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The Impact of Retirement on Household Finances

Causal Evidence from Transaction Data

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The Impact of Retirement on Household Finances: Causal Evidence from Transaction Data

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Abstract

This paper uses high-quality Dutch transaction data to estimate the causal effect of retirement on households' financial outcomes. We use the discontinuity imposed by the Statutory Retirement Age (SRA) and the increase in the SRA to measure causal effects. Monthly data allow us to estimate short-run effects using RD and DiD designs. Our findings show a positive spike in net flow balance at retirement, which financially constrained households use to pay off debts. Debts decline especially for low income, blue collar workers, and social insurance recipients. In addition, we see a gradual increase in the end of month balance over time, that is not directly caused by retirement itself.[1]

Keywords: Retirement, Personal Finance, Panel Data, Instrumental Variables, Regression Discontinuity, Difference-in-Difference, Transaction data

JEL Codes: C23, C24, C26, D14, D91, G21, H55, J26

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1 Introduction

There is a sizable literature that studies the impact of retirement on individual and household finances and financial behavior. Several seminal papers on the life cycle model such as Modigliani and Brumberg (1954); Ando and Modigliani (1963); Heckman (1976) predict smoothing of consumption over the lifetime and a decumulation of wealth over the course of retirement. The empirical evidence on the impact of retirement on consumption, however, is mixed.[2] Furthermore, recent literature finds that wealth for most households remains constant or increases after retirement, contradicting the standard life cycle model.[3]

This paper estimates the impact of retirement on retirees' finances using transaction data. Throughout the paper we focus on the net flow balance (i.e. the total inflow minus the total outflow from accounts), the end of month balance (i.e. the sum of bank and savings accounts at the end of the month), and whether the person is in debt (i.e. a negative balance). For many people the decision to retire may be related to their finances pre-retirement and/or their plans after retirement. To address the potential endogeneity arising from this, we use the discontinuity created by the statutory retirement age, as well as cohort-based variation in the statutory retirement age — both of which significantly affect the actual retirement age — as instruments for retirement. This approach allows us to estimate the causal impact of retirement on the three key outcomes: the net flow balance, the end-of-month account balance, and the likelihood of being in debt.

Our data originate from ING Netherlands, the largest Dutch retail bank with a market share of approximately 40% in personal current accounts. We obtain a sample of around 12,000 individuals born between April 1952 and August 1953 (of which half the sample has 66 and the other half has $66\frac{1}{3}$ as SRA). Everyone in our sample transitions from work to retirement during our sample period. Our data contain monthly total inflows and outflows, and transfers to and from specific (anonymized) bank accounts in the period 2017 to 2021. In order to identify the exact month of retirement, we use the start of repeated inflows from second-pillar pension funds.[4] This implies that our sample consists only of workers who have worked at an employer at some point in their lifetime. Transaction data reflect actual behavior with high accuracy. They are objective and provide granular details that are often difficult to capture through surveys. Because transactions are recorded repeatedly

[2] For instance, Battistin et al. (2009); Agarwal et al. (2015); Aguila et al. (2011); Luengo-Prado and Sevilla (2013); Been and Goudswaard (2020) find no change in consumption patterns around retirement, while Banks et al. (1998); Bernheim et al. (2001); Lührmann (2010) find decreases in consumption around retirement.

[3] See, for instance, Love et al. (2009); Poterba et al. (2011); Kieren and Weber (2022); Olafsson and Pagel (2018).

[4] Second-pillar pension funds are funds build up by a worker's employer during their working life, and these are paid out monthly to the worker when the worker retires. This date can be, and often is, different from the statutory retirement age.

over time, they allow us to track changes in behavior. Transaction data are increasingly used in scientific research (e.g. Floccari et al. (2023); Buda et al. (2023); Baker and Kueng (2022); Kapetanios et al. (2022); Carvalho et al. (2021)).

We find no discrete change in the net flow balance or end of month balance around the months of retirement. Instead, we see a gradual and significant increase in the end of month balance with age. This result implies that on average people are saving during retirement, but that this is not caused by the event of retirement itself. However, we do find that retirement leads to a strongly significant reduction in the probability to be in debt. This is mainly driven by low income, blue collar workers, and social insurance recipients.

Our paper contributes to research on consumption around retirement. This research finds mixed effects. Battistin et al. (2009) and Hori and Murata (2019) find, using survey data from respectively the US and Japan, that consumption decreases after retirement. Alaudin et al. (2019) find – using Malaysian survey data – that this is driven to a large extent by work-related expenses. Aguila et al. (2011) find that food consumption decreases after retirement, and Li et al. (2015) find a decrease in the consumption of non-durable goods. On the other hand, Been and Goudswaard (2020) find – using Dutch survey data – no significant impact of retirement on consumption. We contribute to this literature by using detailed transaction data, and using a causal identification strategy.

Some research studies the distributional impact of retirement. Fisher and Marchand (2014) find that the drop in consumption following retirement is primarily concentrated in high-consumption household. Hurd and Rohwedder (2013) on the other hand, find decreases in consumption primarily for low-wealth households. We contribute to this literature by adding a range of short-run heterogeneity tests, with more detailed and more frequent data (on, for instance, spending patterns before retirement).

Our findings are also of interest for policymakers. Many papers have found decreases in consumption and attribute this to inadequate pension savings as a result of poverty prior to retirement. Our data contrast the finding that on average consumption decreases. In the Netherlands, a country with a generous pension system, we do not observe a decrease in inflow. If anything, balances increase following retirement in the short run. Our heterogeneity analyses show that in particular people with a worse financial position prior to retirement improve their financial position as a consequence of retirement.

The rest of this paper is organized as follows. Section 2 discusses the key aspects of the Dutch retirement system and how these aspects factor into our analysis. Section 3 explain the identification strategy, and section 4 covers the data used. We show and discuss results in section 5. Finally, section 6 concludes.

2 Institutional setting

This section provides an overview of how the Dutch retirement system is organized. As in many countries, the Dutch pension system consists of three pillars. The first pillar operates on a pay-as-you-go basis and entails a uniform public pension provision for all Dutch inhabitants starting from the statutory retirement age. The public pension amount is linked to the net minimum wage and depends on the duration of a person's residency in the Netherlands. Couples residing in the Netherlands in the 40 years preceding their statutory retirement age receive 50% of the minimum wage, while singles receive 70% of the minimum wage. To ensure a minimum standard of living, for individuals with an incomplete public pension, limited pension income, and minimal assets, the public pension is topped up with social assistance (e.g., for immigrants who lived only part of their life in the Netherlands).

In many countries, individuals can access their public pension earlier or later, although with a reduction or additional benefits.[5] In the Netherlands, the statutory retirement age is a fixed starting age; the Dutch public pension cannot be taken earlier or postponed. If people work after the statutory retirement age, they receive public pension benefits in addition to their earnings. From its introduction in 1956 until 2013, the statutory retirement age was 65 for both men and women. As from 2013 the statutory retirement age has gradually increased (OECD (2019)). For the cohorts considered in this study (individuals born between April 1952 and August 1953), the statutory retirement age is 66 or 66 and 4 months (see Table 1). This was established in a law passed in June 2015 that allowed individuals to adjust to the new situation. In 2019, a new agreement reduced the pace of the increase in the retirement age, but this did not impact the individuals born between April 1952 and August 1953.

Cohort	Statutory retirement age	Year of statutory retirement	Range of birth dates
1	66	2018	April 1, 1952 – December 31, 1952
2	66 and 4 months	2019	January 1, 1953 – August 31, 1953

Table 1: Retirement ages and birth years of the cohorts included in our analysis.

The second pension pillar comprises employer- and employee-funded occupational pensions. Occupational pensions in the Netherlands are capital-funded and mandatory in nature, with approximately 90% of all employees participating in a pension scheme through their employer. Primarily, occupational pensions are structured as defined-benefit pension

[5] For example, in the US, benefits can be claimed from the age of 62 and until the age of 70 (Duggan et al. (2007)).

plans. Before the onset of the 21st century, most pension plans aimed to supplement public pensions to achieve a combined pension income totaling 70% of the final gross wage, if an employee had worked full-time for at least 40 years, starting at the age of 65. However, since 2003, pension funds have revised their objectives, now targeting a payout equivalent to 70% of the average career salary (including public pension benefits). Furthermore, with the increase in the statutory retirement age, also the official age used for the accrual of occupational pensions increased. All of this resulted in less generous pension schemes for younger cohorts. People can choose the age at which they access their occupational pension, with a reduction for early withdrawal and a compensation for later withdrawal. Usually, employment contracts are terminated at the statutory retirement age. If individuals wish to continue working beyond that age, a new employment arrangement must be made. After the statutory retirement age, workers have a lower tax burden as they no longer have to pay pension contributions and employee insurance premiums.

Finally, the third pillar comprises private individual pension products, like life annuities, and other private savings. Third-pillar pensions are typically accumulated by self-employed workers, who mostly have an own responsibility to save for their pension, see e.g. Knoef et al. (2016). Throughout this paper, we primarily focus on first- and second-pillar pensions, as our data contains transactional records detailing the inflow of both public pension and occupational pension on a monthly basis.

