Current System Capabilities:** At the moment, FTI STAR Collateral module appears to have the necessary capabilities to import exposure data, run margin calculation, issue margin calls, book and settle collateral movements. However, extensive testing of the full life cycle of Collateral Management and the connectivity between FTI STAR and the settlement / accounting systems are required. The MoPF should consider using technology available in the market to automate the portfolio reconciliation process. If an outsourced model is adopted, the upload of derivatives trade data from FTI STAR to the external agent's Collateral systems and all downstream processes and reporting must be tested thoroughly.

## 6. Accounting for Financial Liabilities and Derivatives

### 6.1. Overview of Accounting for Financial Liabilities and Derivatives

Financial instruments are contractual arrangements that result in a financial asset for one entity and a financial liability or equity instrument in another.

The general principle regarding accounting for financial instruments' initial recognition, drawn from both IFRS (International Financial Reporting Standards) and IPSAS (International Public Sector Accounting Standards), is the same: An entity shall recognize a financial asset or a financial liability in its statement of financial position when, and only when, the entity becomes a party to the contractual provisions of the instrument. In general, trade date accounting rule is preferred, however, IFRS allows settlement date accounting rule as well. If the European System of National and Regional Accounts (ESA 2010) is applied, trade date accounting is mandatory.

ESA 2010 explained by EUROSTAT is the newest internationally compatible EU accounting framework for a systematic and detailed description of an economy. ESA 2010 revises and updates the common standards, classifications and accounting rules for member states in drawing up their national accounts and transmitting their data to EUROSTAT. ESA 2010 provides guidance as to how EU institutions should record derivatives in accounting. In the EUROSTAT Manuals and Guidelines 2016 edition regarding implementation of ESA 2010, part II.4 provides general accounting rules indicating how to record interest on accrual basis. In part VIII Measurement of general government debt, it provides detailed treatment of accounting for liabilities and measurement of liabilities in ESA 2010, including measurement of government debt for EDP purposes. Most importantly, in part VIII.3, it provides guidelines on how to record swaps, including treatment of debt in foreign currency under the EDP, as well as accounting examples based on various types of swaps.

After initial recognition, an entity can either, in certain circumstances, irrevocably designate financial liabilities as measured at fair value through profit and loss (FVTPL) or can measure financial liabilities at amortized cost using the effective interest method and the historical cost for the liability portfolio, and amortizing any premiums or discounts, as well as any issuance costs, over the lives of the liability portfolio. In addition, both IAS39 / IFRS 9 and IPSAS 29, require an entity to recognize derivatives instruments at fair value. Therefore, an entity shall consider to elect recording all debt instruments in its borrowing portfolio at fair value to better align the valuation of the borrowings with their related swaps. However, it is usually at an entity's discretion to elect amortized cost accounting and/or fair value accounting for financial liabilities.

All derivatives in scope of IFRS 9 are measured at fair value. Value changes are recognized in FVTPL unless the entity has elected to apply hedge accounting by designating the derivatives as a hedging instrument in an eligible hedging relationship. The hedge accounting requirements in IFRS 9 are optional. If certain eligibility and qualification criteria are met, hedge accounting allows an entity to reflect risk management activities in the financial statements by matching gains or losses on financial hedging instruments with losses or gains on the risk exposures they hedge. Given the complexity of meeting the qualifying criteria for hedge accounting (although IFRS 9 relaxed some of the complexity), some organizations may not choose the hedge accounting option. For example, the World Bank chooses not to do hedge accounting for derivatives, because the organization's main objective is basically nonprofit making.

### 6.1.1. Amortized Cost Accounting for Financial Liabilities

Under this accounting treatment, the bond would be recorded at amortized cost (bond's carrying value), while any embedded derivatives would need to be separated from the host instrument and recorded at fair value, if and only if all of the following criteria are met:

- The economic characteristics and risks of the embedded derivatives were not clearly and closely related to the economic characteristics and risks of the host contract.

- The hybrid instrument is not remeasured at fair value under otherwise applicable generally accepted accounting principles with changes in fair value reported in earnings as they occur.

- A separate instrument with the same terms as the embedded derivatives would be considered a derivatives instrument.

This accounting treatment would require the embedded derivatives to be reported at fair value, with changes in fair value being reported in earnings (in IPSAS term, it is called surplus or deficit), while the underlying bond would be recorded at amortized cost.

### 6.1.2. Fair Value Accounting for Financial Liabilities and Derivatives

On June 16, 2005, IASB issued the amendment to IAS 39 (where IPSAS 29 was primarily drawn from) Financial Instruments: Recognition and Measurement – The Fair Value Option (FVO). The amendment was developed after several commentators, including the European Central Bank, the Basel Committee and the EU Commission, raised concerns that the fair value option in the revision to IAS39 in December 2003, which permitted any financial instrument to be designated as at FVTPL on initial recognition, may be used inappropriately.

Effective January 1st, 2018, IFRS 9 has replaced IAS 39 financial instruments recognition and measurement. There are two components to the related subject that need to be highlighted from IFRS 9:

1. Fair Value change for financial liabilities due to "own credit" risk, IFRS 9 is allowing such fair value change be recorded in OCI (Other Comprehensive Income) rather than booked directly in FVTPL, and

2. If hedge accounting option is chosen, the effective portion of fair value change on hedging item can be recorded in OCI.

In addition to IFRS 9 (replaced IAS 39) and IPSAS 29 regarding accounting standard for financial instruments, there is an accounting standard imposed by European legislation, that is based on European System of National and Regional Accounts (ESA 2010). The measurement of government debt in ESA 2010 1.94 described as this: "Flows and stocks shall be measured according to their exchange value, i.e. the value at which flows and stocks are in fact, or could be exchanged for cash. Market prices are ESA's basic reference for valuation." The stock of government liabilities should be recorded in national accounts at their market value, at the end of the accounting period, in the closing balance sheet of the general government sector.

However, it is at an organization's discretion to determine which accounting standard to be adopted.

For example, in 2008, the World Bank introduced the Fair Value Option (based on FASB, US GAAP, whereby all entities were permitted to choose, as of a specified election date), to measure eligible items at fair value. The decision to elect the fair value option:

- Shall be applied instrument by instrument.
- Shall be irrevocable.
- Shall be applied only to an entire instrument and not to only specified risks, specific cash flows, or portions of that instrument.

