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* Views expressed are those of the authors and do not necessarily reflect official positions of De Nederlandsche Bank.

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Trust in the financial performance of pension funds, public perception, and its effect on participation in voluntary pension saving plans.

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Abstract

We investigate the determinants of trust in one's pension fund and the effect of trust on the decision to ensure additional pension savings. Our analysis is based on exogenous shocks arising from pension cuts and indexation, and on how these are perceived. These instruments allow identifying the effect of trust in pension funds on participation in voluntary pension saving plans. We disentangle the effects of age, birth cohort, and time in the determination of trust, and counter previous findings of a positive age gradient with trust. This implies that in the future the general level of trust in pension funds will decline. This study also finds a positive effect of trust on additional pension savings. Hence, the positive correlation found in previous studies can be interpreted as causal. Lastly, we contribute to the current debate on self-employment and retirement preparation. Our findings suggest that the decision to become self-employed and to arrange one's own pension savings is likely not driven by the desire to exit the occupational pension system, as those who make additional pension savings arrangements – including self-employed workers – in fact trust their pension fund.

Keywords: Trust, additional pension savings, cohort-time effect, self-employment

JEL codes: G51, J32

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1. Introduction

The sustainability of the Dutch pension system has been impacted by various threats that built up over several decades. Underlying causes included aggravated population aging, a deep financial crisis, a prolonged period of low interest rates, and structural shifts in the labor market, such as the steady growth of non-traditional forms of employment, that induced many workers to leave the occupational pension system.

All these developments put pressure on the ability of pension funds to meet their task of providing defined benefits to their participants. For instance, the financial crisis induced a drop in the funding ratio of many pension funds. This required recovery measures, including a halt to indexation, or even curtailing nominal benefits. These recovery measures may have reduced trust in pension funds, who were seen as breaking their promises of delivering a certain level of benefits. It is in this context that the Dutch government initiated a strategic reform of the pension system, which is expected to be come into force by July 2023. We discuss the relevant elements of the proposed policy changes in Section 2.

Previous studies, which we have schematically summarized in the appendix, already highlighted the impact of both the perceived and actual performance of pension funds on trust in the abilities of one's personal pension fund. Van der Cruijsen and Jonker (2019) found that trust in the ability of pension funds to pay benefits at all times is negatively related with the belief that the pension fund needed to take recovery measures. Van Zaal (2017) also found a significant effect of pension cuts and lack of indexation on trust. His findings indicate that the negative effect of cuts is age-related and especially important for the elderly, while the indexation dummy was only significant for the working population.

Our study elaborates on the role of recovery measures to address issues related to trust, linking it to participation in voluntary pension saving plans. The level of trust in Dutch pension funds experienced a significant drop in 2008 and recovered only marginally afterwards. Understanding the type of behavior that lack of trust can trigger is relevant to policy (Van der Cruijsen et al., 2019). Earlier literature found a positive effect of trust on the willingness to participate in a pension scheme. For example, Van Dalen and Henkens (2015) found a correlation between lack of trust and an increased tendency to opt out. The research by Agnew et al. (2012) on automatic and voluntary enrolment in 401(k) savings plans in the US shows similar findings. They found that a low level of trust in financial institutions is essential in explaining saving behavior. Related research by Agnew et al. (2007) suggests that participants are more likely to opt out of automatic enrolment plans when their trust is low. However, the above studies only consider the correlation between trust and pension participation. Because trust as well as saving behavior may be affected by many unobservable variables – including the attitude to risk and the propensity to save – a causal relationship cannot be established

by these studies. Moreover, there may be a reverse causality problem, in which the direction of the relationship between trust and pension savings is difficult to determine. Ricci and Caratelli (2017) discussed the difficulty they experienced in identifying causality between, on the one hand, financial literacy and trust in financial institutions and, on the other hand, pension decisions, as both factors are endogenous. A solution to address this is to keep financial literacy as endogenous and to use social capital as an exogenous regional indicator as a proxy for trust. However, this indicator, which represents the level of trust between counterparts of a financial contract in each geographical area, is not directly related to pension decisions. They found that social capital positively impacts the decision of workers to enter a private pension scheme and to move severance pay income to voluntary pension schemes. The authors acknowledged the limitations of their proxy and encouraged further research on the causal impact of trust. Our study responds to this encouragement: we propose using new instruments to explain trust, namely the exogenous (negative) shock to investments by pension funds and the perception thereof. We incorporate this into our empirical approach, using information on the indexation of respondents' pensions, and the awareness of these shocks by pension participants. We believe this is a relevant first step in an attempt to assess the effect of trust on voluntary pension saving. However, the validity of our instruments can be questioned on other grounds, mostly because of how the cuts were implemented. For instance, pension funds that were forced to apply cuts varied in many regards (assets, number of participants, past performance). Some characteristics that are difficult to quantify are worth mentioning. For instance, many of these pension funds cover sectors that include many self-employed workers (such as pharmacists and dentists), or they cover specific firms.

Our study is aimed at making some progress in estimating the unbiased effect of trust on the decision to save for pension purposes on a voluntary basis. Voluntary pension savings become an option to consider if one does not believe that occupational pension funds will be able to pay out an acceptable pension benefit. More specifically, we are interested in what determines trust in one's own pension fund and what effect trust has on the decision to have additional pension savings. We thereby try to circumvent the effect of unobservable variables that influence both trust and pension saving behavior. We do this here as well through an IV approach, where recovery plan information at the pension fund level on indexation is the proposed exogenous instrument for trust, along with the possibility that a respondent misperceived this shock. Misperception is defined as either erroneously believing that the shock was suffered, or being unaware of recovery measures that were implemented. We combine data from the DNB Household Survey, the DNB Trust Survey, and the recovery plans that DNB approved for pension funds that violate their Financial Assessment Framework.

The effect of trust in one's pension fund on the decision to have additional pension savings could be expected to follow alternative pathways. Trust is positively related to the

willingness to participate in the pension system. Conversely, low trust in one's pension fund can cause participants to not save voluntarily (for instance, in voluntary pension saving schemes) and, in extreme cases, to leave wage employment in order to avoid occupational pension savings. On the other hand, higher trust could also cause lower participation in voluntary pension savings arrangements: individuals who trust their pension fund might not feel the need to build additional financial buffers. In this study, we also show how trust is affected by indexation and cuts, thus by the variation in expected future income; this means that saving decisions can be affected too, for instance by way of a displacement effect. These competing explanations are central to our study. The influence of personal attributes on trust in pension funds have received increased attention by researchers, age being one of the most prominent factors. In their analysis of determinants of trust in the pension sector, Van Dalen and Henkens (2015) ascribe a considerable role to age to explain the difference in levels of trust. They argue that, over the life cycle, it becomes increasingly clear what can be expected from one's pension funds. The authors state that aging has a positive effect on trust in one's pension fund.

