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ABSTRACT

This paper provides evidence that asset testing of social transfers substantially depresses the liquid wealth of the poor. Our setting is Denmark where the low-income elderly receive an annual payment (around $3,000) if their end-of-year liquid wealth is below a threshold (around $15,000). Using administrative data on income and wealth for the full population, we document that the wealth density distribution of the low-income elderly exhibits large but diffuse excess mass below the wealth threshold: The fraction with wealth between 50% and 100% of the wealth threshold is twice as high as for ineligible control groups who are slightly younger or have slightly higher income. A reform analysis supports a causal interpretation: excess mass below the threshold emerges around the introduction of the program and shifts when the threshold is increased discretely. The excess mass remains when we rely solely on third-party reported data to measure liquid wealth and therefore does not reflect strategic misreporting by the recipients. Finally, analyzing bank customer data with monthly information about wealth, spending and cash withdrawals shows that the excess mass largely reflects permanently lower levels of liquid wealth rather than temporary responses around the end of the year.

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1 Introduction

While wealth taxation for the rich is getting substantial attention in the academic and policy debates,[1], the poor face the stiffest wealth taxes due to asset testing of many transfer programs. In the United States for example, most means-tested programs have asset tests in addition to income tests.[2] The logic is that beneficiaries should first exhaust (most of) their own wealth before getting government support. This obviously creates a disincentive to accumulate wealth, economically equivalent to a wealth tax. The implicit tax is large as often all benefits are lost once wealth crosses a certain threshold – the asset disregard – creating a "notch" in the budget set.

In spite of the ubiquity of such taxes on the wealth of the poor, there is no good empirical evidence on their effects primarily because wealth is generally self-reported with no comparable wealth information for ineligible individuals. As wealth at the bottom provides safety, asset tests could create substantial crowd-out of private safety by public safety programs. There is valuable work on this issue in the US context, but it uses survey data which is not ideal for notch and bunching analysis (Kleven, 2016). It finds suggestive but not systematic evidence of adverse effects on savings and wealth.[3]

In this paper, we break new ground by analyzing the Danish "old-age check" while leveraging comprehensive administrative wealth data, covering the full population and not just the beneficiaries. The old-age check is part of the public retirement system in Denmark. It takes the form of an annual payment (around $3,000 for a single person) to low-income and low-wealth elderly above the statutory retirement age. While the check is phased out smoothly with income, the asset test is sharp: the entire check is lost once end-of-year liquid wealth exceeds a threshold (around $15,000), creating an enormous implicit tax on liquid wealth. The policy design and the comprehensive administrative wealth data thus allow us to compare the liquid wealth distribution of individuals who are eligible in terms of age and income (65+ years, low-income) to two groups of comparable but ineligible individuals: those just below the age threshold (60-64

[1]Saez and Zucman (2019) and Scheuer and Slemrod (2021) provide recent surveys and discussions.

[2]This is true for Medicaid health insurance, Supplemental Nutrition Assistance Program SNAP (formerly food stamps), Temporary Assistance for Needy Families TANF (formerly Aid for Families with Dependent Children AFDC), Supplemental Security Income (SSI) for the elderly, and Federal student aid for parents with children in college (Boyens et al. (2024) provide a detailed description).

[3]Powers (1998), Hurst and Ziliak (2006), Sullivan (2006), Nam (2008), and Hamilton (2021) for the AFDC/TANF program; Neumark and Powers (1998) for SSI; and Gruber and Yelowitz (1999) and Maynard and Qiu (2009) for Medicaid.

years, low-income) and those somewhat above the income threshold (65+ years, higher-income).

We show that the asset test has a large impact on the density distribution of liquid wealth. We find striking excess density below the threshold for individuals satisfying the age and income criteria compared to those failing one of them. The fraction of individuals with wealth between 50% and 100% of the wealth threshold is about 20% for the treatment group while only about 10% for the two control groups. The dynamics around the introduction and expansion of the old-age check is consistent with a causal interpretation of these findings: there is no excess mass before the introduction of the old-age check and the excess mass shifts when the threshold is increased discretely. Generally, the density distribution responds gradually to changes in the program, with the response growing over time.

Exploiting the reform that introduced the old-age check, we also construct a full counterfactual distribution of liquid wealth for the treated group, which serves to estimate the effect of the old-age check on liquid wealth at different percentiles in the distribution. In the spirit of a difference-in-differences analysis, our approach assumes that the distribution of the treated group (65+ years, low-income) would have changed in parallel with the distribution of the control group (60-64 years, low-income) absent the reform. The results suggest that the impact of the old-age check is largest just above the asset test threshold where liquid wealth is around 10% below the estimated counterfactual. Importantly, this estimate only captures responses over the medium term and concerns a period where the real value of the check was relatively low. We expect the long-term responses to today's higher value of the check to be substantially larger.

Finally, we investigate whether the reduction in liquid wealth caused by the old-age check reflects that the elderly *permanently* lower their liquid wealth or that they retime purchases and withdraw cash to *temporarily* lower their account balances just before the end of the year. Clearly, the consequences for financial safety are much more severe if the responses are permanent than if they are temporary. We first note that the shape of the liquid wealth distribution seems most consistent with permanent effects. Specifically, the excess density is not spiky right at the asset test threshold, as one would expect if it reflected end-of-year purchases or cash withdrawals aiming to circumvent the asset test, but diffuse in a broader region below the threshold.[4]

[4]There is no clear gap in the density distribution in the dominated region just above the notch, implying that some individuals are also inattentive to the incentives (Kleven and Waseem, 2013).

We provide more evidence on the nature of the behavioral responses by linking customer data from a large bank to the administrative data. The bank data measures liquid wealth, spending and cash withdrawals on a continuous basis, which allows us to study monthly dynamics. For treated individuals, we find that the excess mass below the threshold of the asset test exists in all months of the year, but is somewhat more pronounced in December. For the control groups of slightly younger or slightly higher-income individuals, there is no systematic variation in the wealth distribution over the year. The results suggest that while temporary responses to the old-age check do exist, most of the reduction in the liquid wealth of the treated group reflects permanent responses.

Our paper is organized as follows. Section 2 presents the institutional framework and the data. Section 3 presents the empirical results using the administrative wealth data. Section 4 presents the results using the financial bank data. Section 5 concludes.

2 Institutional Framework and Data

2.1 Social Security and the Old-Age Check

In Denmark, all citizens at or above the statutory retirement age (65 years during our sample period) are eligible for social security benefits.[5] The monthly payments have two parts: a *base amount*, which is means-tested against labor income and has a maximum annual value of DKK 77,000, and a *supplement* which is means-tested against all personal income and has a maximum annual value of DKK 85,000 for singles (half for people in couples).[6]

Our analysis focuses on an additional social security element: the *old-age check*, which is an annual cash transfer to elderly with almost no income other than social security and little liquid wealth. It amounts to DKK 18,000, paid out each year in late January. It is means-tested against all personal income (except social security) with a disregard of DKK 42,000 and a phase-out rate of 34% for singles (DKK 21,000 and 17% for people in couples). In addition to the means test, the old-age check is subject to a sharp asset test. The check falls away entirely when liquid wealth exceeds DKK 90,000 with no gradual phase-out. For couples, the asset test applies the same DKK 90,000 threshold to their joint liquid wealth. As a result, most of the

[5]We report social security parameters for 2020 stated in Danish Kroner (DKK). The average exchange rate in 2020 was 6.53 DKK per USD.

[6]Abrahamsen (2021) analyzes the income test of the base amount and finds evidence of bunching of wage earnings where the phase-out starts.

eligible are single and our analysis focuses on this group only. We focus on the asset test only and we do not study the smoother income test because the vast majority of beneficiaries have zero personal income outside of social security and income test analysis is not as novel as asset test analysis.

Administration of the old-age check. To determine eligibility for the old-age check, the government relies on a combination of third-party reported and self-reported information. The liquid wealth concept used for the asset test includes the balance on checking, savings and security accounts as well as cash, but excludes all consumer durables, real estate, and pension accounts and does not net out debt. This implies that the government has information from financial institutions about all the components of liquid wealth except cash.