According to amended IAS 39, when an entity becomes party to a hybrid instrument that contains an embedded derivative, IAS 39 requires the entity to assess whether to recognize the embedded derivatives separately from the host contract and measure it at fair value. These requirements can be more complex or result in less reliable measures and, consequently, an entity is permitted to designate the entire hybrid instrument as at FVTPL if the embedded derivatives modify significantly the cash flows associated with the instrument.

The objective of the election to apply Fair Value Option for all the debt instruments in its borrowings portfolio is to report the entire borrowings portfolio on the same measurement basis, thereby eliminating the mixed-attribute approach and better reflecting the overall economic position and results of the portfolio.

### 6.2. Accounting Process

An entity may issue unsubordinated and unsecured fixed and variable rate debt in a variety of currencies. These bonds may be either structured (contain embedded derivatives to hedge currency or interest rate risk) or non-structured financial instruments. For example, some of these debt instruments could be callable, and discount notes with maturity of 360 days or less in the US and Eurodollar market. The variable rates may be based on various criteria such as exchange rates, interest rates or equity indices.

In general, an entity may purchase a software application as its primary system of record for debt and derivatives trading, operations, valuation, and accounting. The accounting component of such system generates historical cost accounting and/or fair value accounting entries for each trade based on the type of instrument and specific features of the trade. At the time of trade set up, each trade is assigned relevant accounting rule based on accounting event, cash flows and payment type, etc. Accounting rule defines possible events occurring over the life of the trade and directs the account postings (i.e. journal entries) for each event.

#### 6.2.1. Accounting Rule Set Up

For trade date accounting, accounting rule should be assigned to trades on trade date automatically based on a program built into the system environment. This program uses a series of criteria to identify the appropriate accounting rule based on the characteristics of each trade, such as:

- Profit Center (or public sector may call it Cost Center).
- Trade Type (e.g. bond / swap).
- Payment Type (coupon-paying vs. zero coupon).
- Index Type (fixed, floating or formula-based).
- Timing of Notional Exchange (start date, end date, both, or none).
- Term (short term, and medium-long term.

- Premium / Discount / Fees (Y/N).
- Illiquid Currency (Y/N).
- Accounting Calendar (defines the accounting periods).
- Chart of Account Code (require for posting all transactions in the accounting system).
- Chart of Account Categories (group account code by categories).
- Inventory rule such as selecting First-in First-out (FIFO) or average cost.

### 6.2.2. Accounting Event

Accounting event is an occurrence over the life of a trade, which requires an account posting. Examples of events include, but not limited to:

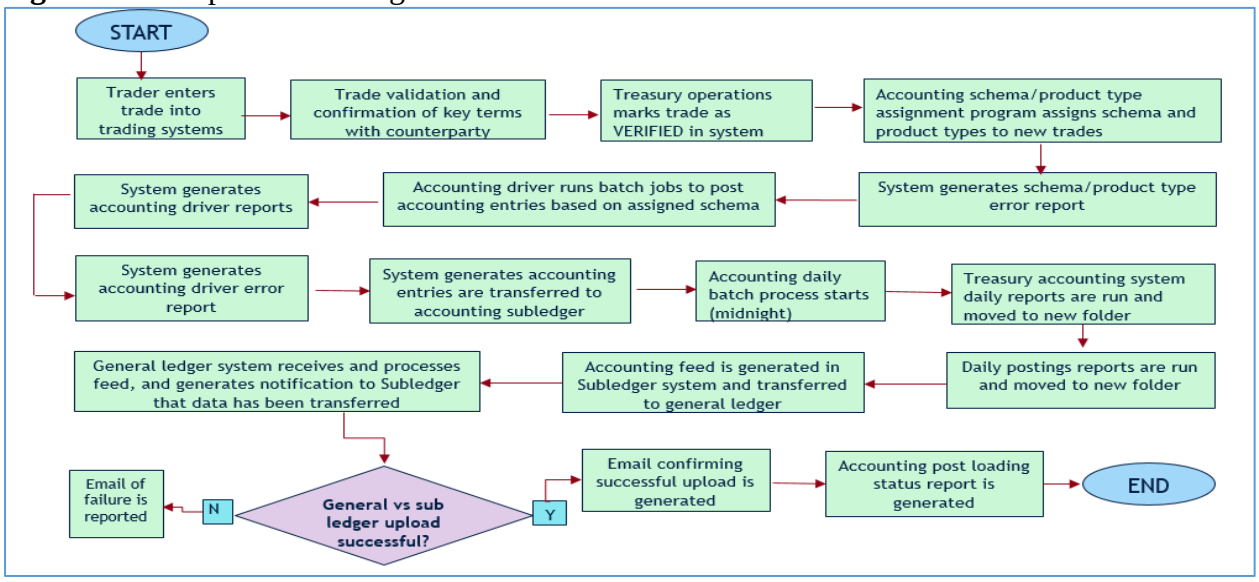
- Exchange of Principal,
- Interest Accrual,
- Interest Payment,
- Fee Settlement,
- Amortization of Premium / Discount / Fee, and
- Maturity (exchange of principal).

Events are independent of trade types, in that the same event may be applicable to many different trade types. For example, the interest accrual event can happen for both bond and swap. An event can have a positive or negative sign, based on the directional flow of funds. For example, a positive interest accrual event represents an accrual of interest income, while a negative interest accrual event represents an accrual of interest expense.

For each event, the account posting rules should define the accounts to be debited and credited for positive and negative occurrences of the event. The chart of account code set up in treasury operation system should be mapped to the account code set up in the general ledger accounting system to facilitate the automated account posting files to be transferred during system interface.

