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How the large-scale early withdrawals from private pension plans were used: insights from young adults

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Abstract

This paper investigates the spending and financial behaviour of young adults in Estonia after they withdrew their pension savings from the previously mandatory second pillar. When the option was first implemented in 2021, one pension saver in five exercised it. We use account-level data to explore changes in spending and investing behaviour, and in bank savings and debt holdings among those withdrawing. Regression analysis of differences in growth rates over various time horizons between matched samples reveals that early withdrawals have substantial short-term impacts on spending and the financial situation of those making the withdrawal, but these effects subside within one year. Over 55% of the money withdrawn had been spent within three months and over 40% was used for repaying debts. The findings indicate that those who withdrew savings from their pension accounts did not adopt alternative retirement saving strategies, suggesting that early withdrawals worsen their long-term financial outlook.

JEL Codes: D12, D14, G51, H55

Keywords: Pension savings, second pillar, early withdrawals, young adults, spending, loans, investments

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Non-technical summary

A three-pillar pension system was introduced in Estonia in the early 2000s. The system consists of a Pay-As-You-Go (PAYG) public pension component called the first pillar; a mandatory private savings scheme known as the second pillar; and voluntary pension savings, which are the third pillar. A major reform in 2020 transformed the second pillar into a voluntary scheme, allowing individuals to withdraw their accumulated savings. When the withdrawal option became available in 2021, about one contributor in five, totalling over 150,000 individuals, choose to take out their pension savings in September 2021, resulting in the withdrawal of 24% of the assets held in second pillar funds. By the end of 2024, over 250,000 individuals had withdrawn their pension savings from the second pillar.

The initial wave of the withdrawals in 2021 was exceptionally large and had a significant impact on the financial situation and aggregate savings of households, and the broader economy. This paper focuses on the effects of these withdrawals on individual spending and investment behaviour, and on bank savings and bank loans. We use bank account-level and transactional data from May 2020 to October 2022 and we focus on individuals aged 18-35. As individuals who terminate their second pillar contributions cannot re-join the scheme for the next ten years, the decision to withdraw can have a huge impact on their future pension outcomes. The compounding effect implies that the restriction affects the long-term pension accumulation of younger cohorts the most.

To evaluate the policy effects, we use propensity score matching to compute a comparison group of non-withdrawers that closely resembles the group of withdrawers. The estimated probability models confirm the findings from other papers on the profile of early withdrawers, as those with lower income and smaller savings are more likely to withdraw their pension savings. The same applies to borrowers, particularly to those experiencing difficulties with loan repayments. Those with investment experience and with pension savings in the third pillar are less likely to withdraw from the second pillar. This suggests that the second pillar complements other savings instruments rather than serving as a substitution for them.

We use a regression analysis over a set of horizons with a sample of withdrawers in the first three waves and non-withdrawers with similar profiles. This approach lets us identify the immediate and longer-term responses of spending and financial behaviour to early pension withdrawals. We assess the instant responses in the same month when the lump-sum withdrawal is received, and responses in the second and third months and on up to twelve months. The results reveal a notable surge in spending associated with pension withdrawals, with spending growth at 124% in the first month, where without the withdrawals the growth in spending would have been 3.7%. Concurrently, investments grew by 55 percentage points more in the first month than they would have otherwise, and the fall in loan balances associated with the withdrawals was 33 percentage points more, since it would have been only 1.5% without the withdrawals. Within three months after the withdrawal, over 55% of the amount was spent on average, over 40% was used to repay debt and only a few percent was invested.

The impact of the early withdrawals diminishes over time, so the bank savings and loan balances of withdrawers converge with those of non-withdrawers with a similar profile by the sixth month. The spending behaviour does not differ from that of the sample of similar non-withdrawers after three months, while after half a year we observe that spending is even smaller than that of the non-withdrawers, indicating that some spending was frontloaded by the withdrawers.

An increase in investment is observed only in the first month, while there is no evidence for a more persistent shift towards alternative saving or investment instruments among those who

withdrew their pension savings, implying that their total retirement savings will be smaller. The transition of the second pillar to a voluntary scheme with the option of early withdrawal is consequently expected to increase pension inequality, and the financial well-being of withdrawers in retirement is likely to be adversely affected.

Contents

1. Introduction

The sustainability of pension systems has emerged as an increasing concern for policymakers and researchers alike at a time when the burden of personal retirement saving is moving from the state onto individuals. Pension systems in the Central and Eastern European (CEE) countries underwent reforms at the end of the 1990s that were similar to those implemented in Latin America. By the beginning of the 2000s, the pension framework in CEE countries had evolved to incorporate three main pillars, with a Pay-As-You-Go (PAYG) component, mandatory private savings known as the second pillar, and voluntary pension savings called the third pillar.

There is an ongoing debate about the adequacy of pension savings in developed countries. Some studies suggest that a substantial proportion of households save less for retirement voluntarily than is best for them, leaving them with insufficient pension savings (Benartzi & Thaler 2013, Lusardi & Mitchell. 2011, Poterba 2014). Other studies indicate that most households save for retirement at optimal levels when all their assets are considered; see the study by Knoef et al. (2016) on Dutch households and Scholz et al. (2006) on US households. However, the arguments in the debate often hinge on the assumptions in the underlying model, as discussed by Biggs (2024) and Munnell et al. (2016). Beshears et al. (2020) model an optimal pension system and demonstrate that the social optimum is achieved by a three-account system, where there is a completely illiquid component that is covered by social security system, a partially liquid component with penalties for early withdrawals, and a completely liquid component represented by private savings accounts. Having a more liquid voluntary pension component encourages people to participate in pension saving.

To increase liquidity in their pension systems, several countries have allowed people to access a portion of their pension savings during periods of economic hardship. The United States and Canada, and Australia have incorporated this into their pension schemes as a permanent option with specific restrictions, as the US imposes discouraging penalties, while Canada and Australia restrict withdrawals to cases of negative income shocks (Beshears et al. 2015). Denmark offered payouts from its Special Pension scheme to all account holders in 2009 as part of a fiscal stimulus programme (Kreiner et al. 2019), while other countries, including Australia, Chile, Malaysia and Peru, passed temporary measures to boost the liquidity of households during the Covid-19 crisis. In the 2010s, several CEE countries reversed the pension reforms they had introduced in the 1990s, either by reducing the contributions to mandatory pension schemes, transitioning these schemes to voluntary participation, or discontinuing the mandatory schemes altogether (Altiparmakov & Nedeljkovic 2022).

This paper studies the impact of the changes in private pension scheme in Estonia that made the second pillar contributions voluntary instead of mandatory and allowed early withdrawals from the second pillar pension accounts. This decision allowed contributors to withdraw their accumulated pension savings as a lump sum without any restrictions on how they used the funds. The option was introduced in 2020 and 20% of contributors totalling 152,000 people opted to stop contributions and withdraw their second pillar savings in the first wave of exits in 2021, resulting in 24% of the assets in the second pillar funds being withdrawn (Grüning et al. 2023). The number of savers applying to terminate their contributions dropped significantly in 2022 to 30,000, which was only a fifth of the number in the previous year, and in 2023 the number exiting the second pillar was less than one seventh of what it was in 2021. This shows that the initial wave of withdrawals in 2021 was exceptionally large, and it had a significant impact on households, aggregate savings, and the economy. Meriküll (2025) quantifies the aggregate effect on consumption as 87% in the first month when withdrawals were made, leading to a substantial positive demand shock and pushing inflation higher by 1-2 percentage points.

This paper focuses on the micro-level impact. We use bank account-level and transactional data to explore the changes in the spending, saving, investing and borrowing of young people who withdrew their pension savings from the second pillar. We focus on individuals aged 18–35, a cohort for whom the second pillar had been mandatory.[1] The Household Finance and Consumption Survey reports that almost 30% of those aged 25–35 opted for early withdrawal from the pension pillar (Korasteljov et al., 2023). A notable restriction is that people who terminate their contributions to the second pillar are prevented from re-joining the scheme for ten years, which can have a huge impact on their future pension incomes, depending on the financial decisions they make after withdrawing their savings. The compounding effect implies that this restriction affects the long-term pension accumulation of younger cohorts the most. The reform implemented in 2021 aimed to offer more flexibility in long-term saving options, so it is important to comprehend how these changes have affected the financial behaviour of young adults.

We use propensity score matching and a regression approach similar to the local projection method to examine the immediate and longer-term responses following the pension withdrawals in the first three waves – September 2021, January 2022 and May 2022. Our analysis spans instant responses within the month of receipt of the lump-sum transfer, and responses after two, three months and so on up to 12 months. We find a notable surge in spending associated with pension withdrawals, with growth in expenditure on consumption at 124% in the first month, while without the withdrawals it would have been at 3.7%. Investment concurrently grew by 55 percentage points more in the first month than it would have without the withdrawals, and the fall in loan balances associated with the withdrawals was 33 percentage points larger than it would have been without the withdrawals. Within three months over 55% of the money withdrawn on average had been spent, and over 40% of it had been used to repay debts while a negligible share of 1–2% of it had been invested.

The effects of the early withdrawals diminish over time so that the spending and investment behaviour, and the balance of the bank savings and bank loans of those who withdraw their savings converge with those of the savers who did not withdraw. Notably, there is no discernible shift towards alternative saving or investment tools among those who withdraw their pensions, implying that the absence of second pillar savings means that the pension savings of this group will be smaller.

To the best of our knowledge, the only three studies to have investigated the impact of early pension withdrawals are one focusing on Singapore by Agarwal et al. (2020) and two examining Australia by Wang-Ly and Nevell (2022) and Hamilton et al. (2024). There are more studies that focus on the choice of whether to make an early withdrawal, as survey data can be used for this (Lee & Hanna 2020, Bateman et al. 2023). While several studies using survey data explore the choice that leads to early withdrawals (Lee & Hanna, 2020; Bateman et al., 2023), the reliability of survey data for assessing financial outcomes is questionable because of its self-reported nature, as reported behaviour may deviate from actual behaviour. Conversely, administrative or transactional data offer more accurate insights, but access to such data is often restricted. There is a lack of research examining how the reversals of pension reforms in CEE countries have affected individual financial outcomes, underscoring the significance of this paper in addressing a critical gap in the literature.

The structure of this paper is as follows: Section 2 explains the pension reforms enacted in CEE countries and Section 3 presents an overview of the existing studies on early withdrawals. Section 4 introduces the dataset employed in this study, while Section 5 outlines the empirical

[1] The second pillar was mandatory for those born in 1983 and later, while older individuals had the option of joining voluntarily.

methodology used. Section 6 presents the findings derived from the analysis, and Section 7 provides a summary of the paper's key insights and conclusions.