Our findings, on the other hand, suggest that, rather than an age effect, it is a cohort-time effect that explains the lower level of trust among younger generations. In turn, we also see that trust in one's pension fund induces participation in voluntary pension savings. Our IV models show that the effect of trust increases relative to simple OLS, suggesting traditional attenuation bias (here due to reverse causality and an omitted variables bias).

Lastly, our study adds to the debate on self-employment and retirement preparation. Self-employed workers must make private saving arrangements as they are not automatically included in an occupational pension scheme. A recent study by DNB shows that, when this group lacks occupational pension savings, they typically also lack other type of savings: most notably private pensions, but also other financial investments and even real estate investments (DNB, 2022). This could be due to all sorts of factors, including market failures (such as opacity) but also preferences. Karpowicz (2019) suggests that individuals who prefer pension plans with more freedom of choice are more likely to be self-employed. Van Dalen and Henkens (2015) show that dissatisfaction is one of the reasons to opt out of a pension system when possible. The compulsory nature of the occupational pillar, in combination with the increasing financial stress of funds of recent years, led them to wonder whether a desire to exit the compulsory pension system drove the decision to become self-employed. Our findings suggest that this is not the case as individuals who make additional saving arrangements for a pension, including self-employed workers, actually trust the pension funds. We show that self-employed workers respond less strongly to trust as a driver of having additional pension savings. Thus the increasing share of self-employment may be driven by factors unrelated to trust in the pension funds, such as labor market rigidities.

The remainder of the study is organized as follows. Section 2 provides background information on the Dutch pension system and the changing labor market. Section 3 presents the data and the descriptive analysis. The results of the empirical analyses are presented in Section 4, followed by a sensitivity analysis in Section 5. In Section 6 we summarize our results and discuss policy implications.

2. Institutional context

2.1 Occupational pensions

In the Netherlands, a capital-funded occupational pension system exists on top of a pay-as-you-go (PAYG) flat-rate state pension. Even though employers are not required by law to offer an occupational pension plan, about 90% of the employees are nonetheless covered by occupational pensions, owing to a strong lobby by the trade unions (Van der Cruijsen and Jonker, 2019). Consequently, occupational pensions are often described as quasi-mandatory (Westerhout et al., 2021). Benefits are traditionally determined by individual contributions, in a defined benefit (DB) manner. However, actual entitlements traditionally depended on the financial performance of the pension fund, through indexation or by nominal entitlement reduction (Beetsma et al., 2015). Whether a fund can index the nominal benefits to wage or price inflation – and thus keep the purchasing power of retirees intact – depends on the fund's funding ratio. The funding ratio is the ratio between available assets and the pension liabilities to current and future members. In general, if the funding ratio exceeds 110%, the fund is allowed to index the nominal benefits, either partially or fully. However, if the funding ratio is too low, a fund may have to opt for measures such as a higher contribution rate or a reduction of benefits.

In the aftermath of the financial crisis of 2008-2013, many funds encountered financial distress, struggled to index the current benefits, and had to increase their premiums. This also led to a policy response, as in January 2015 a new financial assessment framework (FTK in Dutch) was introduced. The new framework aimed at making the occupational pension system more stable, fair, and resilient to shocks. A key section of the new framework was dedicated to discounting methods for future liabilities. The most relevant part for our investigation deals with the actions to be taken if financial recovery is needed. The new framework made it possible to increase the risk profile (the required funding ratio) at the time when the new FTK was enacted. Pension funds still had to maintain high performance, but with renewed attention to investment risks. Funds must manage their risks by conforming to risk assessment requirements: the required funding ratio of funds that are in recovery mode would be increased if they were to invest in risky assets. In the new FTK, recovery modes are still imposed by DNB, which acts as supervisory agency. These revolve around three possible actions: indexation stops, cuts to pension benefits, and increase of pension premiums for active participants.

Through a series of reforms that started in the late 1990s, in the new pension system that is now being introduced, accrued pension wealth will be adjusted according to the funds' performance on the financial markets (Westerhout et al., 2021). Consequently, indexation and pension cuts will happen *ex ante* during the accrual phase. Hence, the new system does not

make any promises about future benefits. Instead, it aims to improve the transparency of how premiums are translated into benefits.

2.2 Voluntary savings

Private savings and personal insurance plans can benefit from tax facilities and from legal protections (and restrictions) that are similar to those of occupational pensions. Contributions are made on a voluntary and individual basis, mostly to insurance companies. Savings are exempted from payroll taxes, same as the returns (Beetsma, 2015). Employees who wish to increase their pension savings can benefit from these types of savings, although they are mostly intended for self-employed workers who do not have an occupational pension. On the whole, the savings involved are modest (CBS, 2020). Only a small number of employees has them, and far from all self-employed workers organize their pension savings voluntarily. Tax benefits and legal protections (such as creditors having no recourse to voluntary pension savings) are offset by the illiquidity and immobility of these instruments. Personal assets and homeownership are often regarded as an additional pillar to the voluntary system. Self-employed workers often rely on these types of savings (Damman et al., 2020).

2.2 The Dutch labor market

In the last two decades, the share of self-employed workers increased from 11% to 17% of the working population (OECD, n.d.). Most of them work on a standalone basis (solo self-employed) (CBS, n.d.). The profile of the self-employed has moreover become increasingly heterogeneous. The group of solo self-employed ranges from highly trained workers, who provide their skills and services to other businesses, to low-skilled workers who perform outsourced tasks. In particular, low-skilled solo self-employed workers who work as freelancers or subcontractors bear higher labor market risks, with no job security and, on average, lower income (Jansen, 2017). Labor market rigidities, such as mandatory participation in worker insurance systems (disability, unemployment, and old-age), attract workers who prefer more flexibility into self-employment. On the other hand, when employers seek to avoid the same rigidities, workers can essentially be forced into self-employment (Hershey et al., 2016). For example, self-employment has become the standard for certain jobs, such as mail and food carriers, making it easier for employers to hire and fire their personnel (Jansen, 2020). Consequently, as the share of self-employed workers increases, more workers have become personally responsible for their retirement savings. Many such workers are financially less well-off and more in need of pension savings for their future financial well-being (Hershey et al., 2016). Pension accrual of the self-employed category is considerably lower than that of employees. This also holds when other aspects of wealth are considered, including private wealth and housing (Zwinkels et al., 2017, and Hershey et al., 2016)