Below is a sample daily accounting data flow chart based on a new trade process from operation to accounting ledger:

**Figure 31:** Sample Accounting Process



### 6.2.3. Amortization of Premium, Discount, and Settlement Fees

In general, amortization of Premium, Discount, and Swap settlement fees (or bond issuance costs) is preferable to be amortized using the effective yield method (also called the constant yield method, or the effective interest rate method). Under the effective yield method, the amount of interest expense in a given year will correlate with the amount of the bond's value. This means that when a bond's book value decreases, the amount of interest expenses will decrease. In short, the effective interest rate method is more logical than the straight-line method of amortizing the bond premium. For the Fixed-Fixed currency swap, the amortization schedule can be considered as two bonds for each leg with opposite direction in value. However, in the case of dealing with a complicated trade, for example, both Premium / Discount and Fees are on the same leg, then the straight-line amortization can be considered. For floating rate bond Premium / Discount amortization, due to its complexity, the straight-line method can be applied.

The basic methodology of how to calculate periodic amortization is included in the Figure 32 below, based on the assumption of amortizing the premium from a 5-year 9% USD100,000 bond issued in an 8% market for USD 104,100 on Jan. 1, 2016. The comparison between the effective interest rate method and straight-line method shows that under the effective interest rate method one has less amortization than under the straight-line method in the earlier accounting periods.

**Figure 32:** Amortization Schedule

| A | B | C | D | E | F | G | | H |
|---|---|---|---|---|---|---|---|---|
| **Date** | **Interest Payment Stated 4.5% x Face** | **Interest Expense Mkt 4% x Previous BV in G** | **Amortization of Bond Premium C minus B** | **Credit Balance in Bond Premium Account** | **Credit Balance in Bond Payable Account** | **Book value of the Bonds F plus E** | | **Straight Line Amortization Bond Premium** |
| | Credit Cash | Debit Interest Expense | Debit Bond Premium | | | | | |
| 1-Jan-2016 | | | | $ 4,100 | $ 100,000 | $ 104,100 | | |
| 30-Jun-2016 | $ 4,500 | $ 4,158 | $ (342) | $ 3,758 | $ 100,000 | $ 103,758 | | $ (410) |
| 31-Dec-2016 | $ 4,500 | $ 4,145 | $ (355) | $ 3,403 | $ 100,000 | $ 103,403 | | $ (410) |
| 30-Jun-2017 | $ 4,500 | $ 4,130 | $ (370) | $ 3,034 | $ 100,000 | $ 103,035 | | $ (410) |
| 31-Dec-2017 | $ 4,500 | $ 4,116 | $ (384) | $ 2,650 | $ 100,000 | $ 102,650 | | $ (410) |
| 30-Jun-2018 | $ 4,500 | $ 4,100 | $ (400) | $ 2,251 | $ 100,000 | $ 102,251 | | $ (410) |
| 31-Dec-2018 | $ 4,500 | $ 4,084 | $ (416) | $ 1,835 | $ 100,000 | $ 101,835 | | $ (410) |
| 30-Jun-2019 | $ 4,500 | $ 4,068 | $ (432) | $ 1,403 | $ 100,000 | $ 101,403 | | $ (410) |
| 31-Dec-2019 | $ 4,500 | $ 4,051 | $ (449) | $ 953 | $ 100,000 | $ 100,953 | | $ (410) |
| 30-Jun-2020 | $ 4,500 | $ 4,033 | $ (467) | $ 486 | $ 100,000 | $ 100,486 | | $ (410) |
| 31-Dec-2020 | $ 4,500 | $ 4,014 | $ (486) | $ 0 | $ 100,000 | $ 100,000 | | $ (410) |
| Total | $ 45,000 | $ 40,900 | $ (4,100) | | | | | $ (4,100) |
| | **First 4 coupon periods** | | **$ (1,451)** | | | | | **$ (1,640)** |

### 6.2.4. Interest Accrual

Interest accrual for both pay and receive leg of the swap should be recorded daily based on contractual accrual rate stipulated in the term sheet. If the index of rate is defined as floating linked to LIBOR for example, the periodic rate reset is required to enable the system to generate correct interest accrual for the next coupon payment. Usually, the floating rate is reset two days prior to the start of the next coupon period. When the interest accrual is manually recalculated to confirm the system generated posting value, one should bear in mind that the day count convention should also be consistent with the swap contract. For example, the most common accrual basis is as follows:

- 30/360
- ACT/365
- ACT/360
- ACT/ACT

Knowing well these basic day count methods will help in building an accounting amortization model.

### 6.2.5. Chart of Account (COA)

Creating general ledger accounts is an important part of implementing a new product. New accounts are created based on expected accounting event for the new type of trade that an entity wishes to settle. Before setting up the new general ledger account, it is suggested to clarify the following components:

- Origin – whether the account is created in Sub ledger or general ledger accounting system.
- Account Category – Asset, Liability, Equity, Income, Expense, or Other.
- Account Code – e.g. Asset 100XXXXXX, Liability 200XXXXXX, Equity 300XXXXXX, Income 400XXXXXX, Expense500XXXXXX, Other type account 800XXXXXX. The length of the code can be vary depending on organization's account structure designed.
- Account Description – e.g. 200210100 New_Bond_Issuance.
- Purpose – For what type of product the account is used.

Regarding the new product implementation to trade Fixed-Fixed currency swaps, or maybe considering the possibility in the future of trading interest rate swaps, the Chart of Account can potentially be set up at once for both trade types. The example of the structure of COA is attached to the following Figure 33.

