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# Banking on Assumptions? How Banks Model Deposit Maturities

February 2026


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# Executive Summary

The paper[1] investigates **euro-area banks estimates on the effective maturity of non-maturing deposits (NMDs)**, which technically have no fixed term but often stay with banks for years. Banks rely on historical customer behavior to assign these deposits to maturity buckets rather than treating them all as having zero maturity.

Results show **wide variation: roughly 20% of deposits are considered to have zero maturity, while about 10% are assumed to last more than seven years**, reflecting the perceived "**stickiness**" of deposits.

Banks with **more volatile, interest-sensitive, or digitally active deposit bases** generally assume **shorter maturities**, though **recent rate hikes did not lead neither to significant NMDs assumed maturities reduction nor to internal model updates**.

The study highlights that realistic assumptions about deposit behavior are **crucial for banks' risk management (IRRBB, ALM and Liquidity Risk) and overall financial stability**: as an example, when banks that rely more heavily on volatile funding sources (such as **uninsured deposits**) indicate **longer NMDs maturities**, thereby **portraying them as more stable**, this could signal that **withdrawal risks are being understated**. It may also indicate the presence of **"window-dressing" behavior**, whereby institutions exploit **optimistic NMD modeling assumptions to hide ALM challenges**.

1) Banking on assumptions? How banks model deposit maturities, Working Paper Series No 3140

# At a Glance


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**Keywords:** IRRBB, NMDs, Liquidity, Banks, Behavioral

# 01

# Introduction

Objective of the Study

# Introduction

## Objective of the Study

The **objective of the ECB investigation** is to explore how banks operating in the **euro area** are estimating the **behavioral maturity of Non-Maturing-Deposits (NMDs)**. The **accurate calibration of those maturities** is very important to ensure **overall financial stability**.

Firstly, for those who are not familiar with this subject, it is important to highlight a few elements:

### What are Non-Maturing Deposits (NMDs)?

By definition, a non-maturing deposit (NMD) is a **type of deposit that has no explicit expiration date** and can be kept for extended periods of time, even if customers are allowed to **withdraw their money at any time with no penalties nor notice**.

### How are banks treating those instruments?

Although NMDs are essentially **floating-rate liabilities with zero maturity**, **banks use internal models to reallocate them across different maturity buckets,** mainly **depending on the past behavior of their clients**, but also considering other factors, such as the macroeconomic context or the bank's business strategies.

### Why it is important to allocate NMDs to the correct maturity bucket?

**Allocating NMDs to the wrong maturity bucket** can lead banks to (i) **bad asset-liability management (ALM) strategies**, especially in **volatile interest rates environments,** (ii) **liquidity risk misinterpretations** and (iii) lack of understating of **Interest Rate Risk** exposure.

# 02

# Analysis of the Dataset

Database

Contractual-Behavioral NMDs

NMDs Categories

Deposit Maturity

Deposits Other than NMDs

# Analysis of the Dataset 1/8

## Database

The **research paper** relies on a rich and confidential dataset primarily sourced from the **ECB**, covering **67 Significant Institutions (SIs) across 16-euro area countries**. This sample represents approximately **72% of total euro area banking assets** and spans the **period from 2019Q2 to 2023Q3A**.

### Supervisory and Financial Databases

- **COREP (Common Reporting):** to collect data on banks' capital positions, including credit risk, market risk, operational risk, and capital adequacy ratios.
- **FINREP (Financial Reporting):** detailed financial statements, including balance sheets, income statements, and specific disclosures.
- **SREP (Supervisory Review and Evaluation Process):** empirical analysis of digitalization, information on the share of digital customers and the volume of digitally opened deposit.

### Monetary and Interest Rate Statistics

- **IBSI (Individual Balance Sheet Items):** provides granular, disaggregated information on loans and deposits by type and maturity.
- **IMIR (Individual MFI Interest Rate):** used to track the interest rates banks apply to specific customer segments (deposit beta) to get the sensitivity of deposit rates to central bank policy changes.

### Cash Flow Data

- The collection of **ECB quarterly cash flow data on NMDs** by maturity bucket are used. The maturity buckets are required by banks to allocate their expected cash flows into **14** distinct **time bands** based on their internal behavior assumptions or remaining contractual maturity.

