

The household cash-flow effects of monetary policy in Denmark and the euro area

Since 2022 the European Central Bank and Danmarks Nationalbank have increased their key monetary policy rates at a record pace. This study shows that the pass-through to retail rates has been stronger in Denmark than in the euro area so far. Interest rate fixation periods are shorter in Denmark, debt turnover is higher and Danish households have more debt. Thus, the household cash-flow channel appears to have been stronger in Denmark compared to the euro area.

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Retail rates have increased significantly more in Denmark compared to the euro area

We find a stronger pass-through to interest rates for households in Denmark than in the euro area. This has in particular been driven by shorter interest fixation periods for Danish households and the Danish market-based mortgage system.



Larger impact on households' total net interest burden in Denmark than in the euro area

Danish households have more debt than deposits whereas the opposite is the case for the euro area. During the hiking cycle since 2022, the net interest burden has increased in Denmark but fallen in the euro area. However, the increase in Denmark has been significantly smaller than during the 2005-2008 hiking cycle.



Cross-country analysis on household-level data also points to a stronger cash-flow channel in Denmark

We combine household-level data from Denmark and the euro area to find that Danish households with higher marginal propensities to consume are more levered than comparable households in the euro area. Thus, they experience a more negative cash flow effect following interest rate increases.

Why is it important?

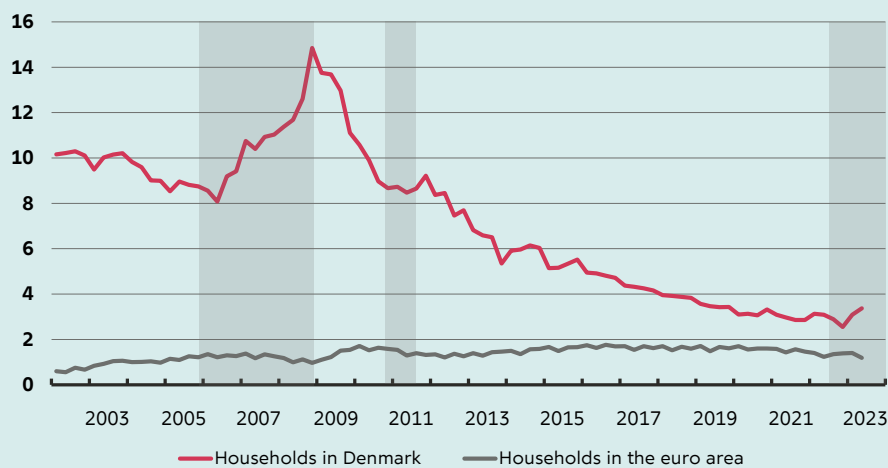
Monetary policy has a direct impact on households' disposable income through its impact on interest expenditures and interest income. Consequently, this channel of monetary policy (the cash-flow channel) is a natural starting point for analysing the transmission of monetary policy in Denmark.

Due to the Danish fixed exchange rate vis-à-vis the euro, understanding any differences in the transmission between the euro area and Denmark is also of interest. This memo, examining one of the channels of monetary policy, provides the first step towards such an understanding. The memo also contributes with a first-of-its-kind cross-country micro data analysis of the interest rate exposures and balance sheet compositions of Danish and euro area households.

Main chart:

Large differences in net interest burden in Denmark and the euro area now and over time

Per cent of gross disposable income



Note: Net interest payments as share of gross disposable income. Interest payments and interest income received are before FISIM allocation. Shaded areas indicate periods with rising monetary policy rates.

Source: ECB.

Keywords

Monetary policy

Interest rates

Denmark and abroad

Debt

Deposits

01 Introduction

Differences in household balance sheets and loan characteristics lead to heterogeneity in transmission of monetary policy across countries

In 2022 and 2023, the European Central Bank (ECB) increased its key monetary policy rates at the fastest pace within a two-year span in its history. This prompted Danmarks Nationalbank, owing to the fixed exchange rate policy vis-à-vis the euro, to raise its monetary policy rates comparably. Since 2022, ECB and Danmarks Nationalbank have raised the policy rate by 4,5 and 4,2 percentage points, respectively. However, even identical increases in monetary policy rates may generate different effects on cash flows for Danish and euro area households as the impact on interest expenditures and interest income may differ across countries.

This discrepancy could arise due to two primary factors. Firstly, the effect on household budgets depends on the size of households' interest-bearing assets and liabilities. Secondly, the pass-through of monetary policy rates to average retail rates in Denmark and the euro area is contingent upon various factors such as the structure of the mortgage market and the average period of interest rate fixation. In this memo, we seek to understand whether the direct impact of monetary policy on households' cash flows (the cash-flow channel) in the short run differs in strength between Denmark and the euro area. We do this by comparing the size and composition of households' balance sheets, as well as the speed of transmission of monetary policy rate changes to retail interest rates.

Stronger cash-flow channel in Denmark compared to the euro area

Overall, our findings indicate a stronger transmission of monetary policy to households through the cash-flow channel in Denmark compared to the euro area so far during this hiking cycle. We find that Danish households have more debt net of deposits and that the pass-through from changes in monetary policy rates to retail rates has so far been larger in Denmark.¹ Stronger pass-through to interest rates on new loans, higher loan turnover and shorter interest fixation periods have contributed to a faster pass-through to interest rates on outstanding loans.²

Moreover, our findings shows that the pass-through of monetary policy rates to retail rates during this hiking cycle until now has been weaker than in 2005-2008, both in Denmark and the euro area. This highlights that the strength of transmission may change over time. Thus, it is important to understand and track developments in factors that affect the transmission.

Finally, we take a step towards assessing the possible consumption response following the changes in cash flows generated by higher interest rates. We find that the net interest rate exposures both of average and of hand-to-mouth households are substantially larger (i.e. more negative) in Denmark than in the euro area. This could imply a larger initial consumption response following an interest rate increase in Denmark compared to the euro area.³

¹ Cross-country heterogeneity in transmission strength of monetary policy and debt levels is also discussed in ECB Economic Bulletin, Issue 5/2023 and in Georgiadis (2015)

² See also Pica (2023), Bank of Italy, for an analysis of adjustable rate mortgage share and heterogeneous effect of monetary policy across the euro area

³ See, for example, Auclert (2019) and Slacalek et al. (2020) for more comprehensive analyses of the impact of monetary policy on consumption.

The implications of our main findings for the relative strength of the cash-flow channel between countries during this cycle are summarized in the heatmap in table 1.

It is important to note that even though we take a step towards understanding the direct implications for household consumption, we do not provide evidence on the size of the consumption response or other real economic consequences of monetary policy.⁴ Consequently, the findings in this memo should not be interpreted as evidence of an overall stronger transmission of monetary policy in Denmark compared to the euro area. Rather, it should be seen as a contribution towards understanding how monetary policy impacts households' cash flows and how households' consumption responses may differ across countries.

In summary, the analysis suggests a stronger transmission through the cash-flow channel in Denmark compared to the euro area average. However, our analysis also shows that there is considerable heterogeneity in the transmission within the euro area. Thus, the strength of the cash-flow channel in Denmark is not an outlier when compared to the variation among euro area countries.

TABLE 1

Summary of main findings and their implications for the strength of the transmission of monetary policy through the cash-flow channel

| | Interest rate transmission | | Household balance sheet | | | Heterogeneity | |
|----|-------------------------------|---------------------------------------|-------------------------|------------------------------|----------------------------|-------------------------|-----------------------------------|
| | Pass-through to lending rates | Share of loans with IRF within 1 year | Debt to income | Deposits and bonds to income | Net interest rate exposure | Share of HtM households | Net interest rate exposure of HtM |
| DK | Dark Red | Light Red | Dark Red | Dark Red | Dark Red | Light Red | Light Red |
| EA | Light Red | Light Red | Light Red | Light Red | Light Red | Light Red | Light Red |
| DE | Light Red | Light Red | Light Red | Light Red | Light Red | Light Red | Light Red |
| FR | Light Red | Light Red | Light Red | Light Red | Light Red | Light Red | Light Red |
| IT | Light Red | Dark Red | Light Red | Light Red | Light Red | Light Red | Light Red |
| ES | Light Red | Dark Red | Light Red | Light Red | Light Red | Light Red | Dark Red |

Note.: The table shows different shades of red, where darker shades of red indicate that the main finding within that cell suggests a stronger (more negative) transmission of monetary policy through the cash-flow channel. Interest rate exposure refers to the degree to which fluctuations in interest rates generate cash flows for households, defined in box 2. HtM households refer to hand-to-mouth households with little liquid wealth, see section 4.

Source: Main findings.

Structure of the memo

The memo is structured as follows: First, we describe the pass-through to lending and deposits rates in the current cycle and discuss structural differences between countries that matters for the transmission at an aggregate level (section 2). Next, we compare the pass-through seen in this cycle to the hiking

⁴ It is beyond the scope of this memo to estimate the elasticity of consumption in response to changes in the monetary policy rate, preventing us from calculating the aggregate consumption response. Additionally, monetary policy operates through various channels in addition to the cash flow channel - such as the labor market or wealth channels - which could also impact household consumption. However, these channels are not considered in this memo.

cycle in 2005-2008 and map out key structural changes over time that are potentially responsible for the development at the aggregate level (section 3). In the following section (section 4), we study cross-country micro data to understand households' interest rate exposure across countries for households with different marginal propensities to consume. This includes households at different positions of the income distribution as well as households defined as hand-to-mouth households. Finally, section 5 wraps up and summarizes our findings.