**Figure 33:** Structure of COA

| COA CODE | SYSTEM_ACCT_NAME | INDX | ACCOUNT_CATEGORY | SYSTEM_ACCT_CATEGORY |
|---|---|---|---|---|
| 102XXXXXX | CSWAP_INT_REC | Fixed | Interest receivable | AST |
| 102XXXXXX | CSWAP_INT_REC | Other | Interest receivable | AST |
| 102XXXXXX | ISWAP_INT_REC | Fixed | Interest receivable | AST |
| 102XXXXXX | ISWAP_INT_REC | Other | Interest receivable | AST |
| 102XXXXXX | CSWAP_RECEIVABLE | Fixed | Face value receivable | AST |
| 102XXXXXX | CSWAP_RECEIVABLE | Other | Face value receivable | AST |
| 200XXXXXX | CSWAP_INT_PAYABLE | Fixed | Interest payable | LIA |
| 200XXXXXX | CSWAP_INT_PAYABLE | Other | Interest payable | LIA |
| 200XXXXXX | ISWAP_INT_PAYABLE | Fixed | Interest payable | LIA |
| 200XXXXXX | ISWAP_INT_PAYABLE | Other | Interest payable | LIA |
| 200XXXXXX | CSWAP_PAYABLE | Fixed | Face value payable | LIA |
| 200XXXXXX | CSWAP_PAYABLE | Other | Face value payable | LIA |
| 400/500XXXXXX | CSWAP_INT_INCOME | Fixed | Interest income | INC |
| 400/500XXXXXX | CSWAP_INT_INCOME | Other | Interest income | INC |
| 400/500XXXXXX | CSWAP_REC_DISC_INC | Fixed | Discount amortization income rec leg | INC |
| 400/500XXXXXX | CSWAP_REC_DISC_INC | Other | Discount amortization income rec leg | INC |
| 400/500XXXXXX | CSWAP_REC_PREM_EXP | Fixed | Premium amortization expense rec leg | EXP |
| 400/500XXXXXX | CSWAP_REC_PREM_EXP | Other | Premium amortization expense rec leg | EXP |
| 400/500XXXXXX | CSWAP_INT_EXPENSE | Fixed | Interest expense | EXP |
| 400/500XXXXXX | CSWAP_INT_EXPENSE | Other | Interest expense | EXP |
| 400/500XXXXXX | CSWAP_PAY_DISC_EXP | Fixed | Discount amortization expense pay leg | EXP |
| 400/500XXXXXX | CSWAP_PAY_DISC_EXP | Other | Discount amortization expense pay leg | EXP |
| 400/500XXXXXX | CSWAP_PAY_PREM_INC | Fixed | Premium amortization income pay leg | INC |
| 400/500XXXXXX | CSWAP_PAY_PREM_INC | Other | Premium amortization income pay leg | INC |
| 400/500XXXXXX | ISWAP_INT_INCOME | Fixed | Interest income | INC |
| 400/500XXXXXX | ISWAP_INT_INCOME | Other | Interest income | INC |
| 400/500XXXXXX | ISWAP_REC_DISC_INC | Fixed | Discount amortization income rec leg | INC |
| 400/500XXXXXX | ISWAP_REC_DISC_INC | Other | Discount amortization income rec leg | INC |
| 400/500XXXXXX | ISWAP_REC_PREM_EXP | Fixed | Premium amortization expense rec leg | EXP |
| 400/500XXXXXX | ISWAP_REC_PREM_EXP | Other | Premium amortization expense rec leg | EXP |
| 400/500XXXXXX | ISWAP_INT_EXPENSE | Fixed | Interest expense | EXP |
| 400/500XXXXXX | ISWAP_INT_EXPENSE | Other | Interest expense | EXP |
| 400/500XXXXXX | ISWAP_PAY_DISC_EXP | Fixed | Discount amortization expense pay leg | EXP |
| 400/500XXXXXX | ISWAP_PAY_DISC_EXP | Other | Discount amortization expense pay leg | EXP |
| 400/500XXXXXX | ISWAP_PAY_PREM_INC | Fixed | Premium amortization income pay leg | INC |
| 400/500XXXXXX | ISWAP_PAY_PREM_INC | Other | Premium amortization income pay leg | INC |
| 400/500XXXXXX | CSWAP_GAIN | Fixed | Realized gain/loss | INC |
| 400/500XXXXXX | CSWAP_GAIN | Other | Realized gain/loss | INC |
| 400/500XXXXXX | CSWAP_LOSS | Fixed | Realized gain/loss | EXP |
| 400/500XXXXXX | CSWAP_LOSS | Other | Realized gain/loss | EXP |
| 400/500XXXXXX | ISWAP_GAIN | Fixed | Realized gain/loss | INC |
| 400/500XXXXXX | ISWAP_GAIN | Other | Realized gain/loss | INC |
| 400/500XXXXXX | ISWAP_LOSS | Fixed | Realized gain/loss | EXP |
| 400/500XXXXXX | ISWAP_LOSS | Other | Realized gain/loss | EXP |
| 100XXXXXX | COLLATERAL RECEIVED | Other | Collateral Received | LIA |
| 100XXXYYY | CONTRA: COLLATERAL RECEIVED | Other | Contra Collateral Received | LIA |

Note: AST – Asset; LIA – Liability: INC – Income; EXP - Expense

### 6.2.6. Accounting Post for a Typical Trade Lifecycle

In general, when a bond is issued, a swap is entered at the same time, and the accounting team is responsible for recording the value of the financial instrument in compliance with adopted accounting standards, rules, and policies. Based on the life cycle of the trade, there are important key dates that should be kept in mind and expected relevant events taking place:

- **Trade Date**: Initial recognition should take place when following the trade date accounting rule.

- **Settlement Date**: Cash in-flows and out-flows are recorded against Swap-Pay (Liability) and Swap-Receive (Asset) account respectively due to the notional exchange for a currency swap. In addition, the contingent event recorded on Trade Date should be reversed out, and interest accrual should start on settlement date.

- **Interim**: On any valid accounting date after the trade settlement during the financial instrument holding period, there are daily routine accounting events that should be expected: (1) amortization of premium/discount; (2) amortization of swap fees; (3) interest accrual.

- **Periodic**: On coupon payment date that is projected in the cashflow schedule, cumulative interest accrual balance for the currently coupon period should be reversed out, and cash transaction for coupon payment should be recorded at the same time for a swap trade both pay leg (cash out-flows against interest expense) and receive leg (cash in-flows against interest income).

- **Maturity Date:** When a trade is matured, the following special accounting events should be monitored closely to ensure the trade is operated properly without outstanding issue at trade level:

    - Final amortization of premium / discount and swap fees.
    - The last coupon payment is recorded at each swap leg for interest income or expense.
    - Notional exchange on maturity (reverse the principal that originally recorded on settlement date).
    - Recognize capital gains or losses related to premium or discount.

- **Daily MTM:** During the trade holding period, mark-to-market (MTM) movement may result in fair value change to the trade on daily basis, therefore, accounting post to record fair market value change against unrealized gains or losses is necessary. Once the trade is terminated or matured, the unrealized gains or losses recorded in MTM accounting event prior to termination and/or maturity should be reversed out, and at the same time the realized gains or losses should be recorded.