The main challenge for administration relates to the timing of the payouts and the information flows. Legally, eligibility for the old-age check paid out in year t depends on liquid wealth at the end of year $t-1$. However, at the time the old-age checks are sent out, in January of year t, this information is not yet available in the administrative registers. By default, the authorities therefore rely on the most recent administrative wealth information that is available, typically for year $t-2$ but sometimes for year $t-3$. We refer to this measure of liquid wealth, based entirely on administrative data and used to determine eligibility in the absence of self-reported information, as *default wealth*.

Due to the lack of precise administrative data at the time of the pay-out, individuals are allowed to override the default by self-reporting income and liquid wealth through a purpose-built government website. The website displays the default values and allows individuals to adjust them by, for instance, adding cash or reducing bank account balances. Any information self-reported before the end of year $t-1$ is used to determine eligibility in year t. We refer to self-reported liquid wealth as *reported wealth*. As administrative wealth data for year $t-1$ becomes available, generally in the course of year t, the authorities can make reconciliations, i.e. reclaim old-age checks from those who received it despite being ineligible and vice versa.

The old-age check over time. The fundamental design of the old-age check has remained the same since the introduction in 2003, but the policy parameters have changed over and above standard indexation, as illustrated in Appendix figure A.1.[7] First, the value of the

[7]Nominal amounts in the Danish tax and transfer system are adjusted annually so that they approximately

old-age check was increased several times and more than doubled in real indexed terms over the period of analysis (panel a). Second, the threshold of the asset test has been constant in real terms over the full period except for a 15% increase in 2010 (panel b). Finally, the income test was initially very strict, both in terms of the threshold at which phase-out starts and the phase-out rate, but has been looser and roughly constant since 2005 (panel c). We leverage the introduction of the check in 2003 and some of the subsequent changes in the empirical analysis.

In recent years, approximately 25% of the elderly above the statutory retirement age received the old-age check in Denmark and aggregate outlays are about 0.2% of GDP.[8]

2.2 Economic incentives

The asset test of the old-age check creates an incentive for individuals who satisfy the age and income criteria to hold less liquid wealth. For instance, a 70-year old with no other income than social security who would aim to hold DKK 100,000 in liquid wealth absent the check may instead aim to hold DKK 50,000 to qualify for the DKK 18,000 annual check. The main goal of the paper is precisely to identify such a permanent effect of the asset test on liquid wealth.

The asset test also creates incentives for other types of behavior that do not change long-run liquid wealth. First, individuals can temporarily lower liquid wealth around the end of the year by retiming purchases. This is a legal way to avoid the asset test. Second, they can lower the liquid wealth that enters the asset test by withdrawing and not self-reporting cash. This is misreporting behavior, which could trigger legal sanctions, and also impractical due to the transaction costs associated with cash.[9]

2.3 Data

Administrative data. The analysis uses data on assets, income and demographics from government administrative registers. Mirroring the administration of the old-age check, we employ two measures of liquid wealth. Default liquid wealth is the third-party reported value of current accounts, savings accounts, and securities accounts. This measure is available for the full population. Reported liquid wealth starts from default liquid wealth and adds self-

follow nominal average wages.

[8]The most comparable program in the United States would be Supplemental Security Income (SSI) for the elderly and disabled, which is also both income and asset-tested.

[9]It is increasingly difficult to move cash in and out off the banking system and many businesses only accept electronic payment.

reported corrections. This measure is available for all individuals above the statutory retirement age. Unfortunately, the reported liquid wealth variable at our disposal does not capture the corrections made close to year-end and therefore does not correspond completely to the variable that the administration uses to evaluate the asset test. For income, we only have the default measure based on third-party reported information and available for the full population.

Bank data. We leverage data from Danske Bank, the largest Danish retail bank (as in Andersen, Johannesen and Sheridan, 2024) to study short-term responses such as increased spending or cash withdrawals close to year-end. The bank data is linked to the administrative data with a unique individual identifier and provides monthly information about spending, cash withdrawals and account balances for the period 2014-2016. Restricting attention to individuals with at least one spending transaction through the bank in every month of the year gives us a bank sample that constitutes around 20% of the Danish elderly population.

Summary Statistics. Appendix Table A.1 reports summary statistics on wealth, income, and demographics for for four groups: (1) singles age 60+, (2) singles age 60-64 who are hence age-ineligible (3) singles age 65+ who are hence age-eligible (4) singles age 65+ who are also income-eligible. In the latter group, around 60% have liquid wealth below the asset test threshold, which makes them eligible for the old-age-check. Panel (a) describes the population sample pooling the years 2014-2018. Panel (b) describes the bank sample pooling the years 2014-2016. The table allows us to assess the representativeness and completeness of the bank data (Baker, 2018). First, the administrative wealth measures are similar across the two panels, suggesting that the bank sample is broadly representative of the population. Second, the bank measure of liquid wealth is only slighly smaller than the administrative measure, notably for the low-income group, suggesting that the bank data is relatively complete.

3 Overall Responses: Wealth Data Evidence

Empirical strategy Our main empirical strategy to identify the effect of the asset test is straightforward: We examine the wealth density distributions around the asset test threshold comparing individuals who are eligible in terms of both income and age (65+years and low-income) to individuals who are ineligible in one of these dimensions, i.e. they are age-ineligible

(60-64 years and low-income) or income-ineligible (65+years and higher-income). The asset test is binding for the former group, who are therefore treated, but not for the latter groups, who may therefore serve as controls.

Concretely, we refer to "low-income" as incomes below the threshold where the old-age check is fully phased out and "higher-income" as incomes between 150% and 200% of that threshold. The higher-income range is chosen to balance two concerns: comparability with the low-income group and potential contamination with individuals who are income-eligible and therefore respond to the asset test.[10]

Our analysis generally pools observations of liquid wealth from multiple years in a single density distribution. In the main analysis, the sample period is 2014-2018. Before pooling, we always make the observations comparable by inflating to 2020-values using changes in the threshold of the asset test. We then examine the resulting distributions around the 2020-value of the asset test threshold.

Moreover, we restrict the sample to singles. As the rules governing eligibility are more complicated and effectively much stricter for couples, this sample restriction allows us to simplify the analysis considerably while keeping the vast majority of old-age check beneficiaries in the sample.

Asset test. Before presenting the main results, we document the discontinuity in the likelihood of receiving the old-age check created by the asset test in Figure 1(a). The analysis includes age-eligible individuals (65+ years). For the income-eligible treatment group (green solid line), the likelihood of receiving the check drops from more than 80% to less than 20% when crossing the asset threshold. The discontinuity is fuzzy because our reported liquid wealth variable does not correspond perfectly to the one used to administer the check, as discussed above. For the income-ineligible control group (red dashed line), the likelihood of receiving the check is small on both sides of the threshold. The likelihood is not precisely zero, reflecting that we cannot account for self-reported corrections to default income.

Main result. Figure 1(b) compares the density distributions of reported liquid wealth for low-income and higher-income individuals who are eligible in terms of age (65+ years). The

[10]Individuals with self-reported income adjustments may be income-eligible although our default income measure suggests they are not.

figure zooms on a portion of the distribution around the asset threshold of the old-age check, but the densities refer to the full distribution. It is visually clear that the treatment group with low incomes exhibits significant excess density mass below the threshold compared to the control group with higher incomes. Quantitatively, 19.2% of the density distribution falls between 50% and 100% of the threshold in the treatment group but only 11.2% for the control group. These results are consistent with a large impact of the old-age check asset test on the liquid wealth distribution.

Interestingly, the excess density is not spiky right at the asset threshold but diffuse in a broader region below the threshold, suggesting that individuals are not able to fully control their end-of-year liquid wealth to target the threshold precisely. There is no clear gap in the dominated region just above the threshold, suggesting that some individuals are inattentive to the incentives created by the old-age check, as found in most notch studies (Kleven and Waseem, 2013).