3 Data

For our analysis, we use transaction data from ING Netherlands, the largest retail bank in the Netherlands serving roughly 9 million Dutch clients. Our analysis begins with a random sample of approximately 20,000 individuals who receive a monthly inflow of at least €800 into their ING accounts and who started receiving occupational pension benefits between January 2016 and January 2021. By selecting individuals with a minimum monthly inflow of €800, we increase the likelihood that ING serves as their primary bank. Individuals included in the study are required to have received occupational pension benefits for at least two consecutive months. Typically, the first receipt of occupational pension benefits coincides with the moment of actual retirement.

Our data include information on the inflow of statutory retirement benefits from September 2017 to January 2021. We select individuals who start receiving statutory retirement benefits at any point during this period. This means that they did not yet receive these benefits in September 2017, but did start receiving these benefits later on. This selection leaves us with approximately 12.000 individuals.

The data encompass all accounts held by the individuals, including shared accounts. Although our selection criteria ensure a monthly inflow of at least €800, it is possible that clients maintain accounts with other banks as well. This could pose an issue, particularly if the use of these alternative accounts changes post-retirement. However, according to the household survey of the Dutch central bank (CentERdata (2022)), the majority of ING clients do not have a current account at another bank. Finally, we exclude the top 1% and bottom 1% inflow and outflow observations to prevent outliers from skewing the results.

3.1 Variable definitions and sample characteristics

Since we observe individuals who start receiving their statutory retirement between September 2017 - January 2021, and because we have bank data until May 2021, our analyses run from September 2017 until May 2021. For these months we observe account balances and monthly cash flows.

Account balances are recorded at the end of each month. Cash flow data include details on occupational and statutory retirement benefits, as well as total inflow and outflow each month for individual and shared accounts. We compute total inflow and outflow by aggregating the individual and shared accounts. For shared accounts, flows are divided by the number of adults in the household. Since inflow and outflow measures might be affected by transfers between accounts, our primary interest lies in the net flow balance. This measure is calculated each month as the difference between total inflow and total outflow, providing a clear picture of financial movements (results on total inflow and outflow can be found in Appendix A.1). Furthermore, we construct a dummy variable, “In debt”, indicating whether an individual is in debt in a given month. This indicator equals 0 when the total balance is zero or positive, and 1 when the total end-of-month balance is negative.

To take into account inflation, we adjust our financial data with the Consumer Price Index provided by Statistics Netherlands, using April 2021 as the base month. This adjustment ensures that our results reflect real balances and flows.

Finally, individual characteristics such as age, gender, household size, and home-ownership status are assessed in May 2021, based on the administrative data of the bank. In the Netherlands, pension funds are predominantly organized by sector, allowing us to categorize individuals into blue-collar and white-collar sectors based on their pension fund affiliations. We categorize blue-collar and white-collar sector workers on the basis of pension flows into individual accounts. This approach ensures that pension incomes from other household members do not influence the classification. However, a limitation is that individuals who choose to receive their occupational pensions in a shared account cannot be assigned to either group. Consequently, about one third of the individuals are not categorized. Note that working in a blue or white-collar sector does not necessarily mean being a blue or white-collar worker. For example, in the construction sector (considered blue-collar), there are also individuals with white-collar jobs (e.g. an administrative job).

	Cohort 1			Cohort 2			P-value
	Mean	Median	SD	Mean	Median	SD	equal means
Age	67.81	68	0.52	67.21	67	0.60	0.000
Female	0.45	0	0.50	0.46	0	0.50	0.000
Household size	1.76	2	0.65	1.78	2	0.64	0.000
Blue-collar sector	0.30	0	0.46	0.29	0	0.46	0.000
White-collar sector	0.31	0	0.46	0.34	0	0.47	0.000
UI/DI recipient	0.20	0	0.40	0.17	0	0.38	0.000
Individuals		5734			6392		

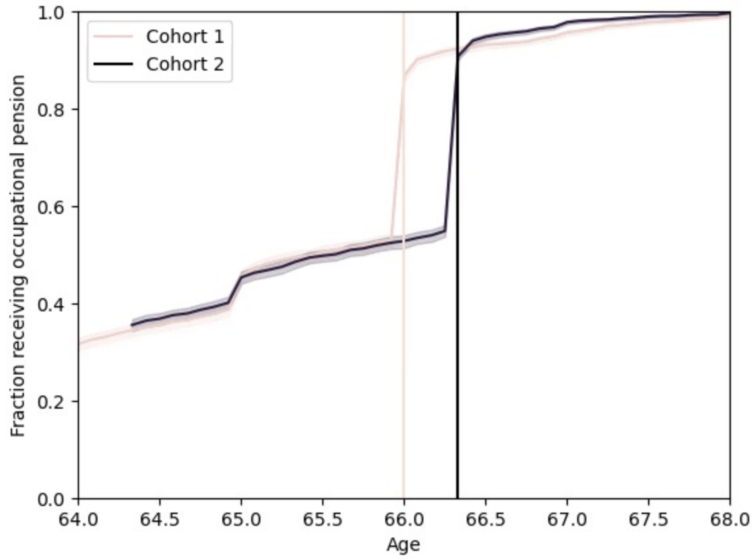
Table 2: Characteristics of the individuals included in the sample, as observed in May 2021. UI/DI recipient is defined as receiving a UI or a DI benefit in the month prior to reaching the statutory retirement age.

Table 2 describes the characteristics of the sample, separating the two cohorts defined in Table 1. Cohort 1 has a statutory retirement age of 66, while cohort 2 has a statutory retirement age of 66 years and 4 months. The two cohorts have a roughly equal number of observations. By definition, cohort 1 is older than cohort 2, with averages of 67.81 and 67.21 years, respectively. Other characteristics are very similar between the two cohorts. About 45% of the individuals are female, the average household size is 1.77, for approximately one-third of the sample we know that they work(ed) in a blue-collar sector, and for another one-third we know that they work(ed) in a white-collar sector. Although the differences between cohort 1 and 2 are statistically significant, they are not meaningful economically (e.g. a less than one percentage point difference in the fraction of females, and a 0.01 difference in household size). Finally, approximately 20% of cohort 1 and cohort 2 receive UI and/or DI benefits in the month prior to reaching the SRA. These are likely individuals with a relatively large distance from the labor market.

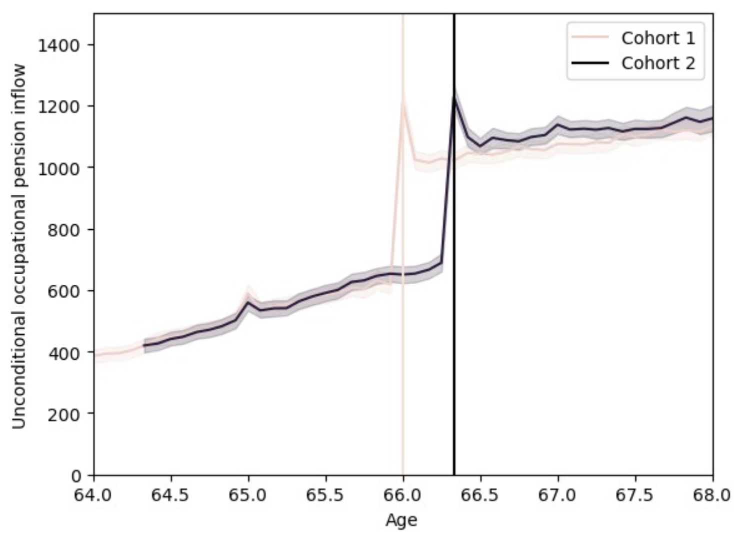
To investigate household finances around retirement, we introduce several key variables. First, we define a dummy variable to indicate whether an individual receives occupational pension income. Figure 1(a) illustrates the percentage of occupational pension recipients by age for cohorts 1 and 2. About 30-35% of the individuals receives occupational pension income at the age of 64. This gradually increases to 55%, after which there is a jump of 35%-points to around 90% upon reaching the retirement age. The remarkable increase in occupational pension recipients at the retirement age can be attributed to the typical termination of labor contracts at the statutory retirement age. In addition, the statutory retirement age may serve as a reference point for individuals in their decision to retire. Seibold (2021), for example, shows that in Germany financial incentives alone cannot explain retirement patterns, but there is a large direct effect of statutory retirement ages. Nearly all remaining individuals in the sample start receiving occupational pension benefits within the two years after the statutory retirement age.

Interestingly, we also see a small jump at the age of 65. This suggests the presence of a social norm effect. Until 2013, the Dutch statutory retirement age was 65. This appears to remain a crucial benchmark for workers, despite subsequent increases in the statutory retirement age. This observation aligns with Behaghel and Blau (2012), who identified a similar pattern in the U.S., indicating that earlier societal norms around retirement ages continue to affect retirement decisions.

Figure 1(b) shows the average unconditional pension inflow by age and cohort. Here we see a spike at the statutory retirement age, which seems to be caused by the one-time payout of small pensions. After this spike, unconditional pension inflow slowly increases, in line with the slow increase in the number of people receiving occupational pension income (Figure 1(a)).



(a) Fraction receiving occupational pension by cohort and age.



(b) Average occupational pension income by cohort and age.

Figure 1: Descriptives of pension recipiency

3.2 Financial data

Table 3 presents descriptive statistics of the financial variables in our data. Net flow balance is on average €48 for cohort 1 and €57 for cohort 2. The medians are €12 and €16, respectively, showing that for most people savings are low. The standard deviation, however is high with about 1800 euros for both cohorts.