2. Institutional context

Estonia, together with other CEE countries, followed the recommendations from the World Bank and the IMF during the 1990s and introduced a three-pillar pension system to supplement the earlier Pay-As-You-Go (PAYG) pension scheme (Louzek, 2008; Hinrichs, 2021). As demographic shifts started to challenge the sustainability of the PAYG component, private pension schemes were introduced to bolster retirement earnings. The mandatory component, known as the second pillar, requires contributions to pension funds that are a fixed share of labour income. A share of the contributions that previously went to the PAYG system are instead re-directed to the private pension scheme. Contributions to the voluntary third pillar are more flexible, with individuals determining the frequency and amounts of their contributions themselves. Estonia's approach to financing the second pillar differs slightly from that of other CEE countries, as a 4% contribution is carved out from the PAYG system but it also has an additional 2% of salary income contributed by employees, leaving them with lower disposable income.

This mandatory private pension scheme was introduced in 2002, and was mandatory for those born in 1983 or later, while older individuals had the option of joining by a certain deadline[2]. Once the saver had enrolled, regular contributions of 2% of their monthly gross salary were automatically transferred to the second pillar, and this was supplemented by an additional 4% from the social security component.[3] Participants were not allowed to discontinue contributions after joining the pillar. Savers can select and change the private pension fund where their pension savings accumulate, and the pension funds are managed by registered fund managers. By 2013, about four fifths of the population aged 18–63 had joined the second pillar (Piirits and Võrk, 2019).

Two decades after the pension reforms were first introduced, they have been partially reversed in several CEE countries, largely because the private pension funds have been less efficient than was initially expected (Jimon et al. 2021). The substantial decline in asset values during the Global Financial Crisis of 2008-2009 significantly diminished the value of pension savings, prompting revisions to the pension system. Hungary, Poland, and Czechia have scrapped the private second pillar, transferring the accumulated pension savings back to the PAYG system from which they were initially carved out. In Macedonia, Latvia and Slovakia, the mandatory pension components have been scaled down, while in Estonia, Bulgaria, Slovakia, Macedonia and Romania, the option of voluntary participation has been extended (Altiparmakov & Nedeljkovic 2022).

In Estonia, the nominal returns on pension funds have performed less well over the long term than those in other countries, with average net real returns adjusted for operating costs being negative over a 20-year period, partly because inflation rates were relatively high in certain periods (OECD, 2023, Table 9.3). This trend is exacerbated by the low level of competition between the private pension funds, which has resulted in higher fees and operating costs than

[2] The deadline for people in each cohort to decide on participation fell progressively from 2002 to 2010, with the final cohort of individuals born between 1980 and 1982 required to make the choice in 2010.

[3] In Estonia the social security tax is 33% of gross income, which is 13% for health insurance and 20% for pension insurance. For those who join the second pillar, the allocation to pension insurance is adjusted so that 16% of the social security tax is directed to pension insurance and 4% is transferred to the second pillar, in addition to the 2% contribution from the individual's gross salary.

those in other developed countries. Although the competition increased and fees started to decline in the 2010s, the substantial costs borne by contributors were a key argument behind the decision of policymakers to transition the mandatory second pillar into a voluntary pension scheme. Since 2021, all participants have had the option of terminating their contributions to the pillar and withdrawing their accumulated savings. Unlike in some CEE countries that reverted to the PAYG system, the savings withdrawn from the second pillar accounts in Estonia are transferred as a lump-sum payment into the bank accounts of individuals without any restrictions on how these sums are used. However, the disbursement is subject to income tax, which was 20% in 2021, and it is only possible to re-join the second pillar scheme after a 10-year wait following the exit from it.

The introduction of private investment accounts (PIK) at the same time allowed individuals to maintain the 2%+4% saving structure independently through a PIK though, providing contributors with additional flexibility beyond the confines of the private pension funds. It was expected that contributors to the second pillar who were not satisfied with the real returns, but who were ready to make investment decisions on their own, would choose this option.

The law on the changes to the second pillar was enacted in the beginning of 2020, but there were extensive policy debate about the legislation throughout the year involving the Chancellor of Justice and the Supreme Court, and a final decision was taken in October 2020.[4] Starting from 2021, contributors were able to submit applications to terminate their pension savings and withdraw the money saved, with the first withdrawals from the second pillar occurring in September 2021 for those who had submitted the application by May 2021. The deadlines for applying to exit the second pillar are set three times a year, with the payments processed five months after the application deadline.

Several countries with privately accumulating pension plans offer early withdrawals to address liquidity problems. In the US, individuals facing immediate and significant financial needs may access their retirement savings through either a loan or a hardship withdrawal, where the withdrawal is subject to a 10% penalty tax.[5] During the Covid-19 pandemic in 2020–2021, several countries including Chile, Australia, Malaysia and Peru allowed temporary access to pension savings to alleviate the financial distress caused by the pandemic.[6] Research indicates that such temporary measures were effective at helping out a number of households during the crisis (Bateman et al. 2023, Fuentes et al. 2023, Wang-Ly and Nevell 2022). In Estonia however, the option of withdrawing accumulated savings represents a more dramatic policy change, as individuals can use this option without restriction at any time.

3. Studies of early withdrawals of pension savings

Several studies have examined the reasons why requests are made for early withdrawals in countries where this option is available. In Denmark, the one-off opportunity to withdraw savings from the Special Pension (SP) scheme, which was already suspended at the time, was intentionally designed as a fiscal stimulus, and so the withdrawal process was made as convenient as possible. Consequently, 94% of individuals with SP accounts chose to withdraw their funds, and 65% of them reported that they had spent the money. Kreiner et. al. (2019)

[4] Initially, the President refrained from promulgating the law and sought the assessment of the Chancellor of Justice, who concluded that the law violated the constitution. However, the Supreme Court ultimately deemed the law to be legitimate. Further details about the case can be found in the yearbook of the Supreme Court at Freedom to Retire - Yearbook of Estonian Courts (riigikohus.ee)

[5] Since 2024 under SECURE 2.0, up to $1,000 per year can be withdrawn without the penalty tax.

[6] See the report by the US Social Security Administration at International Update, December 2020 (ssa.gov)

estimate the aggregate effect on spending to have been 1.8%. By merging survey data with administrative data, they find that the propensity to spend the money withdrawn was higher among more liquidity-constrained individuals.

The option of withdrawing pension savings was not similarly encouraged in other countries, as it was instead based more on needs. Amromin & Smith (2003) and Lee & Hanna (2020) investigate the characteristics of the individuals who opt for early withdrawals in the United States, where they are discouraged through tax penalties and, at the time of the studies, a six-month suspension of contributions applied.[7] Amromin & Smith (2003) use annual tax record data from 1987 to 1996 and employ a probit model to reveal that individuals facing the loss of a job or a decline in income, particularly those with low liquid wealth, are more likely to withdraw money early from their retirement accounts. Similarly, Lee & Hanna (2020) find that the experience of a drop in income and of financial hardship significantly elevate the likelihood of making an early pension withdrawal in the US. They use data from the National Financial Capability Study of 2018 and a logit model, and they also find that overconfident individuals are more likely to withdraw their pension savings, suggesting that people might not fully understand the consequences of their decision, especially when there is a gap between the individual's perceptions of their financial abilities and their actual financial capabilities.

During the Covid-19 pandemic in 2020–2021, Chile permitted early withdrawals of pension assets, with the result that the assets accumulated in the mandatory funded scheme were depleted by about a quarter. Fuentes et al. (2023) use administrative records from the Chilean Pension Regulator to analyse the demographic characteristics of the individuals who accessed their pension savings prematurely. Their analysis reveals that individuals receiving unemployment benefits and those with lower pension balances tended to withdraw a larger proportion of their pension savings, suggesting that the decision to withdraw was driven by economic hardship.

Australia similarly implemented the Covid-19 Superannuation Early Release Scheme between April and December 2020, with the result that 15% of participants in the plan accessed their pension savings prematurely (Bateman et al. 2023). Bateman et al. (2023) conducted a survey among customers of Cbus, one of Australia's largest retirement schemes, and found that a majority of Cbus customers withdrew the maximum amount of savings allowed, depleting their pension accounts. Immediate financial needs and uncertainty about future employment prospects emerged as the most prevalent reasons for the withdrawal. Individuals who understood less the long-term impact of the withdrawal on their retirement savings were more likely to withdraw funds, while those who had been saving for longer and who had larger balances were less inclined to do so.

The data from Australia's largest bank used in the study by Wang-Ly and Nevell (2022), and the data from one of Australia's three largest credit bureaus used by Hamilton et al. (2024) also shed light on the profile of those making withdrawals, revealing that younger individuals aged 26–35 with lower incomes, lower liquid balances, higher short-term debt burdens, increased incidence of arrears prior to withdrawal, and reported lower overall financial well-being were overrepresented among those withdrawing relative to the general population. The decision to withdraw from the pension scheme in Australia, like in Chile, was thus correlated with a worsening financial situation.

Only a few studies use transactional data to examine how the money withdrawn early is used, and the subsequent changes in the financial circumstances of the person who withdrew it.

[7] The restriction that people were not allowed to contribute for six months after the withdrawal was terminated in 2020.

Wang-Ly and Nevell (2022) examine the responses of individuals to early withdrawals in Australia. They employ propensity score matching to match the characteristics of those making withdrawals with those who do not, and use an OLS regression on the matched sample to assess the impact of the withdrawals on spending, debt repayment, saving, arrears, and overall financial well-being over a six-month period following the withdrawal. Their findings indicate a significant increase in spending on debit cards in the following months, accompanied by lower average balances on credit cards and personal loans among those who made withdrawals than for those who did not. While individuals were less likely to fall into arrears during the initial three months following the withdrawal of the pension savings, the probability of arrears increased in subsequent months more than it did for those who did not withdraw their funds. Moreover, taking the option to make a withdrawal correlated with enhanced reported financial well-being.

The use of early withdrawals was studied by Hamilton et al. (2024) using administrative records and a panel of weekly bank transactions. They use a difference-in-differences approach to investigate the response of spending to the withdrawals, and they find that in the first two months after the first withdrawal the propensity to spend was at least 0.43 and it was 0.48 after the second withdrawal, and the spending was distributed across a large range of categories.

A further insight into the use of early withdrawals of pension savings is provided by Agarwal et al. (2020) in their study of Singapore. They use individual-level transactional data spanning from 2010 to 2012 and an event-study methodology to examine the patterns of use of the pension savings withdrawn, which are 10%–30% of savings at age 55. Their analysis estimates the impact on bank account balances, debt levels, and debit and credit card expenditures over a 15-month period, running from three months before the pre-retirement withdrawals to 12 months after them. Their findings reveal that people aged 55 primarily used their retirement savings for immediate spending and for repaying debt, particularly on credit card loans, and the pattern is stronger among low-income and liquidity-constrained individuals. However, a substantial share of the funds withdrawn remained in low-interest bank accounts even 12 months after they were withdrawn, particularly among individuals with higher incomes and greater liquidity, suggesting that these funds were kept for imminent larger purchases or investments rather than as long-term savings.