Appendix Figure A.2 depicts the liquid wealth density distribution over a broader range for the treated group and provides percentiles. Although the densities are generally much higher at the bottom than around the threshold – one third of this group has liquid wealth below DKK 20,000 – the excess mass between 50% and 100% of the threshold remains a clear and salient feature of the distribution. Therefore, the remainder of the analysis focuses on the portion of the distribution around the threshold.

Default vs. reported liquid wealth. The distribution of reported liquid wealth in Figure 1(b) could be affected by strategic misreporting. We therefore compare to the distribution of default liquid wealth, which is based entirely on third-party reported information. As shown in Figure 1(c), default liquid wealth exhibits excess mass below the threshold of the asset test (red dashed line) to the same extent as reported liquid wealth (green solid line): the fraction with wealth between 50% and 100% of the threshold is 19.8% for default liquid wealth vs. 19.2% for reported liquid wealth. The holes between the red and green lines show that self-reported corrections, rather than creating sharp bunching just at the threshold, move mass from a region around the threshold to a region below the threshold. Most importantly, this shows that bunching below the threshold is not an artifact of strategic misreporting, as it exists in third-party reported data. While it also suggests that individuals are more likely to report corrections

that make them eligible for the old-age check, we cannot tell whether those corrections reflect truthful updates or strategic misreporting.

Total net wealth. Finally, we construct a measure of total wealth from third-party administrative data as the sum of liquid assets, pension assets, and housing equity net of all debt and depict the density distribution in Figure 1(c) (blue dotted line). The excess mass below the threshold suggests that total net wealth is also affected by the old-check. This finding is to some extent mechanical, as a significant fraction of the low-income elderly singles in the treated group have no housing nor pension wealth meaning that liquid assets is their only form of wealth (appendix Table A.1).

Age variation. To strengthen the causal interpretation of the main results, we exploit the variation in eligibility that comes from age: individuals are age-eligible in year t if they are age 65 or more at the end of year $t-1$. As reported liquid wealth is only available for the age-eligible population, the analysis uses default liquid wealth as the outcome to ensure consistent measurement across all age groups. Figure 2(a) depicts the density distributions for low-income individuals and compares the treated group of age-eligible individuals (65+ years) to a control group of age-ineligible individuals (60-64 years). There is significant excess mass below the threshold of the asset test for the age-eligible (green solid line) compared to the age-ineligible (red dashed line). Quantitatively, the fraction with wealth between 50% and 100% of the threshold is 19.8% for the age-eligible but only 11.7% for the age-ineligible. The difference between the two lines captures the impact of the old-age check on the distribution of liquid wealth: as low-income individuals become age eligible, they respond by lowering their liquid wealth to meet the asset test. This interpretation assumes that the liquid wealth distributions of low-income individuals in the two age groups would have been the same absent the old-age check. Figure 2(b) lends credibility to that assumption by showing that the liquid wealth distributions of higher-income individuals in the two age groups do not differ materially.

Finally, to understand the dynamics of the response, we plot the density distributions for low-income individuals by age cohort in Figure 2(c). The excess mass below the threshold builds up over time: the fraction with liquid wealth between 50% and 100% of the threshold shifts discretely from 12.9% to 15.7% between ages 64 and 65 and then increases gradually to 18.7% at age 75 and 23.3% at age 80+. This result suggests that, as they age, more and more elderly

bring their liquid wealth below the threshold of the asset test to receive the old-age check.

Reform variation. An additional source of variation to uncover causal effects of the old-age check comes from the introduction of the program in 2003 and the increase in the asset-test threshold in 2010. We study those reforms and report the results in Figure 3.

Figure 3(a) depicts the density distributions of reported wealth for age-eligible, low-income singles in three different time periods: 2001-2002 (i.e. before the introduction), 2003-2005 (i.e. first 3 years after the introduction), and 2006-2007 (years 4-5 after the introduction). The figure shows that there was no excess mass below the threshold before the introduction of the old-age check. Excess mass develops after the introduction and grows over time, consistent with a response mediated by learning. Quantitatively, the density mass between 50% and 100% of the threshold grows from 11.9% (before), to 14.9% (first 3 years after), and 17.3% (years 4-5 after).[11]

Following a similar approach, Figure 3(b) analyzes the discrete increase in the threshold of the asset test in 2010. It depicts the density distribution of reported wealth for age-eligible, low-income singles in three different time periods: 2005-2009 (i.e. before the increase), 2010-2012 (i.e. first 3 years after the increase), and 2013-2015 (i.e. years 4-6 after the increase). The vertical lines depict the thresholds before and after the reform. The figure shows that the excess mass shifts when the threshold is increased. This constitutes additional evidence that excess mass below the threshold is indeed caused by the asset test. Moreover, consistent with the dynamics around the introduction of the old-age check, the adjustment to the higher threshold is sluggish.

Full distributional effects of the old-age check. While it is clear that the old-age check has a large effect on the wealth density around the threshold, estimating how it affects the wealth distribution at each percentile is more challenging because the control groups are imperfect counterfactuals, especially far away from the threshold. In the context of the old-age check introduction, we are able to leverage time variation combined with age variation to construct a better counterfactual wealth distribution and provide compelling causal estimates at each

[11] In this figure, we consistently use the 2006-threshold to delimit the low-income group. The actual income threshold was lower in 2003-2005 than in 2006 (Figure A.1c), implying that a small share of our low-income group was in fact income-ineligible in 2003-2005. This could, in principle, explain part of the difference between short-term and medium-term responses.

wealth percentile.

We document the construction of the counterfactual wealth distribution, i.e. absent the introduction of the old-age check, for the treated group in Figure 4(a). We start from the actual pre-reform densities for the treated group (age 65+, low-income) and construct post-reform counterfactual densities by applying the pre-post percentage change in actual densities for the control group (age 60-64, low-income). The assumption is that the wealth distributions for low-income individuals aged 60-64 vs. 65+ would have evolved in parallel absent the introduction of the old-age check. We use default liquid wealth to implement this design as reported wealth is not available for the control group; we use 2001-2002 and 2006-2007 as pre-reform and post-reform periods; and we restrict the treated group to ages 65-70 to make it as comparable as possible to the control group.

The figure depicts the actual post-reform density for the treated group (solid green line) as well as the counterfactual (dash-dotted black line). The counterfactual is constructed starting from the actual pre-reform density for the treatment group (dashed red line) and multiplying by the ratio of the control group's post-reform (brown dotted line) and pre-reform (dashed blue line) densities. While there is a clear gap between the actual and counterfactual post-reform densities of the treated group below the threshold, it is smaller than in the previous analysis. Quantitatively, the actual density mass between 50% and 100% of the threshold is 15.9% while the counterfatual density mass is 14.1%. The implied excess mass of 1.8 percentage points is only one third of the 5.4pp gap on Figure 3(a) and less than one quarter of the long-run estimates based on Figures 1 and 2. Presumably, the difference reflects that using default wealth as the outcome and restricting the sample to individuals aged 65-70 leads to conservative estimates.

Figure 4(b) plots the cumulative distributions of liquid wealth implied by the actual (solid green line) and counterfactual (dash-dotted black line) density distributions. At each percentile, the estimated causal effect of the old-age check is the horizontal distance between the two distributions. The figure suggests that there is no effect below P50 (wealth around half of the threshold), and no effect above P70 (wealth around twice the threshold). However, there is a negative effect on both sides of P60, which is close to the threshold in the counterfactual distribution. In relative terms, the largest effect is around -10% at P64 just above the threshold (red horizontal line).

