

The development of bank profitability in Denmark, Sweden and Switzerland during a period of ultra-low and negative interest rates

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In June 2014, the ECB decided to lower its interest rate on the deposit facility for the first time to below zero with the aim of countering deflation risks. Negative central bank interest rates have no precedent in history and thus raise questions about potential unintended side effects on the economy and the banking system. To evaluate the risks of such side effects, we investigate the development of bank profitability in three European countries that look back on more than one year of negative interest rates: Denmark, Sweden and Switzerland. Overall we conclude that in these countries, negative interest rates have so far not resulted in a significant reduction of bank profitability and particularly of net interest income. Declines in interest income have been more than compensated for by declines in interest expenses. Most fears about unintended consequences of negative interest rates, such as a rush to cash or a reduction of credit supply, have so far not materialized.

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On June 5, 2014, the Governing Council of the ECB decided to lower the ECB's interest rate on the deposit facility into negative territory for the first time, namely to -0.10% . Three interest rate cuts later the deposit facility rate had reached a level of -0.40% in March 2016. This is the interest rate at which commercial banks may deposit any excess liquidity with the Eurosystem over night. While before the crisis, commercial banks did not use the deposit facility regularly as they could make better deals in the interbank market, the general reluctance to lend to other banks and the overall excess liquidity that currently exists in the financial system have increased the use of the deposit facility substantially, so that now the deposit facility rate has direct implications for money market and customer rates.² The interest rate on the main refinancing operation, i.e. the rate at which banks can borrow one-week liquidity from the ECB, was reduced to 0.00% on March 16, 2016.

Any change in key interest rates has important consequences for many economic aggregates such as inflation, GDP growth, exchange rates or demand and supply for loans, but also for asset prices and the distribution of wealth and incomes. The monetary transmission mechanism describes how an interest rate cut ultimately affects the economy. Recent literature (e.g. Hannoun, 2015) suggests that the extreme case of negative interest rates may fundamentally change several of the transmission channels, thus opening the discussion on whether there is an absolute lower bound for interest rates – which may be at or below zero.

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² An alternative to overnight interbank market lending or the deposit facility – namely to leave any excess liquidity on the Eurosystem's current account – currently yields the same interest rate of -0.40% for all amounts that exceed the minimum reserve requirement. The interest rate for required minimum reserves was lowered to 0.00% in March 2016.

This paper focuses specifically on the effect of ultra-low interest rates on bank profitability.³ The recent policy debate argues that negative key interest rates pose a special challenge to banks because of the limits they encounter when trying to pass on further interest rate cuts to their customers. Given the importance of net interest income as a source of operating income, negative interest rates may strongly affect bank profitability.⁴ A substantial compression of bank profitability may have ambivalent consequences for bank lending or banks' risk aversion. On the one hand riskier banking operations would require closer monitoring by banking supervisors, while on the other hand a possible decline in bank lending would adversely affect the real economy, thwarting the initial purpose of the key interest rate reduction.

The low interest rates we observe today are in line with a global long-term trend that started in the 1980s. However, negative nominal key interest rates have no precedent in economic history up to 2012. Even Japan went below the zero bound only recently. With negative key interest rates, central banks have thus entered uncharted waters. The effectiveness and limits of this unprecedented monetary policy measure are highly uncertain. It is therefore important to carefully monitor available recent experiences with negative interest rates in other countries. In Europe, three countries outside the euro area have had negative central bank deposit rates for more than one year (chart 1): Denmark since July 2012, Switzerland since December 2014 and Sweden since February 2015.⁵

In this study we investigate what effects negative interest rates have so far had on bank profitability in these three countries. However, a country comparison has its limitations since negative interest rates in Denmark and Switzerland were primarily intended to counter appreciation pressures after strong capital inflows, whereas euro area and Swedish monetary policy primarily attempted to counter a subdued inflation outlook, in particular after 2013. These differences in motivation may influence how economic agents assess the future interest rate path. Capital flows toward Denmark and Switzerland are mostly related to the euro area sovereign debt crisis and thus largely exogenous. As crisis sentiment fades, appreciation trends may also swiftly subside or reverse, which would allow the Danish and Swiss central banks to quickly undo earlier interest rate cuts. Deflation risks in the euro area, however, are mainly related to a weakness in domestic demand that is unlikely to vanish in the near term. Banks' response to key interest rate cuts may thus also differ, depending on whether these cuts are perceived as permanent or temporary. Furthermore, the deflation challenge also motivated the Eurosystem and Sveriges Riksbank to pursue asset purchase programs, which may also impact bank profitability. Notwithstanding these limitations, we believe that this analysis may help evaluate the potential future effects of negative interest rates in the euro area.

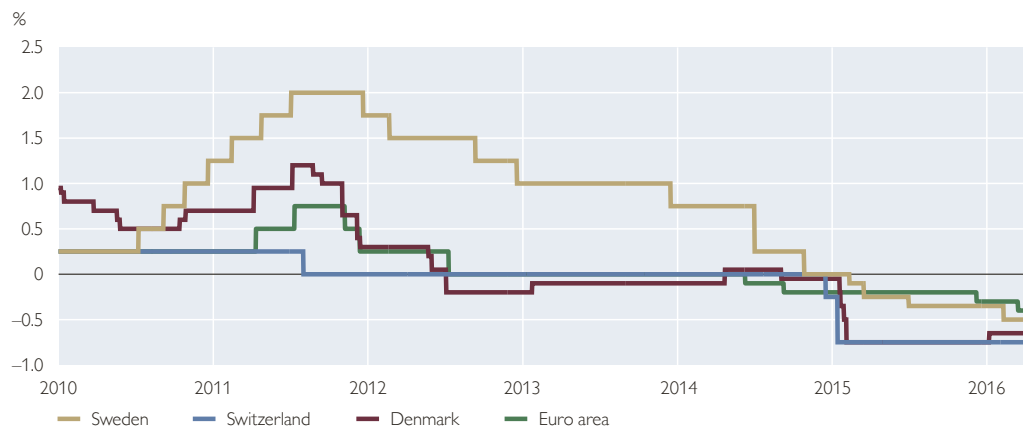
³ For an analysis of the effects of low interest rates on pension funds and insurance companies, see e.g. Antolin et al. (2011).

⁴ We will not consider potential technical and operational problems, e.g. how to ensure that IT systems can handle negative rates.

⁵ Two additional countries recently lowered their specific key deposit rates to below zero: The Bulgarian National Bank announced in November 2015 that it would apply a negative interest rate on excess reserves if the ECB's deposit facility rate was negative. In March 2016, Magyar Nemzeti Bank lowered its overnight deposit rate to -0.05% .

Chart 1

Central bank policy rates in the euro area, Denmark, Sweden and Switzerland



Source: Thomson Reuters.

Note: Denmark: interest on one-week certificates of deposit; euro area: interest on deposit facility; Sweden: repo rate; Switzerland: three-month LIBOR target.

This paper is structured as follows: Section 1 first discusses the standard transmission of monetary expansion to the real economy and to bank profitability and then focuses on the special case of negative interest rates. In this context, we discuss the various intended or unintended effects of ultra-low or negative interest rates. Section 2 briefly sketches the recent monetary policy moves and the introduction of negative interest rates on excess reserves in Denmark, Sweden and Switzerland. Using banking statistics data, section 3 investigates the effects of recent interest rate cuts on various balance sheet positions in the three countries under consideration. Section 4 concludes.

1 Transmission channels of monetary expansion: effects on inflation, growth and bank profitability

This section describes the various channels through which key interest rate cuts affect inflation, growth and bank profitability. Starting from the standard transmission mechanism, we move to the special case of an interest rate cut into negative territory.

