d-fine

The next phase for IRRBB NII - Regulatory requirement or strategic KPI?

analytical. quantitative. tech.

2025

Content

The next phase for IRRBB NII - Regulatory requirement or strategic KPI?, Dec 2025
© d-fine GmbH

01. Introduction

Interest Rate Risk in the Banking Book (IRRBB) – and specifically the net interest income (NII) measure – has entered a new phase, driven by two key developments. First, after years of low and even negative rates, banks have returned to operating in a positive interest rate environment. The rapid rise in rates initially triggered significant losses in securities portfolios, but enabled banks to rebuild their margins. When rates decline, these margins are put at risk and their preservation poses new challenges for banks.

Second, the regulatory framework for NII has reached maturity in the EU. The European Banking Authority (EBA) finalized its IRRBB/CSRBB package (including the Guidelines on IRRBB and CSRBB [1], the Final Draft RTS on Standardized and Simplified Standarized Methodologies [2] and on Supervisory Outlier Tests [3], and the Final Draft ITS on Supervisory Reporting [4]) which have been transposed into international and national frameworks and law (see [5], [6], [7], and [8]). With the IRRBB reporting live since September 2024, the regulatory expectations for measurement methodologies and reporting frameworks are now in place.

Looking ahead, the pace of regulatory rulemaking is likely to slow down. On-Site Inspections (OSIs), however, may surface supervisory findings that require enhancements to models, data, and processes. This forces a strategic question on banks: will they approach IRRBB NII purely as a compliance exercise, meeting regulatory minimum requirements – or will they leverage their NII simulations as a management tool to generate actionable insights for balance sheet steering, margin preservation across rate cycles, and multi-year planning?

Answering this question requires a solid understanding of the methodological foundations. At the heart of IRRBB NII lies the simulation framework that enables banks to project earnings under various interest rate scenarios. Central to any such simulation are the assumptions regarding the development of the balance sheet. For the supervisory outlier test (SOT), the regulator requires a constant balance sheet (CBS) where the balance sheet structure remains unchanged as positions mature – an assumption that enables comparability across institutions by isolating the interest rate and behavioral effects on NII.

At first glance, the definition of the CBS appears straightforward. As we will see, however, realistic implementation examples reveal considerable complexity. While the regulatory framework for the SOT does specify implementation requirements for the CBS, these provisions fall short of a fully unambiguous definition – leaving room for interpretation that has given rise to divergent market practices.

This whitepaper examines these practices and provides a comparison of different CBS simulation approaches. We assess each approach through various lenses: aggregation level, number of newly generated instruments, consistency with dynamic simulations, complexity, flexibility and treatment of hedges. By illuminating strengths and limitations, we offer a framework for making informed choices about IRRBB NII simulation infrastructure. Our objective is not to prescribe a single “correct” approach, but rather help to enable informed discussions within banks on what IRRBB NII should accomplish –and which simulation approach best serves that purpose.

02. Approaches to simulating a constant balance sheet

IRRBB NII is strongly influenced by bank-specific balance sheet structures, behavioural assumptions and modeling choices. As a result, it is not a standardized risk measure. This is supported by regulatory requirements which are principles-based and allow for considerable flexibility – a point we discuss in this section, focusing on NII's key modeling assumption: the constant balance sheet (CBS).

2.1 Regulatory baseline for CBS models

In its Guidelines on IRRBB and CSRBB [1] the European Banking Authority (EBA) sets out general principles for the modeling of NII. These include that NII calculations be currency-specific (GL 91); adequately model embedded options and non-maturity deposits (NMDs) (GL 108–112); follow strict guidelines when modeling equity (GL 113 –116); consider the various types of interest rate risk; and ensure that model complexity reflects the institution's Supervisory Review and Evaluation Process (SREP) category.

EBA's "Final Draft RTS on Supervisory Outlier Tests" [3] provides more details but still allows for a considerable degree of interpretation regarding the CBS implementation. In particular:

- Article 5 (d), definition of CBS: "Institutions shall compute the change in the net interest income under the assumption of a constant balance sheet, where its total size and composition, including on- and off-balance sheet items, shall be maintained by replacing maturing or repricing cash flows with new instruments that have comparable features with regard to the currency, amount and repricing period of the instruments generating the repricing cash flows."

