

ANNEX A. CREDIT RISK MODELLING

To measure risk and expected loss, DFIs employ internal ratings-based (IRB) systems that closely mirror conventional IRB methodologies¹, using the following core building blocks: Probability of Default (PD), Loss Given Default (LGD), Exposure at Default (EAD), maturity adjustments, portfolio correlation models, and stress testing. PDs are typically derived from borrower scorecards and sectoral and country risk assessments; LGDs reflect collateral quality, recovery prospects, legal enforceability, and claim seniority; and EAD incorporates committed exposure, expected disbursement patterns, and guarantee structures.

At the portfolio level, most DFIs use credit risk models analogous to those of regulated banks, including one- or multi-factor models that capture country- and sector-level concentration, as well as simulation models, particularly for guarantee portfolios. Most DFIs also conduct regular stress testing for macroeconomic shocks, sectoral downturns, and country-specific crises. While the methodology echoes commercial bank practice, the scenarios are calibrated to the higher volatility and structural risk characteristics of the contexts in which DFIs operate.

The key difference lies not in the tools but in the objectives and constraints. Unlike commercial banks, DFIs are mandated to accept higher PDs, LGDs, and EADs when justified by development impact, to adjust pricing through concessionary or subsidy mechanisms, and to tolerate lower or slower financial returns. They are also mandated to operate in markets with far greater risk, and their investment decisions must account for additionality and crowding-in, concepts absent from commercial risk management. However, transparency around estimated PDs, LGDs, and EADs at the transaction level remains limited, and it is often impossible to verify whether, for example, deal-level PDs used by DFIs exceed those applied in traditional commercial assessments.

The Impact Fund Denmark (IFDK) example²

Transparency regarding internal risk assessments is low. However, according to Danida (2019), IFDK introduced a traditional IRB system more than 10 years ago, which weighs factors such as partner risk, country risk, management quality, financials, and business risk. The model was calibrated using IFDK's historical default data, yielding internal risk categories comparable to external

¹ Under the Basel II and Basel III regulatory frameworks, the Internal Ratings-Based (IRB) Approach is a set of methodologies that allow banks to use their own internal risk models to calculate regulatory capital for credit risk.

² The Investment Fund for Developing Countries (IFU) changed its name to Impact Fund Denmark (IFDK) in June 2025. In the text, we use the current name, IFDK, throughout, although several documents and annual reports use the former name.

credit ratings. While IFDK does not publicly publish a probability of default (PD) for each deal, it assesses each new investment's creditworthiness during due diligence and assigns an internal risk score or grade, much like commercial banks do under IRB approaches (Danida, 2019).

At the deal level, IFDK follows the standard expected credit loss methodology, which is conceptually aligned with PD, LGD, and EAD components. All project loans are monitored for credit deterioration and classified into different stages for impairment purposes. IFDK calculates loan loss allowances on a loan-by-loan basis, using an estimated loss percentage drawn from IFDK's past default/recovery experience, current conditions, and the loan's internal rating (IFDK, 2020-2024). In practice, this means that IFDK must apply a model of the form $PD \times LGD \times EAD$ to each loan's remaining life. As such, IFDK's approach aligns with classical IRB principles by using risk parameters, as it essentially uses internal ratings (PD-like risk scores) and loss severity assumptions (LGD) to estimate expected losses on exposures (EAD) for accounting purposes.

At the portfolio level, IFDK manages credit risk in line with one- or multi-factor portfolio models. The fund limits exposure by geography and partner to avoid excessive concentrations. For example, IFDK's policy caps commitments to any single country or partner, reflecting recognition of correlated default risk, a concept underlying the traditional one-factor model for portfolio credit risk. As noted in the annual reports (IFDK, 2020-2024), the board has established limits to mitigate excessive risk concentration, and IFDK diversifies across many countries. This mirrors the Basel principle that portfolio risk can be mitigated through diversification.

While IFDK's exact quantitative model is not disclosed, a recent evaluation confirms that IFDK's investment process includes an extended risk analysis at the appraisal stage, with risk ratings used to discuss key risk factors and mitigation in each business case (Danida, 2019). Thus, IFDK's risk department likely aggregates these ratings to assess the portfolio's credit-quality distribution (e.g., by tracking the share of investments in rating categories A, BB, B, etc.). In fact, Danida (2019) presents a chart of IFDK's portfolio by internal risk category, analogous to a bank's portfolio PD-grade breakdown. This suggests that IFDK monitors portfolio Value-at-Risk using internal ratings, a practice consistent with factor models to ensure that the overall portfolio's default risk remains within a preset tolerance level.

Although IFDK does not publish stress-test results, it incorporates macroeconomic and sectoral scenarios into its risk assessments (MFA, 2024). For example, a recent programme document lists a macroeconomic downturn across emerging markets as a significant risk and describes how IFDK would mitigate it (MFA, 2024). This indicates that management conducts scenario

analyses to evaluate how a global recession or regional crisis would affect the portfolio (e.g., higher defaults in specific sectors or countries) and to plan responses. According to Danida (2019), IFDK's internal rating model assigns a 20% weight to country risk, indicating that internal risk reviews incorporate country-risk scenarios (political instability, currency crises). While detailed macro stress test reports are not publicly available, these practices indicate that IFDK incorporates forward-looking scenario analysis (macroeconomic or political) into credit risk management, consistent with Basel frameworks' prescription for banks' ICAAP stress testing.

Another aspect of "risk" modelling is the concept of additionality, which has no equivalent in Basel regulations. According to Hansen and Rand (2023), IFDK evaluates (ex ante) whether an investment's financial and development additionality justifies the risk beyond what pure credit risk assessments indicate. This can lead to adjustments to the decision-making process compared with traditional commercial risk assessment processes. Development additionality is weighed alongside expected internal rate of return (IRR) estimates. However, Danida (2019) observed that IFDK sometimes struggled to balance financial returns against development outcomes, noting no real focus on maximising development outcomes in earlier years.