# Analysis of Deposit Rate Pass Through Effects in Tightening Cycles

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# Introduction to Project: Motivation

- ▶ When central banks raise policy rates, it's expected that other rates follow suit.

- ▶ Deposit rates on savings for private consumers are of particular importance because they affect most (98.6 percent) households[1].

- ▶ How quickly and how much deposit rates "catch up" with policy rates has important implications yet remains difficult to measure due to major differences in starting points for rate hikes over time.

- ▶ Comparing relative and absolute changes in interest rates alone may result in extreme results that lack meaning, for example an increase of 50 basis points from a starting point of zero or negative rates has no economic interpretation.

# Introduction to Project: Approach

- ▶ Our project uses a novel approach to compare the response speed and extent of deposit rate sensitivity to policy rate hikes within a country.
- ▶ We utilize the concept of 'cumulative deposit beta' to measure the total change in deposit rates against policy rates, inspired by recent NY Fed research[2].
- ▶ This beta provides a comparative metric across different rate hike cycles.
- ▶ Our research contributes to the literature by analyzing deposit rate sensitivity in Switzerland and offers an open-source methodology for wider application.

# Data and Methodology: Data Requirements

- In principle, only two data sets are needed to run the analysis, policy rates and deposit rates over time.
- If one or both of these data sets is unavailable for a sufficient time period, they can be approximated from alternative data with similar economic meaning. For example:
  - In the NY Fed research that we used for inspiration, deposit rates are estimated using bank financial statements, taking total interest paid over total interest bearing deposits.
  - In our own analysis which follows in this presentation, we estimate a policy rate for Switzerland that is the midpoint of an upper and lower target range.

# Data and Methodology: Identification of Hiking Cycles

The identification of hiking periods is conducted through a systematic algorithm:

- ► Time $t$ is measured in months.
- ► A hiking period is defined as a sequence of months with an increase in the policy rate.
- ► The algorithm marks a month as 'hiking' if:
  - ► There's an increase in the policy rate from the previous month.
  - ► An increase is anticipated in the subsequent two months.
- ► Months preceding a rate hike are also included in the hiking period.
- ► Unique identifiers are assigned to each hiking period for analysis.

# Data and Methodology: Calculation of Deposit Betas

We estimate the deposit beta ($\beta_t$) to measure how deposit rates respond to policy rate changes:

$$\beta_t = \frac{\Delta D_t}{\Delta P_t} \tag{1}$$

where:

- $\Delta D_t$ is the total change in the deposit rate,
- $\Delta P_t$ is the total change in the policy rate,
- $t$ denotes time in months from the start of the hiking cycle.

A higher $\beta_t$ indicates a stronger response of deposit rates to policy changes. We track $\beta_t$ evolution from the cycle's onset to the peak of deposit rates.

# Swiss Case Study: Applying the Methodology

**Research Question:**

▶ How does the most recent hiking cycle compare to past cycles in Switzerland?

**Data:**

▶ To answer the research question, we use publicly available data from the Swiss National Bank data portal.

▶ Switzerland had a target policy range from 2000-2019, here we use the midpoint. From 2019 onwards, we use the actual target value.

▶ Deposit rates for private customers are provided in monthly format and are utilized directly.

# Swiss Case Study: Interest Rates over Time

## Historical visualization of interest rates in Switzerland
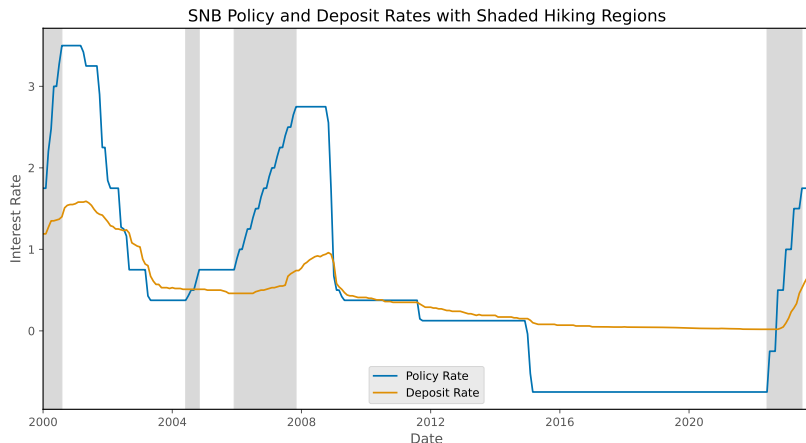


Figure: Policy and Deposit Rates for Switzerland, Source: SNB Data Portal [3]