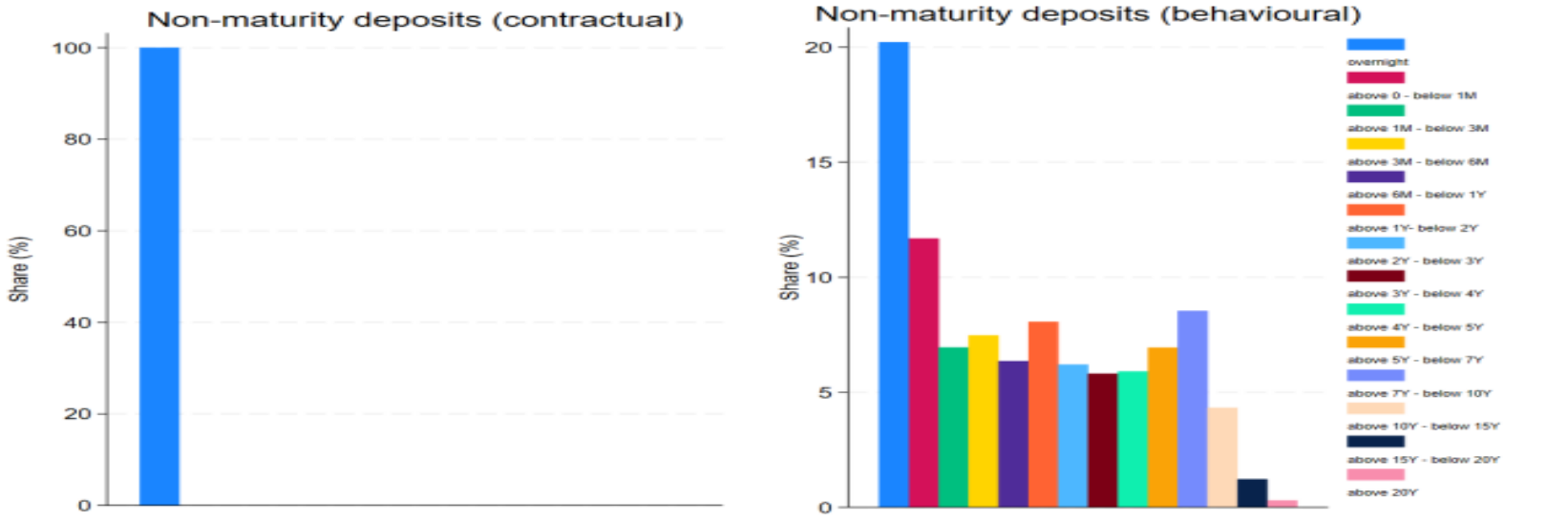
### External Market Data

- **EBA Guidelines**: the categorization of deposits (e.g., distinguishing between retail transactional and non-transactional NMDs) follows the regulatory standards set by the European Banking Authority.
- **ECB Survey of Monetary Analysts:** to determine if interest rate hikes were anticipated, the researchers utilized this survey to compare **market expectations** against the actual **realized** policy path of the ECB's Governing Council.

# Analysis of the Dataset 2/8

## Contractual-Behavioral NMDs

Focusing on bank deposits, it can be noticed the difference between the average maturity profile of NMDs **under contractual terms and as modelled using banks' behavioral assumptions**.




Each bar shows the average share of cash-flows reported in a specific maturity bucket for our sample of 67 banks across 2019Q2-2023Q3. *Source: ECB Supervisory Statistics.*

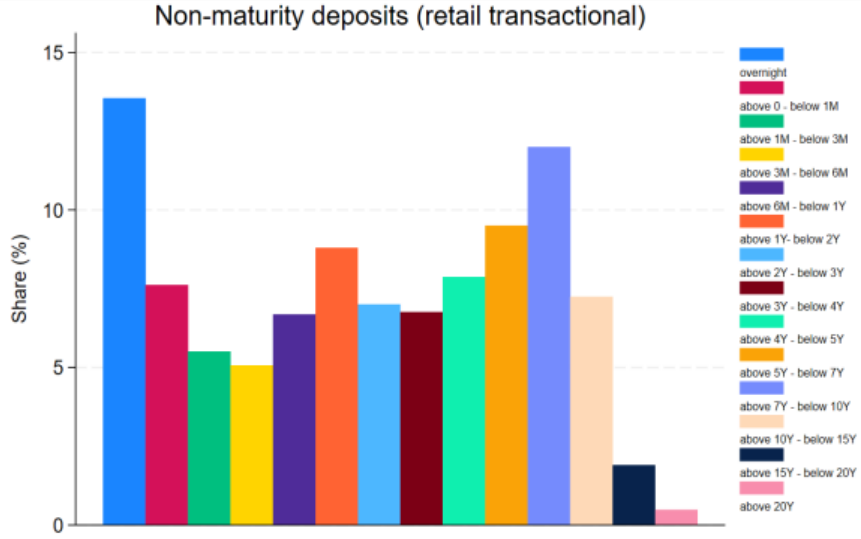
- **Contractual terms** reflect depositors **legal right** to withdraw funds at any time.
- Banks' **behavioral assumptions** aim to capture the actual "**stickiness**" of NMDs based on observed customer behaviors.

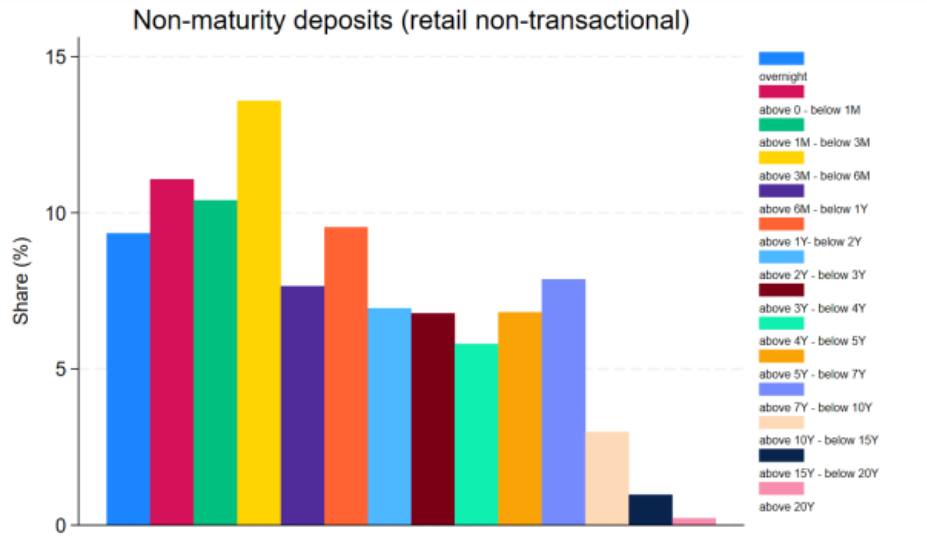
As shown in the graph, under the **contractual terms**, NMDs have **zero maturity** and are effectively treated as **overnight** deposits, reflecting a conservative assumption that considers these funds **highly unstable**.
In contrast, **bank estimates,** distribute NMDs across a **range** of **maturities** including longer-term ones.
Despite the absence of a contractual maturity, banks expect approximately 80% of NMDs share to remain **stable** over extended horizons.