- Article 5 (e), margins of simulated new business: "Margins of the new instruments shall be based on the margins from recently bought or sold products with similar characteristics. In the case of instruments with observable market prices recent market spreads shall be used and not historical market spreads."

We use these provisions as the baseline to examine various CBS modelling approaches. In simple cases, their interpretation is straightforward: a bullet instrument with no interim redemptions that repays its principal at maturity should be replaced with another bullet of equal time to maturity and principal.

However, the banking book typically includes many instruments with more complex redemption profiles than bullets. A simple example is an installment loan that amortises through regular partial redemptions over its lifetime (see Figure 1).

In this case, each principal redemption up to and including the final maturity payment must be reinvested to keep the balance sheet constant. This can quickly lead to many simulated positions. The following subsections discuss different ways of approaching this problem.

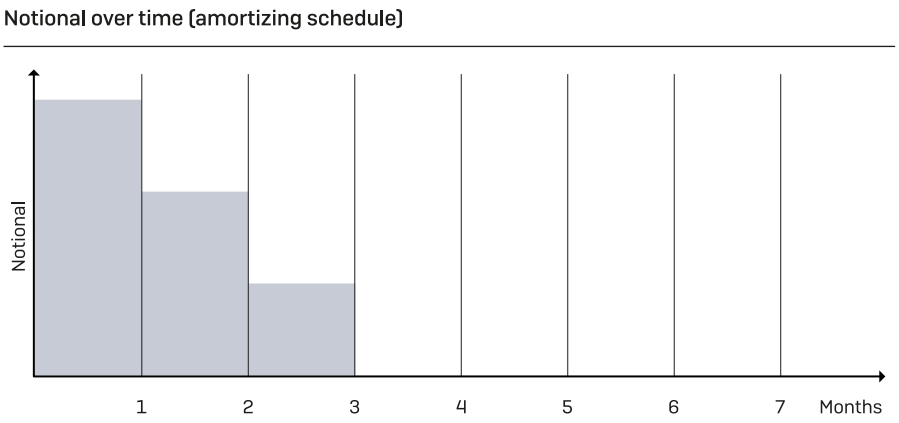

Figure 1: Notional over time (amortizing schedule)

2.2 Shift-and-rescale approach

A natural model for the CBS renewal of amortizing loans is to reinvest each principal repayment into a new amortizing loan that mirrors the original installment profile. Each renewal is sized so that the principal disbursed equals the principal repaid in that period.

Figure 2 illustrates this mechanism. The lightest colour denotes the original instrument, which amortizes through three equal installments. In each subsequent month, principal is repaid on the original instrument and on any existing renewal cohorts. Each repaid amount is replaced by a new three-year amortising loan. Renewal cohorts initiated in months 1 to 4 are shown in progressively darker shades:

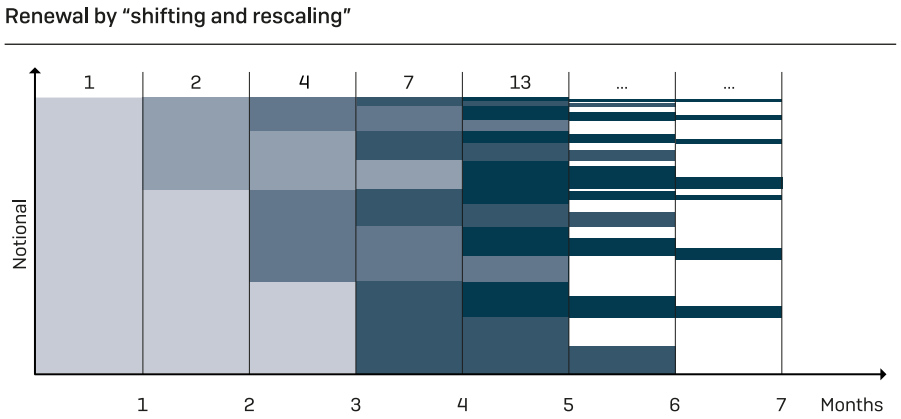

Figure 2: Renewal by "shifting and rescaling"

The numbers on top of the figure show the number of "active" renewal cohorts in each month. Although that count rises rapidly, at any point in time – with perfectly aligned renewal and repayment dates – a maximum of three different colors are outstanding. Note that, despite the added complexity, it always remains possible to combine the outstanding renewal cohorts into the three installments of the original amortizing loan (or one new amortizing loan).