3. Data and descriptive analysis

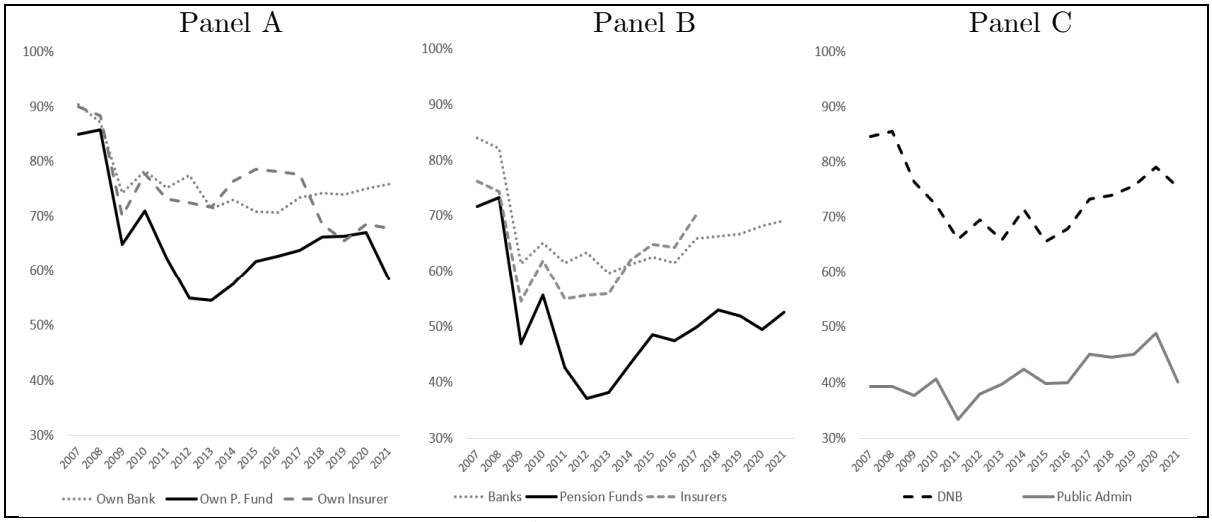
3.1 Data

For our analysis, we use the DNB Household Survey (DHS), a sample that is representative of the Dutch population. DHS, which is administered by CentERdata, collects information on economic and psychological determinants of household savings on an annual basis (Teppa and Vis, 2012, Marchand, n.d.). It has a cross-sectional and panel component. We investigate data from 2007 to 2020. Survey participants are asked which pension fund they participate in, and this information can then be linked to balance sheet information of the various funds. We also use two additional datasets. The balance sheet data of the fund are collected by the Dutch Central Bank (DNB). Finally, we use the supplementary DNB Trust Survey (DTS), in which participants are asked to respond to several statements on trust in financial institutions. This is a special module of DHS, again sponsored by DNB, that can be merged with the DHS data at the person-year level.

3.2 Descriptive statistics

In the DTS, respondents are asked to evaluate how much trust they have in a number of financial institutions.

Figure 1: Share of respondents with trust in financial institutions



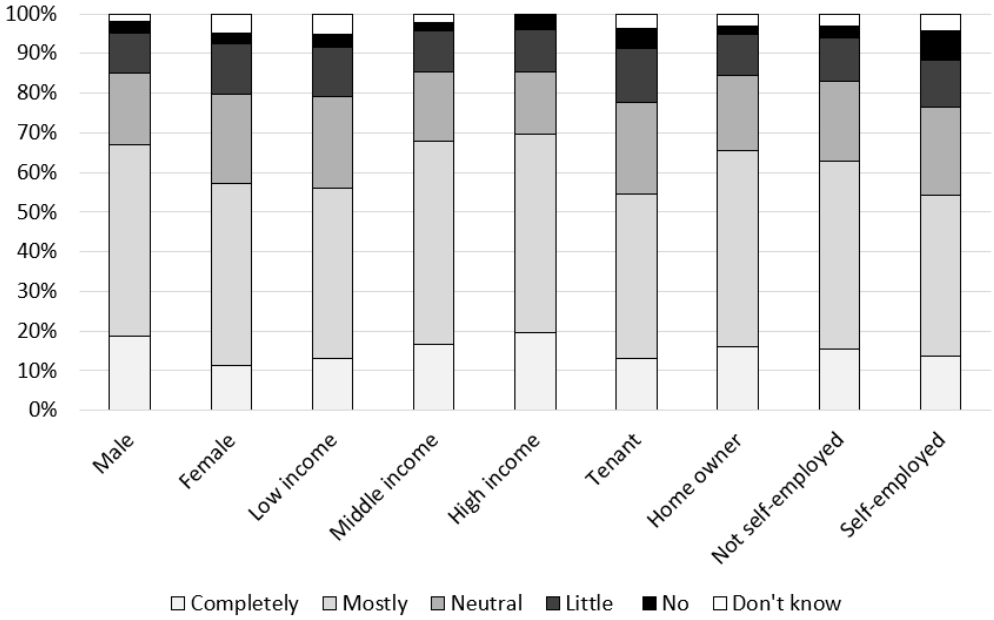
Explanatory note: Source DTS 2007-2021. Panel A shows trust in one's personal bank, pension fund, and insurer. Panel B shows trust in general in banks, pension funds, and insurers. Panel C shows trust in the Dutch National Bank and in public administration in general.

In Figure 1, we show evidence for pension funds, banks, insurers, the public administration (government in general), and the Dutch central bank (DNB). The wording of the survey questions pertaining to different institutions is somewhat divers. For pension funds the question is whether the respondent is confident that funds will be able to pay pensions in

the future. For banks, the poll probes whether they will be able to repay deposits, and for insurers whether they can meet their obligations. As for DNB and the public administration, the question is simply how much trust in general respondents have. As the answers are categorial, whereas the categories differ across questions, we have created a dichotomous variable, equal to 1 if a respondent reports any form of trust, and equal to 0 if there is no trust or if the respondent is neutral. "Don't know" answers are discarded.

Figure 1 shows that, prior to the financial crisis, respondents had equal trust in their own pension fund, insurer and bank, while, during the crisis, trust in one's personal pension fund diminished most. Until the present day, trust has not recovered to pre-crisis levels for any of the financial institutions. Trust in pension funds is structurally lower than trust in banks, insurers, and DNB. The public administration scores lower than any of the financial institutions. Trust in one's own pension fund is heterogeneous across the population and associated with the socio-economic status of the respondent (see Van der Cruijsen and Jonker, 2019). Figure 2 shows the distribution of trust across gender, income, and employment status. It shows that trust increases with income and is higher for males, home-owners, and respondents not currently self-employed.