# Analysis of the Dataset 3/8

## NMDs Categories 1/2

Breakdown of **NMDs under banks' behavioral assumptions**, categorized according to depositor and account characteristics, in line with EBA GL:



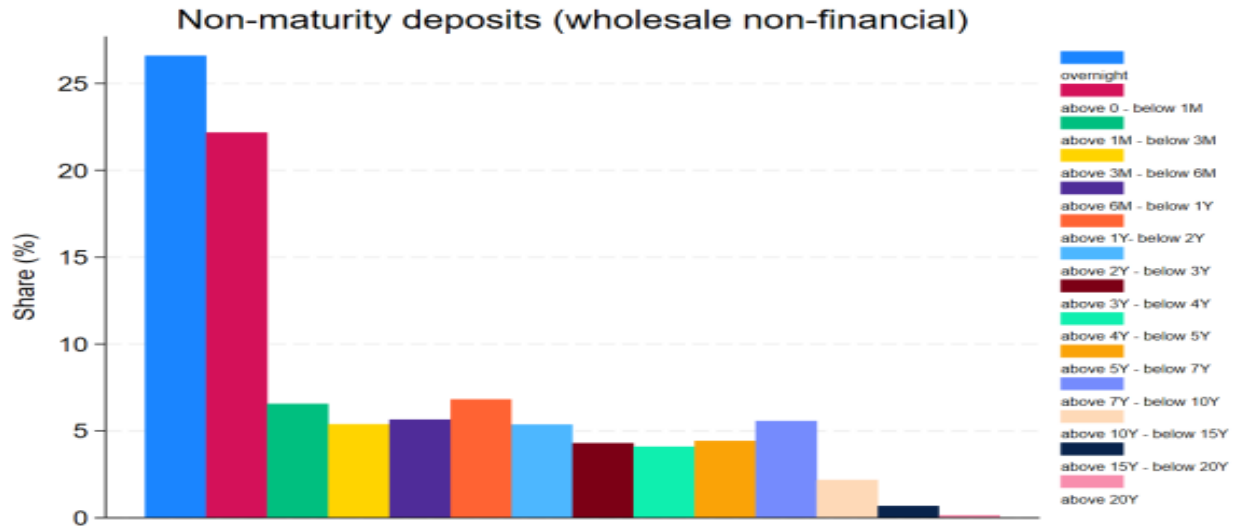

Each bar shows the average share of cash-flows reported in a specific maturity bucket for our sample of 67 banks across 2019Q2-2023Q3. *Source: ECB Supervisory Statistics.*

- **Retail transactional** are non-interest-bearing and other retail accounts for which the **remuneration component is not a key factor** in the client's decision to hold funds. Their distribution is relatively **even** across maturity buckets, indicating a more **stable** holding pattern. These accounts are primarily used for **day-to-day transactions** rather than for interest accumulation.
- **Retail non transactional** are accounts (including regulated ones) where the remuneration component **is a relevant factor** in the client's decision to hold funds. Their distribution shows **pronounced peaks** in short-term maturity buckets, reflecting clients' tendency to place these deposits mainly for **remuneration purposes**. As a result, they are **less sticky** and **more volatile** than transactional deposits.

# Analysis of the Dataset 4/8

## NMDs Categories 2/2

Breakdown of **NMDs under banks' behavioral assumptions**, categorized according to depositor and account characteristics, in line with EBA GL:




Each bar shows the average share of cash-flows reported in a specific maturity bucket for our sample of 67 banks across 2019Q2-2023Q3. *Source: ECB Supervisory Statistics.*

