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Inequality and savings

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Abstract

This memo provides three insights about the impact of demographic shifts and income inequality on the evolution of savings rates in Denmark, and compares with evidence from the US. The US experienced a large rise in savings, because high-income households tend to save large parts of their incomes, and top income shares increased sharply since the 1980s. At the same time, demographic changes changed the distribution of incomes across age groups.

In our analysis of Danish data, we first show that income shares of high-income and middle-aged households have followed similar increasing trends in Denmark as in the US, albeit income inequality is much lower in Denmark.

Second, median savings rates in Denmark exhibit similar patterns over the life cycle and along the income distribution as in the US.

Third, we document important changes in savings behaviour over time. In particular, we find that savings rates increased markedly after the financial crisis for working-age households. We show that this is mainly due to a sharp deleveraging after the financial crisis. Overall, our results imply that changes in savings behavior play an important role when assessing the evolution of aggregate savings, beyond changes in income inequality and demographics.

Inequality in wealth and income is increasing in most industrialised and emerging economies. Policymakers and researchers are debating not only the economic consequences, but also the causes of rising inequality (Bernanke, 2015). A quickly emerging literature on the causes centres around the distributional effects of monetary policy (or, more generally, of low interest rates) and provides mixed answers. Depending on the country under observation, the definition of income and the inequality measure, expansionary monetary policy can increase income inequality (as Andersen et al., 2021, find for Denmark, and Mäki-Fränti et al., 2022, for Finland), decrease income inequality (as Holm et al., 2020, find for Norway, Coibon et al., 2017, for the US, and Lenza and Slacalek, 2021, for the EMU), or have nonlinear effects (as Amberg et al., 2021, find for Sweden).

The debate also concerns the effectiveness of monetary policy. A recent paper by Mian, Sufi and Straub (2021) (henceforth MSS) argues that increasing income inequality in the US better explains the decline in the natural rate of interest, r*, than demographic shifts between 1950 and 2019. Their first main result is that the income shares of rich households, who save large parts of their incomes, have increased over time, potentially pushing down real interest rates. Their second main finding is that saving rates do not vary a lot across the age distribution, without a consistent shift in income towards a particular age group. Consequently, the over-time evolution of rich income shares aligns more closely with the falling trend in r* than the over-time evolution of income shares induced by population ageing. This casts doubt on demographic shifts being the most prominent explanation of the decline in r*. Their result matters for policymakers since inequality-

induced reductions in r* will ultimately hamper monetary policy effectiveness by intensifying the constraints of the effective lower bound.

This note discusses the MSS results in a Danish context by 1) taking stock of what we already know from previous work, and 2) replicating the analysis for the above-mentioned two central findings of MSS based on Danish data, pointing out similarities and differences.

In contrast to the US, Denmark scores low on income inequality. It has one of the lowest Gini coefficients and top-1-per cent income shares across countries (Atkinson and Søgaard, 2016). Denmark also has a very large occupational pension system. All public employees and three of four private sector wage earners are covered by quasi-mandatory labour market pension schemes with average contribution rates of 13 per cent of total remuneration. These funded and mandatory pension schemes cause substantial wealth accumulation across the income distribution in Denmark, unlike in the US, where pension contributions are typically tax-incentivised but not mandatory[1]. Moreover, and as demonstrated in Andersen et al. (2022), the high degree of pension wealth accumulation could lead to increased borrowing as households seek to smooth consumption, effectively causing expanded balance sheets in the household sector.

Our replication exercise yields two major findings. First, the shares of income held by households at the peak of their life cycle (between 45 and 64 years) and by households in the top 10 per cent of the within-birth-cohort income distribution have followed similar trends in Denmark and the US since the mid-2000s. However, the overall income shares held by the within-cohort top 10 per cent and households aged 45 to 64 are much lower in Denmark than in the US. This holds true even when considering pre-tax rather than disposable income, as MSS do.

Second, median savings rates in Denmark exhibit similar patterns over the life cycle and the within-cohort income distribution as in the US. The average household savings rate seems to be lower in Denmark than in the US, but this could partly be influenced by differences in measurement, as discussed in more detail below. High levels of debt, especially mortgages, lead to negative savings rates for a large share of households in Denmark.[2] However, Danish households' savings rates have increased substantially since the 2008 financial crisis due to pronounced reductions in debt uptake. This is in line with previous evidence by Hviid and Kuchler (2017), who find that the consumption ratio reduction seen after the financial crisis in 2008 was to a very large extent explained by changed savings behaviour rather than changes in income and wealth distributions or demography. These findings point to a third important contributor to changes in savings rates apart from changes in income and age distributions, namely changes in savings behaviour.[3]

[1] Evidence based on Danish register data points to mandatory pension contributions as an important factor in stimulating total savings, whereas tax incentives to a large degree have led savers to shift savings from non-retirement savings accounts to pension accounts (Andersen, 2018; Chetty et al., 2014; Arnberg and Barslund, 2013).