1.1 Standard transmission mechanism: the impact of interest rate cuts

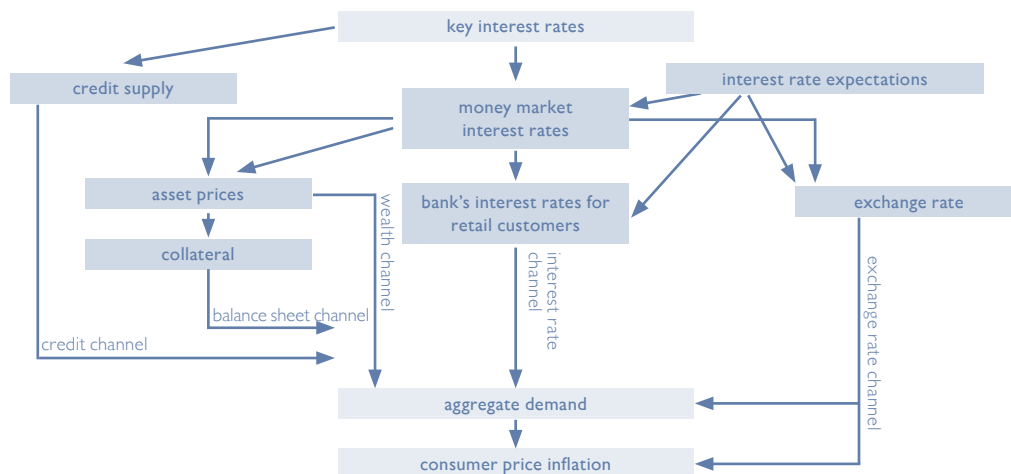
The primary mandate of the Eurosystem's monetary policy is to maintain price stability, which is defined as an inflation rate below, but close to, 2%. Without prejudice to its price stability objective, the Eurosystem may, with its monetary policy moves, also support other goals such as strong economic growth or low unemployment.

In general, with monetary expansion, i.e. interest rate cuts, the Eurosystem either aims to counter deflation risks or/and to promote GDP growth and help lift the economy back on a sustainable growth path that is consistent with its definition of price stability. There are numerous channels through which monetary policy moves affect the economy. The illustration below shows the monetary transmission mechanism for the standard case of a key interest rate cut; several of the channels

depicted here also apply to asset purchase programs, which lead to valuation gains and thus lower yields.

If banks pass on lower refinancing costs to retail customers, investment and consumption become more attractive and loan demand increases (*interest rate channel*).⁶ At the same time an interest rate cut positively affects asset prices, making people feel wealthier and ready to consume and invest (*wealth channel*). Asset purchase programs may reinforce this channel. With lower return on euro area fixed income assets, the euro's exchange rate will depreciate, thereby promoting external demand (*exchange rate channel*) and banks will be more willing to extend loans as the value of collateral rises (*balance sheet channel*) and default risk goes down (*credit channel*). All of these effects should eventually promote economic growth and – with a time lag – lift inflation.

Monetary policy transmission channels



Several of these transmission channels also have effects on bank profitability, which are easiest to illustrate along the major positions of a profit and loss statement (table 1). We focus here on the positions that are directly affected by an interest rate cut:

- Net interest income (A), i.e. the difference between interest income from lending and interest expenses (i.e. interest paid on liabilities, e.g. customer deposits, bonds), is usually a key source of income for banks. It normally increases immediately after an interest rate cut as the entire yield curve shifts downward and steepens at the same time. Returns from maturity transformation increase as the duration of assets typically exceeds the duration of deposits. This effect will increase in line with the share of fixed interest rate loans in total loans since

⁶ Illés et al. (2015) show for 11 EU Member States that banks did not substantially change their rate-setting behavior after the financial crisis and conclude that their interest rate pass-through relationships have remained stable.

Table 1

Profit and loss statement

(A)	+	Net interest income
(B)	-	Loan loss provisions
(C)	+	Net fee and commission income
(D)	+	Realized and unrealized gains/losses on securities
	=	Operating income
(E)	-	Operating expenses
(F)	+/-	Other income/expenses
	=	Net income

Source: OeNB.

interest expenditures for deposits decline almost immediately after an interest rate cut while revenue losses on loans become effective only gradually as high-interest assets mature.⁷ Interest income also benefits from higher credit demand and supply, as suggested by the monetary transmission mechanism.

- Loan loss provisions (B) account for the risks posed by nonperforming loans (NPLs).⁸ These risks, and thus loan loss provisions, usually decline after an interest rate cut because default on loans becomes less likely as lending rates go down and growth prospects brighten. This has a positive effect on bank profitability. However, if interest rates reach very low levels, banks may have incentives to reschedule or roll over debt in case customers have payment difficulties rather than declaring them NPLs and writing them down. This strategy, which is known as “forbearance” or “evergreening of loans” (Lambert, 2015), has potential negative effects on future asset quality if the expected recovery is delayed.
 - As asset prices increase after an interest rate cut, banks benefit from realized and unrealized gains/losses on securities (D), depending on their hedging strategy. Moreover, asset purchase programs pursued by central banks may as well lead to increased earnings from securities via the above mentioned wealth channel.
- Overall, banks’ operating income and profitability typically improve after an interest rate cut. The next section will investigate whether, and to what extent, these effects are different in a negative interest rate scenario.

1.2 Effects of negative interest rates on bank profitability

The recent literature has argued that this inverse relation between key interest rates and bank profitability may weaken or break down in a negative interest rate environment (Hannoun, 2015, or IMF, 2016). This may limit the effectiveness of the expansionary monetary policy move. What remains an open question is whether such non-linearities kick in at zero interest or at a lower level. Moreover, the effect may become effective only when the negative interest rate environment lasts for a while so that economic agents adjust their expectations.

We follow again the various positions in table 1 to illustrate how negative key deposit rates may weigh on bank profitability. The net effect would thus be the sum of the “standard” case described in subsection 1.1 and the special scenario described here.

- In a negative interest rate environment, **net interest income (A)** may be compressed. This results from the fact that there may be limits to lowering inter-

⁷ IMF (2016) shows for selected euro area countries that the share of variable rate loans is especially high in Spain, Italy and Portugal, while fixed rate loans are more common in Belgium, Germany, France, Luxembourg and the Netherlands.

⁸ A loan is labeled nonperforming if the creditor is several months late in servicing their debt, i.e. in paying back the principal or the interest accrued.

est rates to below zero. As short-term interest rates will reach this zero lower bound earlier than the structurally higher longer-term rates, the yield curve flattens. Since banks tend to borrow short but lend long, interest rate cuts are passed on to their full extent to lending rates, but not to deposit rates (Beer and Gnan, 2015). As a result, a rate cut lowers net interest incomes.

One reason for banks' reluctance to lower deposit rates to below zero are legal constraints.⁹ Other reasons may be to preserve the deposit base in a context of high retail funding competition or in view of the risk of substitution of saving deposits by banknotes ("rush to cash"), since holding cash becomes a viable alternative in view of a zero interest rate or negative interest rates.¹⁰ The importance of this rush-to-cash effect will depend on the share of variable rate contracts in total deposits, on the propensity of customers to switch to cash or to competitors – which in turn varies with the type of customer (business customers rely more on electronic settlements than private customers, see World Bank, 2015) and the extent to which the economy is still cash based – and on the duration of the low interest rate situation, since over time customers will adapt to the new environment.¹¹

Obviously banks will also fear rush-to-cash effects more if they depend more on deposits as a source of funding as compared to banks with a higher share of bonds or interbank market funding-based refinancing.¹² A flattening of the yield curve is, however, by no way assured. The yield curve may actually even steepen if a zero lower bound is included in loan contracts. Any incomplete pass-through of interest rate cuts to banks' retail rates would limit the effectiveness of the monetary policy move if the intention behind that move was to influence domestic financing conditions.¹³

To some extent the burden on net interest income may be lifted by the simple fact that customers move from longer-term deposits to short-term deposits in view of low opportunity costs (Beer and Gnan, 2015), thereby reducing banks' interest expenses. However, the costs for hedging against interest rate changes increase if customers opt for higher-maturity loans with fixed interest.

