Sample Content for Funds and Liquidity Transfer Pricing
SAP Profitability and Performance Management
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PUBLIC

Sample Content for Funds and Liquidity Transfer Pricing

Processes and Functions supporting Sample Business Scenarios

Typographic Conventions

Type Style	Description
Example	Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Textual cross-references to other documents.
Example	Emphasized words or expressions.
EXAMPLE	Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.
`Example`	Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.
`Example`	Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.
`<Example>`	Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.
`EXAMPLE`	Keys on the keyboard, for example, `F2` or `ENTER`.

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1 Introduction and Basics

1.1 About this Guide

This guide provides documentation about the sample content for Funds and Liquidity Transfer Pricing, which can be installed on top of SAP Profitability and Performance Management. This sample content describes a project accelerator, ideas, and best practices for modelling an end-to-end Funds and Liquidity Transfer Pricing model that can be used for actuals, planning, forecasting and simulations. It covers the full contribution margin scheme at a granular product level. It also contains references to further documentation required for these tasks.

The structure of this document is arranged around the following topics:

Business Example

This part of the guide describes the business challenges SAP Profitability and Performance Management meets, and the scope the sample content covers.

Funds and Liquidity Transfer Pricing in Detail

This part of the guide covers the main features of the sample content. It describes the information model and calculation model.

Target Audience:

- Business experts
- Solution consultants
- Presales teams

Considerations

It is essential to be accustomed with the content of the corresponding guides and documents related to this topic before beginning with this example. For more information about the available guides and documents, as well as integration with other systems, roles, configuration information, users and authorization concept, see Related Documentation.

1.2 Constraints

This guide does not provide information about the installation of the sample content. For more information about this, see Related Documentation.

1.3 Related Documentation

The following table lists related documents.

Topic	Guide/Tool/Title	Links
• Installation and planning of your system landscape • Activities to keep the system running • Information about how to ensure the required security for your SAP landscape	Administration Guide	Administration Guide
• SAP Note for Sample Content for Funds and Liquidity Transfer Pricing	Sample Content for Funds and Liquidity Transfer Pricing	https://launchpad.support.sap.com/#/notes/2614017 SAP Note 2614017
• Operation of SAP NetWeaver	Technical Operations Manual	https://help.sap.com/viewer/p/SAP_NETWEAVER_750
• Application Help	Detailed Application help for SAP Profitability and Performance Management	SAP Profitability and Performance Management
• SAP HANA Administration Guide	Administration guide for SAP HANA; supported SDA databases	https://help.sap.com/viewer/product/SAP_HANA_PLATFORM/
• SAP Notes		https://launchpad.support.sap.com/

1.4 Glossary

BI	Business intelligence
BPC	Business Planning and Consolidation
BW	Business warehouse
CFG	Cash Flow Generation
CLP	Contingent Liquidity Premium
COF	Cost of Funding
COL	Cost of Liquidity
FTP	Funds Transfer Pricing
GL	General Ledger
LTP	Liquidity Transfer Pricing
TLP	Term Liquidity Premium

2 Business Example

The market is at the dawn of the next big technology change where everything is connected and software is embedded in our lives. This technology change is bringing new opportunities and new threats. Cycle time for innovation is 5–10 time faster, and enterprises can no longer compete unless complexity is reduced, business efficiency is ahead of the market and product and service profitability are constantly tracked and optimized.

That is why digital performance management will be the game-changer for companies who want to be successful in the digital economy. A digital performance management solution for 21st century business needs to measure and manage your enterprise efficiency and drive your product and service profitability in real time.

Built on SAP HANA, SAP Profitability and Performance Management is a next generation digital performance management solution that provides breakthrough real-time business data aggregation capabilities for SAP and non-SAP systems, a high-speed finance and risk calculation engine and comprehensive simulation and scenario management.

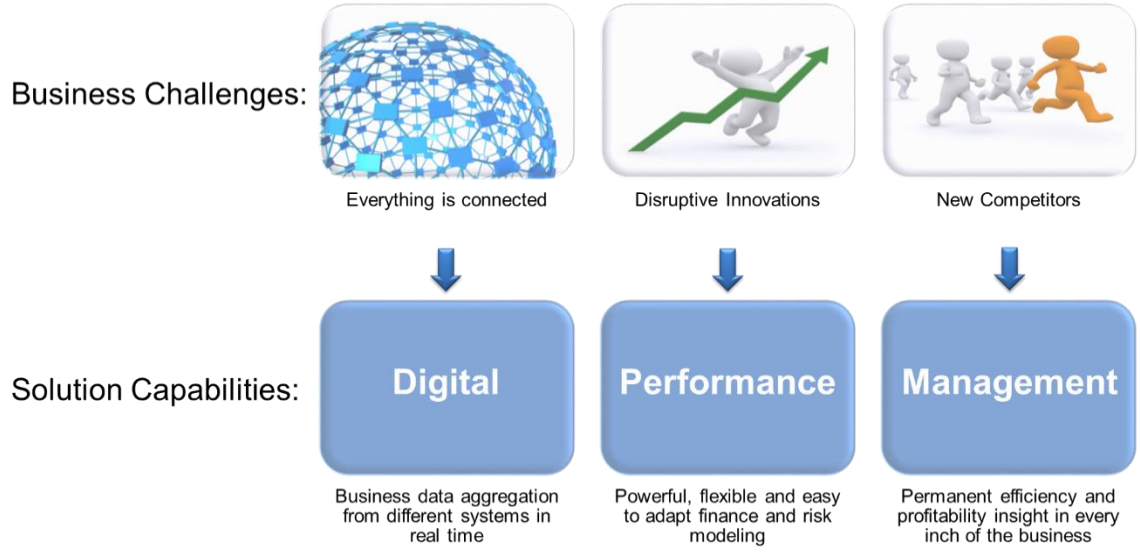

Figure 1: Digital Imperative

2.1 Scope and Business Definition

This sample content covers the sample end-to-end funds and liquidity transfer pricing (FTP/LTP) process of an enterprise, focused on the banking sector, comprising specific aspects of data integration, data input, curve and rate management, cash flow dynamics, processing (including calculations and pricing in accordance with various transfer pricing methodologies), and reporting.

This allows business users to manage and analyze enterprise profitability and cost with regard to internal funding and enterprise liquidity in one central solution.

The following screenshot shows the function hierarchy of the sample content as well as the process template.

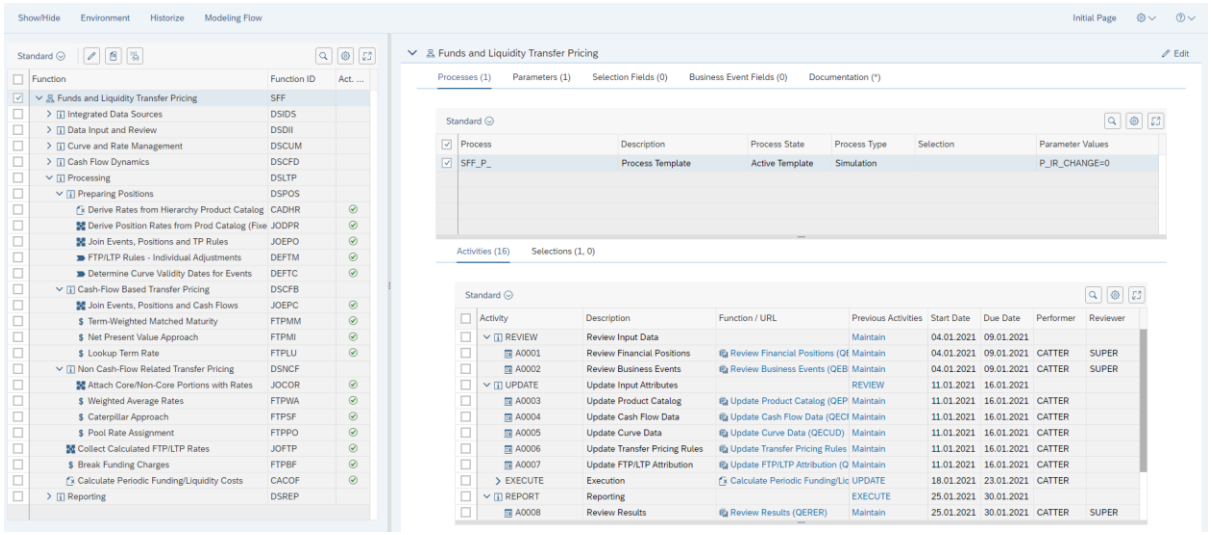

Figure 2: Sample Content Information and Calculation Model

3 Funds and Liquidity Transfer Pricing in Detail

Funds and liquidity transfer pricing is an important task for banks and aims to manage funds and liquidity in a consistent way, optimizing liquidity and minimizing related risks and costs by providing insights into granular revenue, risk and cost information at product, channel or customer level.

This sample content for funds and liquidity transfer pricing (Environment ID=SFF, Version=10) covers an end-to-end example of a matched maturity model applicable to both the assets and liabilities of banks, focusing on specific illustrated products. It incorporates a predefined process template with activities to run the model in production as well as for simulation purposes.

This sample content comes with the SAP Profitability and Performance Management software installation and can be run out of the box.

It consists of one calculation unit function and is structured hierarchically with the following description functions below it in the system:

- Integrated Data Sources
  Defines the information models for the sources of information.
- Data Input and Review
  Provides specific input options for the following:
  - Adjustable data
  - Instance cash flow data
  - Curve data
  - FTP predefined components.
- Curve and Rate Management
  Curves, spreads, and exchange rates can be enhanced and enriched with regard to certain business scenarios. In this sample content version, moving averages of certain curves are derived here and are used subsequently in FTP/LTP processing.
- Cash Flow Dynamics
  Provides various cash flow functions at different granularity levels. Four types of cash flow generating mechanisms are illustrated at contractual level, based on product and position characters. This section analyzes cash flows at portfolio level or at a specified aggregated level that are used subsequently in FTP/LTP processing.
- Processing
  Combines the financial positions, business events, cash flows and transfer pricing rules, provides optional individual adjustments for FTP/LTP treatment of this data. It calculates FTP rates with several methods based on products' properties and goes on to calculate the monthly costs/profits of funding to obtain a complete multidimensional analysis at granular product level.

