

Oracle Financial Services Economic Capital Advanced

User Guide

Release 8.1.1.0.0

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Document Control

Version Number	Revision Date	Change Log
1.0	June 2021	Created the document for Economic Capital Advanced in OFS CAP Release 8.1.1.0.0

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1 Getting Started

1.1 Intended Audience

Welcome to Release 8.1.1.0.0 of the Oracle Financial Services Basel Regulatory Compliance User Guide.

This guide is intended for:

- **Technical Analyst:** This user ensures that the data is populated in the relevant tables as per the specifications, executes, schedules, and monitors the execution of Runs as batches.
- **Business Analyst:** This user reviews the functional requirements and information sources, like reports.
- **Data Analyst:** This user is involved with cleaning, validation, and importing of data into the OFSAA Download Specification Format.
- **Administrator:** The Administrator maintains user accounts and roles, archives data, loads data feeds, and so on. The administrator controls the access rights of users.

1.2 Conventions

The following text conventions are used in this document.

Table 1: Document Conventions

Convention	Meaning
boldface	Boldface type indicates graphical user interface elements associated with an action or terms defined in text or the glossary.
<i>Italic</i>	Italic type indicates book titles, emphasis, or placeholder variables for which you supply particular values.
Monospace	Monospace type indicates commands within a paragraph, URLs, code in examples, file names, text that appears on the screen, or text that you enter.
Hyperlink	Hyperlink type indicates the links to external websites and internal document links.

1.3 Installing this Major Release

For detailed instructions to install this Major Release, see the [Oracle Financial Services Capital Adequacy Installation and Configuration Guide Release 8.1.1.0.0](#).

1.4 Related Information Resources

We strive to keep this and all other related documents updated regularly; visit the [OHC Documentation Library](#) to download the latest version available there. The list of related documents is provided here.

- [OHC Documentation Library](#) for **OFS Capital Adequacy (OFS CAP) Application Pack**:
 - Oracle Financial Services Capital Adequacy Pack Installation Guide
- [OHC Documentation Library](#) for **OFS AAI Application Pack**:
 - *OFS Advanced Analytical Applications Infrastructure (OFS AAI) Application Pack Installation and Configuration Guide*
 - *OFS Analytical Applications Infrastructure User Guide*
 - *OFS Analytical Applications Infrastructure Administration Guide*
 - *Oracle Financial Services Analytical Applications Infrastructure Environment Check Utility Guide*
- **Additional documents:**
 - [OFSAA Licensing Information User Manual Release 8.1.1.0.0](#)
 - [OFS Analytical Applications Infrastructure Security Guide](#)
 - [OFSAAI FAQ Document](#)
 - [OFS Analytical Applications 8.1.1.0.0 Technology Matrix](#)
 - [Oracle Financial Services Analytical Applications Infrastructure Cloning Guide](#)

2 Introduction

The Oracle Financial Services Economic Capital Advanced 8.1.1.0.0 adheres to the calculation of credit risk economic capital for the banking book. It supports mainly the Corporate and Retail asset class. Unlike the 8.0.x line of the application, there is no dependency on Oracle Financial Services Enterprise Modeling or Oracle Financial Services Model Management and Governance Applications. However, certain processes from OFS Capital Adequacy (OFS CAP) Application Pack must be run as a pre-requisite for the Economic Capital Advanced Application to function. Oracle Financial Services Economic Capital Advanced, Release 8.0.1.0.0 computes undiversified Economic Capital (EC) for Credit Risk individually for each exposure in the portfolio, and the portfolio EC is the sum of individual components.

NOTE The Scope of Oracle Financial Services Economic Capital Advanced is limited to Credit Risk Economic Capital.

3 Overview

Economic capital is required by banks to determine adequate levels of capital based on the risk of specific businesses. Loss due to risk can be split into Expected Loss and Unexpected Loss. Expected Loss arises from 'known' risk in the due course of the banking business. Unexpected Loss arises because of more than anticipated liability or the unknown economic scenario of the future. Unexpected loss can arise due to any risk type. For example, unexpected losses due to a pandemic. Economic Capital is the capital level required by the bank to cover the losses with a given probability. Economic capital is attributed mainly by the following three risks:

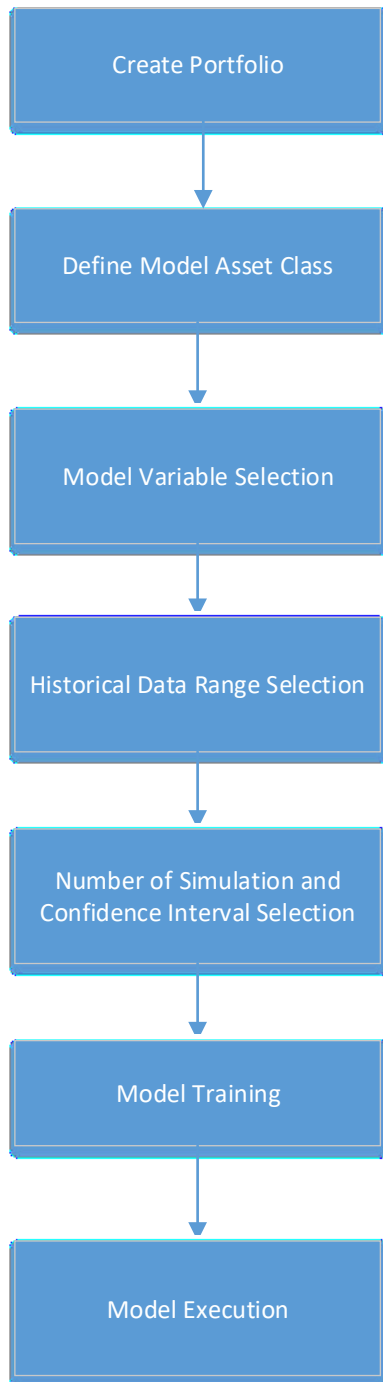
- Credit Risk
- Operational Risk
- Market Risk

Regulators encourage measurement of economic capital so that an aggregated capital is calculated by aggregating all the risks together with one single risk metrics.

Economic Capital calculation methodologies can be applied across products, lines of businesses, geographies, and other segments. Unexpected loss can arise due to any risk type. OFS Economic Capital Advanced 8.1.1.0.0 covers all Corporate and Retail asset classes of the bank and calculates the economic capital at selected granularity using the Probability of Default (PD) – Loss Given Default (LGD) Framework. The product first calculates Unconditional PD & LGD to capture the idiosyncratic risks of the portfolio. It factors in the existing portfolio risk characteristics of the bank. Then the variables capturing systemic risk i.e. the macro-economic variables are simulated to generate future expected values. Conditional PD and LGD based on the expected future macro-economic scenario are predicted for the next 1-year horizon. The Conditional PD & LGD values are further used to calculate Expected Loss, Unexpected Loss, Value at Risk, and Conditional Value at Risk at a particular confidence interval as chosen by the bank depending on their target rating. The Unexpected Loss here is the Economic Capital that the bank must maintain to remain solvent in adverse conditions.