[2] Another potential factor behind lower savings rates in Denmark than in the US could be the presence of a relatively generous social security net as well as a universal public healthcare system, which both reduce the need for precautionary savings. Also note that pension contributions in our measure of savings are less expected tax payments at the time of payout, which also reduces the savings rate considerably. The considerable aggregate savings in the Danish economy are to a large extent driven by the corporate sector; only an average of 14 per cent of aggregate savings in the economy could be attributed to the household sector in the national accounts during the period we consider in this note.

[3] Our results remain agnostic on what may have triggered these changes in savings behavior. This could be "behavioral" factors in a more narrow sense, such as fear, but also changes in regulation or the cost of credit, for example.

Data

We use register data on the universe of Danish households[4] for the 1998-2020 period made available by Statistics Denmark. These data are third party-reported and therefore very accurate. Our oldest cohort was born between 1895 and 1904.

Our savings measure is constructed as the year-on-year change in the following variables: bank deposits and bonds, mortgage and personal debt, asset and debt holdings abroad, and the market value of stocks and mutual funds net of capital gains. We add contributions to employer-administered and private pensions (net of taxes), and subtract the net-of-tax value of lump-sum payouts from the labour market supplementary pension (ATP) and other labour market and private pension schemes, the net-of-tax value of one-time special pension payouts[5], and early pension withdrawals. Details on the savings measure and a discussion of caveats are provided in Appendix A.2.

Our baseline measure of disposable income follows the definition used by Statistics Denmark. In particular, we include salaries, profits from own businesses, interest income and dividends from securities, imputed rents as well as pensions and other government transfers. From this gross income measure, taxes, interest expenses and other types of regular expenses like alimony payments are deducted. We take a moving average over the previous five years of this variable to smooth out unusually high or low incomes in single years.[6]

Finally, we compute savings rates by dividing real savings by the five-year moving average of real disposable income. To prevent our results from being substantially affected by large outliers, we winsorise the savings rate measure at the 1st and 99th percentiles.

Results

Based on Danish register data, in the following, we have replicated some of the key analyses of MSS. It is, however, important to note that a direct comparison of savings rates between Denmark and the US is not straightforward. In particular, institutional differences, such as higher debt levels and a larger reliance on a fully funded pension system in Denmark compared to the US, give rise to structural differences in savings rates. In addition, measurement concepts for wealth, income and their subcomponents may differ between the datasets for the two countries. For instance, the data used by MSS consider pre-tax income from a single year (instead of a moving average), which means that they do not take into account the redistributive effects of taxation, and are more susceptible to outliers. In general, we follow Statistics Denmark and consider post-tax disposable income as the relevant income concept. However, we verified that our results are robust to using pre-tax income instead.

Both in Denmark and the US, the income share of households aged 45 to 64 has increased from the late-1990s to around 2010. This is shown in the left panel of Figure 1. After 2010, the income share of 45 to 64-year-olds in both disposable and total pre-tax income stayed roughly constant in Denmark, whereas it fell slightly in the US.

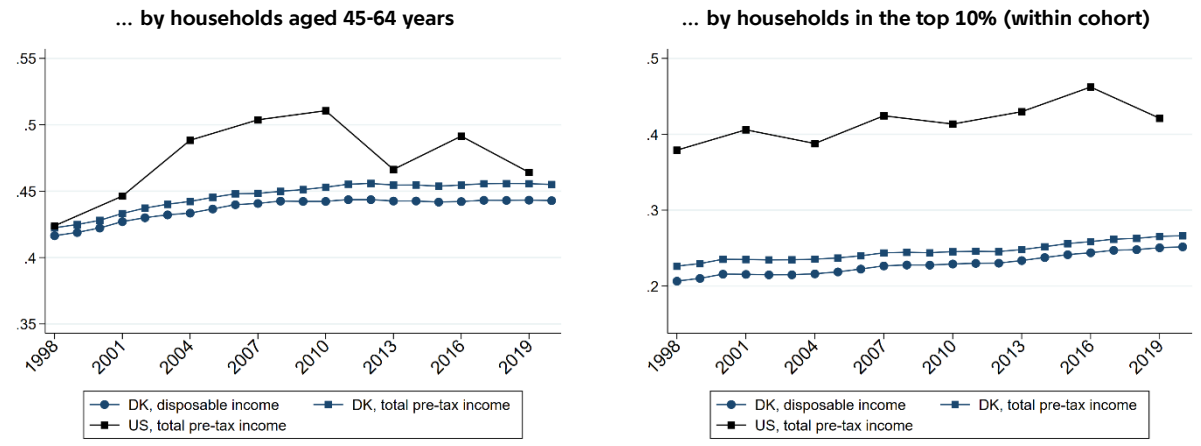
4 See Appendix A.1 for the exact definition of a household in our data. We have also verified that we obtain similar results when using the OECD equivalence scale.