Banks may have different strategies to compensate for potential losses in net interest income. One response would be to expand loan growth,¹⁴ another to take on greater risks – not only in the loan book but on the whole balance sheet ("search for yield").

⁹ In some countries (e.g. Germany or Austria) legal disputes are ongoing on whether a savings book, i.e. the contract between bank and saver, excludes by definition a negative interest rate because this would imply a new contract (e.g. for the sole storage of wealth).

¹⁰ This argument is conditional on customers actually being aware of the negative level of interest rates. Based on the Austrian Household Finance and Consumption Survey (HFCS), Beer et al. (2016) show that respondents are broadly aware that monetary policy rates are currently ultra-low, but at the same time they generally overestimate the interest rates on their savings books.

¹¹ Some of the costs of switching to cash are fixed costs which will only pay off once the low interests remain in place for a protracted period of time. Also, certain services such as the provision of cash storage may only develop over time. UBS (2015) estimates the costs of keeping cash (storage rooms, security, transport, insurance, etc.) at 0.2% to 0.5% of the stored amount.

¹² The IMF (2016) shows that the share of household and corporate deposits in total liabilities is especially low in Sweden and Denmark. By contrast, banks in Germany, Italy, Portugal and Spain are comparatively strongly dependent on household and corporate deposits.

¹³ If negative rates have predominantly the goal to counter appreciation pressures, this argument is less relevant.

¹⁴ The IMF (2016) shows for selected euro area countries that banks are unlikely to be able to extend loan growth sufficiently to offset losses in net interest income with additional income from lending in view of the slow pace of new loan growth in recent years as well as regulatory pressure to improve capital ratios.

- To restore profitability, banks may start raising **fees and/or commissions (C)** to compensate for losses in net interest income (see e.g. Genay, 2014, for U.S. evidence). Fees and commissions represent more than 60% of total noninterest income, which increased to 90% during the crisis period (Borio et al., 2015). The net effect for savers may be identical to that of an interest rate cut, but such a strategy may be less visible to customers and thus a way to avoid rush-to-cash behavior. According to the IMF (2016), there is room to boost fee and commissions income as large European banks depend much less on this source of income than their American peers.
- If operating income remains compressed for longer, banks may be forced to take more fundamental consolidation measures such as reducing the number of staff or bank branches. This would be visible in a decrease in **operating expenses (E)** and a lower cost-to-income ratio.

Overall, the effect of negative interest rates on net interest income and bank profitability is thus a priori undetermined and may change over time (Cœuré, 2012). Whether, in the end, the profitability-compressing effects of negative interest rates dominate over the standard profitability-increasing effects of an interest rate cut depends mainly on the duration of the low interest rate situation and banks' creativity in and capability of compensating for interest income losses by other revenue-creating measures.

Furthermore, as pointed out by Bech and Malkhozov (2016), the modalities of the implementation of negative interest rates have important implications for the transmission of key interest rate cuts to money markets and other interest rates and therefore banks' costs in terms of profitability.

An ultra-low interest rate environment may also lead to redistribution within the banking sector as the importance of interest income for banks' profitability varies across banks and countries and the level of competition differs across market segments. Furthermore, if the zero lower bound on deposits is effective, customers may tend to switch to banks with higher ratings for more security at identical interest. Such moves would lead to higher losses in the deposit base for banks with inferior ratings.

Given the little historical evidence for ultra-low interest episodes, the question of bank profitability remains an empirical one in the end. Section 3 will thus evaluate the empirical evidence in Denmark, Sweden and Switzerland, the three European countries with at least one year of experience with negative deposit rates.

2 Denmark, Sweden and Switzerland – background and motivation for negative interest rates

The central banks of the euro area, Denmark, Sweden and Switzerland all introduced negative interest rates in the period from mid-2014 to early 2015 as a response to the challenging macroeconomic developments prevailing. While the ECB and Sveriges Riksbank declared they intended to counter a subdued inflation outlook which endangered the firm anchoring of long-term inflation expectations, Denmark's and Switzerland's recent monetary policy moves were primarily motivated by an attempt to discourage capital inflows and thus an appreciation of their currencies.

The next three subsections describe the background for these policy moves. When comparing the dimensions of negative interest rates in these three countries, we need, however, to keep in mind that marginal and average interest rates

may deviate substantially because of various forms of exemptions (e.g. tiered reserve systems in Denmark and Switzerland) (OECD, 2016). Bech and Malkhozov (2016) show that in mid-February 2016, Switzerland had the lowest policy rate (−0.75%) for deposits above the exemption threshold, whereas the weighted average rate in Switzerland was much less negative (−0.27%) than in Denmark or Sweden (−0.52%).

2.1 Denmark

The major objective of the monetary policy of Danmarks Nationalbank is to keep the exchange rate vis-à-vis the euro within a $\pm 0.5\%$ fluctuation band around the central parity.¹⁵ To this end, the Danish central bank closely follows the interest rate policy of the Eurosystem and occasionally intervenes in the foreign exchange market.

Danmarks Nationalbank had maintained negative rates on one-week certificates of deposit, a facility to collect commercial banks' excess reserves, from mid-2012 to April 2014, already prior to the ECB's first move below zero. The recourse to negative interest rates was intended to mitigate appreciation pressures originating from strong capital inflows during the euro area sovereign debt crisis. When the ECB cut its deposit rate to -0.10% on June 11, 2014, the Danish central bank followed suit on September 5, 2014, cutting its certificate-of-deposit rate to -0.05% , following a further rate cut by the ECB.

The Danish krone experienced further appreciation pressures stemming from accelerated capital inflows after the discontinuation, by the Swiss National Bank (SNB), of its minimum exchange rate against the euro on January 15, 2015, and the ECB's decision to expand its asset purchase program on January 22, 2015. Four successive rate cuts over a period of two and a half weeks took the rate on certificates of deposit to -0.75% in early February 2015, thus swiftly following the SNB key deposit rate. Heavy interventions in the foreign exchange market to fight speculative capital inflows increased the stock of foreign currency reserves to 38% of GDP by the end of March 2015. Additionally, the Danish Ministry of Finance announced that it would suspend the issuance of domestic and foreign bonds until further notice.¹⁶ As a result, Danish longer-dated sovereign bond yields turned temporarily negative. A reversal of the pressure on the Danish krone since May 2015 led to a gradual decline of foreign exchange reserves back to levels seen before the speculative attack. In early 2016, Danmarks Nationalbank raised the rate on certificates of deposit to -0.65% .¹⁷

The Danish banking system holds reserves and excess reserves at the central bank, which uses a combination of overnight and one-week liabilities to drain the liquidity surplus and offers an exemption threshold for computing the negative remuneration on reserve holdings. Overnight demand deposits in Danmarks Nationalbank's current account earn zero interest, one-week certificates of deposit

¹⁵ Denmark has pursued a nearly fixed exchange rate to the euro since 1982 and entered the Exchange Rate Mechanism (ERM) II in 1999. The ERM II arrangement sets a central rate of DKK/EUR 7.46038 and defines a mutually agreed fluctuation band of $\pm 2.25\%$. This band is narrower than the standard fluctuation band of $\pm 15\%$.

¹⁶ The issuance of government bonds was resumed in October 2015, meeting high demand.

