SPEECH

# BY GOVERNOR LARS ROHDE AT EUROPEAN ECONOMICS AND FINANCIAL CENTRE SEMINAR

DANMARKS NATIONALBANK

## CHECK AGAINST DELIVERY

31 October 2017

**A LIFE CLOSE TO THE CENTRE**

Ladies and gentlemen,

I am grateful for the opportunity to address you here in the historical Houses of Parliament.

Since the financial crisis and the subsequent economic downturn low interest rates have become a global phenomenon. Today policy rates are negative in a number of economies including the euro area. Denmark is no exception – in fact we can be considered a leader in the field. In the beginning of 2015, we reduced our key monetary policy rate to -0.75 per cent.

Having operated with substantially negative policy rates for almost three years this is a good time to reflect on what lessons we can draw. But I will also take a look ahead. There are indications from several countries that the rate cycle is starting to turn. In this context it is becoming increasingly important to assess how our economies are positioned to cope with rising rates.

My remarks will take a Danish perspective and they fall in four parts. First, I will briefly outline key features of the Danish monetary policy regime. Based on that, I will explain how Denmark came to be a global leader in the field of negative policy rates. Subsequently, I will discuss how banks have coped with negative policy rates. And finally, I will turn to the impact on households.

I will argue that – from a financial stability perspective – negative interest rates have not posed significant challenges. And low interest rates have helped supporting private sector demand in the aftermath of the financial crisis. Going forward, higher rates will be welcome as the economic recovery gains momentum. But needless to say, Danish monetary policy interest rates continue to be set with the sole objective of keeping a fixed exchange rate between kroner and euros. We only increase rates if it is consistent with supporting the peg.

**Slide 3: Separator – Background on monetary policy regime**

**Slide 4: Unchanged central parity for three decades**
Since 1982, Danish monetary policy has been centred on keeping the exchange rate fixed – initially against the D-mark and since 1999 against the euro. The central parity has been unchanged since 1987 – that is, for more than three decades. If the exchange rate tends to deviate from the central parity we take consistent action. This implies that we keep the krone within a narrow band – in practice within half a per cent from the central parity. One immediate implication of the policy is that Danish firms see billing in euros and kroner as substitutes.

The peg is a political decision with a clear mandate. It enjoys support from across the political spectrum and it is well understood by market participants.

The framework implies a clear division of responsibilities in economic policy-making. Monetary-policy interest rates are reserved for keeping the krone stable. When setting rates we do not take into account factors such as inflation, growth, employment and house prices. These considerations are addressed by other economic policies. In particular, fiscal policy plays an important role in ironing out economic fluctuations. The policy framework has been the foundation for a stable macroeconomic environment with low inflation and relatively modest business-cycle fluctuations.

**Slide 5: Fixed exchange rate introduced after a period of high and volatile inflation**
The fixed exchange-rate regime was introduced on the basis of an unsustainable macroeconomic situation in the 1970s and early 1980s. Unemployment was high and there were recurrent deficits on the government budget balance as well as on the balance of payments. Furthermore, repeated devaluations targeted at restoring competitiveness only resulted in high and volatile inflation and high interest rates.

In contrast, the German Bundesbank managed to maintain low and stable inflation by the standards of that time. Since Germany was Denmark's largest export market, it was decided to link the krone to the D-mark. As a result, Danish inflation approached that of Germany. The same holds for short-term as well as long-term interest rates.

**Slide 6: Danish monetary-policy rates tightly linked to ECB rates**
An exchange-rate peg can only be maintained if one is willing to implement the same monetary-policy stance as the anchor country. This is a precondition in a world with international capital mobility. It implies that most of the time, Danish monetary policy rates follow those of the ECB.

If the exchange rate tends to deviate from the central rate, we first intervene in the FX market by either buying or selling kroner against foreign currency. If this does not have the desired effect on the exchange rate the next step is to change policy rates.

As we keep the exchange rate very stable, volatility in the FX market cannot be detected by looking at a chart of the exchange rate. Instead it is reflected in the response of monetary policy. For example, if there is pressure on the krone to depreciate against the euro this will lead to a reduction in our foreign-exchange reserves and an increase in the spread between Danish and ECB monetary-policy rates. This was the case in the autumn of 2008 as indicated by the chart.

**Slide 7: Rising net foreign assets have reduced money-market spread**
When the fixed exchange rate was introduced, Denmark was a net debtor. But after several years with significant surpluses on the balance of payments we are now a creditor nation. Our net foreign assets constitute more than 50 per cent of annual GDP. The improved net foreign-asset position is likely to have contributed to reducing monetary-policy interest rates in Denmark.

Until the mid-1990s, the spread between Denmark and Germany, expressed by short-term money-market rates, fluctuated strongly and it was often several percentage points. In the subsequent period, until the outbreak of the financial crisis in 2008, the spread was very stable at a moderate positive level. After a temporary widening in connection with the financial crisis, the spread has been in negative territory for most of the time since 2012. The reduction in the spread is likely to be associated with the improved net foreign-asset position.

Also, whereas episodes with uncertainty in FX markets used to be reflected in downward pressure on the krone, the opposite has been the case

in recent years. This was first seen in 2011 when a number of euro-area countries experienced a sovereign-debt crisis that led some investors to regard the krone as a safe haven. And more recently, we experienced strong capital inflows in early 2015 when the Swiss National Bank, SNB, decided to discontinue the floor under the franc and the ECB subsequently announced its public-sector purchase programme.

**Slide 8: Separator – Strong capital inflows led to a forceful policy response**

**Slide 9: Swiss contagion to Danish FX market**
The key Danish monetary-policy rate first became slightly negative in 2012. This reflected capital inflows associated with the sovereign-debt crisis in a number of euro-area countries. But it was not until early 2015 that policy rates became substantially negative.

On 15 January 2015 the SNB announced that the floor under the franc/euro exchange rate would be discontinued. The Swiss announcement surprised financial markets resulting in increased volatility in a wide range of financial asset markets. The Danish FX market was one of them. In the first few hours after the Swiss announcement, the Danish exchange rate fluctuated more than usual.

Over the following days and weeks, we experienced massive inflows of currency. As a consequence, there was strong pressure on the exchange rate to appreciate. The Swiss decision seems to have led some foreign investors to look for comparable candidates to abandoning a peg. These investors could make a substantial profit if the fixed exchange-rate policy were to be abandoned and the krone appreciated.

So the initial push came from foreign investors. But nearly two thirds of the increased demand for kroner in those few weeks in January and February 2015 came from domestic investors, including insurance companies and pension funds. Some of these companies wished to at least partly insure themselves against losses in the unlikely event that the krone appreciated like the Swiss franc.

**Slide 10: Sharp increase in foreign-exchange reserve in 2015**
In response to the inflows of capital we applied our usual measures to defend the peg. We intervened heavily in the FX market by buying euros and selling Danish kroner to meet the elevated demand. The sizeable FX interventions caused a sharp increase in FX reserves by almost 15 per cent of GDP in less than two months. As the pressure abated, the level of

FX reserves was gradually reversed over the course of 2015 to reach a level of around 20 per cent of GDP – close to the current level.

**Slide 11: Interest-rate spread to the ECB became negative**
In addition, we sharply reduced monetary-policy rates. With effect from 6 February 2015 our key monetary-policy rate was reduced to a historic low of -0.75 per cent. This put it 55 basis points below the ECB's deposit rate.

The sequence – interventions in the FX market followed by changes in monetary-policy rates – is independent of whether the pressure on the krone is to appreciate or depreciate. But there is an asymmetry in the relative importance of FX interventions versus interest-rate changes depending on the direction of the pressure. In case of downward pressure on the krone there is no limit to how much we can increase interest rates. But interventions in the FX market are limited by the initial size of our FX reserves.

When the pressure is towards an appreciation, things are the other way around. In this situation there is no limit on FX interventions – we can issue all the kroner that market participants are willing to absorb in order to prevent the exchange rate from appreciating. In this situation the restriction is on interest rates where there is an effective lower bound. So when the pressure is on the krone to appreciate, as was the case in early 2015, the weight on FX interventions is likely to be larger compared to the situation where the tendency is towards depreciation.

As an additional measure to further curb capital inflows, we announced on 30 January 2015 that the issuance of government bonds would temporarily be suspended. The suspension reduced the availability of government bonds to investors, thereby driving down yields – similar to a QE programme.

As expected, the announcement put immediate downward pressure on the entire Danish yield curve relative to German yields. The re-entry of government-bond issuance was announced in late August with effect from 1 October. The return to the market ran smoothly. The negative monetary-policy spread has been reduced somewhat as the ECB has lowered its deposits rate (December 2015 and March 2016) and we increased rates (January 2016).

**Slide 12: Danish government-bond yields co-move strongly with German yields**

The speculative pressure on the krone was relatively short-lived. This reflects our decisive action as well as the high credibility of Danish monetary policy. Nevertheless, Danish monetary-policy rates continue to be very low – currently our key policy rate is at -0.65 per cent. This partly reflects low ECB rates with the ECB's deposit rate having been at -0.4 since March 2016.

But in addition to this, the ECB is undertaking large-scale asset purchases. This reduces the supply of bonds issued by euro-area sovereigns available to private investors. Danish sovereign bonds stand out as an obvious alternative to for example German bonds. This reflects that – as a consequence of the peg – there is no exchange-rate risk for euro-area investors. Moreover, the credit risk is low and Danish sovereign bonds are highly liquid.

So changes in Danish sovereign-bond yields tend to track changes in German yields. This was also the case in late 2014 when mounting expectations of an ECB QE programme led to substantial declines in sovereign-bond yields across euro-area countries. And it continued to be the case after the launch of the ECB's Public Sector Purchase Programme in early 2015.[1]

**Slide 13: Decline in long-term Danish yields in line with core euro-area countries**

In a recent working paper we provide more details on the way market participants' expectations of the ECB's asset purchases have affected Danish financial markets.[2] We find that Danish sovereign-bond yields have moved very much in line with German yields. And clearly more so than the bonds issued by a number of countries which are members of the euro area.

This chart shows how long-term sovereign yields in a number of countries have reacted to selected pieces of ECB communication in the six months leading up to the start of QE. We look at the reaction of sovereign-bond yields in the two days following each piece of communication. Summing over the 17 pieces of communication included in the study, we arrive at the effects that you can see here.

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1 It could be pointed out that the suspension of government-bond issuances by the Danish government to stem capital inflows caused some fluctuations in Danish yields.

2 See Jakob Roager Jensen, Jakob Guldbæk Mikkelsen and Morten Spange, The ECB's unconventional monetary policy and the role of exchange rate regimes in cross-country spillovers, *Danmarks Nationalbank Working Paper*, no. 119, 2017.

In all of the 2-day windows combined, Danish 10-year sovereign-bond yields declined by a total of 30 basis points. This is very close to the corresponding decline in German yields of 28 basis points. Yields in other northern European countries declined slightly more. However, countries in the south of Europe experienced substantially larger declines in yields.

To sum up, Danish and German bond yields are close substitutes. The impact of QE on bond yields in the euro area also has a spillover effect on Danish bond yields.

**Slide 14: Separator – Implications for banks**

**Slide 15: Interest-rate margins are being squeezed**
It should now be clear that our reason for having negative interest rates is to maintain a stable exchange rate against the euro. I am happy to say that judged by this criterion, negative rates have been highly successful.

Let me turn to the wider implications of negative policy rates. Negative rates have affected the financial sector as well as the broader economy. First consider the banking sector. The introduction of negative policy rates implies that a share of banks' deposits with Danmarks Nationalbank is currently being remunerated at a rate of -0.65 per cent. The negative policy rate has been transmitted to money-market rates which are also negative.

Deposits from households and firms are an important source of funding for many banks. As banks' deposit rates have settled at 0, they have not declined as much as short-term money-market rates. This means that banks' deposit margins have declined.

Following the outbreak of the financial crisis, banks' lending rates did not initially mirror money-market rates. This led to a widening of banks' lending margins which partly offset the decline in deposit margins. However, the last few years have also witnessed a decline in lending margins.

Finally, the spread between short-term and long-term interest rates is also important to banks' earnings. This reflects that banks are engaged in maturity transformation – that is, they rely to a large extent on short-term funding while supplying longer-term loans. The ECB's large-scale asset purchases have worked to reduce the spread between long-term and short-term interest rates. This tends to make maturity transformation less profitable.

**Slide 16: Strong earnings in largest Danish banks**
All else equal, the squeeze in margins puts pressure on banks' profits. Nevertheless, the largest Danish banking groups achieved their best ever overall performance in 2016. This reflects that other factors have countered those negative effects on interest earnings.

**Slide 17: Scope to rebuild interest income when interest rates start rising**
Low interest rates stimulate economic activity and ease debt-servicing costs for firms and households. This results in lower loan-impairment charges for banks. Furthermore, banks have been able to raise fees. This chart shows the composition of banks' income before and after the financial crisis. It illustrates that interest income has indeed been squeezed since negative policy rates were first introduced in 2012. But total loan-impairment charges were close to zero in 2016.