5 These are special payouts from ATP, SP and LD Pensions.

6 If data for less than five years are available for a household, we include as many years as are available. We also used contemporaneous income as a robustness check. The patterns are noisier but generally similar.

Share of total income earned ...

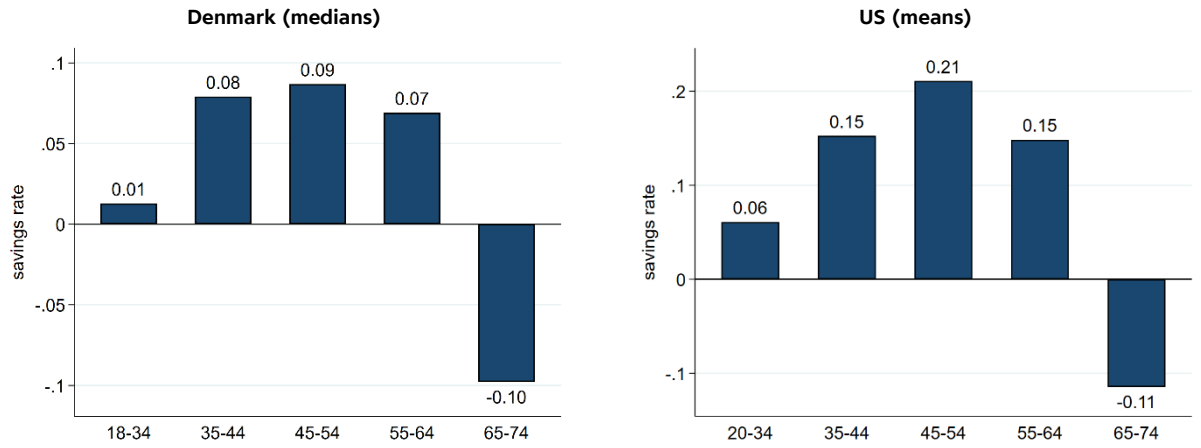
Figure 1



Note: The left panel shows the share of disposable and total pre-tax household income held by households with a head aged 45-64 in Denmark and the US. The right panel shows the share of disposable/total pre-tax household income held by households in the top 10% of the within-cohort disposable/total pre-tax household income distribution in Denmark and the US. For the US, only total household income is available. Following Mian et al. (2021), the within-cohort income distributions are calculated for 10-year cohorts. Note that differences in levels might be partially due to differences in measurement concepts (see details in the text).
Source: Denmark: Own calculations based on household-level data from Statistics Denmark; US: Replication of Mian et al. (2021), Figure 5, based on "SCF+".

Savings rates by age group

Figure 2



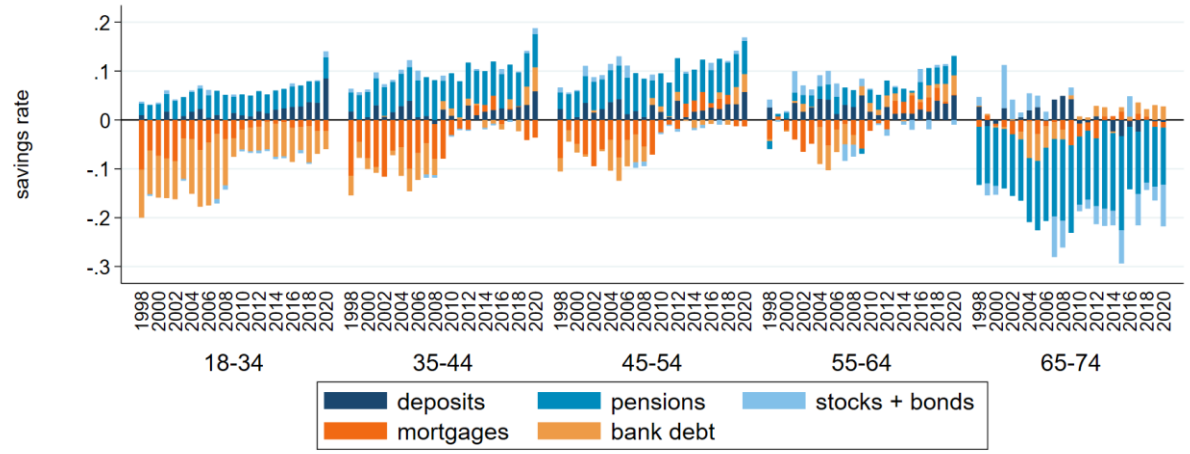
Note: The left panel shows median savings rates by age group for Denmark, averaged over all sample years. The right panel shows average savings rates for the US for the same period.
Source: Denmark: Own calculations based on household-level data from Statistics Denmark; US: Bauluz and Meyer (2021).