02 Stronger pass-through to lending and deposit rates in Denmark

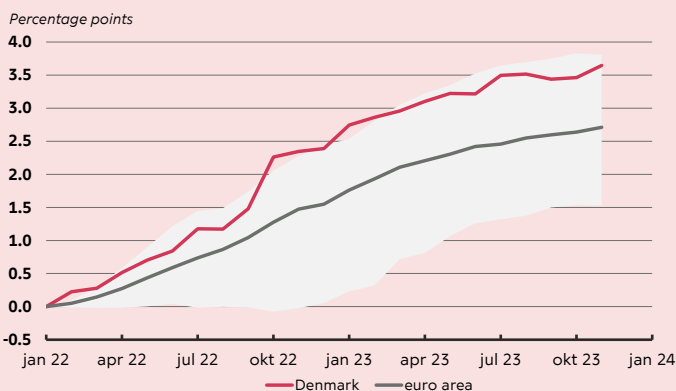
Interest rates on new loans to households have risen faster in Denmark compared to the euro area

The transmission from higher monetary policy rates to the interest rates on *new* loans for house purchase purposes has been stronger in Denmark compared to the euro area, as seen in chart 1. The cumulative rise in retail lending rates in Denmark from the beginning of 2022 until November 2023 was about 3.6 percentage points. This partly reflects that interest rates on new loans in Denmark started rising in early 2022 based on market anticipation of future monetary policy tightening (Danmarks Nationalbank, 2023a). In comparison, euro area households experienced a slower and more modest rise in the interest rates on new loans throughout 2022. This has happened even though the monetary policy rate has increased by 30 bps more in the euro area than in Denmark. However, during 2023 the rate of change in interest rates have been more similar in Denmark and the euro area.

The steady rise in the euro area average interest rate on *new* loans encompasses considerable cross-country variation within the euro area. The cumulative interest rate change within the euro area spans between 1.5 and 3.8 percentage points, as indicated by the shaded area in chart 1, with Denmark comparable to those euro area countries where rates have risen the most.

CHART 1

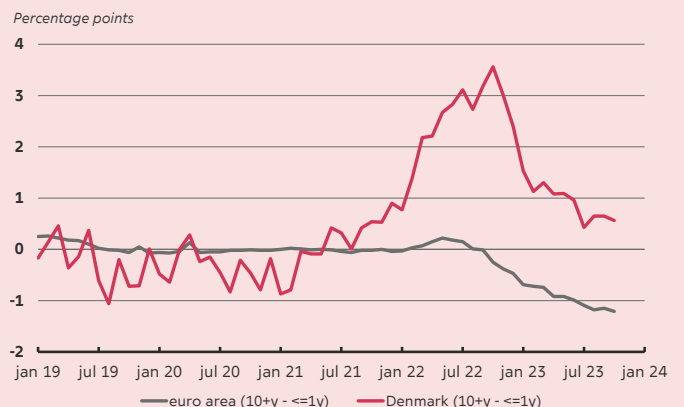
Interest rates on new loans have risen faster in Denmark compared to the euro area



Note: Percentage point changes since January 2022 for interest rates on newly issued debt (all loans with house purchase purpose) to households. The shaded area represents the spread across countries within the euro area (Greece, Croatia, Luxemburg and Malta are excluded).
 Source: Danmarks Nationalbank and ECB.

CHART 2

The spreads between long and short rates on newly issued housing loans has diverged for Denmark and the euro area



Note.: Interest rate spread between newly issued loans to households (for house purchase purposes), with interest rate fixation period of 10+ years and less than 1 year.
 Source: Danmarks Nationalbank and ECB.

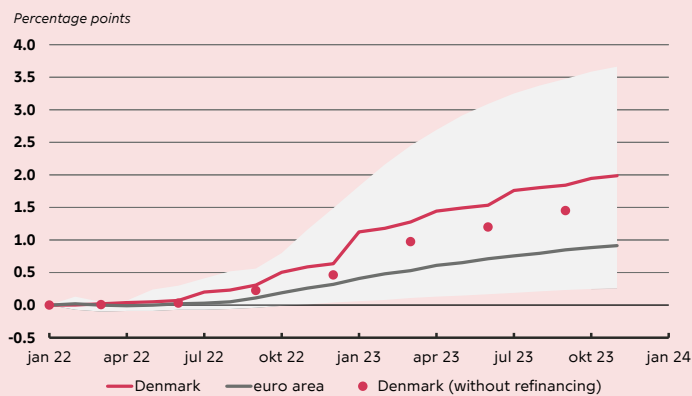
The forward-looking market-based mortgage system in Denmark has contributed to a faster pass-through

A key driver for the relatively fast rate pass-through in Denmark is the market-based mortgage system. Issuance of Danish mortgages are based on the match-funding principle.⁵ This principle ensures that there is a direct transmission from the market-based funding terms faced by mortgage institutions to the concurrent lending rates on new mortgages. Changes in the prevailing market rates are thereby transmitted swiftly to new mortgage rates. Conversely, in most euro area countries, interest rates on loans to households are typically set discretionarily by creditors. Banks in the euro area have to a large extent raised lending rates only after the increase in monetary policy rates have occurred, due to a lack of a built-in, direct forward-looking transmission mechanism from financial market expectations to mortgage rates. Thus, interest rates on new loans in Denmark have also increased more than in Germany, France, Spain, and Italy, as seen in Chart 25 in the appendix.

The mortgage yield curve is positively sloped in Denmark and negatively sloped in the euro area, as illustrated in chart 2. This reflects that the interest rates at the long end of the yield curve are significantly higher in Denmark. To a large extent, this is due to the special features of the Danish mortgage framework. One contributing factor to the positive slope in Denmark, and thus the larger increase in interest rates on new loans with long interest rate fixation, has been a widening of the so-called prepayment premium on newly issued Danish long-term callable mortgage bonds.⁶ The prepayment premium reflects that investors require compensation for the fact that homeowners always have the option (but not the obligation) to prepay the loan at par. A higher implied volatility in bond markets during the current hiking cycle has prompted investors to demand a larger prepayment premium on callable mortgage bonds to compensate for the associated risk.⁷

CHART 3

Average interest rates on household debt have risen faster in Denmark

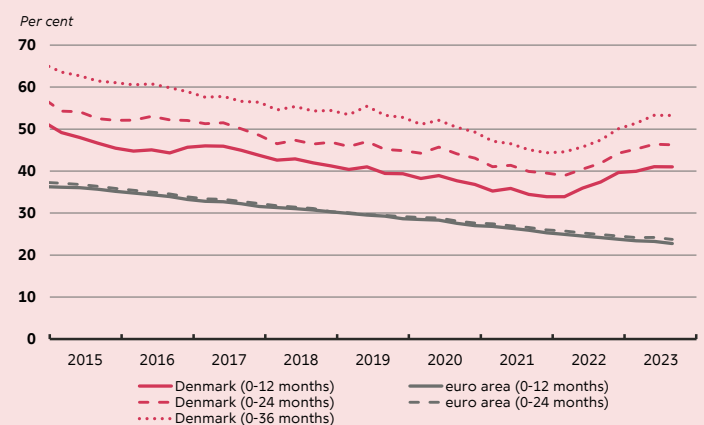


Note: Percentage point changes since January 2022 for interest rates on total outstanding debt of households. The shaded area represents the spread within the euro area (Greece, Croatia, Luxemburg and Malta are excluded).

Source: Danmarks Nationalbank and ECB.

CHART 4

The share of outstanding loans due for interest rate fixation within the next years is significantly larger in Denmark



Note: Share of outstanding debt that is due to receive a new interest rate within the shown periods. Data for euro area 0-36 months is not available.

Source: Danmarks Nationalbank and ECB.

⁵ See section 2 on the Danish mortgage credit system in the Covered Bond Handbook by Danske bank (2016).

⁶ Another contributing factor is market liquidity, see Bentsen and Jensen (2023). For more details on the decomposition of the effective mortgage rate, see pages 10-11 in Danmarks Nationalbank (2020).

⁷ The increase in the prepayment premium is documented in chart 12 in Danmarks Nationalbank (2023b).

The positively sloping mortgage yield curve in Denmark may have contributed to the relatively high demand for mortgages with shorter rate fixation. About 40 percent of the Danish homeowners who refinanced their 30-year fixed rate mortgages in 2022 switched to loans with interest rate fixations below 5 years, in particular loans with a floating interest rate. This shift in households' debt structure has decreased the average interest rate fixation period in Denmark and increased the interest rate exposure of households going forward.⁸

Interest rates on outstanding loans have also risen more in Denmark compared to the euro area

The average interest rate on households' total outstanding debt has also increased considerably faster in Denmark compared to the euro area, as seen in chart 3. The average interest rate on outstanding household debt in Denmark has increased by approximately 2.0 percentage points since January 2022 against about 0.9 percentage point in the euro area. As was the case for new loans, the euro area average encompasses considerable cross-country variation within the currency union, see shaded area in chart 3. In some euro area countries, the average interest rate has been close to unchanged, e.g. Germany and France, while in some smaller countries the average interest rate has increased more than in Denmark, e.g. Finland.

About one quarter of the increase in the average interest rate on outstanding loans in Denmark can be attributed to households refinancing their fixed-rate mortgages (Danmarks Nationalbank, 2023b). The increase in the average interest rate without the effect from refinancing is illustrated by the dotted line in chart 3. The voluntary refinancing into higher rates against a reduction in outstanding debt increases the loan turnover rate and thus speeds up the gradual pass-through to the average rate on outstanding debt. Refinancing when mortgage rates are higher provides households with an option of using the liquidity gain to reduce debt levels. Consequently, the increase in interest payments following the refinancing of a fixed-rate mortgage when rates are higher will in many cases be moderate due to the countering effect from lower debt levels.⁹

Shorter interest rate fixation periods and higher debt turnover strengthens the pass-through in Denmark

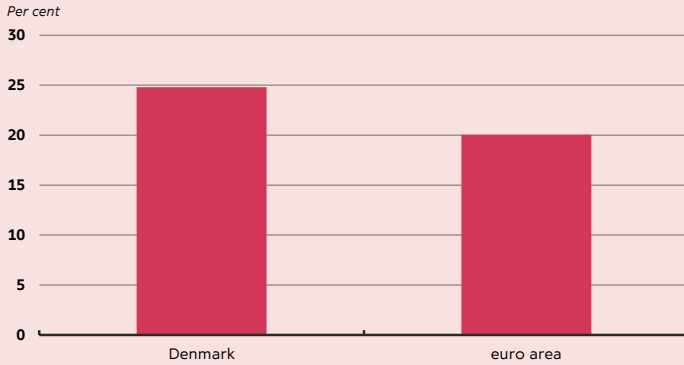
The faster pass-through to the average interest rate on outstanding loans in Denmark can be partly attributed to quicker rate adjustments on *new* loans, as previously shown. Another contributing factor is that interest fixation periods are generally shorter in Denmark compared to the euro area, as seen in chart 4. The chart shows that, by September 2023, 41 percent of household loans in Denmark will receive a new interest rate within the next 12 months compared with only 23 percent in the euro area. This sizable difference suggests a faster pass-through in Denmark from current rates to the average interest rate on all outstanding debt. Interestingly, the chart also shows that within the next 24 months only 25 percent of loans will receive a new rate in the euro area – basically the same share as within the next 12 months. This suggests that the interest fixation structure in the euro area is bifurcated between short-term floating-rate loans and loans with significantly longer fixation periods. Conversely, the prevalence of adjustable-rate mortgages with 3-year and 5-year rate fixation periods in Denmark entails that about 55 percent of outstanding loans are due to receive a new interest rate within the next 36 months. The increasing share of shorter interest rate fixation periods in Denmark since 2022 is not observed in Germany, France, Spain, and Italy, as seen in Chart 26 in the appendix.