In more complex cases – especially when renewal dates and repayment dates do not perfectly align – the number of simultaneously outstanding renewal cohorts

can exceed the original number of installments. This increases modelling and operational complexity (e.g., by requiring aggregation rules to keep the number of instruments under control).

2.3 Bullet-loan approach

An alternative approach is based on the observation that the graph of the notional in Figure 1 can be "sliced" horizontally into rectangles, each corresponding to a bullet loan. As pointed out above, renewal of bullets is straightforward (see Figure 3).

A key advantage of this approach is control over the number of renewal cohorts: while the number of new bullet loans grows linearly with the number of the original instrument's redemptions, the number of "active" renewals never exceeds the total number of redemptions.

Decomposition of the amortizing loan into bullet loans

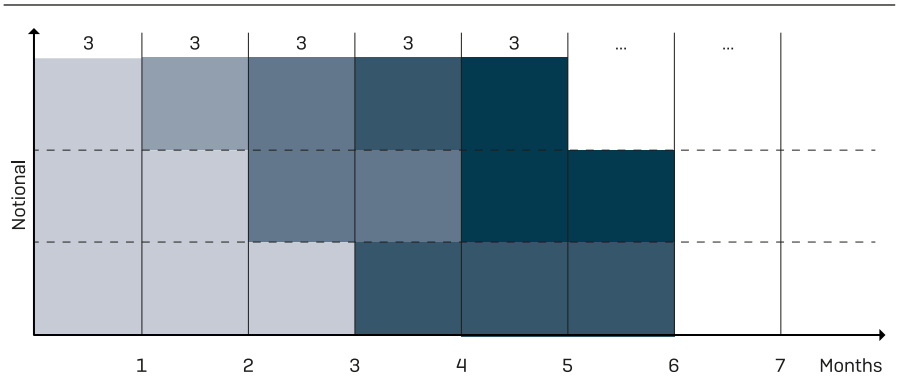

Figure 3: Decomposition of the amortizing loan into bullet loans

From a cash flow perspective, the implementation steps for this approach are: (i) for each redemption cash flow create a bullet loan whose maturity equals the time from loan origination to that redemption date; (ii) recognize the interest cash flows of the original instrument in NII (interest cash flows are not reinvested); (iii) set rates for each new bullet loan according to the relevant scenario and recognize the corresponding interest income or cost in NII; (iv) at maturity, renew each bullet with a new bullet of the same original maturity. This renewal mechanic ensures that the initial pricing considerations for the loan are maintained throughout.

2.4 EBA Standardized Methodology

The EBA Standardized Methodology [2] provides a third approach to CBS modeling. Like the bullet-loan approach, it interpretes cash flows as bullet equivalents. Unlike the instrument-level renewal patterns discussed above, it operates on aggregated, interest-rate-sensitive cash flows in a repricing matrix. To illustrate the approach, we draw on the extensive set of explanatory examples that has been provided by EBA during the consultation phase on the Standardized Methodologies which can be found in EBA's Consultation Paper on Draft RTS on Standardized and Simplified Standardized Methodologies [9].

There are two key differences compared to the bullet-loan approach: First, it uses modeled interest rate-sensitive cash flows rather than contractual cash flows, allowing for a uniform treatment of fixed-rate and floating-rate instruments throughout the simulation. Second, it incorporates both principal and interest rate cash flows into the renewals for the CBS.