¹⁷ For a comprehensive analysis of the impact of negative interest rates on the Danish banking sector, see Danmarks Nationalbank (2015).

currently yield –65 basis points. Both an aggregate limit and individual limits have been set on the amount of funds that can be held in the current accounts. If the aggregate limit is exceeded at the end of the day, deposits exceeding the individual limits are converted into one-week certificates of deposit.¹⁸

2.2 Sweden

Similar concerns as those the ECB encountered led Sveriges Riksbank to move its repo rate into negative territory in the first quarter of 2015. The Swedish central bank aimed at “safeguarding the role of the inflation target as a nominal anchor for price setting and wage formation” (Sveriges Riksbank, 2015a and 2016). Other nonstandard measures complement these negative interest rates. Sveriges Riksbank began to purchase government and inflation-linked bonds, which are set to cover around 37% and 9%, respectively, of current outstanding nominal stocks by end-2016. Although Sveriges Riksbank has no operational exchange rate target, it stated that it was prepared to intervene in the foreign exchange market if the Swedish krona’s appreciation threatens price stability. As a result of these measures, inflation expectations continue to edge higher, albeit slowly (Sveriges Riksbank, 2016).

The Swedish central bank cut its repo rate to –0.10% on February 18, 2015. Further cuts in March and July 2015 and finally in February 2016 lowered the repo rate to –0.50%.¹⁹

Since February 2016, one-week debt certificates issued by the Riksbank have yielded –50 basis points. These debt certificates absorb the bulk of excess liquidity. Moreover, daily fine-tuning operations, aiming to drain any remaining reserves prior to the close of business, earn –0.60%, and only any residual amounts left in the current account earn a negative remuneration of –1.25%.

2.3 Switzerland

As the global economic and financial crisis proceeded, appreciation pressures on the Swiss currency intensified (see, e.g., Yeşin, 2015). Between 2007 and 2011, the Swiss franc appreciated against the euro by almost 38%. Foreign exchange interventions from 2008 onward expanded the balance sheet of the Swiss National Bank (SNB) by more than 200% but could not stop the Swiss franc from appreciating. In September 2011 the SNB laid down a minimum exchange rate of CHF/EUR 1.20, which it maintained for more than three years, aided by substantial further interventions.

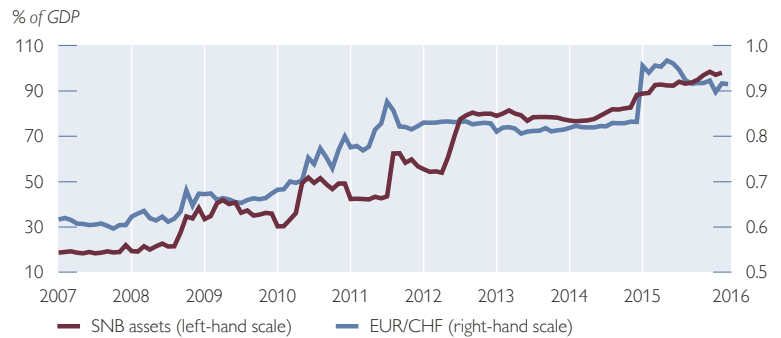
In view of the Eurosystem’s reinforced asset purchase programs, appreciation pressure intensified at end-2014. In December 2014, the SNB introduced an interest rate on sight deposit accounts of –0.25%, to take effect as of January 22, 2015. On January 15, 2015, the SNB announced that it would give up its exchange rate ceiling and lower the targeted level for the three-month LIBOR to –0.75%. Immedi-

¹⁸ In addition to interest rates, Danmarks Nationalbank has actively varied the current account limits – most recently raising them in March 2015 and then lowering them in August 2015 and January 2016.

¹⁹ Sveriges Riksbank had first introduced a negative deposit rate in 2009/10 to keep the interest rate corridor symmetrical. The amount of funds on the overnight deposit is negligible, as Sveriges Riksbank typically uses daily fine-tuning operations to drain most excess liquidity prior to the close of business. Hence, the repo rate is more important for the remuneration of excess reserves than the overnight deposit rate.

Chart 2

Switzerland: exchange rate and central bank assets



Source: ECB, SNB, AMECO.

Note: Data for 2016 based on 2015 GDP figures.

ately after this move, the Swiss franc appreciated markedly and, after a couple of weeks, it stabilized at a level that was about 10% stronger than the original exchange rate ceiling. The SNB continued to accumulate foreign exchange reserves to counter appreciation trends.

The negative interest rates in Switzerland apply only to demand deposit account balances that exceed a given exemption threshold (about 20 times the minimum reserve requirement²⁰). Nevertheless, marginal interest rates significantly have dampened overall financing costs.

3 Bank profitability in a negative interest rate environment: evidence from Denmark, Sweden and Switzerland

To analyze the impact of ultra-low and negative interest rates in Denmark, Sweden and Switzerland we use banking statistics data²¹ from each of the three national central banks. Moreover, we analyze single bank data from SNL Financial and calculate aggregated balance sheets and profit and loss statements. The observation period starts in the first quarter of 2010 and ends in the fourth quarter of 2015. For Switzerland single bank data are only available at a semiannual frequency, starting with the first half of 2010 and ending with the second half of 2015. In all the countries under observation, our banking sample covers more than 50% of total loans. Table 2 lists the individual banks that were analyzed and aggregated.

As we are restricted to using publicly available data, our banking sample concentrates on the major banks in the countries under review. Moreover, we use consolidated bank data (i.e. data including foreign subsidiaries) as this is the most comprehensive data basis. Negative interest rates may have a different impact on banks of different sizes due to e.g. the extent of banks' foreign business, refinancing possibilities or market power. Consequently, our findings are only of limited validity for smaller banks in these countries.²² Because of significant differences between banks' business models in Switzerland, throughout this

Table 2

Aggregated banks' share in total bank assets

Country	Aggregated banks	% of total bank assets in relevant country
Denmark	Danske Bank, DLR Kredit A/S, Jyske Bank, Nykredit Realkredit, Sydbank	75
Sweden	Nordea, Swedbank, SEB, Svenska Handelsbanken	85
Switzerland	Credit Suisse, UBS, Banque Cantonale Vaudoise (BCV), Raiffeisen Gruppe Schweiz, Zürcher Kantonalbank	69

Source: OeNB.

²⁰ For account holders that are not subject to minimum reserve requirements, there is a fixed threshold of CHF 10 million (Swiss National Bank, 2015b).

²¹ Switzerland: SNB Monthly Bulletin of Banking Statistics; Denmark: Danmarks Nationalbank's StatBank – Statistics on the MFI sector; Sweden: Statistiska Centralbyran – Financial market statistics.

²² The financial stability report of Danmarks Nationalbank (2015) explicitly accounts for this fact by investigating the effects for smaller and larger banks separately.

study we differentiate between the two big Swiss banks (UBS and Credit Suisse) and the smaller banks in our sample (Raiffeisen Bank Schweiz, Zürcher Kantonalbank und Banque Cantonale Vaudoise).

To connect the empirical figures with theoretical considerations from section 1, we use the profit and loss statement from table 1 as reference.

As a first step we analyze the overall profitability situation of the examined banks. In a second step we will have a closer look at the different components of their profit and loss statements. However, we have to keep in mind that we do not differentiate between whether the observed developments in banks' financial statements are caused by ultra-low and negative interest rates or by other circumstances (e.g. overall economic developments).

3.1 Overall development of profitability

Based on the theoretical considerations in section 1, we investigate whether banks' profitability has declined over recent years. We find that banks' profitability situation varies across the three countries. On an aggregated basis, the examined Swedish banks have experienced an increase in net income since 2010. This development is also reflected in their return on equity²³ (ROE, 12.7% in the fourth quarter of 2015, annualized) and return on assets²⁴ (ROA, 0.6% in 2015) figures, which are higher than those recorded in the other two countries. Banks in Sweden have managed to raise their net interest income and net fee and commission income over the last five years. These results are somewhat surprising. However, one factor that may have helped Swedish banks might be the fact that Sveriges Riksbank kept raising its main refinancing rate until end-2012 and lowered it significantly just afterward (see chart 1 above).