⁸ See Andersen et al. (2023b)

⁹ See Andersen et al. (2023b)

CHART 5

Annual debt turnover during 2022-2023 has been higher in Denmark than in the euro area

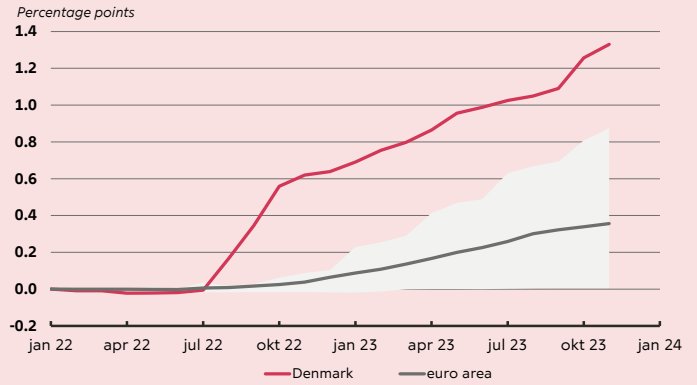


Note: The chart shows the annualized debt turnover ratio defined as all new loans and renegotiations as a share of the total outstanding debt of households. This simple debt turnover ratio should be seen as an upper-bound indicator of the transmission from new lending to the outstanding loan stock since a single loan can be renegotiated multiple times during a hiking cycle.

Source: Danmarks Nationalbank and ECB.

CHART 6

Interest rates on deposits have also risen faster in Denmark compared to the euro area



Note: Percentage point changes since January 2022 for interest rates on overnight deposits for households. The shaded area represents the spread within the euro area (Greece, Croatia, Luxemburg and Malta are excluded).

Source: Danmarks Nationalbank and ECB.

Additionally, the speed at which existing loans are repaid and new loans are issued also affects the pass-through from current lending rates to the rate on the outstanding stock of loans. A higher debt turnover rate in Denmark, as seen in chart 5, has increased the strength of the transmission during this hiking cycle.

Deposit rates have also risen faster in Denmark relative to the euro area

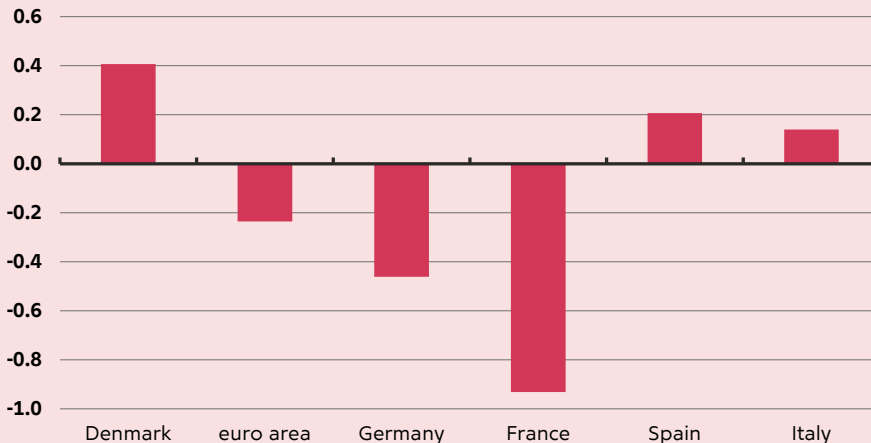
The interest rates that households earn on overnight bank deposits have also increased faster in Denmark compared to the euro area, see chart 6.¹⁰ In fact, deposit rates in Denmark have risen more than in all euro area countries shown in chart 6. A contributing factor driving Danish deposit rates higher is a catch-up effect, as Danish banks in preceding years had negative average deposit rates well below the comparable level seen within the euro area. Similar to lending rates, there are large variations within the euro area in the pass-through to deposit rates. While some countries in the euro area have seen modest rate increases, some countries have hardly seen any increase to this point.

¹⁰ Chart 6 only accounts for overnight deposits and not time deposits and deposits redeemable at notice.

CHART 7

Net interest payments as share of disposable income have risen in Denmark – but fallen in the euro area

Percentage points, change in NIPDI from 2021Q2 - 2023Q2



Note: Interest payments and interest income received are before FISIM allocation. Disposable income refers to gross disposable income for households.

Source: ECB.

Household's interest burden has risen in Denmark – but fallen in the euro area

Since central banks began raising policy rates, Danish households have experienced a slight increase of 0.4 percentage points in their 'net interest payments as a share of disposable income' (NIPDI), as seen in chart 7. This means that households now use a larger fraction of their monthly budget on servicing interest expenses.

Meanwhile, the average NIPDI in the euro area has decreased by 0.2 percentage points. This means that on average households in the euro area have experienced a loosening of their budget constraint through the cash-flow channel since the ECB began raising monetary policy rates. This has been particularly pronounced in France with a decline of 0.9 percentage points. A possible contributing factor is that France has financial regulation aimed at protecting borrowers by capping the lending rates at the usury rate set by Banque de France (Le taux d'usure).¹¹

The increase in NIPDI for Danish households is mainly driven by substantially higher interest expenses, see chart 8. This reflects the relatively fast pass-through to lending rates in Denmark, as previously described. The contribution from increasing interest expenses is in comparison modest in the euro area.

It is important to note that these changes in NIPDI represents the average impact on households. The distribution of both debt and deposits varies greatly between households within each country. Distributional aspects and possible effects of household heterogeneity will be covered in section 4.

¹¹ See more at [link](#)

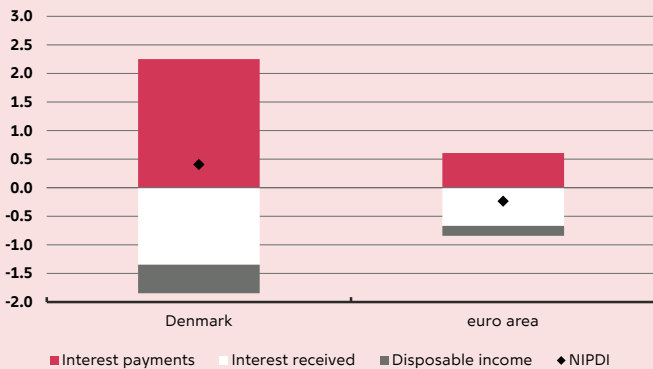
Large deposits cushion euro area households from higher net interest payments

The fall in NIPDI within the euro area can be attributed to the fact that interest income has risen slightly more than interest expenses combined with rising nominal income, as seen in chart 9. This partly reflects that euro area households on average have larger deposits than outstanding debt.

CHART 8

Rising interest expenses dominate in Denmark – in the euro area rising disposable income and interest income dominate

Percentage points, decomposition of change in NIPDI from 2021Q2 - 2023Q2



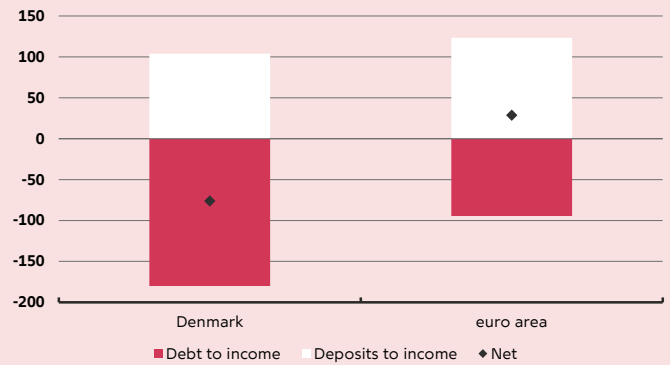
Note: Interest payments and interest income received are before FISIM-allocation. Disposable income refers to gross disposable income for households.

Source: Danmarks Nationalbank, ECB and own calculations.

CHART 9

In 2022, households in Denmark had more debt than bank deposits – opposite in euro area

Per cent of income



Note: Net debt-to-income and deposits-to-income for DK and euro area households in 2022. Deposits covers transferable deposits, time deposits and net debt securities. Income is gross disposable income of households.

Source: Danmarks Nationalbank, ECB and own calculations.

In Denmark, the opposite is the case, as seen in chart 9. In isolation, the larger debt-to-income ratio in Denmark means that households' interest expenses rise faster compared to the euro area when rates increase. Additionally, the larger deposits-to-income ratio in the euro area increases households' interest income when monetary policy rates increase. These differences in balance sheet composition cushion euro area households relative to their Danish counterparts when rates increase.

In the following section, we compare the current hiking cycle to the most recent hiking cycle during 2005-2008 in terms of pass-through to interest rates, average interest rate fixation period, the balance of debt and deposits and the development in NIPDI.¹²

¹² We refer to the 2005-2008 period as the most recent hiking cycle from here and onwards.