The right panel of Figure 1 shows similar series for the share of households from the top 10 per cent of the within-cohort income distribution, computed based on ten-year cohorts as in MSS.

The top 10 per cent share increased in both countries
between the late 1990s and the late 2010s. Thereafter, the increase continues in Denmark,

Decomposition of average savings rates by age group

Figure 3



Note: The figure decomposes average savings rates in Denmark by age group over time. Stocks and bonds include net foreign assets.
Source: Own calculations based on household-level data from Statistics Denmark.

but is reversed in the US. As we would expect, income inequality, as measured by the top 10 per cent share, is higher in Denmark when considering total pre-tax income than when considering disposable income, which takes into account redistribution via the tax code. However, even with total pre-tax income, income inequality in Denmark is much lower than in the US.

The within-cohort income distributions are based on arbitrarily defined ten-year cohorts, following MSS. For comparison, Figure B2 in the appendix shows the evolution of the income share of the top 10 per cent of the overall and the within-age income distribution. The patterns are very similar.

In Figure 2, we show median savings rates over the life cycle in Denmark, averaged across all years in the sample period, and compare them to average group-based savings rates for the same period in the US from Bauluz and Meyer (2021)[7]. While the overall life-cycle patterns are similar, the savings rate of households aged 45 to 54 is less outstanding compared to other age groups in Denmark.

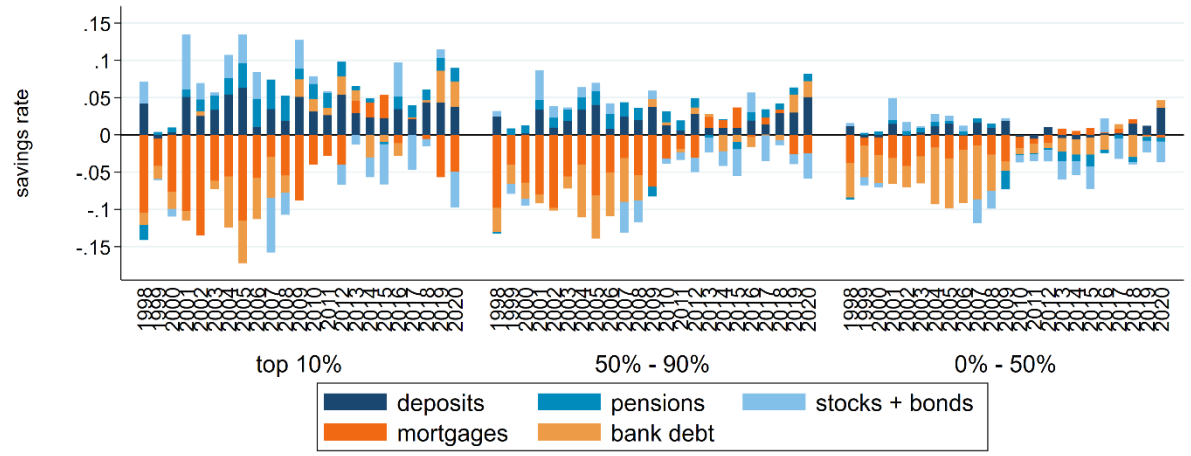
Average savings rates are much lower than median savings rates in Denmark, as shown in Appendix Figure B3. Assuming that the difference between Denmark and the US is not only due to differences in measurement concepts, the finding that savings rates in Denmark in the working-age groups are lower than those in the US, in spite of substantial pension contributions, can to some extent be explained by larger debt accumulation in Denmark. In Figures 3 and 4, we decompose *average* savings rates by age and within-cohort income group over time.[8] The figures show large negative savings contributions from mortgage and bank debt, counterbalanced by positive contributions mainly from pensions and deposits.[9]

[7] As MSS do not provide data for 1998-2018, but only for the whole 1953-2019 period, we rely on the data from Bauluz and Meyer (2021), who use the methods of MSS. We thank the authors for sharing their savings rate data with us.