Finally, Meriküll (2025) investigates the effect of the 2021 pension reform in Estonia using aggregate data and a synthetic difference-in-differences method. She estimates the effects of the first wave of the withdrawal on the aggregate spending, bank deposits, risky assets, consumer loans and housing loans of the household sector, and also on inflation. She finds the largest positive effects on bank deposits and consumption and negative effects on the outstanding amounts of consumer loans. There was a rise in inflation of 1–2 percentage points in three quarters because of the increased demand that followed the first wave of pension withdrawals.

The upshot is that the existing literature focuses on examining the decisions surrounding the early withdrawal of pension savings, but there is a relative scarcity of studies that delve into the subsequent use of the funds and their impact on individuals' financial well-being. While early withdrawals can offer relief from financial distress or enhance overall financial circumstances in certain scenarios, excessive spending of the funds withdrawn may lead to a long-term deterioration in financial standing. The present study addresses this research gap by supplementing the insights from Australia and Singapore with novel findings derived from an alternative policy context in Estonia.

4. Data

We use anonymised account-level transactional data sourced from the third largest commercial bank in Estonia.[8] Our monthly panel dataset covers the period from June 2020 to October 2022, running from five months before the final decision on the second pillar changes was taken, to twelve months after the first wave of withdrawals. The sample comprises a randomised selection of 8500 active bank customers with the second pillar aged between 18 and 35.[9] In the initial sample, 2500 customers opted to withdraw their pension savings, while the remaining 6000 continued to save in the second pillar.[10]

This study focuses on young adults for several reasons. First, the second pillar has been mandatory for this group since the pension scheme was introduced, whereas participation was voluntary for earlier cohorts, becoming mandatory once they had enrolled. Second, young cohorts are affected most by the rule prohibiting re-entry into the second pillar for 10 years following the withdrawal, as this constraint substantially limits their opportunities to accumulate their pension because of the compounding effect. Third, several studies, including Hamilton et al. (2024) and Amromin and Smith (2003), indicate that individuals aged below 35 are the most inclined to make early withdrawals, and so they are particularly affected by the reform.

The banking sector in Estonia is one of the most concentrated in Europe (Kukk et al. 2020). All the main commercial banks provide universal retail banking services, offering a comprehensive suite of loan and investment products. Consequently, investment and pension services are concentrated in a similar way to retail banking, with over three-quarters of pension fund assets managed by the three largest fund managers, all of which are affiliated with major banking groups (Grüning et al. 2023). Given that the main banks in the market provide universal services, their customer base is broadly representative of the entire population. As the demographic profile of customers within the bank sampled tilts towards a younger cohort, we posit that the sample provides valuable insights into the retirement decisions of this particular demographic group.

A detailed description of the variables in the dataset is given in Table A.1 in the Appendix. The monthly panel data encompass balances on checking and other bank accounts, and the loan balance at the end of each month. From the inflows into the checking account, we can derive a proxy for monthly earnings that includes various income streams such as salary transfers, social benefits and scholarships, while excluding dividend payments. Outflows from the checking account let us derive a proxy for spending that excludes loan repayments, transfers for savings and investments, one-off substantial transfers, notary fees and bank charges.

Investments are identified as any acquisition of securities, through either an investment account or a checking account, including purchases of cryptocurrency. Binary data are available on the ownership of various loan products, covering housing loans, consumer loans, student loans and leases, and on the ownership of third pillar pension investments. Demographic details such as age, gender and self-reported education level are additionally recorded for individuals within the sample, alongside dummies for receiving unemployment and disability benefits, and

[8] The commercial bank is the third largest bank in Estonia in terms of total assets, and its customers cover 30% of the Estonian population.

[9] Active customers are defined by the commercial bank from their regular transactions and earnings. The sample was composed by the commercial bank in accordance with the GDPR regulations. All data processing and modelling were conducted on the bank's own servers.

[10] Since the second pillar becomes mandatory from the first wage payment, individuals without prior work experience, and thus without a second pillar contract, are excluded from the sample.

a dummy for any outstanding demands from bailiffs. The account-level transactional data thus allow a comprehensive insight into the income, spending, and financial situation of individuals.

It can be ascertained for each individual within the sample whether they are actively saving in second pillar funds, and withdrawals from the second pillar are detected from transfers from the Pension Registry. It should be noted, however, that if such funds are transferred to accounts held in other banks, this information is not detected in our dataset. Given that the sample comprises customers who conduct their everyday banking activities primarily within this bank, instances where savings are transferred to accounts in other banks are expected to occur only exceptionally.

There are 1660 individuals in the final sample who withdrew their pension savings in September 2021, 168 individuals who withdrew them in January 2022, and 283 individuals who withdrew them in May 2022. Individuals who did not terminate their second pillar saving but shifted their savings from pension funds to pension investment accounts are not included in the sample.[11] Our analysis focuses on individuals who terminated their participation in the second pillar, and on comparing their financial circumstances with those of individuals with a similar profile who maintained their existing pension saving plans.

The summary statistics of the main variables are given in Table 1 for the two groups of individuals who continued saving in the second pillar, called non-withdrawers, and those who opted to terminate their contributions and withdraw the accrued savings, who are called withdrawers. The statistics originate from before the reform, in the period before the Supreme Court's decision on the legitimacy of the second pillar changes in October 2020.

The withdrawers are two years older on average and there is a slightly larger share of men among them. A greater proportion of withdrawers hold various types of loans, particularly mortgages, consumer loans and leases, though the difference in the prevalence of student loan ownership between withdrawers and non-withdrawers is not statistically significant. A smaller share of withdrawers have investments, and the average monthly amount invested is two-thirds of the amount invested by non-withdrawers.[12] Moreover, the withdrawers maintain smaller balances on their bank accounts than non-withdrawers, as the average bank account balance of the withdrawers is approximately half that of the non-withdrawers. Although earnings are relatively similar between the two groups, with a statistically insignificant 10% difference in favour of the non-withdrawers, a higher proportion of the withdrawers experienced unemployment, received disability benefits, or had outstanding demands from bailiffs in June-October 2020. The characteristics of the withdrawers are consequently different to those of the non-withdrawers in many aspects, a factor we will address in our regression analysis.

[11] This group did not terminate their participation in the second pillar but continued to save under the same pension system through a personal investment account instead of a pension fund. As discussed in Section 7, this group is marginal compared to those who stopped saving, 5.7% of the group of those who stopped.

[12] Logarithmic transformations are applied to investments, income and bank account balances in our analysis and in the statistics. The differences given in the text are calculated from the non-transformed data, which are more exact with large differences.

Table 1. Descriptive statistics of non-withdrawers and withdrawers from the second pillar

	Non-withdrawer		Withdrawer		Difference	
	Mean	**se**	**Mean**	**se**	**In means**	**p-value**
Man	0.486	0.006	0.551	0.011	–0.066***	0.000
Age	27.72	0.062	29.77	0.085	–2.055***	0.000
Log(mean income)	6.795	0.087	6.697	0.143	0.098	0.549
Education	2.495	0.008	2.265	0.013	0.229***	0.000
Student loan	0.005	0.001	0.008	0.002	–0.003	0.162
Consumer loan	0.211	0.005	0.510	0.011	–0.299***	0.000
Mortgage	0.115	0.004	0.150	0.008	–0.035***	0.000
Lease	0.069	0.003	0.081	0.006	–0.013*	0.059
III pillar	0.030	0.002	0.011	0.002	0.019***	0.000
Unemployed	0.031	0.002	0.048	0.005	–0.017***	0.001
Disability allowance	0.193	0.005	0.325	0.010	–0.132***	0.000
Invested	0.270	0.006	0.180	0.008	0.090***	0.000
Log(mean investment)	4.317	0.081	3.510	0.119	0.807***	0.000
Log(mean account balance)	9.952	0.144	9.171	0.239	0.781***	0.005
Bailiff	0.025	0.002	0.072	0.006	–0.047***	0.000

Notes: Age and self-reported education are from October 2020, all dummy variables account for positive values in any month between June and October 2020. All continuous variables are average values from June-October 2020, which is the period before the reform was passed. A detailed description of the variables is given in Table A.1. in the Appendix.

5. The empirical strategy

5.1 Propensity score matching

To investigate what effect withdrawing the second pillar savings has, we compare the outcomes for withdrawers and non-withdrawers with similar socio-economic and financial profiles. As the previous literature found and as was noted in the sample statistics presented in the previous section, the decision to withdraw retirement savings is often driven by financial difficulties. The decision is related not only to the individual's financial standing before they make the withdrawal but also to their future prospects, thereby leading to selection bias. We compare the ex-post financial situations of groups that exhibit similar ex-ante characteristics. We employ propensity score matching to eliminate selection bias by computing propensity scores for each individual for withdrawing pension savings. We use the variables given in Table 1 for before the reform, that is seven months before the deadline for applying for termination, and a year before the act of withdrawal.

It is important to note that we refrain from using data from *after* the Supreme Court's final decision at the end of October 2020. This precaution is needed because individuals might plan to terminate their second pillar savings well in advance, and such planning could alter their financial behaviour before the actual transfer of the lump-sum payment is made, thus violating the assumptions made in using pre-treatment data in the matching process.

In the matching process, we use all the available data that may be pertinent to the decision about withdrawing from pension savings, and other variables that can be associated with the outcomes measured. Although some variables may be statistically insignificant, they might still contribute marginally to the propensity scores, and so we prefer to retain a broader set of variables rather than imposing limits on the variable selection. This approach ensures comprehensive coverage and minimises the risk of potentially relevant factors being omitted (Brookhart et al., 2006, Stuart, 2010).

We estimate the following logit model for the probability of a person being a withdrawer:

$$\text{logit}(P_i) \;\; \alpha + \sum_{k=2}^{10} \beta_k \, Z_{ki(t-1)} + \sum_{n=1}^{8} \beta_n \log\left(\overline{Z}_{ni(t-1)}\right) \; + \; \varepsilon_i \qquad (1)$$

where the vector of $Z_{ki(t-1)}$ encompasses ten binary variables including indicators for male gender, unemployment status, receipt of disability benefits, presence of demands from a bailiff, and dummy variables indicating possession of a student loan, consumer loan, lease agreement, or mortgage, ownership of third pillar savings, and investment activity. The binary variable is 1 if any of the specified events like unemployment or disability occurred during the period June-October 2020, which is one year prior the withdrawal act.

The vector of $Z_{ni(t-1)}$ comprises continuous variables such as age, education level, the natural logarithms of average income, average balance on bank accounts, and average investments, and the square roots of age, log income, and log deposits. The averages for income, bank account balance, and investments are computed from data spanning five months from June to October 2020.