03 Structural factors affecting the cash-flow channel have changed since the last hiking cycle

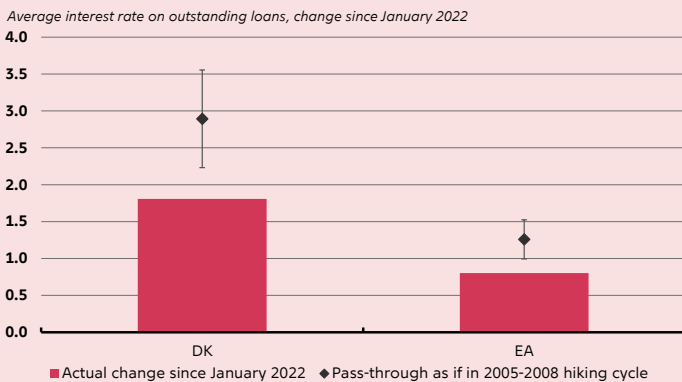
In the previous section, we established that the transmission to lending rates, deposit rates and net interest burden is stronger in Denmark than the euro area thus far in the current hiking cycle. In this section, we explore if the transmission in the current hiking cycle is different from the most recent hiking cycle in 2005-2008.

Pass-through to the average interest rate on outstanding loans is slower now compared to the hiking cycle during 2005-2008

In order to relate the pass-through in the current hiking cycle to the prior cycle, we conduct a counterfactual exercise. Specifically, we estimate regression models on data from the prior hiking cycle in 2005-2008. The estimated parameters are then used to project a counterfactual development in the retail rates for households in the current hiking cycle, i.e. assuming the same

CHART 10

Pass-through to average interest rate on outstanding loans has so far been weaker in the current hiking cycle

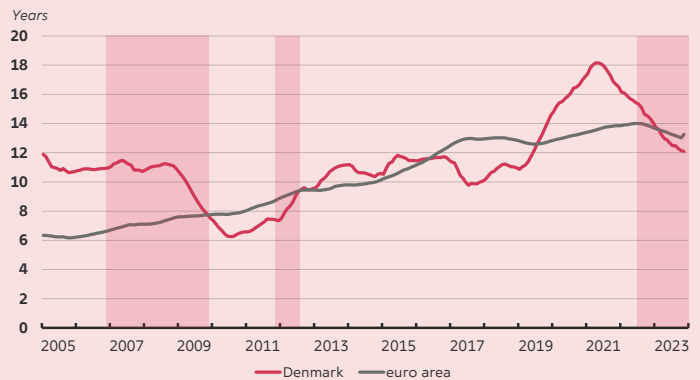


Note: The red bars refer to the actual accumulated change in the interest rate on outstanding loans during the current hiking cycle, whereas the black diamonds represent an estimate assuming the same transmission strength as in the previous hiking cycle in 2005-2008 but the path of monetary policy rate increases during the current cycle. The bands are 90 pct. confidence intervals. See box 1 for details about the regression models.

Source: Danmarks Nationalbank, ECB and own calculations.

CHART 11

Average interest rate fixation period on new debt has been rising steadily in the euro area since 2005



Note: The chart shows the weighted average interest rate fixation period on newly issued debt to households as a moving average over the preceding 2 years. The weights used for debt with interest rate fixation periods of less than 1 year, 1 to 5 years and 5+ years are given by 6 months, 3 years and 30 years (20 years for euro area) respectively. The two first weights are chosen as midpoints within their given intervals. As for the long weight, the typical loan with a fixed rate in Denmark has a contractual duration of 30 years. For the euro area, the fixed rate in a 20-year IRS (where the floating rate is a 6-month EURIBOR) has served as a proxy benchmark for long loans in related work, see Majordomo and Roibás (2023).

Source: Danmarks Nationalbank and ECB.

transmission strength as in 2005-2008, but with the path of monetary policy rate increases and market interest rates during the current cycle. A more detailed description of the regression models can be found in box 1. Results from the models are shown in chart 10 and illustrates that the pass-through from policy rates to rates on outstanding loans until now has been weaker during the current cycle in both Denmark and the euro area compared to 2005-2008. However, it should be noted that this comparison is only to the 2005-2008 hiking cycle and not to the average pass-through during *all* previous hiking cycles. Despite the pass-through being weaker compared to 2005-2008, it may still be in line with the average across a larger set of previous hiking cycles. We leave this question for future analysis.

Estimates on the pass-through to interest rates on *new* loans indicate no significant difference between the current cycle and 2005-2008. This is the case for both Denmark and the euro area, as seen in chart 27 in the appendix. However, in the case of Spain the pass-through to rates on new loans seems to have decreased compared to 2005-2008 as shown in Mayordomo and Roibas (2023).

Weaker pass-through may be driven by longer interest rate fixation and slower loan turnover

Since 2005, euro area households have gradually transitioned towards mortgages with longer rate fixations, as seen in chart 11. This shift has likely contributed to a weaker rate pass-through during the current cycle as longer interest rate fixation slows down the gradual rate adjustment for outstanding debt. This trend has been particularly strong in Spain and Italy.

BOX 1

Comparing the interest rate pass-through between two hiking cycles

The two cycles (2005-2008 and 2022-2023) differ both in terms of duration as well as speed and sizes of the monetary policy hikes. To compare the pass-through, we estimate an econometric model on the previous hiking cycle, which seeks to evaluate the pass-through of monetary policy rates to average retail rates during that cycle. Predictions for the current hiking cycle produced are then generated from these models to provide a counterfactual estimate of the evolution of the retail rates during 2022-2023, *had the pass-through from policy rates been the same as in 2005-2008*. In that sense, comparing the actual and the model-implied evolution of retail rates indicates whether the pass-through has changed.

The pass-through is examined by standard pass-through models inspired by the literature (Gopinath, Itskhoki and Rigobon, 2010; Messer and Niepmann, 2023; Mayordomo and Roibas, 2023). We estimate three time series models for each country/region ($c = DK, EA$) for the pass-through to the average rate on households' outstanding bank debt (1), their over-night deposit rate at banks (2) and finally, the rate on new bank debt (3).

$$\Delta \text{Outstanding_debt_rate}_{c,t} = \mu_1 + \sum_{i=0}^6 \beta_{1,t-i} \Delta \text{MP_rate}_{c,t-i} + \varepsilon_{1,c,t} \quad (1)$$

$$\Delta \text{Deposit_rate}_{c,t} = \mu_2 + \sum_{i=0}^6 \beta_{2,t-i} \Delta \text{MP_rate}_{c,t-i} + \varepsilon_{2,c,t} \quad (2)$$

$$\Delta \text{New_loans_rate}_{c,t} = \mu_3 + \sum_{i=0}^3 \beta_{3,t-i} \Delta \text{MP_rate}_{c,t-i} + \sum_{i=0}^3 \gamma_{t-i} \Delta \text{OIS3Y_rate}_{t-i} + \varepsilon_{3,c,t} \quad (3)$$

Data are monthly observations from 2004-2008. The decision on lag-length and inclusion of a 3-year overnight index swap rate in the models on new loans only is based on statistical tests and the desire to keep the models parsimonious. Inclusion of more lags and, e.g., additional market interest rate variables does not change the results or conclusions materially.

The models capture the pass-through during the most recent hiking cycle and not the long-run pass-through. Moreover, the pass-through only stems from higher monetary policy rates which were the only monetary policy tool in action in the sample period.

Contrary to the euro area, Danish households have a less pronounced trend towards longer rate fixation, as seen in chart 11. The average fixation period on new debt in Denmark varies substantially; however, from 2010-2021 the fixation period was gradually increasing. The availability of loans with interest rate fixation periods ranging from 6 months to 30 years and refinancing behavior following interest rate changes contributes to the fluctuations.

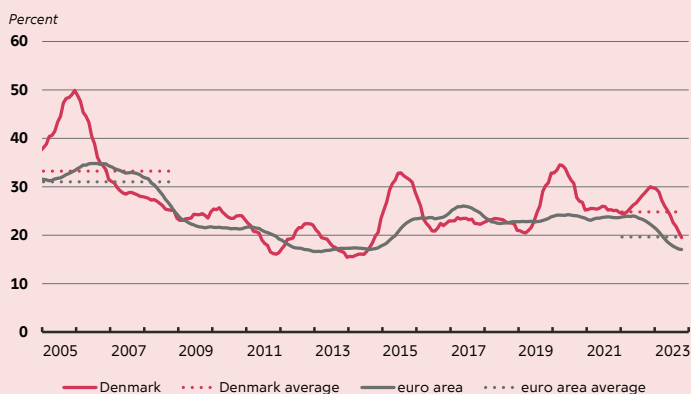
Furthermore, the cash-flow channel is also affected by how current rates are transmitted via the issuance of *new* loans and the roll-off of existing loans, as described in the previous section. Debt turnover has been lower in Denmark during this cycle than in 2005-2008, as seen in chart 12, thus indicating that the substantial slowdown in household borrowing during the current hiking cycle has contributed to dampening the rate transmission and consequently weakened the cash-flow channel. A similar dampening effect is also present for the euro area. Generally, the debt turnover is more volatile in Denmark with pronounced spikes in periods with large volumes of mortgage refinancing.

Pass-through to deposit rates is significantly weaker now than in the previous hiking cycle – especially in Denmark

Our empirical estimates indicate that the pass-through to overnight deposit rates is significantly weaker in the current cycle compared to 2005-2008, as seen in chart 13. The tendency towards weaker pass-through seems prevalent for both Denmark and the euro area. Further, it should be noted that the results only indicate a weaker pass-through compared to the 2005-2008 cycle and not necessarily an average of a larger set of past cycles. Another insight is that the pass-through to deposit rates is stronger in Denmark compared to the euro area

CHART 12

Annual debt turnover during this cycle has been lower compared to 2005-2008

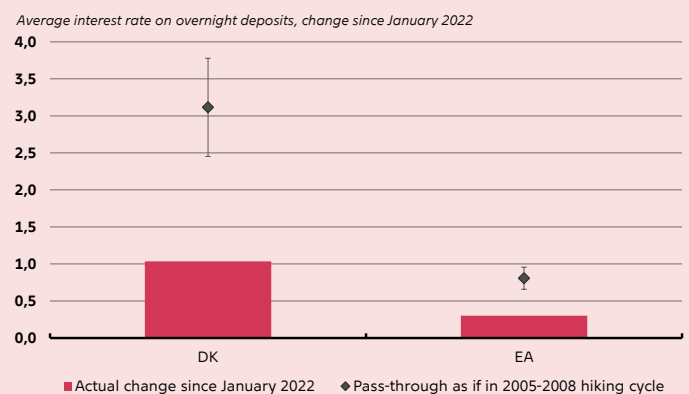


Note: The chart shows the annualized debt turnover ratio defined as all new loans and renegotiations as a share of the total outstanding debt of households. This simple debt turnover ratio should be seen as an upper bound indicator of the transmission from new lending to the outstanding loan stock since a single loan can be renegotiated multiple times during a hiking cycle.