The end-of-month balance, consisting of assets in ING bank and savings accounts, averages 32 thousand euros.[6] Here too, the median is lower, at around 11 thousand euros. This discrepancy reflects the common skewness in wealth distributions, suggesting that some accounts hold significantly higher balances. The standard deviations are large, reaching nearly 79 thousand euros for cohort 1 and approaching 66 thousand euros for cohort 2. 4% of cohort 1 is in debt, as compared to 3% of cohort 2. The remainder of the variables in Table 3 are related to pensions. In approximately half of the observations in cohort 1, individuals receive a public pension. For the younger cohort 2 this is 44%. The public pension inflow (conditional on receiving public pension), is on average €700. This is in line with the full public pension being about €690 per individual for couples and €998 for singles in 2018 (depending also on a tax credit determined by the amount of other income). Occupational pension inflow, conditional on receiving occupational pensions, is quite similar for both cohorts: on average €919 for cohort 1 and €925 for cohort 2, with medians of 712 and 725 for cohort 1 and 2, respectively. Finally, total pension inflow—comprising both public and occupational pensions—averages €1,411 for cohort 1 and €1,345 for cohort 2. As with wealth, the distribution of total pensions is right-skewed, with median values of €1,217 and €1,184 for cohorts 1 and 2, respectively.

	Cohort 1			Cohort 2			P-value
	Mean	Median	SD	Mean	Median	SD	equal means
Net flow balance	48	12	1800	57	16	1774	0.0582
End-of-month balance	31954	10752	78916	32394	11980	65510	0.0277
In debt (binary)	0.04	0	0.19	0.03	0	0.16	0.0000
Fraction receiving public pension	0.52	1	0.50	0.44	0	0.50	0.0000
Public pension inflow (conditional)	700	677	370	701	682	372	0.0000
Fraction receiving occupational pension	0.70	1	0.46	0.69	1	0.46	0.0000
Occupational pension inflow (conditonal)	919	712	889	925	725	884	0.0000
Fraction receiving any pension	0.72	1	0.45	0.72	1	0.46	0.0000
Total pension inflow (conditional)	1411	1217	980	1345	1184	985	0.0000
Observations		270296			261884		
Individuals		5734			6392		

Table 3: Descriptive statistics of financial variables. Net flow balance is defined as the total inflow minus the total outflow in a given month. Total pension inflow is defined as the sum of public and occupational pensions.

Figures 2, 3, and 4 show the development of net flow balance, end-of-month balance and 'in debt' before and after retirement. The first graph presents age on the horizontal axis. The second and third graphs show the distance to the statutory and the actual retirement

[6] This fairly closely aligns with the population average reported by Statistics Netherlands, based on tax and bank data (CBS (2021)).

age on the horizontal axis, respectively.

Net flow balance

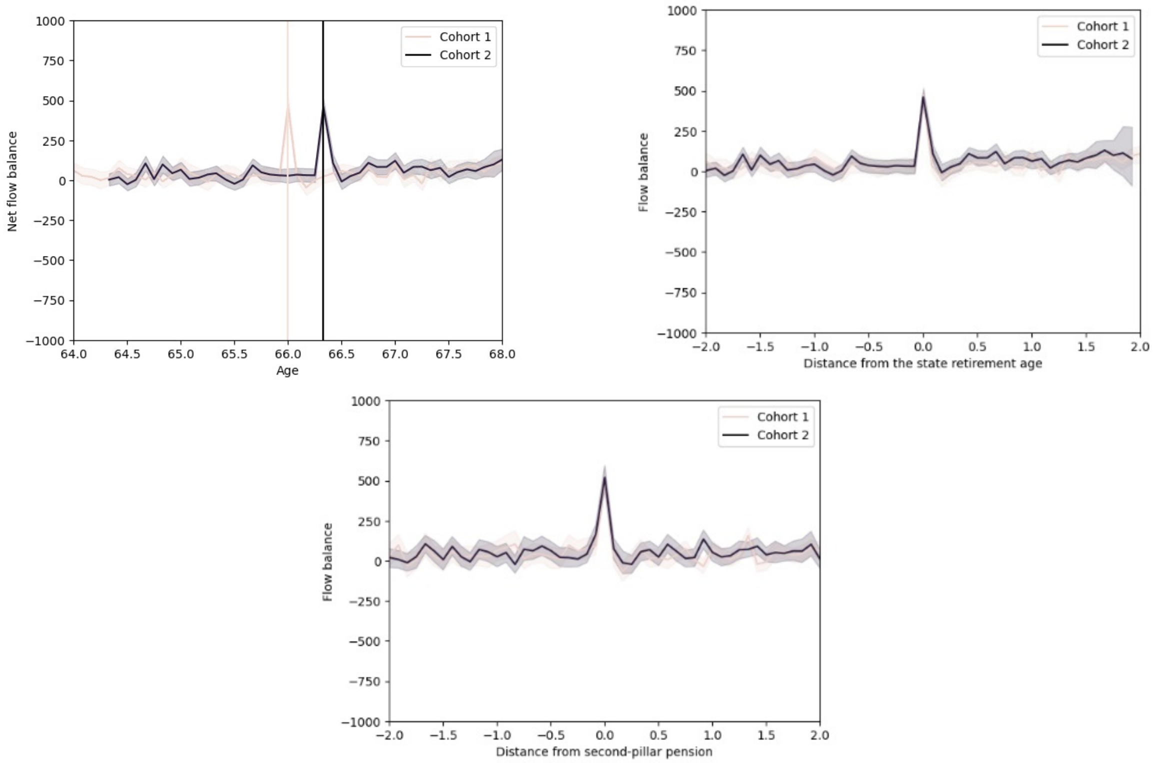


Figure 2: Net flow balance by age, and distances to the statutory and actual retirement age

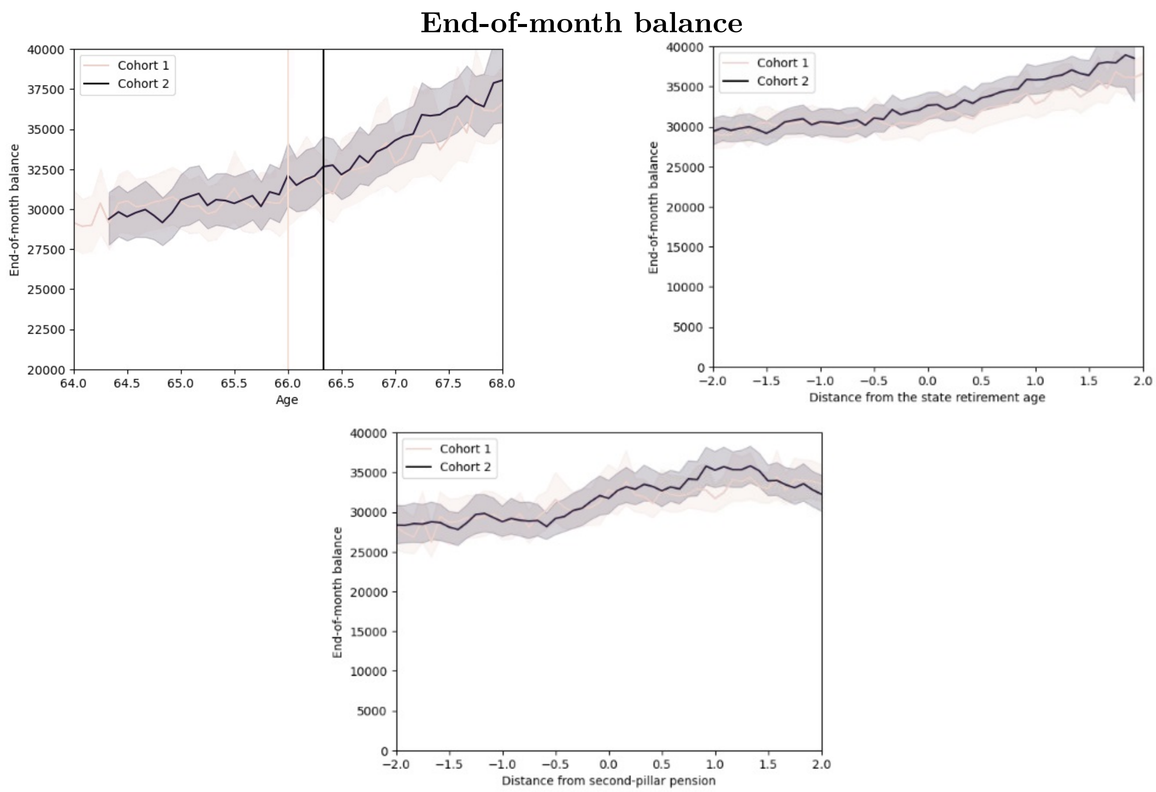


Figure 3: End-of-month balance by age, and distances to the statutory and actual retirement age