Previous research has identified financial difficulties as the key determinant of early withdrawals (Bateman et al., 2023; Fuentes et al., 2023; Wang-Ly and Nevell, 2022). The variables included in our matching procedure encompass both loan-related and liquidity-related variables, in addition to life-cycle characteristics, ensuring that the main drivers of withdrawal are accounted for.

In addition to the differences observed between withdrawers and non-withdrawers, there might also be disparities in unobserved characteristics that may influence the decision to terminate participation in the second pillar, and subsequently impact the post-withdrawal financial circumstances. Present bias is one of the main features in pension savings models that determines decisions to withdraw from pension savings (Beshears et al. 2020). Furthermore, Amromin and Smith (2003) show that lower levels of financial literacy and limited awareness of the long-term consequences of the withdrawal are related to early withdrawals. Although these aspects cannot be controlled for directly, the extensive set of variables available to describe the financial situation before the reform is closely intertwined with unobserved preferences and personal traits. Present bias is strongly related to borrowing and saving behaviours for example (Bradford et al, 2017, Meier and Sprenger, 2010), and loss tolerance is linked to stock market participation (Dimmock and Kouwenberg 2010), and both of these outcomes are available for the matching. This means we can reasonably assume that by matching on a sufficiently comprehensive set of financial observables, we can account indirectly for unobserved characteristics.

We employ full matching with caliper to identify the optimal match from the pool of non-withdrawers for each withdrawer. We follow Greifer (2023) and set the maximum radius, or calliper, to 0.1, signifying that the maximum disparity between the propensity scores is restricted to 0.1. In cases where multiple non-withdrawers fall within the specified radius and

serve as suitable matches for a withdrawer, all such matches are used, with weights assigned such that they sum to one. Following Stuart and Green (2008), these weights are employed both in the evaluation of the propensity score matching and in the subsequent regression analyses on outcomes. We also employed nearest neighbour matching, but full matching with caliper yielded superior results in terms of standardised mean differences.

5.2 Regressions on the use of early withdrawals

The mean amount withdrawn in the sample was 6270 EUR, which on average covers approximately eight months of net income for the withdrawers.[13] It is of note that the average withdrawal in the sample is smaller than the average for the withdrawers in the population, which was 8500 EUR. This discrepancy arises because younger individuals have typically accumulated smaller savings than those aged over 35. The median withdrawal was 5156 EUR, with the smallest amount being 46 EUR and the largest 57,000 EUR.

Our analysis examines the association of pension withdrawal P_i with several outcome variables Y_{it}, which cover spending, investments, the balance on bank accounts, and the loan balance.[14] We estimate the following regression model with the matched sample:

$$\Delta_h \log(Y_{it}) = \alpha + \beta_0 P_i + \beta_1 \log(\overline{X}_{i(t+h)}) \quad (2)$$

where Δ_h denotes the growth rate in the outcome variable. This growth rate is computed as the log difference between an earlier month when the funds had not yet been transferred to the bank account, and the *h*-th month following the transfer. For the withdrawals in September 2021 for instance, *h=1* represents the changes in spending from August to September 2021, while *h=3* represents the differences between August and November 2021.[15] We estimate the model across various time horizons, comparing the effects one month, three months, six months, and one year after the withdrawal. This approach resembles the local projection method (LPM) developed by Jorda (2005), which is commonly employed to project effects over time periods, like impulse response functions. This interpretation applies to spending and investment, which are flow variables. For bank savings and bank loans, which are stock variables measured as a balance at the end of a month, equation (2) estimates the *accumulated* effects by comparing the change in the balance over the given horizon with and without withdrawals.

Our primary focus is on estimating the coefficient β_0. If $\beta_0 = 0$, it indicates that the growth in spending or the other outcome variables, $\Delta_h \log(Y_{it})$, is unrelated to the withdrawal of the pension, as there is no difference between the growth rates of withdrawers and of matched non-withdrawers. Conversely, if $\beta_0 \neq 0$ it suggests there is a linkage between spending growth and the early withdrawal of pension funds in the given month, as the growth rates for the withdrawers are different to those of the non-withdrawers with a similar profile.

The decisions of households in 2021 were clearly influenced by external shocks, such as the second wave of the Covid pandemic and the associated uncertainty. The matching method is

[13] The calculation is based on the average monthly earnings observed over the five-month period from June to October 2020. Outliers characterised by a disproportionately large withdrawal-to-income ratio because of low monthly incomes are excluded from this calculation.

[14] The share of young adults holding a third-pillar account before September 2021 was marginal. Even though 5% of withdrawers in the sample opened a third-pillar account, the resulting number of observations is insufficient for running a separate regression analysis.

[15] The rationale for analysing actual withdrawals rather than the decision to withdraw is that initial investigation shows that individuals responded only after the lump-sum payment was actually received, as discussed in Subsection 6.2. This aligns with evidence from other studies showing that households do not respond to expected tax rebates in advance but only after they receive them (Agarwal et al. 2007, Johnson et al. 2006).

intended to compare two similar groups that were exposed to similar shocks, and that differ only in their decision to withdraw from the second pillar or not to. Since the matching procedure relies on data from before the reform, we incorporate controls for the average earnings during the horizon period, denoted as $\overline{X}_{i(t+h)}$. If there are differences in the prospects for earnings between withdrawers and non-withdrawers, and if those differences are linked to the decision to withdraw, our estimates could be biased. To mitigate this potential bias, we use the average earnings computed over one, two, three months and so on up to twelve months, to correspond to the estimation horizon *h*. For non-withdrawers, for whom the month of the lump-sum transfer is not observed, *t* denotes the month of the transfer of the matched withdrawer.[16]

We augment our model by including additional control variables from the propensity score model:

$$\Delta_h \log(Y_{it}) = \alpha + \beta_0 P_i + \beta_1 \log\left(\overline{X}_{1i(t+h)}\right) + \sum_{k=2}^{10} \beta_k Z_{ki(t-1)} + \\ + \sum_{n=1}^{8} \beta_n \log\left(\overline{Z}_{ni(t-1)}\right) + \epsilon_i \quad (3)$$

In the matching model, we use ten binary variables and eight continuous variables, as detailed in the previous subsection. In equation (2) we use the set of matching variables Z_k and Z_n from before the reform was announced, denoted by subscript $(t-1)$, as we do in the matching model. These variables, which include age and loan ownership status among others, may have statistical significance for the outcome variable, given their potential correlation with an individual's financial circumstances. Nevertheless, we anticipate that the estimated coefficient β_0 is robust to the inclusion of additional control variables.

6. Results

6.1 Propensity score matching

Table 2 shows the relationship between the observed characteristics and the probability of a person withdrawing their second pillar pension savings. We present both marginal effects and estimated coefficients to reveal the non-linear association of age and income with the probability of withdrawing. The results indicate that men are more likely to withdraw their pension savings, a finding that is consistent with the study by Fuentes et al. (2023) for Chile. Conversely, men in the United States have a lower probability of making early withdrawals, as evidenced by Lee and Hanna (2020).

[16] This is possible as each non-withdrawer has previously been paired with a withdrawer in the propensity score matching procedure.

Table 2. Results from the logit regression for the probability of withdrawing pension savings

	(1) Coef	St. err.	(2) Marginal effects	St. err.
Male	0.264***	(0.061)	0.042***	(0.001)
Age	0.751***	(0.085)	0.014***	(0.001)
Age^2	–0.011***	(0.002)		
Average income	0.468*	(0.276)	–0.003	(0.006)
Average $income^2$	–0.038*	(0.023)		
Education	–0.569***	(0.052)	–0.089***	(0.008)
Student loan	0.510	(0.336)	0.080	(0.053)
Consumer loan	0.906***	(0.060)	0.142***	(0.009)
Mortgage	0.241***	(0.082)	0.038***	(0.013)
Lease	0.102	(0.105)	0.016	(0.017)
III pillar	–0.750**	(0.237)	–0.112**	(0.037)
Unemployment benefit	0.042	(0.142)	0.007	(0.022)
Disability allowance	0.492***	(0.064)	0.077***	(0.010)
Invest	–0.407***	(0.100)	–0.064***	(0.016)
Average investment	0.051*	(0.027)	0.008*	(0.004)
Average deposit	0.207***	(0.058)	–0.024***	(0.002)
Average $deposit^2$	–0.024***	(0.004)		
Bailiff	0.582***	(0.131)	0.092***	(0.020)
Constant	–13.730***	(1.440)		
No. of Obs.			8111	
RMSE			0.40	

Notes: The standard errors are given in parentheses. Superscripts ***, ** and * indicate that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively.

The probability of a person withdrawing their pension savings has a non-linear association with their age, as the probability increases gradually until the age of 34 before starting to decline (Column 1 in Table 2), resulting in a positive marginal effect at the mean age of the sample (Column 2).[17] This observation is in line with the findings from the study by Fuentes et al. (2023), who identify a non-linear relationship between age and Covid-related withdrawals in Chile, with the peak occurring at the age of 45. Similarly, Wang-Ly and Nevell (2022) report that younger individuals have a higher probability of Covid-related withdrawals in Australia, while Hamilton et al. (2024) estimate the modal age for such withdrawals to be 33. Amromin and Smith (2003) employ age groups to ascertain that the highest probability of early withdrawals in the United States occurs in the youngest age group, which is individuals up to the age of 35.

Likewise, the relationship with income exhibits a concave pattern, with the highest probability observed at an income level equivalent to 80% of the mean monthly income in the

[17] The values at the highest probability are calculated from the coefficients in column (1), so the age is $\frac{0.751}{2\times0.011} = 34.1$ years and monthly income is $\exp\left(\frac{0.468}{2\times0.038}\right) = \exp(6.158) = 472.5EUR$.

sample (see previous footnote). The relationship subsequently tends to decline across the remainder of the income distribution, resulting in a null net effect at the mean income level (Column 2). This concave relationship with income echoes findings from Amromin and Smith (2003). Other studies that estimate a linear relationship between income and early withdrawals report a negative association (Fuentes et al., 2023; Wang-Ly & Nevell, 2022). Furthermore, higher education is associated with a reduced probability of withdrawing pension savings, and this may also reflect the level of financial literacy, which is an important determinant in retirement planning (Lusardi & Mitchell, 2011).

Young individuals with debt holdings, those receiving disability benefits, and those with demands from a bailiff have a higher probability of withdrawing their pension savings. This observation is in line with the findings of Lee and Hanna (2020), Bateman et al. (2023) and Hamilton et al. (2024), who indicated that financial need serves as a primary driver for early withdrawals.

Individuals who are also saving for their pension in the third pillar and those who engage in investment activities have a reduced propensity to withdraw their pension savings from the second pillar. This observation suggests that investments and pension savings, whether mandatory or voluntary, are not substitutes but rather complements for one another. It highlights the tendency of individuals to use multiple avenues for long-term saving. The role of alternative investment experiences has not been extensively explored in earlier studies, making this insight particularly valuable for understanding the choices of individuals about their retirement saving.