Figure 2: Trust levels of various groups, year 2021

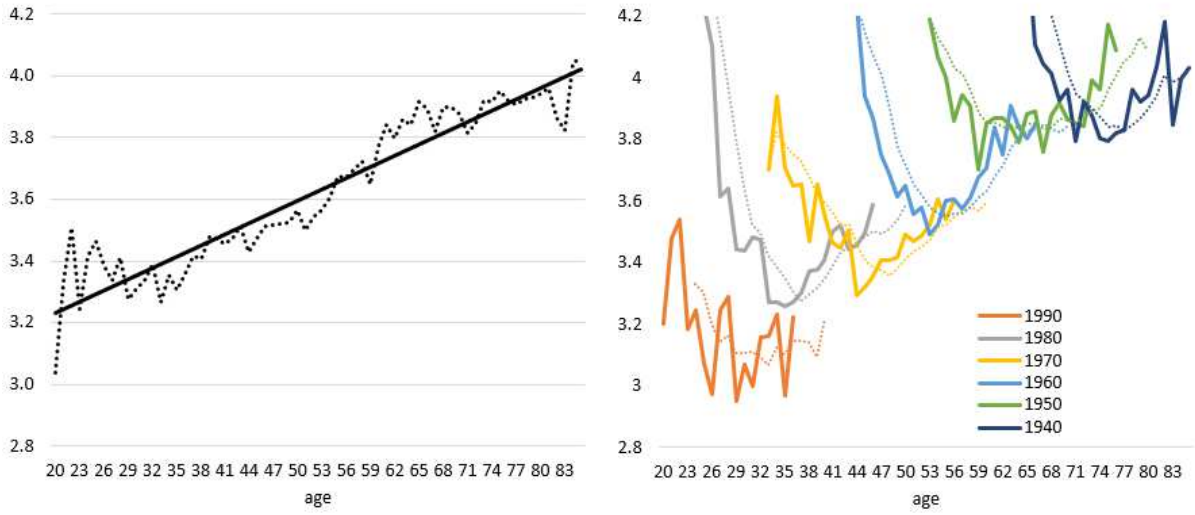


Source: DTS and DHS, own computations.

Cross-sectional analyses by Van Dalen and Henkens (2015) and Van Zaal (2017) found a positive age gradient with trust. The left panel of Figure 3 appears to confirm this. In the right panel, however, we show that much of the age patterns can be attributed to cohort-time effects. Older cohorts show higher levels of trust, which, except for the shock due to the financial

crisis, tends to stay quite constant. While the positive age gradient suggests that trust increases as respondents approach retirement, the positive cohort-time effects suggest that this might not happen. In general, older cohorts appear to be endowed with higher societal average trust: they trust pension funds more than younger cohorts, even when still far from retirement (also see Robinson and Jackson, 2001).

Figure 3: Trust by age (left) and cohort-time (right)



Explanatory note: The solid line in the left panel is a linear interpolation showing the positive age gradient. In the right panel the dotted lines represent the 5-year moving averages of the solid lines, where the age-time pattern is heterogeneous across cohorts. The legend shows the oldest year of birth of a 10-year cohort. Source DTS and DHS, own computations.

Since we use pension fund balance sheet data as an instrument in our regression analysis, we present some data on the financial health of the pension funds in Table 1. Pension cuts are relatively rare, but also no more than a quarter of the pension funds observed between 2007 and 2020 had a sufficiently high funding ratio to index benefits to inflation at any point. No less than 72% of them[1] applied no indexation at all.

Table 1: Pension fund indexation and age

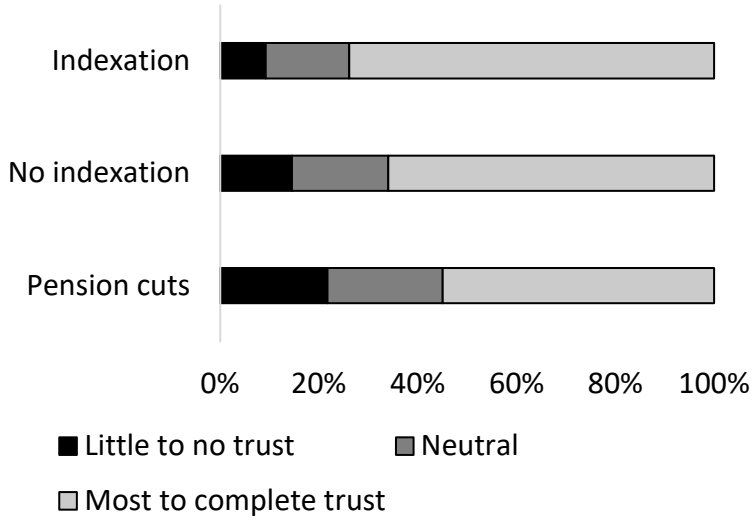
	Cuts	No Indexation	Indexation
Age 20-40	16%	27%	57%
Age 41-55	20%	27%	53%
Age 55-99	23%	28%	48%
N		19871	

Explanatory note: Statistics based on households in the DHS, merged to balance sheet data from DNB.

[1] In our estimating sample, about 70% of respondents belong to one of the 32 funds that are listed as options in the DHS questionnaire. The rest report another, typically smaller fund membership, which is then inquired about in an open-ended question. Altogether, we have 52 different pension funds affiliations. About 45% of respondents report participating in one of the two largest funds in the Netherlands.

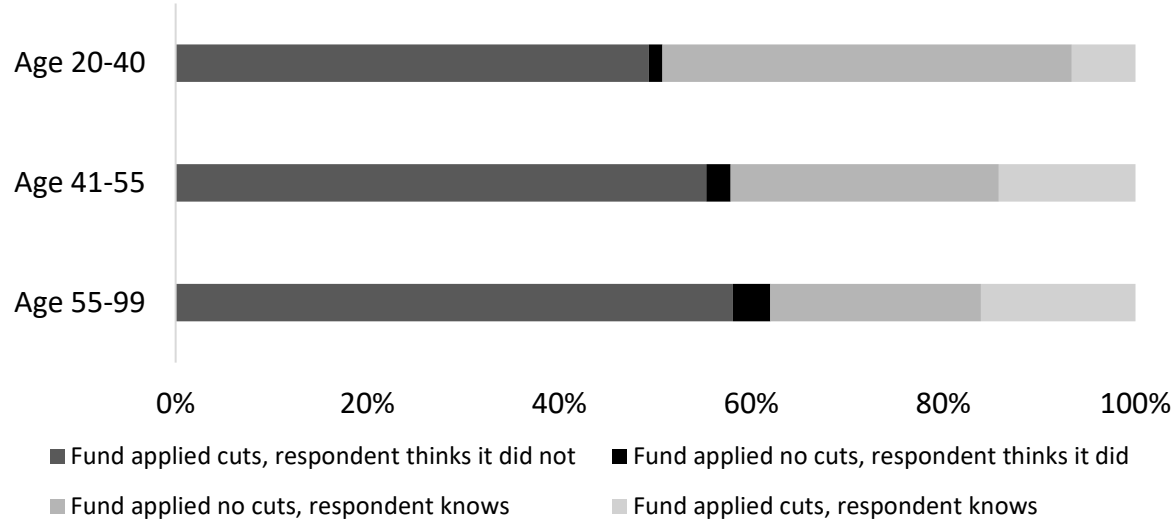
Figure 4 presents the relationship between trust, pension cuts, and indexation. For funding ratios that allow indexation, participants are more likely to trust their pension fund. Similarly, the level of distrust (lack of trust) is highest for funds that had to cut benefits, compared to funds that did not. This is in line with previous findings by Van Zaal (2017).