[8] Since medians do not aggregate, we have to use means for this decomposition exercise.

[9] In fact, new evidence points to the existence of an important relationship between pension savings and debt. Andersen et al. (2022)

Decomposition of average savings rates by within-cohort income group Figure 4



Note: The figure decomposes average savings rates in Denmark by within-cohort income group over time. Stocks and bonds include net foreign assets.
Source: Own calculations based on household-level data from Statistics Denmark.

After the financial crisis of 2008, Danish households were deleveraging sharply, resulting in increased savings rates for all but the oldest group of households. Moreover, we see a pronounced increase in the savings rates of younger households and households from the bottom 50 per cent of the within-cohort income distribution in 2020 in Figures 3 and 4. This increase is largely driven by savings in the form of deposits. One potential explanation would be the payout of holiday money as a stimulus during the crisis triggered by the Covid-19 pandemic, combined with the lack of spending opportunities due to the pandemic.

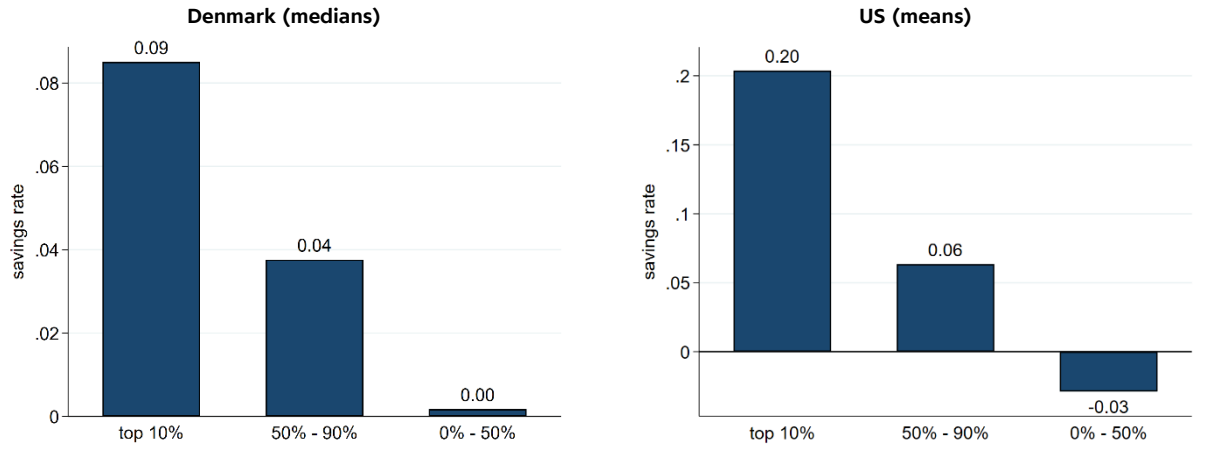
Similar to MSS and Bauluz and Meyer (2021), we find that savings rates increase monotonically with increasing within-cohort income rank, as shown in Figure 5. Like in the US, savings rates are only positive for the upper half of the within-cohort income distribution.

Figure 6 presents the evolution of median savings rates across time for different age and income groups. Households of all age groups except the oldest increased their savings in the period following the financial crisis in 2008, as illustrated in the left panel of Figure 6. The largest increase was seen among households aged 35-64, and mostly concentrated in the top 50 per cent of the within-cohort income distribution, as the right panel of Figure 6 shows. This is consistent with the evidence based on averages in Figures 2 and 5. It is also consistent with previous evidence showing that highly leveraged households, in particular, reduced their consumption in the wake of the financial crisis (Andersen et al., 2016; Hviid and Kuchler, 2017). The reduction in savings rates among households aged 65-74 in the 2000s, shown in the left panel of Figure 6, reflects the maturing of the fully funded pension system, implying that retiring cohorts gradually have larger pension savings that they draw upon in retirement.

find that individuals that are subject to increasing mandatory pension contributions accumulate more debt.

Savings rates by within-cohort income group

Figure 5



Note: The left panel shows median savings rates by within-cohort income group for Denmark, averaged over all sample years. The right panel shows average savings rates for the US for the same period.
Source: Denmark: Own calculations based on household-level data from Statistics Denmark; US: Bauluz and Meyer (2021).

Median savings rates over time in Denmark

Figure 6

Note: The figure shows the time evolution of the savings rates by age from Figure 3 (left panel) and by within-cohort income group from Figure 4 (right panel).
Source: Denmark: Own calculations based on household-level data from Statistics Denmark.