Renewals are not modeled step-by-step. Instead, projected interest income from the renewals required to keep the balance sheet constant is computed directly: each re-pricing amount is multiplied by the scenario-specific forward rate and applied over the time to the NII horizon. To assign the correct forward rate, the model needs (i) the repricing time (when the cash flow occurs and the rate resets) and (ii) the reference term (the original maturity for fixed rate instruments or the repricing period for floating-rate instruments).

Consider two loans for illustration. The first is a fixed-rate loan issued three years ago with an original maturity of five years and a principal amount of €100, repaid in five equal annual installments. The second is a floating-rate loan issued one year ago with a principal amount of €60 and maturity of three years, based on three-month EURIBOR, repaid in three equal annual installments. Both loans have a remaining maturity of two years but differ in their interest-rate-sensitive-cash flow representation shown in Figure 4.

Figure 5 shows the allocation of these cash flows to the repricing matrix for a one-year NII horizon with the repricing and reference term buckets specified by the EBA Standardized Method.

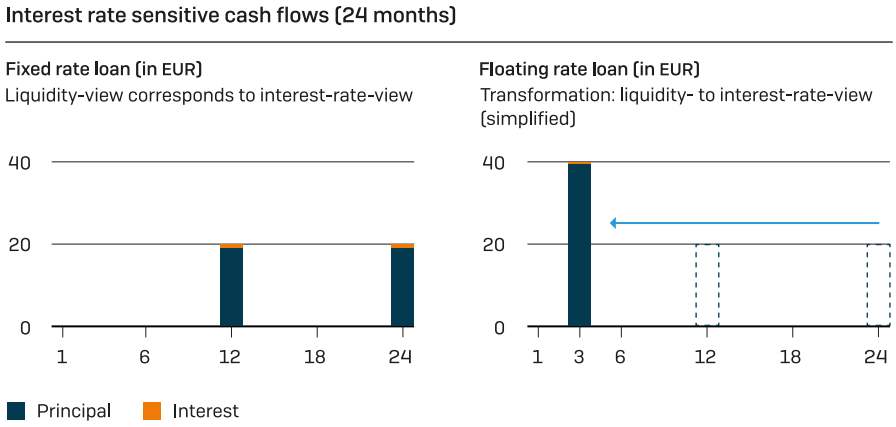

Figure 4: Interest rate sensitive cash flows

Repricing time	1D	1D–1M	1M–3M	3M–6M	6M–9M	9M–12M
Reference term						
1 Year			40.5			
2 Year						
3 Year						
4 Year						
5 Year						22
...						
>20 Years						

Figure 5: Cash flow allocation into the repricing matrix

Multiplying each cell in the repricing matrix by its forward rate and the "remaining time" factor for the time period till the end of the NII horizon yields the projected interest income over the NII horizon from renewals. To obtain total NII this projection is supplemented by (i) interest income from existing instruments within the NII horizon and (ii) projected margins on new business.

The margin projection from renewals mirrors the forward-rate projection but uses contractual cash flows in the repricing matrix and replaces forward-rates with estimates of currently achievable margins. Margin estimates are derived from recent market prices for liquid instruments or recently transacted margins for illiquid instruments.

Interest income from existing instruments is recognized directly from scheduled interest cash flows within the NII horizon (only interest accruing within the horizon is included). A modeling of the associated principal cash flows is not required for the CBS. Figure 6 recaps the components of NII under the EBA Standardized Methodology, each of which is calculated using a distinct methodological treatment.