As interest rates eventually start to increase, this could lead to higher loan-impairment charges. But as the rate cycle turns, banks are likely to restore interest-rate spreads to levels closer to those observed prior to the financial crisis. In particular, deposit rates are likely to be kept at zero for a while as other rates are increased. This will imply higher interest income.

**Slide 18: Separator – Implications for households and firms**

**Slide 19: Households are largely exempt from negative interest rates on deposits**
Let me now turn to the impact of negative policy rates on households and firms. Banks have shied away from introducing negative deposit rates for households. This contrasts with the experience of other groups of depositors. In particular, institutional investors such and insurance companies and pension funds have been exposed to negative deposit rates. This is also the case for a number of non-financial corporations.

Banks' reluctance to impose negative deposit rates on households is likely to reflect concerns over reputational risks. The first bank to introduce negative interest rates to households may suffer a substantial loss of costumers. This would not only lead to a loss of deposits. A household typically relies on a single bank and potentially an associated mortgage bank as their provider of financial services. This means that for a bank, the loss of a household's deposits is likely to be associated with a loss of a wider range of business activities. The reduction in revenues from the decline in activity is likely to exceed the narrow benefits from lowering deposit rates.

**Slide 20: Share of cash payments in Denmark is declining steadily**
With negative policy rates one potential concern could be a significant hoarding of cash. So far, we have seen no signs of this in Denmark. A potential explanation is that firms and institutional investors would face significant costs of handling, storing and insuring cash. And as I have already mentioned, households have not been met by negative deposit rates.

Another explanation is that Danish consumers to an increasing extent seem to prefer electronic means of payments instead of cash – either by using credit cards or smartphones. This suggests that in Denmark the inconvenience cost of cash is rather high. The declining use of cash suggests that in our case the effective lower bound of policy rates is well below the current level.

**Slide 21: Stable circulation of large denomination notes**
Any tendency towards using cash as a store of value should be reflected in a pickup in the circulation of large denomination notes. Our bank note with the highest denomination is kr. 1.000 (approx. 135 euro). The chart confirms that we have seen no substantial pickup in the demand for cash from households and firms.

**Slide 22: Incentive to switch to cash depends on level and expected duration of negative rates**
An investor considering whether or not to circumvent negative interest rates by hoarding cash is interested in the differential between the short-term interest rate and the zero rate that can be earned by holding cash. But it is also important for how long this differential is expected to persist. This is illustrated in the chart where the shaded areas provide a measure of the incentive to switch to cash.

It is worth pointing out that based on this measure the incentive is significantly lower than in mid-February 2015 or a year ago. This underlines that the lower bound for the interest rates is substantially below the current level.

**Slide 23: Mortgage rates and government-bond rates became negative**
In Denmark, real estate is primarily financed by mortgage-banks issuing mortgage bonds. This means that mortgage rates are determined in financial markets – and that no lower bound exists. Indeed, as money-market rates fell sharply in the beginning of 2015, short-term mortgage rates became negative – just like short-term government bond rates.

So while households have not been exposed to negative deposit rates, the very low mortgage rates are an example of how they have been affected by the low interest-rate environment. Competition from mortgage banks may be a factor behind the continued decline in the spread between banks' lending and deposit rates.[3]

**Slide 24: Indebted households consolidated heavily following the financial crisis**

A large proportion of Danish households have financed their homes with flexible-rate mortgages. And households with fixed-rate mortgages have been able to re-mortgage into mortgages with lower rates. In such a situation households can either use the saved proceeds for additional consumption or they can increase savings. Data shows that, collectively, households have taken the opportunity to consolidate their finances during the period of very low interest rates.

Consumption was reduced sharply when the financial crisis erupted around 2008. But several years after the onset of the crisis, it is still affecting households' consumption and saving patterns. At present, total private consumption is slightly higher than in the beginning of 2008. This masks substantial heterogeneity across groups of households.

All groups of households reduced their consumption immediately after the onset of the financial crisis. But since then the consumption-to-income ratio of net savers has returned to its pre-crisis levels. Conversely, net borrowers – especially those with high gross debts – have consolidated their finances at an increasing pace. This indicates that the adjustment of households' balance sheets is a relatively long-lasting process that has extended into the beginning of the economic recovery.[4]

**Slide 25: Danish households are well placed to cope with higher interest rates**

This chart shows that total credit to households was roughly flat for several years and has only recently started to pick up. Moreover, since the financial crisis there has been a substitution of bank loans for mortgage loans. Mortgage loans now constitute almost 80 per cent of total household debt. Mortgage debt is backed by very high-quality collateral. Moreover, households have been substituting towards mortgages with rates being fixed for a longer time period, including fixed-rate mortgag-

[3] Note that fees paid to the mortgage banks imply that actual interest rates facing the borrowers are higher than implied by the chart.

[4] See Simon Juul Hviid and Andreas Kuchler, Consumption and Savings in a Low Interest-rate Environment, *Danmarks Nationalbank Working Paper*, no. 116, 2017.

es. And importantly, in Denmark debt continues to be concentrated among the more wealthy households.

So a key message is that Danish households as well as our banks are well positioned for the turning rate cycle. And as we expect the economy to strengthen further over the forecast horizon, increasing interest rates are likely to coincide with a robust macroeconomic environment. This means that they will help curbing sharp increases in house prices. Nevertheless, we will continue to watch out for economic and financial risks that may materialise. This may be relevant if we experience abrupt changes to interest rates or asset prices.

**Slide 26: Rising house prices – but no bubble**
An environment of very low interest rates increases the risk of asset price bubbles. And the low interest-rate environment has indeed caused real-estate prices to rise. In particular, house prices in and around Copenhagen should be monitored carefully. House prices in the large cities are generally more sensitive to interest-rate changes as a larger fraction of the mortgages carry variable interest rates and the potential to build additional housing is limited.

It is a concern that low interest rates and a booming economy could induce households to be overly confident. Such over-confidence led to a house-price bubble in the mid-2000s. The current increase in house prices could at a first glance look like a repeat of such a situation. However, when taking into account developments in fundamental factors, i.e. mortgage rates, income, and the housing stock, there is no clear sign of an emerging speculative house-price bubble. Not even in Copenhagen.

**Slide 27: Prices of Copenhagen apartments not out of line with other large cities**
This conclusion is corroborated by an international comparison. While house prices have indeed risen substantially in the Copenhagen area, their sustainability cannot be assessed by looking at growth rates alone. Also their level relative to income must be taken into account. This chart illustrates that compared to other large European cities, house prices in Copenhagen, when measured relative to GDP per capita, are not out of line with those cities.  And unlike the other cities in the chart, they are not above their pre-crisis peak.

But the absence of a speculative bubble does not mean that house prices cannot fall. An unexpected increase in the mortgage rates poses a significant risk to households' balance sheets which would dampen house pric-

es. As we have previously experienced, such losses could challenge macroeconomic and financial stability if households are not sufficiently robust.

**Slide 28: Legal and technical challenges have been addressed**
Let me conclude with some remarks on the legal and technical aspects of negative interest rates. In February 2015 the Minister for Business and Growth set up a task force to identify potential issues in relation to negative rates of interest on mortgage loans. In a report from April 2015, the task force concluded that negative interest rates do not cause significant problems in relation to adjustable-rate loans. But they may constitute a challenge in relation to loans that are based on variable-rate bonds.

At the same time, the task force assessed that there is no immediate need for legislation in this area. The individual mortgage banks are free to choose the model that best matches their business. As a result, they have applied different models for handling negative rates. The borrowers have received the negative interest either as a direct disbursement, as a reduction of the outstanding debt or as a capital gain.

As regards taxation of interest rates, in February 2015 the Danish tax authorities, SKAT, issued guidelines describing the taxation and deductibility of negative interest: Interest income in the form of a negative rate of interest is taxable for the borrower, while interest costs in the form of a negative rate of interest are deductible for the lender. In addition, the Danish parliament has adopted adjustments to a number of laws regarding the tax treatment of negative interest.

**Slide 29: Thank you!**
So let me conclude. Since the outbreak of the financial crisis a number of large central banks have resorted to unconventional monetary policies. This has substantially impacted the economic and financial conditions of Denmark and other small open economies. By doing so, it has posed a number of challenges and led us into unchartered territory. But it is important for me to stress that the spill-overs arising from the policies of large central banks have been manageable. This has been the case for us at Danmarks Nationalbank as well as for our commercial banks and for firms and households.

Looking ahead, the rate cycle is starting to turn. This is likely to coincide with a further strengthening of the economy, and in Denmark banks as well as firms and households are well positioned to coping with higher rates. In fact, higher rates will be a welcome contribution to curbing

house prices as the recovery gains momentum. But needless to say, we will continue to watch out for potential risks to macroeconomic as well as financial stability. A stable macroeconomic environment supported by a robust financial sector is key to our overall well-being as a society.

Thank you for your attention!

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# A LIFE CLOSE TO THE CENTRE

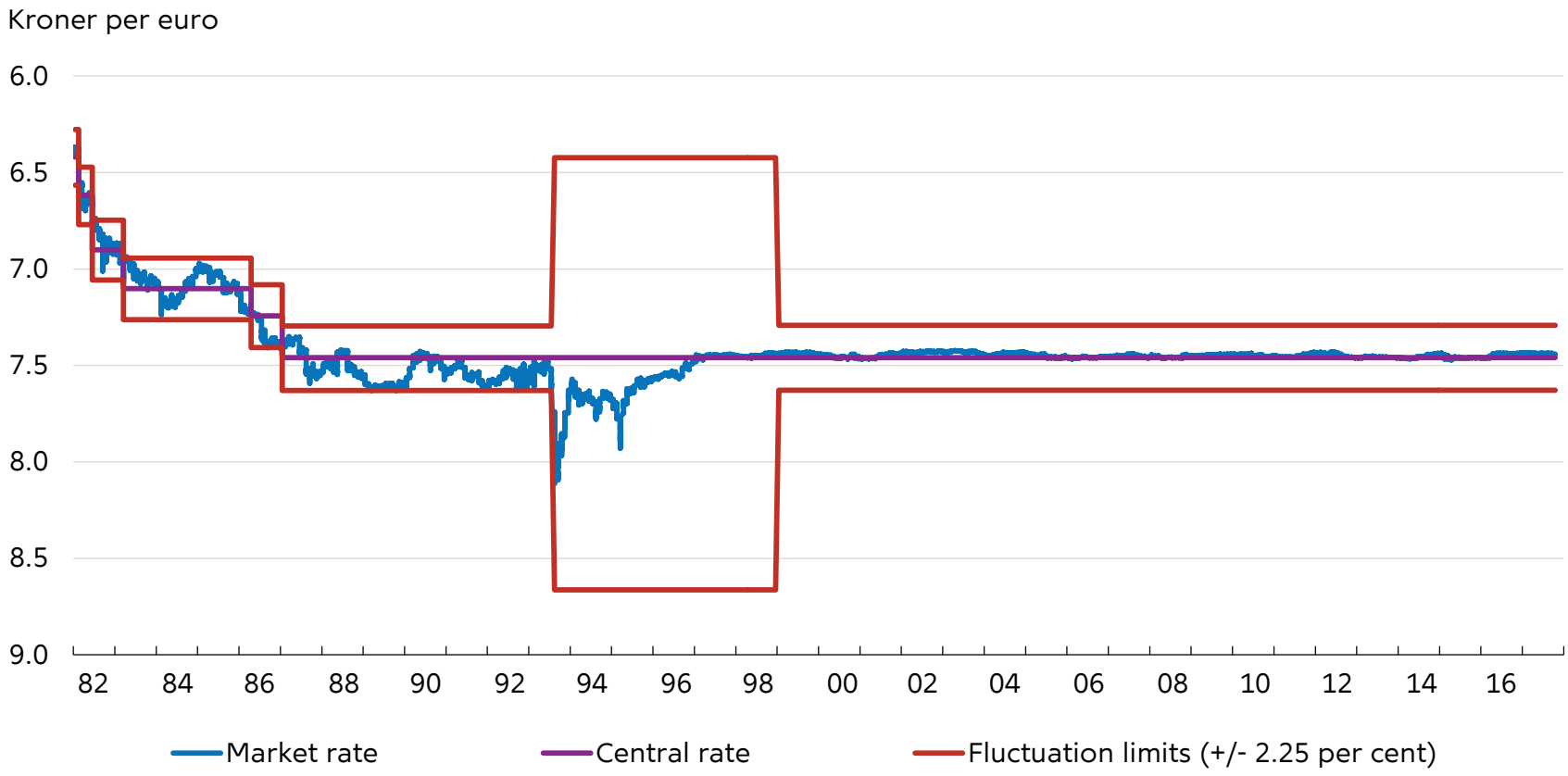
Lars Rohde, Chairman of the Board of Governors, 31 October 2017

# Agenda

1. Background on monetary policy regime
2. Negative policy rates in Denmark
3. Implications for banks
4. Implications for households

# Background on monetary policy regime

# Unchanged central parity for three decades




Note: Reverse scale.
Source: Danmarks Nationalbank.