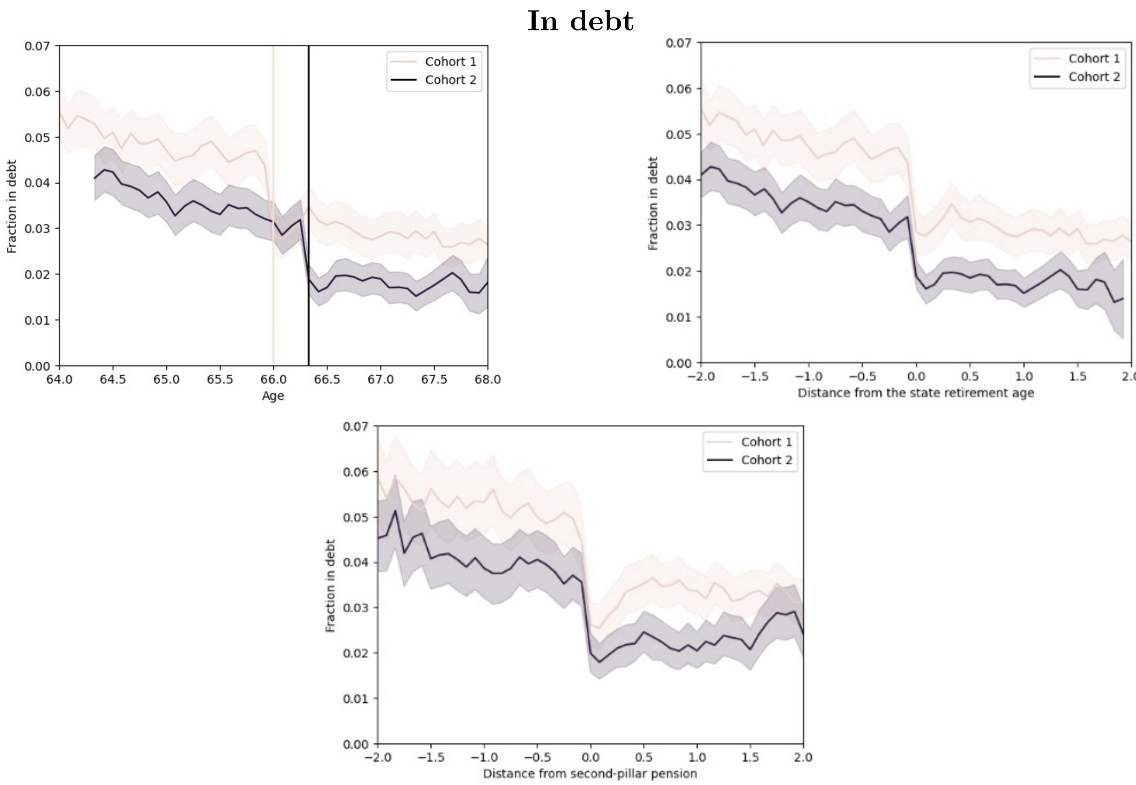


Figure 4: In debt by age, and distances to the statutory and actual retirement age

Focusing first on figure 2, we observe that the net flow balance is predominantly positive, with pronounced spikes occurring at the statutory retirement age. An explanation for these spikes is that many labor contracts are terminated at the statutory retirement age, and accumulated holiday pay and year-end bonuses are paid out at that time. Additionally, at the statutory retirement age, some small pensions are paid out as a lump-sum (as we also observed in Figure 1(b)). As detailed in Appendix A.1, both inflow and outflow peak at the statutory retirement age, with inflow exceeding outflow. When comparing the periods before and after the statutory retirement age, we find that the net flow balance is quite similar.

Looking at figure 3, we find that the end-of-month balance increases with age. In the last graph, however, we do not see the clear upward trajectory in end-of-month balance. This can be explained by the fact that the end-of-month balance (wealth) is likely to influence the timing of actual retirement. More affluent individuals tend to retire relatively early, resulting in a more stable end-of-month balance around the actual retirement age compared to around the statutory retirement age.

Figure 4 shows the fraction in debt by age. In line with Table 3, cohort 1 is more often in debt than cohort 2. The percentage of individuals in debt decreases with age, and particularly around the statutory and actual retirement age debts are often paid off.

4 Methodology

To assess the effect of retirement on financial outcomes, we use two modeling approaches. We begin with a regression discontinuity design (Section 4.1), followed by a difference-in-differences strategy (Section 4.2).

4.1 Regression Discontinuity approach

The statutory retirement age creates a discontinuity in the probability of retirement that enables us to apply a regression discontinuity (RD) framework, with age minus the statutory retirement age as the running variable. Elaborating on Stancanelli and Van Soest (2012) and Been and Goudswaard (2020), we use a "fuzzy" regression discontinuity design, because the jump in the probability of retirement at the statutory retirement age is between zero and one.[7] Our fuzzy RD model is specified as follows:

$$F_{it} = \beta_0 + \beta_1 R_{it} + \beta_2 f(A_{it}) + \beta_3 PUB_{it} f(A_{it}) + X_{it}' \beta_4 + v_{1it} \tag{1}$$

$$R_{it} = \gamma_0 + \gamma_1 PUB_{it} + \gamma_2 f(A_{it}) + \gamma_3 PUB_{it} f(A_{it}) + X_{it}' \gamma_4 + v_{2it} \tag{2}$$

Where F_{it} denotes a financial outcome of individual i in month t (that is, net flow balance, end of month balance, or in debt). R_{it} denotes a dummy for whether individual i is actually retired in month t (measured by the inflow of second-pillar pensions), and X_{it} denotes a vector of controls. We control for household size, gender, cohort, and calendar month fixed effects (to capture seasonality). PUB_{it} is a dummy variable that indicates whether an individual has reached the statutory retirement age. The discontinuity introduced by the statutory retirement age is the instrument in the analysis. A_{it} denotes age minus the individual's statutory retirement age (i.e. the distance to the statutory retirement age). $f(A_{it})$ is a polynomial centered around the statutory retirement age. The term $PUB_{it} f(A_{it})$ allows the slope to be flexible on each side of the statutory retirement age. Finally, the v's are zero-mean errors, and the correlation between the elements of v_1 and v_2 are presumably nonzero. The crucial condition for the instrument PUB_{it} to be valid, is that it is correlated with actual retirement R_{it}, but that it is uncorrelated with v_1. Therefore, our estimates are causal if the statutory retirement age affects retirement but does not affect financial outcomes other than via retirement. The parameter of interest in the regression

[7] Stancanelli and Van Soest (2012) use a fuzzy RD design to identify the causal effect of retirement on home production. Been and Goudswaard (2020) use this design to estimate the causal effect of retirement on spending and time use decisions using survey data.

is β_1, which provides us with an estimate of the causal effect of retirement on the financial outcomes.

In the baseline we use a first-degree order polynomial for $f(.)$, but we also estimate second-degree order polynomials as a robustness check. Furthermore, our baseline RD specification is a donut RD, where we exclude the month in which the statutory retirement age is reached, as well as the months just before and after the statutory retirement age. We therefore exclude the spikes in Figures 2, to prevent our findings from being affected by payments, bonuses and/or expenses related to the date of retirement. In Appendix A.2, we also show the estimation results using the complete dataset (without the donut). We cluster standard errors at the individual level.

Note that the RD model estimates local average treatment effects around the statutory retirement age. The estimates do not necessarily apply to individuals further away from the statutory retirement age. Furthermore, by using the statutory retirement age as an instrument, we estimate a complier average causal effect, where the compliers are those who retire at the statutory retirement age.

4.2 Difference-in-Differences approach

Whereas the regression discontinuity design exploits the discontinuity induced by the statutory retirement age, in the difference-in-differences approach we will exploit the increase in the statutory retirement age between cohort 1 and cohort 2. Due to the gradual phase-in of the increase in the statutory retirement age, cohort 2 had to wait an additional 4 months before receiving public pension benefits compared to cohort 1. That is, they became eligible at the age of 66 years and 4 months, while cohort 1 became eligible at the age of 66. On this basis, we can compare cohort 2 with cohort 1, which was not affected by a 4-month delay in receiving public pension benefits. Our reduced form model is in line with the models of Staubli and Zweimüller (2013) and Rabaté et al. (2024):

$$F_{it} = \eta_0 + \eta_1 COH2_i + \eta_2 AGE_{it} + \eta_3 PUB_{it} + X_{it}\eta_4 + \iota_{it} \tag{3}$$

Where $COH2_i$ denotes a dummy variable indicating whether individual i belongs to cohort 2. AGE_{it} represents the age of the individual. PUB_{it} and X_{it} are specified before, and ι_{it} is the error term.

Since we are interested in the effect of retirement on financial outcomes, we estimate the following instrumented difference in differences model:

$$F_{it} = \delta_0 + \delta_1 COH2_i + \delta_2 AGE_{it} + \delta_3 R_{it} + X_{it}\delta_4 + w_{1it} \tag{4}$$

$$R_{it} = \zeta_0 + \zeta_1 COH2_i + \zeta_2 AGE_{it} + \zeta_3 PUB_{it} + X_{it}\zeta_4 + w_{2it} \tag{5}$$

The identifying assumption is that, if the statutory retirement age had not been increased, the development of financial outcomes over the life cycle would have been similar between cohort groups not yet qualified for retirement benefits ($COH2$, the treatment group) and those already eligible ($COH1$, the comparison group), after controlling for background characteristics. Under this assumption, δ_3 measures the average causal impact of an increased statutory retirement age on F_{it}, using variation over time.