We also convert the distributional estimates illustrated in Figure 4(b) to average effects for

broader groups. While the old-age check has no effect for P0-P50, it reduces the average wealth by 4.1% for P50-P75 where the effects are concentrated. Assuming a zero effect above P75, this translates into an overall 1.7% negative effect on average wealth along the entire distribution P0-100.[12] This shows that the 1.8 percentage point excess mass between 50% and 100% of the threshold found in Figure 4(a) implies sizable treatment effects on wealth in this part of the distribution: a 4% drop for P50-75 and a 10% drop just above the threshold. Because the long-run estimates of excess mass based on Figures 1 and 2 are 4 times larger than 1.8 percentage points, the long-run treatment effects could be 4 times larger as well.

4 Permanent vs. Temporary Effects: Bank Data Evidence

The strong behavioral response documented in the previous section could be due to changes in real savings behavior with permanent effects on liquid wealth. Alternatively, they might reflect retiming of purchases that only temporarily reduce liquid wealth around the end of the year when the asset test is conducted, or cash withdrawals. We address this important distinction empirically by exploiting the bank data with high-frequency information about spending, cash withdrawals and account balances for a subsample of the population. For data availability reasons, the analysis pools observations for the shorter period 2014-2016.

Wealth densities throughout the year. Figure 5(a) depicts the density distributions of liquid wealth at the end of each calendar month for the treated group eligible in terms of both age and income. These are the individuals who receive the old-age check if their liquid wealth in December is below the threshold (vertical line). Consistent with the main analysis, there is significant excess mass below the threshold in December (solid green line).[13] This suggests that the asset test causes the low-income elderly to hold less liquid wealth. More importantly, the figure shows that excess mass below the threshold also exists in all the other months of the year

[12] We note that the actual and counterfactual distributions do not line up nearly as well in the top 20% as in the bottom 50%. Assuming a zero effect above P75 allows us to gauge the implications of the well-identified effects in the range P50-75 for population-wide average wealth.

[13] The distributions based on bank data for the end of December (solid green line) and individually matched third-party reported administrative data for the end of the year (black dotted line) are almost identical. This suggests that the difference in density mass between 50% and 100% of the threshold in the bank data analysis (17.9%) and in the main analysis (19.8%) reflects differences between the bank sample and the population sample rather than incomplete bank data.

too. This suggests that the reduction in liquid wealth is permanent. While there is a slight shift in the distribution from November (red dashed line) to December suggestive of temporary responses aiming to pass the asset test at the end of the year, the difference is rather small: density mass between 50% and 100% accounts for 17.7% in November vs. 17.9% in December. There is also an outward shift in the distribution from December to January (brown dotted line), which is likely to reflect disbursement of the old-age check in January. The distribution is much more stable between February and November (gray lines).

To gauge the potential role of cash withdrawals in reducing liquid balances in the bank between November and December, Figure 5(a) also plots the density distribution of liquid wealth at the end of December while adding back all December cash withdrawals into the liquid wealth measure (blue dotted line). The implicit assumption is that *all* the cash withdrawn in December is added to liquid reserves outside the bank while *none* of it is spent or given away, which provides an upper bound on the mismeasurement of true liquid wealth due to December cash withdrawals. The figure shows that liquid wealth continues to exhibit significant excess mass below the threshold with this cash withdrawal adjustment, albeit slightly less than liquid wealth held at the bank. This suggests that cash reserves outside of the banking system could potentially explain only a modest fraction of the old-age check's impact on liquid wealth identified in the main analysis.

We provide analogous monthly density distributions for the two control groups: those who are comparable to the treated group in terms of income but below the age threshold in Figure 5(b) and those who are comparable in terms of age but above the income threshold in Figure 5(c). In both cases, the densities are very similar from month to month. This is consistent with our interpretation that the shifts in the distribution for the treated group around the end of the year is caused by the old-age check.

Cash withdrawals, spending, and debt repayment. We use the bank data to provide more evidence on the dynamics in cash withdrawals, spending and debt repayment around the end of the year and report the results in appendix Figure A.3. For all three outcomes, we compare monthly means in December (green solid line), January (red dashed line) and all other months (brown dotted line) across individuals with different end-of-year liquid wealth. We show analogous results for the treated group of low-income individuals above the age threshold (age

65+) and the control group of low-income individuals who are just below (age 60-64).

Panel (a) shows that individuals in the treated group generally make more cash withdrawals in December than in other months. The difference is most pronounced for individuals with end-of-year liquid wealth just below the threshold, i.e. around DKK 1,000 compared to around DKK 500 at higher and lower liquid wealth levels. By contrast, in the control group, cash withdrawals are only slightly higher in December than in other months and the difference is not systematically larger around the threshold, as shown in Panel (b). These results suggest that the emergence in December of additional excess mass below the threshold, documented in Figure 5(a), is at least partly explained by unusually high cash withdrawals. However, we cannot tell whether the cash is spent, given to family or friends, or kept as liquid reserves outside the bank.

Panels (c) and (d) show that spending is generally at the same level in December as in other months, both in the treated group and in the control group. This is true for individuals with end-of-year liquid wealth just below the threshold as well as for individuals with higher or lower levels of liquid wealth. Panels (e) and (f) show similar patterns for changes in short-term debt. Overall, the results are not consistent with spending and debt repayments being used strategically to reduce liquid wealth temporarily around the end of the year.

In sum, while the main analysis shows that the asset test of the old-age check causes a substantial reduction in liquid wealth, the bank data analysis suggests that the effect is largely permanent. Nonetheless, temporary responses to manage liquid wealth around the end of the year do exist and take the form of cash withdrawals rather than spending or debt repayment.

5 Conclusion

Exploiting unusually rich data from Denmark, our study provides the first evidence of clear and quantitatively important reductions in liquid wealth in response to an asset test for a government support program. The responses we obtain are not sharp bunching as predicted by the standard budget set model, but diffuse and sluggish consistent with informational frictions. We therefore rely on reduced-form graphical and quantitative analysis rather than structural estimation of behavioral elasticities, which is challenging in the presence of frictions (Kleven, 2016; Kosonen and Matikka, 2020).

The results have important implications for welfare and policy design. Liquid wealth helps

individuals weather unexpected economic shocks. The elderly in Denmark benefit from generous and stable health and retirement benefits. Yet, uninsured economic shocks still arise and credit constraints are significant for the elderly with low income and limited collateral. In these cases, liquid wealth remains important by providing safety. Implicitly taxing wealth by asset testing government transfers discourages liquid wealth formation and creates a standard deadweight loss assuming rationality in saving behavior. This welfare cost is further increased if the elderly do not accumulate enough buffer stock savings for other reasons such as myopia or self-control problems.

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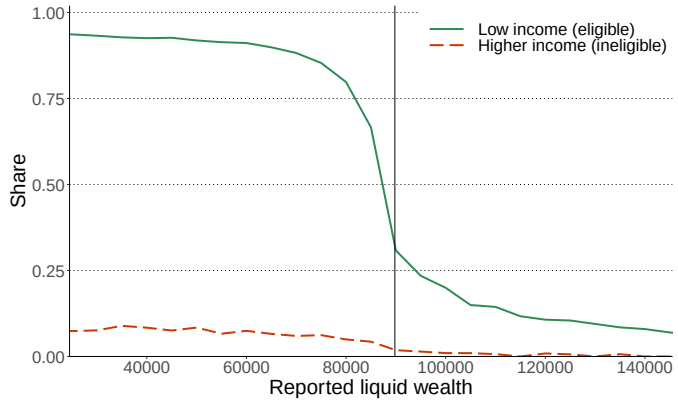
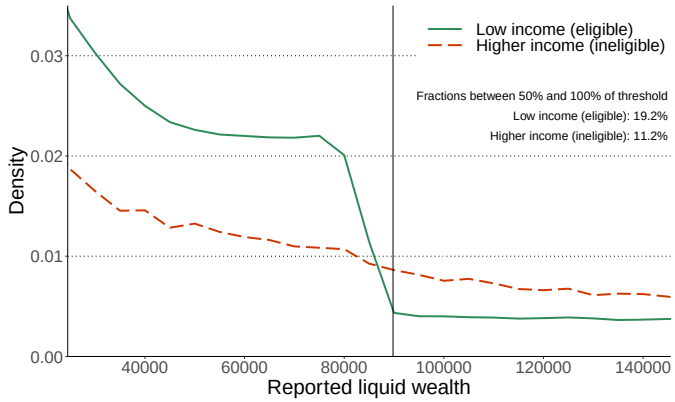
Figure 1: Asset Testing and Excess Mass Around the Threshold