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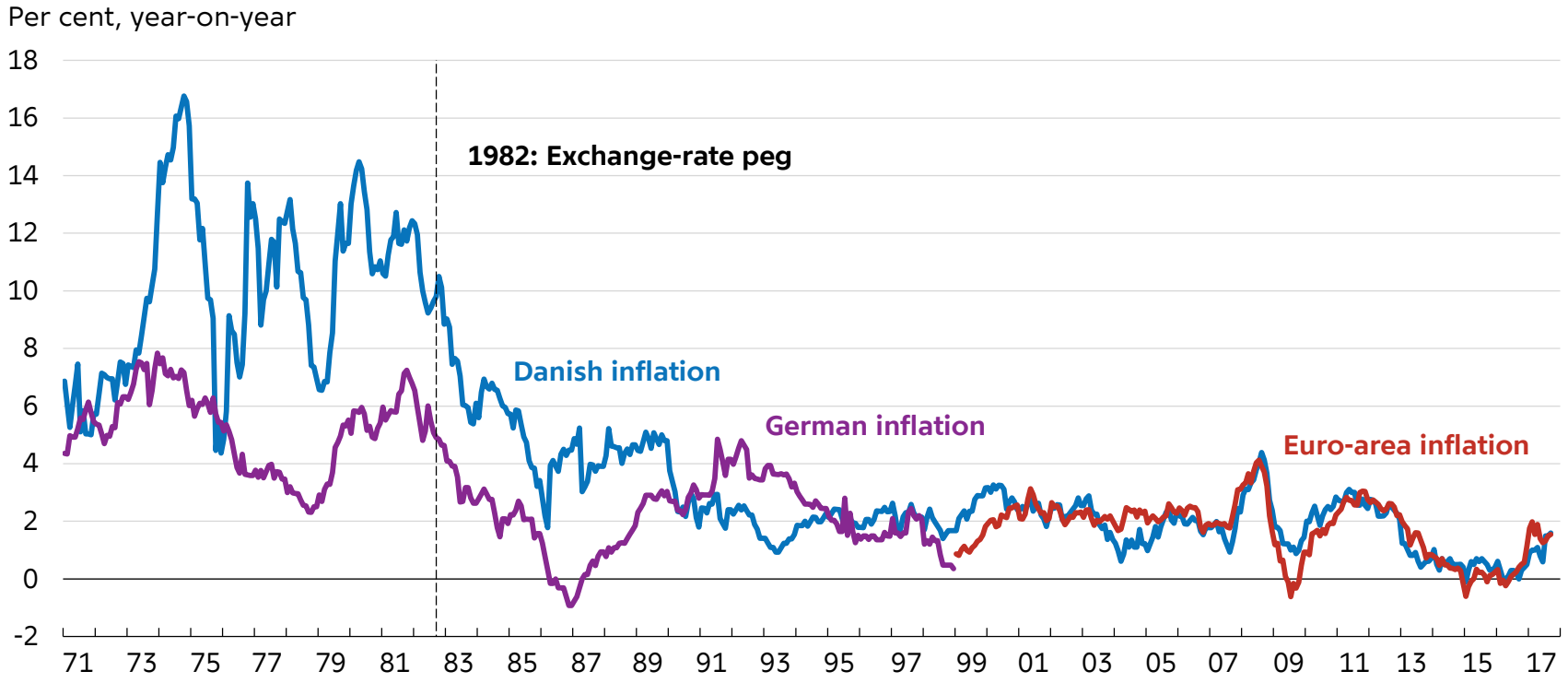
# Fixed exchange rate introduced after a period of high and volatile inflation




Source: Statistics Denmark and Thomson Reuters Datastream.

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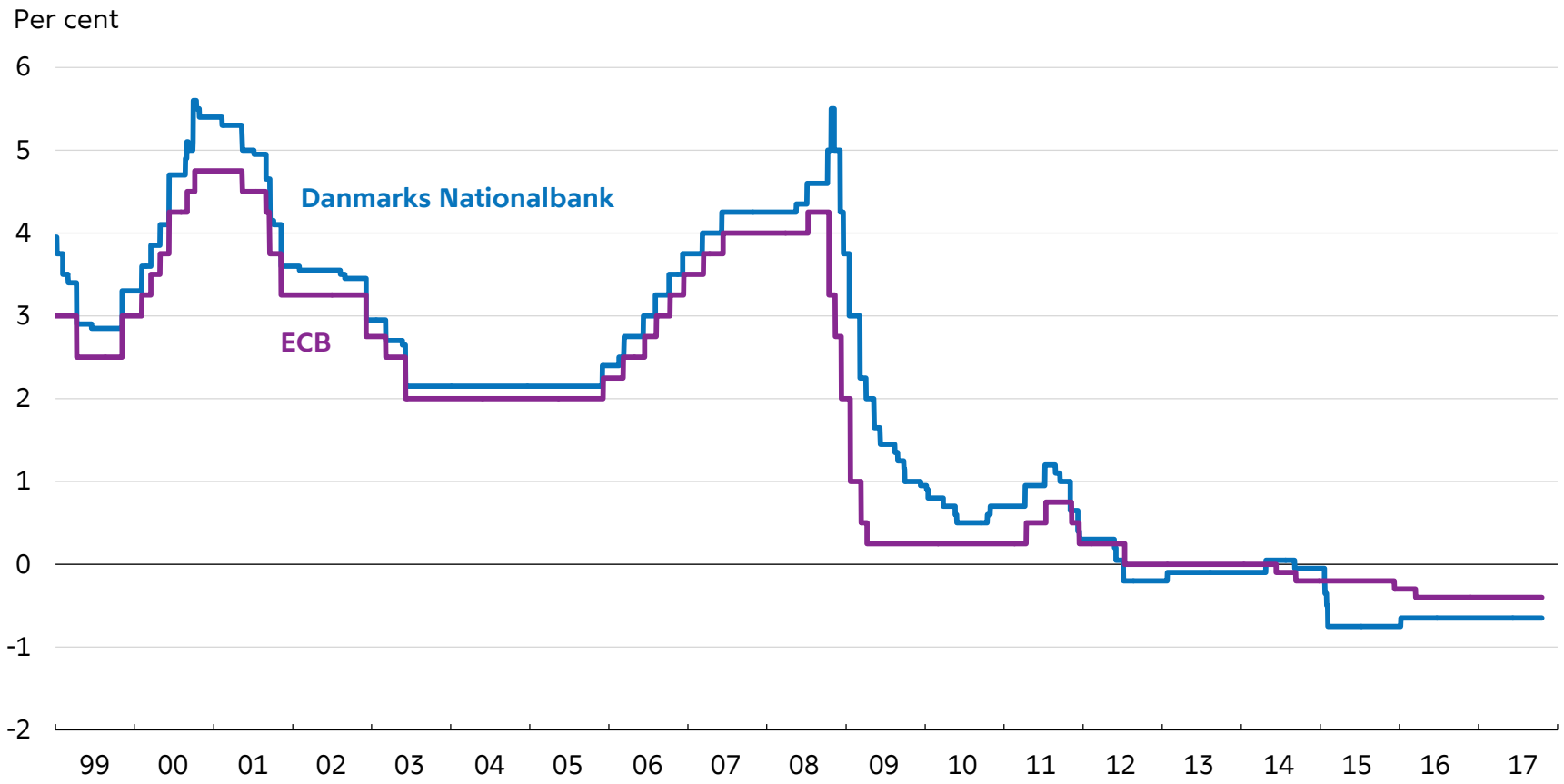
# Danish monetary-policy rates tightly linked to ECB rates




Note: Key policy rates.
Source: Thomson Reuters og Danmarks Nationalbank.

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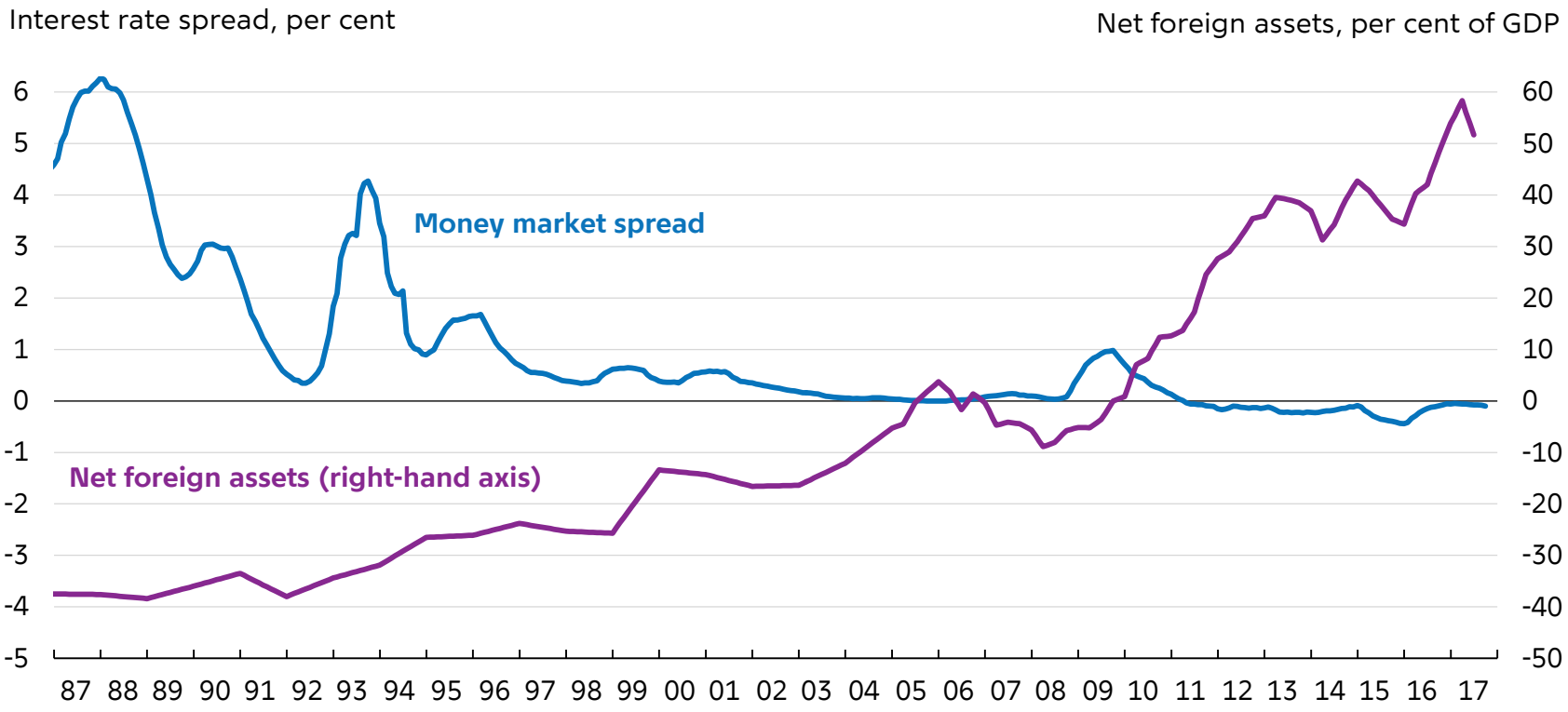
# Rising net foreign assets have reduced money market spread

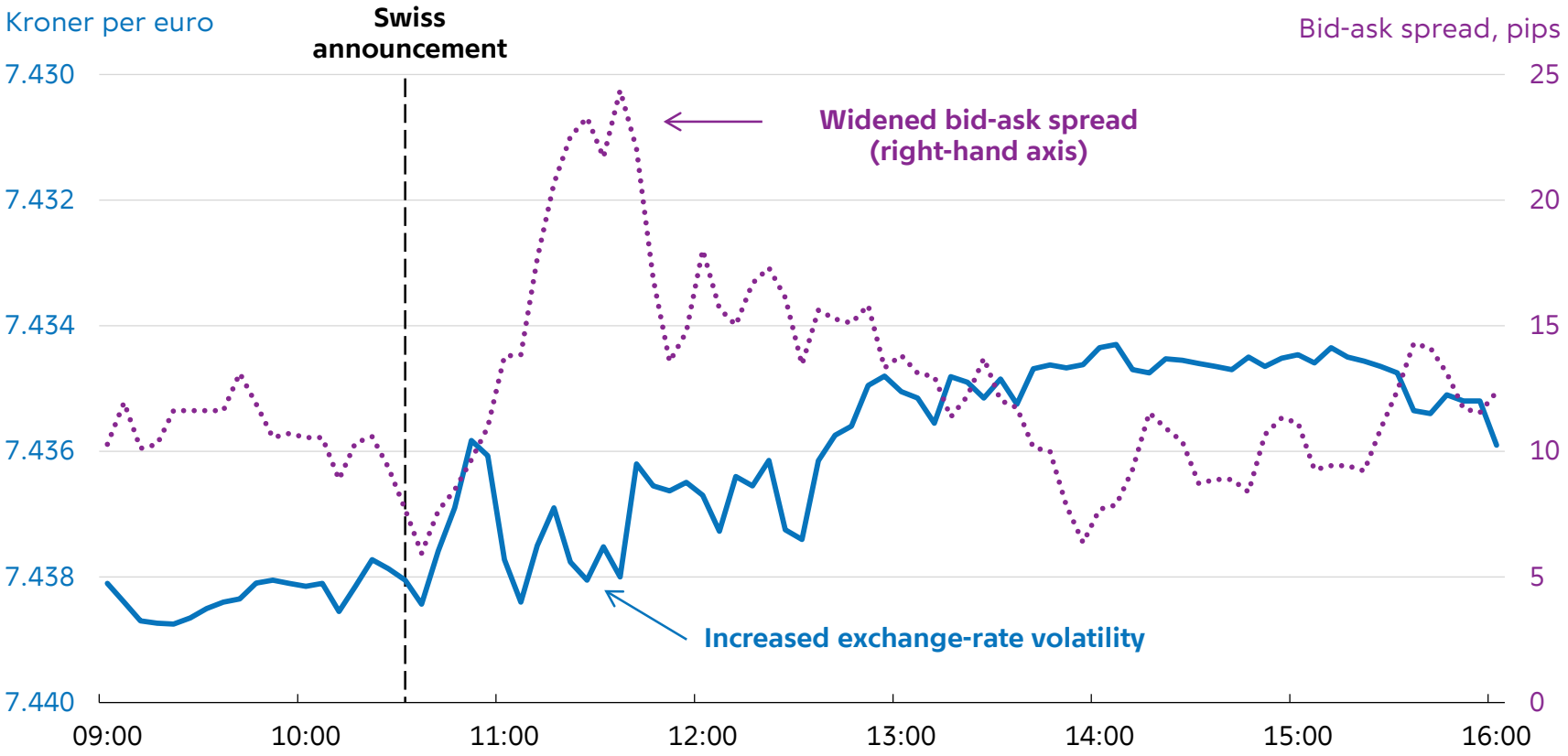



Source: Thomson Reuters Datastream and Statistics Denmark.