Source: Danmarks Nationalbank and ECB.

CHART 13

Pass-through to deposit rates has so far been weaker in the current hiking cycle in both Denmark and the euro area



Note: The red bars refer to the actual accumulated change in the interest rate on over-night deposits during the current hiking cycle, whereas the black diamonds represent an estimate assuming the same transmission strength as in the previous hiking cycle in 2005-2008 but the path of monetary policy rate increases during the current cycle. The bands are 90 percent confidence intervals. See box 1 for details about the regression models.

Source: Danmarks Nationalbank, ECB and own calculations.

both in this hiking cycle and in the 2005-2008 cycle. During this cycle, the stronger pass-through in Denmark has contributed to a convergence in the level

of deposit rates in Denmark and the euro area, as the deposit rates were initially lower in Denmark when the current cycle began.

Excess liquidity and compressed margins may weaken the transmission to deposit rates during this cycle

Banks in both Denmark and the euro area have accumulated considerable liquidity in recent years. Rising bank deposits, stable loan demand and regulations aimed at improving liquidity and stability in the financial system may reduce the incentive for banks to attract short-duration deposits.¹³ In turn, ample liquidity may dampen price competition and thereby the need to increase overnight deposit rates during the current cycle (Messer and Niepmann, 2023).

In addition, the low interest rate environment in the years leading up to the current hiking cycle have generally compressed banks' interest margins, as most credit institutions were hesitant to reduce deposit rates into negative territory¹⁴. This introduced downward stickiness in deposit rates while lending rates continued to decline, hence compressing banks' interest rate margins. Both potential explanations, excess liquidity and compressed margins imply that the pass-through to deposit rates is slower in the current hiking cycle.

The debt-to-income ratio has been reduced in Denmark since 2005, but Danish households still have more debt than deposits – contrary to the euro area

The potential impact through the cash-flow channel is affected by the amount of debt and deposits that households have. Changes in household balance sheets over time is therefore an important structural aspect that affects the strength of the cash-flow channel.¹⁵ As chart 14 shows, Danish households have reduced their debt-to-income ratio from about 280 percent in 2008 to 160 percent in 2023. All else equal, this makes Danish households less sensitive to rising interest rates today than they were in 2005-2008, at the aggregate level. However, during the same period Danish households have also reduced their deposits to income ratio.

The balance sheet for euro area households has been remarkably steady with regards to debt and deposits since 2005. The debt-to-income ratio remains close to 90 percent, and the deposit-to-income ratio has increased slightly since 2005 from 110 percent to 120 percent. The most striking characteristic of the euro area household balance sheet compared to that of Danish households is that there are more deposits than debt in the euro area. This is the case in both 2005-2008 and in 2022-2023.

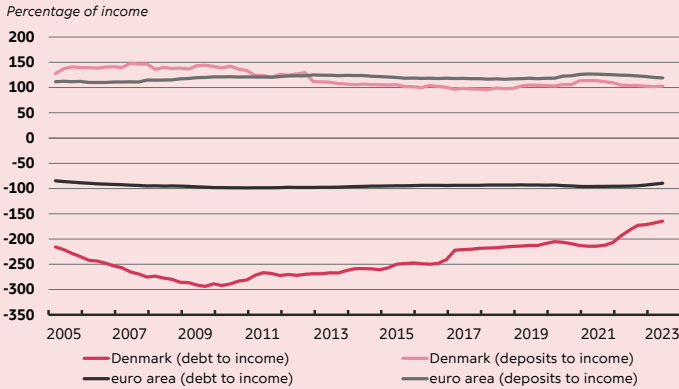
¹³ Specifically, legal requirements for bank liabilities introduced after the financial crisis, including requirements for stable funding (NSFR), have reduced the value of deposits as funding, see Financial Stability Report, High earnings can counteract increased risks for the banks, Danmarks Nationalbank, November 2023.

¹⁴ Finansiell stabilitetsrapport, Rentestigningerne mærkes hos bankerne og deres kunder, Danmarks Nationalbank, juni 2023.

¹⁵ See Otte and Yordanova (2020) for an analysis of how and why the balance sheets of Danish households have changed since 1983.

CHART 14

Danish households have reduced their debt since the hiking cycle in 2005-2008

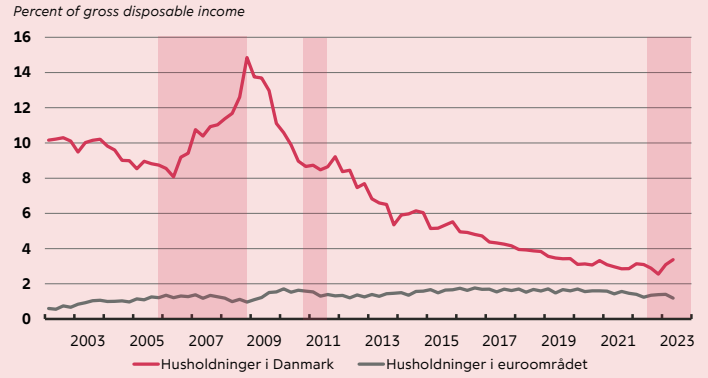


Note: Debt-to-income and deposits-and-bonds-to-income for DK and euro area households. Deposits and bonds cover transferable deposits, time deposits and debt securities. Income is gross disposable income of households.

Source: ECB and DST.

CHART 15

Net interest burden rises in Denmark during hiking cycles, but falls in the euro area



Note: Net interest payments as share of gross disposable income. Interest payments and interest income received are before FISIM allocation. Shaded areas indicate periods with rising monetary policy rates.

Source: ECB.

When comparing the balance sheet of Danish households to those of the euro area, it is important to note that Danes have significantly larger pension savings and privately held equity portfolios.¹⁶ As mentioned earlier, this memo is focused on the direct effect on the cash-flow of households so further considerations regarding potential effects through the wealth channel is beyond the scope, although they may have important implications for the impact of monetary policy.

Households’ net interest burden rose much more in Denmark in the previous hiking cycle than in the current cycle

A way to summarize many of the previous results is to consider ‘net interest payments as a share of gross disposable income’ (NIPDI). As described in the previous section, NIPDI has increased in Denmark during the current hiking cycle, but decreased slightly in the euro area.

During the hiking cycle from 2005-2008, there was a big increase in NIPDI for Denmark and again a tendency towards a slight decrease in the euro area, and the same pattern is also notable around the short hiking cycle in 2011, as seen in chart 15. This indicates a structural transmission to the budget of Danish households through the cash-flow channel when monetary policy rates rise. Conversely, in the euro area it indicates a tendency towards a slight loosening of households’ budgets through the cash-flow channel. Again, we note that this is a result at the aggregate level. Individual households might be affected differently than the average. Such heterogeneous effects will be the focus of the following section 4.

The interest burden (NIPDI) rose markedly in Denmark in 2005-2008, and we have not seen a similar rise so far during the current hiking cycle, as seen in chart 15. However, it should be noted that this cycle has been characterized by a rather rapid increase in interest rates. Therefore, it is possible that part of the

¹⁶ See Andersen et al. (2022) and Andersen et al. (2023c).

difference is due to a lag effect, and that we most likely have not seen the full impact in this cycle yet. Other factors contributing to the difference includes the reduced debt level in Denmark and the weaker pass-through to the average rate on outstanding loans in this cycle compared to 2005-2008. Specifically, the debt-to-income ratio in Denmark was increasing during 2005-2008 when interest rates were increasing, hence pronouncing the increase in NIPDI. During the current hiking cycle debt-to-income ratio has been decreasing. Finally, increases in disposable income also directly affect the NIPDI. Increases in gross disposable income have been more pronounced in Denmark in 2022-2023 than in 2005-2008, contributing to a more modest increase in NIPDI so far in the current hiking cycle.

In the euro area, the interest burden has shown a similar pattern during this cycle compared to previous hiking cycles. Contributing factors include that the level of debt to income and deposits to income has been relatively stable in the euro area since 2005. The increase in disposable income during this cycle has also been more pronounced in the euro area compared to 2005-2008. Generally, the interest burden has been significantly less volatile in the euro area compared to Denmark since 2005.

To summarize, the aggregate results in the previous two sections would suggest a stronger transmission through the cash-flow channel in Denmark compared to the euro area during this hiking cycle, and a somewhat weaker transmission during this cycle compared to 2005-2008 in both Denmark and the euro area.

04

Household heterogeneity matters for monetary policy transmission

In the previous sections, we have established that the transmission of monetary policy to average retail interest rates has been stronger in Denmark compared to the euro area. The extent to which higher interest rates generate cash-flow changes for households depends on which types of assets and liabilities they have. Empirical studies have shown that household heterogeneity in terms of balance sheet composition is very important for understanding how different households are impacted differentially by interest rate changes. Especially the distribution of debt and liquid assets is important for the monetary transmission since marginal propensities to consume vary across households.¹⁷ Thus, cross-country differences in households' balance sheet composition are important for understanding how interest rate increases impact Danish households compared to euro area households. In the remainder of the memo, we therefore focus on the asset and debt composition of Danish and euro area households. We consider, for example, differences in the prevalence of different types of mortgages and homeownership rates and compare household characteristics across countries in dimensions that we expect to matter for the implied consumption response.