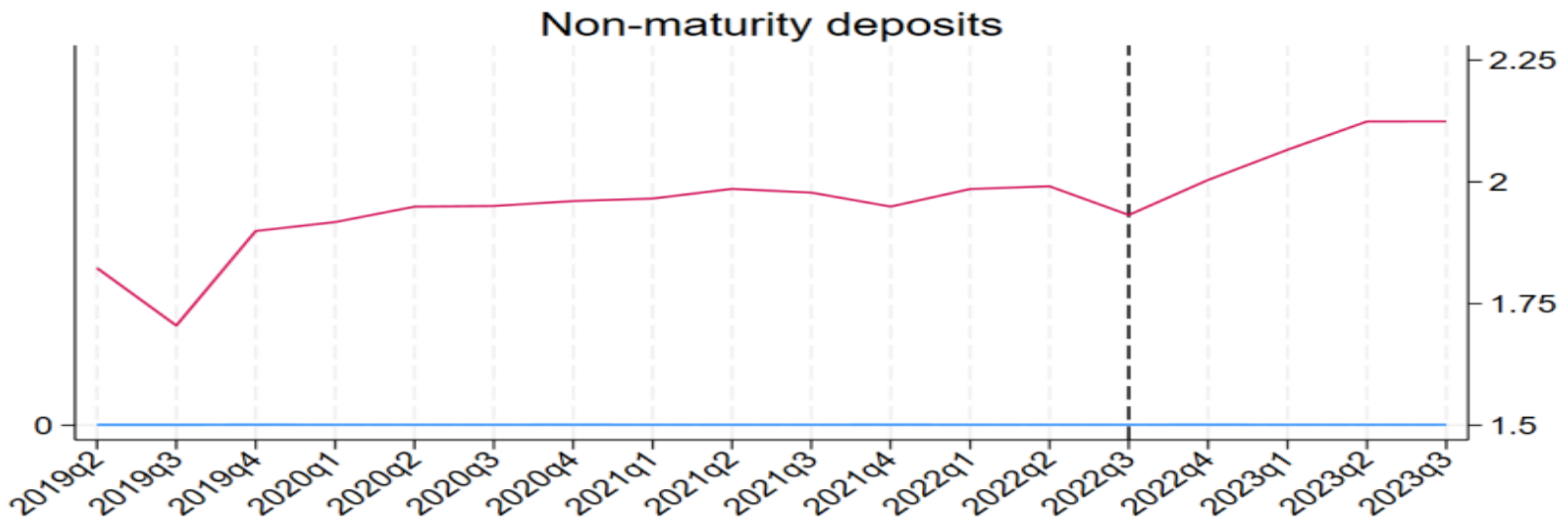
For **Wholesale financial** there is **no distinction** between contractual terms and banks modeling, as that these deposits are consistently treated as **overnight**.

**Wholesale non-financial** are deposits from corporate and other wholesale clients, excluding interbank accounts or other fully price-sensitive ones. With respect to the retail categories, banks assume these deposits to **be more volatile and less predictable** as reflected in their behavioral maturity distributions so classified as **shorter-term liabilities**. On average approximately 50% of these deposits are allocated to the first **two maturity buckets** ranging from overnight to less than one month.

# Analysis of the Dataset 5/8

## Deposit Maturity 1/2

Since this paper focuses on **maturity** (i.e., the contractual term of NMDs) the graph below reports the evolution of the **weighted average maturity of NMDs over the sample period**.




The maturity profile based on banks' behavioral assumptions (**red**) remains consistently above the contractual maturity profile (**blue**). The dashed vertical line indicates the onset of the monetary policy tightening cycle in July 2022

The dashed line marks the beginning of the monetary policy tightening. The lines represent the average values for our sample of 67 banks. *Source: ECB Supervisory Statistics*

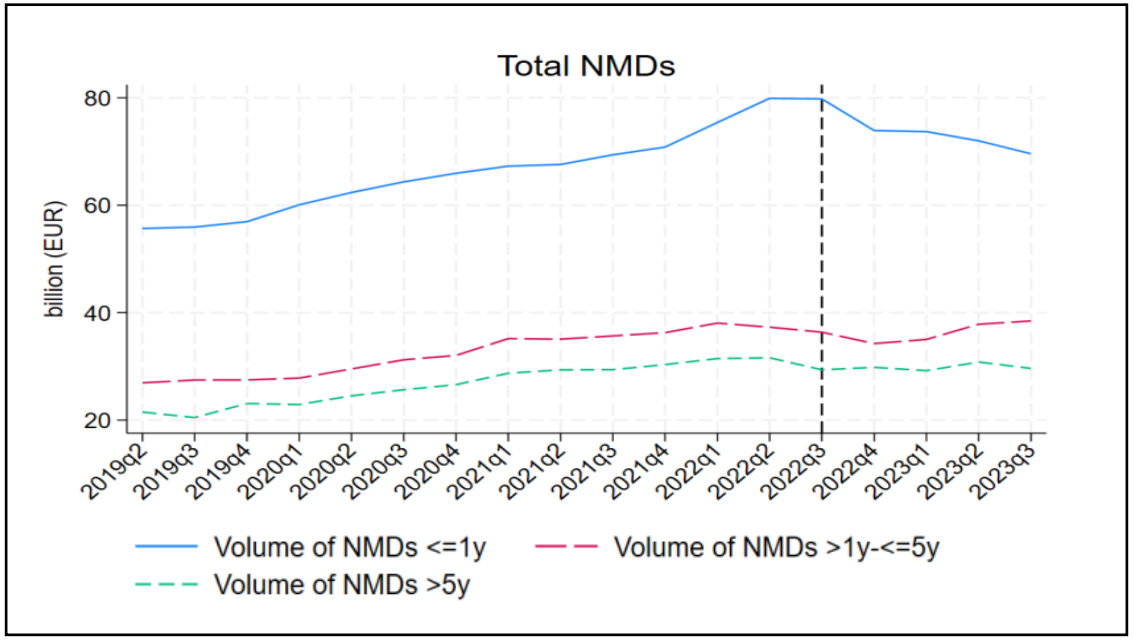
Following the monetary policy tightening, the weighted average maturity of NMDs increased from 2.00 to 2.15 years. Although the increase is limited—corresponding to approximately 55 days on average across banks—it is nonetheless **surprising** in a context of rapidly **increasing interest rates**, a phase in which deposits are generally expected to exhibit **lower stability**.