The example of a typical lifecycle of the trade accounting post is illustrated in Figure 34 below, which is using the same sample trade used for training purposes during the October 23 to 27, 2017 WB RAS mission to Bucharest.

**Figure 34:** Lifecycle of Trade Accounting Post

| Accounting Operation and Set up | Accounting Date | Account ID | Account Type | CCY | DEBIT | CREDIT | Event Type | Description |
|---|---|---|---|---|---|---|---|---|
| **INITIAL TRADE SET UP** | Trade Date | 800130100 | Memo Acct-Pending Cswap-REC | USD | 1,000,000,000.00 | | Contingent-TR | Memo trade date to settlement |
| | | 800137100 | Memo Acct-Pending Cswap-REC-Contra | USD | | 1,000,000,000.00 | Contingent-TR | Memo trade date to settlement |
| | | 800134100 | Memo Acct-Pending Cswap-PAY | EUR | | 850,000,000.00 | Contingent-TR | Memo trade date to settlement |
| | | 800136100 | Memo Acct-Pending Cswap-PAY-Contra | EUR | 850,000,000.00 | | Contingent-TR | Memo trade date to settlement |
| Reversal trade date | Settlement Date | 800130100 | Memo Acct-Pending Cswap-REC | USD | | 1,000,000,000.00 | Contingent-TR-AD | Reverse CON_TR on settlement |
| | | 800137100 | Memo Acct-Pending Cswap-REC-Contra | USD | 1,000,000,000.00 | | Contingent-TR-AD | Reverse CON_TR on settlement |
| | | 800134100 | Memo Acct-Pending Cswap-PAY | EUR | 850,000,000.00 | | Contingent-TR-AD | Reverse CON_TR on settlement |
| | | 800136100 | Memo Acct-Pending Cswap-PAY-Contra | EUR | | 850,000,000.00 | Contingent-TR-AD | Reverse CON_TR on settlement |
| Notional Exchange, | Settlement Date | 102503500 | Asset Acct-CSWAP-REC | USD | 1,000,000,000.00 | | XNL | Notional exchange-REC Leg |
| | | CASH | CASH | USD | | 1,000,000,000.00 | SET | Net cash flows within trade |
| | | 200330100 | Liab. Acct-CSWAP-PAY | EUR | | 850,000,000.00 | XNL | Notional exchange-PAY Leg |
| | | CASH | CASH | EUR | 850,000,000.00 | | SET | Net cash flows within trade |
| Interest Accrual Starts | Settlement Date | 102341500 | Cswap-INT-REC | USD | 510,416.67 | | IAC | Interest Accrual |
| | | 500144000 | Cswap-INT-Inc | USD | | 510,416.67 | IAC | Interest Accrual |
| | | 200005200 | Cswap-INT-PAY | EUR | | 292,187.50 | IAC | Interest Accrual |
| | | 500154000 | Cswap-INT-Exp | EUR | 292,187.50 | | IAC | Interest Accrual |
| **INTERIM** | | | | | | | | |
| Interest Accrual | Valid Accounting Date After Settlement | 102341500 | Cswap-INT-REC | USD | | 510,416.67 | IAC | Reversal of Interest Accrual |
| | | 500144000 | Cswap-INT-Inc | USD | 510,416.67 | | IAC | Reversal of Interest Accrual |
| | | 200005200 | Cswap-INT-PAY | EUR | 292,187.50 | | IAC | Reversal of Interest Accrual |
| | | 500154000 | Cswap-INT-Exp | EUR | | 292,187.50 | IAC | Reversal of Interest Accrual |
| | | 102341500 | Cswap-INT-REC | USD | 1,020,833.34 | | IAC | Interest Accrual as of 10/18/2017 |
| | | 500144000 | Cswap-INT-Inc | USD | | 1,020,833.34 | IAC | Interest Accrual as of 10/18/2017 |
| | | 200005200 | Cswap-INT-PAY | EUR | | 584,375.00 | IAC | Interest Accrual as of 10/18/2017 |
| | | 500154000 | Cswap-INT-Exp | EUR | 584,375.00 | | IAC | Interest Accrual as of 10/18/2017 |
| **PERIODIC** | | | | | | | | |
| Reversal of Interest | Any valid accounting | 102341500 | Cswap-INT-REC | USD | | 16,673,611.11 | IAC | Reversal of Interest Accrual on CPN date |
| | | 500144000 | Cswap-INT-Inc | USD | 16,673,611.11 | | IAC | Reversal of Interest Accrual on CPN date |
| | | 200005200 | Cswap-INT-PAY | EUR | 9,544,791.67 | | IAC | Reversal of Interest Accrual on CPN date |
| | | 500154000 | Cswap-INT-Exp | EUR | | 9,544,791.67 | IAC | Reversal of Interest Accrual on CPN date |
| Interest Payment | On Coupon Payment date | CASH | CASH | USD | 16,843,750.00 | | SET | Interest Payment on Coupon Date |
| | | 500144000 | Cswap-INT-Inc | USD | | 16,843,750.00 | INT | Interest Payment on Coupon Date |
| | | CASH | CASH | EUR | | 9,642,187.50 | SET | Interest Payment on Coupon Date |
| | | 500154000 | Cswap-INT-Exp | EUR | 9,642,187.50 | | INT | Interest Payment on Coupon Date |
| **MATURITY** | | | | | | | | |
| Last Interest Coupo | On Maturity dat | CASH | CASH | USD | 30,625,000.00 | | SET | Interest Payment on Coupon Date |
| | | 500144000 | Cswap-INT-Inc | USD | | 30,625,000.00 | INT | Interest Payment on Coupon Date |
| | | CASH | CASH | EUR | | 17,531,250.00 | SET | Interest Payment on Coupon Date |
| | | 500154000 | Cswap-INT-Exp | EUR | 17,531,250.00 | | INT | Interest Payment on Coupon Date |
| Exchange of Notiona | On Maturity dat | 102503500 | Asset Acct-CSWAP-REC | USD | | 1,000,000,000.00 | XNL_AD | Reverse XNL maturity of swap |
| | | CASH | CASH | USD | 1,000,000,000.00 | | SET | Cash flows for notional exchange |
| | | 200330100 | Liab. Acct-CSWAP-PAY | EUR | 850,000,000.00 | | XNL_AD | Reverse XNL maturity of swap |
| | | CASH | CASH | EUR | | 850,000,000.00 | SET | Cash flows for notional exchange |

### 6.2.7. Accounting for Collateral

If an entity is exposed to commercial and non-commercial counterparty credit risk, i.e. the risk that counterparties fail to meet their payment obligations under the terms of the contract, an effective management of counterparty credit risk is required to be put in place, to monitor and manage these risks continuously as the market environment evolves.