- Reporting
  Provides one review report with end-to-end traceability from financial positions through all applied FTP and LTP calculations to the final results at GL account level. It also provides three further reports focusing on profit center, product, and client segment levels respectively.

The *Funds and Liquidity Transfer Pricing* calculation unit defines the Process template **SFF_P_ - Process Template** with the following activities:

- ***Review Input Data***
  - *Review Financial Positions*: Ensures that the calculation uses the correct and complete financial position data.
  - *Review Business Events*: Ensures that the calculation uses the correct and complete event data
- ***Update Input Attributes***
  - *Update Product Catalog:* Allows the access to Product Catalog, which serves as input for the FTP/LTP calculation.
  - *Update Cash Flow Data*: Allows the upload of manually created cash-flows. These are required for certain financial positions and business events in the what-if simulation.
  - *Update Curve Data*: Allows you to apply user adjustments and scenario/version-based movements, if needed.
  - *Update Transfer Pricing Rules*: Allows you to assign FTP/LTP methods to products with regard to various dimensions.
  - *Update FTP/LTP Attribution*: Allows you to apply specific FTP/LTP attributes from external sources, if needed.
- ***Execution*** Runs the complete calculation of the FTP/LTP model.
- ***Reporting***
  - *Review Results*: Is a fully granular traceability report from the originating financial positions through all applied methods and calculations to the final periodic profits/costs of funding at GL account level.
  - *Profit Center Results*: Provides a predefined result report at profit center level.
  - *Product Results*: Provides a predefined result report at product level.
  - *Client Segment Results*: Provides a predefined result report at client segment level (channels).
  - *NII Margin Results*: Provides a dynamic result report starting at position and posting date level.

Note

For demonstration purposes, all activities in the standard sample content have been defined with level "0" so that they can be executed in parallel. In implementation projects, you can define dependent activities by using different levels.

The activities have not been assigned any performer or reviewer teams. This means that any SAP Profitability and Performance Management execution user can run the activities. In an implementation project, you are able to assign teams to further restrict the use of an activity and to specify which users can execute an activity.

Characteristic-based authorizations can be defined in an implementation project. For example, in the *Review Financial Position Data* report, the company data for "Big Bank" company is visible only to specific users. Characteristic-based authorizations also help in decentralized planning so that sales planning data can only be changed by one group of people, while marketing planning data can be changed by another group, for example.

3.1 Integrated Data Sources

In this section, you define the required data sources.

> Note
>
> This sample content does not work with specific customer data and does not require a customer-specific system landscape, application or interface.

The integration of data sources uses functions of the type "Model Table" to make test data available. These model tables need to be exchanged by *Model Views* and other model functions in an implementation project to connect to the real, customer data sources.

The complete information model is kept lean to ease the adaption in an implementation project.

> Example
>
> The Integrate Data Sources section assumes just 21 fields as a financial position data feed. In most cases this is sufficient and is much easier to provide than 50 fields.

3.1.1 Financial Positions

This Model Table function is used to provide active positions from various sources. It is assumed that the financial positions come from source systems and they should not be edited in what-if simulations. For testing purposes, users may maintain the data in this model and upload their own test data set via the given UI interface in the beginning of their processes.

The function defines the following fields:

- *Posting Date*: Gives you the flexibility to provide active positions on a yearly, quarterly, monthly or daily basis to run the funds and liquidity transfer pricing process.
- *Company*: Funds and liquidity transfer pricing is usually executed at controlling area level, which spans multiple companies and legal entities. This field can therefore have different values and is still available in reporting.
- *Profit Center*: This field is required because the model incorporates revenues as well as costs. The profit center is the lowest granularity level in a company or legal entity that generates profit.
- *Position ID*: Main identifier to differentiate individual positions.

- *Finance Source*: The field can have different values since the relevant accounting data does not always come from one general ledger in some system landscapes. This field is also available in reporting.
- *Product*: The product property of a position (for example, a loan or a deposit).
- *Customer ID*: The unique ID for the counterparty of the corresponding position (where applicable).
- *Start Date*: Date on which the position is started (where applicable).
- *End Date*: Date on which the position expires (where applicable).
- *Interest Rate (%)*: The interest rate given to or received from the customer. This is an annual rate given in percentage.
- *Day Count Convention*: This is used to count days when calculating accrued interest for a given period. In banking practice, different business lines may use different day count conventions. The following methods are available:
  - 0 - US (NASD) 30/360
  - 1 - Actual/Actual
  - 2 - Actual/360
  - 3 - Actual/365
  - 4 - European 30/360
  - 5 - German 30/360
- *GL Account*: This field is used to record revenues and costs at a granular level.
- *Channel*: The customer segments that a company uses to categorize its business. In profitability analysis this can be used to identify values in different customer segments.
- *Currency (TC)*: Transaction currency is the currency used to calculate profitability in the sample content. This is because it is common practice to translate every amount into the same currency so that only one currency (controlling area currency) is used in the complete profitability model.
- *Curve ID*: The index of a rate term structure that is used to determine the interest rate of a floating rate product for the payment periods in its lifecycle.
- *Start Amount (TC)*: The nominal amount of a product in transaction currency when the product is issued (if applicable).
- *End Amount (TC)*: The final amount in transaction currency that should be repaid on the maturity date of the product when applicable.
- *Periodic Payment Rate (%)*: The periodic principal payments can also be specified by a rate in this field. The periodic payment amounts are determined by combining start and end amounts.
- *Payment Period*: The time interval in a given period unit between two consecutive payments.

- *Day Shift*: The number of days by which the regular payments should be shifted when the cash flow is scheduled. The range is from 0 to 28 (End of month). 28 (End of month) means that the payments always occur on the last business day of the calendar month.
- *Period Unit*: The unit of specified payment period which can be:
  - BW- Bi-Week
  - D – Day
  - HR- Hour
  - HY- Half-Year
  - M – Month
  - Q- Quarter
  - W-Week
  - Y – Year
- *Version*: This field allows you to differentiate between multiple planning versions.
- *Amortizing Type*: This specifies which amortizing type is to be applied to financial positions when cash flow generation is triggered. The following types are available in this sample content:
  - 1 – Regular Amortization
  - 2 – Regular Amortization with Balloon Payment
  - 3 – Bullet with Interim Interest
  - 4 – Bullet with Interest at Maturity
  - 5 – Straight Line (Linear) Amortization
  - 6 – Straight Line (Linear) Amortization with Balloon Payment
  - 7 – Interest Only Period with Principal Amortization Window
  - 8 – Amortization based on Index
  - 9 – User Defined Cash Flows
- *Interest Rate Type*: The financial positions carrying periodic interest payments are categorized by this field:
  - *Fixed Rate*: The annualized interest rate is fixed during the life of the position.
  - *Floating Rate*: The annualized interest rate is periodically repriced according to a predefined index.
  - *Adjustable Rate*: The annualized interest rate can be adjusted under certain circumstances.

3.1.2 Business Events

This Model Table function is used to provide business events for the relevant financial positions from various sources. It is assumed that the business events come from source systems and should not be edited in what-if simulations. For testing purposes, users may maintain the data in this model and upload their own test data set via the UI interface provided at the beginning of their process.

The function defines the following fields:

- *Posting Date*: The date on which a business event is posted. This field gives you the flexibility to provide plan and forecast totals on a yearly, quarterly, monthly or daily basis to run the funds and liquidity transfer pricing process.
- *Event ID*: The unique ID of a registered event. This is the main identifier of an event, which differentiates the specified event from others.
- *Event Source*: In some system landscapes, the business event data comes from multiple systems (such as data warehouses) or is entered manually. In these cases, the *Finance Source* field has different values and is still available in reporting.
- *Event Type*: The property of a certain event, for instance a prepayment event type.
- *Position ID*: The ID of a position for which certain events are posted in systems. For more information, see the *Position ID* field in *Financial Position* function.
- *Amount (TC)*: Amount in transaction currency that represents the values carried by an event.
- *Currency (TC)*: Transaction currency is the currency used to calculate profitability in the sample content. This is because it is common practice to translate every amount into the same currency so that only one currency (controlling area currency) is used in the complete profitability model.
- *Event Quantity*: The quantity of underlying financial instruments of the posted business event.
- *Partition Key*: To parallelize the processes and speed up the performance when handling big volume data sets, this field can be used to partition a data set into desired subsets.
- *Timestamp*: The time when the event is registered in a system. This is a technical field that provides a chronological log for events.
- *Version*: This field allows you to differentiate between multiple planning versions from each other.

3.1.3 Product Catalog

This Model Table function is used to provide product catalog parent-child hierarchy structure with default Rate values for every product. It is assumed that this structure is maintained as master data and contains only one consistent hierarchy for each Version field value. Since this structure is used to derive default parent Rate value for missing values, it should NOT contain nodes which are not relevant for such derivation (Root node, for example).

It defines the following fields:

- *Version:* This field can be used to separate multiple actual/simulated versions from each other.
- *Scenario:* This field can be used to differentiate business scenarios. Data sets assigned to different scenarios will be analyzed simultaneously in sequentially related processes.

- *Product:* The product property of a position, for instance loan, deposit, etc.
- *Parent Product:* Defines parent node value in hierarchy structure.
- *Rate Component:* Defined user defined components of the rate, for example, Base Rate and Loyalty Program Rate. Rate components are summarized to get the final Rate value. (Not used in current implementation).
- *Rate:* The interest rate which is given to or received from the customer. It is an annual rate given in percentage.
- *Rate Unit:* Unit for the Rate field value (Default value 'Annual rate given in percentage' is used).
- *Effective To:* Node validity date (Valid To). (Not used in current implementation).
- *Effective Date:* Node validity date (Valid From). (Not used in current implementation).

3.1.4 Cash Flow Data

This Model Table function is used to provide scheduled cash flows for the relevant financial positions, such as loans, for example. It provides the interface to users via the Query function *Update Cash Flow Data* mentioned below so that the user specified cash flows can be updated on the fly during the what-if simulation.