Danish households are more levered than euro area households

We use household-level data from 2021 on Danish households from Danish administrative registers and household level data on euro area households from the 2021 wave of the Household Finance and Consumption Survey (HFCS). Combining these data sources allows us to compare households' balance sheet composition across countries. Table 2 illustrates how household balance sheets differ across countries. As already hinted by the heatmap summary of our main findings and chart 9, table 2 shows that Danish households have much more debt relative to income compared to households in the euro area.¹⁸ However, table 2 also shows that this is not true within all types of debt as, e.g., French households have more fixed-rate mortgages and Spanish households have more adjustable-rate mortgages than Danish households.¹⁹ The table shows no clear correlation between homeownership rates and debt levels across countries, but a clear correlation between debt levels and the share of households that are mortgaged, see also chart 28 in the appendix. This illustrates the importance of the mortgage market for debt levels and the pass-through of monetary policy through the cash-flow channel across countries.

¹⁷ See e.g. Andersen et al (2023a), Crawley and Kuchler (2023), Holm et al (2021) and Hviid and Kuchler (2017).

¹⁸ Note that Chart 9 and Table 2 show a similar pattern but not identical leverage ratios as the denominator differs in the leverage measures. In Chart 9 the denominator is gross disposable income whereas the denominator in Table 2 is gross income.

¹⁹ The characteristics of fixed and variable rate mortgages also vary across countries. Fixed rate mortgages in Denmark are contractually fixed for up to 30 years, which is longer than in other countries.

TABLE 2

| | Debt / Income | FRM/ Income | ARM/ Income | Other debt/ Income | Per cent who owns real estate | Per cent who has mortgage | Interest bearing assets/income |
|-----------|---------------|-------------|-------------|--------------------|-------------------------------|---------------------------|--------------------------------|
| DK | 146% | 55% | 44% | 37% | 46% | 36% | 48% |
| euro area | 70% | 35% | 27% | 9% | 62% | 24% | 72% |
| DE | 49% | 35% | 8% | 5% | 45% | 18% | 59% |
| ES | 95% | 20% | 60% | 15% | 74% | 35% | 81% |
| FR | 95% | 62% | 21% | 13% | 57% | 26% | 67% |
| IT | 46% | 24% | 13% | 9% | 77% | 14% | 107% |

Note.: The table shows the total outstanding debt over total gross income, the total amount of fixed rate mortgage debt to gross income and so on for each country. FRM refers to fixed-rate mortgages and ARM refers to adjustable-rate mortgages, where the distinction is whether the loan agreement allows the interest rate to vary during the life of the contract. For Denmark, total debt is the sum of the market value of mortgage debt and other debt, whereas data for FRM and ARM are based on nominal values.

Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

Steeper income gradient in debt in Denmark compared to euro area countries

Chart 9 in section 2 has already shown that Danish households in the aggregate have more debt relative to income compared to both the euro area and the individual countries included in this analysis. Supplementing this evidence chart 16 shows household leverage for different income groups across countries. Interestingly, the chart shows that the high leverage of Danish households in the aggregate is mostly a result of higher leverage among households in the top 20 per cent in terms of income. For the consumption response related to the cash-flow channel, this could, in isolation, imply that the overall higher leverage of Danish households does not translate into an accordingly higher consumption response since the households with most of the debt are, generally speaking, households with relatively low marginal propensities to consume. We will return to this issue later.

The high leverage of Danish top-income households could be due to several factors related to the housing and mortgage markets, for example duration of loans, the availability of interest-only loans, collateral requirements and homeownership rates. The asset side of the balance sheet also plays a role.²⁰ In comparison with euro area counterparts, a larger share of high-income Danish households are mortgaged, see chart 17. Conditional on being mortgaged, there is no clear income gradient in the extent of adjustable-rate mortgages in Denmark and individual euro area countries, see chart 18. The prevalence of adjustable-rate mortgages seems to vary more between countries than across income groups within countries. This suggests that mortgage market characteristics are important for the functioning of the monetary policy transmission.²¹

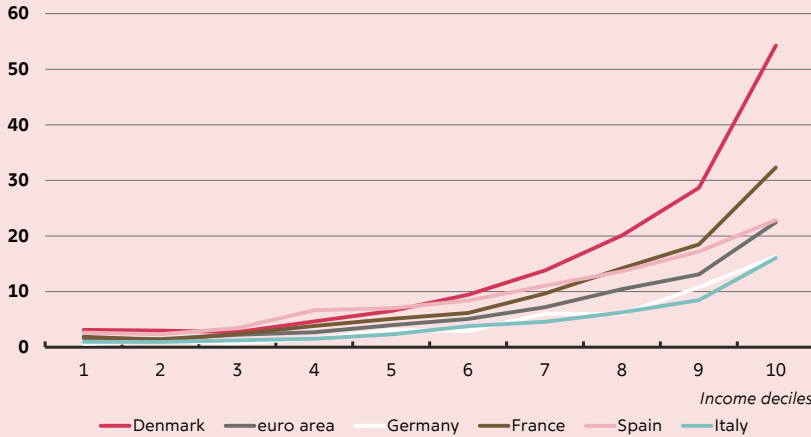
²⁰ For example, if households have a substantial pension wealth, they do not necessarily need to bring down their level of debt before retirement to the same extent as households without pension wealth. See Andersen et al. (2022) for an overview of the literature on links between debt levels and pension wealth.

²¹ See, for example, Pica (2023) for more on mortgage markets and heterogeneity of monetary policy across the euro area. Further information on heterogeneity in mortgage market finance across OECD countries can be found in Hoenselaar et al. (2021).

CHART 16

Danish top income households have much more debt than top income households in the euro area

Group liabilities/total income, per cent



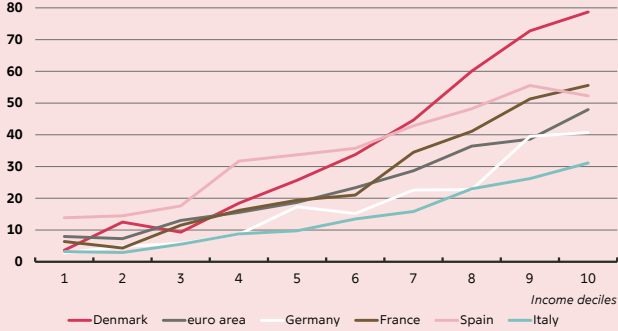
Note: The chart shows the debt level in each income decile as a fraction of total gross income for all households in the country/area.

Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

CHART 17

Larger share of mortgage holders at the top of the income distribution in Denmark compared to euro area

Share with mortgage, per cent



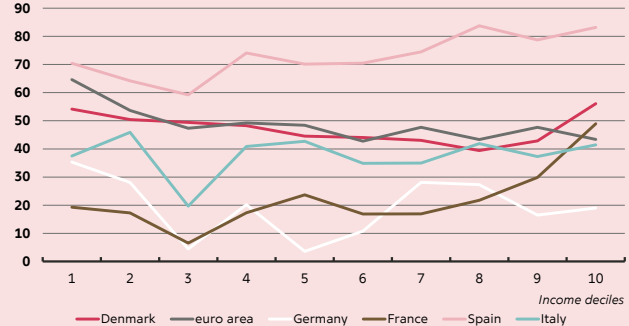
Note: Income deciles are within country deciles based on gross income

Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

CHART 18

There is no clear income gradient in the share of households with adjustable-rate mortgages among mortgage owners in Denmark or euro area

Share of mortgage holders with ARM, per cent



Note: Income deciles are within country deciles based on gross income

Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

BOX 2

Measurement of interest exposure

To understand the importance of changes in interest rates for individual households' cash flows, we consider the Unhedged Interest Rate Exposure (URE), see Auclert (2019). Conceptually, URE measures the net amount of assets and liabilities that is exposed to interest rate fluctuations over a given period, typically one year. URE can therefore be used to obtain an estimate of the impact on household cash flows of, for example, an interest rate increase of 1 percentage point for one year.

In line with the literature, we measure URE as the difference between maturing assets and maturing liabilities at a 1-year horizon. As maturing assets, we count all bank deposits, as well as 25 percent of the value of bond holdings and mortgage deeds. For the euro area, we also include 90 percent of managed accounts, following Tzamourani (2021). Maturing liabilities include all bank debt as well as all adjustable-rate mortgages (ARM). The latter also includes loans with a longer remaining time-to-interest rate fixation than one year. Based on the available data, it has not been possible to estimate the share of ARMs that are due to have their interest rate reset at a 1-year horizon. To enable comparison, we therefore also in data from Denmark include all ARMs in URE, while acknowledging that this will imply an overestimation of the short-term interest rate exposure of mortgage debt.

In principle, URE should also include the amount that a household expects to save over the coming year, but we are not in our data able to estimate this amount in a way that enables comparison between Denmark and the euro area.

A positive URE value indicates that households have more maturing assets than liabilities, and that their cashflow over the coming year therefore would benefit from an interest rate increase, whereas the opposite is the case for negative URE values. Danish households' total URE amounts to around -30 percent of their gross income, whereas it in the euro area amounts to around +30 percent. This could imply that the downward impact of interest rate increases on consumption will be higher in Denmark than in euro area countries. This will, however, also depend on the distribution of URE across different types of households with varying marginal propensities to consume.

While inclusion of all ARMs in URE may, as discussed, imply an overestimation of the interest rate sensitivity of debt for Denmark (and other countries), the possibility to refinance fixed rate mortgages (FRM), which is a specific feature of the Danish mortgage market (see discussion earlier), may contribute to an underestimation of the interest rate exposure of debt. If households to a large extent buy back their FRMs and replace them by higher rate FRMs, interest rate sensitivity of FRMs would *de facto* be substantial, even though it is not so in contractual terms.

To assess the size of cash-flows generated by interest rate increases, in addition to mortgages we also need to take other debt and interest-bearing assets into account. We therefore consider the so-called Unhedged interest Rate Exposure (URE). In essence, URE measures the impact of a change in interest rates on changes in households' cashflows through their net interest rate exposure. See box 2 for a more detailed description of URE.