Our identification stems from age ranges in which one cohort has reached the statutory retirement age whereas others have not yet. Thus, we use between cohort variation to identify causal effects. We cluster standard errors at the individual level.

5 Results

5.1 Fuzzy donut RD results

Table 4 presents the results of the fuzzy donut RD model. We exclude the month in which the statutory retirement age is reached, as well as the months immediately preceding and following the statutory retirement age. Throughout we choose a bandwidth of 2 years (left and right of the statutory retirement age), based on the results of the optimal bandwidth selection strategy outlined by Imbens and Kalyanaraman (2012). The results of the first stage can be found in Appendix A.5. The instrument (that is, the binary indicator of receiving statutory retirement benefits) has a highly significant positive coefficient of 0.36, in line with the fraction of people who retire at the statutory retirement age in Figure 1.

Model (2) presents results for the net flow balance and end-of-month balances. Retirement increases the monthly net flow balance with €16, though this effect is not statistically significant. Similarly, the coefficient for the end-of-month balance is positive (€890), but also not statistically significant. The fuzzy RD estimates indicate that the share of individuals in debt declines significantly upon retirement. Specifically, the estimates show a reduction of 3.1%-points, compared to average debt rates of 4% in cohort 1 and 3% in cohort 2.

Appendix Table A.6 presents the full list of coefficients. Interestingly, and as expected, we observe a substantial and highly significant positive coefficient for net flow balance in the month of May, which is the month when typically holiday payments are received. Accordingly, the end-of-month-balance is €1529 euros higher than in January (the reference month). Holiday payments are (partly) used to pay off debts, as evidenced by the decline in the fraction of individuals in debt by 1.3%-points during the same month. In the months that follow, the net flow balance turns negative (e.g. holiday spending). Furthermore, in December the end-of-month balance is relatively low compared to January (the reference month). On average, the end-of-month balance is €798 lower in December compared to

January. The net flow balance is €99 lower in December compared to the reference month of January.

Appendix Table A4 shows the results including the donut observations. That is, including the month in which the statutory retirement age is reached, and the months immediately preceding and following the statutory retirement age. While the results for the end-of-month-balance and 'in debt' remain similar, the coefficient for net flow balance shifts to a substantial and significant value of €239. This shift is likely caused by the high peak in net flow balance observed in the retirement month.

Robustness checks in Appendix A.3 show that the coefficient for 'in debt' is robust for varying bandwidth sizes around the statutory retirement age. The coefficients for end-of-month balance are similar for bandwidths of 1.5, 2, 2.5, and 3 years, but are more volatile for smaller bandwidths of 0.5 an 1 year. Net flow balance is only significant for larger bandwidths of 2.5 and 3 years. We also estimate the model with a second-order polynomial instead of a first-order polynomial. This leads to conclusions similar to the baseline results. Finally, Table A8 shows the reduced form results. These results align with the baseline results, indicating a consistent pattern across the models. However, the coefficients are smaller in the reduced form model as they reflect the intention to treat effects (focusing on the statutory retirement age, instead of actual retirement).

Dependent variable	Model 1	Model 2
Net flow balance	-20.28	16.33
	(24.79)	(25.07)
End-of-month balance	760.97	890.13
	(1043.53)	(1037.97)
In debt (binary)	-0.033***	-0.031***
	(0.004)	(0.004)
Controls	x	✓
Observations	497271	497271
Individuals	12125	12125
First-stage F-stat	23716	23017

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Fuzzy donut RD estimates examining the effect of retirement on several financial outcome measures. Bandwidth of two years. Control variables are gender, household size, a cohort 2 dummy, and a set of calendar month dummies. Extended estimation results can be found in Appendix A.6.

5.2 Instrumented difference in differences model

Whereas the RD in Table 4 exploits the discontinuity in retirement caused by the statutory retirement age, Table 5 shows the estimation results of the Instrumented difference-in-differences model, exploiting the increase in the statutory retirement age between cohort 1 and cohort 2. Figure 1(a) shows a clear parallel trend for cohorts 1 and 2 before the statutory retirement age. At the age of 66, cohort 1 reaches their statutory retirement age. Upon examining the figure, it seems very likely that, in the absence of the increase in the retirement age, cohort 2 would have followed a similar pattern to cohort 1. Also, with regard to the financial outcomes (Figures 2, 3, and 4) we see clear parallel trends in the graphs in the left column.

The first-stage results show that the instrument (that is, the binary indicator of receiving occupational pension benefits) has a highly significant positive coefficient of 0.35 (Appendix A.5). This is very similar to the coefficient found in the fuzzy donut RD model. Also, the second stage results lead to similar conclusions. The coefficient for 'in debt' shows again a significant drop in the fraction of individuals in debt by 3.5%-points. The coefficients for net flow balance and end-of-month balance have the same order of magnitude and are not significantly different from zero. Appendix Table A.6 presents the full list of coefficients and show similar dynamics across the year as we found in the fuzzy donut RD model (a relatively large net flow balance and end-of-month balance in May, and a relatively low end-of-month balance in December). In both models, the coefficients suggest that part of the holiday payments are used to pay off debt.

To make a clean comparison with the fuzzy RD donut model, in the instrumented diff-in-diff model we used the same estimation sample as in the fuzzy RD donut model. That is, we excluded the observations at the statutory retirement age, and the months immediately preceding and following the statutory retirement age. In Table A4 we estimate the same model including these observations. The results lead to the same conclusions as the fuzzy RD model (without the donut). Namely, the fraction in debt declines with 3.5%-points, the coefficient of the end-of-month balance is not significant, and net flow balance is relatively large: €239. The reduced form results (Appendix Table A8) align again with the baseline results, and are smaller than the baseline results as they reflect the intention to treat effect.

Dependent variable	Model 1	Model 2
Net flow balance	-5.76	26.20
	(34.53)	(25.43)
End-of-month balance	1020.52	1436.00
	(1775.47)	(1053.85)
In debt (binary)	-0.029***	-0.031***
	(0.005)	(0.004)
Controls	x	✓
Observations	497271	497271
Individuals	12125	12125
First-stage F-stat	22429	22191

Clustered Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Instrumented DiD estimates examining the effects of retirement on financial outcome measures. Control variables are gender, household size, age, and month dummies. Extended estimation results can be found in Appendix A.6.

5.3 Heterogeneity

Next, we explore heterogeneous effects by conducting analyses on various subsamples. We separate our estimates by gender, by blue/white collar sector, income, household size, and whether the individual received UI or DI benefits prior to receiving statutory retirement benefits.[8]

Table 6 shows RD estimates for the aforementioned subgroups. We find small but positive net flow balance effects for women, but no other gender-related differences. Net flow balances increase especially for single-person households, and not significantly for multi-person households. When comparing blue-collar workers to white-collar workers, UI/DI recipients to non-UI/DI recipients, and comparing high-inflow groups to low-inflow groups, we find remarkable differences: Debt decreases more sharply for low-inflow groups, and end-of-month balances increase. The accumulation of savings observed in low-inflow households after retirement is particularly noteworthy.

Comparing the estimates to the base levels in Table A13, net flow balances increase sharply for financially constrained individuals, whereas debts decrease by over half of their mean value. For UI/DI recipients, Appendix A.8 presents outcome measures based on age, distance from the statutory retirement age, and distance from receiving occupational pensions. This subgroup exhibits lower net flow balances and higher debt rates, which

[8] We define income as 'high' ('low') as the individual has an above (below) median income in 2016, as compared to the rest of the individuals in the sample. By selecting on flows and balances in 2016, we preclude income being an outcome of occupational pensions, as none of the individuals in the sample receive occupational pension benefits yet in this year. Group means of the dependent variables for these subgroups prior to receiving occupational pensions are shown in Table A13 of A.6.

decrease more sharply after retirement than in the remainder of the sample.

Table 7 presents DiD estimates for the aforementioned subgroups. The results are similar to the findings in Table 6, albeit less precisely estimated. We no longer observe any significant net flow balance effects. However, remarkable differences in debt remain intact. Contrasting white-collar and blue-collar workers, we find larger decreases in debt for blue-collar workers than for white-collar workers. As in Table 6, debt decreases more sharply for UI/DI recipients, low-inflow individuals, and blue collar workers than for the remainder of the sample. The decrease in accuracy is likely due to the DiD model identifying effects based on a four-month difference in the statutory retirement age (SRA), whereas the RD model uses a two-year bandwidth around the SRA.

Dependent variable / subgroup	Men	Women	Single-person	Multi-person	DI/UI	No DI/UI
Net flow balance	6.52	23.25***	101.35***	-28.92	26.85***	13.03*
	(8.75)	(7.44)	(34.80)	(6.53)	(9.05)	(7.06)
End-of-month balance	-799.34	1738.02	1133.81	1234.66	2151.58*	805.57
	(1225.87)	(1098.49)	(2883.33)	(1631.46)	(1212.78)	(1051.05)
In debt (binary)	-0.031***	-0.032***	-0.032***	-0.031***	-0.044***	-0.028***
	(0.003)	(0.003)	(0.009)	(0.004)	(0.006)	(0.002)
Controls	✓	✓	✓	✓	✓	✓
Observations	265436	219710	162217	323372	92515	403074
Individuals	6569	5544	3897	8151	2211	9837

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Dependent variable / subgroup	White-collar	Blue-collar	High-inflow	Low-inflow
Net flow balance	4.23	69.78***	-6.68	34.05***
	(12.73)	(10.20)	(11.15)	(5.75)
End-of-month balance	-3148.53**	-1124.62	381.94	2106.76***
	(1516.77)	(1208.20)	(1819.63)	(573.37)
In debt (binary)	-0.028***	-0.039***	-0.024***	-0.037***
	(0.003)	(0.003)	(0.003)	(0.003)
Controls	✓	✓	✓	✓
Observations	158813	143579	247780	247809
Individuals	3991	3603	6002	6046

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Heterogeneity analyses for the donut fuzzy RD estimates, examining the effects of retirement on several financial outcome measures. Estimates control for gender, household size, a cohort 2 dummy, and a set of month dummies.