4 Application Flow

Figure 1: Application flow of Economic Capital Advanced



5 Modeling Methodology

5.1 Pre Modeling Data Quality Checks

Missing Value: All missing values in the observations are imputed by a proxy value. The application uses the median of the continuous values available to replace a missing value. However, if the data is discrete, then the mode is used to replace a missing value. By default, all variables with more than 30% missing values are dropped from the modeling process.

Outlier Detection: Any modeling process is very sensitive to extreme values and therefore, extreme values should be treated. The following is the methodology for the treatment of extreme values in the variables.

Calculate Inter Quantile Range (IQR) = 75th Percentile – 25th Percentile

Upper Boundary = 75th Percentile + (IQR * 1.5)

Lower Boundary = 25th Percentile - (IQR * 1.5)

IF Variable Value > Upper Boundary THEN Variable Value = Upper Boundary

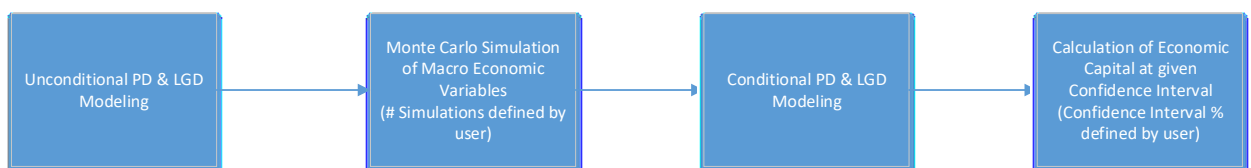
ELSE IF Variable Value < Lower Boundary THEN Variable Value = Lower Boundary

ELSE Variable Value

5.2 Modeling Process

OFS Economic Capital Advanced 8.1.1.0.0 uses a PD – LGD Modeling Approach. The following illustration is a high-level depiction of the modeling process followed in the application.

Figure 2 High-level flow of modeling process



5.2.1 Unconditional PD & LGD Modeling

Unconditional Probability of Default (PD) and Loss Given Default (LGD) is modeled using Historical Data capturing both idiosyncratic factors and systemic factors. Idiosyncratic factors are captured by the firm or portfolio-specific variables such as financial information and systemic factors are captured by macro-economic variables such as Inflation, GDP, and so on. The length of Historical Data to be used for modeling Unconditional PD & LGD can be selected by the user.

5.2.2 Monte Carlo Simulation of Macro Economic Variables

The macro-economic variables are simulated using the Monte Carlo Method for the next one year. The number of simulations can range from 10,000 to 100,000 and can be selected by the user.

5.2.3 Conditional PD & LGD Modeling

Conditional Probability of Default (PD) and Loss Given Default (LGD) are modeled with a one-year horizon using both idiosyncratic factors and systemic factors. Idiosyncratic and systemic factors are captured by the same variables as in the Unconditional PD & LGD models.

5.2.4 Calculation of Economic Capital at given Confidence Interval

After the Conditional PD & LGD are calculated, the application calculates Expected Loss (EL) for each simulated value for each account. Based on the confidence interval % defined by the user, portfolio level Expected Loss (EL), Unexpected Loss (UL), Value at Risk (VaR), and Conditional Value at Risk (C-VaR) are calculated. The Unexpected Loss is the Economic Capital for that portfolio.

5.3 Inputs Required for Economic Capital Modeling

The following table details the inputs required for Economic Capital Modeling:

Figure 3 Inputs for Economic Capital Modeling

Input	Action
Model Name	To be defined in the UI. For example, Economic Capital Calculation for Corporate Portfolio
Model Description	To be defined in the UI
Portfolio	Corporate or Retail
PD Models Variables	Portfolio Specific variables to be considered for PD Modeling
LGD Model Variables	Portfolio Specific variables to be considered for LGD Modeling
Macro-Economic Variables	Macro-Economic variables to be considered for both PD & LGD Modeling and for running Monte Carlo Simulations. NOTE The set of macro-economic variables are the same for both PD & LGD Modeling.
EAD Measure	Exposure at Default (EAD) is an input that has to be provided by the bank. The EAD can be before or after applying credit risk mitigation. NOTE There is no EAD Modeling done within the application.

Input	Action
Confidence Interval	The confidence interval at which the Value-at-Risk is calculated.

6 Modeling Techniques

Figure 4: Modeling Techniques and details

Asset Class	Model or Approach	Technique	Release Version
Retail	Unconditional or Conditional PD	Stepwise Logistic Regression	8.1.1
Retail	Unconditional or Conditional LGD	Linear Regression	8.1.1
Retail / Corporate	Monte Carlo	Multivariate Monte Carlo Simulation	8.1.1
Corporate, Sovereign, Bank	Unconditional or Conditional PD	Stepwise Logistic Regression	8.1.1

7 Data Requirements

7.1 T2T Specific to CREC

Figure 5 T2Ts for CREC

Source Stage Tables	Target Tables
STG_CARDS	FSI_CREC_EXPOSURES
STG_INVESTMENTS	FSI_CREC_EXPOSURES
STG_LOAN_CONTRACTS	FSI_CREC_EXPOSURES
STG_OD_ACCOUNTS	FSI_CREC_EXPOSURES
STG_MARKET_VARIABLES	FSI_CREC_MARKET_VARIABLES

NOTE

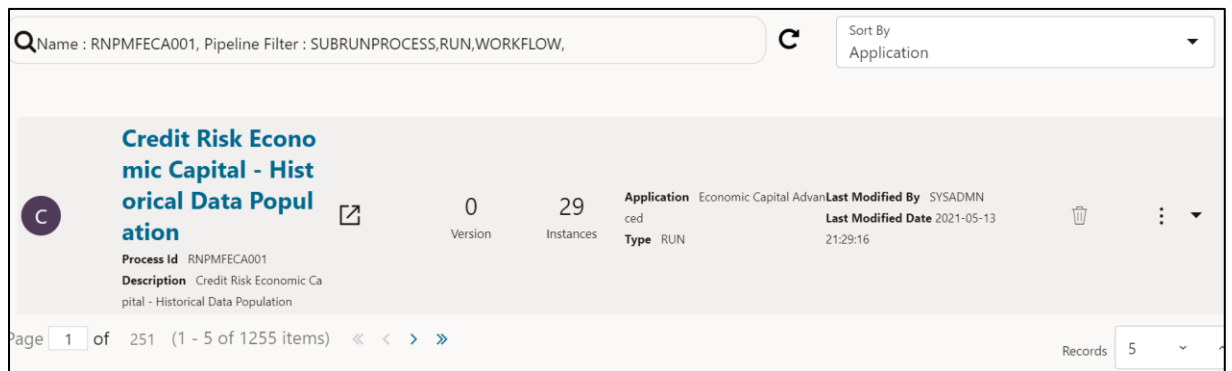
Detailed data requirements are described in detailed DL Spec and Run charts.