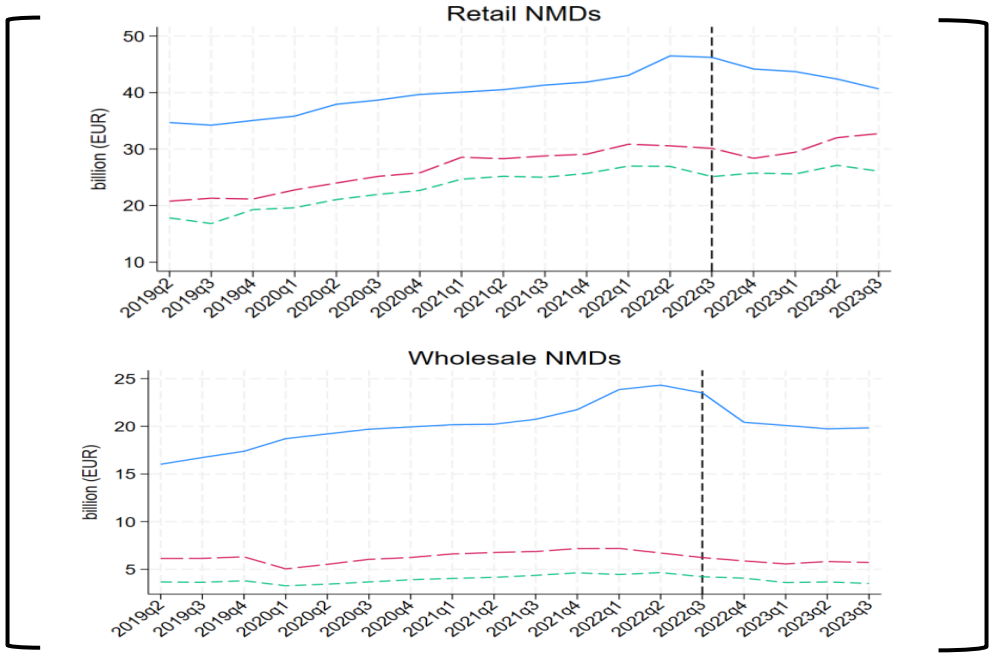
A possible explanation of this phenomenon is given in the following slide

# Analysis of the Dataset 6/8

## Deposit Maturity 2/2

Banks may have **assumed higher stability** for NMDs in order to **reduce** the apparent extent of asset–liability **mismatches** in a **high-interest rate environment**. Alternatively, the observed increase may reflect a **composition effect**, whereby more rate-sensitive, **short-term** deposits are **withdrawn**, leaving a higher share of **longer-term**, **stickier** balances.



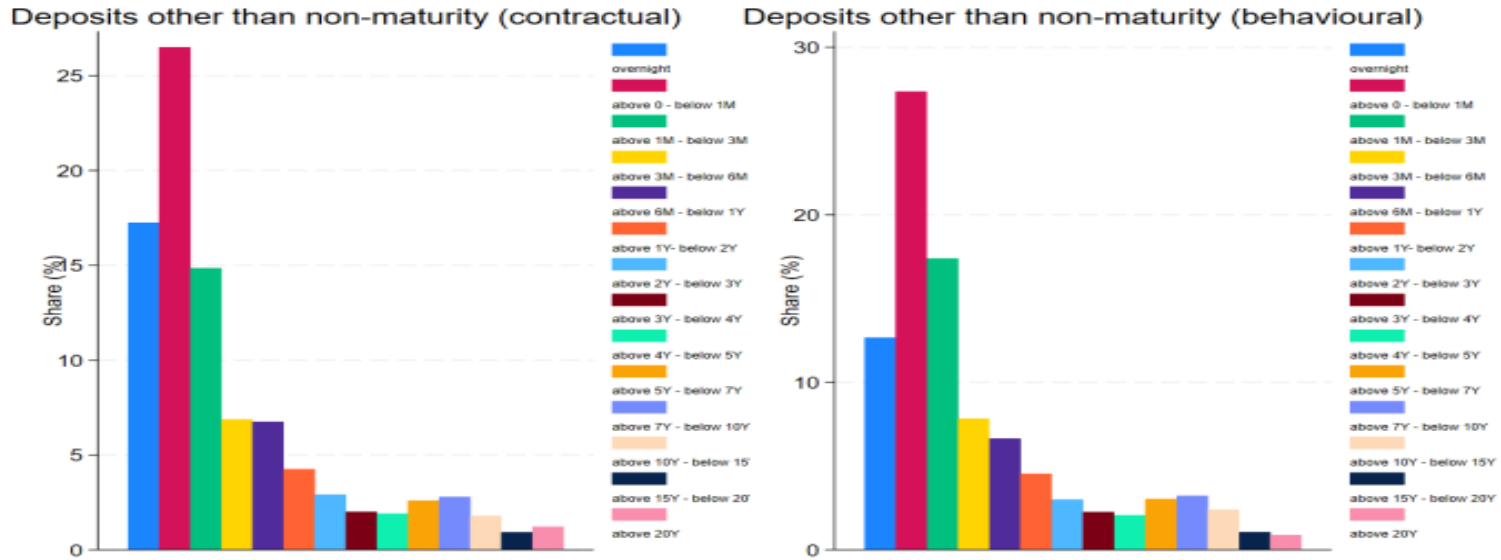




The **increase** in behavioral maturity appears to be driven by a **decline in short-term NMD volumes**. This pattern supports the interpretation that banks **lost** more **volatile deposits** while **retaining** those classified as **longer-term** and more **stable**. A further decomposition into **retail** and **wholesale** segments, confirm a **decline** in the **short-term** NMDs. The **wholesale** deposits exhibits a **sharp** contraction immediately following the onset of the monetary tightening, indicating greater sensitivity relative to **retail** deposits, which declined more **gradually**.