The function defines the following fields:

- *Version*: This field allows you to differentiate between multiple planning versions from each other.
- *Scenario*: This can be used to differentiate different scenarios. The cash flows associated to different scenarios will be analyzed simultaneously in subsequent processes.
- *Posting Date*: The date on which the corresponding flow is generated. This field gives you the flexibility to provide cash flow totals on a yearly, quarterly, monthly or daily basis to run the funds and liquidity transfer pricing process.
- *Flow ID*: Cash flow generation in the sample content is supposed to be triggered by specific business events. Therefore, the event ID is used as a flow ID so that the flows can be attached to events and positions in the FTP process using this unique ID.
- *Flow Date*: The due date of a cash flow.
- *Flow Type*: The inflow/outflow property of a flow amount (for example, principal payment or interest).
- *Flow Amount*: The amount that is due on a given flow date.
- *Flow Currency*: The currency of the flow amounts.

This function is configured as editable, which allows you to make manual cash flow changes later in the end-to-end process.

3.1.5 Curve Data

This Model Table function is used to provide curve data, for instance FTP base rate curves that will be used in FTP calculations.

The function defines the following fields:

- *Curve ID*: The ID assigned to a curve (term structure of specific rates). This is the main identifier of a curve.
- *Curve Validity Date*: This is the date on which the corresponding curve is valid.
- *Curve Type*: The type of a curve, which specifies the curve's properties.
- *Curve Date*: To specify the (future) dates of specific term points of a curve.
- *Curve Rate*: The rate in percentage assigned to the corresponding curve date.
- *Currency (TC)*: The currency for which the curve rates are applicable.
- *Term*: The time interval from the curve validity date to the given curve date in a term unit (Day, Month, or Year). This is calculated according to a specific day count convention.
- *Term Unit*: The unit of specified terms which can be:
  - BW- Bi-Week
  - D – Day
  - HR- Hour
  - HY- Half-Year
  - M – Month
  - Q- Quarter
  - Y – Year
- *Version*: This field allows you to differentiate between multiple actual/simulated versions.

This function is configured as editable, which allows you to make manual curve data changes later in the end-to-end process.

3.1.6 Transfer Pricing Rules

This Model Table function is used to provide funds and liquidity transfer pricing rules at the granularity level of product and event type. The transfer pricing rules are decided by an Asset Liability Committee within the bank and in practice can be refined in terms of adding more dimensions.

The function defines the following fields:

- *Product*: Specifies for which product certain FTP/LTP rules are assigned.
- *FTP/LTP Rule:* Specifies which FTP/LTP method should be applied regarding the product and business events. For demonstration purposes, the following rules have been defined. These derive five FTP rules by product properties:
  - CA – Caterpillar Approach
  - LU – Lookup Term Rate

  - MI – Net Present Value Approach
  - MM – (Term-Weighted) Matched Maturity
  - PO – Pool Rates
  - WA – Core/Non-Core Weighted Average
- *Version*: This field allows you to differentiate between multiple planning versions.
- *Event Type*: Specifies for which kind of business event certain FTP/LTP rules are assigned.
- *Curve ID:* Specifies the curve that is used to price the given product under given events.
- *Curve Type:* Specifies the curve type.
- *FTP Component:* Provides further adjustments and spreads to certain transfer pricing rules in practice.
- *FTP Component Value*: A value that corresponds to a user-specified FTP/LTP component.
- *Scenario*: This field allows you to differentiate between scenarios. The cash flows associated with different scenarios are analyzed simultaneously in subsequent processes.
- *Rate Type:* Specifies for which type of FTP/LTP rate the calculation rule is applicable. In this sample content two rate types are available:
  - **FL_-** Floating Rate
  - **BASE** – FTP Base Rate
  - **TLP** – Term Liquidity Premium/Charge
  - **FX-** Fixed Rate
  - **DEF-** Default Rate

The function is configured as editable, which allows you to make manual transfer pricing rule changes later in the end-to-end process.

3.1.7 Predefined FTP/LTP Attribution

This Model Table function is used to provide predefined FTP/LTP components (for example, contingent liquidity premiums from the risk department that are allocated in FTP/LTP calculations).

The function defines the following fields:

- *Version*: This field allows you to differentiate between multiple planning versions.
- *Product*: Specifies for which product the FTP components (contributions) are applicable.
- *FTP Component*: FTP/LTP rates may be broken down into various components in banking practice. Some components need to be predefined, calculated or configured in various sources for certain purposes. When these contributions come from external sources, they can be stored in this function as predefined components with user-specified names.
- *FTP Component Value*: A value that corresponds to a user-specified FTP/LTP component. This is a percentage in this function.
- *Scenario*: This field allows you to differentiate between business scenarios. The cash flows assigned to different scenarios are analyzed simultaneously in subsequent processes.

The function is configured as editable, which allows you to make manual FTP/LTP attribution changes later in the end-to-end process.

3.2 Data Input and Review

In this section, you define additional Query functions to enable modelling users to conveniently review and maintain data.

In the review and maintenance process, the following activities are run before the funds and liquidity transfer pricing calculation is executed:

- *Review Financial Positions* provides read-only access to financial positions imported from source systems.
- *Review Business Events* provides read-only access to business events imported from source systems.
- *Update Product Catalog* provides read and edit data access to Product Catalog, which serves as input for the FTP/LTP calculation.
- *Update Cash Flow Data* provides read and edit access to external cash flow data.
- *Update Curve Data* provides read and edit access to curve data.
- *Update Transfer Pricing Rules* provides read and edit access to transfer pricing rules.
- *Update FTP/LTP Attribution* provides read and edit access to predefined FTP/LTP attribution.

> Note
>
> The edit access queries sometimes provide only a subset of the test data for editing to show-case the function.

3.2.1 Review Financial Positions

This Query function is used to provide read data access to financial positions, which serve as input for the FTP/LTP calculations.

For more information about the fields, see Financial Positions.

3.2.2 Review Business Events

This Query function is used to provide read data access to business events, which serve as input for the FTP/LTP calculations.

For more information about the fields, see Business Events.

3.2.3 Update Product Catalog

This Query function is used to provide read and edit data access to Product Catalog, which serves as input for the FTP/LTP calculation.

For more information about the fields, see the Product Catalog function.

3.2.4 Update Cash Flow Data

This Query function is used to provide read and edit data access to external cash flows, which serve as input for the FTP/LTP calculations.

For more information about the fields, see Cash Flow Data.

3.2.5 Update Curve Data

This Query function is used to provide read and edit data access to curves, which serve as input for the FTP/LTP calculations.

For more information about the fields, see Curve Data.

3.2.6 Update Transfer Pricing Rules

This Query function is used to provide read and edit data access to transfer pricing rules, which serve as input for the FTP/LTP calculations.

For more information about the fields, see Transfer Pricing Rules.

3.2.7 Update FTP/LTP Attribution

This Query function is used to provide read and edit data access to predefined FTP/LTP attribution, which serves as input for the FTP/LTP calculations.

For more information about the fields, see Predefined FTP/LTP Attribution.

3.3 Curve and Rate Management

This section contains only the Derive Moving Averages of Curve Rates function, which applies the moving average method to build one kind of hybrid curve. The derived moving average rates are used to price certain non-maturing products in the main part of processing described later.

3.3.1 Derive Moving Averages of Curve Rates

This derivation function is used to derive the moving averages for certain curves from the *Curve Data* function that carries the term structure of curves as discussed. These moving average rates will be used later for calculating the FTP and LTP rates. This method is quite common in banking practice when handling non-maturing products/positions.

During input, the *Curve Data* function is used. The *Curve Type* field is used to filter correct data by selecting **CDDA**, **CREDCD**, **MMDA** and **LP**.

For demonstration purposes, the following rules have been defined, which derive four different averages according to specific requirements:

- **R1 - 3 Month Moving Average**, in which the curve rates of term 3 (months) are selected, and the average of rates from 3 successive ends of month is calculated and assigned to the curve rate. The curve type is then renamed **MAVG3M**.
- **R2 - 1 Year Moving Average**, in which the curve rates of term 12 (months) are selected, and the average of rates from 12 successive ends of month is calculated and assigned to the curve rate. The curve type is then renamed **MAVG1Y**.
- **R3 - 1 Month Daily Average**, in which the curve rates of term 1 (month) are selected, and the average of rates from 30 successive business days is calculated and assigned to the curve rate. The curve type is then renamed **DAVG1M**.
- **R4 - 3 Month Daily Average**, in which the curve rates of term 3 (months) are selected, and the average of rates from 90 successive business days is calculated and assigned to the curve rate. The curve type is then renamed **DAVG3M**.

3.4 Cash Flow Dynamics

Cash flows at various granularity levels are important tools for pricing the underlying financial positions. The functions in this section are executed prior to FTP/LTP processing, so that contractual cash flows are generated for certain maturing products that carry natural cash flows by contractual properties, and behavioral analysis is carried out at a specific granularity level to determine statistical metrics that are used as input parameters in FTP/LTP calculations.

3.4.1 Join Events and Positions

This Join function is used to combine business events and financial positions and prepares the necessary information for triggering a certain type of cash flow generation or analyzing portfolio/aggregated cash flows of some products.

> Note
> No fields are ignored and all information is kept.

3.4.2 Contractual Cash Flow Generation

In this section, four types of cash flow generation are demonstrated for:

- Linear (straight line) fixed rate instruments: The periodic principal repayments are evenly distributed over the lifetime of the contract. The periodic interest payments are determined by a fixed interest rate.
- Linear (straight line) floating rate instruments: Periodic principal repayments are evenly distributed over the lifetime of the contract in the same way as for the linear fixed rate instruments but the periodic interest payments are determined by a floating interest rate normally adapted from a given index.
- Regular fixed rate instruments: Periodic payments (principal and interest) and the periodic interest payments determined by a fixed interest rate are evenly distributed over the lifetime of the contract. This means that the periodic principal repayments vary along the tenor (remaining time until maturity) since the balances and the interests determined by the balances vary along the tenor.
- Regular floating rate instruments: Periodic payments (principal and interest) are evenly distributed over the lifetime of the contract as regular fixed rate instruments. However, the periodic interest payments are determined by a floating interest rate normally adapted from a given index.

3.4.2.1 CFG – Linear Fixed Rate Instruments

This function demonstrates cash flow generation for linear fixed rate instruments (such as loans). For the financial positions from integrated data sources, four rules will be used to generate the periodic principal and interest payments in each case, according to their product properties specified in the function *Financial Positions*. The cash flow generation is commonly triggered by certain events. Therefore, during input the *Join Events and Positions* function is chosen. In the input tab the fields for *Amortizing Type* and *Interest Rate Type* are used to filter for desired entries. By selecting "3", "4", "5" and "6" for amortizing type and **FX** (fixed rate) for interest rate type respectively, the input entries are therefore limited to linear fixed rate instruments.

