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# Preferences for solidarity and attitudes towards the Dutch pension system

Evidence from a  
representative sample

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## Abstract

### **Preferences for solidarity and attitudes towards the Dutch pension system – Evidence from a representative sample**

Collective pension systems are based on the principle of solidarity across and within generations. Using methods from experimental economics we elicit preferences for solidarity of different age cohorts towards the same and other age cohorts for a representative sample of the Dutch population. In addition, we use survey methods to measure stated inter- and intra-generational altruism and solidarity attitudes with respect to the Dutch pension system. Finally, we analyze how revealed solidarity preferences are related to demographic and socio-economic characteristics of participants by linking the experimental and survey data to administrative data of the Dutch population maintained by Statistics Netherlands (CBS).

In our study, participants made decisions in a 'solidarity game' where real money was at stake. They had to decide how they would share money with another participant in case they received the money while the other participant did not. We found that participants were willing to share about 40% of the money received. This shows that participants on average had a strong preference for (ex-ante) solidarity. However, the results also show large heterogeneity as well as a bias in favor of the age group that a participant belongs to. A significant percentage of young participants were prepared to share substantially more with other young participants than with other age groups. Likewise, a large percentage of old participants were prepared to share substantially more with other old participants than with other age groups. We also find that beliefs about what others will give (i.e. anticipated reciprocity) correlate strongly with solidarity preferences: participants who expect more when in need show more solidarity towards others who are likewise in need. Remarkably, participants were rather pessimistic about the solidarity of others within and across age groups in the sense that they expected others to give substantially less than they themselves would actually do. Finally, a number of demographic and socio-economic characteristics (gender, education, marital status, political involvement) of our participants are statistically significantly related to the elicited solidarity preferences.

In the survey, participants of all age categories indicated that they believe that solidarity between the young and the old is under pressure. We also see clear differences between young and old participants regarding the preferred pension system. While old participants favor a collective system over an individual system, for young participants the reverse holds. Opinions on the Dutch pension system correlate to some extent with the elicited solidarity preferences. Overall, however, the correlation

between survey and experimental measures is relatively weak. This indicates that pension policymakers should take into account that stated preferences on solidarity do not necessarily reflect the true solidarity preferences of individuals.

## Samenvatting

Solidariteit is een belangrijk fundament onder collectieve pensioenstelsels. Door gebruik te maken van methodes uit de experimentele economie meten we solidariteitsvoorkeuren van verschillende leeftijdsgroepen ten opzichte van zowel de eigen leeftijdsgroep als andere, op basis van een representatieve steekproef van de Nederlandse bevolking. Verder gebruiken we een vragenlijst om gerapporteerd altruïsme te meten en om beter begrip te krijgen van houdingen tegenover solidariteit in het kader van het Nederlandse pensioenstelsel. Tot slot analyseren we hoe de gemeten solidariteitsvoorkeuren gerelateerd zijn aan demografische en sociaal-economische kenmerken van de deelnemers. Dit doen we door de data verkregen uit het experiment en de vragenlijst te koppelen aan gegevens van de Nederlandse bevolking uit registers van het Centraal Bureau voor de Statistiek (CBS).

In ons onderzoek namen deelnemers beslissingen in een 'solidariteitsspel' waar echt geld op het spel stond. De deelnemers moesten beslissen hoe ze geld met een andere deelnemer wilden delen in het geval dat ze zelf het geld kregen terwijl de ander geen geld kreeg. De resultaten lieten zien dat deelnemers bereid waren gemiddeld rond 40% van het ontvangen geld met de andere deelnemer te delen. Daarmee is aangetoond dat de deelnemers gemiddeld genomen een sterke voorkeur hebben voor (ex-ante) solidariteit. Maar de resultaten lieten ook een grote heterogeniteit zien alsmede een *bias* ten voordele van de eigen leeftijdsgroep. Een substantieel deel van de jongere deelnemers aan het experiment waren bereid om beduidend meer geld met hun eigen leeftijdsgroep te delen dan met andere leeftijdsgroepen. Eveneens was een grote groep ouderen bereid substantieel meer geld te delen met deelnemers van de eigen leeftijdsgroep dan met die van andere leeftijdsgroepen. We zien ook dat verwachtingen over de solidariteit van andere deelnemers (geanticipeerde wederkerigheid) sterk gecorreleerd zijn met de eigen solidariteitsvoorkeuren: deelnemers die in geval van nood meer solidariteit verwachtten, zijn zelf meer solidair met andere deelnemers die zich in een dergelijke situatie bevinden. Opmerkelijk is dat de deelnemers over het algemeen gezien nogal pessimistisch zijn over de solidariteit van anderen, zowel betreffende hun eigen leeftijdsgroep als andere leeftijdsgroepen. Deelnemers verwachtten aanzienlijk minder solidariteit dan ze zelf bereid zijn te geven. Tot slot zijn een aantal demografische en sociaal-economische kenmerken (geslacht, opleiding, burgerlijke staat, politieke participatie) van de deelnemers gerelateerd aan hun solidariteitsvoorkeuren.