7.2 Existing Basel Data load and PMF Run Configuration for CREC Loss Model

The Account Clustering Data Population Pipeline can be searched in PMF Process Modeler by entering text 'Credit Risk Economic Capital - Historical Data Population' or Process ID 'RNPMFECA001'.

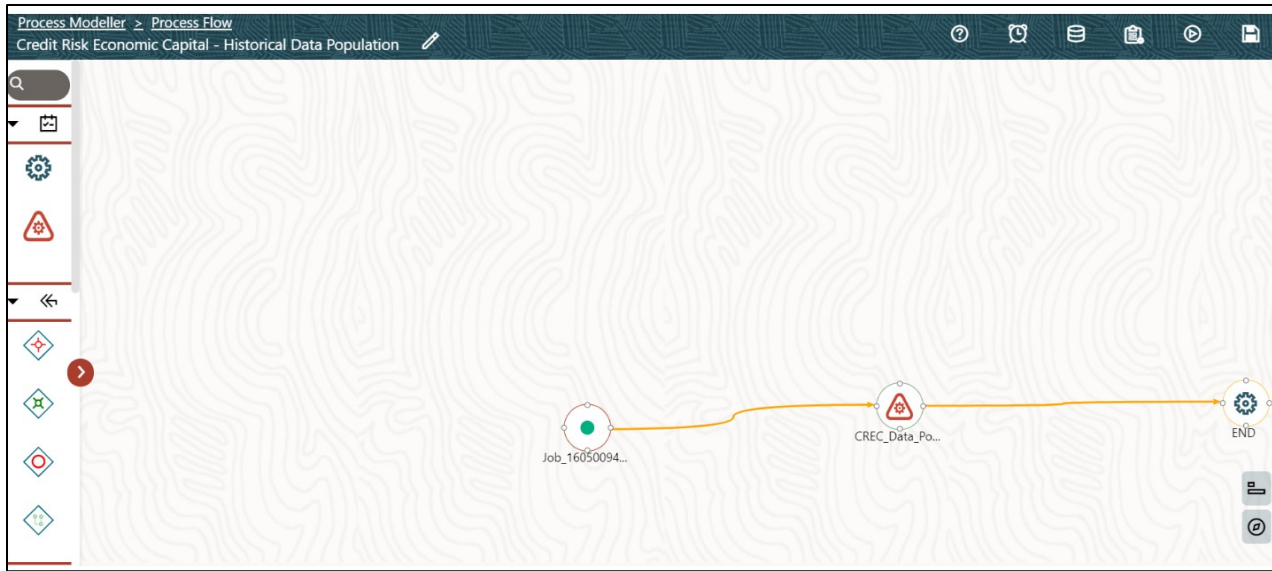
The 'Data pipeline in 'PMF' is shown as:

Figure 6: Economic Capital data population in Process Modeler



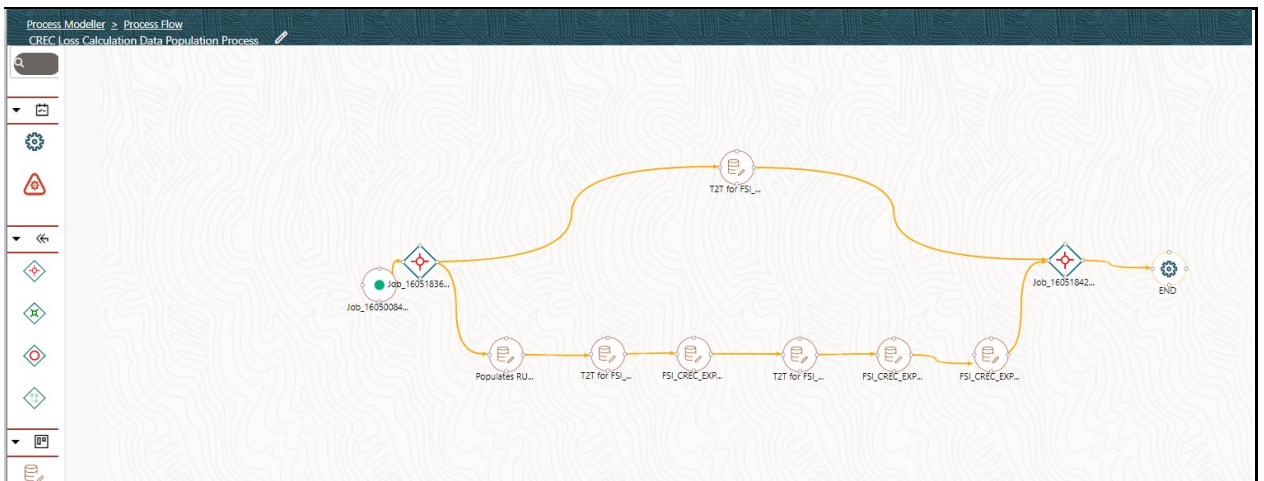
On double-clicking the above process ID, entire data pipeline components are displayed as the following:

Figure 7: Data Pipeline Components



Clicking on the node **CREC_Data_Population_Process** (Process ID **PMFECA001**) further leads to sub pipeline.

Figure 8: Sub Pipeline for CREC_DATA_Population_Process



All components of CREC Data Pipeline are as follows:

Figure 9: Components of CREC Data Pipeline

Process ID/Job Id	Process Name	Pipe Line Type
PMFECA001	CREC_Data_Population_Process'	Main Pipe Line
Job_1605009221793	T2T for FSI_CAP_PARTY_FINANCIALS	Sub Pipe Line
Job_1605608088396	FSI_CREC_EXPOSURES from STG_LOAN_CONTRACTS	Sub Pipe Line
Job_1605008518971	T2T for FSI_CREC_EXPOSURES from STG_INVESTMENTS	Sub Pipe Line
Job_1614331088136	FSI_CREC_EXPOSURES from STG_CARDS	Sub Pipe Line
Job_1614331084607	FSI_CREC_EXPOSURES from STG_OD_ACCOUNTS	Sub Pipe Line
Job_1605184258631	T2T for FSI_CREC_MARKET_VARIABLES	Sub Pipe Line

8 CREC Model Variables

8.1 Key Variables for PD and LGD Models

Figure 10 Variables of PD and LGD Models

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
MIS Date	FSI_CREC_EXPOSURES	N_MIS_DATE_SKEY
Exposure Account Identifier	FSI_CREC_EXPOSURES	N_ACCT_SKEY
Exposure GAAP Identifier	FSI_CREC_EXPOSURES	N_GAAP_SKEY
Measure to store Run Surrogate Key	FSI_CREC_EXPOSURES	N_RUN_SKEY
V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
MIS Date	FSI_CREC_EXPOSURES	N_MIS_DATE_SKEY
Exposure Account Identifier	FSI_CREC_EXPOSURES	N_ACCT_SKEY

8.2 PD Model Training Variables

8.2.1 PD Dependent Variable

Figure 11: PD Dependent Variables

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Defaulted Flag Value	FSI_CREC_EXPOSURES	N_CPT_DEFAULTED_FLAG