For demonstration purposes, the following rules are defined:

- **R1 Principals by Payment Rate** which is set to "Flow Generation" rule type, on level "0". Cash flows are generated according to the predefined periodic payment rate. The selection condition "periodic payment rate greater than 0" is used in this rule. **R1** contains the following line:
  - *LP Principal Payment* of Line Type "Periodic Fixed Rate Flow", which distributes the principal to all payment periods using the given periodic payment rate.
- **R1I Interests**, which is set to "Rate Modelling" rule type, on level "1". It is executed after **R1** and uses the result from **R1** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of a loan and the previous principal payments. It has a line *L1 - Interests calculated by given interest rates* of line type "Periodic Fixed Interest".
- **R2 Principals by Even Distribution**, which is set to "Flow Generation" rule type, on level "0". It generates cash flows by evenly distributing principal amounts. The selection parameter "periodic payment rate equal to 0" is used in this rule which selects the disjoint subset of **R1** from the input function. **R2** contains three lines:
  - *L1 Disbursement* of Line Type "Single Flow", which produces the disbursement cash flow of loans according to related events.
  - *L2 Principal Payment* of Line Type "Periodic Fixed Even Flow", which distributes the amount (start amount – end amount) evenly to all payment periods.
  - *L3 Final Repayment* of Line Type "Single Flow", which produces the final repayment on the end date specified by the end amount of the position.

  R2I Interests, which is set to "Rate Modelling" rule type, on level "1". It is executed after **R2** and uses the result of **R2** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of loans and previous principal payments. It has a line *L1 - Interests calculated by given Interest Rates* of Line Type "Periodic Fixed Interest".

3.4.2.2 CFG – Linear Floating Rate Instruments

This function demonstrates cash flow generation for linear floating rate instruments (such as loans). For the financial positions from integrated data sources, six rules will be used to generate the periodic principal and interest payments in each case, according to their product properties specified in the *Financial Positions* function. The cash flow generation is commonly triggered by certain events. Therefore, in the input the *Join Events and Positions* function is chosen. In the input tab the fields for *Amortizing Type* and *Interest Rate Type* are used to filter for desired entries. By selecting "5", "6" and "8" for amortizing type and **FL** (floating rate) for interest rate type respectively, the input entries are therefore limited to linear floating rate instruments.

For demonstration purposes, the following rules have been defined:

- **R1 Principals by Payment Rate**, which is set to "Flow Generation" rule type, on level "0". It generates cash flows according to the predefined periodic payment rate. The selection condition "periodic payment rate greater than 0" is used in this rule. **R1** contains two lines:
  - *L1 Disbursement* of Line Type "Single Flow", which produces the disbursement cash flow of loans according to related events.
  - *L2 Principal Payment* of Line Type "Periodic Fixed Interest Rate Flow", which distributes the principal to all payment periods using the given periodic payment rate.
- **R1R Lookup Period Rates from Index**, which is set to "Rate Modelling" rule type, on level "1". It is executed after **R1** and uses the index information from related positions in **R1** to look up periodic rate from the specified index. It has a line *L1 – Rate from a given index* of line type "Lookup Rate by Interpolation". The given curve rates identified by the curve ID (index) are interpolated and assigned to each payment period in this rule.
- **R1I Interests**, which is set to "Rate Modelling" rule type, on level "2". It is executed after **R1R** and uses the result of **R1R** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of loans and the previous principal payments, as well as the periodic interest rate determined in **R1R**. It has a line *L1 - Interests calculated by given interest rates* of line type "Periodic Fixed Interest".
- **R2 Principals by Even Distribution**, which is set to "Flow Generation" rule type, on level "0". It generates cash flows by evenly distributing principal amounts. The selection condition "periodic payment rate equal to 0" is used in this rule, which selects the disjoint subset of **R1** from input function. **R2** contains three lines:
  - *L1 Disbursement* of Line Type "Single Flow", which produces the disbursement cash flow of loans according to related events.
  - *L2 Principal Payment* of Line Type "Periodic Fixed Even Flow", which distributes the amount (start amount – end amount) evenly to all payment periods.
  - *L3 Final Repayment* of Line Type "Single Flow", which produces the final repayment on the end date specified by the end amount of the position.
- **R2R** *Lookup Period Rates from Index*, which is set to "Rate Modelling" rule type, on level "1". It is executed after **R2** and uses the index information from related positions in **R2** to look up periodic rate from the specified index. It has a line *L1 – Rate from a given index* of line type "Lookup Rate by Interpolation". The given curve rates identified by the curve ID (index) is interpolated and assigned to each payment period in this rule.
- **R2I** *Interests*, which is set to "Rate Modelling" rule type, on level "2". It is executed after **R2R** and uses the result of **R2R** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of loans and previous principal payments, as well as the periodic interest rate determined in **R1R**. It has a line *L1 - Interests calculated by given Interest Rates* of Line Type "Periodic Fixed Interest".

3.4.2.3 CFG – Regular Fixed Rate Instruments

This function demonstrates cash flow generation for regular fixed rate instruments (such as loans). For the assumed financial positions from integrated data sources, four rules will be used to generate the periodic principal and interest payments in each case, according to the product properties specified in the function *Financial Positions.* The cash flow generation is commonly triggered by certain events. Therefore, during input the *Join Events and Positions* function is chosen. On the input tab, the fields *Amortizing Type* and *Interest Rate Type* are used to filter for desired entries. By selecting "1" and "2" for amortizing type and **FX** (fixed rate) for interest rate type respectively, the input entries are limited to regular fixed rate instruments.

For demonstration purposes, the following rules have been defined:

- **R1 Principals by Payment Rate**, which is set to Flow Generation Rule Type, on level "0". It generates cash flows according to the predefined periodic payment rate. The selection that "periodic payment rate greater than 0" is used in this rule. **R1** contains two lines:
  - *L1 Disbursement* of Line Type "Single Flow", which produces the disbursement cash flow of loans according to related events.
  - *L2 Principal Payment* of Line Type "Periodic Fixed Rate Flow", which distributes the principal by the given periodic payment rate and fixed interest rate to all payment periods.
- **R1I Interests**, which is set to "Rate Modelling" rule type, on level "1". It is executed after **R1** and uses the result of **R1** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of loans and the previous principal payments. It has a line *L1 - Interests calculated by given interest rates* of line type "Periodic Fixed Interest".
- **R2 Principals by Regular Scheduled Amounts**, which is set to "Flow Generation" rule type, on level "0". It generates cash flows by evenly distributing principal amounts. The selection condition "periodic payment rate equal to 0" is used in this rule, which selects the disjoint subset of **R1** from input function. **R2** contains three lines:
  - *L1 Disbursement* of Line Type "Single Flow", which produces the disbursement cash flow of loans according to related events.
  - *L2 Principal Payment* of Line Type "Periodic Fixed Even Flow", which distributes the amount (start amount – end amount + interest amounts) evenly to all payment periods.
  - *L3 Final Repayment* of Line Type "Single Flow", which produces the final repayment on the end date specified by the end amount of the position.
- **R2I** *Interests*, which is set to "Rate Modelling" rule type, on level "1". It is executed after **R2** and uses the result of **R2** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of loans and previous principal payments. It has a line *L1 - Interests calculated by given Interest Rates* of Line Type "Periodic Fixed Interest".

3.4.2.4 CFG – Regular Floating Rate Instruments

This function demonstrates cash flow generation for regular floating rate instruments (such as loans). For the assumed financial positions from integrated data sources, five rules will be used to generate the periodic principal and interest payments in each case, according to the product properties specified in the function *Financial Positions*. The cash flow generation is commonly triggered by certain events. Therefore, during input the *Join Events and Positions* function is chosen. In the input tab the fields for Amortizing Type and Interest Rate Type are used to filter for desired entries. By selecting "1" and "2" for amortizing type and **FL** (floating rate) for interest rate type respectively, the input entries are limited to regular fixed rate instruments.

For demonstration purposes, the following rules have been defined:

- **R0 Lookup Period Rates from Index** which is set to "Rate Modelling" rule type, on level "0". For the regular amortizing type, the periodic interest rate must be determined first to calculate the amortized principal. Therefore, for a floating interest rate type, the rate modelling is used first to lookup the correct rates from relevant curve (index). It has a line *L1 – Rate from a given index* of line type "Lookup Rate by Interpolation". The given curve rates identified by the curve ID (index) is interpolated and assigned to each payment period in this rule.

- **R1 Principals by Payment Rate**, which is set to "Flow Generation" rule type, on level "1". It generates cash flows according to the predefined periodic payment rate and the periodic interest rate determined in **R0**. The selection condition "periodic payment rate greater than 0" is used in this rule. **R1** contains two lines:

  - *L1 Disbursement* of Line Type "Single Flow", which produces the disbursement cash flow of loans according to related events.

  - *L2 Principal Payment* of Line Type "Periodic Fixed Rate Flow", which distributes the principal by the given periodic payment rate and fixed interest rate to all payment periods.

- **R1I Interests**, which is set to "Rate Modelling" rule type, on level "2". It is executed after **R1** and uses the result of **R1** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of loans and the previous principal payments, as well as the periodic interest rate determined in **R0**. It has a line *L1 - Interests calculated by given Interest Rates* of line type "Periodic Fixed Interest".

- **R2 Principals by Regular Scheduled Amounts**, which is set to "Flow Generation" rule type, on level "1". It generates cash flows by evenly distributing principal amounts. The selection condition "periodic payment rate equal to 0" is used in this rule, which selects the disjoint subset of **R1** from **R0**. The rule **R2** contains three lines:

  - *L1 Disbursement* of Line Type "Single Flow", which produces the disbursement cash flow of loans according to related events.

- *L2 Principal Payment* of Line Type "Periodic Fixed Even Flow", which distributes the amount (Start Amount – End Amount) evenly to all payment periods.
- *L3 Final Repayment* of Line Type "Single Flow", which produces the final repayment on the end date specified by the end amount of the position.

- **R2I Interests**, which is set to Rate *Modelling* rule type, on level "2". It is executed after **R2** and uses the result of **R2** as input to produce periodic interests using the period beginning balance, which is determined by the start amount of loans and the previous principal payments, as well as the periodic interest rate determined in **R0**. It has a line *L1 - Interests calculated by given Interest Rates* of line type "Periodic Fixed Interest".