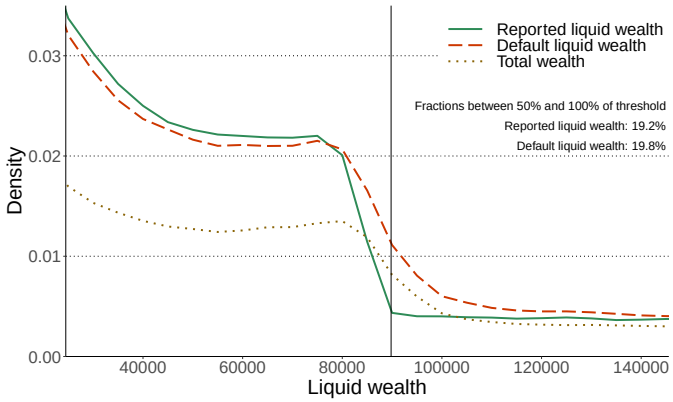
(a) Old-age check eligibility by liquid wealth



(b) Density distribution of liquid wealth



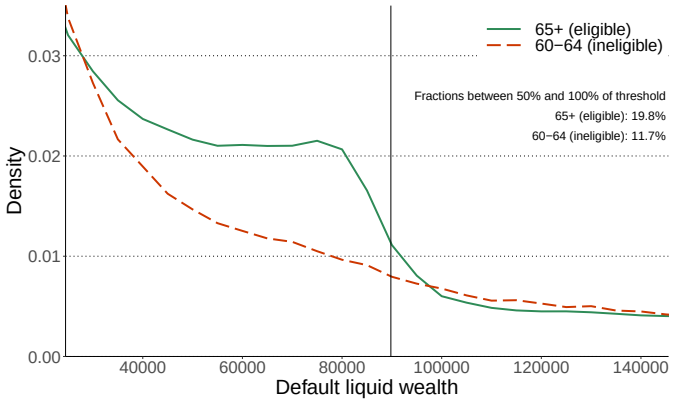
(c) Default vs. reported liquid wealth, total net wealth



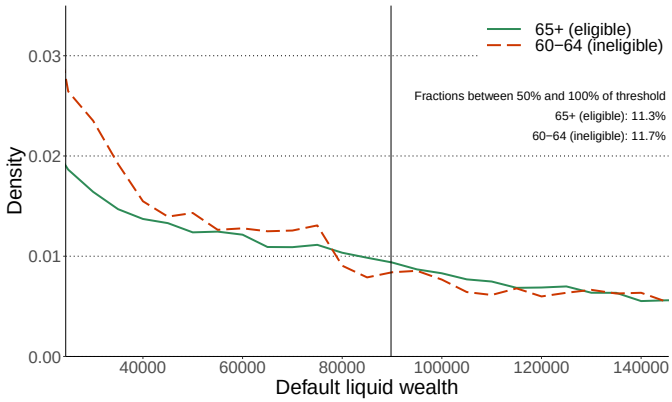
Notes: Panel (a) illustrates the discontinuity in eligibility for the old-age check created by the asset test. The figure shows the likelihood of receiving the old-age check by reported liquid wealth for age-eligible singles comparing the treatment group of low-income individuals (green solid line) to a control group of higher-income individuals (red dashed line). Panel (b) illustrates the excess mass in the wealth distribution below the threshold of the asset test. It shows the density distribution of reported liquid wealth for age-eligible singles comparing the treatment group of low-income individuals (green solid line) to a control group of higher-income individuals (red dashed line). Panel (c) illustrates that the excess mass below the threshold of the asset test extends to alternative wealth measures. It compares the density distribution of three wealth measures: reported liquid wealth (green solid line), default liquid wealth (red dashed line) and total wealth (brown dotted line) for the treatment group of age-eligible low-income singles. Default liquid wealth is the third-party reported value of bank deposits and listed securities. Reported liquid wealth is default liquid wealth net of self-reported corrections. Total wealth is default liquid wealth, gross of pension wealth and housing wealth and net of liabilities. Age-eligible means age 65 or older. Income is net of social security and before self-reported corrections. Low-income refers to incomes below the threshold where the old-age check is fully phased out and higher-income refers to incomes between 150% and 200% of the threshold. All three figures pool observations for 2014-2018. The vertical line indicates the nominal value of the asset test threshold in 2020. Liquid wealth is inflated to 2020-values with the growth rate in the asset test threshold ($1 = 6.53 DKK in 2020). The horizontal axis groups individuals into DKK 5,000 bins of liquid wealth. Densities refer to the full distribution and not just the portion of the distribution displayed.

Figure 2: Exploiting Age Variation for Identification

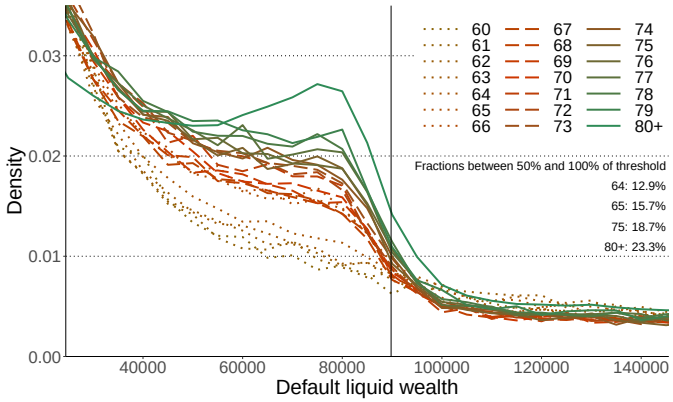
(a) Low-income singles by age eligibility