# Strong capital inflows led to a forceful policy response

# Swiss contagion to Danish FX market

**15 January 2015**




Note: Left-hand axis: Reversed scale. Right-hand axis: 30-minutes moving average of bid-ask spreads measured at 5 minutes intervals.
Source: OlsenData.

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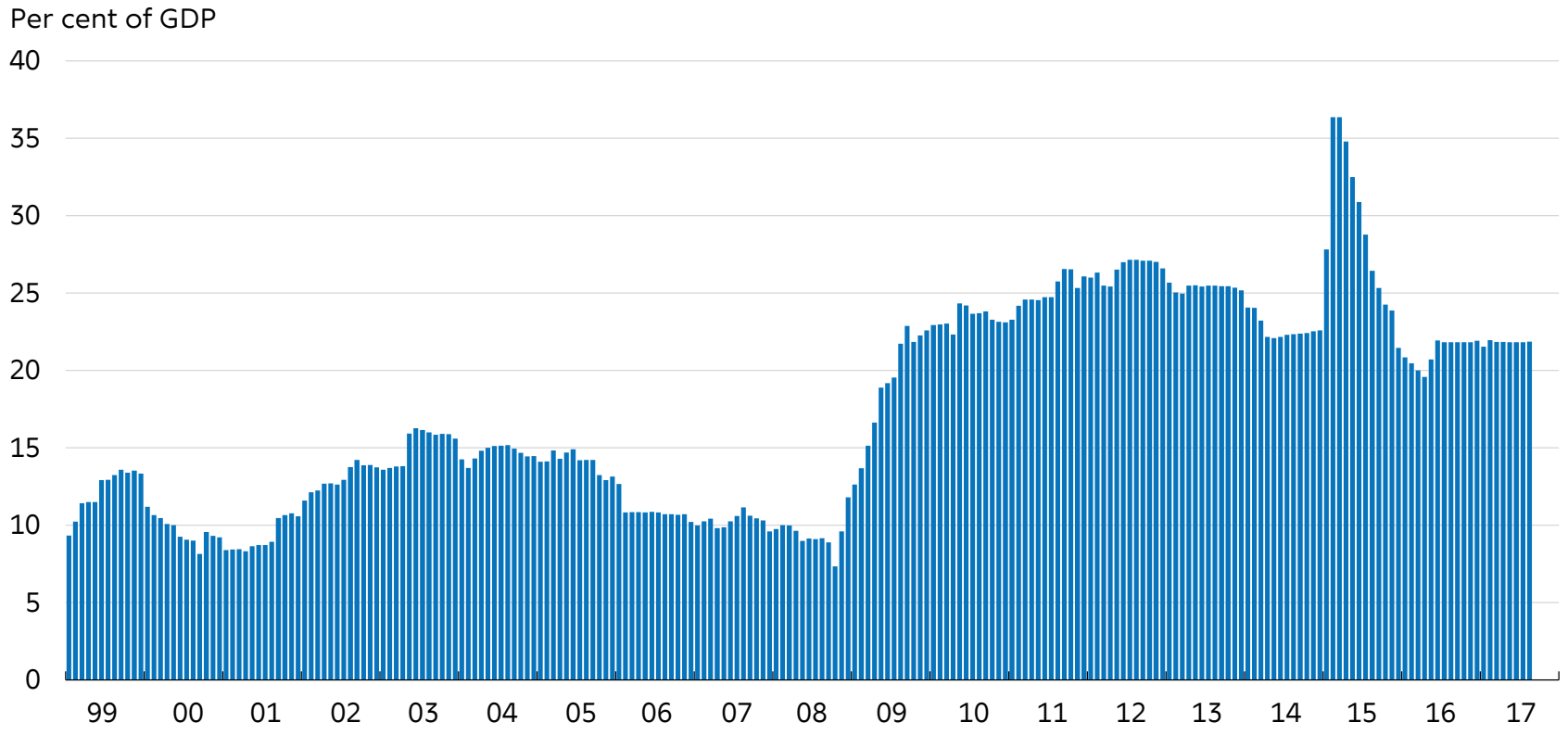
# Sharp increase in foreign exchange reserve in 2015




Note: In per cent of nominal GDP at yearly frequency. GDP for 2017 is from Danmarks Nationalbank's projection.

Source: Danmarks Nationalbank and Statistics Denmark.

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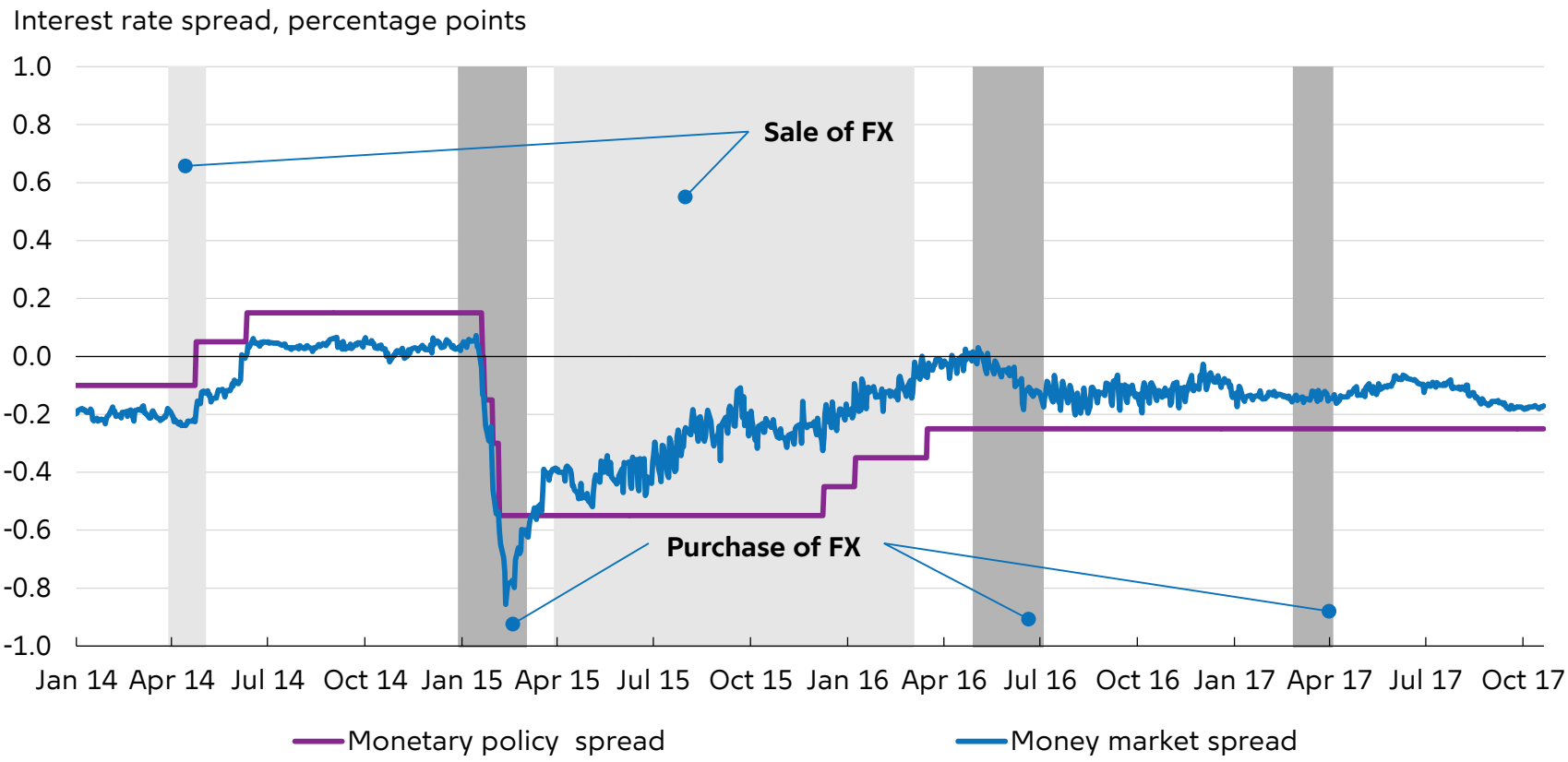
# Interest rate spread to the ECB became negative




Note: Shaded quarters illustrate quarters where Danmarks Nationalbank intervened for more than kr. 5 billion (net). Money market spread is the spread between 1 month OIS rates (i.e. EONIA- and CITA-swaps). Monetary policy spread is the spread between Danmark Nationalbank's CD rate and the ECB's deposit rate.

Source: Rio, Thomson Reuters Datastream, Danmarks Nationalbank and own calculations.

