

Model Development Documentation – ICAAP Credit Risk Model

Version 2024

European Fictive Bank (EFB)

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1. Introduction

The present document provides an updated description of the ICAAP Credit Risk Economic Capital model used by EFB for the 2024 ICAAP cycle.

This version incorporates several improvements following the 2023 Internal Audit review, including:

- a more detailed presentation of data sources,
- the introduction of a clearer modelling structure,
- the integration of updated parameter files,
- and the development of a partial validation framework.

2. Model Overview

The ICAAP Credit Risk Model estimates portfolio economic capital using a simulation-based approach. The model aggregates expected and unexpected losses across Corporate, SME, Retail Secured, and Retail Unsecured segments.

Compared with 2023, the 2024 model includes:

- an increased number of simulations (from 5,000 to 10,000),
- a revised correlation parameter (from 0.18 to 0.22),
- improved PD and LGD consistency checks,
- partial versioning of the Python scripts.

3. Data Sources and Data Lineage

3.1 Data Sources

Three main data inputs are used:

- **PD data** extracted from the internal rating system (IRMS)
- **LGD data** provided by Recoveries and adjusted using downturn add-ons
- **EAD data** extracted from Finance (quarterly snapshot)

Compared with 2023, the modelling team has added a short technical appendix listing the main fields used.

3.2 Data Lineage (Partially Improved)

A simplified lineage diagram was drafted in 2024 to describe the main data flows. It is still incomplete and will be expanded in future versions.

1. IRMS → PD Extract (CSV)
2. Recoveries → LGD Extract (Excel)
3. Finance → EAD Extract (Excel)
4. Manual consolidation via “Exposure_2024.xlsx”
5. Python script → “SimResults_2024.csv”

While this is an improvement over 2023, lineage remains:

- partly manual,
- not systematically documented,
- and lacking automated consistency checks.

The modeling team indicates that the full automation is planned for 2025.

4. Assumptions and Parameters

4.1 Time Horizon and Confidence Level

- One-year horizon
- 99.9% confidence level (unchanged compared to 2023)

4.2 PD and LGD Assumptions

Improvements:

- The 2024 documentation now includes PD and LGD averages by segment.

- Some adjustments for downturn LGD are mentioned.

4.3 Correlation Structure (2024 -corrected)

The 2024 ICAAP Credit Risk Model continues to rely on a **single-factor correlation structure**. A uniform asset correlation parameter of **0.22** is applied across all segments (Corporate, SME, Retail Secured, Retail Unsecured). The purpose of this parameter is to approximate the impact of a common systematic risk driver without introducing excessive model complexity.

The justification for the choice of 0.22 is based on a combination of internal judgment and a high-level comparison with regulatory references. Internal discussions concluded that correlations materially below 0.20 tended to underestimate portfolio volatility, while values above 0.25 produced capital levels that were considered unrealistically high compared with historical loss experience. As a compromise, a value of 0.22 was retained for 2024, in line with the Bank's conservative stance, although no formal quantitative calibration study has yet been completed.

No differentiated correlation is applied by sector or geography at this stage, mainly due to data limitations and resource constraints. A more granular correlation framework, as well as dedicated sensitivity analysis on the correlation parameter, is planned for future versions of the model but has not yet been implemented in 2024.

5. Methodology

The 2024 documentation introduces a short description of the key steps:

1. Consolidation of segment-level exposure tables
2. Generation of a systematic risk factor
3. Simulation of segment losses using lognormal distributions
4. Aggregation into a portfolio loss distribution
5. Economic capital = Loss at 99.9% – Expected Loss

Improvements since 2023:

- High-level steps are at least listed
- Some parameter tables included in Annex B
- Simulations increased to 10,000 draws

6. Implementation Structure

6.1 Excel Files

The number of input files has been reduced:

- **PD_LGD_Inputs_2024.xlsx**
- **EAD_Inputs_2024.xlsx**
- **Exposure_2024.xlsx**

However, several manual steps remain, including copy/paste operations.

6.2 Python Implementation

Two main scripts exist:

- `merge_inputs_2024.py`
- `simulate_losses_2024.py`

Improvements:

- Header documentation added
- Relative file paths used
- Some basic logging implemented

7. Results

7.1 Expected Loss (EL)

Expected loss for 2024 is reported at:

- **€0.26bn**

Segment-level detail is provided in Annex C.

7.2 Loss Simulation Output

The model now includes a short table summarising key quantiles:

- 95%: €0.55bn
- 99%: €0.94bn
- 99.9%: €1.95bn

7.3 Economic Capital

EC = €1.69bn

8. Validation and Testing

- A partial backtesting file was produced (Corporate and SME only)
- A two-page sensitivity note was generated but not included in this document. Reconciliation and validation of economic capital figures will be formalised in the next version.
- Some parameter stability commentary added

9. Governance

Roles now listed explicitly:

- Model Owner (1st line)
- Risk Methodology (2nd line)
- Internal Audit (3rd line)

Annex A — Main Variables

Variable Name	Description	Type	Comments
counterparty_id	Unique counterparty identifier	String	No consistency checks performed
segment	Model segment (Corp/SME/RS/RU)	Categorical	Created manually in Excel
pd	12-month PD (PIT)	Numeric	Missing for ~0.6% of rows
lgd	LGD downturn estimate	Numeric	Uplift not documented
ead	Exposure at Default	Numeric	Extracted from Finance snapshot
country	Counterparty country	String	Not used in modelling
product_type	Internal product mapping	String	Mapping table missing

Annex B — Parameter Summary

Lognormal Parameters Used in the 2024 Simulation

Segment	μ (mean)	σ (stddev)
Corporate	-1.80	0.95
SME	-1.55	1.15

Retail Secured	-2.45	0.75
Retail Unsecured	-1.30	1.30

Parameters are based on expert judgment and prior internal studies.

Annex C — Segment-Level Expected Loss

Segment	PD Avg	LGD Avg	EAD (€bn)	EL (€m)
Corporate	2.1%	38 %	42.3	337
SME	2.6%	42 %	18.5	203
Retail Secured	0.8%	18 %	22.1	32
Retail Unsecured	3.9%	55 %	5.8	124
Total	—	—	88.7	696

Annex D — Sign-off Sheet

Document: ICAAP Credit Risk Model — Development Documentation 2024

Version: 1.1

Date: 12 December 2024

Role	Name	Signature	Date
Model Owner (1st line)	A. Martin	<i>Signed</i>	12/12/2024
Head of Risk Methodology (2nd line)	D. Lambert	<i>Signed</i>	13/12/2024