Net income in Denmark was quite volatile between 2010 and 2015. On an aggregated basis, banks in Denmark posted a loss two times over the observation period (in the third quarter of 2011 and in the fourth quarter of 2014). Losses resulted from unrealized and realized losses on securities. Moreover, in 2014 Danish banks suffered losses in their insurance subsidiaries (DKK -3.2 billion) and they had to step up their loan loss provisions (DKK 3.5 billion). The significant rise in loan loss provisions might be a result of the burst housing bubble in Denmark. However, over the last five years, banks in Denmark have managed to improve their ROE (7.5% in 2015) and ROA (0.4% in 2015).

In Switzerland, the two big banks (Credit Suisse and UBS) recorded rather volatile developments in net income/loss between 2010 and 2015. Their net income decreased significantly from the beginning of the observation period until the first half 2013, when UBS posted a loss of CHF 4 billion (mainly goodwill impairments). Since the first half 2013, the two banks managed to raise their net income again. Credit Suisse, however, reported a loss of CHF 5 billion in the second half of 2015 (mainly goodwill impairments as well). The situation is totally different for the smaller banks in Switzerland. These managed to keep their net income quite constant. However, profitability indicators like the ROE (7.0% in 2015) and ROA (0.5 in 2015) have been declining slightly but constantly since 2010.

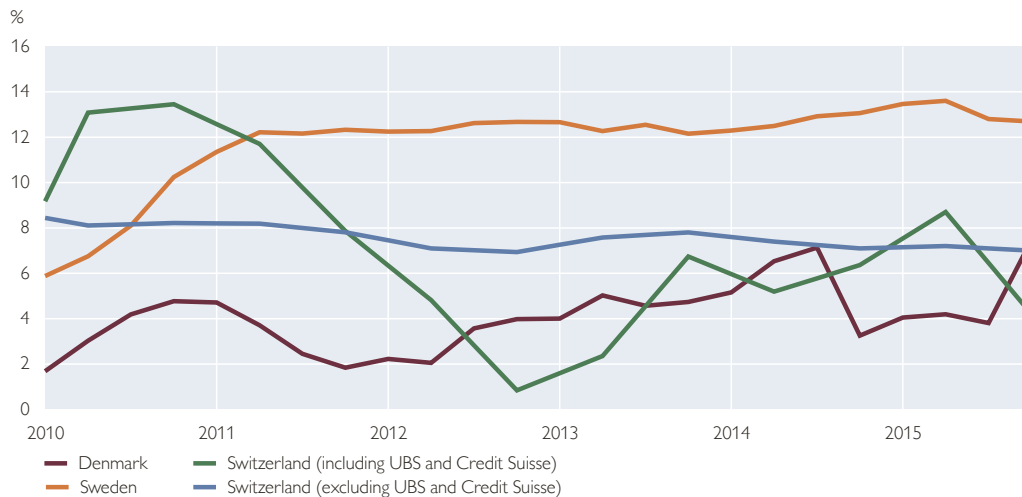
²³ Return on equity (ROE) = net income/average total equity (four-quarter moving average).

²⁴ Return on assets (ROA) = net income/average total assets (four-quarter moving average).

Chart 3

Slump in return on equity (ROE) for most banks in the sample

Year-on-year annualized quarterly data



Source: SNL Financial, OeNB.

As we can see from chart 4, the income composition of the banks in our sample did not change significantly from 2010 to 2015. We observe some decrease in net interest income for the smaller banks in Switzerland, while UBS and Credit Suisse expanded the share of net interest income as a share of operating income. Net fee and commission income also went up slightly in all three countries. In the subsequent sections we will have a closer look at each income component.

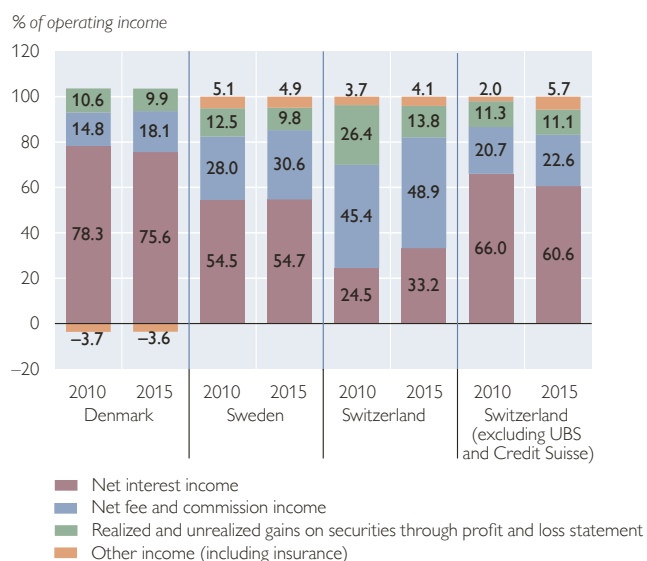
3.2 Net interest income (A)

In all countries examined and for all banks excluding UBS and Credit Suisse, net interest income is the most important source of income, amounting to more than 50% of operating income. Although interest rates are negative in all three countries, the absolute level of banks' net interest income has remained almost stable and the relative importance of net interest income for operating income, on an aggregated basis, has remained almost unchanged as well (see chart 4).

Despite the fact that the net interest margin²⁵ is at a low level and declining slightly in all countries (except for UBS and Credit Suisse), net interest income has not declined significantly since

Chart 4

No major changes in the composition of operating income

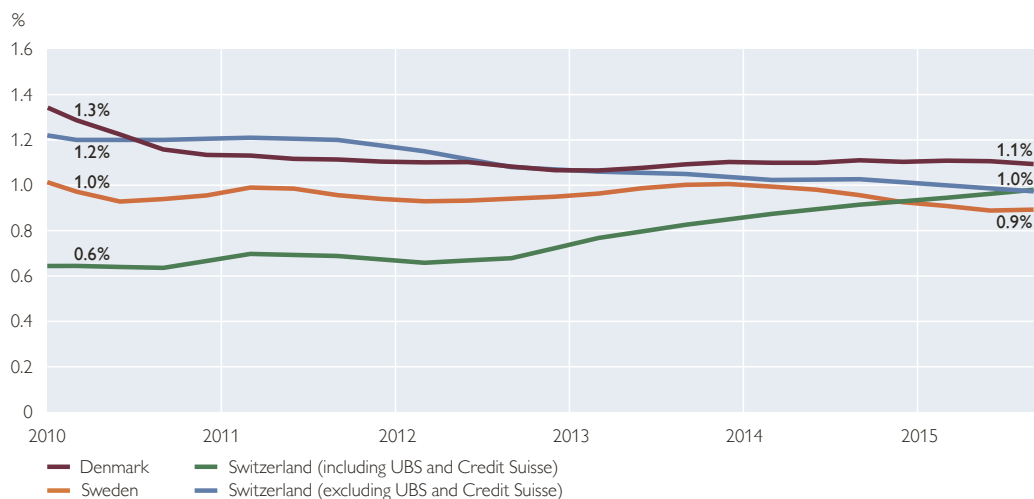


Source: SNL Financial, OeNB.

²⁵ Net interest margin = net interest income/average interest-earning assets (four-quarter moving average).

Net interest margins almost stable

Year-on-year annualized quarterly data



Source: SNL Financial, OeNB.

2010. If we look at the components of net interest income, we find that all banks in the sample managed to reduce their interest expenditure faster and by a larger extent than their interest income, which resulted in stable net interest income. By contrast, for an extended country sample, Claessens et al. (2016) empirically showed that lower interest rates are typically associated with lower net interest margins. Moreover, they find that the adverse effect on net interest margins is substantially larger when interest rates are at low levels.

One of the reasons why interest expenditure decreased more strongly than interest income might be the observable shift from fixed-term to demand deposits (short-term deposits), at least at the beginning of the observation period. Such a shift reduces interest expenditure as banks pay lower interest rates on demand deposits than on fixed-term deposits. This development is in line with the theoretical considerations given in section 1. However, deposit growth is stagnating or even declining (Denmark and Sweden), which may make this effect less relevant.