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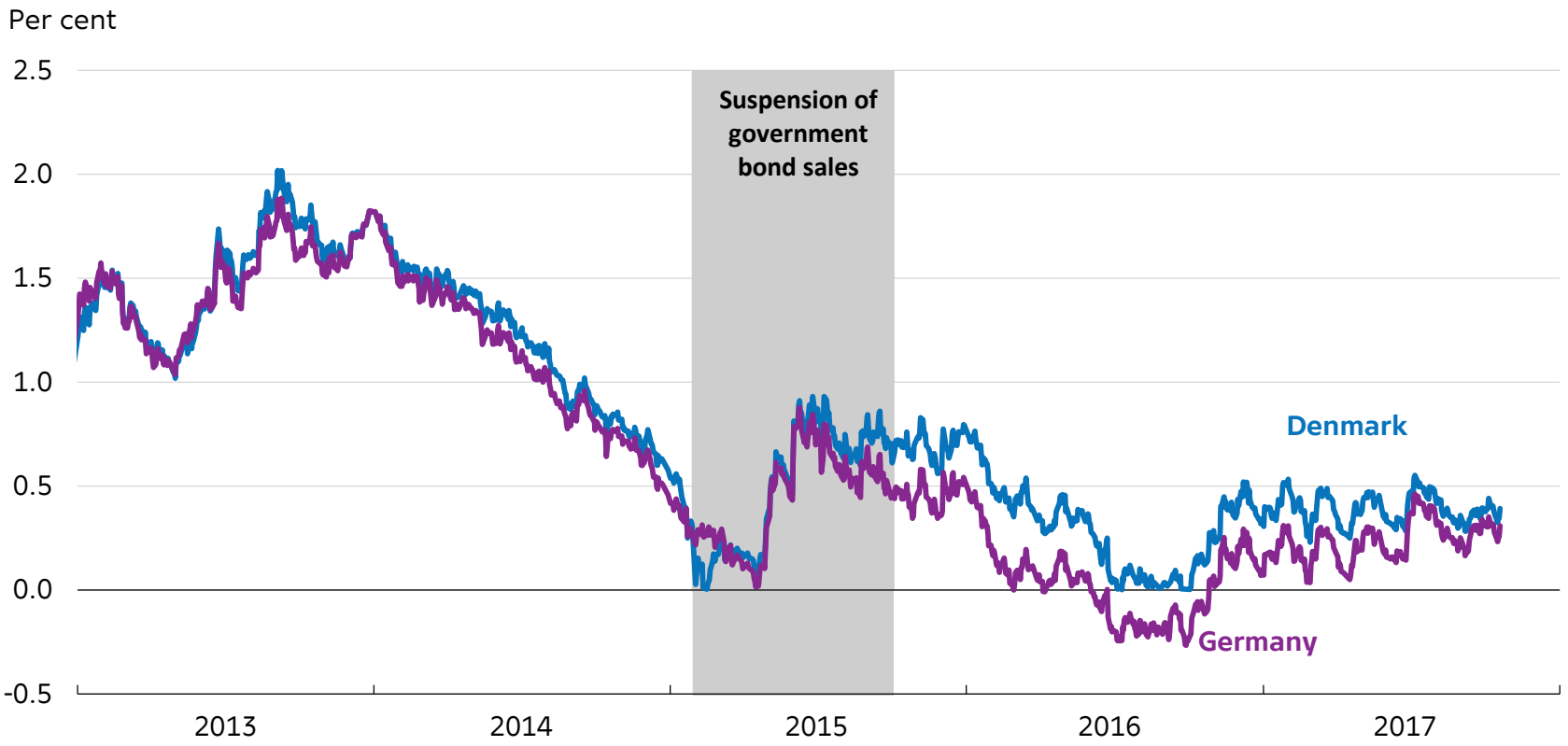
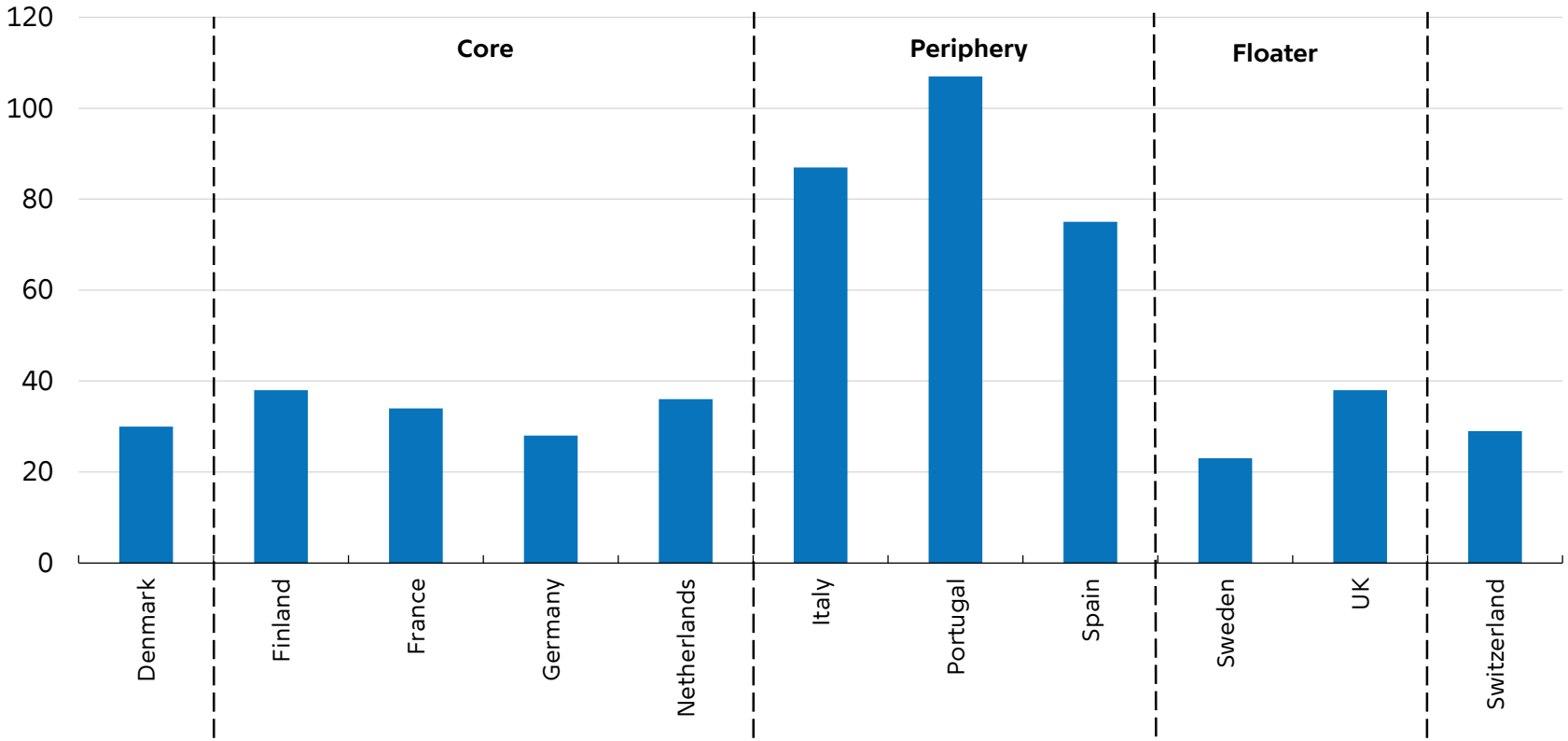
# Danish government bond yields co-move strongly with German yields




Note: 9-year par rates.
Source: Nordea Analytics.

# Decline in long-term Danish yields in line with core euro area countries

Basis points decline in 9-year government bond yields




Note: Aggregate decline in sovereign bond yields in two-day windows following 17 pieces of ECB communication.
Source: Thomson Reuters Datastream, ECB and own calculations.

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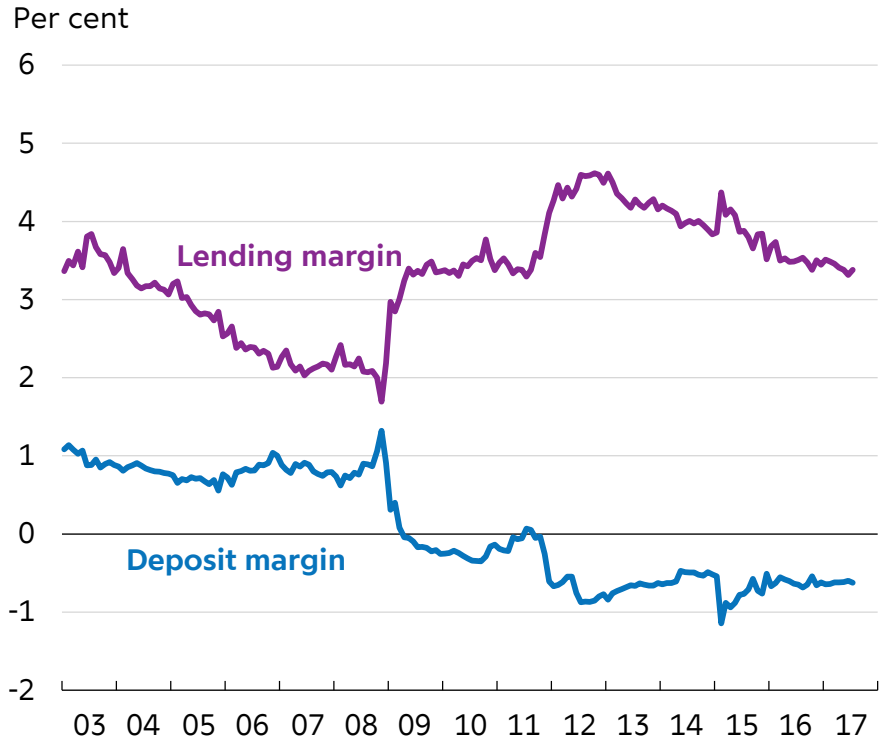
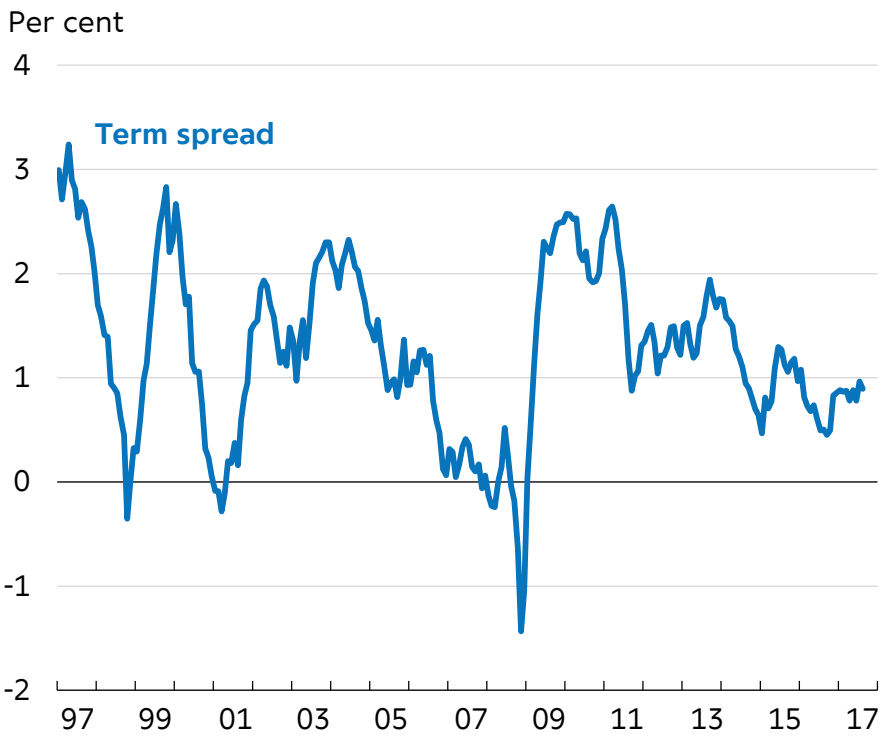
# Implications for banks

# Interest rate margins are being squeezed




Note: The lending margin is calculated as the difference between the average lending rate and the T/N money market rate. The deposit margin is the difference between the T/N money market rate and the average deposit rate. Lending rates and deposit rates are based on data for Danske Bank, Nykredit, Jyske Bank and Sydbank. The term spread is calculated as the difference between 10-year government bond yield and the T/N money market rate. Data are monthly averages.

Source: Danmarks Nationalbank and Nordea Analytics.

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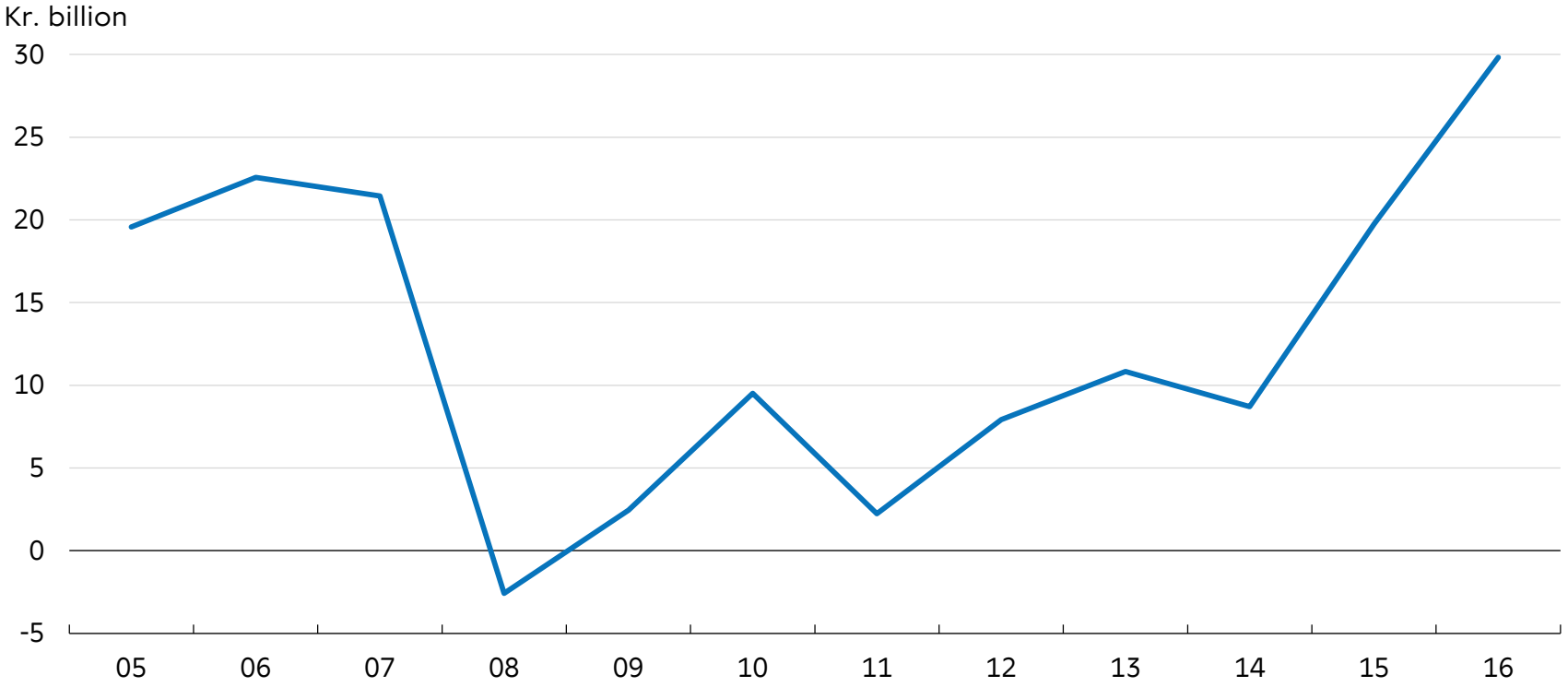
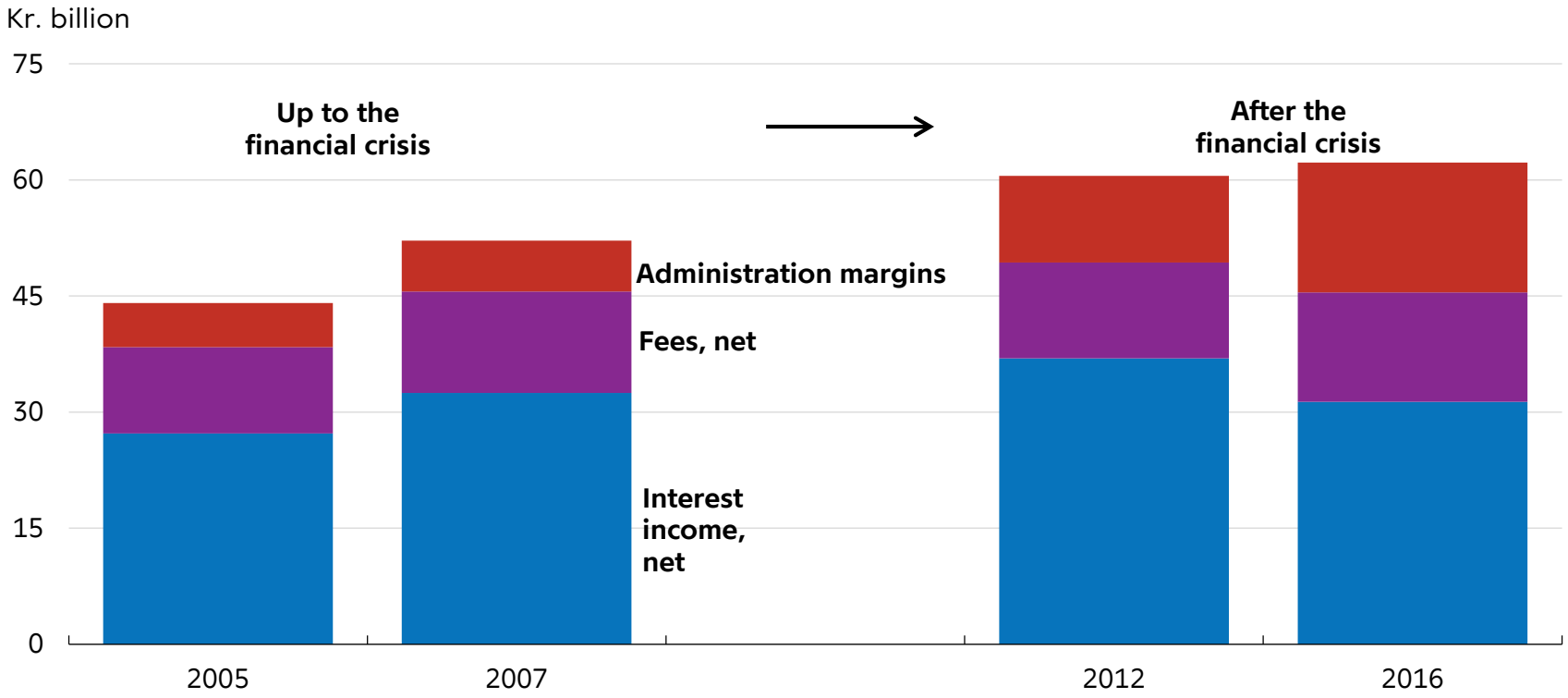
# Strong earnings in largest Danish banks