Bij de beantwoording van de vragen gaven deelnemers van alle leeftijdsgroepen aan dat volgens hen de solidariteit tussen jongeren en ouderen onder druk staat. We

zien ook dat er duidelijke verschillen zijn tussen jongeren en ouderen met betrekking tot het gewenste pensioenstelsel. Terwijl oudere deelnemers aangaven een voorkeur te hebben voor een collectieve in plaats van een individuele pensioenregeling, zien we precies het omgekeerde bij jongere deelnemers. Opvattingen over het Nederlandse pensioenstelsel hangen enigszins samen met de solidariteitsvoorkeuren. Echter, over het algemeen zijn de verbanden zoals vastgesteld op basis van de vragenlijst en de in het experiment gemeten voorkeuren zwak. Dit geeft aan dat (pensioen)beleidsmakers rekening moeten houden met de mogelijkheid dat beweerde solidariteitsvoorkeuren niet noodzakelijk de echte persoonlijke solidariteitsvoorkeuren weerspiegelen.

## 1. Introduction

A pressing question about the future structuring of the Dutch pension system is whether the level of solidarity among pension fund participants can be maintained. Due to the mandatory enrollment in the pension funds associated with their employers, the Dutch pension system inherently enforces solidarity in various ways (Hoff 2015). For example, through collective risk-sharing, solidarity occurs within a generation of pension savers; and due to risk-sharing over time, inter-generational solidarity is also an integral element of the current system (Bonenkamp et al. 2014).

solidarity within the second pillar of the current pension system is becoming more challenging due to the increasing heterogeneity of pension participants (e.g., diverging job careers, increasing differences in education levels), demographic changes (aging), and increased labor market flexibility. In addition, in recent years the investment risk has shifted from the collective to the individual participant (Dellaert and Ponds, 2015). In a collective arrangement the increased heterogeneity of pension fund participants almost inevitably leads to more redistribution within and between generations through risk solidarity. The question arises whether the inter-generational and intra-generational solidarity preferences of pension fund participants are affected by these developments.

To answer this, a thorough knowledge of how preferences for solidarity are distributed within the Dutch population is necessary, which then can serve as a basis for targeted and effective pension policies and pension communication. This study elicits solidarity preferences within and between generations, using incentivized distribution tasks from experimental economics. An important element of this study is that, to account for the potential heterogeneity of solidarity preferences among Dutch citizens, it uses a representative sample of the Dutch population and tests for links between socio-economic characteristics (including generation belonging to a specific generation) and preferences for solidarity within and between generations.

So far, survey research related to pension solidarity has focused on opinions (Kloosterman and Schmeets, 2014a,b; Vrooman et al., 2014, Hoff, 2015; van Dalen and Henkens, 2016). Some of this research indicates that there may be limits to the willingness to stand in for other population groups (Vrooman et al., 2014; Hoff 2015). These studies provide important suggestive evidence. However, they elicit opinions and stated preferences instead of revealed preferences, and they suffer from noise inherent to the hypothetical decisions as well as potential biases related to survey responses (Camerer and Hogarth, 1999). If opinions and stated preferences differ from actual preferences, such studies may not accurately reflect the true attitudes

of Dutch citizens regarding pension solidarity. In our study, the use of incentivized experimental economics methods, in collaboration with Statistics Netherlands (CBS), allowed us to collect data on revealed solidarity preferences among a representative sample of the Dutch population and to link these preferences to register data. This link enables us to explore potential socio-economic correlates of intra-generational and inter-generational solidarity preferences at the individual level.

The remainder of this paper is organized as follows. Section 2 discusses related literature on pension solidarity and briefly surveys experimental literature on solidarity preferences. Section 3 presents the experimental decision situation and describes the implementation of the study in the field. Section 4 describes the results of the study with respect to solidarity preferences and the attitudes of study participants towards pension solidarity and the Dutch pension system. It also presents regression analyses on whether and how solidarity preferences and solidarity attitudes are linked to each other and to demographic and socio-economic characteristics of participants. Finally, Section 5 discusses our findings and states conclusions.