(b) Higher-income singles by age eligibility



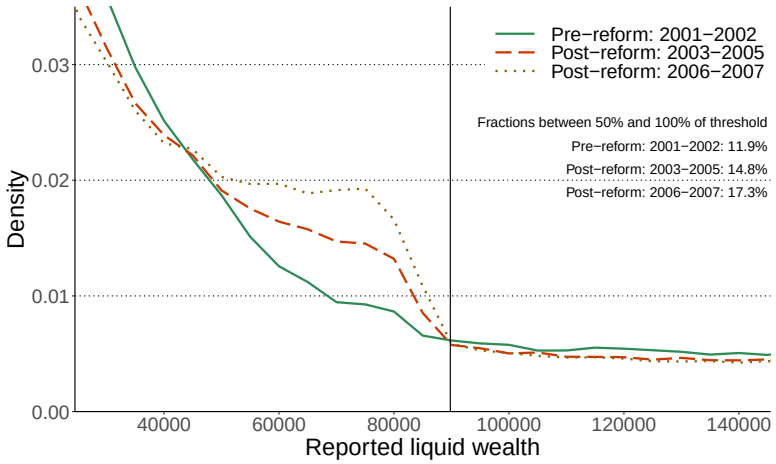
(c) Low-income singles by age cohort



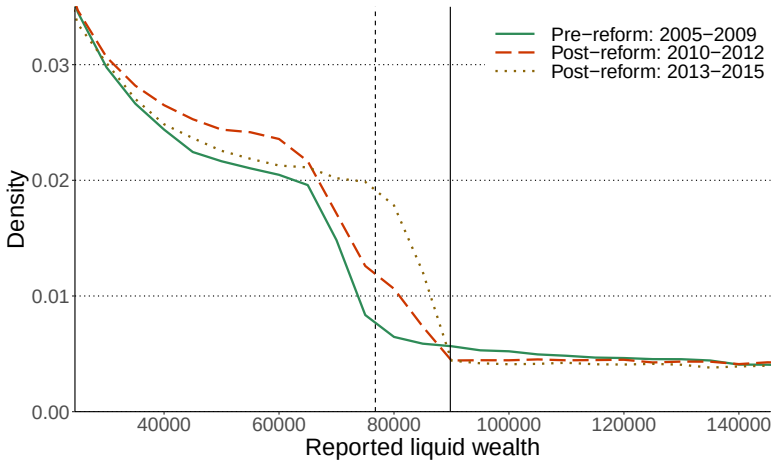
Notes: Panel (a) illustrates the excess mass in the wealth distribution below the threshold of the asset test. It shows the density distribution of default liquid wealth for low-income singles comparing the treatment group of age-eligible individuals (green solid line) and a control group of slightly younger individuals who are age-ineligible (red dashed line). Panel (b) illustrates a placebo test for individuals whose income makes them ineligible. It shows the density distribution of default liquid wealth for higher-income singles comparing the group of age-eligible individuals (green solid line) and a group of slightly younger age-ineligible individuals (red dashed line). Panel (c) illustrates how the excess mass below the asset test threshold increases systematically with age. It shows the density distribution of default wealth for low-income singles by age cohort. Default liquid wealth is the third-party reported value of bank deposits and listed securities. Age-eligible means age 65 or older. Age-ineligible means age 60-64. Income is net of social security and before self-reported corrections. Low-income refers to incomes below the threshold where the old-age check is fully phased out and higher-income refers to incomes between 150% and 200% of the threshold. All three figures pool observations for 2014-2018. The vertical line indicates the nominal value of the asset test threshold in 2020. Liquid wealth is inflated to 2020-values with the growth rate in the asset test threshold ($1 = 6.53 DKK in 2020). The horizontal axis groups individuals into DKK 5,000 bins of liquid wealth. Densities refer to the full distribution and not just the portion of the distribution displayed.

Figure 3: Exploiting Reform Variation for Identification

(a) Introduction of the old-age check



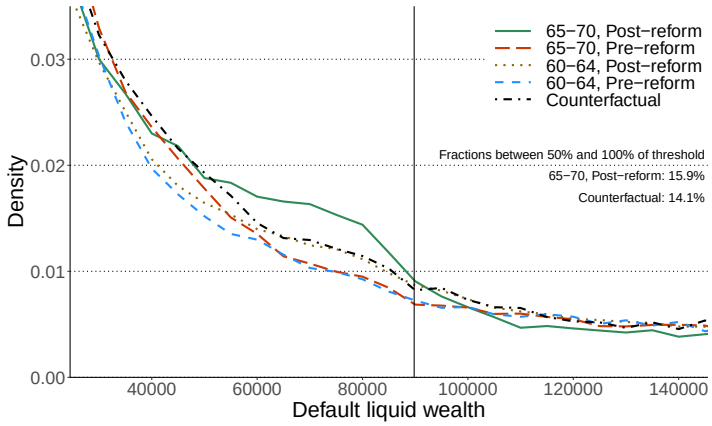
(b) Increase in the asset test threshold



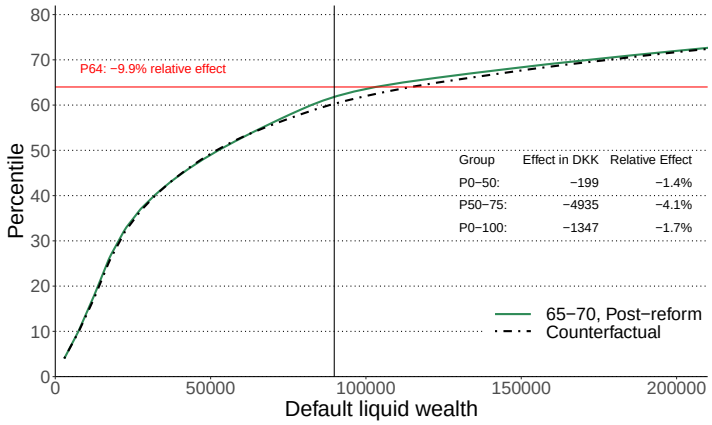
Notes: Panel (a) illustrates how the wealth distribution of the low-income elderly changed around the introduction of the old-age check in 2003. It plots the density distribution of reported liquid wealth for age-eligible, low-income singles in three different periods: before the reform, 2001-2002 (solid green line); the short run after the reform, 2003-2005 (dashed red line), the medium run after the reform, 2006-2007 (dotted brown line). Panel (b) illustrates how the wealth distribution of the low-income elderly changed around the reform that discretely increased the asset test threshold in 2010. It plots the density distribution of reported liquid wealth for age-eligible, low-income singles in three different periods: before the reform, 2005-2009 (solid green line); the short run after the reform, 2010-2012 (dashed red line), medium run after the reform, 2013-2015 (dotted brown line). Reported liquid wealth is the third-party reported value of bank deposits and listed securities net of self-reported corrections. Income is net of social security and before self-reported corrections. Age-eligible means age 65 or older. Low-income refers to incomes below the threshold where the old-age check is fully phased out. We apply the 2006-threshold to 2001-2005 observations as no income threshold existed in 2001-2002 a much lower threshold was applied in 2003-2005. The full vertical lines indicate the asset test thresholds in 2010 (solid vertical line) and before 2010 (dotted vertical line). All wealth figures are inflated to 2020 DKK ($1 = 6.53 DKK in 2020).

Figure 4: The Effect of Asset Testing on Liquid Wealth

(a) Constructing a counterfactual liquid wealth density



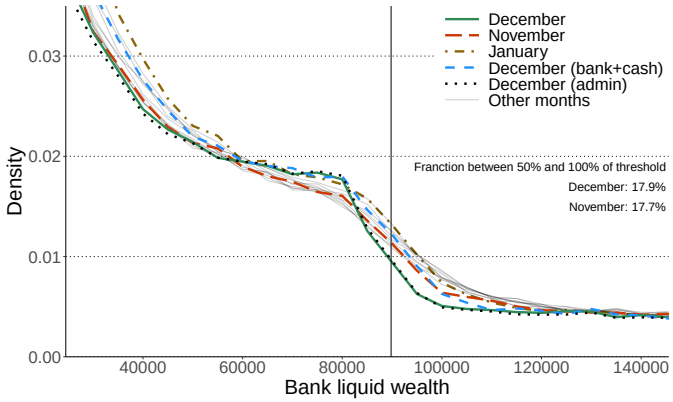
(b) Actual vs. counterfactual cumulative distributions



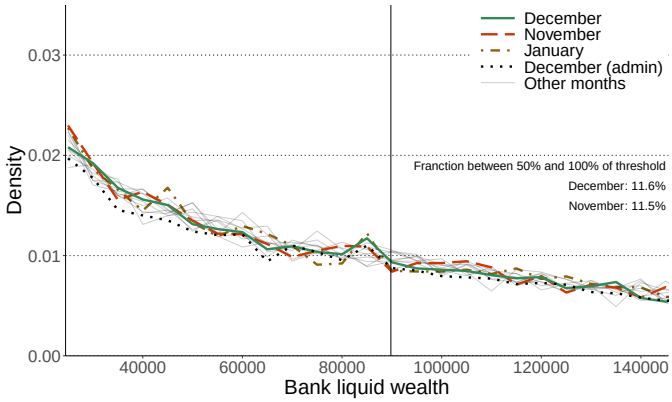
Notes: Panel (a) illustrates how we obtain counterfactual densities of default liquid wealth for the low-income elderly by exploiting the reform that introduced the old-age check. It shows the actual density distribution of default liquid wealth for the treatment group of age-eligible, low-income singles in the pre-reform period 2001-2002 (red dotted line) and the post-reform period 2006-2007 (solid green line) as well as for a control group of slightly younger age-ineligible, low-income singles in the pre-reform period 2001-2002 (blue dashed line) and the post-reform period 2006-2007 (brown dotted line). The counterfactual densitites for the treatment group (black dashed line) is the pre-post change in the densitites of the treatment group minus the pre-post change in the densitites of the control group. Panel (b) illustrates how we estimate the effect of the asset test on liquid wealth by comparing the actual and counterfactual distributions. It shows the actual (solid green line) and the counterfactual (black dasged line) cummulative distribution of default liquid wealth for the low-income elderly the post-reform period 2006-2007. At a given percentile on the vertical axis, the estimated effect is the horizontal distance between the two curves. At just below 10%, the estimated effect is largest at the 64th percentile (horizontal red line). Default liquid wealth is the third-party reported value of bank deposits and listed securities. Age-eligible means age 65 or older. Age-ineligible means age 60-64. Income is net of social security and before self-reported corrections. Low-income refers to incomes below the income threshold where the old-age check is fully phased out (except we apply the 2006-threshold to 2001-2002 observations as no threshold existed before the old-age check was introduced). The vertical line indicates the nominal value of the asset test threshold in 2020. Wealth is always inflated to 2020 DKK ($1 = 6.53 DKK in 2020). The horizontal axis groups individuals into DKK 5,000 bins of liquid wealth. Densities refer to the full distribution and not just the portion of the distribution displayed.