## Earnings of largest Danish banks




Note: The chart shows financial statements for the Danske Bank, Nykredit, Jyske Bank and Sydbank groups.
Source: Danish Financial Supervisory Authority and own calculations.

# Scope to rebuild interest income when interest rates start rising

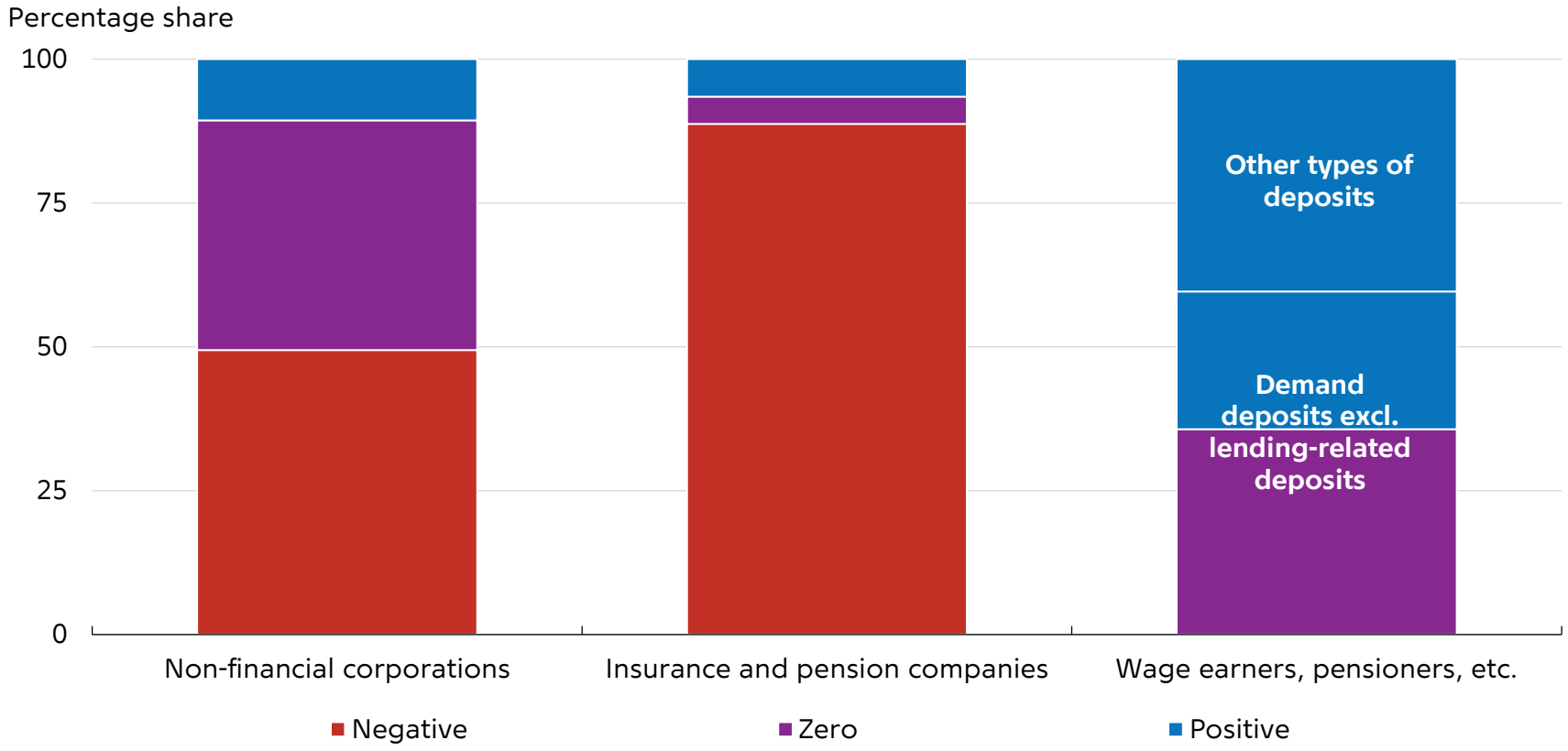



Note: The chart shows financial statements for Danske Bank, Nykredit, Jyske Bank and Sydbank.
Source: Danish Financial Supervisory Authority and own calculations.

# Implications for households

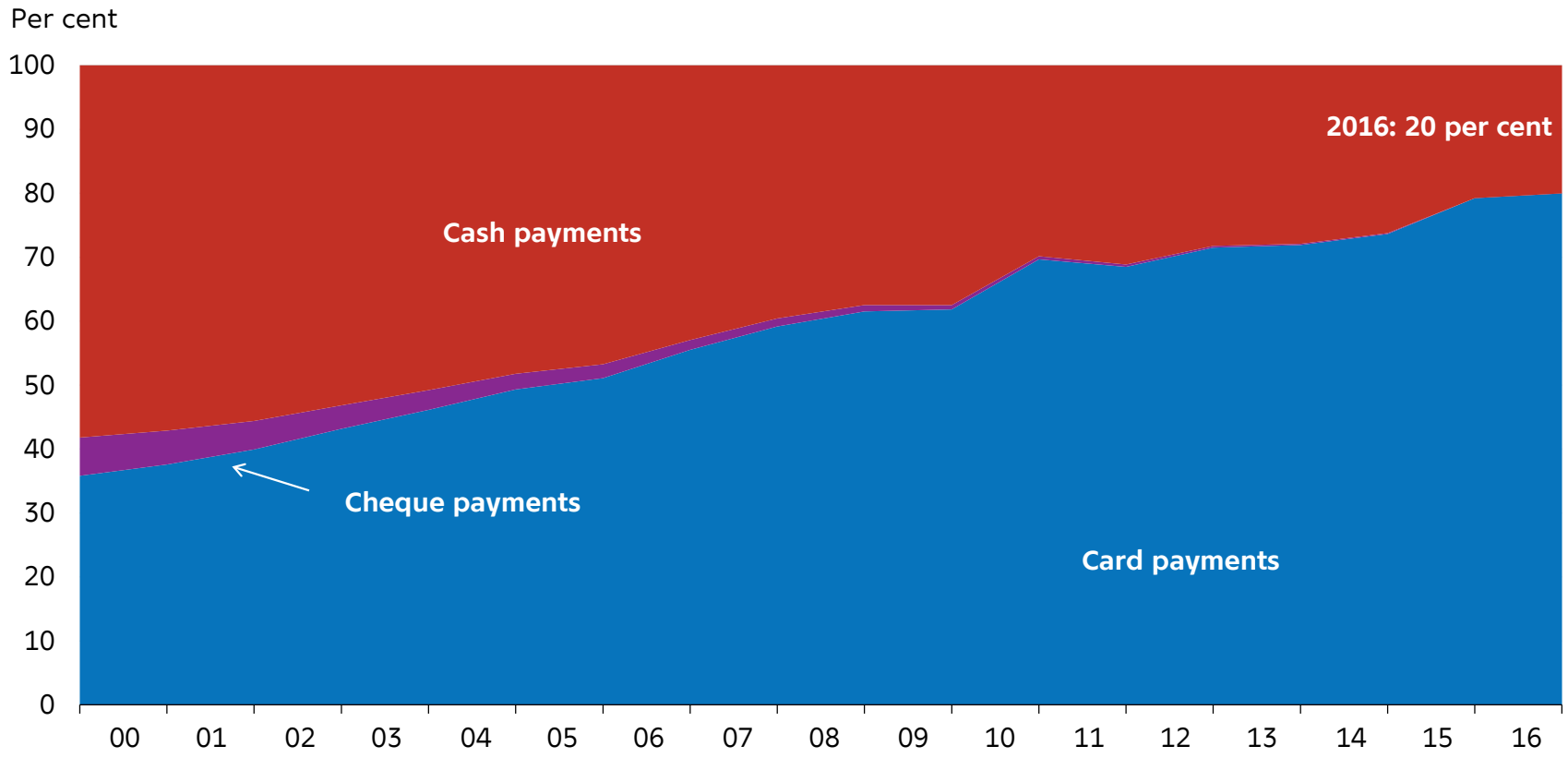
# Households are largely exempt from negative interest rates on deposits

## Rate of interest on bank deposits




Note: "Other types of deposits" refer to time deposits, lending-related deposits, etc.
Source: Danmarks Nationalbank.

# Share of cash payments in Denmark is declining steadily




Note: Payments made by smart phones are included in card payments.
Source: Statistics Denmark, Danmarks Nationalbank, Finance Denmark, Nets and own calculations.