# Analysis of the Dataset 7/8

## Deposits Other than NMDs 1/2

Comparison of **deposits other than NMDs** under contractual terms versus bank behavioral assumptions:



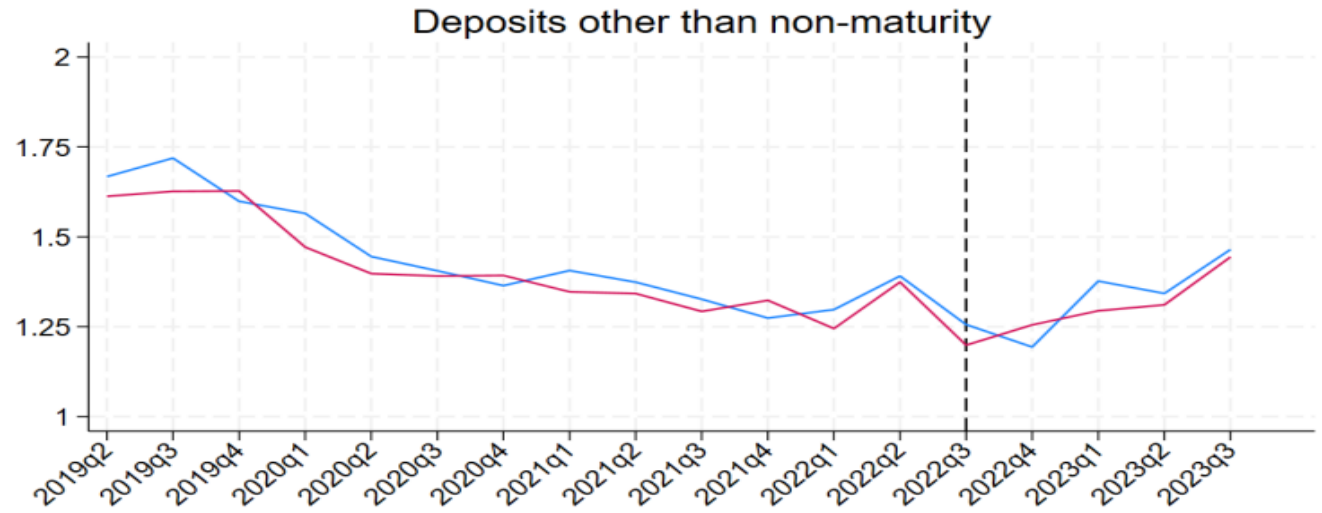

Each bar shows the average share of cash-flows reported in a specific maturity bucket for our sample of 67 banks across 2019Q2-2023Q3. *Source: ECB Supervisory Statistics.*

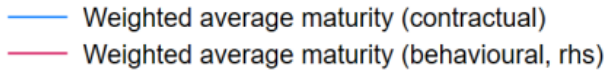
- Additional insight emerges comparing the deposits other than NMDs under **contractual terms** versus bank **behavioral assumptions**. These deposits refer to instruments with a **fixed maturity date** or those requiring advance **notice before withdrawal**, thereby reducing the need for and reliance on behavioral modelling.
- The difference between the two approaches **is less pronounced.** Indeed, even under banks' assumptions, the **allocation** remains **relatively conservative**, with a substantial share still classified as short-term.

# Analysis of the Dataset 8/8

## Deposits Other than NMDs 2/2

Evolution of the weighted average maturity for **deposits other than NMDs**:




The maturity profile based on banks' behavioral assumptions (**red**) remains closely aligned over the contractual maturity profile (**blue**).

The dashed line marks the beginning of the monetary policy tightening. The lines represent the average values for our sample of 67 banks. Source: ECB Supervisory Statistics

- The closely **aligned behavior** for the deposits other than NMDs supports the notion that banks' modelling assumption play a significant role primary in the treatment of NMDs, while having slight **minimal influence** on the modeling of other deposit categories.
- Furthermore, although a slight increase in average maturity is observed following the onset of monetary policy tightening, there is **no clear structural break** relative to the pre-tightening period. This suggests that, while the volume of deposits other than NMDs may have **increased after** the **tightening**, the rise was **relatively uniform** across maturity buckets, leaving the overall maturity profile largely unchanged.

# 03

# Results Summary

Baseline Results

Rising Interest Rates Environment

# Results Summary 1/3

## Baseline Results 1/2

Below is a summary of the **main findings** of the study, reorganized into some **key categories**:

### General Results

- Banks with a **high number of deposits** compared to their total assets do usually assign **longer behavioral maturities to NMDs**: a **+10%** increase in Deposits/Total Assets ratio is associated with a **+0.32 years** rise in estimated NMDs maturity.
- There is a **negative relationship between fixed term deposits and estimated NMDs maturity**: a **+10%** increase in the share of fixed term deposits translate into a **-0.27 years** decrease in assumed NMDs maturity.
- There is a **positive relationship between overnight deposits and estimated NMDs maturity**: a **+10%** increase in the share of O/N deposits translate into a **+0.14 years** rise in assumed NMDs maturity.
- **Larger banks** tend to assume **longer NMD maturities**: their estimation might be driven by greater reliance on their internal models, that are usually more sophisticated than the ones applied by their smaller peers, increasing the perceived stability of their deposits.