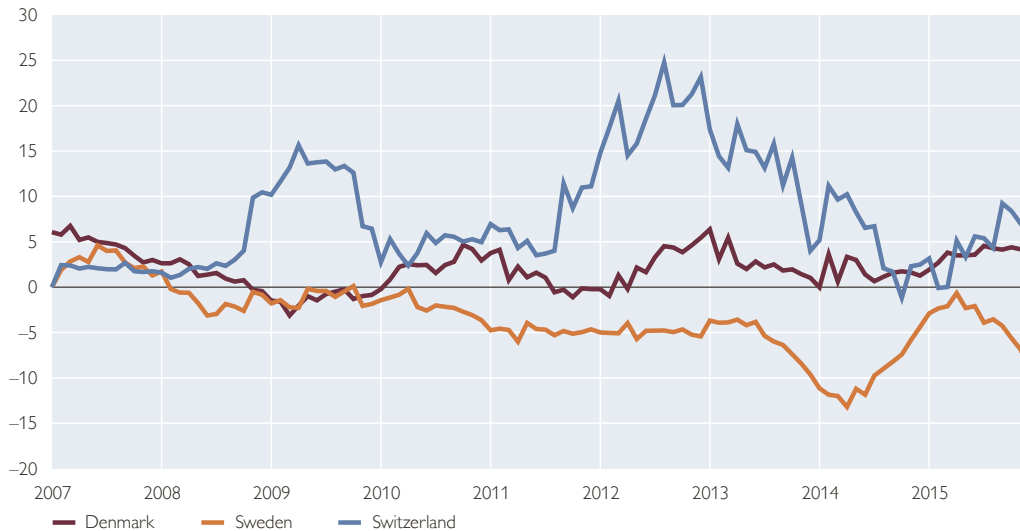
Interestingly, so far no rush-to-cash behavior motivated by negative interest rates has been observable in the three countries in question (chart 6). By contrast, cash use in Sweden went down over the last few years, mainly because the Swedish population prefers to use electronic payment methods. In Switzerland, by contrast, the volume of currency in circulation augmented significantly in recent years. Since this development started as early as in 2008, it cannot solely be related to negative interest rates. But the unusually steady increase in currency in circulation during 2015 may indicate a shift in customer preferences toward cash.

An additional factor which may have helped to lower interest expenditure quickly might be that banks in Denmark and Sweden refinance their loans heavily via the financial markets (the loan-to-deposit ratio is 189% in Sweden and 320% in Denmark for the banks in our sample). Bech and Malkhozov (2016) show that the pass-through of central bank interest rates to money market rates works efficiently in the three countries, which should ensure that a bank's interest expenses go

Chart 6

Currency in circulation in Denmark, Sweden and Switzerland

Nominal year-on-year change in period-end stock in %

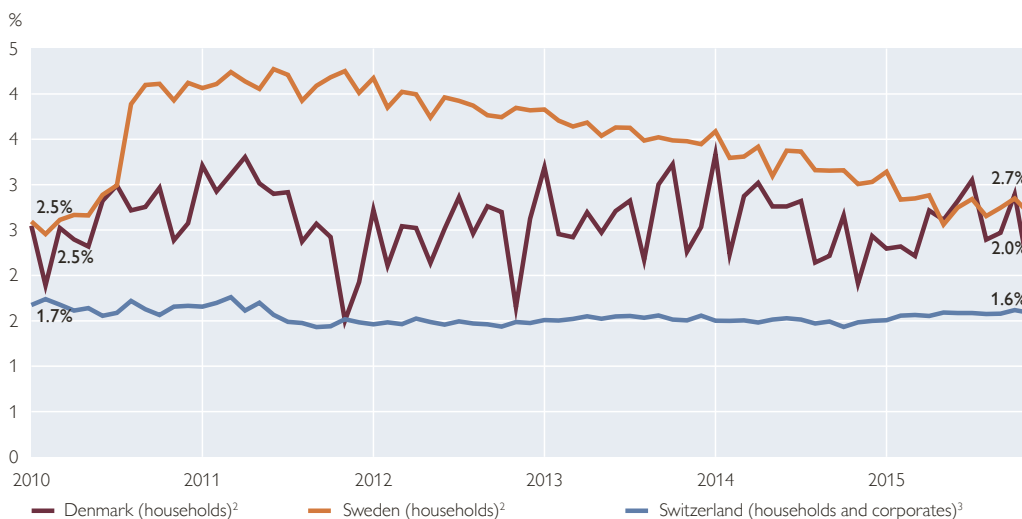


Source: ECB, SNB.

down rather quickly if the bank is heavily refinanced via the financial markets. In a similar vein, the IMF (2016) points out that strong refinancing via the financial markets could have helped banks in Denmark and Sweden to lower their interest expenses. By contrast, banks in Switzerland refinance themselves mostly via deposits (the loan-to-deposit ratio is below 100%). Moreover, asset purchases by

Chart 7

Banks still earn a margin on the difference between loan and deposit rates¹



Source: National central banks, OeNB.

¹ Difference between loan and deposit rates = loan rate – deposit rate.

² Monetary financial institutions.

³ Banks.

the central banks might also have helped as they translated into lower bond yields and thus lower refinancing costs for banks.

A further reason why interest income did not decline as fast as interest expenditure could be that interest rates on loans were reduced more slowly than interest rates on deposits. For example, a high share of fixed-rate loans in total loans could delay the effect of lower interest rates on banks' loan portfolio (see also IMF, 2016). This might be the case in Switzerland (share of fixed-rate loans in new loans: 83%), but probably not in Sweden (share of variable rate loans in new loans: 66%) and Denmark (share of variable rate loans in outstanding loans: 74%). In addition, Sweden witnessed an observable shift from fixed- to variable rate loans.

Switzerland is an interesting case. After an initial decline in lending rates following the central bank's deposit rates move into negative territory, the two major Swiss banks, UBS and Credit Suisse, switched strategy and eventually raised – rather than lowered – their mortgage interest rates for new loans as a way to restore profit margins. Generally, demand in this market segment is rather inelastic in view of the booming housing market. However, competition is rising in this sector as insurance companies and pension funds also offer more and more mortgage lending in search for yield (Swiss National Bank, 2015), so that this practice may eventually come to an end.

Another interesting point is that in all three countries under observation, banks occasionally impose negative interest rates on large business customers, but not on households' retail deposits.²⁶ As a result, deposit rates for households remained at a higher level than deposit rates for corporates for a longer period. Therefore, the difference between deposit and lending rates remained almost stable in all three countries (see chart 7), which points to the fact that banks still earn on interest rate differences even though negative interest rates are not passed on to household deposits. Bech and Malkhozov (2016) also show that banks' profitability will only be negatively affected if negative interest rates are transmitted to the lending rates for firms and households.

Moreover, when going through banks' financial statements, we can see that their net interest income was also held stable to some extent via an increase in loan volumes, which compensated for lower interest rates to some extent. However, loan growth rates in Denmark have been oscillating around zero. Positive growth rates stem mainly from the lending activities of mortgage credit institutions. The situation is different in Sweden and Switzerland, where loan growth remained positive. In Sweden, loan growth rates recovered in mid-2014 but are now slowing down again. However, the subset “loans to households (including mortgages)” still posts significant positive and increasing growth rates.