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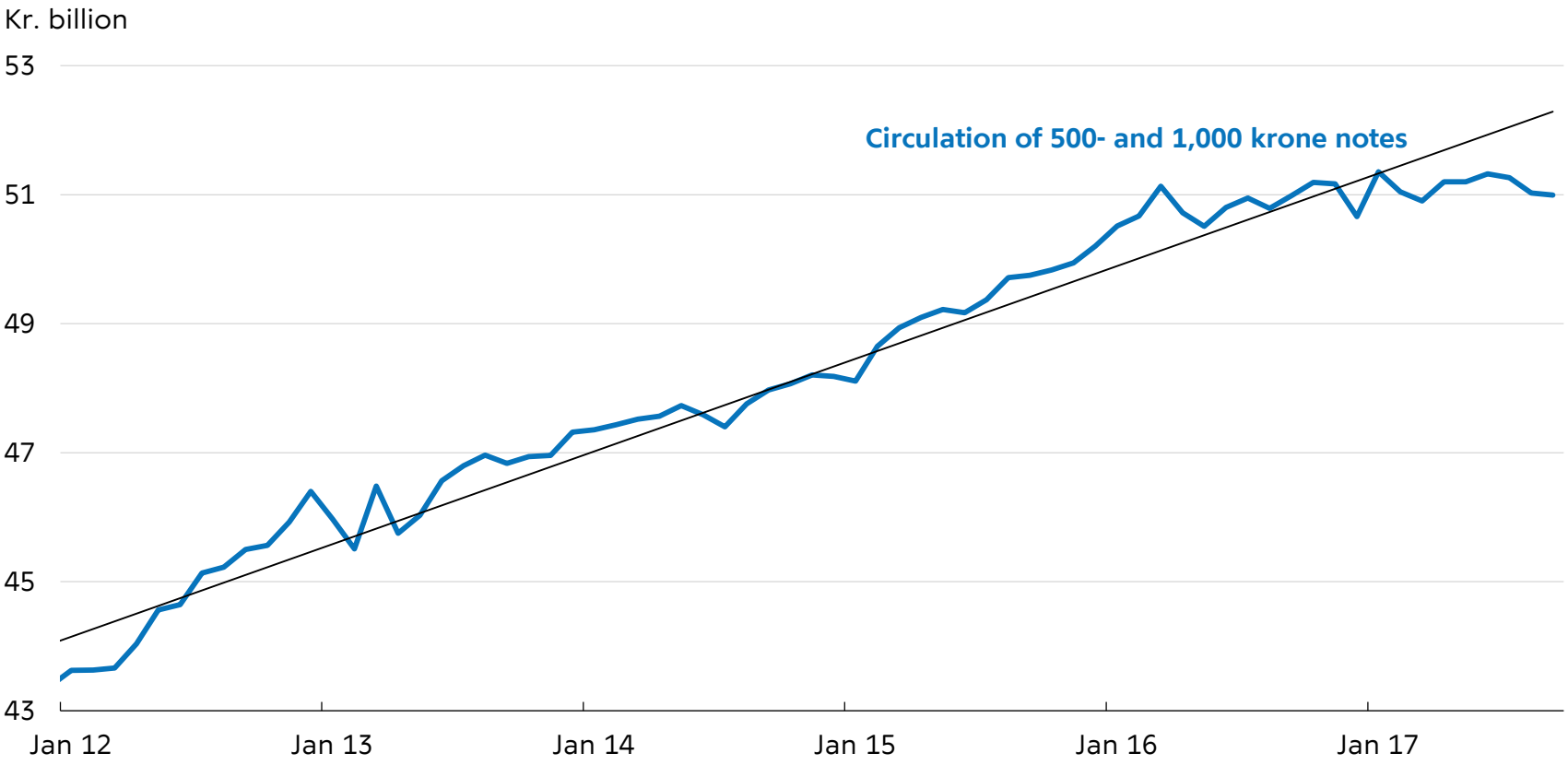
# Stable circulation of large denomination notes




Source: Danmarks Nationalbank.

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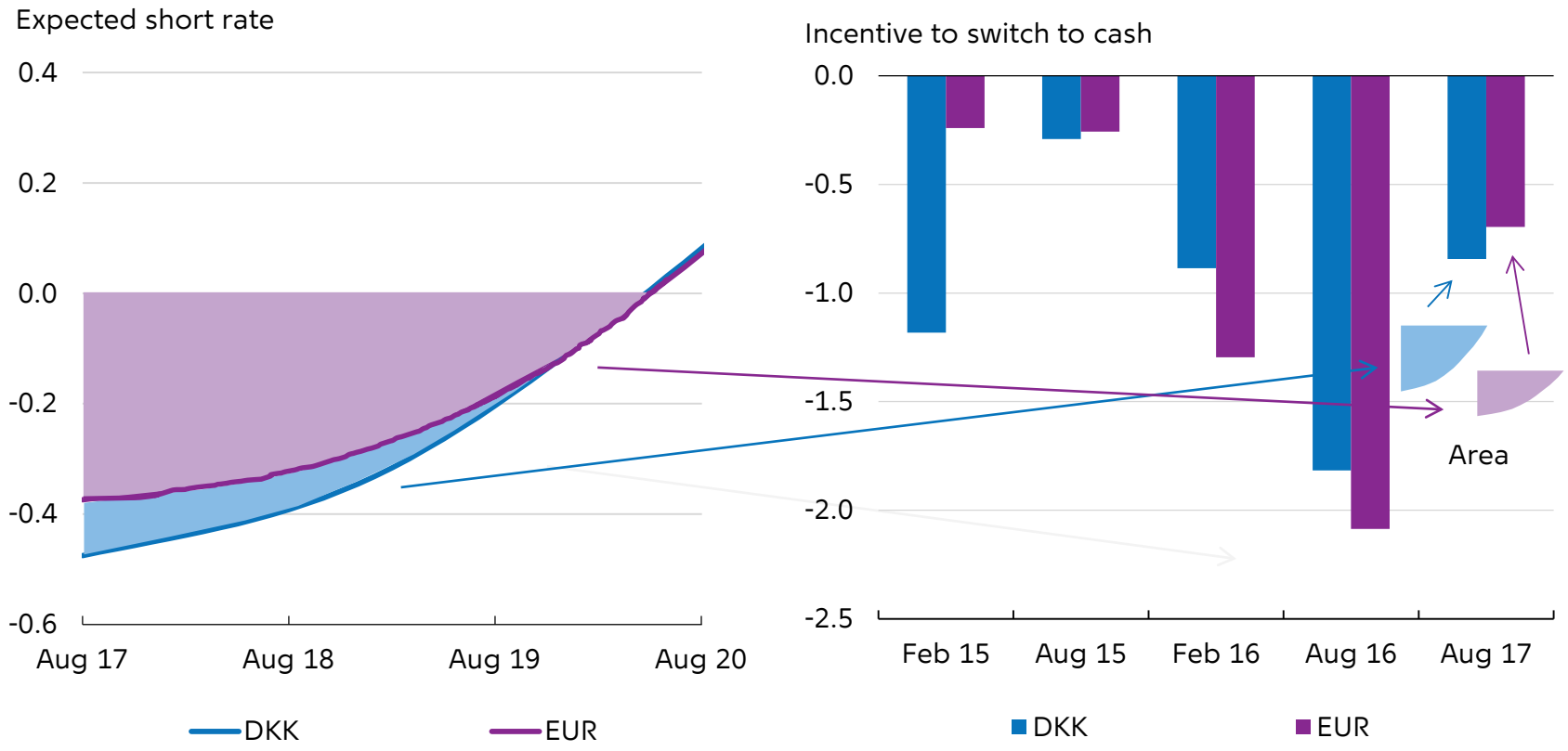
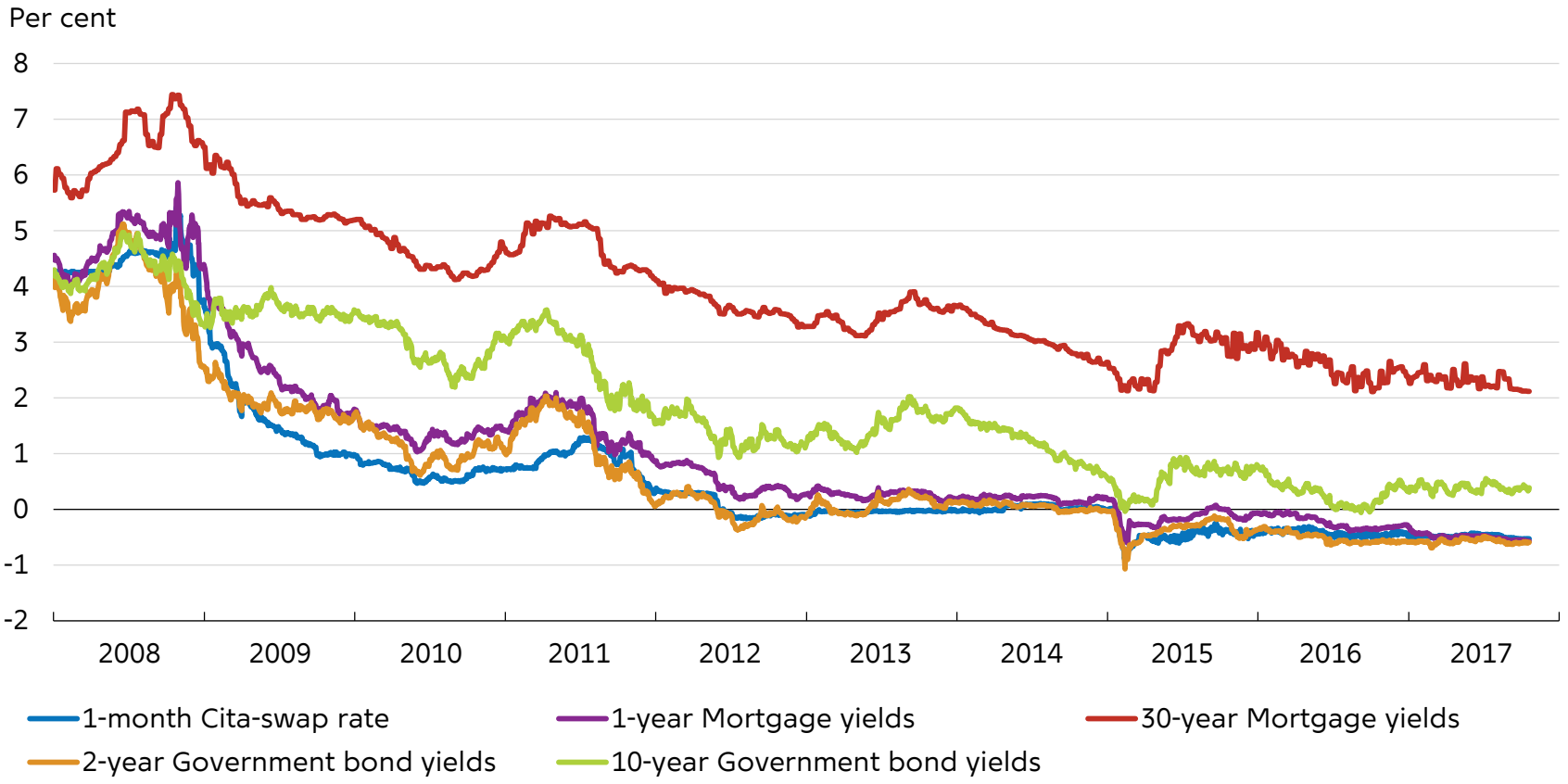
# Incentive to switch to cash depends on level and expected duration of negative rates



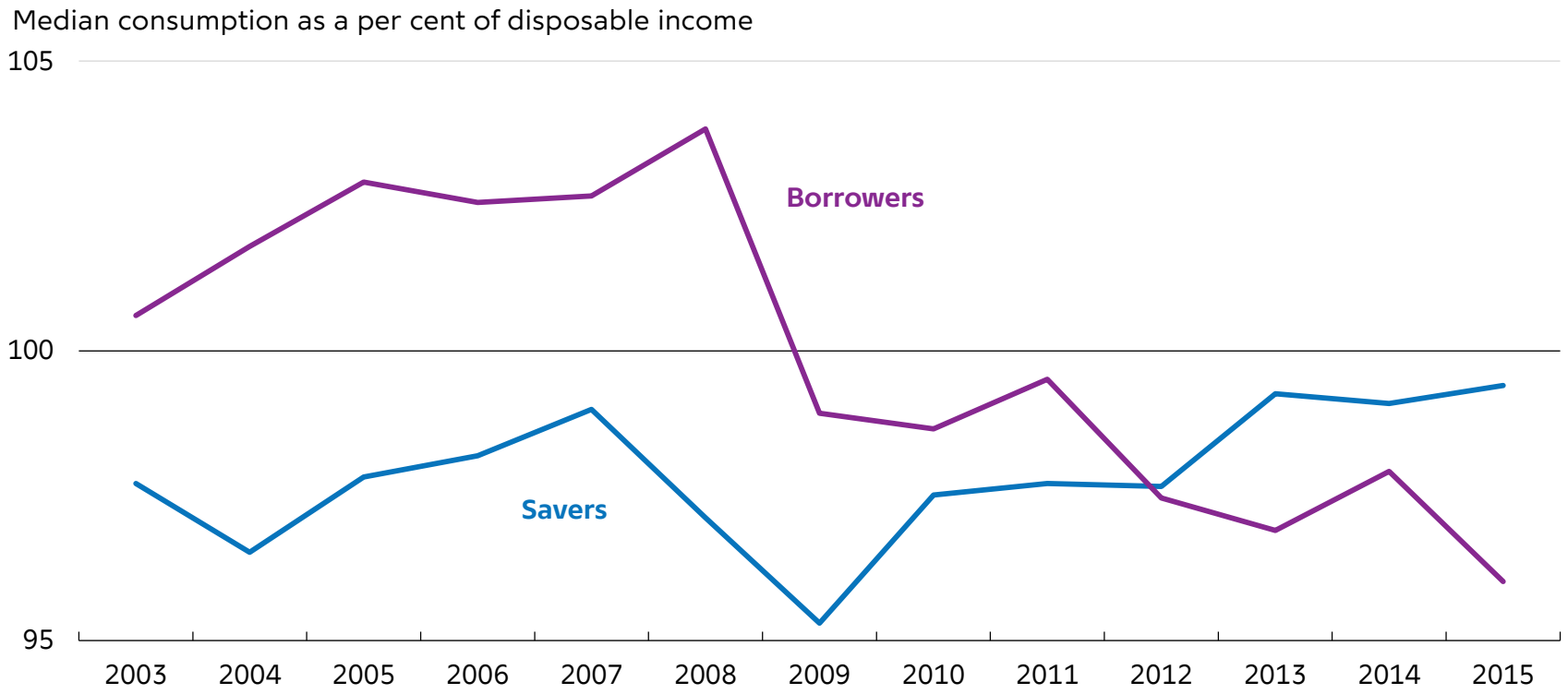

Note: Derived from OIS rates. Observations are mid-month.
Source: Rio, own calculations.