### Deposits Category

- **O/N deposits from households tend to be more stable** than those from non-financial corporations, maybe because for the last ones it is easier to switch to other banks looking for better rates and conditions. As a proof of this concept, O/N deposits from NFCs have been notably more volatile than those from HHs during the recent **monetary policy tightening cycle** (the share of O/N deposits have been reduced by **-12.33%** from NFCs compared to a decrease of **-4.78%** of the HHs during the analyzed period).
- Banks with a **higher share of HH overnight** deposits assume longer NMDs maturities.
- There is not any clear evidence that **NFC O/N deposits** affect assumed NMDs maturities.

# Results Summary 2/3

## Baseline Results 2/2

Below is a summary of the **main findings** of the study, reorganized into some **key categories**:

**Deposits Composition**

- Banks with more **uninsured (or volatile) deposits** assume shorter maturities for NMDs: a **+10%** increase in the share of uninsured deposits is associated with a reduction of approximately **-0.68 years** in estimated NMD maturity.

**Deposits Sensitivity**

- Greater **sensitivity to policy rates** corresponds to shorter assumed NMDs maturities: a **+1 standard deviation** increase in the deposit beta corresponds to a decrease in NMD maturity of approximately **-0.2 years**.
- Banks experiencing a **high number of deposit outflows events** in at least half of the sample quarters assume significantly shorter NMD maturities (**-0.67 years**) compared to the other banks in the dataset.

**Joint Effects**

- The effects of **deposit composition** remain robust when **deposit sensitivity** measures are included jointly.
- A **+10%** increase in the share of (wholesale) **uninsured deposits** reduces the estimated NMD maturity by approximately **-0.51 years**.
- a **+1 standard deviation** increase in the **deposit beta** corresponds to a decrease in NMD maturity of approximately **-0.16 years** (-15 days compared to standalone regression).

**Digital Deposits**

- Banks with more **digitally originated deposits** tend to assign shorter NMD maturities. A **+10%** increase in the share of digital deposits reduces the estimated NMD maturity by about **-0.21 years**.

# Results Summary 3/3

## Rising Interest Rates Environment

Analyzing the **baseline results**, it seems clear that **banks take care of deposits sensitivity and stability where calibrating NMDs maturities**.

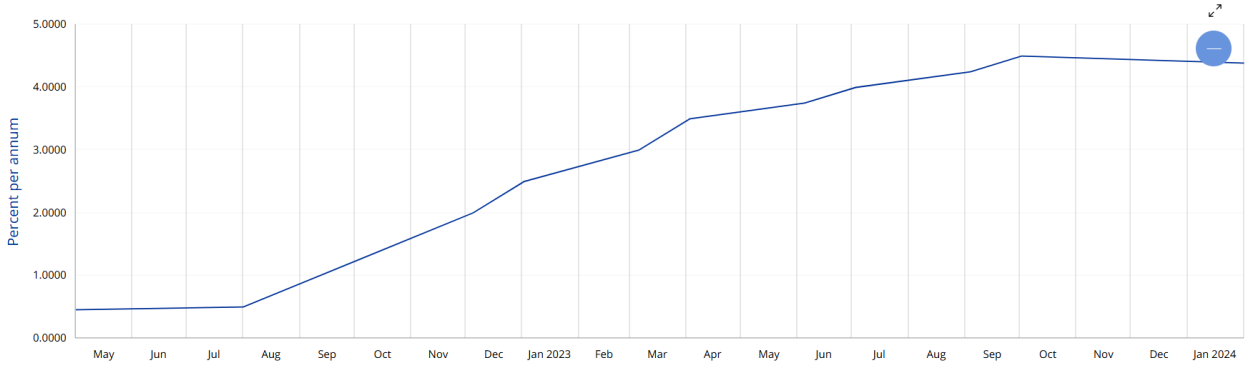
Therefore, using specific **OLS and Logit models**, the **ECB has investigated how banks react and change their NMDs behavioral maturity as well as their calibration models and assumptions in response to market changes**, by examining a **specific monetary policy tightening period**, where policy rates have been **unexpectedly increased above the levels estimated by most analysts**, limiting banks' ability to **adjust NMD assumptions** in anticipation to the event. The **period between Q1 2021 and Q3 2023** has been examined by ECB.

The following **key facts** are worth highlighting:

- **Overnight deposits from both NFCs and HHs** declined significantly during the **tightening**, indicating **increasing volatility**.
- Most models were **calibrated during low interest rates periods**.

There are **two principal results** of this analysis:

1. **The ECB did not find any evidence that more rate-sensitive banks** were more likely to **update their modelling assumptions in a rising interest rates environment**.
2. **Banks with more volatile deposits** did not **shorten assumed NMD maturities following the tightening**.




*Main refinancing operation rate, Euro Area (%), May 2022 – Jan 2024. Source: ECB Data Portal*

The **truthfulness of the ECB findings** is supported by the results of some specific **robustness checks** summarized in Annex

# 04

# Conclusions

Key Findings & Comments

# Conclusions

## Key Findings & Comments

- ✓ Banks account for **deposit stability** when calibrating NMD maturities, providing little support for **"window-dressing" behavior**.
- ✓ Banks account not only for the **composition of their deposit base,** but also for **its sensitivity** to changing market conditions when calibrating assumptions about NMD maturity.
- ✓ NMD maturity assumptions are broadly **aligned with banks' balance-sheet structures**, especially **liability-side characteristics linked to deposit stability**.
- ✓ Banks place **greater weight on deposit composition** than on deposit **sensitivity** when calibrating NMD maturity assumptions.
- ✓ It seems that **uninsured depositors react primarily to non-remunerative factors**, such as perceived bank solvency risk, rather than levels of deposits rates.
- ✓ Banks account for the **degree of deposit digitalization** when calibrating their NMD assumptions.
- ✓ Banks with **more rate-sensitive deposits did not adjust NMDs maturities estimation nor update their internal models** after periods of **monetary policy tightening**.
- ✓ Banks **should reassess more frequently deposit risk** and adjust internal models to **better capture changes in customers' behavior, driven by both rates volatility and digitalization processes** that are heavily impacting the industry. This is also a crucial point for the correct estimation of **IRRBB and liquidity risk**.
- ✓ Banks should **perform specific stress testing exercises** to be well prepared to **periods of high volatility in the deposits market**.