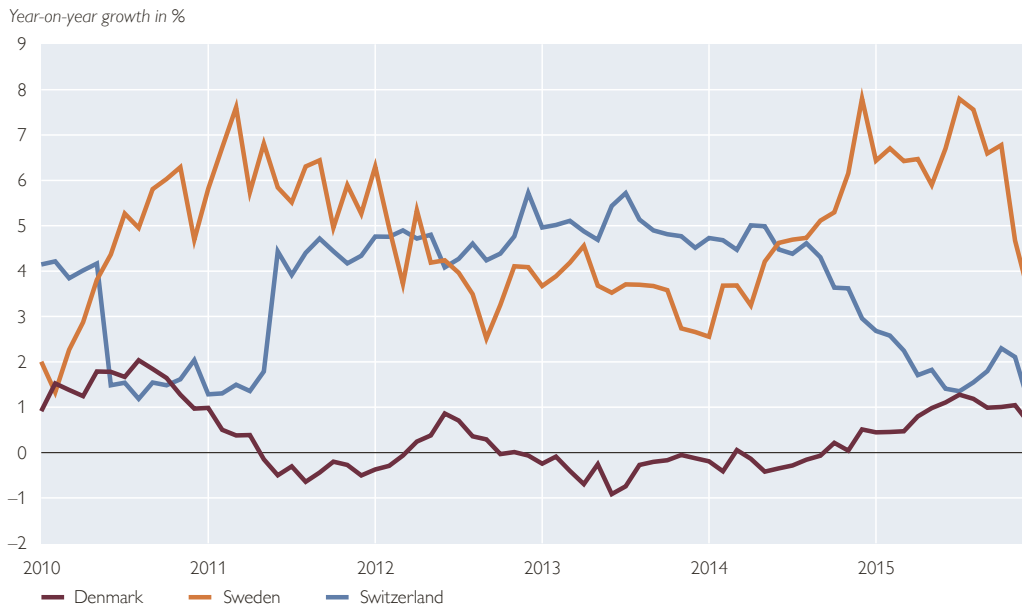
3.3 Loan loss provisions (B)

In line with the theoretical considerations in section 1, we observe a significant decline in loan loss provisions in all three countries under observation. At the same time, NPL ratios (i.e. the ratio of NPLs to gross loans) in Sweden and Switzerland are very low and declining further. Sveriges Riksbank (2015b) points out that a high share of credit losses in Sweden comes from banks' lending in other

²⁶ There is one notable exception: At the end of 2015, a small Swiss bank specialized in ethical banking services (Alternative Bank Schweiz) pioneered by announcing negative deposit rates also for private retail customers

Chart 8

Domestic loan growth declining but still positive



Nordic countries and the Baltics. Nevertheless, as interest rates have fallen also in this region, the effect of lower interest rates on credit losses is likely to be strong. Moreover, interest-only loans are common in these countries and might have also helped keep NPL ratios low. By contrast, in Denmark we observe slightly increasing NPL ratios, a phenomenon which relates to the burst housing bubble. At the same time, coverage ratios (i.e. the ratio of NPLs to loan loss reserves) in Sweden and Switzerland are declining. Some of the banks in these two countries even dissolved their loan loss reserves over the observation period.

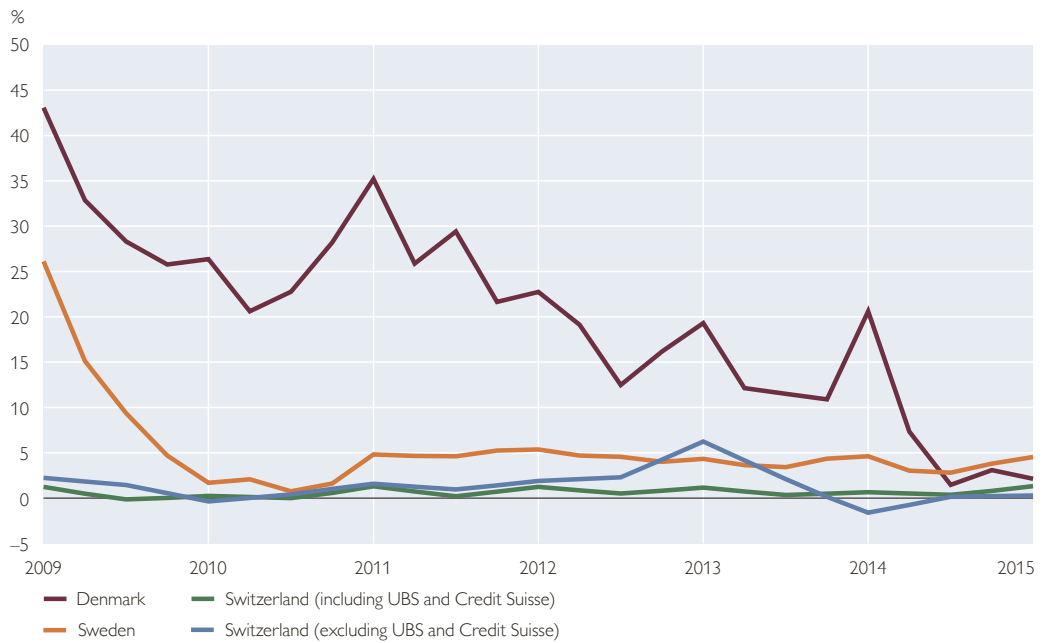
3.4 Realized and unrealized gains on securities through profit and loss statement (D)

With decreasing interest rates, we expect debt and equity securities to increase in value (see section 1 – wealth channel). However, asset purchases might have also influenced the value of debt and equity securities. This should lead to an increase in the value of debt and equity instruments held by banks. If a bank values these securities at fair value or realizes gains on securities, income from realized and unrealized gains on securities should increase. Furthermore, we would expect that the positive fair value of derivatives will decrease when interest rates decline. This holds only under the assumption that banks' main reason for entering into a derivative contract is to hedge interest rate risk so that they receive and pay variable interest rates.

However, the development of realized and unrealized gains on securities varies across countries and banks. What is more, due to data restrictions it is not possible to decompose the different effects of market value changes on banks' balance sheets and profit and loss statements. It also seems that different banks are hedged against interest rate risk to a different extent. In Denmark, for instance, banks

Chart 9

Loan loss provisions as a share of operating income very low in all three countries



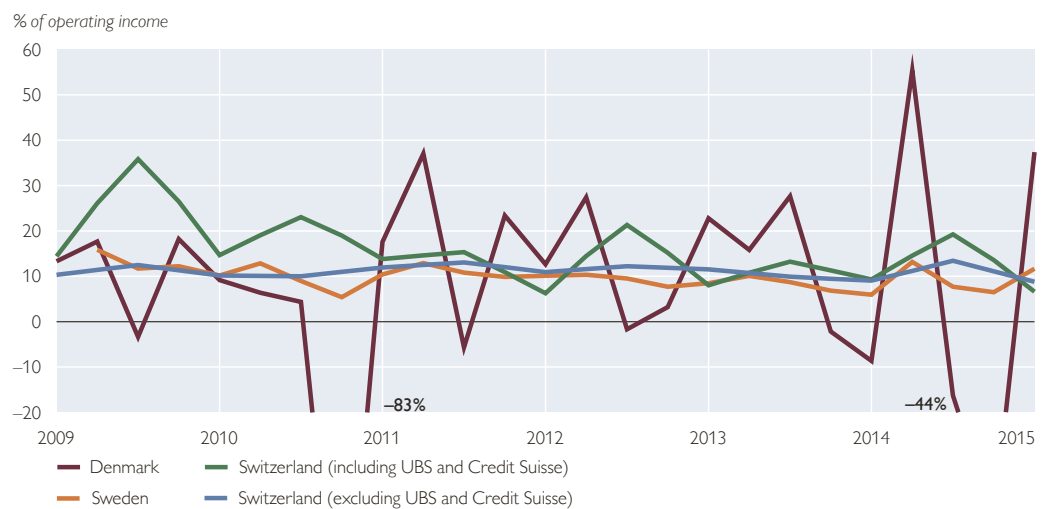
Source: SNL Financial, OeNB.

report different developments of realized and unrealized gains/losses on securities over the same time horizon.

