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The case of interest rate risk at domestically focused banks in Switzerland

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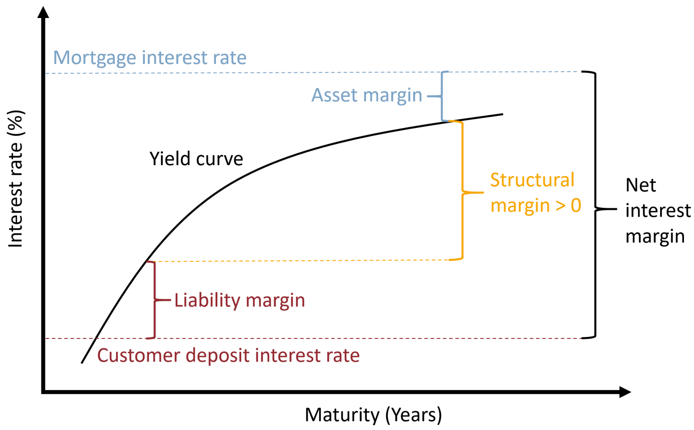
A fundamental economic function of the banking system is maturity transformation. This occurs when banks use short-term deposits (which can be withdrawn quickly by customers) to fund long-term loans (which are typically repaid much later by customers). Maturity transformation creates so-called interest rate risk for banks, as changes in market interest rates can affect their profitability—or even their financial soundness. Managing this risk is particularly important for banks whose business model relies on maturity transformation, which is the case for Swiss domestically focused banks. In this note, we explain why the interest rate increase in 2022 and 2023 was profitable for these banks, while further interest rate increases would have been detrimental due to the materialisation of interest rate risk.

A typical commercial bank acts as an intermediate between economic agents (such as households and businesses) that have different financial needs. Some agents have a surplus of cash and demand short-term deposits that can be withdrawn quickly. Others have a cash deficit and seek long-term funding that would typically be repaid much later. This process of transforming short-term deposits into long-term loans, called *maturity transformation*, is a fundamental economic function of the banking system. It enables households and businesses to access long-term loans and thus plan their activities, such as buying a house or investing in new machinery.

Maturity transformation is more or less profitable for a bank depending on economic conditions. Before going into detail, we introduce an essential concept: the *yield curve*. The yield curve gives the market interest rate of a debt instrument, e.g., a government bond, as a function of its maturity. The black line in Chart 1 illustrates an upward-sloping yield curve—that is, long-term interest rates are higher than short-term interest rates. The shape of the yield curve changes over time depending on the economic environment and can affect the profitability of maturity transformation for banks.

In general, banks lend at higher interest rates than they offer on customer deposits, which generates a profit. For example, let us assume that a bank grants 10-year mortgages at a given interest rate of 3% (fixed over the 10 years) and pays 1% interest on short-term customer deposits. The bank generates a net interest margin of 3% - 1% = 2%, which can be decomposed into three components (see Chart 1). First, the asset margin is the difference between the interest rate on the mortgage and the market interest rate with the same maturity (given by the yield curve). Second, the liability margin is the difference between the relevant market interest rate on the yield curve and the interest rate paid on the customer deposit, which generally has a short maturity. Finally, the structural margin, which results from maturity transformation, is simply the difference between the net interest margin and the sum of the asset and liability margins.

CHART 1: AN UPWARD-SLOPING YIELD CURVE AND THE BANK'S INTEREST MARGIN



As mentioned, Chart 1 depicts a positive and upward-sloping yield curve. This is a typical shape of the yield curve. It represents usual market conditions in which banks profit from asset and liability margins as well as from a positive structural margin. However, maturity transformation is not always profitable for banks and entails certain risks.