3.4.2.5 Union All Cash Flows

This Join function collects all generated cash flows from all four cash flow generation functions mentioned above.

Since all cash flows generated in previous functions share the same fields and granularity, simple "Union All" rules for the inputs are sufficient in the rules of this function. Furthermore, the superfluous entries where the flow amount is "0" are filtered out by the selection conditions.

> Note
> No fields are ignored and all information is kept.

3.4.2.6 Merge External Cash Flows

This Join function merges the external user specified cash flows, which are stored in the model BW function *Cash Flow Data*, with all generated cash flows from the Join function mentioned above into a unified data set in preparation for subsequent use in FTP/LTP processes.

3.4.3 Portfolio/Aggregated Cash Flow Analysis

It is also important to observe and analyze the portfolio/aggregated cash flows at a specific granularity level (specified in multiple dimensions) so that a product's specific statistical characters can be described more precisely using quantified metrics.

With these statistical metrics, some products can be priced more appropriately at specific granularity level. In this sample content version, this such treatment is illustrated by the *Calculate Non-Core Portions* function. Here the behavioral cash flows are observed to determine the non-core portions of GL accounts under the assumption that these GL accounts reflect certain good behavioral patterns.

3.4.3.1 Calculate Non-Core Portions

In banking practice, non-maturing products (for example, savings accounts or deposits) are often handled for transfer pricing at portfolio level. A common approach is to split the monthly balances into core and non-core portions, for example. The core portion is a relatively stable part of the balance and is normally assigned a long-term FTP rate (for example, a 1-year rate). The non-core portion, on the other hand, is a relatively unstable part and is assigned a short-term FTP rate (for example, overnight, 1-month, or 3-month rate). The splitting of core/non-core portions can be achieved by observing the monthly inflows/outflows; in other words, the difference between two consecutive monthly balances of a portfolio. From these monthly inflows/outflows the n-th worst flow will then be selected as the monthly non-core potion according to a given confidence level. In this sample content, the GL accounts are considered as portfolios, monthly inflow/outflows from the past 24 months before 2019 are observed and used to determine core/non-core portions with the assumed confidence level of 95%.

In the input, the *Join Events and Positions* function is used. The fields *Event Type* with selection **MCLBAL** and *Product & Service* with **CDDA**, **CREDCD**, **MMDA** and **TDA** are used to filter for correct data.

For demonstration purposes, the following rules have been defined:

- **DELTA** *Monthly Delta Calculation*, in which the records of "Posting Date" before February 1, 2019 are selected. The monthly difference between every 2 consecutive monthly closing balances is calculated and assigned to the field *FTP Component Value*. Furthermore, the FTP Component is marked as **MON_CF** (monthly cash flow).
- **NONCORE** *Percentage Ranking*, in which the records marked as **MON_CF** in the field *FTP Component* from the previous rule **DELTA** are selected, and the non-core portions are calculated and assigned to the field *FTP Component Value*. The Curve Type is assigned with **MAVG3M**. Furthermore, the FTP Component is marked as **NON_CORE** (Non-core portion).

3.5 Processing

In this section, the core functions of the model to calculate the FTP/LTP rates for illustrated financial products and periodic funding profits/costs results are defined.

Once the input data is reviewed and updated, process execution can begin. It comprises the following functions:

- *Derive Rates from Hierarchy Product Catalog* derives missing rates from parent product nodes.
- *Derive Position Rate from Product Catalog* Is used to substitute Rate value in Fixed Rate product positions with default rates taken from Product Catalog.
- *Join Events, Positions and TP Rules* combine business events with active financial positions and assumed transfer pricing rules in one data stream.

- *FTP/LTP Rules – Individual Adjustments* enables users to adjust calculation rules, components, and so on, individually.
- *Determine Curve Validity Dates for Events* assigns curve validity dates to the events contained in the result of the preceding function, according to event types.

From here on, the main data stream is split into two streams according the cash flow property of the products.

Cash flow carrying products are handled in the *Cash-Flow Based Transfer Pricing* node by the following functions:

- *Join Events, Positions and Cash Flows* combine business events, financial positions, generated cash flows and cash flows from other sources, so that the required fields are prepared for FTP calculation in the following steps.
- *Term-Weighted Matched Maturity* calculates FTP and TLP rates using the term-weighted matched maturity method.
- *Net Present Value Approach* calculates FTP and TLP rates by looking up rates from specified curves according to the tenor (the rest of the maturity determined using the event posting date and end date).
- *Lookup Term Rate* calculates FTP rates by looking up rates from specified curves according to the tenor (the rest of the maturity determined using the event posting date and end date).

Products that do not carry contractual cash flows are handled in the *Non-Cash-Flow Related Transfer Pricing* node by the following functions:

- *Attach Core/Non-Core Portions with Rates* calculate and combine core/non-core portions and moving average rates so that the data can be used in further FTP related calculations.
- *Weighted Average Rates* calculates FTP rates by taking the weighted average of two rates with weights determined by core and non-core portions derived in previous functions.
- *Caterpillar Approach* calculates FTP rates using the caterpillar method that is an analogy of the strip funding method for maturing products.
- *Pool Rate Assignment* calculates FTP rates by picking up base rates from specified curves by pre-determined term. In this scenario, the 3-month rate is used. The liquidity premiums from source data FTP predefined components are also assigned to certain products in this function.

After the two streams have been processed, the data is combined and further processed by the following functions:

- *Collect Calculated FTP/LTP Rates:* After FTP rates are calculated for all products using the functions listed above, the calculated results are combined in this function for further processes.
- *Break funding Charges* calculates the break funding charges (breakage costs) for break funding event (for example, a prepayment event).
- *Calculate Periodic Funding/Liquidity Costs* calculates the monthly costs/profits of funds.

Note

The calculations described above are run and triggered as one process activity. This is possible due to the high processing speed and does not require the steps listed above to be executed in batch mode.

The calculations described above were not configured to perform data aggregation or field exclusion. This means that no information is destroyed and all results are available at granular level, providing complete traceability from the source of positions and events through FTP calculations down to the result at product and service level.

3.5.1 Preparing Positions

Under this node, the following three functions prepare the positions that need to be transfer priced with the information required for FTP treatment.

3.5.1.1 Derive Rates from Hierarchy Product Catalog

This Calculation function is used to go through product catalog hierarchy and derive missing Rates from parent product nodes.

The same function *Product Catalog* is used as both input and lookup functions.

Each of the function's rules implements the following algorithm:

- Select records with 0 Rate value from input set;
- Lookup Rate values from parent nodes (made by parent's key value in Lookup Product field);
- Put lookup record parent key to Lookup Product field.

This allows each rule to go one level up through hierarchy searching for non-zero Rate value.

For demo purposes 5 rules were defined. This means that function can derive missing Rate values up to 5 levels above. If more hierarchy depth is needed to be processed, additional level rules should be added by copying.

3.5.1.2 Derive Position Rates from Prod Catalog (Fixed Rates only)

This Join function is used to substitute Rate value in Fixed Rate product positions with default rates taken from Product Catalog (Demo purpose).

The following fields are removed from result set:

- Lookup Product - Temporary field used in previous Calculation function
- Rate Component - Not used in current implementation.

3.5.1.3 Join Events, Positions and TP Rules

This Join function is used to combine the functions *Business Events*, *Financial Positions* and *Transfer Pricing Rules* from different data sources in one stream. The main FTP process is run at a later stage for this data set.

> Note
> No fields are ignored and all information is kept.

3.5.1.4 FTP/LTP Rules – Individual Adjustments

This derivation function can be used to individually adjust FTP and LTP calculation rules, components, etc. before the main calculations for all enriched data from the Join function described above are run.

For demonstration purposes, the rules configured in this function are set as "Inactive", as they would not derive results that are different from the input data. In other words, no individual adjustments are deployed in this sample content.

3.5.1.5 Determine Curve Validity Dates for Events

This derivation function is used to derive the FTP and LTP curve validity dates regarding event types and additional fields, in some cases for all the enriched data from the derivation function mentioned above.

For demonstration purposes, eight simple rules have been defined. These derive appropriate curve validity dates for all entries from the input function. In an implementation project, these rules could be a lot more complex, depending on your requirements. As soon as the curve validity date is determined, a unique curve (or rate) is assigned to each entry in the main data stream, which is a prerequisite for FTP and LTP calculations.

3.5.2 Cash-Flow Based Transfer Pricing

Under this node, you run cash-flow based transfer pricing. The positions carrying future cash flows from their contractual natures are priced according to their cash flow features using different methods under the concept of matched maturity.

3.5.2.1 Join Events, Positions and Cash Flows

This Join function is used to attach the cash flows stored in the *Cash Flow Data* function or generated by the cash flow generation functions mentioned in *Cash Flow Dynamics* to the corresponding business events and financial positions (of maturing products).

> Note
>
> No fields are ignored and all information is kept.

In the input, the *Determine Curve Validity Dates for Events* function is used. The FTP/LTP Rule field is used to filter data. By selecting "LU", "MM" and "MI", the input records are limited to maturing products carrying contractual cash flows, which are applied later using the Lookup Term Rate, Net Present Value Approach or Term-Weighted Matched Maturity method to calculate FTP and LTP rates.

For demonstration purposes, the following rules have been defined:

- **R0001** *Curve Validity Dates* from rule type "From" on level "0", in which all records are selected from the input function chosen, with the selection specified, on the input tab.
- **R0002** *External Cash Flows* from rule type "Left Outer Join" on level "0", in which the records from the *Merge External Cash Flows* function will be left outer joined with the records from rule **R0001** by equaling the fields *Posting Date* from **R0001** and **R0002**, as well as the *Event ID* and *Version* from both functions.

3.5.2.2 Term-Weighted Matched Maturity

Matched Maturity is an advanced FTP/LTP method and considers the individual cash flow features of a product/position. In this function, the following formula is used to calculate the FTP base rate. Notation: r_{MMFTP}, of a product/position with cash flows:

$$r_{MMFTP} = \frac{\sum_{i=1}^{n} P_i \times T_i \times r_i}{\sum_{i=1}^{n} P_i \times T_i}$$

where P_i is the i-th principal payment amount relating to the i-th term T_i , r_i is the prevailing interest rate relating to T_i retrieved from the specified FTP rate curve, and n is the total number of principal payments.