Interest rate increases have opposite effects on cash flows for Danish and euro area households

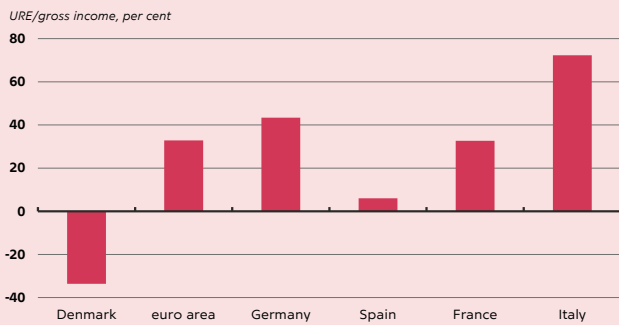
Danish households have on average a negative URE, implying that Danish households on average will experience a negative cashflow from interest rate increases, see chart 19. In all other countries included in the chart URE is positive or close to zero on average. This could indicate that aggregate consumption in Denmark would react stronger to an increase in interest rates than in the euro area. The cash-flow-induced response of aggregate consumption to an interest rate increase will, however, in addition to the size of the induced changes to cash flows also depend on their distribution. Chart 20 therefore illustrates how URE is distributed across income groups. Interestingly, URE is clearly negative for high-income households in Denmark, whereas URE in the other countries is generally positive. For all countries in the chart there is almost no income gradient across the bottom-to-middle-income households.

As already briefly discussed above, it is typically found in the literature that households with higher income have a lower marginal propensity to consume

following an unexpected shock to their income. Our finding that the richest Danish households account for the largest part of the debt and have the largest (negative) interest rate exposure could therefore imply that the response of aggregate consumption would be smaller than if the interest rate exposure had been more equally distributed. However, this conclusion is not certain, as it depends on actual marginal propensities to consume as well as the distribution of income and consumption. Even if the richer households on average have lower marginal propensities to consume and adjust their consumption less in percentage terms than lower-income households following a shock to interest payments, the aggregate consumption response to rising interest rates may still be larger in euros if the richest households account for a large share of total consumption.²² It is outside the scope of this memo to estimate the response on aggregate consumption to interest rate increases.

CHART 19

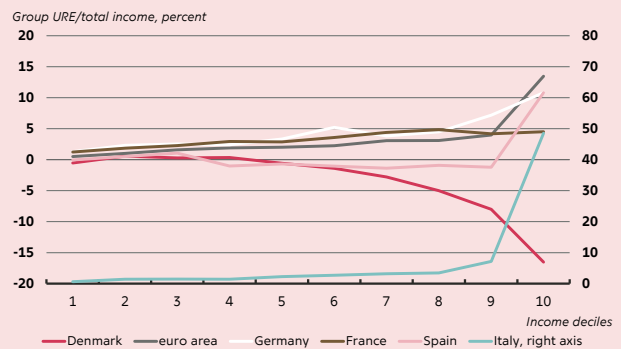
On average, Danish households have a negative URE



Note: Income deciles are within country deciles based on gross income.
 Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

CHART 20

There is a clear negative income gradient in URE for Danish households and positive or no income gradient in euro area countries



Note: Income deciles are within country deciles based on gross income.
 Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

Hand-to-mouth households are more levered in Denmark than in the euro area

In addition to considering differences across the income distribution, we will now focus on a group of households that the literature has identified as especially important for explaining the aggregate consumption response to interest rate changes – the hand-to-mouth households, see box 3. These households are liquidity-constrained and typically have a high marginal propensity to consume following smaller transitory income shocks, see, for example, evidence from Denmark in Crawley and Kuchler (2023). If, for example, the share of the interest rate exposure held by hand-to-mouth households vary across countries, this could give rise to cross-country differences in the extent to which consumption responds to changes in interest rates.²³ In the final part of the memo, we will therefore explore cross-country differences in the characteristics of hand-to-mouth households and discuss the potential impact of these differences on the strength of the cash-flow channel of monetary policy.

²² Note also that MPC within the top-income groups may vary substantially with, for example, access to liquid assets.

²³ Hand-to-mouth-households will also be important for the multiplier effect and thus the total aggregate effect on consumption and GDP, but in this memo we focus solely on how they can be important for the strength/speed of the cash-flow channel.

BOX 3

Hand-to-mouth households

In recent years, heterogenous agent models have shown that heterogeneity in households' balance sheet composition is important for understanding how households adjust their consumption following an income shock, and thus for the transmission of monetary policy, see for example Kaplan, Violante and Moll (2018) or Auclert (2019).

The permanent income hypothesis suggests that in a frictionless world rational households will not adjust their consumption much following transitory income shocks, but instead smooth consumption over their life cycle. However, due to factors such as credit constraints, myopia, differences in discount factors etc., households with low liquid wealth are often unable or unwilling to smooth consumption across transitory income shocks. Hence, these households often consume all (or most of) their income at every period – i.e. live hand-to-mouth. Kaplan and Violante (2014) show that when it is costly to access illiquid wealth even relatively wealthy households can be living hand-to-mouth and therefore adjust consumption in response to transitory income shocks²⁴. This could, for example, be seen among homeowners, who have positive net wealth but little liquid wealth. Because both types of hand-to-mouth households are liquidity-constrained, their marginal propensity to consume following transitory income shocks will often be larger than other types of households. The share of hand-to-mouth households in an economy, and their interest rate exposure, could therefore be important determinants of the strength of the cash flow channel of monetary policy.

It is important to note that if income shocks become large enough, the wealthy hand-to-mouth households can choose to liquify some of their illiquid wealth in order to smooth consumption. Poor hand-to-mouth households do not have this option since they own neither liquid nor illiquid wealth.

In this analysis, we define hand-to-mouth households as households with net liquid assets corresponding to less than two months of gross income. This threshold is somewhat higher than the threshold in Slacalek et al. (2020) but chosen to ensure comparability across data sources. HFCS measures stock variables at the date of the interview, and the Danish administrative data measures stock variables end of year where most households will have received their monthly salary already. Following Slacalek et al. (2020), we define net liquid assets in the HFCS data as the difference between deposits and credit card debt. In the Danish data, bank deposits are the only liquid wealth component.

First, we compare the share of hand-to-mouth households across countries. A larger share of such households in a country could imply a larger short-run consumption response to a given change in cash flows. However, as chart 21 shows there is no considerable differences in the shares of hand-to-mouth households across Denmark and the euro area countries. Another way in which differences across countries could arise could be if hand-to-mouth households have a larger share of the total debt. That could give rise to differences in transmission of changes in loan rates across countries, even if the share of hand-to-mouth households is the same. chart 22, however, shows that Denmark also do not stand out compared to the euro area on this dimension.

Even though we found that Danish hand-to-mouth households do not constitute a larger share of Danish households and do not have a larger share of total household debt than euro area households, their presence can still give rise to a differential pass-through to consumption across countries. This could, for example, be the case if Danish hand-to-mouth households have more debt in general and/or have a larger interest rate exposure due to, e.g., sizable adjustable-rate mortgages and/or few maturing interest rate-bearing assets. We therefore examine the unhedged interest rate exposure of the hand-to-mouth households in chart 23. The figure shows that the unhedged interest rate exposure of Danish hand-to-mouth households is more negative than that of hand-to-mouth households in the euro area. This is mainly a result of a larger level of maturing debt with adjustable rates, i.e. bank loans and adjustable-rate mortgages, in Denmark. chart 24 shows that the larger URE in Denmark is not because adjustable-rate mortgages are more prevalent in Denmark among

²⁴ Kaplan, Violante and Weidener (2014) provide empirical evidence on the existence of such households across European countries.

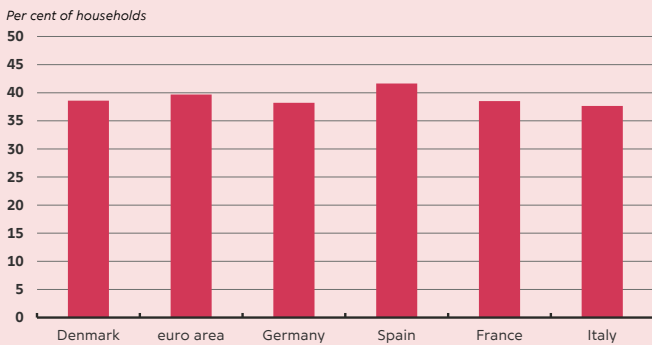
hand-to-mouth households. It seems to rather be a result of higher leverage in general among these households in Denmark.

As discussed in section 2 and box 2, the institutional setup of the Danish mortgage market implies that the interest rate pass-through to fixed-rate mortgages (FRM) is not necessarily zero. In our measure of URE, we do not include FRMs since there is no mechanical effect of changing interest rates. A more realistic estimate of the interest rate exposure of the debt of hand-to-mouth households in Denmark could likely be somewhere between the unhedged interest rate exposure of chart 23 and the total debt in Chart 24.

In summary, the large negative unhedged interest rate exposure of hand-to-mouth households in Denmark could imply that the first-order impact of monetary policy on consumption through the cash-flow channel might be stronger than in the euro area, and the exposure might be even larger due to the characteristics of the mortgage market. It should be noted that our approach is focused on cash flows in the relatively short run. For example, we calculate

CHART 21

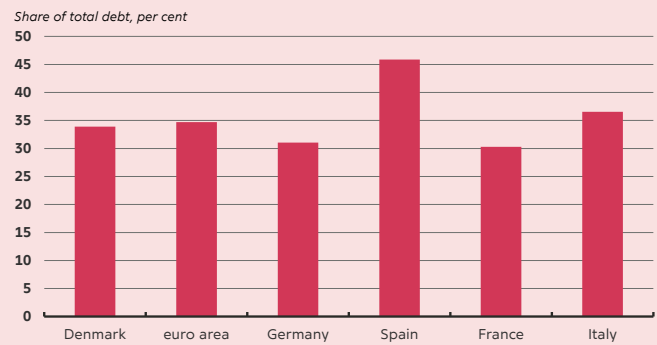
No large differences in the share of hand-to-mouth households across countries



Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

CHART 22

Danish hand-to-mouth households do not account for a larger share of total debt than in euro area

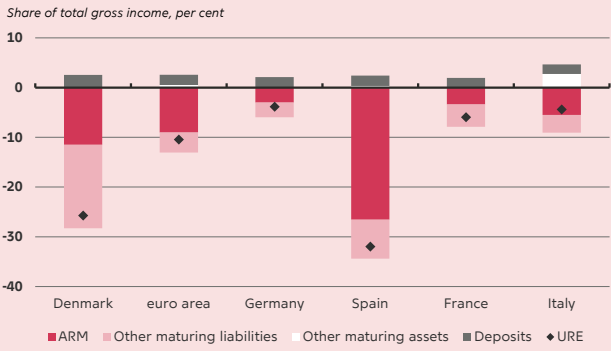


Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

unhedged interest rate exposure at a short horizon. While this is the most relevant approach for assessing the short-term strength of the transmission of interest rate increases, when assessing the transmission in the longer term, other parts of households' balance sheets could also become important to consider. This could be particularly important if the increase in interest rates lasts for a long time or is expected by the households to do so. While Danish households have a large level of debt, they also have a large level of assets. In fact, for many households in Denmark, returns on pension wealth more than outweighed their interest payments during 2015-2022, see Andersen et al. (2023c). Though pension wealth is inherently less liquid than other types of financial assets, the large stock could still imply that potential changes in cash flows (or expected cash flows) resulting from changes in returns on pensions could be important to pin down consumption in Denmark in the medium term.