Under normal business circumstances, an organization could trade various derivatives and foreign exchange financial instruments to manage an institution's exposure to fluctuations in interest and exchange rates. These types of transactions entail commercial counterparty credit risk. Under a mark-to-market collateral arrangement, if an entity is in a net receivable position higher than the agreed upon collateral threshold allocated to a counterparty, counterparties are required to post cash collateral (under the assumption that security collateral is not in the scope of this report) with the entity. This type of cash collateral posted to the institution is subject to disclosure in the financial report periodically. Posting collateral could be one way or two way, depending on the collateral agreement between institutions, to identify acceptable securities and/or cash in certain currencies as agreed upon by the counterparties. For example, the World Bank (IBRD) is not required to post collateral under its derivatives agreements as long as it maintains a triple-A credit rating.

In the financial report, those collaterals which the receiving entity (e.g. MoPF) has the right to sell or repledge, are subject to disclosure. For example, in general, the collaterals that the World Bank receives may be repledged, something that is required to be disclosed in the financial statement.

A new Chart of Account for posting collateral from counterparties is suggested to be created in the accounting system to avoid manual intervention, as well as for keeping consistent historical records. The suggested account structure is included in the table attached in 6.2.5 Chart of Account.

### 6.3. Current Arrangements and Issues Arising

The MoPF has acquired a comprehensive FTI STAR system, the complete treasury system that is quoted as Designed by Treasurers for Treasurers. It is covering the full range of Front, Middle and Back Office treasury processes and providing risk management and in-depth analyses and reporting capability, including accounting and valuation functionalities.

Currently, the MoPF is still in the phase of reaching a decision regarding the accounting policies and accounting standards (e.g., IFRS, IPSAS, or ESA 2010) to be applied. The MoPF is currently recording interest expense and income using "accrual modified" accounting basis, which is commonly used by government agencies. It combines both accrual-basis and cash-basis accounting rules, that recognize expenses when liabilities are incurred, and recognize income when it becomes available and measurable. In the future, once the borrowing portfolios are registered in FTI STAR, and before the accounting rule is set up in FTI STAR, the MoPF needs to make a decision which accounting policies to adopt: (1) what accounting rule should accounting for financial instruments be based on; and (2) what accounting and reporting standards should be applied, i.e., follow IFRS, IPSAS, ESA 2010, or other standards that can be justified.

For IT support, there is a request (e.g., from the MoPF's Back Office) for system configuration between FTI STAR and the organization's general ledger accounting and reporting system, so that financial data can be interfaced automatically based on the required frequency. In the event that system configuration has not been set up, but the FTI STAR accounting module has been implemented to generate accounting posting at trade level, manual upload and posting to general ledger can be an option based on a FTI STAR-generated accounting posting report. Under any circumstances where an FTI STAR accounting module is not applied, but swaps are traded, the Back Office should follow the general guideline illustrated in Figure 34, to calculate interest accrual and FV of the instrument periodically to fully and manually record the trades in the accounting ledger.

When reconciling the FTI STAR sub-ledger accounting data with central accounting general ledger, one may observe system-to-system reconciliation differences. The usual reasons for such differences are:

- Timing difference,
- Rejected transactions,
- Mismatches in account mappings,
- Different F/X rates used,
- Wrong file/or wrong transactions uploaded to general ledger,
- System processing errors, and
- Immaterial rounding.

Therefore, IT system support to FTI STAR should be playing an important role in troubleshooting and problem solving, together with accounting staff's investigation.

Lastly, regarding existing old bonds (with or without swaps), a cut-off date can be decided to: (1) reverse out the old book value by this date; and (2) post the current fair value (or carrying value) and accruals on the same date. Going forward, accounting for those old trades can be followed with FTI STAR valuation and posting generated on daily basis.

### 6.4. Things to Follow Up

The accounting module is currently embedded in the Middle Office pull down menu of FTI STAR system. However, the accounting professionals that will handle treasury accounting can be either from the MO or BO, as long as they have a suitable set of skills. Currently, the MoPF is trying to deploy an adequate number of treasury accounting professionals to work on accounting module implementation in order to e utilize the accounting functionalities from FTI STAR to automatically interface accounting data from FTI STAR to the organization's general ledger accounting system. This will reduce manual intervention and increase efficiency.

Based on the agreement between the MoPF and FTI STAR after this treasury system was purchased, FTI STAR would provide consulting services to the MoPF to help treasury accounting professionals to set up accounting rules and posting rules to assist accounting personnel in carrying out the accounting process in the Middle Office accounting module at the desired frequency.

Depending on Management's priorities, to implement the accounting module in FTI STAR and build up the proper environment for the accounting unit and set up the rules and comply with accounting standards, here are some actions to consider:

1. Designate an adequate number of accounting professionals working in the treasury operations to handle financial instruments' accounting, reporting, and financial disclosures.

2. Balance out the resource allocation among treasury MO or BO accounting and identify the internal counterparty in central accounting department within the organization, so that periodic accounting transaction interface can be performed smoothly based on the two units' (treasury accounting and central accounting) collaboration.

3. Engage FTI STAR consultant to activate FTI STAR accounting module by setting up accounting rules and posting rules, and also include a certain level of required training on the application delivered by FTI STAR. Run through a trade testing cycle to compare with other sample trades and excel simulated results.

4. Structure a working road map for accounting professionals to gain confidence by communicating with other organizations that have similarities and commonalities, to clear the existing queries.