The shape of the yield curve has a strong impact on the profitability of maturity transformation

The profitability of maturity transformation depends on the shape of the yield curve, which in turn depends on factors such as long-term inflation expectations, the supply and demand of debt instruments and risk premia. A positive and upward-sloping yield curve is a standard market situation, but this is not the only possible form of a yield curve. We discuss two other relevant cases. First, an inverted curve is depicted in Chart 2. This may occur when inflation is high and investors expect it to decrease over the medium to long term. In this case, banks' net interest margins are compressed as the structural margin becomes negative. Second, a flat curve is depicted in Chart 3. This may happen when inflation is low and is expected to remain so for a long time. In this case, the structural margin is zero, and banks' net interest margins are relatively compressed. That is, maturity transformation is no longer profitable. Importantly, banks might continue to maturity transform regardless of reduced profitability as economic agents continue to demand long-term loans.

CHART 2: INVERTED YIELD CURVE

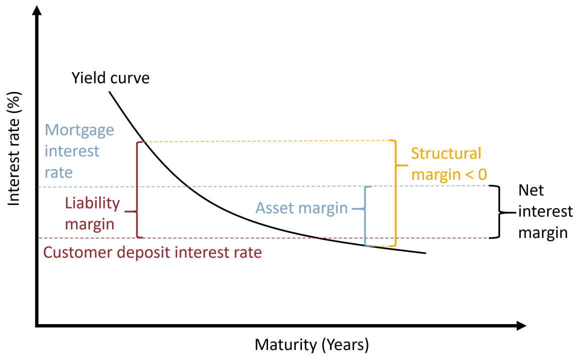
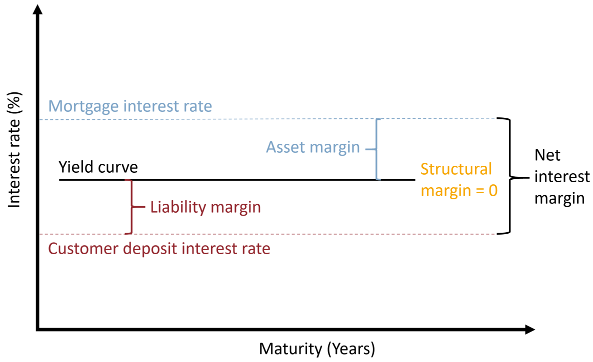


CHART 3: FLAT YIELD CURVE



Maturity transformation entails an interest rate risk for banks

The intrinsic risk of maturity transformation, also known as interest rate risk, lies in the mismatch between how often interest rates on banks' short-term funding and long-term lending reset.[1] When interest rates rise, banks face a situation where their interest expenses, such as the interest they pay on customer deposits, increase faster than the interest income they earn from long-term fixed-rate loans. In this setting, while the asset and liability margins remain positive, the structural margin becomes negative and reduces banks' net interest margins. Consequently, banks' net interest income, which is equal to interest income minus interest expenses, also decreases.[2]

The frequency at which interest rates on short-term funding or long-term lending reset depends on the types of interest-bearing products. For example, a fixed-rate mortgage has a contractually defined interest rate resetting period (e.g., 10 years). This is not the case for a customer deposit. Instead, the frequency and speed at which interest rates on customer deposits reset depend on banks' pricing power. This pricing power is typically determined by both internal (e.g., branding, reputation) and external (e.g., market competition, customer deposit behaviour, availability of liquidity) factors.

[1] See Saunders et al. (2024) for an introduction to interest rate risk and SNB (2024, sections 4.2.3 and 5.4) for an assessment of the current interest rate risk for Swiss banks.

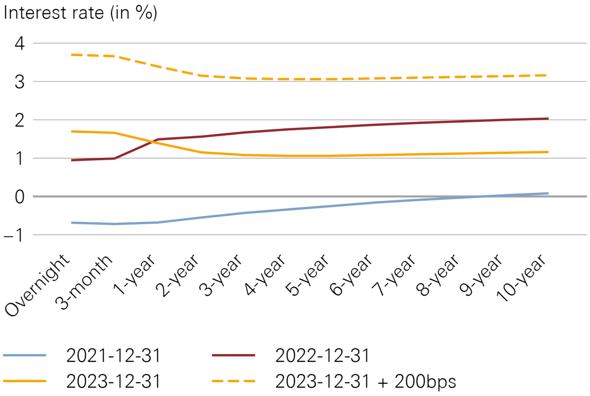
[2] In general, net interest income is equal to the net interest margin multiplied by interest-bearing assets.