On the input tab, choose the *Join Events, Positions and Cash Flows* function. Since each individual position and event is assigned to an FTP and LTP rule and principal payments are used in the calculation as mentioned above, the three fields *Flow ID*, *Flow Type* and *FTP/LTP Rule* are used to filter for the correct data by selecting **PRIN** for flow type and "MM" for FTP/LTP rule and excluding empty flow IDs.

The lookup tab contains the *Curve Data* function because it will be used to assign FTP and LTP rates to individual cash flows by matching dates. The FTP or LTP curve rates are linearly interpolated in the background so that all cash flow dates will be assigned with a correct FTP or LTP curve rate.

For demonstration purposes, the following rules have been defined:

- **R1 Lookup Rates for Cash Flows** of Rule Type "Rate Modelling", on level "0". This has only one line *L1 Rate from a given curve* of Line Type "Lookup Rate by Interpolation". When this rule is performed, the curve rates will first be linearly interpolated in the background and then assigned to all cash flows according to the specified curve ID, curve validity date, and flow date.
- **R0 Calculate Term** of Rule Type "Key Figure Formula", on level "1". This has two lines, which assign values to the term and term unit fields.
- **R2 Base Rate by Matched Maturity** of Rule Type "Matched Maturity", on level "2". This rule selects the entries from the result from **R1** by limiting the rule type as **BASE** – base rate – and contains a line *L001 Term-Weighted Matched Maturity FTP* that calculates the FTP Base Rate using the formula above at the granularity level of position ID and event ID.
- **R3 Liquidity Premium by Matched Maturity** of Rule Type "Matched Maturity", on level "2". This rule selects the entries from the result from **R1** by limiting the rule type as **TLP** – term liquidity premium – and contains a line *Matched Maturity* that calculates the LTP rate using the formula above at the granularity level of position ID and event ID.

3.5.2.3 Net Present Value Approach

The Net Present Value Approach is an advanced FTP/LTP method that observes the net present values of future cash flows for a given object. It derives an FTP/LTP rate in a logic sequence shown in the following figure:

Figure 3: Net Present Value Approach - Calculation Steps

Net Present Value (NPV): The net present value of an investment is the difference in present values of cash inflows and outflows it generates within its maturity minus the initial amount invested (which may also be a cash outflow at the beginning). It compares the time values of money.

Since an investment normally receives interests in the future, future money should be discounted by a discount factor D to present value. Suppose an annual (compounding) interest rate r is given over a time t from now. Then the discount factor is calculated by various formulas w.r.t. the compounding method and interest calculation method. For discrete compounding:

$$D = \frac{1}{(1+r)^{\frac{t}{d}}}$$

and for continuous compounding:

$$D = e^{-\frac{r \times t}{d}}$$

Where in both cases the time t is counted in days regarding the given interest calculation method, and d the total amount of days in a year regarding the given day count convention, for example, $d = 360$ for Act/360, 30/360; $d = 365$ for Act/365, and so on. The same applies below.

When a discount factor D is given at period t, the present value of the future money amount *P* at the same period can be seen as a function of this amount and is calculated as:

$$PV(P) = P \times D$$

The net present value of an investment (i.e., a time series of cash flows) is then calculated by summing all future discounted cash flows with their signs up and subtracting the initial amount invested.

$$NPV = \sum_{i=1}^{n} P_i \times D_i - P_0$$

where P_i is the net cash flow (cash inflow – cash outflow) in period i, P_0 the total initial amount invested, D_i discount factor in period i.

Effective Interest Rate: The (annual) effective interest rate, denoted as r_{eff}, is an interest rate on a financial product (for example, bonds) calculated as if compounded annually. It represents the yield of an investment, assuming that the coupon payments are reinvested once received. Suppose a financial product has a nominal annual rate r_{nom} and the number of its compounding periods per year is i. Then r_{eff} is calculated in the following way:

$$r_{eff} = (1 + \frac{r_{nom}}{i})^i - 1$$

The continuous effective interest rate, denoted as r_{eff}^c, assumes a theoretic continuous compounding and should represent the same annual yield as the effective interest rate, therefore it can be determined by:

$$r_{eff}^c = ln(1 + r_{eff})$$

where ln is the natural logarithm.

The effective interest rate is a special case of Internal Rate of Return (IRR) in the context of savings and loans. Assume a financial product (a loan, for example) has an initial invested amount of P_0 and receives total n (re)payments (principals and interests) according to the specified terms within its maturity. In this case the effective interest rate r_{eff} is determined as the root of following equation:

$$P_0 = \sum_{i=1}^{n} \frac{P_i}{(1+r)^{\frac{T_i}{d}}}$$

where

P_i is the i-th (re)payment including principal and interest, the same below.

T_i is the term of i-th payment counted in days, i.e., the days from starting date to i-th payment counted regarding a given interest calculation method, the same below.

d is as mentioned above.

In SAP Profitability and Performance Management the secant method is used to iteratively solve this equation.

Effective Capital over Time (Amount): The effective capital corresponds to the remaining capital but takes the incoming payments including principal and interest resulting from repayments into account, and not the debit positions. The effective capital is basically the difference between the value-dated capital and the sum of all resulting repayments and capital transfer outflows, based on the incoming payments. The system determines the new effective capital by adding the effective interest to the existing effective capital and adding or subtracting the payment flows. The used rate is the effective interest rate.

$$ECOT_i = ECOT_{i-1} \times e^{\left(r_{eff}^{c} \times \frac{T_i - T_{i-1}}{d}\right)} - P_i$$

$i = 1, \dots, n$. By convention $ECOT_0$ is the initial amount invested (e.g. total amount of a loan).

Capital Growth (Amount): Capital growth is the increase in value of an asset or investment over time. It is measured by comparing the current value of the investment or asset with how much originally was invested. In general, investors who go for capital growth have a higher risk tolerance than those who seek income. In this formula, the rate can be the effective interest rate:

$$CG_i = ECOT_{i-1} \times \frac{e^{\left(r_{eff}^{c} \times \frac{T_i - T_{i-1}}{d}\right)} - 1}{r_{eff}^{c}}$$

$i = 1, \dots, n$. By convention $CG_1 = 0$.

Net Present Value Capital Growth (Amount): Capital growth is the increase in value of an asset or investment over time. In this formula, we discount the result of the capital growth with the discount rate to get the realistic capital growth over time.

$$NPV(CG) = \sum_{i=1}^{n} CG_i \times D_i$$

In SAP Profitability and Performance Management, $D_i s$ are calculated by interest rate r_i during the period $[T_{i-1}, T_i]$ regarding continuous compounding.

$$D_i = e^{-r_i \times \frac{T_i - T_{i-1}}{d}}$$

Margin Spread (Rate): The margin spread is determined by dividing the sum of the present values of cash flows by the sum of the present values capital growth.

$$r_{MS} = \frac{\sum_{i=1}^{n} P_i \times D_i - P_0}{\sum_{i=1}^{n} CG_i \times D_i}$$

FTP/LTP Rate: After previous calculation steps, the final FTP/LTP rate r is calculated by subtracting the margin spread from the continuous effective interest rate.

$$r = r_{eff}^{c} - r_{MS}$$

On the input tab, choose the *Join Events, Positions and Cash Flows* function. As each individual position and event is assigned to an FTP and LTP rule, filter for the correct data by selecting "MI" in the *FTP/LTP Rule* field and **DISBMT**, **INTR**, **PDIS**, **PRIN** in *FLTYPE* field.

The lookup tab contains the *Curve Data* function because it is used to assign FTP and LTP rates to individual cash flows by matching dates and the *Predefined FTP/LTP Attribution* function. In this sample content, contingent liquidity premiums from the second function are also assigned to individual positions and events. The FTP curve rates are linearly interpolated in the background so that all cash flow dates are assigned with a correct FTP curve rate.

For demonstration purposes, the following rules have been defined:

- **R0** *Lookup Curve Rates* from rule type "Rate Modelling", on level "0". This has only one line *L1 Lookup Curve Rate* of line type "Lookup Rate by Interpolation". When this rule is performed, as mentioned above, the curve rates will first be linearly interpolated in the background, then assigned to all cash flows according to the specified curve ID and curve date.
- **RC** *Enhancement and CLP* of rule type "Key Figure Formula", on level "1". This has five lines which assign the contingent liquidity premium from *Predefined FTP/LTP Attribution* to the field *Contingent Liquidity Premium (%)* field, calculate *Term in Years*, assign Y (meaning Year) to *Term Unit*, 1 as *Year Basis*, and calculate *Discount Factor* respectively.
- **R1** *Base Rate by NPVA* from rule type "Market Interest Rate", on level "2". This rule selects the entries from result **RC** by limiting the rate type as **BASE** – *Base Rate* and contains a line *L1 Base Rate* of line type "Market Interest Rate" that calculates the *FTP Base Rate (%)* using the formula above at the granularity level of position ID, event ID, flow type and version.

3.5.2.4 Lookup Term Rate

Lookup Term Rate is an FTP method that takes the tenor (the remaining term) of a position into account with regard to a given event. It determines the FTP rates by looking up the rate of a term point that corresponds to the tenor on a given FTP curve. In practice, the tenor can be replaced by duration, or average life of the observed product/position, for example.

On the input tab, the *Join Events, Positions and Cash Flows* function is chosen. Since each individual position and event is assigned to an FTP rule and principal payments are used in the calculation as mentioned above, the fields *Flow Type* and *FTP Rule* are used to filter for the correct data, by selecting **PRIN** for flow type and "LU" for FTP rule.

The lookup tab contains the *Curve Data* function because it is used to assign FTP rates to an individual position and event. The FTP curve rates are linearly interpolated in the background so that all positions and events are assigned with a correct FTP curve rate.