Components of NII under the EBA Standardized Methodology

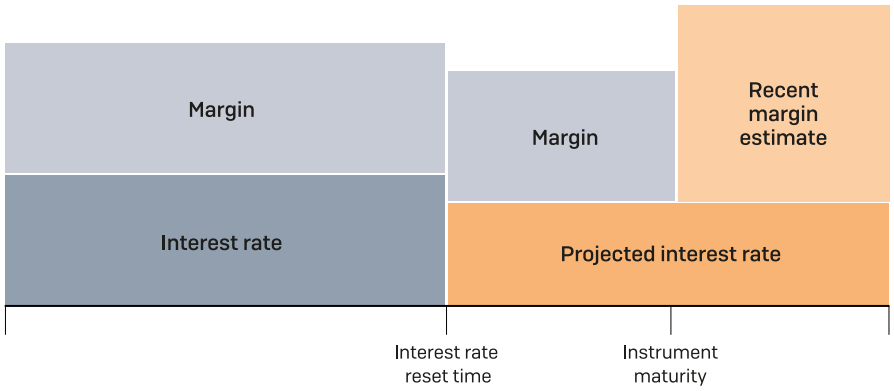

Figure 6: Components of NII with a CBS under the EBA Standardized Methodology

While the bullet-loan and EBA Standardized Methodology are related in principle, they differ in practice. In aggregation and traceability: the bullet-loan approach preserves loan-level links to NII results whereas the Standardized Methodology aggregates cash flows and does not retain instrument-level traceability. In the use of rates, the Standardized Methodology applies scenario-specific forward rates to project renewal income while the bullet-loan approach can use either scenario spot rates or forward rates. In renewal mechanics and scalability, the bullet-loan approach renews cash flows iteratively until the end of the NII horizon, possibly resulting in many simulated positions, whereas the Standardized Methodology applies a single renewal, improving scalability for large portfolios.

2.5 Planning approach

The final approach we discuss is based on the bank's planning process. Planning systems typically run dynamic simulations in which balance-sheet size and composition evolve with business expectations. To approximate the CBS within this setup, the process is constrained so that principle run-off within defined planning groups is reinvested back into the same groups, thereby keeping total size and composition effectively constant.

In practice, existing instruments are mapped to sufficiently homogeneous planning groups—by currency, balance-sheet category, product type, counterparty segment, and original maturity, among other relevant attributes. For each group, principal redemptions are aggregated to derive a run-off cash-flow profile, and the aggregated volume is reinvested (or refinanced for liabilities) as new instruments within the same group. Interest coupons are recognized within the NII horizon and are reinvested.

This approach preserves balance-sheet size and, subject to the homogeneity of the planning groups, preserves composition to a good approximation. Its primary advantage is operational: existing planning/ALM systems can be reused, which his particularly helpful where advanced tools are in place (e.g., FIS Balance Sheet Manager, Wolters Kluwer OneSumX). Many such systems also support renewal at the individual-instrument level; however, instrument-level renewal functionalities often suffer from the problems described above, such as uncontrolled growth in the number of instruments which can be avoided by group-level renewals.

The trade-offs of the planning approach usually involve reduced instrument-level traceability and sensitivity to grouping choices. If groups are too broad, composition can drift and comparability with CBS requirements may weaken. Robust aggregation rules, documentation of group definitions and reconciliation checks against CBS size and composition constraints are therefore needed.

2.6 Comparison

In the table on the next side we summarize some of the key differences between the methods that we discussed above.

Remarks:

- Using aggregated cash flows throughout simplifies implementation of the EBA Standardized Methodology. Data volume scales with repricing buckets rather than instrument count, which can be practical for spreadsheet implementations. However, aggregation reduces instrument-level traceability.

- CBS NII forecasts are inherently complex. Keeping size and composition constant is non-trivial once partial redemptions, future disbursements, amortization schedules, and prepayments are considered. Planning platforms can make the operational mechanics – even with these actions present – more straightforward.

- Hedging instruments warrant careful treatment. Per Article 5(d), CBS applies to on- and off-balance-sheet items, which includes hedges. When the balance sheet is not in a steady state direct renewal of hedges may conflict with the hedging policy. A policy-based approach is preferable: apply the CBS requirement directly to non-hedging instruments and determine hedge renewals based on the bank's hedging strategy (e.g., considering BPV by time bucket together with the associated limits and renewing hedges to bring metrics back when limits have been breached).