Dependent variable / subgroup	Men	Women	Single-adult	Multi-adult	UI/DI	No UI/DI
Net flow balance	10.69	27.10	109.95	-17.82	33.04	24.15
	(65.64)	(71.33)	(116.81)	(45.80)	(95.37)	(52.48)
End-of-month balance	-576.30	1903.96	1599.16	1754.26	2479.36	1342.85
	(3179.30)	(3038.71)	(4200.52)	(2083.77)	(3270.23)	(2126.04)
In debt (binary)	-0.031***	-0.032***	-0.033**	-0.031***	-0.045*	-0.028***
	(0.010)	(0.011)	(0.015)	(0.008)	(0.023)	(0.007)
Controls	✓	✓	✓	✓	✓	✓
Observations	265436	219710	162217	333372	92515	403074
Individuals	6569	5544	3897	8151	2211	9837

Dependent variable / subgroup	White-collar	Blue-collar	High-income	Low-income
Net flow balance	11.55	72.00	8.84	39.97
	(122.19)	(106.30)	(72.95)	(53.87)
End-of-month balance	-2949.49	-1120.25	1147.78	2387.56
	(6177.27)	(5861.48)	(3017.58)	(1839.27)
In debt (binary)	-0.028***	-0.039***	-0.024***	-0.037***
	(0.015)	(0.016)	(0.008)	(0.012)
Controls	✓	✓	✓	✓
Observations	340554	143579	247780	247809
Individuals	3991	3603	6002	6046

Table 7: Heterogeneity analyses for the instrumented DiD estimates, examining the effects of retirement on several financial outcome measures. Control variables are gender, household size, age, and a set of month dummies

6 Discussion and conclusion

This paper investigates how retirement affects the financial behavior of retirees. Using the statutory retirement age as an instrument for actual retirement, we estimate how retirement affects cash flows, account balances, and debt using data from the largest retail bank in the Netherlands.

One of the contributions of our paper lies in the use of high quality and high frequency bank account data. As compared to survey data, we have richer and much more frequent data. This allows us to estimate a new support of income and spending behavior more accurately. For instance, we can identify effects just after retirement. With our identification strategy we estimate causal effects, as opposed to descriptive evidence that is common in the retirement literature on household finances.

In the short-run, we find a spike in the net flow balance at the retirement age due to end-of-contract payments and small pensions that are paid as a lumpsum. This money is used to pay off debt. Furthermore, end-of-month balances increase over time (positive age effect). These findings add a layer of depth to the retirement-consumption puzzle.

Additionally, our findings suggest that retirement in the Netherlands alleviates financial constraints. Specifically, for groups with lower educational levels, lower incomes, and UI/DI benefits, we observe increases in both net flow balances and end-of-month balances after retirement. We do not observe decreases for individuals with higher education and income levels, indicating that they can still make ends meet after retirement.

In general, our findings on the retirement-consumption puzzle may explain existing findings in the survey data literature of both papers that do (i.e. Hori and Murata (2019)) and do not (i.e. Been and Goudswaard (2020) show a drop in consumption after retirement. We find positive net flow balances and wealth accumulation in the longer run, but no short-run effects of retirement apart from the spike at retirement.

This paper informs policy makers in two ways. First, the absence of negative net flow balance effects suggests that the combination of first- and second-pillar pensions is, in general sufficient. The observed decreases in debt, particularly for low-income groups, indicates that retirement may help relatively vulnerable individuals to pay off debts and accumulate wealth in the short run. Secondly, both the cash flow and end-of-month balance dynamics that we observe contribute to the discussion on the size as well as the flexibility of retirement benefits over time.

Our findings, from a country with a generous pension system, suggest that retirement does not necessarily lead to a decline in financial well-being; rather, it can improve the financial position of those who were worse off prior to retirement. This underscores the importance of pension system design in influencing post-retirement financial outcomes.

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A Appendices

A.1 Inflow and outflow summary statistics and estimates

Table A1 presents summary statistics of inflow and outflow, separated on the basis of cohort. The average Inflow and outflow are slightly higher for cohort 1, as is the median. The difference in means is significantly different from zero.

	Cohort 1			Cohort 2			
	Mean	Median	SD	Mean	Median	SD	P-value equal means
Total inflow	3440	2427	3375	3353	2347	3352	0.0000
Total outflow	3392	2369	3253	3296	2287	3219	0.0000
Observations		270296			261884		
Individuals		5734			6392		

Table A1: Descriptive statistics of total inflow and total outflow

Figure A1 illustrates inflow and outflow dynamics on the basis of distance from the statutory retirement age and occupational pension recipiency, respectively. Inflow and outflow spike after the receipt of statutory retirement benefits as well as the receipt of occupational beAfterwardterwards, inflow and outflow decline, but remain slightly higher than before receiving statutory retirements and occupational pensions.

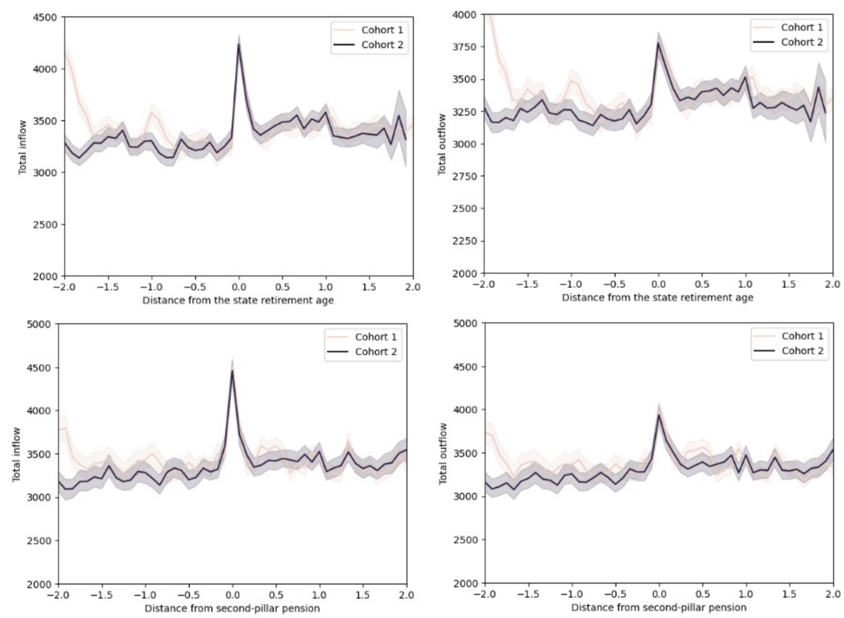

Figure A1: Inflow and outflow before and after the statutory retirement age and receiving occupational pension.

Tables A2 and A3 present RD and DiD estimates, respectively, for inflow and outflow. Inflow and outflow sharply increase for individuals who comply with the statutory retirement age, and the estimated effect intensifies after accounting for controls. However, we cannot verify whether these effects are due to increases in income and spending or whether they result from administrative processes such as transfers between bank accounts.

Dependent variable	Model 1	Model 2
Inflow	724.24***	855.75***
	(54.62)	(82.58)
Outflow	794.52***	839.42***
	(57.63)	(53.35)
Controls	x	✓
Observations	497271	497271
Individuals	12125	12125
First-stage F-stat	23716	23017

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A2: RD estimates of inflow and outflow as a result of retirement. Control variables are a cohort 2 dummy, household size, gender, and a set of calendar month dummies.

Dependent variable		
Inflow	854.88***	904.86***
	(55.74)	(56.39)
Outflow	871.33***	878.66***
	(70.07)	(54.55)
Controls	x	✓
Observations	497271	497271
Individuals	12125	12125
First-stage F-stat	22429	22191

Clustered Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A3: DiD estimates of inflow and outflow as a result of retirement. Control variables are age, household size, gender, and a set of calendar month dummies.

A.2 Robustness checks: including the cutoff observations

The baseline models are estimated with a donut: we exclude the observation at the statutory retirement age, the observation just before the statutory retirement age, and the observation just after the statutory retirement age. In this way, we mitigate the effect of the peak in net flow balance at retirement. Since this effect is interesting in itself, and we are interested in the robustness of the results, we also estimated the models including these cutoff observations and show the results in this appendix.

Tables A4 and A5 report estimates that include the threshold observations for the instrumented RD model and the instrumented DiD model, respectively. Net flow balances sharply increase as a result of the statutory retirement cutoff observations. As in our donut models, we find no short-run effect for end-of-month balances and observe a sharp decrease in debt.