For demonstration purposes, the following rules have been defined:

- **R1** *Base Rate determined by Tenor* of Rule Type "Rate Modelling", on level "0". This rule selects the entries from the input function by limiting the rule type as **BASE** – *Base Rate* and contains one line *L1 Rate determined by Tenor* of Line Type "Lookup Rate by Interpolation". When this rule is performed, as mentioned above, the curve rates are first linearly interpolated in the background, then assigned to all positions based on their event ID by the specified curve ID, curve validity date, and end date. The output field of this rule is *FTP Base Rate (%)*.
- **R2** *Liquidity Premium determined by Tenor* of Rule Type "Rate Modelling", on level "0". This rule selects the entries from input function by limiting the rule type as **TLP** – *Term Liquidity Premium* and contains one line *L1 Rate determined by Tenor* of Line Type "Lookup Rate by Interpolation". The configuration and calculation here is like **R1** and the output field of this rule is *Term Liquidity Premium (%)*.

3.5.3 Non-Cash-Flow Related Transfer Pricing

Under this node, all other positions that do not have contractual cash flow features or normally are priced in a higher granular level are selected and processed by non-cash flow related-funds and liquidity transfer pricing methods for the FTP and LTP rate calculation.

3.5.3.1 Attach Core/Non-Core Portions with Rates

This Join function is used to attach the correct rates to the core/non-core portions of financial positions, which carry the monthly closing balance amounts from monthly closing events. Since the core portion behaves like long-maturity funds, and the non-core portion like short-maturity funds, it

is common to assign a core portion with a long-term or an average long-term rate and a non-core portion with a short-term or average short-term rate.

> Note
>
> No fields are ignored and all information is kept.

In the input, the *Determine Curve Validity Dates for Events* function is used. The *FTP/LTP Rule* field is used to filter out data. By selecting "CA" and "WA", the input records are limited to the non-maturing products, to which the *Caterpillar Approach* method or *Weighted Average* method is applied to calculate FTP and LTP rates.

For demonstration purposes, the following rules have been defined:

- **R1** *Events and Positions*, from rule type "From" on level "0", in which the records are selected from the input function chosen on the input tab and where the selection of an FTP rule equal to "WA" or "CA" has been applied. In the sub view, the condition that the posting date is later than or equal to 1 January 2020 is applied. This is because in the scenario of the sample content, it is assumed that the FTP process is executed only for the year 2020.
- **R2** *Core and Non-Core Portions*, from rule type "Left Outer Join" on level "0", in which the records from rule **R1** will be left outer joined with the records from rule **R2S** and rule **R2U** by the *Position ID* field from **R1** equal to the one from **R2**, the *Version* from **R1** equal to the one from **R2**, as well as *Posting Date* from **R1** greater than or equal to the one from **R2**.
- **R2S** *Noncore Portions Selection*, from rule type "From" on level "1", in which records from the *Calculate Non-Core Portions* function are selected by the conditions of Posting Date later than or equal to 1 January 2019 as well as FTP Component equal to **NONCORE**.
- **R2U** *Calculate and Union Core Portion*, from rule type "Union All" on level "1", in which records from the *Calculate Non-Core Portions* function with the same conditions as above are used to calculate the core portions, assign the rows as curve type **MAVG1Y**, and union the results onto the results from R2S.
- **R3** *Moving Averages*, from rule type "Left Outer Join" on level "0", in which the records from rule **R1** will be left outer joined with the records from rule **R3S** by equaling the fields *Curve ID*, *Curve Validity Date, Version*, as well as *Curve Type* from **R1** and **R3S** respectively.
- **R3S** *Moving Averages Selection*, of rule type "From" on level "1", in which all records from the *Derive Moving Averages of Curve Rates* function are selected by the conditions "Curve Type" equal to **MAVG3M**, **MAVG1Y**, **DAVG1M** or **DAVG3M**, and *Curve Validity Date* later than or equal to 1 January 2018.

3.5.3.2 Weighted Average Rates

The *Weighted Average* function assigns positions by assigning its core and non-core portions different rates, and then calculates the average as their FTP/LTP rate. The weighted average FTP/LTP rate r_{WAFTP} is calculated by:

$$r_{WAFTP} = \frac{p_1 \times r_1 + p_2 \times r_2}{p_1 + p_2}$$

where $p_{1,2}$ is the core and non-core portion in each case, which can be an amount or percentage, $r_{1,2}$ is the corresponding FTP rate assigned to these two portions respectively. As indicated in the previous function, the 3-month moving average rate is used for non-core portions and the 1-year moving average rate is used for core portions in this function.

In practice, a position can also be split into more than two portions. As soon as the portions are determined and appropriate FTP/LTP rates have been assigned accordingly, this weighted average FTP function can also calculate the correct FTP/LTP rate for the position by extending the formula mentioned above in a trivial way.

On the input tab, the *Attach Core/Non-Core Portions with Rates* function is chosen. Since each individual position and event is assigned to an FTP/LTP rule, the *FTP/LTP Rule* field is used to filter for the correct data by selecting "WA".

For demonstration purposes, the following rules have been defined:

- **R1** *Base Rate Weighted Average* of Rule Type "Weighted Average Rate", on level "0". This rule selects the entries from the input function by limiting the rate type as **BASE** – *Base Rate* and contains one line L1, which calculates the weighted rate at the granularity level of *position ID*, *event ID*, *rate type* and *version*. The output field of this rule is *FTP Base Rate (%)*.
- **R2** *Liquidity Weighted Average* of Rule Type "Weighted Average Rate", on level "0". This rule selects the entries from the input function by limiting the rate type as **TLP** – *Term Liquidity Premium* and contains one line L1, which calculates the weighted rate at the granularity level of *position ID*, *event ID*, *rate type* and *version*. The output field of this rule is *Term Liquidity Premium (%)*.

3.5.3.3 Caterpillar Approach

This *Caterpillar Approach* function applies the concept of strip funding to non-maturing positions that do not have contractual cash flows. In this sample content, the non-core portion will determine the monthly payment amount because it is assumed that this part will be a monthly outflow. In this way, the observed portfolios (positions) are replicated by stripped components.

On the input tab, the *Attach Core/Non-Core Portions with Rates* function is chosen. As each individual position and event is assigned to an FTP/LTP rule and the non-core portion number is needed for the calculation, the two fields *FTP/LTP Rule* and *FTP Component* are used to filter for the correct data by selecting "CA" for the first and **NONCORE** for the second.

For demonstration purposes, the following rules have been defined:

- **R1** *Calculate Periodic Payment Amount* from Rule Type "Key Figure Formula", on level "0". This has three lines. In this rule the monthly payment amount is simulated by the non-core portion and current balance of the observed position. In this way the monthly cash out-flows will be simulated in **R2** and used for pricing the position.
- **R2** *Base Rate by Caterpillar* from Rule Type "Strip Funding", on level "1". This rule selects the entries from input function by limiting the rule type as **BASE** – *Base Rate* and contains one line 1. The calculated FTP rate is assigned to the field *FTP Base Rate (%)*.
- **R3** *TLP by Caterpillar* from Rule Type "Strip Funding", on level 1. This rule selects the entries from input function by limiting the rule type as **TLP** – *Term Liquidity Premium* and contains one line 1. The calculated FTP rate is assigned to the *Term Liquidity Premium (%)* field.

3.5.3.4 Pool Rate Assignment

This *Pool Rate Assignment* function is a non-cash flow-related FTP/LTP method that assigns the same FTP/LTP rates to the positions in a funding pool. The pool rates may be fixed by relevant departments beforehand or by taking a rate from a specified FTP/LTP curve with a fixed term. In this sample content, the second approach is used and the fixed term is assumed to be 3 months. Furthermore, a contingent liquidity premium is also assigned to the positions in this function and it is assumed that this contingent liquidity premium rate is from an external source and stored in the *Predefined FTP/LTP Attribution* function.

On the input tab, choose the *Determine Curve Validity Dates for Events* function. As each individual position and event is assigned to an FTP/LTP rule, the value "PO" in the *FTP/LTP Rule* field has been selected to filter for the correct data.

The lookup tab contains the functions *Curve Data* and *Predefined FTP/LTP Attribution*. The first of these will be used to assign FTP base rates and term liquidity premiums to an individual position and event. Contingent liquidity premiums from the second function are also assigned to an individual position and event.

For demonstration purposes, the following rules have been defined:

- **R0** *Contingent Liquidity Premium* from rule type "Key Figure Formula", on level "0". This has only one line L1, which assigns the contingent liquidity premium from *Predefined FTP/LTP Attribution* to the *Contingent Liquidity Premium (%)* field.
- **R1** *Base Rate from predefined component or curve* from rule type "Key Figure Formula", on level "1". This rule selects the entries from rule **R0** by limiting the rule type as **BASE** – *Base Rate* and contains one line L1, which assigns the rate of term 3 months from *Curve Data* to the *FTP Base Rate (%)* field.
- **R2** *Term Liquidity Premium* from rule type "Key Figure Formula", on level "1". This rule selects the entries from **R0** by limiting the rule type as **TLP** – *Term Liquidity Premium* and contains

one line L1, which assigns the rate of term 3 months from *Curve Data* to the *Term Liquidity Premium (%)* field.

3.5.4 Collect Calculated FTP/LTP Rates

This Join function collects all calculated FTP and LTP rates from the FTP functions mentioned above.

Since all positions and events that are calculated for FTP and LTP rates in previous functions share the same fields and granularity, a simple "Union All" rule type for the inputs is sufficient in the rules of this function.

> Note
> No fields are ignored and all information is kept.

3.5.5 Break Funding Charges

This FTP function is used to calculate break funding charges/breakage costs for a prepayment event. As a demonstration, a prepayment event of type **PREPMT** is used in this function. However, in practice or projects the function can be extended to calculate various break funding events.

In the input, the *Collect Calculated FTP* Rates function is used. The *Profit Center* and *Event Type* fields are used to filter out data. By selecting **LOAN** for profit center, **DISBMT** and **PREPMT** for event type, the calculation will be correctly executed for the desired purpose.

For demonstration purposes, the following rules have been defined:

- **R1** *Mark Breakfunding Event*, in which the difference between the FTP rate of a prepayment event and the rate of a previous disbursement event is calculated and assigned to the *FTP Component Value* field. Correspondingly, the *FTP Component* field is assigned with the value **BFC** – *Break Funding Cost* so that in the next rule the correct records can be selected according to this value.
- **R2** *Calculate Charges*, in which the calculated *FTP Component* and *FTP Component Values* fields are used for selecting correct results from rule **R1**. The condition for FTP component is **BFC** and FTP component values should be set to be greater than 0. There is one line of line type "Periodic Fixed Interest" in this rule, which calculates the interests as break funding costs based on the difference between two FTP rates calculated in **R1**.