Feature	Shift and Rescale	Bullet Loans	EBA Standardized Methodology	Planning Approach
Aggregation level (existing portfolio)	Instrument	Instrument	Aggregated cashflows (repricing matrix)	Instrument
Aggregation level (renewal portfolio)	Instrument	Instrument	Single projection to horizon	Planning group (sometimes also instrument)
Number of new instruments generated	High (may grow exponentially)	Moderate (limited by number of redemptions)	Low (no iterative renewals)	Limited by the granularity of planning groups and time buckets
Suitability for dynamic simulation	Not suitable for dynamic simulation	Not suitable for dynamic simulation	Not suitable for dynamic simulation	Made for dynamic simulation – constant balance sheet may require approximations, consistency should be ensured
Complexity	Medium – high: special cases (e.g. FX forwards, future loan disbursements) increase complexity depending on choices made	Medium – high: see Shift and Rescale	Low – medium: inclusion of margins requires a two-fold cash flow model, add-ons increase complexity; the simplified version reduces the complexity for eligible banks	Medium – high: defining homogeneous planning groups to approximate a constant balance requires significant effort and maintenance; varying system functionalities for constant balance sheet
Flexibility	Medium – high: Since renewals can be traced back to individual instruments, it is possible to tune the renewals using any available information on the instrument	Medium – high: see Shift and Rescale	Low: methodologically tied down by the supervisor, therefore little flexibility remains (deviations from the standard are possible at the risk of losing the implicit methodological approval by the supervisor	Medium: depends on the system, but reporting granularity (also relevant for analyses) is limited by the granularity of the planning groups
Hedging	Hedging instruments can be renewed – care is needed to adapt this approach to the typical hedge instruments (swaps) but new hedge deals may also be created based on a hedging strategy	Hedging instruments can be renewed – see Shift and Rescale	Hedging instruments are renewed based on their cash flows – especially when the portfolio is not in a steady state the result may deviate from the bank's hedging policy and lead to increased interest rate risk	More advanced systems allow for hedging instruments to be generated based on a hedging strategy. The limitations of these systems may require certain approximations
Scalability/ Performance	Medium	Medium - high	High	High
Supervisory CBS alignment	Strong	Strong	Very strong (method is specified by EBA)	Moderate

Table 1: Comparison of NII methodologies

03. Further development and integration of IRRBB NII

As discussed in this whitepaper, there is no single, universally optimal CBS design for IRRBB NII. Instead, banks have to choose from a spectrum of approaches differing in aggregation level, number of newly generated instruments, consistency to dynamic simulations, and treatment of hedges. Each of these approaches comes with distinct advantages and limitations. This diversity reflects the banking industry itself, where institutions vary in size, complexity, business models, and strategic priorities. However, one choice that all banks face is whether to aim for minimum supervisory compliance regarding NII or to embrace NII as a management tool to generate actionable insights.

With regulatory IRRBB reporting live, all banks in the EU now operate at least one system to simulate NII. However, in many cases these solutions have been developed incrementally, as pragmatic answers to emerging regulatory requirements and are often based on legacy IT architectures. While such ad-hoc implementations – in many instances aimed at short term compliance with the regulatory minimum expectation – may have been sufficient up to now, the changed market environment and regulatory scrutiny expected within OSIs may force banks to reassess their choices or even adopt entirely different approaches.

For banks aiming beyond the regulatory minimum, IRRBB NII must be integrated deeper into their bank steering framework. This will require linking IRRBB NII with the normative perspective of the Internal Capital Adequacy Assessment Process (ICAAP) as well as the process for multi-year planning and budgeting. This way, IRRBB NII serves as an early indicator of balance-sheet driven interest rate risk for the development of the bank's KPIs and may support the limit setting process. In this case, a CBS design that reconciles IRRBB with the ICAAP and planning view is a key prerequisite.

In the end, as OSIs surface findings on models, data, and processes, we expect a partial convergence in the methodologies used across banks. However, because of the nature of NII forecasts and the diversity of banks' strategies and business models, we expect material diversity to remain. Ultimately, different institutions will weigh the differences between the various methods differently. Key differentiators include:

- **Portfolio size and complexity:** For a bank with a small but specialized portfolio it may be important to be flexible to accurately capture the relevant properties of the various instruments. For a bank with a large but homogeneous portfolio it may be more relevant to use aggregation as much as possible to improve performance.