Dependent variable	Model 1	Model 2:
Net flow balance	200.31***	238.78***
	(22.42)	(22.98)
End-of-month Balance	1067.46	1236.26
	(1514.98)	(1010.56)
Debt (Binary)	-0.035***	-0.034***
	(0.003)	(0.003)
Controls	x	✓
Observations	532177	532177
Individuals	12125	12125
First-stage F-stat	30042	29261

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A4: RD estimates of cash flows as a result of retirement including the cutoff observations. Control variables are gender, a cohort 2 dummy, household size, and a set of month dummies.

Dependent variable	Model 1	Model 2:
Net flow balance	200.08***	239.14***
	(22.35)	(23.09)
End-of-month balance	805.61	1881.29
	(1511.56)	(1272.59)
Debt (Binary)	-0.033***	-0.034***
	(0.004)	(0.004)
Controls	x	✓
Observations	532177	532177
Individuals	12125	12125
First-stage F-stat	29693	29313

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A5: DiD estimates of cash flows as a result of retirement including the cutoff observations. Control variables are gender, age, household size, and a set of month dummies.

A.3 Robustness checks fuzzy donut RD model

To check the robustness of the fuzzy donut RD results, we estimate our models with different bandwidths and we estimate our model with a second-order polynomial instead of a first-order polynomial.

Table A6 exhibits RD estimates with varying bandwidths. As in the main results, roughly 35% of the sample complies with the statutory retirement age. We find effects close to 0 for net flow balances, only positive for the three-year bandwidth. End-of-month balance estimates likewise show no statistically significant effects, only being positive for the half-year bandwidth. Finally, debt decreases for all bandwidth sizes, with the magnitude of the decrease amplifying as the bandwidth size decreases.

Dependent variable	Bandwidth 3 yr	Bandwidth 2.5 yr	Bandwidth 1.5 yr	Bandwidth 1 yr	Bandwidth 0.5 yr
Occupational pension (binary)	0.378***	0.367***	0.355***	0.376***	0.380***
	(0.002)	(0.002)	(0.003)	(0.004)	(0.007)
Net flow balance	52.94***	37.49*	31.39	31.07	-74.56
	(19.52)	(21.21)	(29.67)	(41.18)	(79.51)
End-of-month balance	770.89	1007.84	900.22	565.50	3777.18*
	(1069.80)	(1007.34)	(1088.16)	(1233.61)	(1944.07)
In debt	-0.029***	-0.029***	-0.034***	-0.036***	-0.044***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.008)
Controls	✓	✓	✓	✓	✓
Observations	652391	594220	385560	252228	115769
Individuals	12125	12125	12125	12124	12114

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A6: Donut RD estimates with varying bandwidth sizes between 0.5 and 3 years. Control variables are gender, a cohort 2 dummy, household size, and a set of month dummies.

Table A7 presents RD estimates using a second-order polynomial instead of a first-order polynomial. Compliance with the statutory retirement age closely aligns to the main results. Similarly, the estimates for our dependent variables are similar to those in 4: Net flow balances and end-of-month balances are not affected by receiving occupational pension, whereas debt sharply decreases.

Dependent variable	Model 1	Model 2
Occupational pension (binary)	0.360***	0.363***
	(0.004)	(0.004)
Net flow balance	-18.08	27.05
	(45.92)	(45.47)
End-of-month Balance	-179.56	650.34
	(1820.32)	(1412.72)
In debt (binary)	-0.032***	-0.039***
	(0.005)	(0.005)
Controls	x	✓
Observations	497271	497271
Individuals	12125	12125
First-stage F-stat	7751	7877

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A7: Donut RD estimates with a second-order polynomial instead of a first-order polynomial. Control variables are gender, a cohort 2 dummy, household size, and a set of month dummies.

A.4 Reduced form results

Tables A8 and A9 present reduced form estimates of Tables 4 and 5, respectively. The estimates in Tables A8 and A9 are approximately a quarter of the estimates in the main results. These estimates closely match our main results when scaled by the first stage in Tables A11 and A12

Dependent variable	Model 1	Model 2
Net flow balance	-7.31	5.82
	(8.93)	(8.94)
End-of-month Balance	274.57	317.49
	(374.64)	(370.25)
In debt (binary)	-0.012***	-0.011***
	(0.001)	(0.001)
Controls	x	✓
Observations	497271	497271
Individuals	12125	12125

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A8: RD reduced form estimate on the basis of receiving statutory retirement benefits. Control variables are a cohort 2 dummy, household size, gender, and a set of month dummies.

Dependent variable	Model 1	Model 2
Net flow balance	-5.76	9.16
	(8.87)	(8.89)
End-of-month Balance	357.74	502.33
	(370.75)	(370.25)
In debt (binary)	-0.011***	-0.012***
	(0.001)	(0.001)
Controls	x	✓
Observations	497271	497271
Individuals	12125	12125

Clustered standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

Table A9: DiD reduced form estimate on the basis of receiving statutory retirement benefits. Control variables are age, household size, gender, and a set of month dummies.

A.5 First stage results

Table A10 presents the full coefficient estimates of the first-stage models for the RD estimates and the DiD estimates, respectively. Individuals receive occupational pension benefits before the statutory retirement age at a rate of 12% per year, which decelerates to 4% per year after the statutory retirement age. Cohort 2 receives occupational pensions more often, whereas we find mixed effects for women. Larger households are less likely to receive occupational pensions, potentially due to financial constraints. Finally, individuals retire in January and September relatively often, and less often in April, May, and June.

Dependent variable:	Occupational pension	Occupational pension
Model:	RD approach	DiD approach
State pension	0.3567***	0.3498***
	(0.002)	(0.002)
Distance SRA	0.1206***	
	(0.001)	
State pension * Distance SRA	-0.0799***	
	(0.002)	
Cohort 2	0.0328***	0.0089***
	(0.001)	(0.001)
Age minus 66		0.0859***
		(0.001)
Female	-0.0239***	0.0240***
	(0.001)	(0.001)
Household size	-0.0200***	-0.0199***
	(0.001)	(0.001)
Month = 2	-0.0015	-0.0010
	(0.003)	(0.003)
Month = 3	-0.0040	-0.0040
	(0.003)	(0.003)
Month = 4	-0.0047*	-0.0066**
	(0.003)	(0.003)
Month = 5	-0.0049*	-0.0042
	(0.003)	(0.003)
Month = 6	-0.0056**	-0.0056**
	(0.003)	(0.003)
Month = 7	-0.0020	-0.0023
	(0.003)	(0.003)
Month = 8	-0.0009	-0.0014
	(0.003)	(0.003)
Month = 9	0.0014	0.0008
	(0.003)	(0.003)
Month = 10	-0.0002	-0.0010

	(0.003)	(0.003)
Month = 11	-0.0022	-0.0033
	(0.003)	(0.003)
Month = 12	-0.0032	-0.0041
	(0.003)	(0.003)
Constant	0.5809***	0.5413***
	(0.003)	(0.003)
Observations	497271	497271
Individuals	12125	12125

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A10: Full parameter list of the first stage estimates of the models estimated in Table 4 and 5, respectively. Reference categories are the first month of the year (January) and male. Baseline age is equal to the statutory retirement age (66 for cohort 1 and 66.33 for cohort 2).

A.6 Full esimation results

Tables A11 and A12 present the estimates shown in Table 4 and 5. In addition to the results shown in the main paper, several differences are present. Net flow balance and end-of-month balance spike in month 5, likely due to workers getting their vacation payout. In month 12, flow balance and end-of-month balance decrease, likely due to expenses related to end-of-year holidays. and end-of-year payout in these months, respectively.

Dependent variable:	Net flow balance	End of month balance	In debt
Distance SRA	-9.40	718.04**	-0.001
	(7.22)	(278.83)	(0.001)
State pension * Distance SRA	40.22***	2224.53***	-0.000
	(7.98)	(406.90)	(0.001)
Occupational pension	16.33	890.13	-0.031***
	(25.07)	(1037.97)	(0.003)
Female	-23.17***	-1786.96	-0.003***
	(4.97)	(1161.06)	(0.001)
Household size	-37.68***	244.58	0.004***
	(4.13)	(1025.91)	(0.000)

Cohort 2	14.18***	985.93	-0.012***
	(5.08)	(1136.08)	(0.001)
Month = 2	68.21***	683.54***	-0.002**
	(13.43)	(202.43)	(0.001)
Month = 3	-65.77***	676.45***	0.000
	(12.56)	(246.42)	(0.001)
Month = 4	2.66	822.86***	0.001
	(12.99)	(248.16)	(0.001)
Month = 5	339.80***	1528.57***	-0.013***
	(13.56)	(268.82)	(0.001)
Month = 6	-63.90***	818.55***	-0.009***
	(13.95)	(248.76)	(0.001)
Month = 7	-181.06***	802.69***	-0.004***
	(13.05)	(268.96)	(0.001)
Month = 8	-49.53***	1002.80***	-0.001
	(13.39)	(261.89)	(0.001)
Month = 9	4.00	889.28***	-0.002**
	(12.75)	(255.14)	(0.001)
Month = 10	-103.59***	589.42**	0.002*
	(12.55)	(233.38)	(0.001)
Month = 11	16.78	406.88	0.001
	(12.95)	(248.24)	(0.001)
Month = 12	-99.38***	-797.68***	-0.001
	(15.70)	(287.05)	(0.001)
Constant	93.84***	29930***	0.058***
	(24.25)	(2518.08)	(0.003)
Observations	497271	497271	497271
Individuals	12125	12125	12125

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A11: Full parameter list of the models estimated in Table 4. Reference categories are the first month of the year (January) and male. Baseline age equals 66 for cohort 1, and 66.33 for cohort 2.