5. Clarify the accountabilities and responsibilities between accounting staff in treasury operations and staff in central accounting unit. In addition, clarify accountabilities and responsibilities in the entire trade operational cycle, from Front Office (e.g., who puts

a trade in the system), to the Back Office (e.g., who does trade verification and settlement), as well as Middle Office (e.g., who does valuation), as these will eventually be reflected in the accounting value posted to the ledger. Therefore, a high-level of collaboration among the working units is crucial to ensure accuracy of accounting records.

## 7. Operational Risk Management

This section has been excerpted and adapted from an earlier published WBG Guidance Note for Operational Risk Management in Government Debt Management[11]. The note draws on existing literature for operational risk management principles and practices that have been formulated by the Bank for International Settlements (BIS) Basel Committee on Banking Supervision, the Committee of Sponsoring Organizations (COSO) and the findings of the Debt Management Performance Assessments (DeMPA). It provides guidance on developing a framework for assessing risk exposures from incidents or events that can adversely impact on reputation, financial cost, outputs and/or budget variance.

### 7.1. Overview of Operational Risk

Under Basel II[12], operational risk is defined as the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. While this definition and sound practices have been primarily designed for the banking and financial sector, the governing principles can appropriately be applied to government debt management operations.

In government debt management operations, the categories of risks, such as market risk (exchange rate and interest rate risk), credit risk, refinancing risk and liquidity risk, are relatively well known; however operational risk is not. Government debt management units (DMUs) are increasingly using derivatives, collateral and netting arrangements to manage their exposure to market and credit risk. This may generate other forms of risk as these transactions are by their nature complex, which creates increased operational complexities and risks. More importantly, operational risks are more difficult to manage as the embedded risk cannot be captured and measured in the same way as market and credit risk. In addition, market or credit risks can be effectively managed by a relatively small number of debt managers (typically in the Front and Middle Offices) whereas operational risks must be addressed at all levels across all of government debt management operations.

### 7.2. Categories of Operational Risks for Government Debt Management

The Basel II definition as quoted above includes legal risk but excludes strategic and reputation risk. The strategic and reputation risk, however, can be caused by both bad operational risk management and an unexpected consequence of an informed business decision. A poor strategic decision due to lack of adequate training of staff and lack of system support is an operational risk, while an informed strategic decision based on a reasonable cost and risk analysis that still resulted in a loss for the government is an ordinary business risk. Both can of course affect the reputation of the government. However, in the former case the reputation will be more damaged as the government will be criticized for not knowing what it is doing, putting the taxpayer's money at risk.

The categories of operational risks that are relevant for government debt management including examples under each category are:

1. **Infrastructure & Technology Failures:** Power failure, hardware failure, sabotage, data corruption including viruses, LAN / WAN / intranet / internet failure, internal

[11] Guidance for Operational Risk Management in Government Debt Management, March 2010, World Bank Group.
[12] International Convergence of Capital Measurement and Capital Standards: A Revised Framework, June 2004.

flood (sprinklers, pipes), voice network failure, theft of equipment, theft of data / information, poor maintenance, and accidental damage.

2. **Incidents Where Access to Premises is Denied:** Flooding or a fire concern, health and safety violation, hazardous chemicals accident, gas or chemical leak, industrial action or riot, bomb or terrorist threat, building fire or explosion, internal / external flood, sabotage or terrorism.

3. **Key Service Providers or Resource Failures Dependencies:** Failure of key service providers (telephone, internet, banking etc.), third party providers (Central Bank and other outsourced operations), impact of incident on critical teams or groups (travel, food poisoning, group incident).

4. **Staff, Management and Related Human Failures:** Human error, poor training or inadequate supervision, failure to follow code of conduct or conflict of interest guidelines, lack of policy guidance, poor understanding of risk environment, poorly specified delegations, failure to follow or adhere to administrative practices, key person risk, fraudulent, corrupt or dishonest practices.

5. **Failure to Meet Statutory, Legal, Human Resources and Other Obligations:** Legal/statutory obligations, management directives, procedures manuals and delegated authorities, reporting obligations, contractual obligations, health and safety regulations.

6. **Major Natural & Regional Disasters:** Earthquake, severe flooding, tsunami, volcanic eruption, severe fires, civil disturbance or terrorism.

### 7.3. Principles for Developing an Appropriate Risk Management Environment

It is useful to consider the principles for operational risk management within the context of the legal and managerial structure that shapes and directs the operations of the DMU. This includes the legislation that defines goals, authorities, and accountabilities. It also embodies the management framework, covering issues such as the formulation and implementation of a debt management strategy, operational procedures, quality assurance practices, and reporting responsibilities. The governance structure for operational risk management may be quite extensive with an operational risk committee, audit committee, a management committee, and an advisory or decision-making board.

The following sets out the principles that might apply to government debt management operations:

***Developing an Appropriate Risk Management Environment:***

1. The Head of the DMU and/or members of the decision-making board (if this exists) should be aware of the major aspects of debt management operational risks as a distinct risk category that should be managed, and the Head of the DMU (or the board) should approve and periodically review the operational risk management framework applicable to all government debt management operations. The framework should provide a definition of operational risk and lay down the principles of how operational risk is to be identified, assessed, monitored, and controlled/mitigated.

2. The Head of the DMU and/or members of the decision-making board should ensure

that the operational risk management framework is subject to effective and comprehensive internal audit by operationally independent, appropriately trained and competent staff. The internal audit function should not be directly responsible for operational risk management.

3. Senior management across all government debt management operations should have responsibility for implementing the operational risk management framework approved by the Head of the DMU and/or the decision-making board. The framework should be consistently implemented throughout all debt management operations, and all levels of staff should understand their responsibilities with respect to operational risk management. Senior management should also have responsibility for developing policies, processes and procedures for managing operational risk across all debt management activities, processes and systems.

***Risk Management: Identification, Assessment, Monitoring, and Mitigation / Control***

4. The DMU should identify and assess operational risk exposures inherent in all activities, processes and systems. The debt managers should also ensure that before new activities, processes and systems are introduced or undertaken, the operational risk inherent in them is subject to adequate assessment and managed appropriately.

5. The DMU should implement a process to regularly monitor operational risk profiles and material risk exposures. There should be regular reporting of pertinent information to the Head of the DMU, and members of the decision-making board that supports the proactive management of operational risk.