Figure 5: Within-Year Variation: Temporary vs Permanent Responses

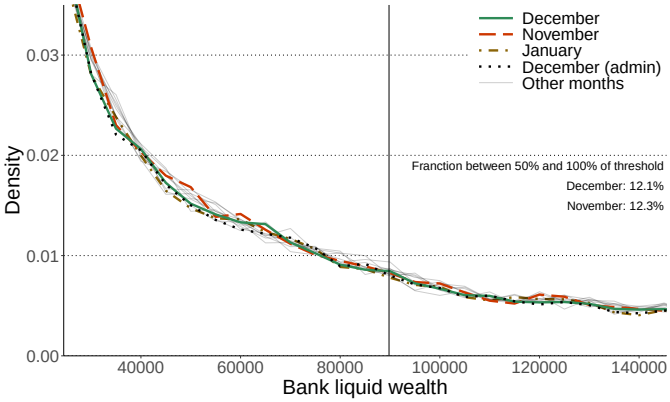
(a) Treatment group: low-income, age-eligible



(b) Control group: higher-income, age-eligible



(c) Control group: low-income, age-ineligible



Notes: The figure uses monthly bank data to illustrate how the distribution of liquid wealth changes within the year. Panel (a) shows the density distribution of bank liquid wealth for age-eligible, low-income singles at the end of November (red dashed line), December (green solid line), January (brown dotted line) and other months (thin gray lines). It also shows the density distributions of cash-adjusted bank liquid wealth at the end of December (blue dashed line) and default liquid wealth (black dotted line). Panel (b) shows the same density distributions for a control group of age-eligible but slightly higher-income singles. Panel (c) shows the same density distributions for another control group of low-income, but slightly younger age-ineligible singles. Bank liquid wealth is the value of bank deposits and listed securities in the bank. The cash-adjustment adds in cash withdrawals made in the course of the month. Age-eligible means age 65 or older. Age-ineligible means age 60-64. Low-income refers to incomes below the income threshold where the old-age check is fully phased out and higher-income refers to incomes between 150% and 200% of the threshold. All three figures pool observations for 2014-2016. The vertical line indicates the nominal value of the asset test threshold in 2020. Liquid wealth is inflated to 2020-values with the growth rate in the asset test threshold ($1 = 6.53 DKK in 2020). The horizontal axis groups individuals into DKK 5,000 bins of liquid wealth. Densities refer to the full distribution and not just the portion of the distribution displayed.

Appendix

Table A.1: Summary statistics

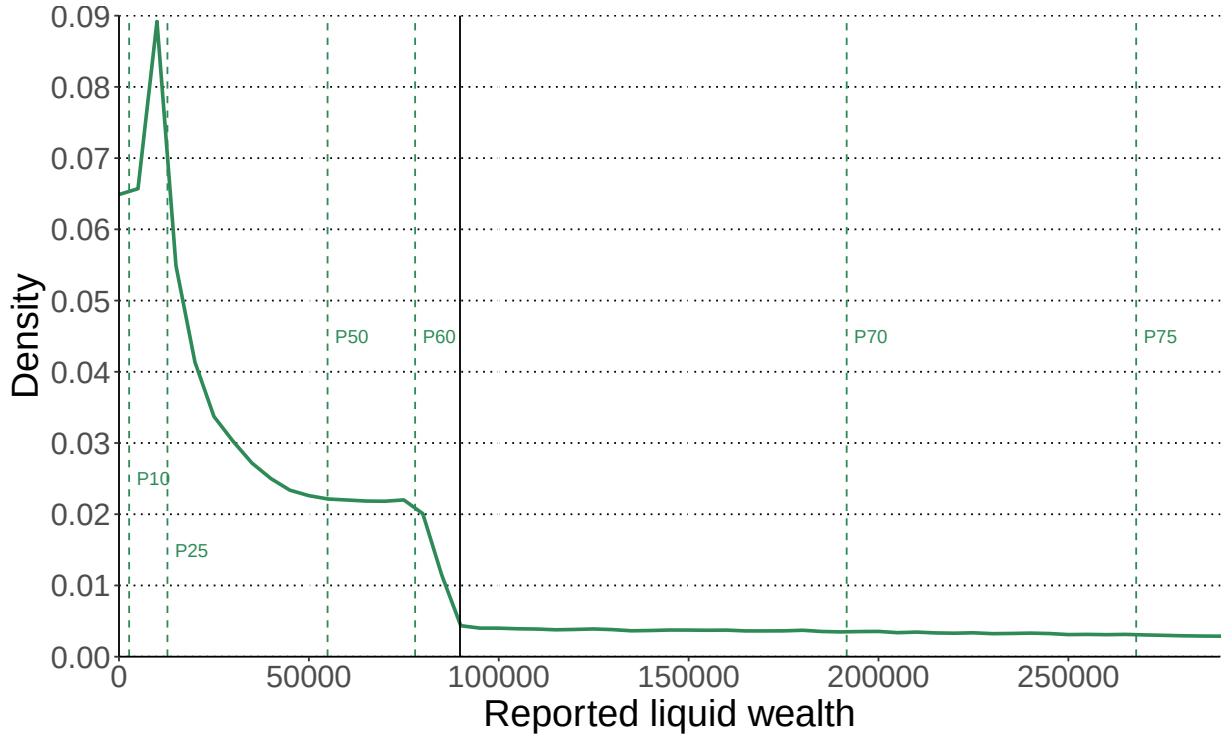
	All singles 60+	*Singles 60-64*	*Singles 65+*	*Singles 65+* low income
Panel A: Population sample, 2014-18				
Default liquid wealth, DKK	472,700	344,200	502,700	237,700
Reported liquid wealth, DKK	–	–	448,000	229,700
Fraction below asset test threshold	0.47	0.54	0.45	0.60
Fraction home owner	0.39	0.41	0.39	0.28
Housing wealth, DKK	614,700	614,500	614,600	330,500
Fraction with pension wealth	0.51	0.80	0.44	0.27
Pension wealth, DKK	456,000	881,400	358,700	64,500
Total income, DKK	275,100	325,100	263,600	209,300
Earned income, DKK	117,800	201,500	98,700	19,800
Fraction low-income	0.59	0.45	0.62	1
Fraction higher-income 150%-200% of eligible	0.05	0.03	0.06	0
Age	73.77	61.78	76.51	77.18
Fraction male	0.34	0.46	0.32	0.30
Number of observations	2,523,974	468,987	2,054,987	1,274,330
Panel B: Bank sample, 2014-16				
Default liquid wealth, DKK	508,900	389,800	536,200	213,900
Reported liquid wealth, DKK	–	–	495,000	211,600
Bank liquid wealth, end-of-year, DKK	434,800	325,800	459,900	195,000
Annual cash withdrawals, DKK	30,400	30,500	30,400	31,900
Annual non-housing spending, DKK	122,200	147,200	116,400	89,700
Number of observations	480,680	89,777	390,903	228,467

Notes: The table reports summary statistics on the balance sheet, income, and demographic variables used in the analysis. It shows average values for four subsamples: (1) singles age 60 or more, (2) singles age 60-64, (3) singles age 65 or more, (4) low-income singles age 65 or more. Panel (a) samples from the full population and pools observations for 2014-2018. Panel (b) samples from Danske Bank customers with at least one spending transaction in every month of the year and pools observations for 2014-2016. All amounts are in 2020 DKK ($1 = 6.53 DKK in 2020). Default liquid wealth is the third-party reported value of bank deposits and listed securities. Reported liquid wealth is default liquid wealth net of self-reported corrections. Housing wealth is the assessment value of properties. Pension wealth is the value private pension accounts in pension funds or similar. Bank liquid wealth is the value of bank deposits and listed securities in the bank. Low-income refers to incomes below the income threshold where the old-age check is fully phased out and higher-income refers to incomes between 150% and 200% of the threshold.