8.2.2 PD Independent Variables

Figure 12 PD Independent Variables

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Net Profit Margin	FSI_CREC_EXPOSURES	N_CPT_NET_PROFIT_MARGIN
Current Ratio	FSI_CREC_EXPOSURES	N_CPT_CURRENT_RATIO
Delinquent Indicator	FSI_CREC_EXPOSURES	N_DELINQUENT_IND
Return On Asset	FSI_CREC_EXPOSURES	N_CPT_RETURN_ON_ASSETS
Asset turnOver Ratio	FSI_CREC_EXPOSURES	N_CPT_ASSET_TURNOVER_RATIO
Liquidity Ratio	FSI_CREC_EXPOSURES	N_CPT_LIQUIDITY_RATIO
Debt Coverage Ratio	FSI_CREC_EXPOSURES	N_CPT_DEBT_COVERAGE_RATIO
Accounts Payable	FSI_CREC_EXPOSURES	N_CPT_ACCOUNTS_PAYABLE

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Annual Income	FSI_CREC_EXPOSURES	N_CPT_ANNUAL_INCOME
Bankruptcy Flag	FSI_CREC_EXPOSURES	N_CPT_BANKRUPTCY_FLAG
Cash And Bank Balances	FSI_CREC_EXPOSURES	N_CPT_CASH_BANK_BALANCES
Cash Marketable Securities	FSI_CREC_EXPOSURES	N_CPT_CASH_MARKETABLE_SEC
Common Equity Tier I Captial Ratio	FSI_CREC_EXPOSURES	N_CPT_CET1_CAPITAL_RATIO
Consolidated Total Assets	FSI_CREC_EXPOSURES	N_CPT_CONSOL_TOTAL_ASSETS
Capital To Risk Adequacy Ratio	FSI_CREC_EXPOSURES	N_CPT_CRAR_PERCENT
Current Long Term Maturities	FSI_CREC_EXPOSURES	N_CPT_CURR_LONG_TERM_MAT
Current Assets	FSI_CREC_EXPOSURES	N_CPT_CURRENT_ASSETS
Current Liabilities	FSI_CREC_EXPOSURES	N_CPT_CURRENT_LIABILITIES
Debt Service Ratio	FSI_CREC_EXPOSURES	N_CPT_DSR
Earnings Before Interest And Taxes	FSI_CREC_EXPOSURES	N_CPT_EBIT_AMT
Goodwill Amount	FSI_CREC_EXPOSURES	N_CPT_GOODWILL_AMT
Gross Profit Margin	FSI_CREC_EXPOSURES	N_CPT_GROSS_PROFIT_MARGIN
Group Asset Size	FSI_CREC_EXPOSURES	N_CPT_GROUP_ASSET_SIZE
Group Sales Amount	FSI_CREC_EXPOSURES	N_CPT_GROUP_SALES_AMT
Interest Coverage Ratio	FSI_CREC_EXPOSURES	N_CPT_INTEREST_COVERAGE_RATIO
Interest Expense	FSI_CREC_EXPOSURES	N_CPT_INTEREST_EXPENSE
Inventory Amount	FSI_CREC_EXPOSURES	N_CPT_INVENTORY_AMT
Inventory Turnover Ratio	FSI_CREC_EXPOSURES	N_CPT_INVENTORY_TURNOVER_RATIO
Liquidation Indicator	FSI_CREC_EXPOSURES	N_CPT_LIQUIDATION_IND
Loans And Advances	FSI_CREC_EXPOSURES	N_CPT_LOANS_AND_ADVANCES
Long Term Debt	FSI_CREC_EXPOSURES	N_CPT_LONG_TERM_DEBT
Long Term Provision Amount	FSI_CREC_EXPOSURES	N_CPT_LONG_TERM_PROVISION_AMT
Market Capitalization	FSI_CREC_EXPOSURES	N_CPT_MARKET_CAPITALISATION
Net Current Assets	FSI_CREC_EXPOSURES	N_CPT_NET_CURRENT_ASSETS
Net Fixed Assets	FSI_CREC_EXPOSURES	N_CPT_NET_FIXED_ASSETS
Net Income	FSI_CREC_EXPOSURES	N_CPT_NET_INCOME
Net Operating Income	FSI_CREC_EXPOSURES	N_CPT_NET_OPER_INC
Net Profit After Tax	FSI_CREC_EXPOSURES	N_CPT_NET_PROFIT
Net Sales Amount	FSI_CREC_EXPOSURES	N_CPT_NET_SALES_AMT
Operating Income To Debt Ratio	FSI_CREC_EXPOSURES	N_CPT_OPER_INCOME_DEBT_RATIO
Quick Ratio	FSI_CREC_EXPOSURES	N_CPT_QUICK_RATIO

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Amount Receivables	FSI_CREC_EXPOSURES	N_CPT_RECEIVABLES_AMT
Leverage Ratio Of Counterparty	FSI_CREC_EXPOSURES	N_CPT_REG_LEVERAGE_RATIO
Reserve Amount	FSI_CREC_EXPOSURES	N_CPT_RESERVE_AMOUNT
Retained Earnings	FSI_CREC_EXPOSURES	N_CPT_RETAINED_EARNINGS
Sales Amount	FSI_CREC_EXPOSURES	N_CPT_SALES_AMT
Score	FSI_CREC_EXPOSURES	N_CPT_SCORE
Short Term Debt	FSI_CREC_EXPOSURES	N_CPT_SHORT_TERM_DEBT
Tangible Assets	FSI_CREC_EXPOSURES	N_CPT_TANGIBLE_ASSETS
Tier 1 Capital Ratio	FSI_CREC_EXPOSURES	N_CPT_TIER1_CAPITAL_RATIO
Tier 1 Common Ratio	FSI_CREC_EXPOSURES	N_CPT_TIER1_COMMON_RATIO
Tier 2 Capital Ratio	FSI_CREC_EXPOSURES	N_CPT_TIER2_CAPITAL_RATIO
Total Assets	FSI_CREC_EXPOSURES	N_CPT_TOTAL_ASSETS
Total Capital Ratio	FSI_CREC_EXPOSURES	N_CPT_TOTAL_CAPITAL_RATIO
Total Expenditure	FSI_CREC_EXPOSURES	N_CPT_TOTAL_EXPENDITURE
Total Liabilities	FSI_CREC_EXPOSURES	N_CPT_TOTAL_LIABILITIES
Total Senior Debt	FSI_CREC_EXPOSURES	N_CPT_TOTAL_SENIOR_DEBT_AMOUNT
Current Debt Service Ratio	FSI_CREC_EXPOSURES	N_CURR_DSR
Current Debt Service Ratio	FSI_CREC_EXPOSURES	N_CURR_DSR
Current Debt To Income Back-End	FSI_CREC_EXPOSURES	N_CURR_DTI_BACKEND
Current Debt To Income Front-End	FSI_CREC_EXPOSURES	N_CURR_DTI_FRONTEND
Current Loan To Value	FSI_CREC_EXPOSURES	N_CURR_LTV
Ever 90+ Dpd In The Past 12 Months Flag	FSI_CREC_EXPOSURES	N_EVER_90_DPD_LST_12_MTHS
Exposure Defaulted Flag	FSI_CREC_EXPOSURES	N_EXP_DEFAULTED_FLAG
Exposure Defaulted Flag	FSI_CREC_EXPOSURES	N_EXP_DEFAULTED_FLAG
Exposure Defaulted Flag	FSI_CREC_EXPOSURES	N_EXP_DEFAULTED_FLAG
Exposure Revolving Flag	FSI_CREC_EXPOSURES	N_EXP_REVOLVING_FLAG
Exposure Revolving Flag	FSI_CREC_EXPOSURES	N_EXP_REVOLVING_FLAG
Guaranteed By Sovereign Indicator	FSI_CREC_EXPOSURES	N_GUAR_BY_SOVERIGN_IND
Owner Occupied Flag	FSI_CREC_EXPOSURES	N_OWNER_OCCUPIED_FLG
Past Due Flag	FSI_CREC_EXPOSURES	N_PAST_DUE_FLAG
Past Due Flag	FSI_CREC_EXPOSURES	N_PAST_DUE_FLAG
Past Due Flag	FSI_CREC_EXPOSURES	N_PAST_DUE_FLAG
Recalcitrant Flag	FSI_CREC_EXPOSURES	N_RECALCITRANT_FLAG