How did the recent increase in interest rates affect Swiss domestically focused banks?

Interest rates increased rapidly across many economies in 2022 and 2023. This was also the case in Switzerland, with one notable difference: Switzerland had negative interest rates between 2015 and 2021. That is, the interest rate increase started from negative interest rate levels. This altered the way the interest rate increase affected banks' asset, liability and structural margins.

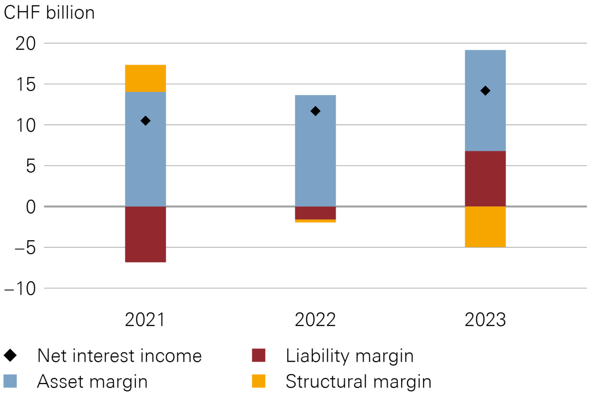
In 2021, Swiss domestically focused banks (DFBs, including cantonal and regional banks) operated in a negative interest rate environment with an upward-sloping yield curve (the blue curve in Chart 4).[3] The leftmost stacked bars in Chart 5 illustrate what this meant for the banks' interest margins. Banks' asset margins (in blue) constituted most of their net interest income. This is because banks have pricing power on their asset margins. Banks' liability margins were negative (in red) because the yield curve was negative but the interest rate applied to most customer deposits was zero (illustrative of the so-called *zero lower bound*). This meant that it was relatively expensive for banks to hold customer deposits. However, given that the yield curve was upward-sloping (in blue), banks' structural margins were positive (in orange). Together, the positive asset and structural margins were sufficiently large to compensate the negative liability margins.

CHART 4: EVOLUTION OF YIELD CURVE
Using CHF swap rates



Source(s): SNB

CHART 5: NET INTEREST INCOME BREAKDOWN
Swiss domestically focused banks



Source(s): SNB

The interest rate changes in 2022 and 2023 had an overall positive effect on DFBs' net interest income. Even though DFBs are maturity transformers and face risk when interest rates rise, their net interest income overall increased in 2022 and 2023 (see the black dots in Chart 5). There are two main explanations for the observed dynamics in 2022. First, the interest rate increase started from negative interest rate levels. Therefore, approximately one-third of the increase simply brought interest rate levels back into positive territory (as shown

[3] Domestically focused banks are Swiss banks with a share of domestic loans to total assets exceeding 50% or with a prominent role in the domestic deposit market (see SNB, 2024, section 3).

by the blue and red curves in Chart 4). Second, DFBs applied a lower bound on most of their customer deposits during the long period of negative interest rates. Since customer deposit volumes were relatively stable, this enabled banks to improve their liability margins during the phase of rising interest rates by holding customer deposit interest rates near zero for most of 2022 (see the red bars in 2022 compared with 2021 in Chart 5).

Interest rates continued to rise until approximately mid-2023, which had two effects on DFBs' margins. On the one hand, banks continued to improve their liability margins by adjusting interest rates on customer deposits relatively slower than the speed at which market interest rates were changing (see the red bar in 2023 in Chart 5). On the other hand, given that DFBs are maturity transformers, rising interest rates still had a negative effect on their structural margins (see the yellow bar in 2023 in Chart 5). As noted in the previous section, this was driven by interest expenses rising faster than interest income. Taken together, the improvement in the DFBs' liability margins was sufficiently large to compensate the expected negative impact on their structural margins, resulting in an overall positive impact on their net interest income (see the black dots in Chart 5). As discussed below, the impact would have been markedly different if the starting point had been a positive interest rate environment.

What would have happened if interest rates had continued to rise substantially?