## 2. Related literature

Various studies have elicited opinions about solidarity through population surveys. Van Dalen and Henkens (2016) and Hoff (2015) reported that part of the Dutch population expresses the wish to decide actively on some aspects related to pension savings, such as the risks of selected investments. Moreover, while solidarity in general seems to be perceived as valuable component of the Dutch pension system, there are indications of limited willingness to stand in for other population groups. For example, a large share of younger Dutch survey participants states to be unwilling to give up some of their income in order to increase the support of older citizens (Vrooman et al., 2014; Hoff, 2015).

These studies are informative but do not necessarily elicit *actual* preferences for solidarity because they ask for opinions. The question remains to what extent the attitudes of Dutch citizens regarding pension solidarity stated in these questionnaires reflect the underlying actual solidarity preferences. To tackle this question, we conduct economic experiments in which participants have to make real decisions with real financial consequences (see, e.g., Potters et al., 2016). Research in experimental economics indeed consistently shows that decision-makers have social preferences, implying that they care not only about their own welfare but also that of other people (see Cooper and Kagel, 2016 for a recent survey). However, meta-analyses also shows that people differ considerably in the strength of their social preferences (Engel 2011). Our research builds on these findings and on the fact that the target of solidarity (e.g., someone from one's own or another age group) may significantly shape a person's attitudes towards redistribution (Tausch et al., 2013).

In our research, to measure solidarity preferences we adapted an established experimental paradigm introduced in the seminal study by Selten and Ockenfels (1998), which allows us to investigate the willingness of subjects to share their wealth in the face of income risk. In the original study, decision-makers were matched in groups of three, where each decision-maker had a  $2/3$  chance of winning 10 Deutsche Mark and a  $1/3$  chance of receiving nothing. Prior to knowing the outcome, participants had to decide how much of the winning prize they were willing to share in case they would win and the other group members would lose. Selten and Ockenfels (1998) reported that winning decision-makers share substantial amounts with losing decision-makers. Since then, several experimental studies have consistently shown a general willingness of decision-makers to behave in solidary ways and to share income risks (e.g. Büchner et al., 2007; Charness and Genicot, 2009; Trhal and Radermacher, 2009; Tausch et al., 2014; Cettolin and Tausch 2015).

At the same time, there is evidence that the strength of solidarity preferences varies across the population and that it also depends on background characteristics. For example, in laboratory studies conducted with student samples exploring solidarity among East Germans and West Germans, it was found that the level of solidarity was significantly lower among the East German participants (Ockenfels and Weimann, 1999; Brosig-Koch et al., 2011).

Important for our study, there is evidence that suggests that older people behave more pro-socially in distribution situations that involve no exogenous income risk (see e.g. Bellemare et al., 2008; Engel, 2011; Kettner and Waichman, 2016). Our study adds to this literature and, more generally, to the literature on social preferences over the lifespan. To the best of our knowledge, our study is the first that analyzes the distribution of solidarity preferences across generations in a large population sample and that links it in a systematic manner to official administrative data on demographics and socioeconomic characteristics.

Another novel element of our study is that we investigate both intra-generational and inter-generational solidarity. That is, we explore solidarity preferences towards one's own (age) generation as well as solidarity preferences towards other generations, for example, between the younger and older generations. Insofar as belonging to an age generation creates identity (Tajfel and Turner, 1979; Zacher et al., 2019), our study is also related to the literature on the impact of social identity on economic decision-making. Akerlof and Kranton (2000) included social identity in the utility function of economic agents. Various experimental studies have established that decision-makers indeed show stronger other-regarding (or pro-social) behavior towards members of their own social group (see, for example, Chen and Li, 2009; Ockenfels and Werner, 2014; and the references cited therein). However, it should be noted that the evidence from economic studies is not conclusive (see the meta-analysis by Lane, 2016).<sup>1</sup>

A final element of our study is that we can analyze to what extent stated attitudes related to intra- and inter-generational solidarity in the Dutch pension system are correlated with solidarity preferences elicited in an experiment with real monetary

1 Fong and Luttmer (2011) tested the willingness to donate to a charity supporting hurricane victims among a representative sample of US citizens and found that the degree of discrimination in favor of or against black hurricane victims depended on the decision-maker's expressed identification with this group. Grimm et al. (2017) experimentally tested whether university students discriminate differently between multiple out-groups and found supporting evidence. Tanaka and Camerer (2016) provided lab and field evidence from Vietnam that shows that members of various ethnic groups are discriminated against to different degrees.

consequences. Such a comparison between questionnaires and real decisions allows us to evaluate the external validity of questionnaires.