6. The DMU should have policies, processes and procedures to control and/or mitigate material operational risks. The DMU should periodically review their operational risk profile and should adjust their risk limitation and control strategies in the context of the government's overall debt and risk management strategy.

7. The DMU should have in place contingency and business continuity plans to ensure its ability to operate on an ongoing basis and limit losses in the event of any business disruption.

***Role of Internal and External Auditors***

8. Internal and external auditors should independently examine and assess the DMU's framework for identifying, assessing, monitoring and controlling/mitigating material operational risks. External auditors should independently conduct, directly or indirectly, regular evaluation of debt management policies, procedures and practices related to operational risks.

***Role of Disclosure***

9. The DMU should make sufficient public disclosure to allow the Minister of Finance and government as well as market participants to assess their approach to operational risk management. This should include a statement setting out the DMU's approach to managing operational risk and the publication of the external auditor's report on a review of operational risk management policies, procedures and practices.

### 7.4. Operational Risk Management Framework

Developing an operational risk management framework should be an evolutionary process as it will take dedicated time and effort to not only identify and understand the risks but also the mitigation techniques in an environment that is constantly changing. The framework can be developed and applied incrementally as techniques improve and DMU staff begin to understand the risks and mitigation techniques. For the framework to succeed, it is important to develop a culture of risk awareness across the DMU and ensure that all staff are involved in developing and implementing the framework.

The first stage involves senior management understanding and signaling to all staff in the DMU the importance attached to operational risk management and the need for their participation and ongoing cooperation. The principles as outlined above that will be followed in the management of operational risk need to be made clear to all staff and embedded into day-to-day debt management operations. Each line manager needs to be made responsible for operational risk management in their own business area.

It is advisable that a risk champion from the Middle Office be appointed to take overall responsibility for operational risk management. The risk champion will lead and guide the process across the DMU, coordinate reporting to senior management, and develop the appropriate operational risk management policies and procedures and control environment. Ideally the risk champion would have relevant background or experience, although this will often not be possible. There are, however, opportunities for professional training in operational risk management and business continuity planning which could be considered.

Once the structure has been established, the development and maintenance of an operational risk management framework for a DMU should follow a six-step process:

1. Understand and document business activities,
2. Identify, assess and measure risks,
3. Develop risk management strategies,
4. Implement capabilities,
5. Monitor performance, and
6. Continuous improvement.

## 8. Annex

### 8.1. ISDA Best Practice Guidelines

| Potential Risks | Best Practices |
|---|---|
| • Inconsistent representation of trade details within the organization's processing systems rendering the confirmation matching process ineffectual. | **Single point of trade capture**<br>• Within an organization's technology infrastructure, there should be one single point for capturing the details of a transaction, and for capturing any subsequent Trade Event relating to that transaction. |
| • Delays or errors in the confirmation matching process caused by manual intervention. | **Employ electronic confirmation matching**<br>• The bilateral submission of electronic confirmations for automated matching is the most reliable and process-efficient method of confirming trades, and provides for the earliest possible means of risk mitigation within the Confirmation Matching Process. Electronic confirmation matching, whether via an in-house or third-party system, should be employed by the organization. |
| • Delays identifying inaccurate trader risk positions. | **Electronic matching of dealer recaps**<br>• Dealer recaps should be processed via an electronic confirmation matching system and do not supersede or negate the need for the confirmation matching process. |
| • Delay in executing the confirmation matching process. | **Electronic confirmation issuance**<br>• Electronic Confirmations should be issued on a timely basis and operational staffs should process (i.e, generate and make available for matching) throughout the trading day. |
| • Ineffective escalation of confirmation matching delays or disputes. | **Confirmation matching status tracking**<br>• Operational staffs should be able to track the real-time status of every confirmation processed by the electronic confirmation matching system. |
| • Confirmation matching process is rendered ineffective as a result of data corruption. | **Avoid updating trade-related information directly into the electronic confirmation matching system**<br>• It is essential that the electronic confirmation matching system, operations processing system and trade capture system (if this is different from the operations processing system) remain synchronized. |
| • Inconsistent representation of trade details within the organization's processing systems rendering the confirmation matching process ineffectual. | **Ensure system integrity**<br>• To ensure the integrity of the confirmation matching process, the data contained in the electronic confirmation matching system must be consistent with that held in the other systems within the organization. |
| • Delay in executing the confirmation matching process. | **Timely resolution of interface errors**<br>• When submitting trades to an electronic confirmation matching system, Operations should regularly monitor |

| | |
|---|---|
| | available system interface error logs in order to identify and correct feed failures in a timely fashion<br>• Whenever a failure is highlighted, the organization should endeavor to perform corrective action, and resubmit the trade to electronic confirmation matching system, on the same day that failure occurred |
| • Ineffective escalation of confirmation matching delays or disputes | **Timely electronic confirmation matching**<br>• By Trade date plus one business day, a trade should be electronically matched or, if this is not possible, an exception formally raised |
| • Compromising the independence and effectiveness of the confirmation matching process | **Segregation of responsibilities**<br>• Management should ensure that appropriate segregation of responsibilities exists between operational staff and those individuals involved in trade execution<br>• Operations staff should be responsible for the execution and management of the electronic confirmation matching process |
| • Malicious or accidental corruption of data and/or controls by a user | **Control systems' access**<br>• Users of any technology system should not be able to alter the functionality of that system directly within the production environment. Developers should have limited access to production systems, and only then within a strictly controlled environment |
| • Effectiveness of the confirmation matching process is impacted as a result of incomplete or inaccurate data | **Reference data management**<br>• The reference data associated with the electronic confirmation matching process should be managed in a robust and reliable manner. Organizations should look into:<br>- Maintain data via automated feeds from external sources, where possible,<br>- Validate data that is manually received against independent sources, and<br>- Have rigorous controls to ensure accurate update of data into systems. |
| • Suspension of the confirmation matching process through a loss of key personnel or infrastructure | **Contingency plans**<br>• Operations should develop and test contingency plans for operating in the event of the incapacitation of any or all of their system(s), operational site(s) and/or staff. |

**8.2. Trade Lifecycle Accounting Flows for CSWAP and ISWAP Trades** (Please double click to open)