# A

# Annex

Methodology: Baseline Results

ECB Equation Variables

Robustness Checks

# Annex

## Methodology: Baseline Results

The **equation** below represents a **summary of the methodology** used by the ECB for assessing whether banks' assumptions on NMD maturities refelcts balance sheet fundamentals or if they are utilized for **"window-dressing"**[1] to mask asset-liability risks.

The employed standard **panel data estimation** takes the following form:

$$Y_{i,t} = \alpha_b + \alpha_t + \beta\, Deposits\_Mix_{i,t-1} + \rho X'_{i,t-1} + \sigma Z'_{i,t} + \varepsilon_{i,t}$$

$Y_{i,t}$ represents the **weighted average maturity of NMDs for bank $i$ at quarter $t$** as estimated by the bank's internal behavioral models.

$Deposits\_Mix_{i,t-1}$ is a **comprehensive vector of granular deposit metrics** for understanding the composition and management of banks' liabilities.

$X'_{i,t-1}$ is a **vector of time-varying, bank-specific control variables** to control for cross-sectional differences in banks' fundamentals, such as liquidity, size, riskiness, capitalization, profitability, and efficiency that may influence the extent to which banks rely on modelling assumptions.

$Z'_{i,t}$ includes both the **logarithmic change in NMD volumes for each maturity bucket** and a **binary indicator** equal to 1 if bank $i$ reports a **change in its internal NMD modelling assumptions** in quarter $t$, and 0 otherwise.

$\alpha_b$ are **bank business model fixed effects** influencing bank asset-liability structure.

$\alpha_t$ are **quarter fixed effects** to account for common time trends affecting the estimation of NMDs maturities.

[1]"Window-dressing behaviour can be viewed as a form of regulatory arbitrage aimed at temporarily reducing a bank's risk profile. The Basel Committee on Banking Supervision (BCBS) discusses this issue in a recent consultation document in relation to Global Systemically Important Banks (G-SIBs) and their specific regulatory framework (Basel Committee on Banking Supervision, 2024)." In practice, banks may overestimate deposit stability hence reporting longer NMDs maturities.

[2]Details regarding the major equation variables are available in Annex

# Annex

## ECB Equation Variables

| Variables underlying the "Deposit_Mix" equation's component: |
|---|
| Ratio of deposits to total assets |
| Ratio of overnight deposits to total deposits |
| Ratio of term (or time) deposits to total deposits |
| Ratio of overnight deposits from households to total overnight deposits |
| Share of uninsured deposits to total deposits |
| Share of wholesale uninsured deposits to total deposits |
| Deposit Beta (interest rates sensitivity) |
| A dummy variable equal to 1 if a bank experiences overnight deposit outflows in more than half of the quarters in the sample, and 0 otherwise |

These variables are essential to understand how bank's liabilities are composed

| Control variables composing the "$X$'" equation's term: |
|---|
| Cash and cash balances at the central bank to total assets ratio |
| Logarithm of bank total assets |
| Non-performing loans ratio |
| Common Equity Tier 1 ratio |
| Ratio of net income to total assets |
| Cost-to-income ratio |

These variables have been included with the aim to control for cross-sectional differences in banks' fundamentals, such as liquidity, size, riskiness, capitalization, profitability, and efficiency

# Annex

## Robustness Checks

The following checks aim to test the robustness of the main findings on bank assumptions about the maturity of the NMDs:

| Test | Country-specific characteristics | Fiscal and monetary policy measures | The SVB fallout |
|---|---|---|---|
| How does it work? | This control includes **country x time fixed effects** to the model. This approach captures both observable and unobservable national characteristics, such as regulatory regimes, banking market conditions, saving behaviors, and demographic factors, that may influence banks' assessments of deposit **stability**. | This control is due since the sample period includes the **pandemic years** during which bank balance sheets were significantly affected by **extraordinary policy interventions** (**government loan** guarantees and the ECB's **TLTRO** III) aimed at mitigating the economic fallout and preserving financial stability. Such programs led to large **deposit inflows** and changes in bank's liability structers which could have affected assumptions about **NMD maturity**. | The SVB failure is treated as an **unexpected external shock** that could have increased concerns about deposit **stability**. Although euro area banks did not experience large deposit outflows, financial markets reacted strongly, indicating heightened awareness of deposit risk. The analysis examines whether banks with riskier deposit structures adjusted their assumptions following the **SVB collapse**. |
| Result | The inclusion of these controls **does not materially affect the results**, indicating that the **main findings** are **not driven** by **country-specific factors.** | The results remain in line with the baseline findings, indicating that these temporary policy measures **did not significantly influence** banks' **assumptions** about NMD maturity. | The results show that banks **did not** meaningfully change their assumptions about deposit maturity after the **SVB collapse**, even those with more volatile deposit structures. |

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