CHART 23

Unhedged interest rate exposure of Danish hand-to-mouth households is more negative than in the euro area

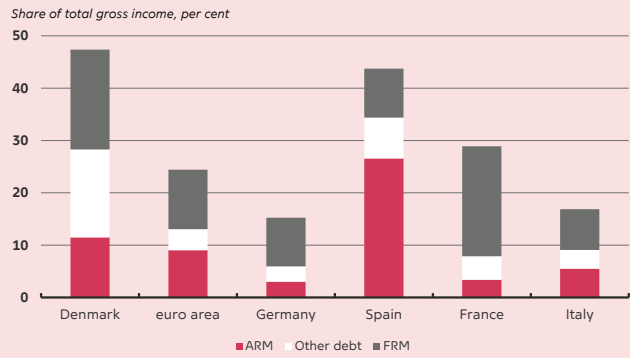


Note: Interest rate exposure of hand-to-mouth households as share of total gross income of all households in the economy. ARM denotes adjustable-rate mortgage, whereas FRM denotes fixed-rate mortgage. URE denotes unhedged interest rate exposure.

Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

CHART 24

Adjustable-rate mortgages are not more prevalent among hand-to-mouth households in Denmark than in euro area



Note: Debt of hand-to-mouth households as share of total gross income of all households in the economy. ARM denotes adjustable-rate mortgage whereas FRM denotes fixed-rate mortgage.

Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

05

Conclusions

Stronger transmission through the cash-flow channel to Danish households

During the current hiking cycle, the interest burden has risen in Denmark but fallen in the euro area, measured as 'net interest payments as share of gross disposable income'. Several factors contribute to this development. The forward-looking market-based Danish mortgage system contribute to a faster pass-through from monetary policy rates to interest rates on new loans. In Denmark, voluntary refinancing behavior, faster turnover in the stock of outstanding loans and shorter interest rate fixation periods compared to the euro area speed up the pass-through from rates on *new* loans to the average rate on total *outstanding* loans. Further, Danish households hold more interest-bearing debt than deposits, whereas euro area households hold more deposits than debt, which makes Danish households more exposed to rising interest rates. The large amount of deposits in the euro area explains the somewhat surprising result that the interest burden for euro area households, measured as 'net interest payments as share of gross disposable income', tends to fall marginally during hiking cycles. Generally, this measure is much more volatile in Denmark and remains very stable at low levels in the euro area.

Slower transmission through the cash-flow channel in Denmark compared to the hiking cycle in 2005-2008

The interest burden in Denmark has risen significantly less during this current hiking cycle than in 2005-2008. This is partly due to a substantial reduction in the debt-to-income ratio in Denmark compared to 2005-2008. Also, we estimate that the pass-through to the average interest rate on the outstanding stock of loans and to deposit rates have been significantly weaker so far during this cycle in both Denmark and the euro area. We find indications that longer interest rate fixation periods and less turnover in the stock of outstanding loans have contributed to the weaker pass-through to interest rates during this cycle compared to 2005-2008 in both Denmark and the euro area.

Evidence from micro data also suggests a stronger cash-flow channel in Denmark

We take a step towards comparing the consumption response following the first-order effect in cash-flows generated by higher monetary policy rates. Using household-level data from Danish administrative registers and household level data from the 2021 wave of the Household Finance and Consumption Survey (HFCS), we show that households with high marginal propensities to consume are more levered in Denmark and have more interest-rate-sensitive debt than corresponding households in the euro area. The analysis based on micro data is therefore consistent with a stronger cash-flow channel in Denmark. Finally, our findings also indicate substantial cross-country heterogeneity within euro area countries.

To summarize, this memo compares monetary policy transmission through the cash-flow channel in Denmark and the euro area. The Danish fixed exchange rate regime, where Danmarks Nationalbank broadly follows the interest rate policy of the ECB, implies that heterogeneity in the consumption response between Denmark and the euro area can have implications for the optimal path of fiscal policy in Denmark. Even though this memo takes the first step in understanding the impact of the cash-flow channel on household consumption, it does not provide evidence on the aggregate impact of monetary policy. This partial analysis of the cash-flow channel is one small step towards a better understanding of heterogeneity in the transmission of monetary policy across countries.

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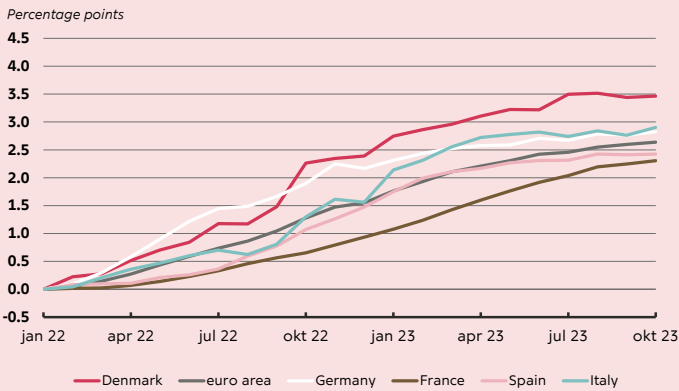
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06 Appendix

CHART 25

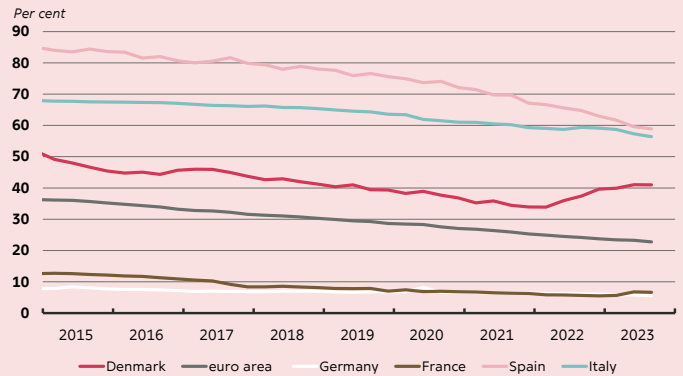
Interest rates on new loans have risen faster in Denmark compared to Germany, France, Spain, and Italy



Note: Percentage point changes since January 2022 for interest rates on newly issued debt (all loans with house purchase purpose) to households.
Source: Danmarks Nationalbank and ECB

CHART 26

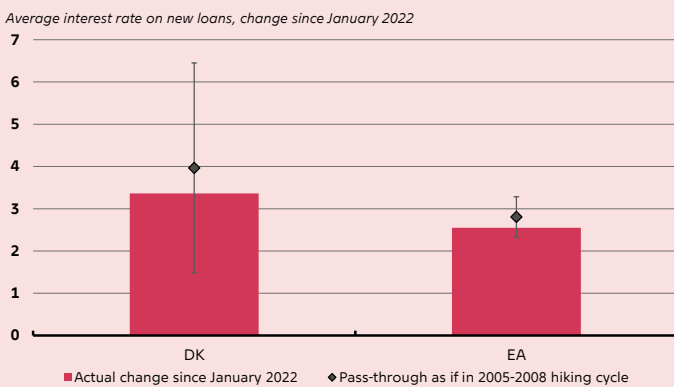
The share of outstanding loans due for interest rate fixation within the next 12 months has been increasing in Denmark



Note: Share of outstanding debt that are due to receive a new interest rate within next 12 months.
Source: Danmarks Nationalbank and ECB

CHART 27

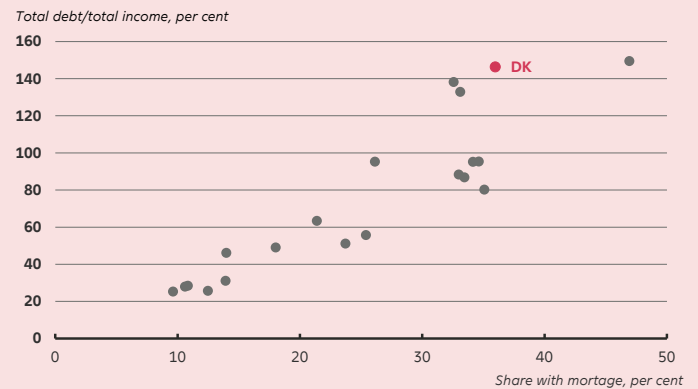
Pass-through to interest rates on new loans has so far not been significantly different during the current hiking cycle



Note: The red bars refer to the actual accumulated change in the interest rate on over-night deposits during the current hiking cycle, whereas the black diamonds represent an estimate assuming the same transmission strength as in the previous hiking cycle in 2005-2008 but the path of monetary policy rate increases during the current cycle. The bands are 90 percent confidence intervals. See box 1 for details about the regression models.
Source: Danmarks Nationalbank, ECB and own calculations

CHART 28

Countries with high prevalence of mortgages also have more debt relative to income



Note: The table shows the correlation between total debt in a given country and the share of households which owns a mortgage.
Source: Own calculations based on household-level data from Statistics Denmark and the Eurosystem Household Finance and Consumption Survey.

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