Figure 4: Trust in pension fund and indexation



Explanatory note: Statistics based on households in the DTS and DHS, merged to balance sheet data (DNB).

Figure 5: Awareness and pension fund indexation

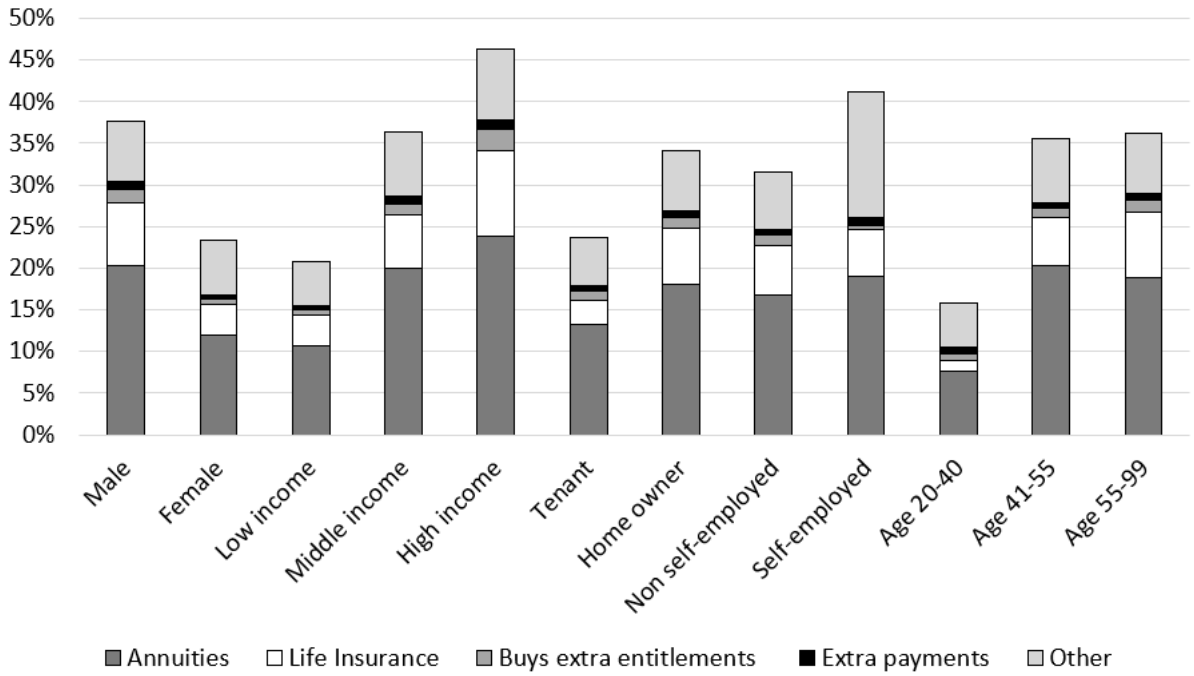


Explanatory note: Statistics based on households in the DTS and DHS, merged to balance sheet data (DNB).

In Figure 5, we combine the information on indexation cuts by the respondents' fund to the answers in the DHS questionnaire, which ask respondents whether they are aware of having suffered any cut. Some respondents appear to be unaware of the cuts that have actually been applied by their funds (about 3% of the sample, regardless of age). The opposite situation, where respondents mistakenly think that negative indexation took place, is far less common. Real and perceived indexation (whether correctly or wrongly) will be used as instruments later on, to explain participation in voluntary pension savings.

In our analysis we also test, using DHS data, whether respondents with low trust participate in voluntary pension arrangements. Figure 6 shows the distribution of additional voluntary pension saving vehicles, broken down by respondent characteristics. The figure shows that most individuals have no additional pension savings, as all bars are below 50%. Annuities are the most common type of voluntary arrangement, followed by life insurances and other (unspecified) arrangements; arrangements via one's employer (buying additional entitlements or signing in on higher contributions) are the least popular. The figure also shows that there is a relationship with socio- economic status. Most voluntary savings are observed among respondents with high income, older respondents, and home-owners (see also Bassett et al., 1998; Jansen, 2020). The savings balance on these voluntary accounts is not reported in the data. We therefore only study the level of participation in these arrangements.

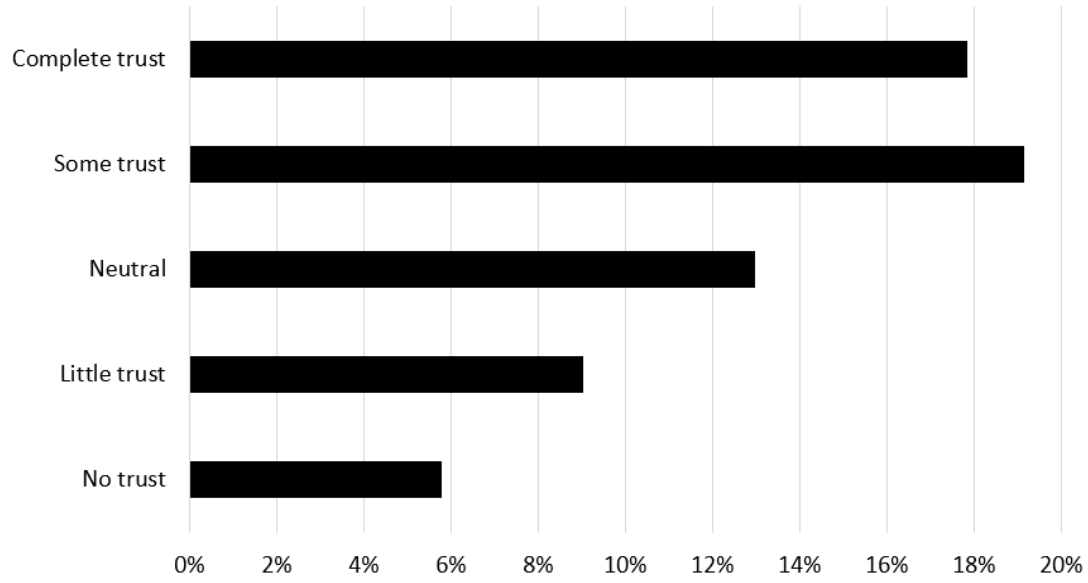
Figure 6: Voluntary pension arrangements and observable household characteristics



Explanatory note: Source, DHS data, own computations. Period 2007-2021

Finally, Figure 7 shows the relationship between trust and additional pension savings. It shows that higher levels of trust are positively related to having additional pension arrangements.

Figure 7: Voluntary pension savings and trust in one's personal pension fund in 2021



Explanatory note: Statistics based on households in the DTS, merged to DHS data.