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Recalcitrant Flag	FSI_CREC_EXPOSURES	N_RECALCITRANT_FLAG
Total Revenue	FSI_CREC_EXPOSURES	N_TOT_REVENUE
Troubled Debt Restructure Flag	FSI_CREC_EXPOSURES	N_TROUBLED_DEBT_RESTRUCRE_FLAG
Adjustment Earnings Bf Int Taxes Depreciation Amortization Of Borrower Entity Amt	FSI_CREC_EXPOSURES	N_CPT_ADJ_EBITDA_AMT
Earnings Bf Int Taxes Depreciation And Amortization Of Borrower Entity Amt	FSI_CREC_EXPOSURES	N_CPT_EBITDA_AMT

8.3 LGD Model Training Variables

8.3.1 LGD Dependent Variable

Figure 13: LGD Dependent Variables

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Realized LGD	FSI_CREC_EXPOSURES	N_REALISED_LGD

8.3.2 LGD Independent Variables

Figure 14: LGD Independent Variables

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Senior Claim Flag	FSI_CREC_EXPOSURES	N_SENIOR_CLAIM_FLAG
Business Risk	FSI_CREC_EXPOSURES	N_BUSINESS_RISK
CounterParty Total Revenue	FSI_CREC_EXPOSURES	N_CPT_TOTAL_REVENUE
Net Worth	FSI_CREC_EXPOSURES	N_CPT_NETWORTH
Secured Indicator	FSI_CREC_EXPOSURES	N_SECURED_IND
Bankruptcy Flag	FSI_CREC_EXPOSURES	N_CPT_BANKRUPTCY_FLAG
Stated Liquid Net Worth	FSI_CREC_EXPOSURES	N_CPT_STATED_LIQ_NET_WORTH
Stated Net Worth	FSI_CREC_EXPOSURES	N_CPT_STATED_NET_WORTH
Credit Loss Amount	FSI_CREC_EXPOSURES	N_CREDIT_LOSS
Current Loan To Value	FSI_CREC_EXPOSURES	N_CURR_LTV
Delinquency Days	FSI_CREC_EXPOSURES	N_DELINQUENT_DAYS
Double Default Flag	FSI_CREC_EXPOSURES	N_DOUBLE_DEFAULT_FLAG

V_VARIABLE_NAME	V_TABLE_NAME	V_COLUMN_NAME
Exposure Defaulted Flag	FSI_CREC_EXPOSURES	N_EXP_DEFAULTED_FLAG
Exposure Seniority	FSI_CREC_EXPOSURES	N_EXPOSURE_SENIORITY
Full Recourse Flag	FSI_CREC_EXPOSURES	N_FULL_RECOURSE_FLAG
Guaranteed By Sovereign Indicator	FSI_CREC_EXPOSURES	N_GUAR_BY_SOVERIGN_IND
Impairment Status	FSI_CREC_EXPOSURES	N_IMPAIRMENT_STATUS
Loan To Cost Ratio	FSI_CREC_EXPOSURES	N_LOAN_TO_COST_RATIO
Refinance Flag	FSI_CREC_EXPOSURES	N_REFINANCE_FLAG
Reposessed Flag	FSI_CREC_EXPOSURES	N_REPOSSESSED_FLAG
Restructured By Bank Flag	FSI_CREC_EXPOSURES	N_RESTRUCTURED_BY_BANK_FLAG
Restructured Indicator	FSI_CREC_EXPOSURES	N_RESTRUCTURED_IND
Sub Prime Flag	FSI_CREC_EXPOSURES	N_SUB_PRIME_FLAG
Total Revenue	FSI_CREC_EXPOSURES	N_TOT_REVENUE
Troubled Debt Restructure Flag	FSI_CREC_EXPOSURES	N_TROUBLED_DEBT_RESTRUCRE_FLAG