MSS consider long-term savings rate averages, as we do in Figures 2 and 5. When we consider the developments over time, it becomes clear that when assessing long-term trends in savings, it is important to take account of changes in savings behaviour, not only changes in income and age distributions. MSS implement a shift-share approach, decomposing changes in groups' savings rates into changes in income shares and changes in savings rates. In their analyses, they then only consider the "mechanical" effects from changing income shares. However, they report in their Table 1 that the contribution from changed savings rates, which they treat as a "residual", is around 94 per cent of the total change in

savings rates for the bottom 50 per cent, 80 per cent for the middle 40 per cent, and 9 per cent for the top 10 per cent of the within-cohort income distribution. This suggests that changes in savings behaviour are also of high importance in the US context.[10] Consequently, "mechanical" shifts in income shares are important in explaining changes in savings rates at the very top of the distribution, but only play a minor role in explaining changes in the savings rates of the bottom 90 per cent, who have lower savings rates than the rich, but account for a larger share of total household savings than the top 10 per cent.

So far, we followed MSS and considered "active" savings, i.e. savings net of capital gains. In the left panel of Figure 7, we assess the effect of including capital gains on directly held stocks and mutual funds into our measure of household savings. Since households in the bottom 50 per cent of the within-cohort income distribution do not hold substantial amounts of stocks, the difference between the series with and without stock capital gains is small for this group. For the upper half of the distribution, and in particular the top 10 per cent, the difference is larger. However, the savings rate series for these groups mainly become more volatile when including stock capital gains, while the average level effect is limited.

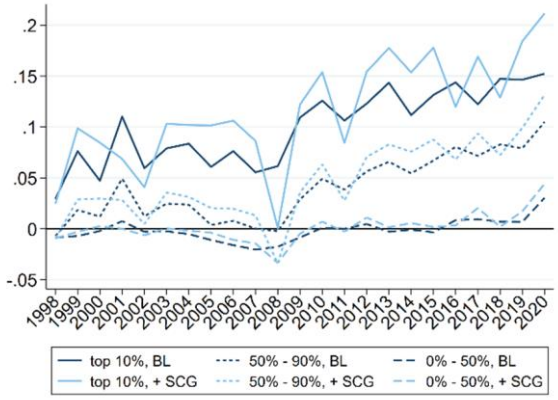
The picture is different when including capital gains on pension savings, which we observe in the data from 2015 onwards. The right panel of Figure 7 shows that average savings rates over the period since 2015 increase for all three income groups when including pension capital gains. Unlike direct stock holdings, which are concentrated in the upper parts of the income distribution, pensions are held by individuals from all parts of the distribution due to the quasi-mandatory occupational pension scheme in Denmark. Yet like stock capital gains, pension capital gains cause the savings rate series to become much more volatile. For instance, Danish pension savers made massive capital losses in 2018, causing the savings rate with pension capital gains to be below the baseline rate for all three groups in that year.

In Appendix Figure B4, we show the median savings rate across all Danish households when not including any capital gains, or including only capital gains on directly held stocks and mutual funds, or including both stock and pension capital gains. In 2020, the savings rate more than doubled when including capital gains, mostly driven by capital gains on pension wealth. This huge difference is likely to be part of the reason why the "active" savings rate is lower in Denmark than in the US. Moreover, the difference underpins the observation that the size of the pension balance plays a role for the flow of individual savings, since the absolute amount of "passive" savings increases with the balance for a given return, which possibly affects households' overall savings decisions.

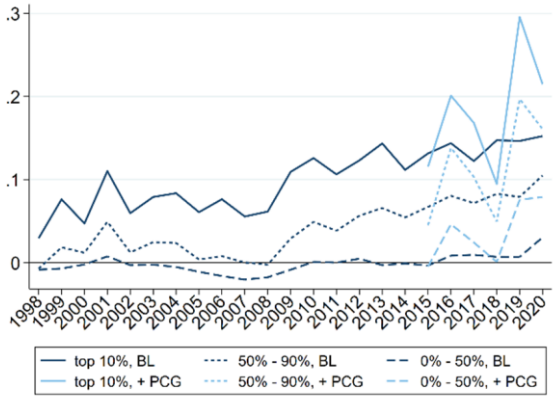
[10] In Denmark, the corresponding numbers are 92 per cent for the bottom 50 per cent, 99 per cent for the middle 40 per cent, and 86 per cent for the top 10 per cent.

Median savings rates over time in Denmark, including stock and pension capital gains Figure 7

By within-cohort income, including stock capital gains



By within-cohort income, including pension capital gains



Note: The figure shows the time evolution of the baseline savings rates by within-cohort income group from Figure 7 ("BL") and compares them to a version including either stock capital gains ("+ SCG", left panel) or pension capital gains ("+ PCG", available since 2015, right panel).
Source: Denmark: Own calculations based on household-level data from Statistics Denmark.