To conclude, the effect of ultra-low and negative interest rates on bank profitability via an increase in the value of securities is not straightforward and highly dependent on banks' hedging strategies.

Chart 10

Volatile realized and unrealized gains on securities through profit and loss statement



Source: SNL Financial, OeNB.

Chart 11

3.5 Net fee and commission income (C)

For the majority of banks in our sample, net fee and commission income (NFCI; i.e. the difference between fee and commission income and fee and commission expenses) is of subordinated importance in comparison with net interest income. Some mortgage lenders in Denmark even post negative NFCI. For the other banks, the contribution of NFCI to operating income comes to between 18% and 35% (fourth quarter of 2015). In our banking sample, the relative importance of NFCI is lowest in Denmark and highest in Switzerland (in particular because of the importance of wealth management for UBS), closely followed by Sweden (for Swedish banks, NFCI makes up one-third of operating income on average). Developments in the countries examined have been heterogeneous since 2010.

All Danish banks in our sample, except those that recorded a negative NFCI, were able to raise their NFCI in absolute and relative terms (Danske Bank: 16%–23%; Sydbank: 22%–35%; Jyske Bank: 17%–18% from 2010 to 2015). The three banks managed to step up their NFCI by increasing their fee and commission income while at the same time keeping their fee and commission expenses stable.

The situation is different in Sweden. NFCI already made up 21% to 37% of banks' operating income in 2010. The absolute and relative development of NFCI was stable for most of the banks except for Nordea and Svenska Handelsbanken. Nordea managed to raise its fee and commission income while keeping fee and commission expenses stable. Svenska Handelsbanken increased their NFCI in absolute terms by the same procedure. However, as net interest income went up at the same time and makes up a larger part of operating income, the relative importance of NFCI as a share of operating income did not change. Sveriges Riksbank (2015b) found that increases in NFCI were partly driven by stronger asset management activities as well as by investment banking services.

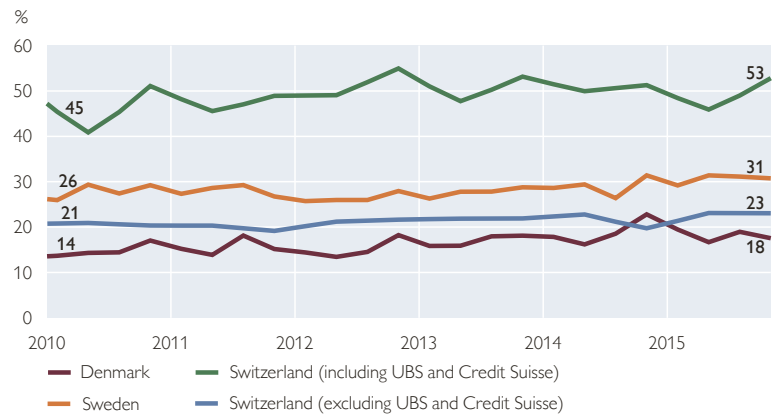
The picture in Switzerland is mixed. Larger banks managed to increase the relative importance of NFCI. However, for smaller banks the relative importance of NFCI did not change. In Switzerland, fee and commission income remained mostly stable while fee and commission expenses went down.

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3.6 Operating expenses (E)

Cost-to-income (i.e. operating income-to-operating expenses) ratios vary across the three countries. Swedish banks recorded the lowest cost-to-income ratio (49% in 2015), followed by Denmark (53% in 2015). For our banking sample, in Switzerland the ratio amounted to 95% (in 2015, resulting mainly from a loss of Credit Suisse at end-2015); except for Credit Suisse and UBS, the ratio improved to 58% (2015) but remained significantly higher than in the other two countries. Banks in Sweden and Denmark reduced their cost-to-income ratio

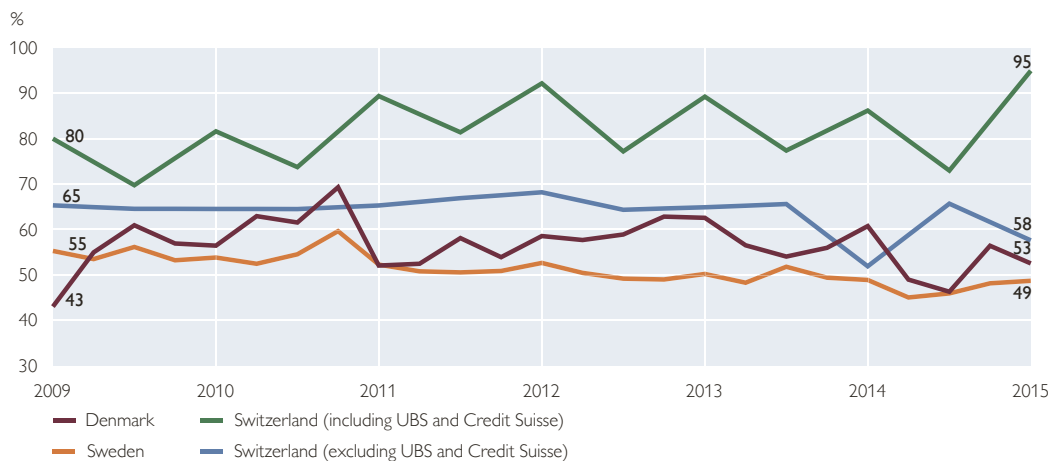
Net fee and commission income as a share of operating income increased slightly



Source: SNL Financial, OeNB.

Chart 12

Cost-to-income ratio



Source: SNL Financial, OeNB.

since 2012 by managing to keep their costs constant while increasing operating income. In Switzerland, Credit Suisse plans to cut costs by reducing their staff by 4,000 persons and UBS will reduce their staff by between 500 and 3,000 persons and shift part of the jobs to lower-income countries like Poland.

4 Conclusions

This article investigates the effects of ultra-low or negative central bank interest rates in three European countries that have had negative rates in place for more than one year: Denmark, Sweden and Switzerland. We focus specifically on the effects of negative interest rates on bank profitability and the main income components, given that banks' soundness and the strategies they follow in dealing with revenue shortfalls may be key for both the smooth pass-through of monetary policy measures to the real economy and financial stability (Shin, 2016). Such an analysis may help policymakers to prepare early for dealing with the potential future effects of negative interest rates on the profitability of euro area banks.

We find that in the countries under observation, ultra-low and negative interest rates have so far not resulted in a significant slump of bank profitability and especially of net interest income. Moreover, there has been no observable significant shift in the composition of banks' operating income from net interest income to other income components. The stable development of the net interest income of the examined banks resulted from a stronger decrease in interest expenses in comparison with interest income. We observe that some of the banks increased their net fee and commission income. However, a significant rise in NFCI was only visible for banks that do not yet earn a substantial part of their income from net fee and commission income.

The pass-through of central bank interest rates to money market rates works quite efficiently, as shown by Bech and Malkhozov (2016). Nonetheless, we observe that lending rates did not decrease as fast and to the same extent as central bank interest rates. As a result, loan-deposit rate spreads remained broadly stable so that banks can still earn interest income on this difference. Illes et al. (2015) suggest

comparing lending rates with a weighted average cost of funds to show that banks did not substantially change their rate-setting behavior after the financial crisis and that therefore the interest rate pass-through relationships across eleven European countries appear to have remained stable.

If negative interest rates are in place for a longer period of time, banks' room for maneuver may be constrained and this, in turn, may eventually curtail banks' profitability. One instrument to compensate for lower interest income could be to raise lending volumes. However, banks' lending capacity might be limited by stricter regulatory requirements.

Overall, we conclude that in Denmark, Sweden and Switzerland, most of the fears about the adverse side effects of negative interest rates for banks have so far not materialized. Banks' profitability has remained sound, and we do not observe significant rush-to-cash effects on banks' customers.

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