Dependent variable:	Net flow balance	End-of-month balance	In debt
Occupational pension	26.20	1436.00	-0.031***
	(25.430)	(1053.85)	(0.004)
Cohort 2	9.19*	301.81	-0.011***
	(5.01)	(1139.03)	(0.002)
Age minus 66	7.23	1637.63***	-0.001
	(5.88)	(236.39)	(0.001)
Female	-23.43***	-1801.68	-0.003
	(4.98)	(1161.20)	(0.002)
Household size	-37.51***	253.57	0.004**
	(4.14)	(1025.89	(0.002)
Month = 2	67.96***	669.87***	-0.002*
	(13.43)	(201.97)	(0.001)
Month = 3	-65.74***	678.00***	-0.001
	(12.56)	(246.53)	(0.001)
Month = 4	3.64	877.24***	0.001
	(13.00)	(249.57)	(0.001)
Month = 5	339.47***	1510.56***	-0.013***
	(13.56)	(268.34)	(0.001)
Month = 6	-63.86***	820.68***	-0.009***
	(25.43)	(248.72)	(0.001)
Month = 7	-180.37**	813.35***	-0.004***
	(13.06)	(269.31)	(0.001)
Month = 8	-49.26***	1017.66***	-0.000
	(13.39)	(262.58)	(0.001)
Month = 9	4.29	905.63***	-0.002
	(12.75)	(255.85)	(0.001)
Month = 10	-103.20***	611.40***	0.002*
	(12.55)	(233.26)	(0.001)
Month = 11	17.34	438.09*	0.001
	(25.43)	(248.93)	(0.001)
Month = 12	-98.90***	-770.52***	0.001
	(15.70)	(288.55)	(0.001)
Constant	108.45***	30740***	0.058***

	(23.57)	(2513.49)	(0.003)
Observations	497271	497271	497271
Individuals	12125	12125	12125

Clustered standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table A12: Full parameter list of the models estimated in Table 5. Reference categories are the first month of the year (January) and male. Baseline age equals 66.

A.7 Means of dependent variables by subgroup

Table A13 presents the means of the dependent variables utilized in 6 and 7 for each subgroup. On average, net flow balances and end-of-month balances are positive for every subgroup, but they are higher for men, single-adult households, individuals who do not receive UI/DI benefits, white-collar individuals, and individuals with high inflows prior to retirement. Conversely, debt follows the opposite pattern.

Mean for:	Men	Women	Single-adult	Multi-adult	UI/DI	No UI/DI
Net flow balance	51.10	32.91	81.77	23.85	18.35	48.42
End-of-month Balance	33017.07	31209.03	31445.69	32479.22	23673.31	34084.44
In debt (binary)	0.035	0.031	0.037	0.032	0.053	0.029

Mean for:	White-collar	Blue-collar	High-inflow	Low-inflow	High-wealth	Low-wealth
Net flow balance	46.73	33.74	58.58	27.04	64.35	21.28
End-of-month Balance	34699.49	20590.07	43693.14	18262.30	57154.13	7133.48
In debt (binary)	0.030	0.041	0.023	0.044	0.001	0.066

Table A13: Means of dependent variables by subgroup.

A.8 Cash flows and balances for UI/DI recipients

Figures A2 and A3 illustrate occupational pension recipiency on the basis of age, occupational pension inflow on the basis of distance from the statutory retirement age, and outcome measures on the basis of distance from the statutory retirement age and occupational pension recipiency, respectively. Pension recipiency is slightly higher prior to reaching the statutory retirement age, and the jump incurred by the statutory retirement age is larger than for main sample. Occupational pension flows are lower than for the rest of the sample. Flow balances and total balances are higher for UI/DI recipients than for the rest of the sample. Finally, debt is higher among UI/DI recipients than for the rest of the sample.

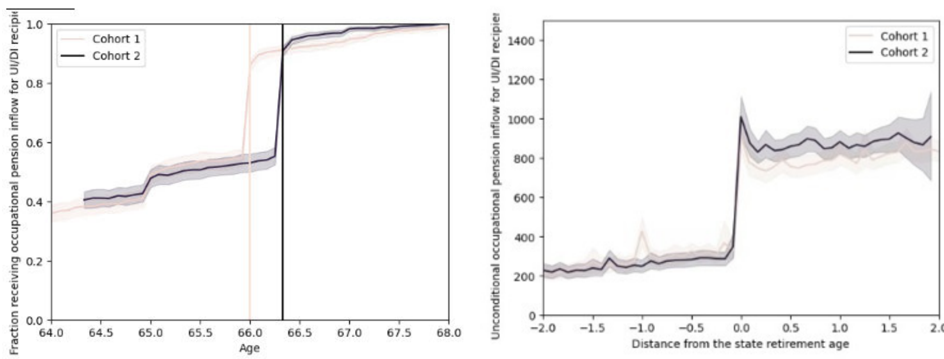

Figure A2: Pension recipiency and unconditional pension inflow for UI/DI recipients.

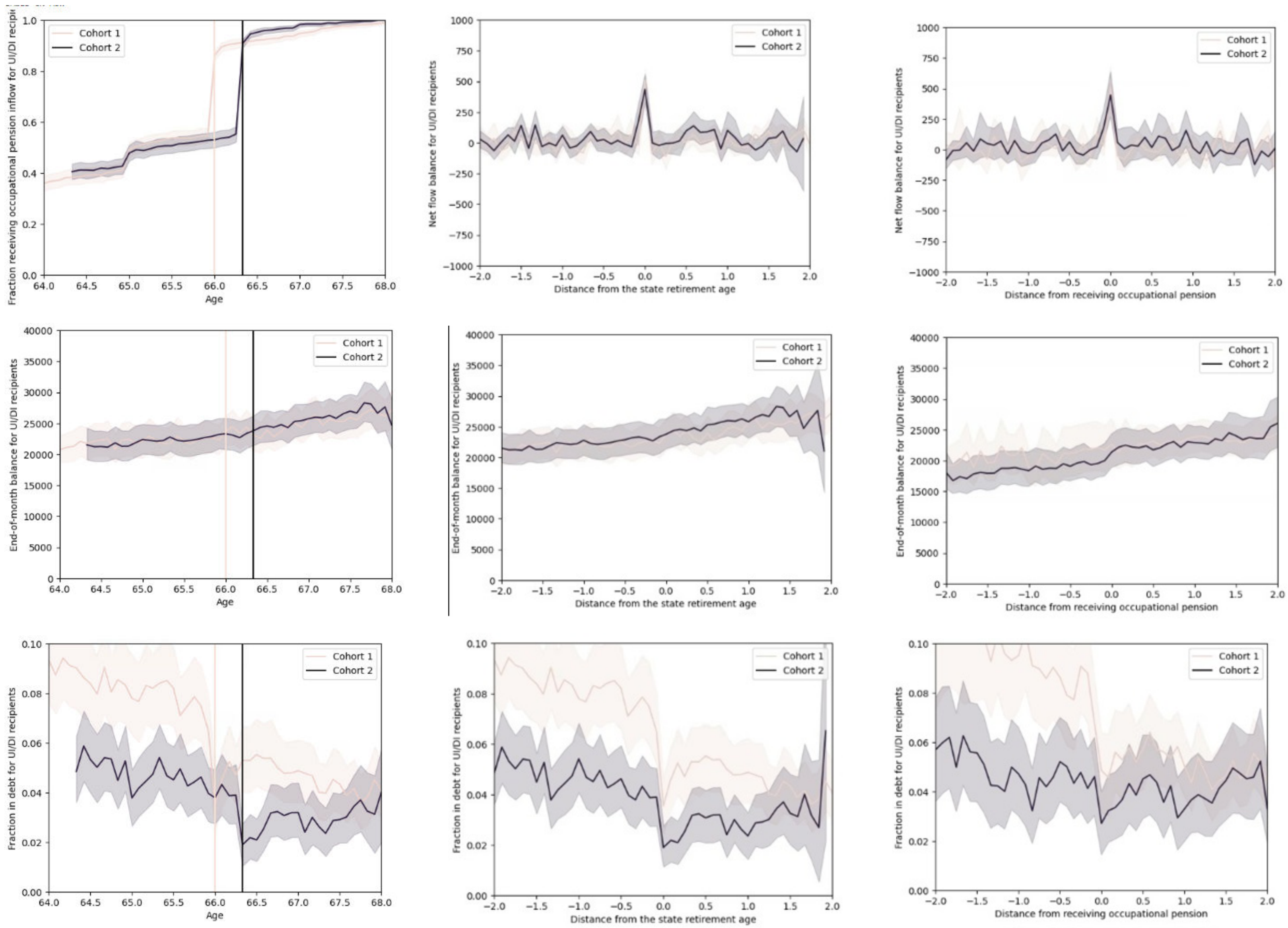

Figure A3: Outcome measures on the basis of age, distance from the statutory retirement age, and distance from occupational pension for UI/DI recipients.