### 3. Research design and procedures

In our experimental solidarity game, participants were anonymously matched in pairs.<sup>2</sup> In each pair, both participants faced the same situation with uncertain pay-offs, involving four possibilities. With a probability of 50%, both received the good outcome of €80 (case 1). With 10% probability, both received the bad outcome of zero euros (case 2). In cases 3 and 4, that each occurred with a 20% probability, one participant in the pair received €80, while the other participant received zero euros. These latter cases differed only in terms of which of the two participants received the good and the bad outcome respectively.

In the experiment, for the case where the recipient receives €80 and the matched recipient zero euros, participants had to decide how much of the €80 they would be willing to transfer to the other participant. Using the strategy method (Selten, 1967), we elicited decisions before the cases were actually realized. This allowed us to measure (ex-ante) risk solidarity and collect data on the decisions of all participants. Importantly, all participants had to make transfer decisions for each age group of the recipient that they could be matched with. We divided participants into three groups: young participants (between 16 and 34 years), middle-aged participants (between 35 and 64 years), and old participants (65 and older). In line with research standards in experimental economics, all relevant information about the decision situation was provided truthfully to the subjects in the instructions, and it was made clear that all decisions would be anonymous. After participants made their transfer decisions, they were asked to state their beliefs about the transfer amounts they would receive on average from members of each of the three age groups. Thereafter, they completed a questionnaire that elicited their attitudes towards aspects of the Dutch pension system and stated altruism.

The experiment and the survey were conducted on-line by the research agency Flycatcher. A representative sample of 6,000 Dutch citizens aged 16 or older was drawn by CBS and contacted for the study with an invitation letter. After two weeks they were sent a reminder letter. Every invitee received a link to the study website and an individual code to enter the website. Instructions were provided on-line. The invitation letter informed the invitees that upon participation they would be matched into pairs and would have the chance to share 80 euros with the matched person, as well as that each tenth pair would be randomly chosen for payout and that their decisions

2 The experiment was approved by Maastricht University's Ethics Review Committee Inner City Faculties (ERCIC\_104\_04\_10\_2018).

would determine their earnings. From an ex-ante perspective, the expected payoff for a participant accounted for €5.60 and the study duration was about twenty minutes.<sup>3</sup> The field phase lasted from mid-October to mid-November 2018. Altogether 745 subjects started the study and made transfer decisions to each age group and 693 subjects completed the entire study, yielding a participation rate of 11.6%. In the next section, we report results based on unweighted data. However, to adjust for a potential non-response bias, the data were re-weighted based on a weighting model which included various population characteristics.<sup>4</sup> We conducted additional analyses of our main variables of interest with the weighted data but did not find large discrepancies between unweighted and weighted data. We comment on the results using the weighted data in the main text where applicable. The details of these analyses are included in the appendix.

3 The hourly gross minimum wage in the Netherlands in 2018 was €9.20 for people aged 22 or older, and the average hourly gross wage was about €15.

4 This pertains to the following model (number of categories in brackets): marital status (4), density of municipality (6), gender\*standardized household income (6), gender\*age (8), region (4).

#### 4. Results

We start by reporting the elicited solidarity preferences and analyzing the degree of intra- and inter-generational solidarity among the participants in our sample. Thereafter, we describe our results concerning the questionnaire items that measure attitudes towards solidarity in the Dutch pension system and test the link between these stated attitudes and the solidarity preferences revealed in the experiment. Finally, we assess the relationship between various socio-demographic characteristics and solidarity preferences.

Our measure for solidarity preferences is the amount in euros that a participant is willing to send to the other participant when receiving €80, while the other participant receives zero euros. Keep in mind that each participant had to make a transfer decision for each of the three different age groups that the other participant may belong to. Calculated over all three age groups, participants transfer on average €31.17 (SD = €15.01), thus keeping €48.83 of their endowment of €80. Only 6.3% of the participants exhibit fully selfish behavior by choosing to transfer zero euros for all three groups. This is a clear indication for non-negligible solidarity preferences. Table 1 separately lists the average transfers from each age subgroup to recipients of each age subgroup. We identify young, middle-aged and old participants who made the transfer decisions as *Sender\_Y*, *Sender\_M* and *Sender\_0*, and those from the age groups who received the transfers as *Transfer\_Y*, *Transfer\_M* and *Transfer\_0*, respectively.<sup>5</sup>