8.4 Derived Variables

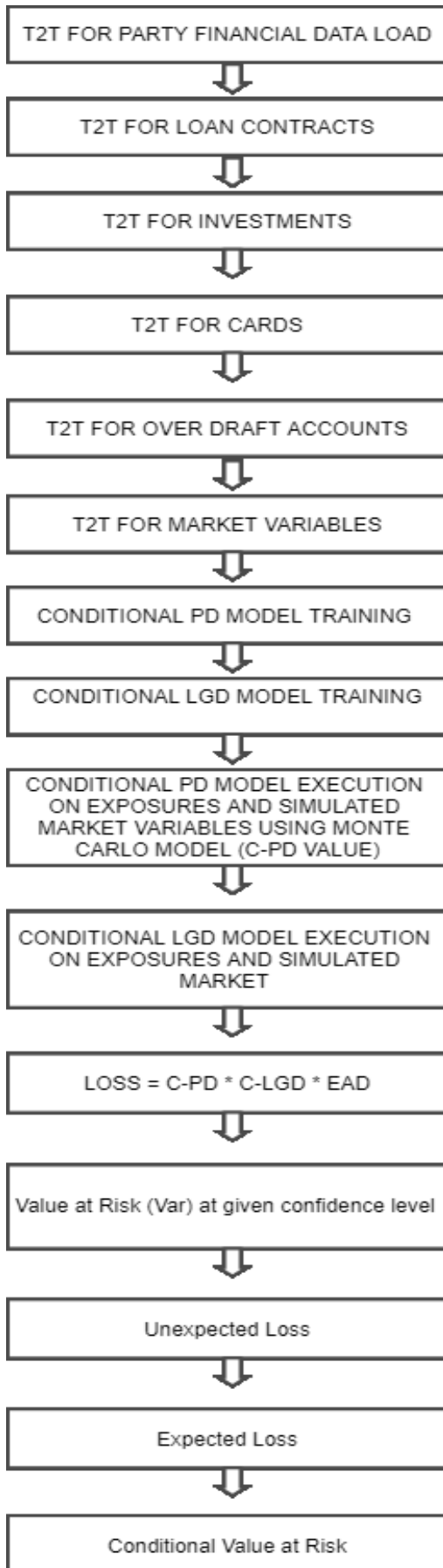
Figure 15: Derived Variables

V_VARIABLE_NAME	V_COLUMN_NAME	Expression
CASH RATIO	N_CASH_RATIO	$\frac{STG_PARTY_FINANCIALS.N_CASH_MARKET_ABLE_SEC}{STG_PARTY_FINANCIALS.N_CURRENT_LIABILITIES}$
OPERATING INCOME LIABILITY RATIO	N_OPERATING_INCOME_LIABILITY_RATIO	$\frac{STG_PARTY_FINANCIALS.N_NET_OPER_INC}{STG_PARTY_FINANCIALS.N_CURRENT_LIABILITIES}$
DEBT RATIO	N_DEBT_RATIO	$\frac{(STG_PARTY_FINANCIALS.N_LONG_TERM_DEBT + STG_PARTY_FINANCIALS.N_SHORT_TERM_DEBT)}{STG_PARTY_FINANCIALS.N_TOTAL_ASSETS}$
NET MARGIN RATIO	N_NET_MARGIN_RATIO	$\frac{STG_PARTY_FINANCIALS.N_NET_PROFIT}{STG_PARTY_FINANCIALS.N_NET_SALES_AMT}$
EBIT MARGIN RATIO	N_EBIT_MARGIN_RATIO	$\frac{STG_PARTY_FINANCIALS.N_EBIT_AMT}{STG_PARTY_FINANCIALS.N_NET_SALES_AMT}$

V_VARIABLE_NAME	V_COLUMN_NAME	Expression
EBITDA MARGIN RATIO	N_EBITDA_MARGIN_RATIO	STG_PARTY_FINANCIALS.N_EBITDA_AMT / STG_PARTY_FINANCIALS.N_NET_SALES_AMT
ADJUSTMENT EBITDA MARGIN RATIO	N_ADJ_EBITDA_MARGIN_RATIO	STG_PARTY_FINANCIALS.N_ADJ_EBITDA_AMT / STG_PARTY_FINANCIALS.N_NET_SALES_AMT
OPERATING MARGIN RATIO	N_OPERATING_MARGIN_RATIO	STG_PARTY_FINANCIALS.N_NET_OPER_INC / STG_PARTY_FINANCIALS.N_NET_SALES_AMT
RETURN ON ASSET RATIO	N_RETURN_ON_ASSETS_RATIO	STG_PARTY_FINANCIALS.N_NET_INCOME / STG_PARTY_FINANCIALS.N_TOTAL_ASSETS
WORKING CAPTIAL TURNOVER RATIO	N_WORKING_CAPITAL_TURNOVER_RATIO	STG_PARTY_FINANCIALS.N_NET_SALES_AMT / STG_PARTY_FINANCIALS.N_CAPITAL_WORK_IN_PROGRESS

9 Process flow

Figure 16: Process Flow for ECA



10 ECA UI Navigation for Model Training and Execution

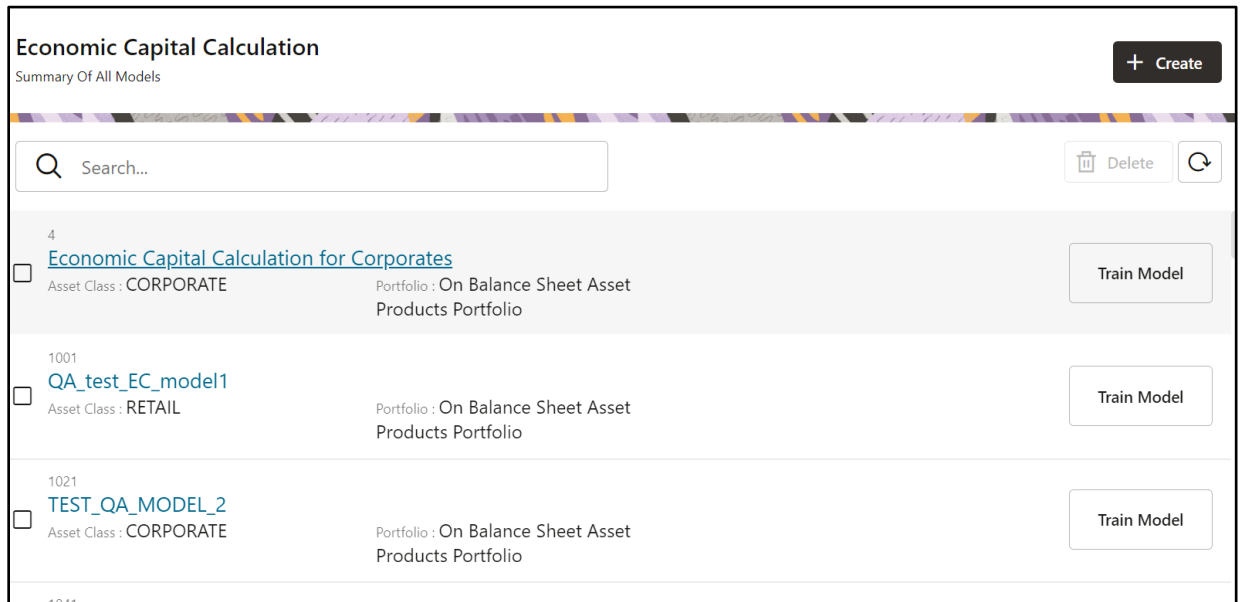
- [Creating a Model for ECA](#)
- [Training a Model for ECA](#)
- [Executing the Loss Model by Using PMF Framework](#)

10.1 Creating a Model for ECA

To create Models for ECA, perform the following steps:

1. Click **Financial Services Economic Capital** from your CAP application.
The **Navigation List** is displayed.
2. Click **Economic Capital Advanced, Economic Capital**, and then click **Model Summary**.
The **Economic Capital Calculation (Summary of All Models)** page is displayed.
3. Click **Create** from the **Summary of all Models** page for Economic Capital Calculation.

Figure 17: Summary of all Models page for Economic Capital Calculation



The **New Model Definition** page is displayed which allows you to create New Model Definitions.

Figure 18: New Model Definition Page

Economic Capital Calculation
New Model Definition Cancel Save

Name *
Description
Asset Class *
Portfolio *

4. Enter a name for the model in the **Name** field.
5. Enter the description for the model in the **Description** field.
6. Select the asset class as **Retail** or **Corporate** from the **Asset Class** drop-down list.
7. Select a portfolio that you created from the **Portfolio** field.
8. Click **Save** and then click **Next** →.

The variable selection page is displayed.