4. Empirical strategy

The descriptive evidence above suggests some intuitive relationships between trust in one's own pension fund and observable characteristics. We test whether these relationships are significant within a multivariate analysis by estimating the following equation:

$$T_{i,t} = \gamma_0 + \gamma_1 Z_{f,i,t} + \gamma_2 X_{i,t} + \gamma_3 Y_t + \gamma_4 C_i + \upsilon_{i,t} \quad (1)$$

where T stands for trust of individual i at time t. It takes integer values between 1 and 5, with 1 indicating no trust . On the righthand side, Z is the level of indexation, in percentage points (negative in case of cuts) of pension fund f in each period, complemented with the (wrongly) perceived indexation described above. X is a vector containing individual characteristics, including age and trust in other institutions; C contains time invariant variables such as cohort; and Y proxies business cycles effects that are relevant for fund investments, captured by GDP growth. (We cannot use year dummies because we already correct for age and year of birth).

In Table 2, we present four different specifications of (1), namely a simple OLS (Model 1)[2], an OLS with robust standard errors (Model 2), a random effect model (Model 3) and a fixed effect model (Model 4). This progression is meant to progressively account for the panel structure of the data. The table shows some features that are common across all specifications. First, the recovery measures have the expected effect on trust. There is a significant positive relation between the level of indexation (or pension cuts) and whether the participants trust their pension fund. This means that the more a fund indexes the benefits, the higher the level of trust. Also (wrongly) perceived indexation is significantly related to trust, where participants unaware of actually applied cuts have higher trust in their fund. The opposite situation, namely the wrong belief that funds applied cuts, is not significant. Both parameters are, however, jointly significant.

We also see that trust in other financial institutions is positively related to trust in one's own pension fund. This is also true for the general government, but the estimated coefficient is lower. This could suggest a role for unobservables, whereby trusting individuals trust all institutions more. This might explain the somewhat lower size of the trust indicators in Model 4, as in the fixed effect estimation these types of unobserved individual-fixed characteristics are filtered out. So, while unobservables seem to affect trust in pension funds as well as in financial institutions, these do not explain their relationship in full.

[2] A simple logit model, although not reported here, delivers quite similar results.

Table 2: Regressions for trust in own pension fund

	Model 1 OLS	Model 2 OLS	Model 3 RE	Model 4 FE
Pension cuts & indexation	7.626***	7.626***	6.232***	5.890***
Fund applied cuts, respondent thinks it did not	0.115***	0.115***	0.084***	0.081***
Fund applied no cuts, respondent thinks it did	-0.152	-0.152	0.012	0.107
Self-employment	-0.002	-0.002	-0.018	0.055
Trust in DNB (0/1)	0.337***	0.337***	0.249***	0.181***
Trust in Public Admin. (0/1)	0.147***	0.147***	0.116***	0.070***
Trust in Banks (0/1)	0.543***	0.543***	0.383***	0.288***
Male	0.075***	0.075***	0.099***	
Age 18 - 30	-0.076***	-0.076***	-0.070***	-0.066***
Age 31 - 40	-0.019***	-0.019***	-0.022***	-0.017**
Age 41 - 50	-0.019***	-0.019***	-0.019***	-0.017***
Age 51 - 60	0.007*	0.007	0.003	0.003
Age 61 - 70	-0.002	-0.002	-0.003	-0.005
Age > 70	-0.006	-0.006	-0.009*	-0.012**
Cohort after 1994	-1.779***	-1.779***	-1.835***	
Cohort 1994 - 1990	-1.536***	-1.536***	-1.639***	
Cohort 1989 - 1985	-1.413***	-1.413***	-1.565***	
Cohort 1984 - 1980	-1.169***	-1.169***	-1.358***	
Cohort 1979 - 1975	-0.951***	-0.951***	-1.143***	
Cohort 1974 - 1970	-0.818***	-0.818***	-0.992***	
Cohort 1969 - 1965	-0.720***	-0.720***	-0.893***	
Cohort 1964 - 1960	-0.553***	-0.553***	-0.700***	
Cohort 1959 - 1955	-0.492***	-0.492***	-0.631***	
Cohort 1954 - 1950	-0.310***	-0.310***	-0.445***	
Cohort 1949 - 1945	-0.313***	-0.313***	-0.415***	
Cohort 1944 - 1940	-0.258***	-0.258***	-0.319***	
Cohort 1939 - 1935	-0.177***	-0.177**	-0.246***	
Cohort 1934 - 1930	-0.221***	-0.221***	-0.237***	
Family size	0.026**	0.026	0.023	0.014
Single without children	0.054	0.054	0.010	-0.028
Couple without children	0.056	0.056	-0.017	-0.060
Couple with children	0.006	0.006	-0.049	-0.028
Single with children	0.087	0.087	0.064	0.060
Education: secondary (lower)	-0.032	-0.032	0.065	0.293**
Education: secondary (higher)	0.023	0.023	0.119**	0.229*
Education: secondary (vocational)	0.017	0.017	0.117**	0.244**
Education: tertiary (lower)	-0.023	-0.023	0.085	0.151
Education: tertiary (higher)	-0.052	-0.052	0.055	0.134
Gross income / 10^3	0.013***	0.013***	0.010***	0.005
Homeowner	0.027*	0.027	0.008	-0.076*
GDP growth	0.021***	0.021***	0.025***	0.026***
Constant	5.838***	5.838***	5.969***	5.340***
Observations	22,220	22,220	22,220	22,220
R-squared	0.224	0.224	0,22	0.068
Number of id			5,818	5,818

Explanatory note: Model 1: basic OLS. Model2: OLS with robust standard errors. Model 3: RE model. Model 4: FE model. Reference cases: cohort born before 1930, elementary or no education, other cohabitation forms. We have tested whether cuts have a larger effect relative to indexation. Our result (not shown) is that we cannot reject the null hypothesis of the two effects being equal. All models show marginal effects. *** p<0.01, **p<0.05, *p<0.10.

The cohort effects, where the oldest cohort serves as reference group, suggest that older cohorts have more trust, while the age-time effects are more negative for younger respondents. Those are age splines, so for instance participants between 18-30 become approximately 0.07 less trusting (in the trust scale from 1 to 5) each year that they become older, while for older

individuals the reduction is at most 0.01. The remaining factors to have a similar impact in all models are related to income and gender. This is the case for the positive effect of gross income (Van der Cruijsen and Jonker, 2019; Chaudhuri and Gangadharan, 2002) and GDP growth. The latter is a time effect and shows that respondents are more trusting in periods of higher growth. In the fixed effect model, although we have an unbiased estimator, we must drop all time-varying variables. Given our discussion about the cohort effects, this is a drawback since the descriptive evidence shows pronounced cohort differentials. Fortunately, the main coefficient of interest, that on indexation, is very similar in Models 4 and 5. Sample simulations with these results show that if indexation had been 1% point higher across the entire sample period (which is a large increase given the average conditional indexation being 1.4%), trust would have increased only very slightly, from 3.64 to 3.70.