Figure 1 depicts a comparison of the distribution of the propensity scores between the unmatched and matched samples. As expected, the distribution of the propensity scores of the non-withdrawers in the unmatched sample is markedly more tilted towards the left than that for the withdrawers, indicating lower probability of withdrawal. However, following the matching procedure, the distributions of the two groups overlap closely.

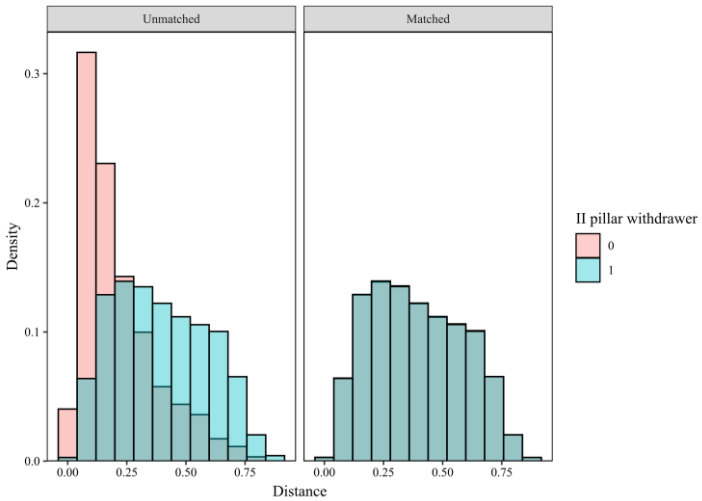

Figure 1. The distribution of the propensity scores for the unmatched sample and the sample matched with the withdrawers from the second pillar

To assess the effectiveness of the matching process for each variable, we use the standardised mean difference (SMD) based on the results presented in Table A2 in the Appendix, as shown in Figure 2. Figure 2 notably illustrates that the absolute value of the SMD falls between 0 and 0.04, while the guidelines of Austin (2011) state that a value below 0.1 indicates successful matching. The outcome consequently underscores the high degree of similarity in terms of

socio-economic characteristics and financial situation that the two groups exhibit post-matching, thereby allowing us to proceed with the regression analysis.

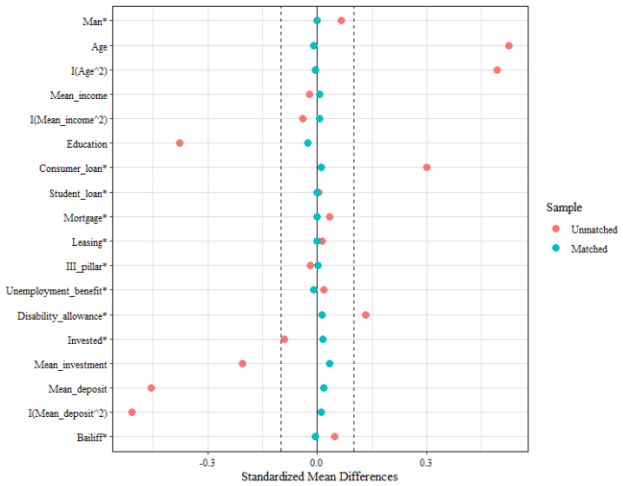

Figure 2. Difference in the means of withdrawers and non-withdrawers in the unmatched and matched samples

Note: The figure is based on the statistics in Table A.2 in the Appendix.

6.2 Regression results

We estimate the effect of pension withdrawals on spending and investment, and on the balance in bank savings and bank loans by examining the relative differences between the growth rates for withdrawers and similar non-withdrawers, as outlined in equation (2). The results for the effect in the initial month after the pension withdrawal are presented in Table 3. We transform the estimated coefficients into differences in growth rates as given in the Appendix A.3. The estimated coefficient of 0.77 implies that the spending of the withdrawers grew by an average of 124%, while the growth in their spending would have been 3.7% if they had not received the lump-sum pension savings, so 120 percentage points of the spending growth can be attributed to the pension withdrawal.

Empirical evidence indicates that the marginal propensity to consume is higher among liquidity constrained households, younger age groups, and for smaller windfall gains (Jappelli and Pistaferrri, 2010, Fagereng et al., 2021). Our sample with “an income gain” consists exclusively of individuals who proactively applied for their second-pillar savings to be terminated, suggesting they probably had specific plans for how they would use the pension money withdrawn, resulting in the substantial increase in spending that is observed.

Table 3. The impact of early pension withdrawals on spending and the financial situation in the first month

	Spending	**Investments**	**BankSaving**	**BankLoans**
Withdrawal	0.770***	0.376***	1.634***	–0.404***
	(0.025)	(0.044)	(0.057)	(0.097)
Log(average income)	0.012**	0.017**	0.006	0.007
	(0.005)	(0.009)	(0.011)	(0.023)
Constant	–0.035	0.076	0.188**	–0.062
	(0.033)	(0.057)	(0.075)	(0.158)
No. of Obs.	8108	8108	8108	2089
Adjusted R^2	0.103	0.009	0.091	0.007

Notes: The estimated coefficients for eq. (2). The standard errors are given in parentheses. Superscripts ***, ** and * indicate that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively.

The coefficient of 0.376 for the change in log investments implies the growth without the withdrawal should be multiplied by 1.47 to obtain the observed average growth in investment of 74%, as the growth in investment would have been 20% otherwise. Furthermore, the decline in the debt balance was 34% for the withdrawers and most of the decline is associated with the withdrawal, as without it the debt balance would have declined by only 1.5%. Bank account balances showed a significant surge, increasing on average by 540%, the majority of which is associated with the pension withdrawals, as without them the growth rate for savings would have been 25%. These results are robust to the set of control variables and to the application of an alternative matching method such as nearest neighbour matching.[18]

Given that individuals receive the lump-sum payment directly into their checking accounts, the large short-term boost is unsurprising, as the amounts that were not used for spending, investing or loan repayment in the first month remained in the account. As a substantial share of young adults run down the amount on their checking account before payday, the average balance on checking accounts was rather low before the withdrawal pension money arrived. Despite a notable increase after the withdrawal, the additional amount held in balances remained two to three times smaller than the sums allocated to spending and loan repayments. Similarly, the amount of monthly investment was very low, so the increase in investment of 55 percentage points means that 1-2% of the money withdrawn went to additional investments. In the first month, 33% of the money withdrawn on average was used for debt repayments while the largest share, 48% of the money withdrawn on average, was used for spending.

To shed light on the spending behaviour, we conducted additional statistical analysis on the detailed spending categories identified from card transactions and payments from checking accounts. This analysis does not cover all expenses, such as those made after cash withdrawals or transfers to other banks, and it focuses solely on spending identified directly from the checking account.

We compared the average monthly spending of the withdrawers three months before the withdrawal to that two months after the withdrawal. We separated card payments, e-payments, and bank transactions into five spending categories of (1) food and beverages, and tobacco; (2) accommodation, restaurants and transport; (3) home, clothing and health; (4) free time, sports

[18] The results are not reported but are available upon request.

and entertainment; and (5) gambling.[19] As Table 4 shows, spending on free time, sports and entertainment increased by 96%, while spending on home, clothes and health increased by 35%. These expenditures are probably driven by purchases of durables or services. Spending on food and beverages witnessed a monthly increase of 21%, which is significant given that it primarily reflects non-durable consumption. Gambling expenditures increased by 73%, and since gambling accounts for a considerable share of total spending at 9% during the two months after the withdrawal, this suggests that some withdrawals were also directed towards risky behaviours. Hamilton et al. (2024) found that gambling was one of the largest spending categories after early pension withdrawals in Australia, and it was larger than credit card repayments or spending in supermarkets.

Table 4. The growth and the share in average monthly spending in five spending categories

Spending category	**Growth (%)**	**Share of total spending (%)**
Free time, sports and entertainment	96%	41.3%
Home, clothing and health	35%	22.1%
Food, beverages and tobacco	21%	24.8%
Accommodation, restaurants and transport	20%	2.6%
Gambling	73%	9.2%

Notes: The share is calculated from total spending in the two months after the withdrawal, September-October 2021, and the growth is average monthly spending in this period compared to June-August 2021.

To provide a more comprehensive understanding of how the money withdrawn is used, we extend our analysis to estimate the effect after two, three and four months and so on up to 12 months. We additionally incorporate control variables as outlined in equation (3), thereby examining the robustness of the results presented in Table 3 for the first month. Figure 3 presents the dynamics of the monthly effect of the withdrawal over 12 months while Table 5 presents the estimated coefficients for the withdrawal and for average income in the first, second, third and sixth months and in the 12th month. The estimated coefficients for the other control variables are given in Table A.4 in the Appendix.

Panel A in Figure 3 and in Table 5 reveals that the pension withdrawal only led to a short-term increase in spending in the first and second months. In the third month, there was no significant difference in monthly spending between withdrawers and the matched non-withdrawers while in months five to eight after the withdrawal, monthly spending was lower by roughly ten percentage points. From the ninth month, the monthly spending of pension withdrawers did not differ from that of similar non-withdrawers. Hamilton et al. (2024) found in Australia that spending increased during the first few weeks following the withdrawals but then returned to pre-withdrawal levels after eight weeks. Meriküll (2025) uses aggregate data to identify the effects on aggregate consumption and finds likewise that the strongest positive effect on consumption was felt in the first month of the withdrawals. We reveal additionally that the withdrawers brought some of their planned expenditures forward, and consequently had slightly lower spending in subsequent months.

[19] The categorisation is based on the type of stores and service providers identified. Only e-payments through e-payment solution providers cannot be categorised into spending types, so these payments are considered in the category of food and beverages, which is assumed to be the largest share of e-payments.