Figure 19: Variable Selection Page

Economic Capital Calculation
New Model Definition Cancel Save

Probability Of Default Model | Loss Given Default Model | Macro Economic Variables For Monte Carlo Simulation

Master List Of Variables
Search...
Gross Profit Margin
Inventory Amount
Liquidation Indicator

Model Variables
Cash And Bank Balances

9. Select the required variables from the **Master List of Variables** pane to the **Model Variables** pane for the **Probability of Default Model**, **Loss Given Default Model**, and **Macro Economic Variables for Monte Carlo Simulation** tabs.
10. Click **Save** to save the Loss Model Definition.

10.2 Training a Model for ECA

When you create a Loss Model Definition, you can train the model from the Model Summary Page.

Perform the following steps to train the Loss Model Definition:

1. Click **Train Model** against the required Loss Model Definition.
The **Model Training Parameters** window is displayed.

Figure 20: Model Training Parameters Window

Model Training Parameters

PD Model Historical Data From
22/04/2021

PD Model Historical Data To
22/04/2021

LGD Model Historical Data From
22/04/2021

LGD Model Historical Data To
22/04/2021

Value at Risk Confidence Level %

Number Of Simulations

Enter a number between 9

Ok Cancel

2. Complete the following fields in the **Model Training Parameters** pop-up as per the following table:

Figure 21: Model Training Parameters

Field	Description
PD Model Historical Data From	Start date of historical data for PD modeling
PD Model Historical Data To	End date of historical data for PD modeling
LGD Model Historical Data From	Start date of historical data for LGD modeling
LGD Model Historical Data To	End date of historical data for LGD modeling
Value at Risk Confidence Level	Percentage for calculating Value at Risk
Number of Simulations	Number of times Monte Carlo simulation should run for each exposure

3. Click Ok.

The Loss Model definition is trained.

4. Navigate to Economic Capital Advanced, Economic Capital, and select Model Training Summary.

The **Summary of All Trained Models** page is displayed. You can view the status of the trained loss model definition from here.

Figure 22 Status of Trained Model in the Summary of All Trained Models Page

Economic Capital Calculation
Summary Of All Trained Models

↻

<input type="checkbox"/>	4 Calculation Failed	Economic Capital Calculation for Corporates Confidence Level : 95 Simulations : 50000	MIS Date : Economic capital :	Portfolio : On Balance Sheet Asset Products Portfolio 2 month(s) ago by SYSADMIN
<input type="checkbox"/>	1001 Variables Saved	QA_test_EC_model1 Confidence Level : 99 Simulations : 10000	MIS Date : Economic capital :	Portfolio : On Balance Sheet Asset Products Portfolio 27 days ago by CAPUSER
<input type="checkbox"/>	1021 Calculation Failed	TEST_QA_MODEL_2 Confidence Level : 99 Simulations : 10000	MIS Date : Economic capital :	Portfolio : On Balance Sheet Asset Products Portfolio 26 days ago by CAPUSER

You can view the following statuses for the Loss Model Definition from this page:

- Variables Saved

- Calculation In Progress
- Calculation Complete
- Calculation Failed

NOTE If the Loss Model Definition training fails, verify the following logs:

- App server log = /<user folder>/<tomcat or weblogic folder>/webapps/OFSCAP/logs
- Python ML log = \$FIC_DB_LOG/log/EconomicCapital

10.3 Executing the Loss Model by Using PMF Framework

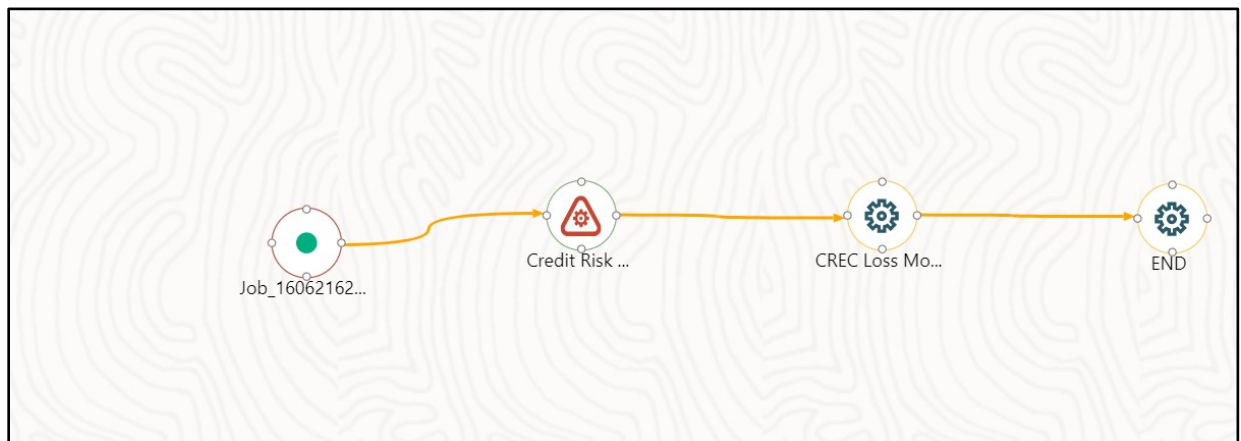
To execute a trained LossModel, a PMF process template is available in the **Process Modeler** window. The process ID for the process name Credit Risk Economic Capital - Loss Estimation is RNPMFECA002.

To execute a trained Loss Model by using PMF framework, perform the following steps:

1. Click **Economic Capital Advanced, Process Modelling**, and then select **Process Modeller** from the **Navigation List**.
2. Click on the process name **Credit Risk Economic Capital - Loss Estimation** to train the newly created Loss Model.

The Process Flow page for Credit Risk Economic Capital - Loss Estimation is displayed.

Figure 23: Process Flow Page for Credit Risk Economic Capital - Loss Estimation



The two nodes available here are Credit Risk Economic Capital Data Population and CREC Loss Model Invocation. The following metrics are available for CREC Loss Model Invocation:

- Value At Risk (VaR) at given confidence level
- Unexpected Loss
- Expected Loss

- Conditional Value at Risk
3. Double-click the **CREC Loss Model Invocation** component to add the newly created model ID. The **CREC Loss Model Invocation** settings pop-up is displayed.