To answer this question, we leverage a detailed simulation tool that is used in SNB financial stability reports. The simulation accounts for how quickly interest income and interest expenses are likely to evolve after a given interest rate shock, accounting for assumptions about customer deposit behaviour.[4] We consider a permanent 200-basis-point (bp) increase in interest rates from their end-2023 levels. The shift is parallel: all interest rate maturities are affected in the same way.

The effect of the shift is depicted in Chart 6. Compared with a negative interest rate environment, a positive interest rate environment does not feature an improvement in the liability margins of DFBs. This is due to the assumption that banks are not able to hold customer deposit interest rates much lower than market interest rates. As a result, the underlying negative effect of the interest rate increase on banks' structural margins is significant and leads to an overall reduction in net interest income.

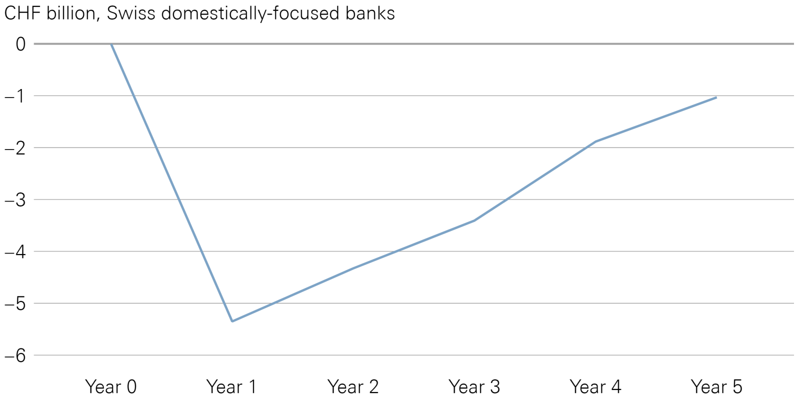
At the end of 2023, DFBs were substantially exposed to a large increase in interest rates. The 200-bp shift simulated in Chart 6 (see section 5.4 in SNB, 2024) is comparable to the observed interest rate increase between 2021 and 2023, which was approximately parallel and approximately 250 bp (see Chart 4, red vs. blue line). Given that DFBs have long-term lending and short-term funding, interest expenses increase more quickly than interest income does. The main impact on net interest income occurs in the first year of the interest rate increase. The projected decrease in total net interest income amounts to approximately CHF

[4] See SNB (2016) for more details of the approach.

5.3 billion. Compared with the total net interest income earned in 2023 (CHF 14.6 billion), this represents an approximately 36% decrease in net interest income for these banks. The negative effect subsides as the long-term assets of these banks are gradually renewed at higher interest rates from the second year onwards.

CHART 6: NET INTEREST INCOME SIMULATION

Effect of a 200 bp increase in interest rates in year 1



Source(s): SNB

How can banks mitigate interest rate risk and why is it important?

Maturity transformation makes banks' net interest income sensitive to changes in interest rates. A bank can address this interest rate risk in two main ways. First, the bank can actively manage the types of assets and liabilities it holds. For example, the bank may manage its balance sheet positions such that the average interest rate resetting periods are similar for both assets and liabilities. Second, the bank can make its net interest income less sensitive to changes in interest rates by using hedging instruments (e.g., interest rate derivatives). In Switzerland, DFBs actively manage their interest rate risk with a combination of balance sheet management and hedging instruments.

Overall, it is crucial for a bank to manage its exposure to risks related to maturity transformation. Changes in interest rates can significantly affect a bank's profitability. Depending on the extent of the impact on a bank's profitability, it may be difficult for the bank to maintain its financial soundness and meet the obligations of its daily activities. The failure of Silicon Valley Bank (SVB) in the United States is a case in point.[5] A high level of interest rate risk created a situation that put SVB under significant liquidity pressure due to large deposit outflows, which ultimately led to the bank's failure. This case provides an unfortunate reminder that managing interest rate risk prudently is important for a bank to maintain depositors' confidence in its activities even when interest rates fluctuate.

[5] See FRB (2023).

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