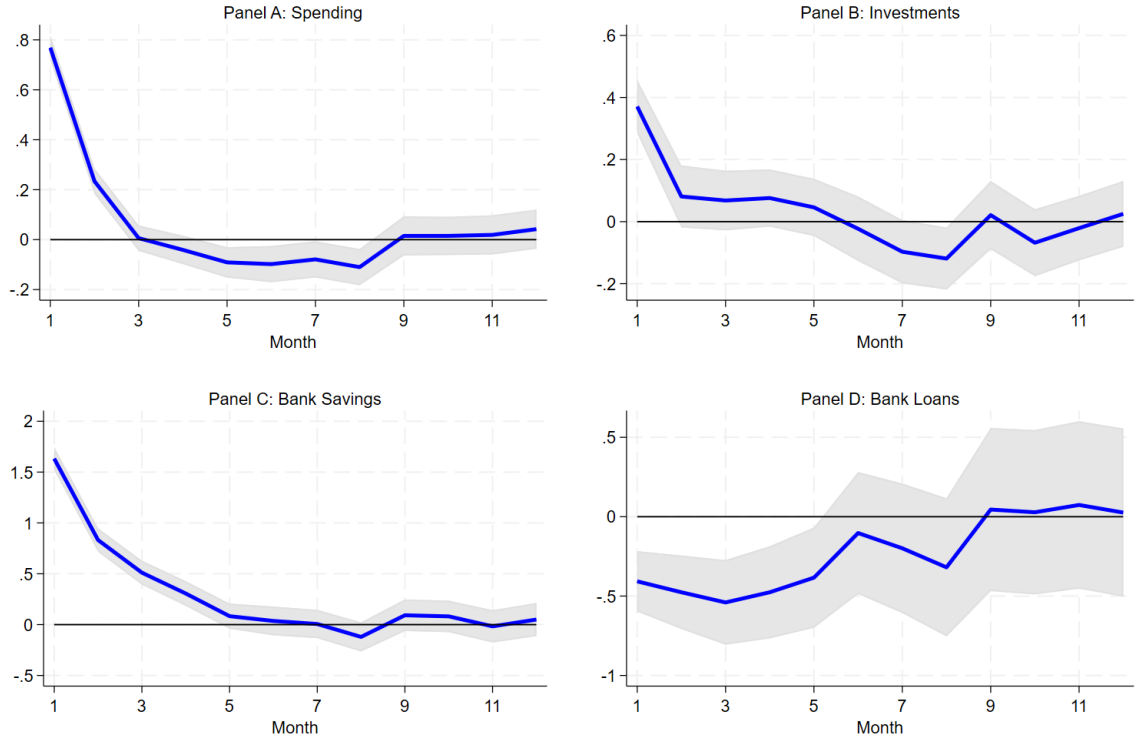

Figure 3. The impact of early pension withdrawals on spending and investment flows, and on the balance of bank savings and bank loans over 12 months

Note: The estimated coefficients β_0 from eq. (2) are presented for each month with 95% confidence intervals.

The investments are purchases of stocks, bonds, investment funds, and cryptocurrency. The response in investments is shown in panel B of Figure 3 and Table 5, which reveals that the increase in investments associated with the withdrawals is present only in the first month, and the monthly difference in investments from non-withdrawers disappears over the following months, implying that withdrawers only augmented their investments temporarily and there was no discernible long-term impact on their investment behaviour. Similarly, Meriküll (2025) shows that the aggregate volume of risky assets did not increase persistently, as the rise is observable only during the initial months.

Similarly, the comparison of savings in bank accounts reveals that the larger balances in bank accounts that are associated with the pension withdrawals vanish after five months, leaving the balances comparable to those of the savers who did not withdraw their pension savings. Meriküll (2025) finds a large and more persistent increase in bank deposits in the aggregate data for the full population. It is common in Estonia for people to hold a significant proportion of their savings in bank accounts, and these accounted for 71% of financial assets in 2021, while they were 44% in the euro area (Korasteljov et al. 2023). Agarwal et al. (2020) found for Singapore that early withdrawers retained substantial amounts on low-interest checking accounts. These findings were for individuals aged 55, whereas we investigate the financial choices of young individuals, who are apparently more inclined to use the money from the pension account for various purposes rather than leaving the funds idle in a bank account. Our results indicate that the bank savings of young adults did not increase in the longer term because of the pension withdrawals.

The funds withdrawn were allocated to loan repayments, which have a statistically significant estimated coefficient of –0.54, implying that the balance reached the lowest value

in the third month after the money withdrawn was received.[20] Young individuals apparently use these funds to repay short-term loans, where the amounts are smaller, resulting in a substantial decline in the average loan balance. This is confirmed by Meriküll (2025) from the aggregate data on loans, as she finds that early pension withdrawal results in a decline in consumer loan balances for several months, but has no effect on housing credit. Some portion of these repayments may be directed towards settling debts with bailiffs given that the incidence of individuals facing such demands is higher among withdrawers.

Nevertheless, the loan balance does not remain lower persistently, as the difference from the matched non-withdrawers disappears after nine months. This finding diverges from that of Agarwal et al. (2020), who show that the loan balance remains lower for early withdrawers. Individuals withdrawing savings at age 55 in Singapore are less likely to take on additional loans, while the young individuals in our sample are in the early stages of their lives, when the demand for loans is high. The initial decline in the loan balance may therefore allow them to take additional loans in subsequent periods, and consequently the effect on the loan balance is temporary.

We also examined whether there were any changes in the financial situation of people leading up to the withdrawal, in anticipation of the sums to be received from pension savings. We estimated equation (3) for spending, investment, balance on loans, and balance on bank accounts three months before the money withdrawn was received, but we did not detect any statistically significant differences in the financial situation in advance (results not reported). This suggests that households did not adjust their financial behaviour in anticipation of the lump-sum payment, and they only reacted after they had actually received it.

This finding is in line with earlier studies on household responses to anticipated income gains (Agarwal et al. 2007, Johnson et al. 2006) and with the study by Agarwal et al. (2020) on the response to early pension withdrawals. They showed that households in Singapore did not increase their spending on credit cards and other transactions before individuals turned 55. Instead, the rise only occurred after the eligible pension funds had been withdrawn. The lack of response to anticipated income gains is often explained by the presence of liquidity constraints (see literature overview by Jappelli and Pistaferri, 2010). Given that young individuals are typically more liquidity-constrained than those approaching retirement age, this could also explain the lack of pre-emptive financial adjustments in our sample.

The upshot of the results for young withdrawers from the pension scheme is that their financial situation experiences a temporary improvement that is characterised by increased spending and a lower level of indebtedness. Within three months on average over 55% of the withdrawals had been spent and over 40% of the money withdrawn had been used to repay loans. However, this effect is not persistent, and after nine months, their financial situation does not differ from that of those who did not withdraw their pension savings. We detect that on average only a few percent of the money withdrawn was invested and there is no evidence of a persistent increase in their savings and investments outside of the pension accounts.

[20] The sample in the regression of the loan balance is smaller as it consists only of individuals with loans from a commercial bank.

Table 5. The impact of early pension withdrawals on spending and investment flows, the balance of bank savings and bank loans over various time periods

Horizon:	1st month	2nd month	3rd month	6th month	12th month
Panel A. Dep var: spending (change in flows)					
Withdrawal	0.769***	0.234***	0.006	–0.098**	0.042
	(0.025)	(0.026)	(0.026)	(0.037)	(0.040)
Income 1/3/6/12m	0.013**	0.037***	0.033***	0.100***	0.215***
respectively	(0.005)	(0.006)	(0.006)	(0.009)	(0.009)
Other control variables	Yes	Yes	Yes	Yes	Yes
No. of Obs	8108	8108	8108	6768	6063
Adjusted R^2	0.105	0.015	0.005	0.021	0.087
Panel B. Dep var: investments (change in					
Withdrawal	0.371***	0.081	0.068	–0.023	0.025
	(0.044)	(0.051)	(0.049)	(0.053)	(0.054)
Income 1/3/6/12m	0.013	0.029**	0.020*	0.004	0.015
respectively	(0.009)	(0.011)	(0.011)	(0.013)	(0.013)
Other control variables	Yes	Yes	Yes	Yes	Yes
No. of Obs	8108	8108	8108	6768	6063
Adjusted R^2	0.014	0.011	0.002	0.009	0.016
Panel C. Bank saving (change in balance)					
Withdrawal	1.633***	0.832***	0.511***	0.036	0.050
	(0.057)	(0.059)	(0.060)	(0.072)	(0.083)
Income 1/3/6/12m	0.020*	0.057***	0.060***	0.172***	0.175***
respectively	(0.011)	(0.013)	(0.014)	(0.018)	(0.019)
Other control variables	Yes	Yes	Yes	Yes	Yes
No. of Obs	8108	8108	8108	6768	6063
Adjusted R^2	0.105	0.031	0.016	0.021	0.018
Panel D. Bank loans (change in balance)			42102.1		
Withdrawal	–0.407***	–0.476***	–0.540***	–0.103	0.026
	(0.097)	(0.118)	(0.136)	(0.196)	(0.270)
Income 1/3/6/12m	0.006	–0.005	–0.026	–0.056	0.424***
respectively	(0.023)	(0.031)	(0.038)	(0.058)	(0.072)
Other control variables	Yes	Yes	Yes	Yes	Yes
No. of Obs	2089	2089	2089	1782	1599
Adjusted R^2	0.015	0.020	0.018	0.023	0.066

Notes: The regression results for eq. (3). The estimated coefficients for the other control variables are given in Tables A.4-A.7 in the Appendix. The standard errors are given in parentheses. Superscripts ***, ** and * indicate that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively.

7. Discussion and final comments

This paper investigates the case of Estonia, where the mandatory private pension plan was transformed into a voluntary pension saving plan. The changes to the second pillar were implemented in 2021, prompting one contributor in five to the second pillar to terminate their contributions and to withdraw their accumulated savings as a lump-sum payment. Our analysis focuses on young adults aged 18–35 and we use bank account-level data to explore their spending and investment patterns, and deposit and loan dynamics over a one-year period following the early withdrawal.

The logit model assessing the probability of exiting the second pillar reveals that individuals with existing loans, those receiving unemployment or disability benefits, and those facing demands from bailiffs are more likely to withdraw their pension early, underscoring the role of financial difficulties in driving such decisions. Furthermore, we show that having additional savings in the third pillar or financial investments is associated with people having a lower probability of terminating their second pillar savings, suggesting that different saving plans complement, rather than substitute, each other.

The regression results for the matched sample reveal that the withdrawers spend more and repay their loans more than matched non-withdrawers in the first months after they receive the lump-sum transfer of pension savings. However, nine months after the withdrawal, their financial situation in terms of investments, savings in bank accounts, or loans does not show an improvement over that of the matched non-withdrawers. The results suggest that the early withdrawals had a short-term positive effect on their spending and financial situation, but the absence of second pillar savings means that the withdrawers will experience a worse financial situation in the long term.

Some countries permit early withdrawals from retirement savings when household income falls below a certain threshold (Beshears et al. 2015). Studies conducted in countries that permitted access to pension savings during the Covid-19 pandemic reveal that this option was extensively used by individuals facing economic hardship. This meant the policy served as a lifeline for households during a highly uncertain period. It has been argued that the opportunity to liquidate voluntary pension savings could increase participation in the system (Beshears 2020), but the liquidation of mandatory pension savings might not offer the same benefit if the scheme was deliberately made mandatory to overcome the problem of undersaving.

The results for Estonia showed that early withdrawals facilitated loan repayments and accelerated spending. This behaviour can be justified for young adults using the model of Blake et al. (2014), which illuminates an optimal path for consumption and saving over a person's life-cycle. It shows that saving for retirement becomes more critical in a person's 40s, and starting late needs the saving rate to rise to 30-35%, though this high rate is not supported by empirical data. Findings from studies by Lee & Hanna (2020) and Bateman et al. (2023) suggest that a portion of households may not fully comprehend the long-term consequences of depleting their pension savings, so their early withdrawals are not driven by an optimal saving plan but rather by the presence of present bias and gaps in financial planning, as highlighted by abundant empirical evidence (Goda et al., 2019, Lusardi & Mitchell, 2011).