- **Interest rate risk management approach:** Banks manage interest rate risk in different ways. Some have a policy of taking very little interest rate risk in the banking book, others explicitly target a certain benchmark. There are also big differences in the type of risk figures that are computed and how they are used. This also determines how the NII figures are used: as additional "boundary conditions" or as an integral part of the internal management of interest rate risk.

- **Systems and data architecture:** Depending on the systems that are already in use, different approaches may be more or less feasible or consistent to other reports in the bank. As an example, for a bank that already uses an advanced planning and budgeting tool, reusing this system for both dynamic and constant balance sheet simulations can be relatively easy.

- **Role of dynamic simulation:** Larger and more complex banks are required by the supervisor to also measure NII risk using a dynamic simulation. So far, little emphasis has been put on this requirement regarding dynamic simulation. Should this change in the future, banks may be forced to introduce suitable systems. This might then in turn influence the choice of a system for constant balance sheet simulations (see previous bullet point).

After several years of evolving regulations, it seems that the IRRBB/CSRBB train is finally slowing down, making the corresponding requirements less of a moving target. We see this as a welcome opportunity for banks to evaluate their current IRRBB/CSRBB implementations and determine how they can be optimized or more closely aligned with their internal risk and financial management frameworks.

Authors

Dr. Christian van Enckevort
Principal and Expert in ALM and Liquidity Risk
d-fine B.V., Utrecht
Christian.Van.Enckefort@d-fine.com

Matthias Mrozek
Manager and Expert in ALM and Bank Management
d-fine GmbH, Frankfurt am Main
Matthias.Mrozek@d-fine.com

References

[1] European Banking Authority, „Guidelines on the management of interest rate risk and credit spread risk arising from non-trading book activities“, EBA/GL/2022/14

[2] European Banking Authority, "Final Draft RTS on Standardised and Simplified Standardised Methodologies", EBA/RTS/2022/09

[3] European Banking Authority, "Final Draft RTS on Supervisory Outlier Tests", EBA/RTS/2022/10

[4] European Banking Authority, "Final Draft ITS on Supervisory Reporting", EBA/ITS/2023/03

[5] EU Commission, "Commission Implementing Regulation (EU) 2024/855"

[6] EU Commission, "Commission Delegated Regulation (EU) 2024/856"

[7] EU Commission, "Commission Delegated Regulation (EU) 2024/857"

[8] Bundesanstalt für Finanzdienstleistungsaufsicht, "Rundschreiben 06/2024 (BA) MaRisk"

[9] European Banking Authority, “Consultation Paper on Draft RTS on Standardised and Simplified Standardised Methodologies", EBA/CP/2021/38

d-fine

Berlin
d-fine GmbH
Kranzler Eck
Kurfürstendamm 21
10719 Berlin
Germany
berlin@d-fine.de

Dusseldorf
d-fine GmbH
Gustaf-Gründgens-Platz 5
40211 Dusseldorf
Germany
duesseldorf@d-fine.de

Frankfurt
d-fine GmbH
An der Hauptwache 7
60313 Frankfurt
Germany
frankfurt@d-fine.de

Hamburg
d-fine GmbH
Am Sandtorpark 6
20457 Hamburg
Germany
hamburg@d-fine.de

London
d-fine Ltd
14 Aldermanbury Square
London, EC2V 7HR
United Kingdom
london@d-fine.co.uk

Milan
d-fine s.r.l.
Piazza Sigmund Freud, 1
20124 Milan
Italy
milano@d-fine.com

Munich
d-fine GmbH
Bavariafilmplatz 8
82031 Grünwald
Germany
muenchen@d-fine.de

Stockholm
d-fine AB
Kungsgatan 9
11143 Stockholm
Sweden
stockholm@d-fine.se

Utrecht
d-fine B.V.
Stadsplateau 7
3521 AZ Utrecht
Netherlands
utrecht@d-fine.nl

Vienna
d-fine Austria GmbH
Seilerstätte 13
1010 Vienna
Austria
wien@d-fine.at

Zurich
d-fine AG
Brandschenkestrasse 150
8002 Zurich
Switzerland
zuerich@d-fine.ch