The results in Table 2 not only explain how trust was affected by pension fund indexation, but they could also serve as a first stage of an IV model, where indexation and pension cut and the (wrongly) perceived indexation are used as instruments to explain participation in voluntary pension savings. To this purpose, the following relationship is estimated:

$$s_{i,t} = \beta_0 + \beta_1 T_{i,t} + \beta_3 X_{i,t} + \beta_4 Y_t + \beta_5 C_i + \varepsilon_{i,t} \quad (2)$$

Here X, Y, and C are defined as in (1) and are expected to affect voluntary pension savings (Bassett et al., 1998; Jansen, 2020), s is a dichotomous variable capturing voluntary pension savings participation, and β_1 is the effect of the trust (in pension funds only) variable (T). Above, we discussed how trust in one's pension fund could be endogenously related to trust in other financial institutions. When we look at voluntary savings participation, this endogeneity could be even stronger, as factors affecting saving decisions that are unobserved here – think for instance of risk aversion, or the propensity to save and trust – could affect trust in the pension funds as well. Linde (2019) found that individuals who are more risk-averse are more likely to engage in additional pension savings for precautionary reasons. Also, in game theory, the perception towards risk is often labeled as an important driver for the decision to trust a counterpart (see, e.g., Snijders and Keren, 1999).

In cases of omitted variable bias or reverse causality, IV can be used to overcome the problem of such endogenous regressors. For the IV regression, two conditions must hold: instrument relevance and exogeneity. Formally, the first condition boils down to testing that $Cov(T_{i,t}, Z_{f,i,t}) \neq 0$, while the second implies that $E(\varepsilon_{i,t}|Z_{f,i,t}) = 0$. The first condition was already tested above. Results for our models for voluntary savings are included in Table 3, where we also add a specification that is focused only on self-employed workers.

Table 3: Linear probability models for participation in voluntary pension savings

	Model 6	Model 7	Model 8	Model 9
	OLS	IV	Panel IV (RE)	Panel IV (employed)
Trust in own pension fund (1/5)	0.011**	0.138***	0.138***	0.262***
Trust in DNB (0/1)	0.019**	-0.024	-0.025*	-0.052***
Trust in Public Admin. (0/1)	0.010	-0.009	-0.012	-0.021*
Trust in Banks (0/1)	0.004	-0.066***	-0.047**	-0.100***
Male	0.092***	0.082***	0.076***	0.042***
Self-employment	-0.170***	-0.168***	-0.088***	-0.080***
Age 18 - 30	0.001	0.011**	0.015**	0.027**
Age 31 - 40	-0.007***	-0.004**	-0.005**	-0.002
Age 41 - 50	-0.003	-0.000	-0.008***	-0.008**
Age 51 - 60	-0.005*	-0.006***	-0.012***	-0.010***
Age 61 - 70	-0.009***	-0.009***	-0.011***	-0.013**
Age > 70	-0.012***	-0.011***	-0.014***	-0.010
Cohort after 1994	-0.500***	-0.256***	-0.418***	-0.138
Cohort 1994 - 1990	-0.489***	-0.274***	-0.453***	-0.219
Cohort 1989 - 1985	-0.472***	-0.273***	-0.456***	-0.212
Cohort 1984 - 1980	-0.399***	-0.233***	-0.433***	-0.212
Cohort 1979 - 1975	-0.349***	-0.211***	-0.398***	-0.211
Cohort 1974 - 1970	-0.266***	-0.147**	-0.321***	-0.145
Cohort 1969 - 1965	-0.212***	-0.107**	-0.259***	-0.081
Cohort 1964 - 1960	-0.116*	-0.035	-0.165**	-0.001
Cohort 1959 - 1955	-0.118*	-0.047	-0.133**	0.022
Cohort 1954 - 1950	-0.017	0.029	-0.061	0.087
Cohort 1949 - 1945	-0.054	-0.009	-0.073	0.038
Cohort 1944 - 1940	-0.035	0.002	-0.037	-0.061
Cohort 1939 - 1935	-0.073	-0.046	-0.073	0.104
Cohort 1934 - 1930	-0.035	-0.004	-0.017	0.278
Family size	-0.012	-0.015***	-0.013*	-0.006
Single without children	0.036	0.028	0.067**	0.089*
Couple without children	0.006	-0.002	0.050*	0.071*
Couple with children	-0.017	-0.018	0.033	0.046
Single with children	-0.001	-0.013	0.015	0.014
Education: secondary (lower)	-0.030	-0.026	-0.003	0.013
Education: secondary (higher)	0.003	-0.001	0.018	0.025
Education: secondary (vocational)	-0.003	-0.005	0.014	0.028
Education: tertiary (lower)	0.021	0.023	0.037	0.056
Education: tertiary (higher)	0.047	0.053***	0.047*	0.050
Gross income / 10^3	0.008***	0.006***	0.006***	0.004
Homeowner	0.043***	0.040***	0.023**	0.002
GDP growth	0.0001	-0.003*	-0.003*	-0.008***
Constant	0.331***	-0.429	-0.422	-1.351**
Observations	22,220	22,220	22,220	13,514
Number of id			5,818	4,051
F-statistic first stage > 10		yes	yes	yes
p-value of Sargan-Hansen test, $\chi^2(2)$		0.09	0.10	0.23

Explanatory note: Model 6: Standard OLS. Model 7: standard IV. Model 8: RE panel IV. Model 9: same as Model 8, sample employed only (wage-employed and self-employed); standard error clustered at individual level. Reference cases: cohort born before 1930, elementary or no education, other cohabitation forms ***p<0.01, **p<0.05, *p<0.10.

As in the case of trust, we first present OLS results (Model 6), standard IV (Model 7), and two random effect models (Models 8 and 9)[3], the latter strictly focusing on the population of

[3] We do estimate fixed effects models because of our focus on cohort effects that are time-invariant.

employed respondents. In all cases we computed robust standard errors, clustering at the respondents' level. Table 3 shows a positive relationship between trust in one's own occupational pension fund and participation in voluntary pension savings. The relationship to trust in banks and DNB is instead generally negative, possibly indicating that pension savings are seen as an alternative to savings in the banking system, which is more popular among individuals with less trust in the banking system. The effect in the OLS regression has a much lower magnitude relative to the IV regressions. For these models, we already discussed the relevance of the instruments; here we also show results of the Sargan-Hansen test, which allow us to reject the null hypothesis that the instruments are not valid at the 5% level, and for the random effect models also at 10%. So, the positive correlation found in previous studies can be interpreted as a causal effect of trust on participating in voluntary pension savings.

Self-employed workers are less likely to answer that they participate in a voluntary arrangement. This might be because some of these arrangements (buying extra entitlements and paying extra premiums) are only available for workers who have an employer, although the finding is common in other studies as well (Mastrogiacomo and Alessie, 2014), as self-employed workers are less likely to have additional pension savings of any type. Cohort-time and age effects reveal higher participation among older cohorts and a negative age gradient for older ages. All variables connected to the socio-economic status show positive and often significant coefficients.