# Mortgage rates and government bond rates became negative




Source: Thomson Reuters Datastream, Nordea Analytics and Danmarks Nationalbank.

# Indebted households consolidated heavily following the financial crisis

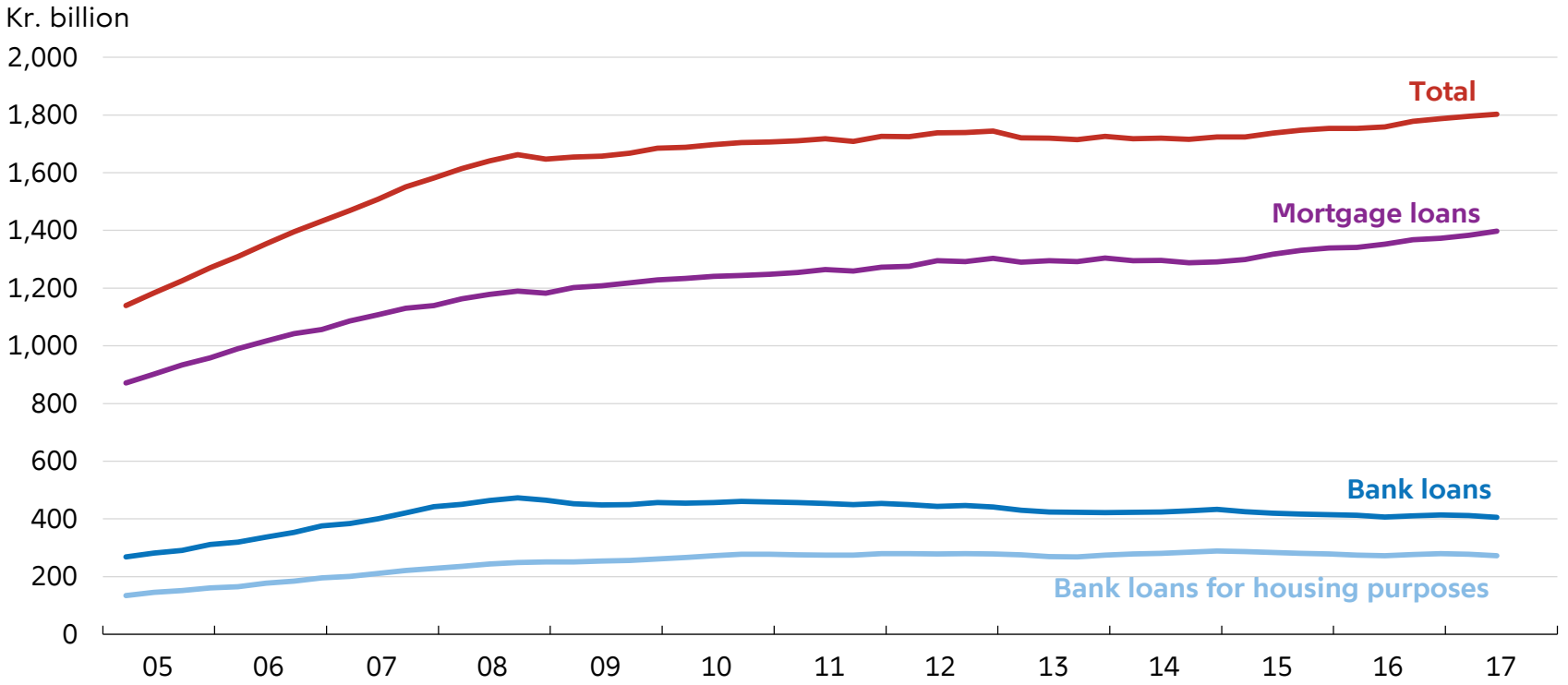



Note: Savers are defined as households whose liquid financial assets (bank deposits, stocks, and bonds etc. excl. pension savings) exceed their financial liabilities and vice versa for borrowers.

Source: Statistics Denmark and own calculations.

# Danish households are well placed to cope with higher interest rates

## Lending to households




Note: Bank loans funded by mortgage bonds issued, are placed in the mortgage loan category.
Source: Danmarks Nationalbank.

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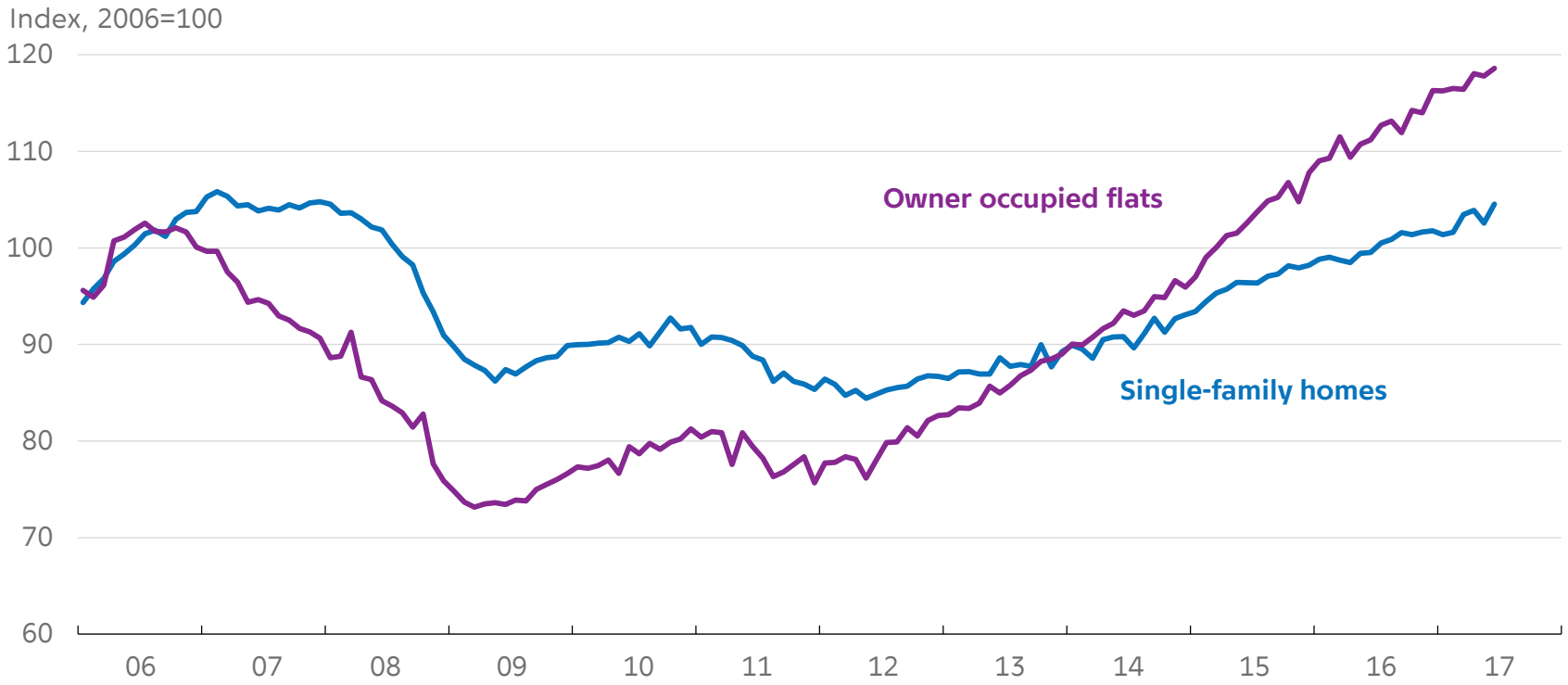
# Rising house prices – but no bubble




Note: Own seasonal adjustment.
Source: Statistics Denmark.

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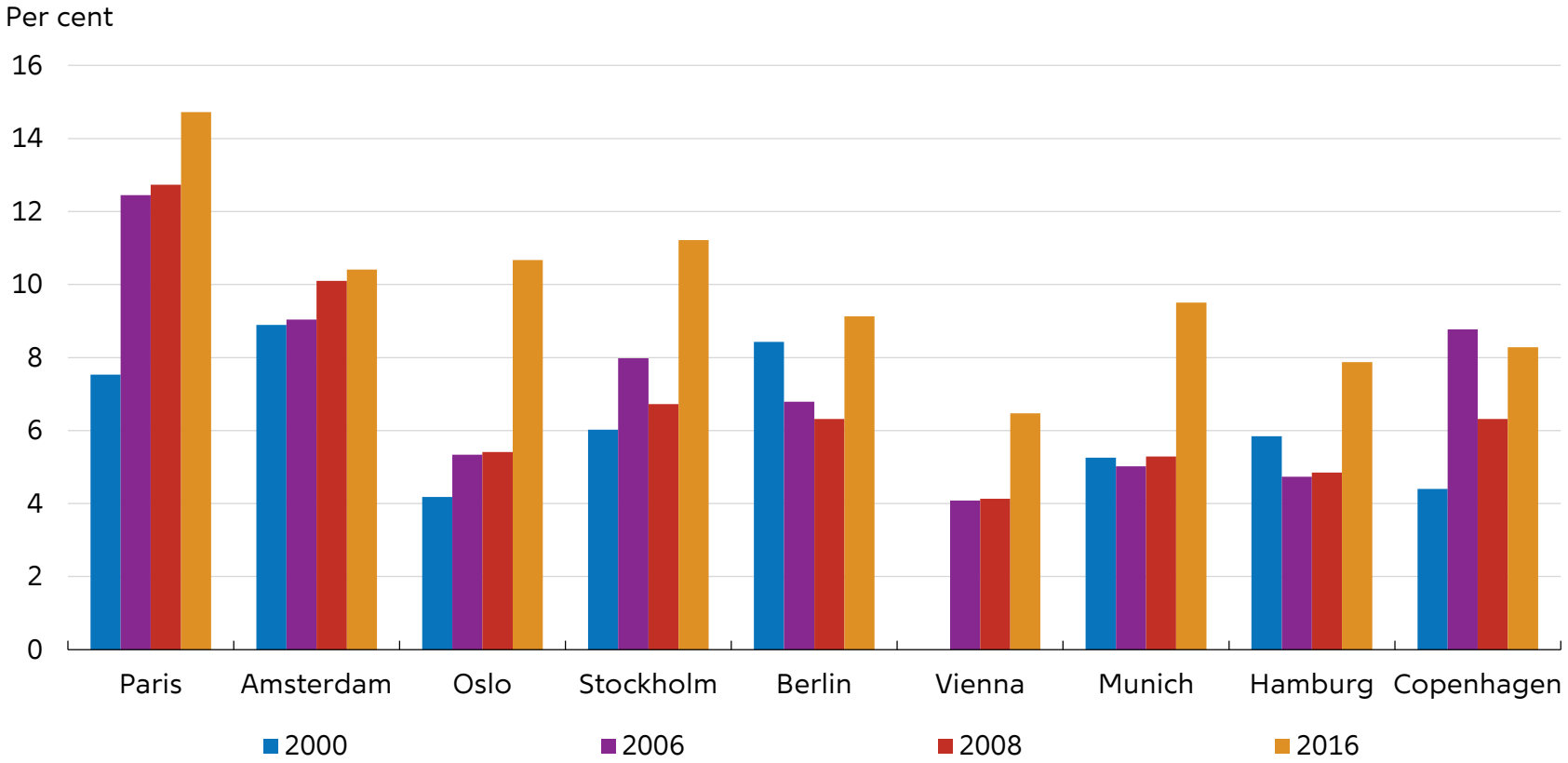
# Prices of Copenhagen apartments not out of line with other large cities

## Price per square meter, residential flats, per cent of nominal GDP per capita




Note: GDP per capita is on the same regional basis as the price per square meter data. GDP per capita data for 2014-16 has been extrapolated using nominal GDP per capita growth on a country-basis. Exceptions are Oslo (extrapolation only for 2016) and Denmark (extrapolation for 2015-16).

Source: Source: RIWIS, Statistics Netherlands, Notaires Paris – Ile-de-France, Statistics Denmark, Association of Swedish Real Estate Agents, Real Estate Norway, and Statistics Norway.

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# Legal and technical challenges have been addressed

Mortgage: Negative interest rates initially raised a number of technical and legal challenges

- IT systems: Handling a situation where borrowers receive and investors pay interest.
- Tax issues: Borrowers pay tax on interest received; investors can deduct any interest payable.

Borrowers: Benefit from negative interest rates, e.g. by direct disbursement or a reduction of the outstanding debt

Tax: The Danish parliament has furthermore adopted adjustments to a number of laws regarding the tax treatment of negative interest for pension returns and corporate tax

# THANK YOU!