After calculation, the breaking funding costs are stored in the *FTP Component Value* field.

3.5.6 Calculate Periodic Funding/Liquidity Costs

This Calculation function is used to calculate periodic COF for each individual position and event, except those belonging to the **COMMIT** event type. As a demonstration, the COF are calculated for each month in the year 2020. However, in practice or real-life projects the function can be extended to calculate COF for an arbitrary period, (for example, a day, a week or a quarter).

In the input function, the *Collect Calculated FTP/LTP Rates* function is used. The field *Event Type* is used to filter out data. By excluding **COMMIT**, the commitment event will not be calculated for COF.

For demonstration purposes, the following rules have been defined:

- **R0** *Calculate Term Liquidity Spread*, in previous functions positions are priced by two curves for two rates: Base Rate and Term Liquidity Premium, the term liquidity spread is then the margin of the (temporary) term liquidity premium less base rate, and the result is again assigned to the same *Term Liquidity Premium* field.
- **R1** *Calculate Funding/Liquidity Costs*, in which the periodic interest is calculated according to the calculated FTP base rates and new calculated term liquidity spread respectively, the periodic beginning balance amounts of products, and the day count method. These interest amounts correspond exactly to the periodic cost of funds and cost of liquidity respectively.
- **R2** *Sum up FTP/LTP rates,* in which the calculated FTP base rates, term liquidity premiums, contingent liquidity premiums, etc. are totaled and assigned to the *FTP Rate (%)* field. All numbers are percentages.
- **R3** *Calculate Total Costs and Marginal Spreads*, in which the *Cost of Funds* and *Cost of Liquidity* are totaled and assigned to the *FTP Amount (TC)* field. The NII Margin is also calculated as the difference between the FTP rate and the interest rate.
- **R4** *Preparing Report Figures*, in which additional fields are calculated for use in the dynamic reporting.

3.6 Reporting

In this section you define additional Query functions to allow execution users to review results.

Once the funds and liquidity transfer pricing processing has been run, you can run the following review and reporting activities:

- *Review Results* provides read-only access to the granular results with a predefined layout to trace results from positions and events through FTP processing to the final calculated periodic FTP costs/profits in one screen.
- *Profit Center Results* focuses on the results at profit center level.
- *Product Results* focuses on the results at product and service level.

- *Client Segment Results* focuses on the results at client segment (channel) level.
- *NII Margin Results* displays the results dynamically, giving accurate results even when dimensions are changed.

Note

Specific chart types have not been defined in this sample content. Reports, therefore use the default “Column” chart type. However, end users can change this type on the fly.

3.6.1 Review Results

This Query function is used to provide read data access to the full granular funds and liquidity transfer pricing results. In what-if simulation it provides a chart of the fields listed below. There are also other dimensional fields available for customer views during simulation and reporting.

The following fields are included in the *Key Figures* structure in columns:

- *FTP Amount (TC),* which is the sum of cost of funds and cost of liquidity mentioned below.
- *Cost of Funds*
- *Cost of Liquidity*
- *Contingent Liquidity Premium*
- *Curve Rate*
- *Event Quantity*
- *Amount (TC)*
- *Periodic Payment Amount (TC)*
- *Periodic Payment Rate (%)*
- *Flow Amount*
- *FTP Base Rate (%)*
- *FTP Component Value*
- *Term Liquidity Premium (%)*
- *End Amount*
- *Interest Rate (%)*
- *Start Amount (TC)*

The following field is set in rows:

- *GL Account:* The user can choose to display the GL accounts in a hierarchy instead of a flat list.

The following fields are set as "Free" and are available for customer views and analytics:

- *Amortizing Type*
- *Curve Date*
- *Curve ID*
- *Curve Type*
- *Curve Validity Date*

- *Event ID*
- *Event Source*
- *Timestamp*
- *Event Type*
- *Company*
- *Day Shift*
- *Profit Center*
- *Payment Period*
- *Period Unit*
- *Finance Source*
- *Currency (TC)*
- *Flow Date*
- *Flow ID*
- *Flow Currency (TC)*
- *FTP Component*
- *FTP/LTP Rule*
- *Partition Key*
- *Scenario*
- *Term*
- *Term Unit*
- *Version*
- *Interest Rate Type*
- *Channel*
- *Customer ID*
- *Day Count Convention*
- *End Date*
- *Position ID*
- *Product*
- *Start Date*
- *Rate Type*
- *Posting Date:* The user can choose a hierarchy to display the date in a hierarchy of years, quarters, months and days.
- *Flow Type*

The fields listed above and the configuration ensure that the complete FTP rates and cost of funding are visible and traceable, from positions, events and cash flows (if applicable) through all calculations to the final periodic profits/costs.

> Note
>
> A selection of data is predefined to reduce the number of records initially shown. However, this selection can be changed by end users on the fly.

3.6.2 Profit Center Results

This Query function is used to provide read data access to the funds and liquidity transfer pricing results at profit center level. In a what-if simulation it provides a chart of the fields listed below. There are also other dimensional fields available for customer views during simulation and reporting, see Review Results.

The following fields are set in columns in this report:

- *FTP Amount (TC)*
- *Cost of Funds*
- *Cost of Liquidity*

The following field is set in rows:

- *Profit Center*

The following fields are set as "Free" and are available for customer views and analytics:

- *Day Count Convention*
- *Curve ID*
- *Curve Type*
- *Event Source*
- *Event Type*
- *Company*
- *GL Account*
- *Period Unit*
- *Finance Source*
- *Flow Type*
- *FTP Component*
- *FTP/LTP RULE*
- *Term Unit*
- *Version*
- *Channel*
- *Customer ID*
- *Scenario*
- *Rate Type*
- *Amortizing Type*
- *Interest Rate Type*
- *Currency (TC)*
- *Flow Currency*
- *Curve Data*
- *Curve Validity Date*
- *Event ID*
- *Timestamp*

- *Day Shift*
- *Posting Date*
- *Payment Period*
- *Flow Date*
- *Flow ID*
- *Partition Key*
- *Term*
- *End Date*
- *Position ID*
- *Start Date*
- *Product*

3.6.3 Product Results

This Query function is used to provide read data access to the funds and liquidity transfer pricing results at product level. In a what-if simulation it provides a chart of the fields listed below. There are also other dimensional fields available for customer views during simulation and reporting.

For more information, see *Review Results.*

The following fields are set in columns in this report:

- *FTP Amount (TC)*
- *Cost of Funds*
- *Cost of Liquidity*

The following field is set in rows:

- *Product*

The following fields are set as "Free" and are available for customer views and analytics:

- *Day Count Convention*
- *Curve ID*
- *Curve Type*
- *Event Source*
- *Event Type*
- *Company*
- *GL Account*
- *Profit Center*
- *Period Unit*
- *Finance Source*
- *Flow Type*
- *FTP Component*

- *FTP/LTP Rule*
- *Term Unit*
- *Version*
- *Channel*
- *Customer ID*
- *Scenario*
- *Rate Type*
- *Amortizing Type*
- *Interest Rate Type*
- *Currency (TC)*
- *Flow Currency*
- *Curve Data*
- *Curve Validity Data*
- *Event ID*
- *Timestamp*
- *Day Shift*
- *Posting Date*
- *Payment Period*
- *Flow Date*
- *Flow ID*
- *Partition Key*
- *Term*
- *End Date*
- *Position ID*
- *Start Date.*

3.6.4 Client Segment Results

This Query function is used to provide read data access to the funds and liquidity transfer pricing results at product and service level. In a what-if simulation it provides a chart of the fields listed below. There are also other dimensional fields available for customer views during simulation and reporting, see *Review Results.*

The following fields are set in columns in this report:

- *FTP Amount (TC)*
- *Cost of Funds*
- *Cost of Liquidity*

The following field is set in rows:

- *Channel*

The following fields are set as "Free" and are available for customer views and analytics:

- *Amortizing Type*
- *Curve Data*
- *Curve ID*
- *Curve Type*
- *Curve Validity Date*
- *Event ID*
- *Event Source*
- *Day Count Convention*
- *FTP Component*
- *Profit Center*
- *GL Account*
- *Finance Source*
- *Flow Type*
- *Company*
- *Event Type*
- *Customer ID*
- *Rate Type*
- *Product*
- *Interest Rate Type*
- *Scenario*
- *FTP/LTP Rule*
- *Position ID*
- *Start Date*
- *End Date*
- *Flow Currency*
- *Term*
- *Payment Period*
- *Timestamp*
- *Posting Date*
- *Flow ID*
- *Term Unit*
- *Currency (TC)*
- *Period Unit*
- *Day Shift*
- *Version*
- *Flow Date.*

3.6.5 NII Margin Results

This Query function is used to provide read data access to multiple results of the funds and liquidity transfer pricing calculations at any level. The default level is posting date and position ID. In a what-if simulation, the function provides a chart of the fields listed below. However, many dimensional fields are available for custom views during simulation and reporting (see *Review Results*).

The following fields are set in columns in this report:

- *Amount (TC)*
- *Interest Amount*
- *FTP Amount*
- *FTP Base Amount*
- *Term Liquidity Premium*
- *Contingent Liquidity Amount*
- *Margin Amount*
- *Margin (%)*
- *Interest Rate (%)*
- *FTP Rate (%)*
- *FTP Base Rate (%)*
- *Term Liquidity Premium (%)*
- *Contingent Liquidity Premium (%)*

The following fields are set in rows:

- *Posting Date*
- *Position ID*

The following fields are set as "Free" and are available for customer views and analytics:

- *Day Count Convention*
- *Finance Source*
- *Profit Center*
- *Event Type*
- *Curve Type*
- *Flow Type*
- *Scenario*
- *Product*
- *Customer ID*
- *Channel*
- *Event ID*
- *Curve ID*
- *Event Source*
- *Company*
- *GL Account*
- *Period Unit*
- *FTP Component*
- *FTP/LTP Rule*
- *Term Unit*
- *Version*
- *Rate Type*
- *Amortizing Type*

- *Interest Rate Type*
- *Currency (TC)*
- *Flow Currency*
- *Curve Date*
- *Curve Validity Date*
- *Timestamp*
- *Day Shift*
- *Payment Period*
- *Flow Date*
- *Flow ID*
- *End Date*
- *Start Date*

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Example Code

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