# Swiss Case Study: Hiking Cycle Identification

## Identification of Hiking Cycles and Rising Deposit Rates

| Period | Starting policy rate | Ending policy rate | Total change | Duration |
|--------|---------------------|--------------------|--------------|----------|
| Dec 1999 - Jul 2000 | 1.75 | 3.50 | 1.75 | 8 |
| May 2004 - Oct 2004 | 0.38 | 0.75 | 0.38 | 6 |
| Nov 2005 - Oct 2007 | 0.75 | 2.75 | 2.00 | 24 |
| May 2022 - Jun 2023 | -0.75 | 1.75 | 2.50 | 14 |

Figure: Hiking Cycles Across Time, Source: SNB Data Portal [3]

| Period | Starting Deposit Rate | Ending Deposit Rate | Total Change | Duration |
|--------|----------------------|---------------------|--------------|----------|
| Dec 1999 - Apr 2001 | 1.19 | 1.59 | 0.40 | 17 |
| May 2004 - Nov 2004 | 0.51 | 0.51 | 0.00 | 7 |
| Nov 2005 - Oct 2008 | 0.46 | 0.96 | 0.50 | 36 |
| May 2022 - Sep 2023 | 0.02 | 0.69 | 0.67 | 17 |

Figure: Deposit Rates Summary across Hiking Periods, Source: SNB Data Portal [3]

# Swiss Case Study: Deposit Betas
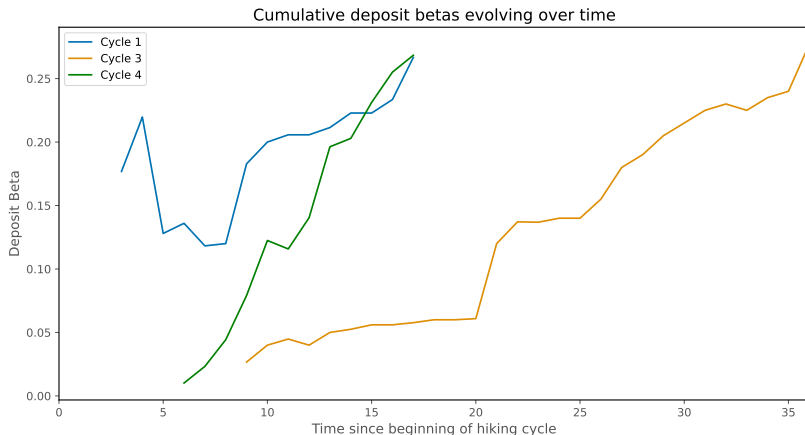
## Plotting Deposit Betas over Time



Figure: Deposit Rates Summary across Hiking Periods, Source: SNB Data Portal [3]

# Swiss Case Study: Analysis of Results

- ► **Steeper Pass-Through Effect in Recent Cycle:**
  - ► The current hiking cycle (Cycle 4) shows a steeper pass-through effect compared to the 2000 hikes (Cycle 1) and the '05-'08 hikes (Cycle 3).
- ► **Exclusion of 2004 Hike (Cycle 2):**
  - ► Although technically a rate hike, economically it wasn't significant. The conditions remained accommodative, and deposit rates did not adjust.
- ► **Conclusions:**
  - ► The current cycle has captured the same percentage of policy adjustment in a shorter time.
  - ► This is noteworthy, especially considering the lag in response is yet to be observed.
  - ► The sub-zero starting point gave policy rates a 'head-start', delaying pressure on deposit rates.

# Development Environment

- **GitHub Codespaces:** Cloud-based development environment for the project.
- **Dev Containers:** Ensures a consistent development environment across all contributors.
- **Benefits:**
  - Allows the group members to develop on low-powered devices
  - Version-controlled development environments.
- **Workflow:**
  - Developers access the project in GitHub Codespaces.
  - Dev containers automatically configure the development environment.
  - Changes are recorded with Git
- **Tools:**
  - Configuration as Code: devcontainer.json, Dockerfile, docker-compose.yml

# Project Architecture

**Data Ingestion:**

- ▶ **Source:** CSV files containing deposit rate data.
- ▶ **Ingestion Process:** ETL process.
- ▶ **Destination:** PostgreSQL Database.

**Database Design:**

- ▶ Well-structured tables for different data entities.
- ▶ Ensures data integrity and relationships.
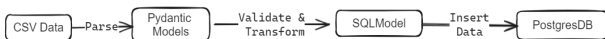- ▶ Dedicated read-only account for the Notebooks.

**ETL**



Figure: ETL Process

[1]  Board of Governors of the Federal Reserve Board. *2022 Survey of Consumer Finances*. Federal Reserve System. 2023. URL: https://www.federalreserve.gov/econres/scfindex.htm.

[2]  Alena Kang-Landsberg, Stephan Luck, and Matthew Plosser. *Deposit Betas: Up, Up, and Away?* Apr. 2023. URL: https://libertystreeteconomics.newyorkfed.org/2023/04/deposit-betas-up-up-and-away/.

[3]  Swiss National Bank. *Published interest rates for new transactions, Official Interest Rates, Target Range of the SNB (Until July 2019)*. 2023. URL: https://data.snb.ch/en/topics.