By May 2021, which was the first deadline for applying to terminate saving in the second pillar and to withdraw the accumulated savings, the Estonian economy and labour market had recovered from the first wave of the Covid-19 pandemic, significantly reducing uncertainty (Matsulevitš & Soosaar, 2021). The decision to withdraw savings was thus not primarily driven by immediate financial needs resulting from the Covid-19 shock. That almost 30% of pension savers opted out of the second pillar within two years after the option was introduced, with the

consequence that they cannot re-join the scheme for the next ten years, implies that there will be more severe long-term consequences for early withdrawers in Estonia than for their counterparts in other countries. In the US the six-month suspension from pension contributions after an early withdrawal was abolished in 2020, and one of the arguments for this policy change was the potential loss of compounded earnings.[21]

One argument for the changes to the second pillar was that it granted households autonomy in deciding how they save for retirement. This included the option for households of investing independently through pension investment accounts (PIKs), thereby bypassing pension fund managers. However, the use of PIKs remains meagre as the number of individuals who opened a pension investment account in the year after the option was introduced was 2.7% of the number of those who terminated their contributions to the second pillar within the same time period.[22] Although the number of third pillar pension accounts increased in 2021 slightly more than it did in other years,[23] this small rise did not offset the decline in savings in the second pillar, as the total combined amount in the two pillars decreased by 20% between September 2021 and December 2022.[24] This disparity underscores the unsurprising outcome that the shift from mandatory to voluntary pension savings has resulted in total pension savings being considerably smaller.

Piirits and Võrk (2019) demonstrate with a microsimulation model for Estonia that the transition from a PAYG pension system to a three-pillar system has increased pension inequality. The second pillar is the primary savings component for half of the population in Estonia (Kulu et al., 2020), particularly among the low-income segment that was more inclined to opt out of the second pillar. Those who have withdrawn their second pillar pension funds will receive smaller public pensions. As they have not replaced the second pillar with other private savings, it is evident that pension inequality will increase because of this reform, and the financial well-being of the withdrawers in retirement is likely to suffer substantially.

The average replacement rate, which denotes the ratio of average pension income to average pre-retirement income, stands at 50% in Estonia, while the projections for the future net replacement rate from the mandatory schemes is calculated as being among the lowest across developed countries (OECD, 2023, Figure 1.16). Given the declining importance of the PAYG system in European countries because of demographic changes in society, privately accumulated pension savings will play an even larger role in ensuring well-being in retirement for today's younger generations. The three-pillar pension system has been in place for a relatively brief period of one or two decades in the CEE countries, during which there have been modifications to the schemes that have seen young individuals lose the most in retirement wealth (Chlon-Dominczak 2018). Moreover, constant modifications or reversals of the schemes undermine confidence in the pension system (Baulhol, 2023).

With voluntary pension schemes, it is a larger challenge to encourage private saving in the CEE countries than in Western European countries, where such schemes have been in place for decades (Marcinkiewicz, 2019, Le Blanc 2011). Moreover, lower living standards in the CEE countries coupled with expectations of earnings converging to overall European levels do not

[21] See https://blog.ifebp.org/401k-hardship-withdrawals-contribution-suspensions/

[22] By the second quarter of 2022, the number of PIKs was about 5000 while 182,000 people had terminated their second-pillar contract by that time.

[23] The yearly increase in the number of accounts was close to 11% in 2021, while the subsequent years saw a growth rate of 8-9%. Comparisons with the dynamics from before 2021 are not feasible, as the extraordinary increase of 108% in the number of accounts in 2020 was induced by less favourable tax treatment for new accounts opened from the beginning of 2021.

[24] The statistics can be seen at the website of Pensionikeskus at Value of Assets of Funded Pension — Pensionikeskus.

foster a conducive environment for voluntary long-term saving. As discussed by Baulhol et al. (2023) and Jackson (2017), ensuring a higher retirement replacement rate needs more flexible retirement schemes, more attractive schemes for voluntary pension saving, or more stringent rules for mandatory saving schemes.

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Appendix

Table A.1 Description of the variables in the dataset

Variable	Description
Man	Binary variable equal to 1 for male
Age	Individual's age as at 2020.06, 18–35 year olds
Mean income	Logarithm of mean income in June – October 2020
Education	Self-reported educational level 1 – below secondary education 2 – secondary education 3 – higher education
Withdrawal	Binary variable equal to 1 for individuals with early pension withdrawal.
Consumer loan	Binary variable equal to 1 if payments to main consumer credit providers identified from transfers from checking account in period June – October 2020
Mortgage	Binary variable equal to 1 if mortgage payments identified from transfers from checking account in period June – October 2020.
Student loan	Binary variable equal to 1 if student loan payments identified from transfers from checking account in period June – October 2020.
Lease	Binary variable equal to 1 if lease payments identified from transfers from checking account in period June – October 2020.
III pillar	Binary variable equal to 1 if third pillar payments to the Pension Registry identified from transfers from checking account in period June – October 2020.
Unemployment benefit	Binary variable equal to 1 if the individual received unemployment benefits from the Estonian Unemployment Insurance Fund at least once in period June – October 2020.
Disability allowance	Binary variable equal to 1 if the individual received disability allowance at least once in period June – October 2020.
Invested	Binary variable equal to 1 if the individual invested through bank accounts or through identified investment platforms
Mean investment (mean_investment)	Logarithm of mean investments in June – October 2020
Mean bank saving (mean_banksaving)	Logarithm of mean checking account at the end of the month in June – October 2020
Bailiff	Binary variable equal to 1 if payments to bailiffs identified from transfers from checking account in period June – October 2020.

Table A.2 The comparison of the unmatched and matched samples

	Unmatched		Matched		Matched
	With-drawers	**Non-withdrawers**	**With-drawers**	**Non-withdrawers**	**Standardised mean difference**
Male	0.55	0.49	0.55	0.55	0.00
Age	29.78	27.72	29.78	29.81	–0.01
Age^2	901.86	791.44	901.89	903.23	–0.01
Log(mean income)	6.37	6.39	6.37	6.36	0.01
$Log(mean\ income)^2$	41.35	41.79	41.35	41.29	0.01
Education	2.27	2.49	2.27	2.28	–0.03
Consumer loan	0.51	0.21	0.51	0.50	0.02
Student loan	0.01	0.01	0.01	0.01	0.01
Mortgage	0.15	0.12	0.15	0.15	0.00
Lease	0.08	0.07	0.08	0.08	0.00
III pillar	0.01	0.03	0.01	0.01	0.02
Unemployed	0.05	0.03	0.05	0.06	–0.04
Disability			0.32	0.31	
Allowance	0.33	0.19			0.03
Investing	0.18	0.27	0.18	0.17	0.04
Log(mean investment)	0.46	0.74	0.46	0.41	0.03
Log(mean bank saving)	7.02	8.00	7.02	6.99	0.02
$Log(mean\ bank\ saving)^2$	53.91	69.30	53.94	53.58	0.01
Bailiff	0.07	0.03	0.07	0.08	–0.02
Obs	**2111**	**6000**	**2108**	**6000**	**8108**

Notes: The mean values for the two groups in the unmatched and matched samples. The matching is effective when the standardised mean difference is <0.1.

A.3. The re-transformation of the coefficients when the dependant variable is in log-differences

As both the growth rate of the dependant variable and the estimated coefficients are large, we cannot use the proxy approach but have to re-transform the coefficients to obtain the effect in percentage points. We calculate the effects on the growth of an outcome variable given pension withdrawals W_i from:

$$E[\Delta_h \ln(Y_{it}) \,|W_i] = E[\Delta_h \ln(Y_{it}) \,|NW_i \, + \beta_0] \qquad (A.1)$$

where $\Delta_h \ln(Y_{it}) \,|NW_i$ is the growth without the withdrawal and β_0 is the estimated additional growth related to the withdrawal. We take the exponential from both sides:

$$\exp[\Delta_h \ln(Y_{it}) + \, \beta_0] = \frac{\exp(\ln(Y_{t+h}))}{\exp(\ln(Y_t))} \times \exp(\beta_0) \qquad (A.2)$$

and use the equality condition:

$$\frac{\exp(\ln(Y_{t+h}))}{\exp(\ln(Y_t))} = \frac{Y_{t+h}}{Y_t} \qquad (A.3)$$

hence eq (A.1) can be expressed as:

$$E\left[\frac{Y_{it+h}}{Y_{it}} \,|\, W_i\right] = E\left[\frac{Y_{it+h}}{Y_{it}} \,|\, NW_i \times \exp(\beta_0)\right] \qquad (A.4)$$

The estimated coefficient of $\beta_0 = 0.77$ implies that the spending growth without the withdrawal (*NW*) is multiplied by $\exp(0.77) = 2.16$ to obtain the spending growth with the withdrawal (*W*). Given observed growth $\frac{Y_{it+h}}{Y_{it}} \,|\, W_i = 2.24$, meaning a growth rate of 124%, the spending growth without the withdrawal would be $\frac{Y_{it+h}}{Y_{it}} \,|\, NW_i = \frac{2.24}{2.16} = 1.037$ implying a growth rate of 3.7%, so that the withdrawal makes the growth 120 percentage points larger.