Conclusions

Overall, we find that the income shares of rich and middle-aged households have followed similar patterns in Denmark and in the US, although overall income inequality is much lower in Denmark. Likewise, we find similar patterns of savings rates over the life cycle and along the income distribution, despite average savings rates being lower in Denmark than in the US due to high indebtedness, and probably also due to the higher levels of social protection and pension savings in Denmark, which reduce the need for precautionary savings.

Yet beyond changes in the distribution of incomes and demographic changes over time, which are emphasised by Mian et al. (2021), our results clearly show that changes in savings behavior also play an important role in the evolution of aggregate savings rates. In particular, the financial crisis triggered a pronounced deleveraging of Danish households, leading to an increase in savings rates throughout the working-age population, as also documented in previous studies by the Danish central bank. It is likely that similar changes in savings behaviour are also important in the US and other countries, and it would therefore be of high importance to consider this when analysing the factors behind changes in aggregate savings rates over long time periods. Our results are not inconsistent with higher inequality being an important explanatory factor for changes in savings rates, as argued by MSS, but they do suggest that other mechanisms, in particular changes in savings behaviour, should not be neglected when studying savings dynamics, especially outside the very top of the income distribution.

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Appendix

A. DETAILS ON THE DATA

A.1 HOUSEHOLD DEFINITION

We apply the household definition of a family applied by Statistics Denmark: Two adults are regarded as members of the same family if they are living together and a) are married to each other or have entered into a registered partnership, b) have at least one common child registered in the Civil Registration System, or c) are of opposite sex and have an age difference of 15 years or less, are not closely related and live in a household with no other adults. Adults living at the same address but not meeting one of the three criteria are regarded as separate families. Children living with their parents are regarded as members of their parents' family if they are under 25 years old, have never been married or entered into a registered partnership and do not themselves have children. A family meeting these criteria can consist of only two generations. If three or more generations live at the same address, the two younger generations are considered one family, while the members of the eldest generation constitute a separate family.

A.2 SAVINGS MEASURE

Some cautionary remarks on our savings measure are due. Following MSS and a common approach in the literature, we impute stock market capital gains by applying the OMXC20 stock price index to the previous period's stock wealth. In the current version of our data, we cannot precisely measure capital gains on housing or home improvements. We therefore do not include changes in housing in our savings measure, which is a measure of financial savings. In order to avoid mismeasurement in the year of a home purchase, we exclude households in the purchasing year when computing our savings measure (see Crawley and Kuchler, forthcoming). Moreover, we cannot distinguish between savings and inheritances in the current version of our data.[11] Finally, another shortcoming of our data is that we cannot measure changes in business wealth.[12] We, however, assessed the robustness of our results to excluding all households in which any of the spouses was ever self-employed during our sample period, and found very similar results to the baseline.

Previous studies based on the same data show that aggregate imputed consumption expenditures, calculated by subtracting savings from income, are generally comparable to those compiled from other sources in the National Accounts statistics (Abildgren et al., 2020). The same is therefore expected to be the case for the savings measure, although there are some methodological differences between household-level measures of consumption and savings. For example, payments into employer-administered pension schemes do not enter in the calculation of disposable income and thereby consumption, whereas they are part of the savings measure.

[11] We hope to improve on these aspects in future research, based on previous work by, e.g., Druedahl and Martinello (2020).

[12] In future work, we are planning to use the capitalisation method of Jakobsen et al. (2020) to improve on this aspect.

B. SUPPLEMENTARY FIGURES

Share of total income earned in the US by households...