Figure A.1: Indexed Parameters of the old-age check

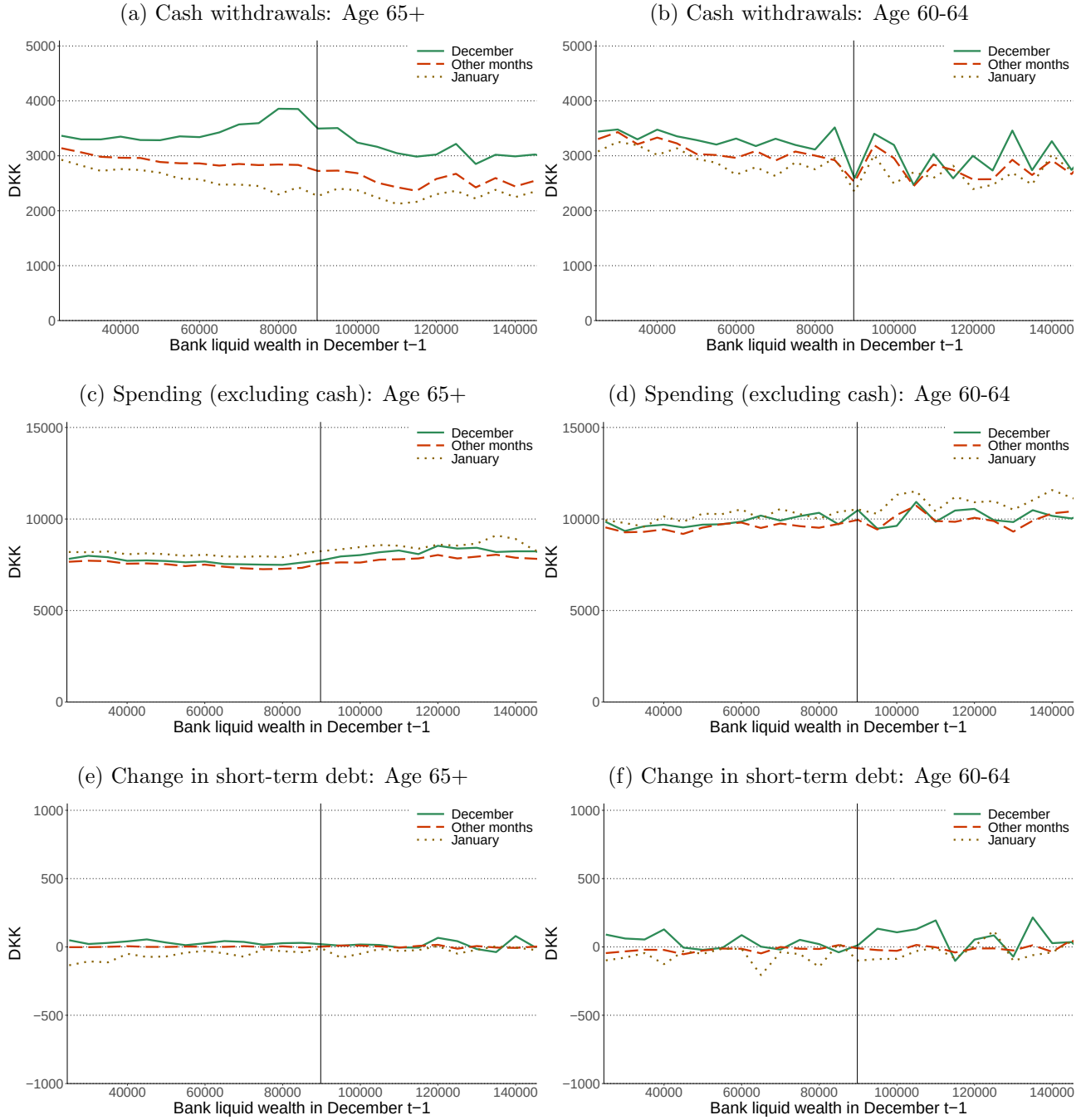
Notes: The figure illustrates how the the parameters of the old-age check have evolved over time. Panel (a) shows the maximum value of the old-age check in 2020-values, inflating nominal values with the index used to automatically adjust nominal tax and transfer parameters (roughly equal to nominal wage growth). The figure highlights that the value of the old-age check was increased over and above the normal indexation in 2005, 2007, 2009, and 2013. Panel (b) shows the threshold value of the asset test in 2020-values inflating nominal values with the same index ($1 = 6.53 DKK in 2020). The figure highlights that the threshold was increased over and above the normal indexation by around 15% in 2010. Panel (c) shows the threshold income levels where phase-out of the old-age check begins (red dashed line) and where it ends (green solid line) (inflating nominal values with the same index). The figure highlights that the income test was initially very strict but has been unchanged (in real terms) since 2006 except for a small increase in the income threshold values in 2020.

Figure A.2: Wider Density Distribution of Reported Liquid Wealth



Notes: The figure illustrates the density distribution of reported liquid wealth for age-eligible, low-income singles. It is analogous to Figure 1(b) except that it displays a larger portion of the distribution and plots the percentiles P10, P25, P50, P60, P70, and P75 (dashed green vertical lines). The excess mass below the asset test threshold remains a clear and salient feature of the distribution when taking a broader view than in the main analysis despite the large mass at very low wealth levels. Reported liquid wealth is third-party reported value of bank deposits and listed securities net of self-reported corrections. Age-eligible means age 65 or older. Income is net of social security and before self-reported corrections. Low-income refers to incomes below the threshold where the old-age check is fully phased out. The figure pools observations for 2014-2018. The vertical line indicates the nominal value of the asset test threshold in 2020. Liquid wealth is inflated to 2020-values with the growth rate in the asset test threshold ($1 = 6.53 DKK in 2020). The horizontal axis groups individuals into DKK 5,000 bins of liquid wealth. Densities refer to the full distribution and not just the portion of the distribution displayed.

Figure A.3: Cash Withdrawals, Spending, and Short-term Debt: Evidence from Bank Data



Notes: The figure uses bank data for 2014-2016 to identify temporary responses to the asset test of the old-age check around the end of the year. It shows how cash withdrawals (top panels), spending (middle panels) and changes in consumer debt (bottom panels) by bank liquid wealth comparing with each panel December (solid green line), January (dotted brown line) and other months (dotted red line) and comparing across panels the treated group of age-eligible (aged 65+), low-income singles (left panels) to a slightly younger control group of age-ineligible (aged 60-64), low-income singles (right panels). Income is net of social security and before self-reported corrections. Low-income refers to incomes below the income threshold where the old-age check is fully phased out. The vertical line indicates the nominal value of the asset test threshold in 2020. Liquid wealth is inflated to 2020-values with the growth rate in the asset test threshold ($1 = 6.53 DKK in 2020). The horizontal axis groups individuals into DKK 5,000 bins of liquid wealth. The vertical axis plots the mean of the variable of interest by liquid wealth bin, month and income group.