Table. A.3. The calculation of the effect of early withdrawals in percentage points

	Spending	**Invest-ments**	**Bank-Saving**	**Bank-Loans**
Coef for withdrawal (β_0)	0.770	0.376	1.634	–0.404
Growth multiplier, $\exp(\beta_0)$	2.16	1.46	5.12	0.67
Observed growth $\frac{Y_{t+1}}{Y_t}$	2.24	1.74	6.42	0.66
Observed growth rate	1.24	0.74	5.42	–0.34
Calculated growth wo withdrawal	1.04	1.20	1.25	0.99
Calculated growth rate wo withdrawal	3.7%	19.7%	25.2%	–1.5%
Difference in growth rate in percentage points (pp)	**120**	**55**	**516**	**-33**

Table A.4. Regression results on monthly spending in the following 12 months

	1st month	**3rd month**	**6th month**	**12th month**
Constant	1.240**	1.180**	2.085***	2.170**
	(0.534)	(0.559)	(0.794)	(0.874)
Withdrawal	0.769***	0.006	–0.098***	0.042
	(0.025)	(0.026)	(0.037)	(0.040)
Income 1m	0.013**			
	(0.005)			
Income 3m		0.033***		
		(0.006)		
Income 6m			0.100***	
			(0.009)	
Income 12m				0.215***
				(0.009)
Male	–0.014	–0.011	0.039	–0.041
	(0.024)	(0.025)	(0.034)	(0.037)
Age	–0.096**	–0.101**	–0.220***	–0.268***
	(0.038)	(0.040)	(0.056)	(0.062)
Age^2	0.002***	0.002***	0.004***	0.005***
	(0.001)	(0.001)	(0.001)	(0.001)
Education	–0.008	0.008	0.064**	0.062**
	(0.020)	(0.021)	(0.029)	(0.031)
Consumer loan	0.024	0.018	–0.034	–0.135***
	(0.023)	(0.024)	(0.034)	(0.037)
Student loan	0.283**	0.238*	–0.178	–0.121
	(0.124)	(0.130)	(0.184)	(0.198)
Mortgage	0.019	–0.034	0.016	–0.059
	(0.032)	(0.033)	(0.046)	(0.050)
Lease	–0.024	0.040	–0.073	0.087
	(0.041)	(0.043)	(0.060)	(0.065)
III pillar	0.009	–0.004	–0.008	0.063
	(0.117)	(0.122)	(0.183)	(0.216)
Disability allowance	–0.003	0.003	–0.007	–0.131***
	(0.025)	(0.026)	(0.036)	(0.039)
Invested	0.053	–0.004	0.021	–0.018
	(0.043)	(0.045)	(0.062)	(0.068)
Mean investment	–0.009	0.007	0.004	0.020
	(0.012)	(0.013)	(0.018)	(0.020)
Mean bank saving	–0.005	–0.004	0.077**	0.104***
	(0.023)	(0.024)	(0.034)	(0.037)
Mean bank $saving^2$	–0.001	0.000	–0.007***	–0.011***

Table A.4 continued

	1st month	**3rd month**	**6th month**	**12th month**
Bailiff	0.005	–0.131***	–0.115*	–0.041
	(0.043)	(0.045)	(0.062)	(0.067)
No. of Obs	8108	8108	6768	6063
R^2	0.107	0.007	0.023	0.089
Adjusted R^2	0.105	0.005	0.021	0.087
AIC	28248.4	28977.9	27324.4	24851.1
BIC	28381.4	29111.0	27454.0	24978.6
RMSE	1.01	1.08	1.25	1.33

Notes: Superscripts ***, ** and * indicate that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively.

Table A.5. Regression results on monthly investments in the following twelve months

	1st month	**3rd month**	**6th month**	**12th month**
Constant	0.332	0.327	0.191	–0.506
	(0.924)	(1.025)	(1.132)	(1.181)
Withdrawal	0.371***	0.068	–0.023	0.025
	(0.044)	(0.049)	(0.053)	(0.054)
Income 1m	0.013			
	(0.009)			
Income 3m		0.020*		
		(0.011)		
Income 6m			0.004	
			(0.013)	
Income 12m				0.015
				(0.013)
Male	0.115***	0.121***	0.059	–0.037
	(0.041)	(0.045)	(0.049)	(0.050)
Age	–0.030	–0.061	–0.025	0.007
	(0.066)	(0.073)	(0.080)	(0.083)
Age^2	0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Education	0.045	0.033	0.030	0.035
	(0.034)	(0.038)	(0.041)	(0.043)
Consumer loan	0.080**	–0.001	0.086*	0.045
	(0.040)	(0.044)	(0.048)	(0.050)
Student loan	0.082	0.001	–0.409	0.029
	(0.215)	(0.239)	(0.263)	(0.267)
Mortgage	–0.084	–0.062	0.108	–0.021
	(0.055)	(0.061)	(0.066)	(0.068)
Lease	0.209***	–0.054	0.223***	0.182**
	(0.071)	(0.079)	(0.085)	(0.087)
III pillar	–0.105	0.207	0.025	–0.227
	(0.202)	(0.225)	(0.261)	(0.292)
Disability allowance	0.035	0.006	0.079	0.119**
	(0.042)	(0.047)	(0.051)	(0.052)
Invested	–0.036	–0.073	–0.307***	–0.374***
	(0.074)	(0.082)	(0.089)	(0.092)
Mean investment	0.075***	0.003	–0.046*	–0.086***
	(0.021)	(0.023)	(0.025)	(0.026)
Mean bank saving	–0.027	0.105**	0.015	0.073
	(0.040)	(0.044)	(0.049)	(0.050)

Table A.5 continued

	1st month	**3rd month**	**6th month**	**12th month**
Mean bank saving[2]	0.002	–0.008**	–0.002	–0.005
	(0.003)	(0.003)	(0.004)	(0.004)
Bailiff	–0.114	–0.076	–0.016	–0.104
	(0.075)	(0.083)	(0.088)	(0.091)
No. of Obs	8108	8108	6768	6063
R^2	0.016	0.004	0.011	0.019
Adjusted R^2	0.014	0.002	0.009	0.016
AIC	37123.7	38805.1	32119.1	28505.0
BIC	37256.7	38938.1	32248.7	28632.5
Log,Lik,	–18542.862	–19383.537	–16040.540	–14233.513
RMSE	1.88	2.10	2.07	2.05

Notes: Superscripts ***, ** and * indicate that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively.

Table A.6. Regression results on the balance of checking account in the following twelve months

	1st month	**3rd month**	**6th month**	**12th month**
Constant	0.922	0.170	1.942	1.701
	(1.198)	(1.276)	(1.558)	(1.807)
Withdrawal	1.633***	0.511***	0.036	0.050
	(0.057)	(0.060)	(0.072)	(0.083)
Income 1m	0.020*			
	(0.011)			
Income 3m		0.060***		
		(0.014)		
Income 6m			0.172***	
			(0.018)	
Income 12m				0.175***
				(0.019)
Male	0.031	–0.034	–0.030	–0.113
	(0.053)	(0.056)	(0.067)	(0.077)
Age	–0.006	–0.033	–0.169	–0.146
	(0.085)	(0.091)	(0.110)	(0.127)
Age^2	0.000	0.001	0.003	0.003
	(0.001)	(0.002)	(0.002)	(0.002)
Education	–0.193***	–0.004	–0.025	0.062
	(0.045)	(0.048)	(0.056)	(0.065)
Consumer loan	0.117**	0.069	0.086	–0.046
	(0.052)	(0.055)	(0.066)	(0.076)
Student loan	–0.776***	–0.668**	0.779**	–0.965**
	(0.279)	(0.297)	(0.362)	(0.409)
Mortgage	–0.029	–0.207***	–0.053	–0.114
	(0.071)	(0.076)	(0.090)	(0.104)
Lease	0.012	0.043	0.012	–0.084
	(0.092)	(0.098)	(0.118)	(0.134)
III pillar	–0.339	–0.366	–0.966***	0.019
	(0.263)	(0.280)	(0.359)	(0.447)
Disability allowance	0.001	0.166***	0.028	–0.197**
	(0.055)	(0.059)	(0.070)	(0.080)
Invested	–0.033	0.069	–0.025	0.299**
	(0.095)	(0.102)	(0.122)	(0.141)
Mean investment	0.039	–0.013	0.026	–0.057
	(0.027)	(0.029)	(0.035)	(0.040)
Mean bank saving	–0.111**	–0.008	0.047	–0.117
	(0.051)	(0.055)	(0.067)	(0.076)
Mean bank $saving^2$	0.001	–0.002	–0.011**	0.001

Table A.6 continued

	1st month	**3rd month**	**6th month**	**12th month**
	(0.004)	(0.004)	(0.005)	(0.006)
Bailiff	–0.132	0.410***	0.062	–0.024
	(0.097)	(0.103)	(0.122)	(0.139)
No. of Obs	8108	8108	6768	6063
R^2	0.107	0.018	0.023	0.021
Adjusted R^2	0.105	0.016	0.021	0.018
AIC	41343.1	42363.0	36441.4	33660.7
BIC	41476.1	42496.1	36571.0	33788.2
RMSE	2.02	2.20	2.40	2.61

Notes: Superscripts ***, ** and * indicate that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively.

Table A.7. Regression results on the balance of bank loans in the following twelve months

	1st month	**3rd month**	**6th month**	**12th month**
Constant	4.023	10.238***	13.682***	17.323**
	(2.547)	(3.565)	(5.097)	(7.004)
Withdrawal	–0.407***	–0.540***	–0.103	0.026
	(0.097)	(0.136)	(0.196)	(0.270)
Income 1m	0.006			
	(0.023)			
Income 3m		–0.026		
		(0.038)		
Income 6m			–0.056	
			(0.058)	
Income 12m				0.424***
				(0.072)
Male	0.113	0.085	0.138	–0.024
	(0.094)	(0.131)	(0.188)	(0.260)
Age	–0.290	–0.650***	–0.830**	–1.270***
	(0.178)	(0.249)	(0.356)	(0.489)
Age^2	0.005	0.011**	0.013**	0.020**
	(0.003)	(0.004)	(0.006)	(0.008)
Education	0.139*	–0.044	–0.066	0.357
	(0.080)	(0.112)	(0.159)	(0.219)
Consumer loan	–0.267***	–0.440***	–0.833***	–1.427***
	(0.093)	(0.131)	(0.189)	(0.262)
Student loan	–0.882*	–0.693	–2.248**	–3.946***
	(0.487)	(0.682)	(1.097)	(1.441)
Mortgage	–0.081	–0.383***	–0.895***	–1.917***
	(0.091)	(0.128)	(0.184)	(0.255)
Lease	–0.191	–0.179	–0.015	–0.278
	(0.128)	(0.180)	(0.262)	(0.362)
III pillar	–0.412	–0.415	–0.339	0.201
	(0.413)	(0.578)	(0.866)	(1.350)
Disability allowance	–0.062	–0.125	–0.017	0.218
	(0.095)	(0.134)	(0.191)	(0.264)
Invested	0.038	0.233	0.183	–0.120
	(0.151)	(0.212)	(0.306)	(0.425)
Mean investment	0.011	–0.035	–0.027	0.053
	(0.045)	(0.063)	(0.089)	(0.124)
Mean bank saving	0.083	0.121	0.023	–0.129
	(0.090)	(0.126)	(0.184)	(0.249)
Mean bank $saving^2$	–0.005	–0.007	0.001	0.012

Table A.7 continued

	1st month	**3rd month**	**6th month**	**12th month**
Bailiff	–0.037	–0.422	–0.180	0.347
	(0.223)	(0.312)	(0.432)	(0.587)
No. of Obs	2089	2089	1782	1599
R^2	0.023	0.026	0.033	0.076
Adjusted R^2	0.015	0.018	0.023	0.066
AIC	9848.0	11253.7	10586.6	10358.8
BIC	9955.2	11361.0	10690.9	10460.9
Log,Lik,	–4904.984	–5607.864	–5274.315	–5160.381
RMSE	2.22	2.99	3.87	4.92

Notes: Superscripts ***, ** and * indicate that the coefficient is statistically different from 0 at the 1%, 5% and 10% level respectively.

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