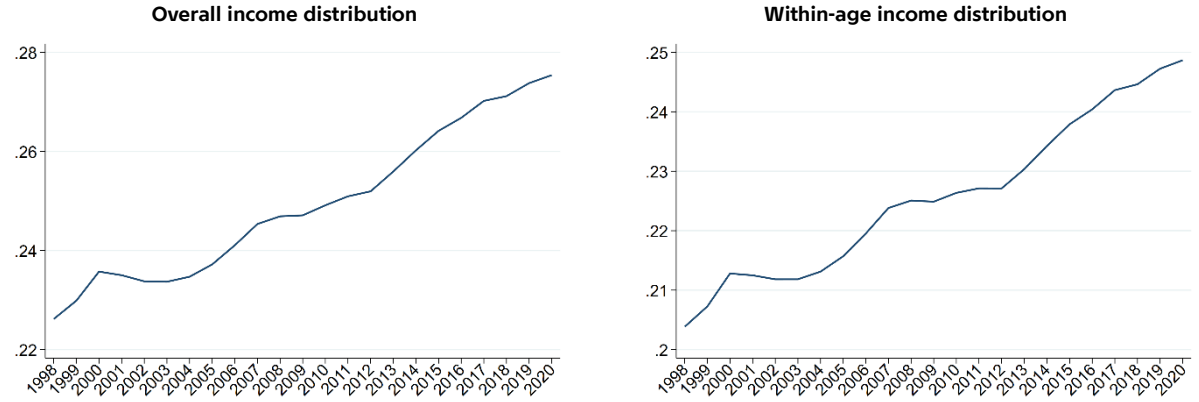
Figure B1

Note: The figure shows the share of total pre-tax household income held by households with a head aged 45-64 (left) and households from the top 10% of the within-cohort income distribution (right) in the US. The dashed lines indicate the sample start of the Danish data in 1998.

Source: Replication of Mian et al. (2021), Figure 5, based on "SCF+".

Share of total income earned by top 10% in Denmark

Figure B2

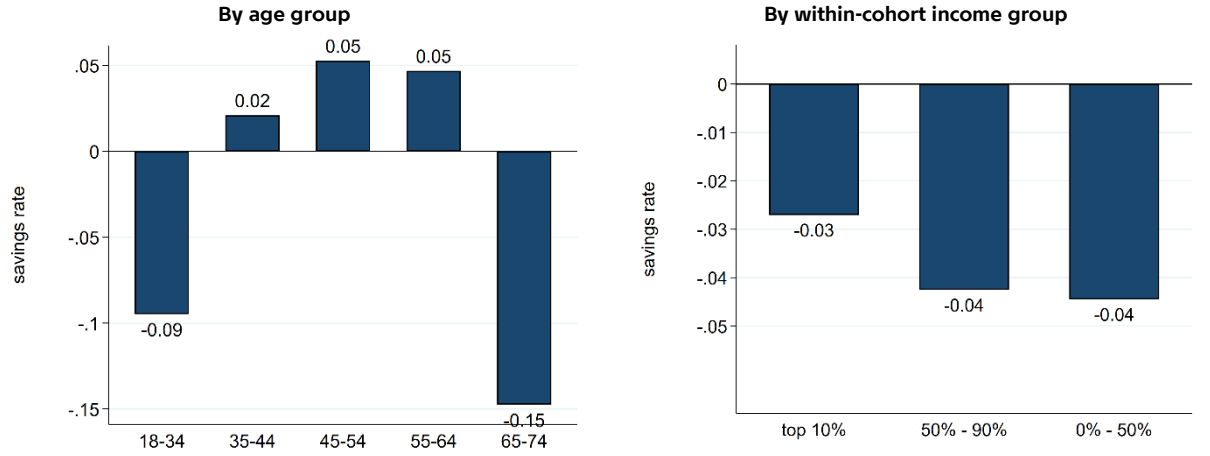


Note: The figure shows the share of disposable household income held by households in the top 10% of the overall (left panel) and within-age (right panel) disposable household income distribution in Denmark.

Source: Own calculations based on household-level data from Statistics Denmark.

Average savings rates

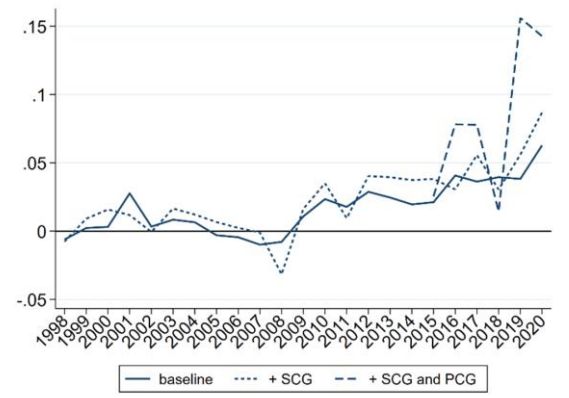
Figure B3



Note: The left panel shows mean savings rates by age group for Denmark, averaged over all sample years. The right panel shows mean savings rates by within-cohort income group for Denmark, averaged over all sample years.
Source: Denmark: Own calculations based on household-level data from Statistics Denmark.

Overall median savings rate in Denmark, with and without stock and pension capital gains

Figure B4



Note: The figure shows the time evolution of the baseline median savings rates in Danmark and compares it to a version including either stock capital gains ("+ SCG") or both stock and pension capital gains ("+ SCG and PCG", available since 2015).
Source: Own calculations based on household-level data from Statistics Denmark.

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