The results suggest that the likelihood of having additional pension savings rises when an individual's trust level increases by one step on the ordinal five-point scale. In ordinal scales, answer values only indicate rankings, but a difference in ranks does not have a cardinal interpretation (e.g., a specific change in intensity), nor does it allow for interpersonal comparability. Individuals may interpret the various answer categories very differently; the associated adjectives may be used differently by different people. For instance, "complete trust" can mean different things to different individuals. In a similar line of reasoning, a step from complete lack of trust to predominant lack of trust cannot be viewed as an equal step as, for example, from neutral to predominant trust.

To give an additional idea of the magnitude of the estimated effects, we also perform a within-sample simulation using Model 7, for the increase in the share of individuals that would have additional pension savings if everybody were to have complete trust in pension funds. Our results show that participation in voluntary savings would then increase from approximately 21% to 39%.

6. Summary and policy implications

In this study, we propose the use of two new instruments to explain the effect of trust on participation in voluntary pension savings, namely two shocks related to the financial performance of pension funds. These are the level of indexation of respondents' occupational pension funds in the DHS population, and their perception (correct or wrong) of indexation. We show that trust is significantly related to these instruments, and that it increases with indexation and the positive perception thereof.

Trust across age, cohorts and time

Our descriptive evidence also shows that a person's trust does not necessarily grow as that person grows older, but rather that different birth cohorts enter adult life with a certain trust endowment, which is lower for each younger cohort. Therefore, it is to be expected that the average level of trust in one's pension fund will be lower across the population as older cohorts get replaced by younger ones. Consequently, pension funds should be aware that trust declines, and that each group of retirees is likely to have less trust relative to previous ones. This is relevant because of the possible implications. If it is just age that drives trust in pension funds, then policymakers might decide to relay the message to young workers that their perception might change "by itself". So there is a potential commitment problem as young workers might need to commit to a plan of action that they would refuse if they only factored in their current beliefs. If trust is driven by cohort differences, then participants especially need information on intergenerational redistribution and risk sharing, so that they understand all relevant issues of redistribution and solidarity in the system.

Potential tension between uncertainty and trust

As the recovery measures of pension funds play a considerable role in explaining the level of trust that participants have in their fund, there are some avenues for pension funds to act on. Public sentiments about pension funds revolve around the dissatisfaction with the lack of indexation. In the transition to the new system, the necessary funding ratio for indexation of benefits was reduced, enabling more funds to apply this (Rijksoverheid, 2022a). At the same time, once the transition is over, it is unclear how participants will respond to a lack of pension promises (Rijksoverheid, 2020). In the new system, the funding ratio will no longer be a relevant policy parameter. Still, even prior to the introduction of the new contract, we witnessed a rapid rise in these ratios, which allowed indexation of pensions again after almost a decade. As the general public learns how to follow this parameter, readjusting to a contribution-based system may initially affect the level of trust in the new system. It is possible

that the role of pension funds in terms of explaining uncertain future pension benefits (Van Dalen and Henkens, 2021) will play a pivotal role in determining trust.

Lack of trust does not keep the self-employed away

We find a positive effect of trust on savings, in line with previously studied correlations between trust and pension decisions (see Van der Cruijsen and Jonker, 2019; Van Dalen, Henkens and Kortleve, 2021). With the planned introduction of more freedom of choice for different pension payouts – such as a lumpsum payment – individuals with low trust are expected to prefer these forms of payout. At the same time, we complement previous findings, by arguing that older birth cohorts have a higher level of trust in their pension funds compared to younger cohorts. However, it is not necessarily aging that accounts for this.

We show that self-employed workers are less likely to have additional pension savings, in addition to being less likely to have an occupational pension. The aim of the present policy of including self-employed workers in the occupational pension system might in this light be regarded as difficult to achieve. Mandatory pensions, in combination with the increasing difficulties that pension funds experience in indexing past benefits, could be seen as a rigidity that workers might want to avoid by becoming self-employed. Our findings show that participants in voluntary pension savings, including self-employed workers, actually trust their pension fund. We have tested (not shown in this paper) whether there is a difference in this respect between employees and self-employed workers, but we found it to be not significant. This shows that it is not lack of trust – thus a desire to abandon occupational pensions – that pushes workers to become self-employed. The increasing share of the labor force that works on a self-employed basis is therefore not due to lack of trust of pension funds.

Speculating further, and projecting the results based on past experiences to the future structuring of the pension system, we would expect that, for self-employed workers, trust in pension funds should not be a reason for them to opt out of the occupational pension system (Rijksoverheid, 2021).

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Appendix A

Overview table with main findings and methods in the referenced literature

Study	Aim	Evidence	Identification strategy
Van der Cruijsen and Jonker (2019)	Estimate influence of people's expectations about their expenses during retirement and their trust in pension funds, on preferences for different pension arrangements.	Most workers prefer a flat-rate annuity, but workers who expect declining expenses during retirement are more likely to opt for a high/low annuity-based pension and/or a lump sum payment at retirement.	Correlation study
Van Zaal (2017)	Investigate trust in pension funds over a longer period of time, and estimate the effect of pension cuts and indexation on trust.	A participant whose fund applied nominal cuts loses trust in the fund, compared to the years when the fund did not cut. Indexation, on the other hand, increases participants' trust. The effect of nominal cuts is strongest for the oldest group, whereas indexation is most important for the trust of the youngest groups.	Fixed effects regression
Van Dalen and Henkens (2015)	Examine the trends and determinants of trust in pension funds.	Important determinants for trust in pension funds are stability and honesty. Participants of funds that underwent nominal cuts have less trust in their fund, compared to participants of funds that did not undergo such cuts. Participants who exit the pension fund mostly do so because of dissatisfaction with their fund. Trust does not seem to play a role for quitters.	
Agnew et al. (2012)	Assess the impact of financial literacy and lack of trust in 401(k) participation with automatic enrolment plans and voluntary plans.	The study finds a strong correlation between knowledge of plan features and participation in both types of plans. Moreover, participants who do not trust financial institutions are more likely to quit automatic enrolment plans.	Correlation study
Agnew et al. (2007)	Assess the impact of financial literacy and lack of trust in 401(k) participation with automatic enrolment plans and voluntary plans.	Financial literacy improves savings behavior in both types of 401(k) plans. Meanwhile, lack of trust in financial institutions appears to be a key factor in influencing savings behavior in automatic enrolment plans, with participants more likely to opt out if they lack trust.	Probit regression.
Ricci and Caratelli (2017)	Investigate the role of financial literacy and trust in voluntary pension plan participation.	Trust positively impacts both the decision to enter a private pension scheme or to devote severance pay to a private pension scheme.	Probit / IV probit regression

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