Figure 24: CREC Loss Model Invocation Component Settings

CREC Loss Model Invocation

Activity Name
CREC Loss Model Invocation

Activity Desc
CREC Loss Model Invocation

Activity Type
AUTOMATIC

Status

Outcomes


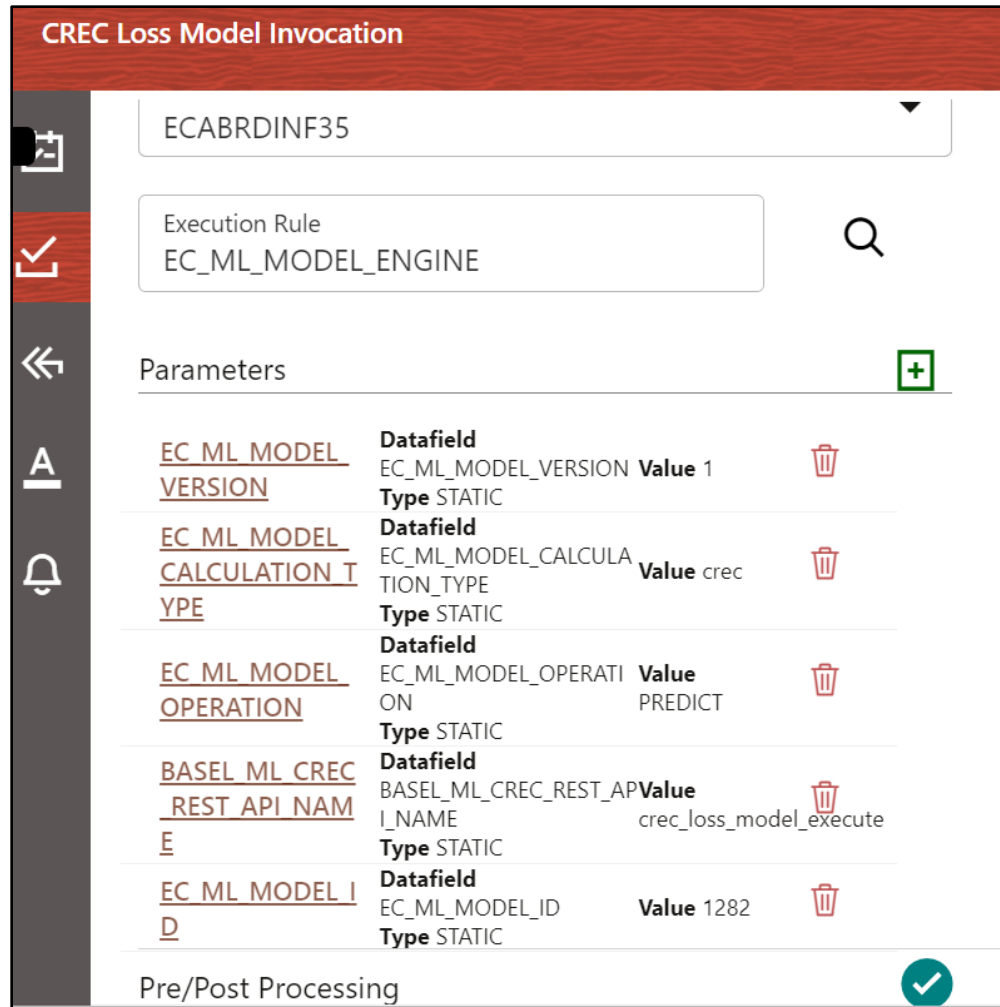


4. Click **Implementation** . The **Implementation** tab is displayed.

Figure 25: Implementation tab



5. Click **Delete**  against the **EC_ML_MODEL_ID** parameter in the **Parameters** pane.
6. Click **Add**  to add the new Model ID, and then click **OK**.

The configured **Credit Risk Economic Capital - Loss Estimation** execution process is now available for execution on the **Process Modeler** window.

The Loss Model measures calculation can be retrieved from the target exposures table **FSI_CREC_EXPOSURES** which is detailed in the following table:

Figure 26 Calculations for Loss Model

Logical Measures	Table Name	Column Name
Value at Risk	FSI_CREC_EXPOSURES	N_VAR_UNDIVERSIFIED_EC
Unexpected Loss	FSI_CREC_EXPOSURES	N_VAR_UNDIVERSIFIED_EC_UL
Expected Loss	FSI_CREC_EXPOSURES	N_UNDIVERSIFIED_EC_EL

Logical Measures	Table Name	Column Name
Conditional Value at Risk	FSI_CREC_EXPOSURES	N_CVAR_UNDIVERSIFIED_EC
Logical Measures	Table Name	Column Name
Value at Risk	FSI_CREC_EXPOSURES	N_VAR_UNDIVERSIFIED_EC

When the process is executed, you can check the logs from the following directory path by using WinSCP:

`$HOME/OFSCAP/ficdb/log/EconomicCapital`

11 Annexure A - Technical Details

11.1 Download Specifications

For information, see [Download Specifications](#).

11.2 Pre Requisite Basel Steps – Historical Execution

For training the Model, you must have five different dates' data suggestively with a gap of one year between the dates. These dates should have a successful Basel Run to execute Credit Risk Economic Capital - Historical Data Population Run. When you execute the Credit Risk Economic Capital - Historical Data Population Run, you need to select Basel execution Run, which was Run with the same execution date. See the following image for reference:

Figure 27: PMF execution for Credit Risk Economic Capital - Historical Data Population run

The image shows a web-based configuration interface for a PMF execution. The interface has a red header bar with the word "Execution" in white. Below the header, there are several input fields and dropdown menus. The "Basel Execution" dropdown menu is highlighted with a green border. The "Legal Entity" and "Reporting Currency" fields have a link icon to their right.

Field	Value
Execution Type	With Parameters
Execution Date	11/02/2017
Consolidation Type	Consolidated
Basel Execution	Basel III Capital Calculation - 10
Legal Entity	RESERVE BANK OF INDIA
Reporting Currency	Indian Rupee

11.3 Populating FSI_CREC_Market_Variables

For populating **FSI_CREC_Market_Variables**, you need to maintain **STG_MARKET_VARIABLES_MASTER**. For each data update of **STG_MARKET_VARIABLES_MASTER**, you need to Run the SCD for Dim Market Variables task in the SCD batch.

Figure 28: SCD for Dim Market Variables in the SCD Batch

Task11	scd for Dim Market Variables	scd,64	RUN EXECUTABLE	Task10	N
--------	------------------------------	--------	----------------	--------	---

Unconditional Probability of Default	Probability of a customer defaulting one holding period later, given the information available today. The holding period is generally assumed to be one year.
Conditional Probability of Default	Probability of a customer defaulting one holding period later given a scenario for information that becomes available in the future. The holding period is generally assumed to be one year.
Unconditional Loss Given Default	The loss anticipated if the customer happens to default one holding period later given the information available today. The holding period is generally assumed to be one year.
Conditional Loss Given Default	Loss anticipated if the customer happens to default one holding period later given a scenario for information that becomes available in the future. The holding period is generally assumed to be one year.
Exposure at Default	The expected exposure at the time of default.
Confidence Interval/Level	A user-selected percentile of the loss distribution of the customer one holding period later. The holding period is generally assumed to be one year.
Value at Risk (VaR)	Defined as the maximum dollar amount expected to be lost over a given time horizon, at a pre-defined confidence level.
Conditional Value at Risk (C-VaR)	The expected loss in situations worse than a user-selected confidence level of the loss distribution of the customer one holding period later. It the mean of losses above the Value at Risk %. The holding period is generally assumed to be one year.
Expected Loss (EL)	The expected loss is the average credit loss that we would expect from an exposure or a portfolio over a given period of time. Expected Loss is calculated as $PD \times LGD \times EAD$.

Unexpected Loss (UL)

Average total loss over and above the mean loss. It is calculated as a standard deviation from the mean at a certain confidence level. It is calculated as $VaR - EL$. This is considered as the economic capital.