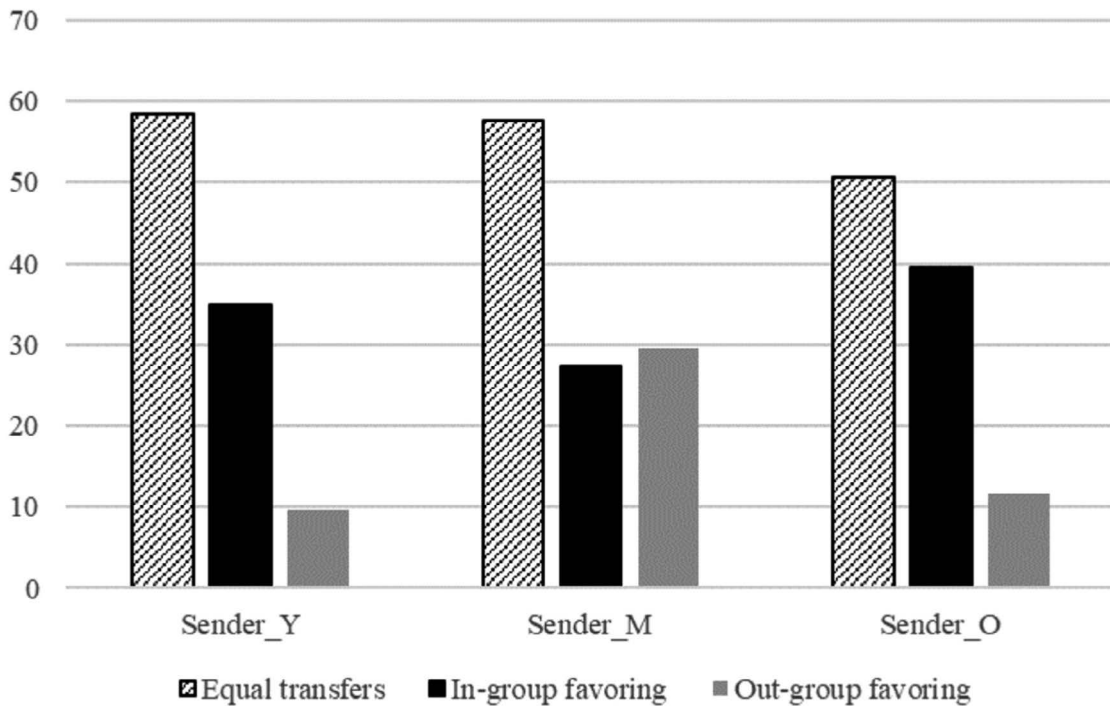
We observe substantial own-age group (i.e., in-group) favoritism among young and old senders. For these groups, average transfers to recipients from one's own age group are substantially higher than transfers to recipients belonging to other groups. Young senders are willing to share 19.1% and 12.1% more with young recipients than

*Table 1. Average transfers (in euros) out of €80 to recipients from different age groups*

	<i>Transfer_Y</i>	<i>Transfer_M</i>	<i>Transfer_0</i>	<i>Average transfer of age group</i>
<i>Sender_Y</i>	33.33	27.98	29.74	30.35
<i>Sender_M</i>	30.27	32.30	34.31	32.29
<i>Sender_0</i>	27.47	27.39	35.90	30.25
<i>Average transfer to age group</i>	30.01	29.68	33.83	31.17

5 When using the weighted data, the average transfers are similar and the overall pattern is qualitatively the same (see Table A2 in the appendix).

Figure 1. Share of in-group and out-group favoritism for different age groups



with medium-aged and old recipients, respectively. In-group favoritism is even more pronounced among old participants: they transfer 30.7% and 31.1% more to their own group than to young and medium-aged participants, respectively. For middle-aged participants we do not see this pattern. They transfer 6.7% less to young participants and 5.9% more to old participants than they transfer to members of their own group.<sup>6</sup>

The reported averages may mask substantial heterogeneity at the individual level. To gain a better understanding of this heterogeneity, we measure the degree of in-group favoritism as follows. We calculate the share of participants who transfer more, at least once, to a recipient of their own age group than to the other two age groups. Likewise, we classify the transfer profile of a participant as out-group favoring if a recipient of at least one of the two other age groups received a higher transfer than the recipient belonging to the age group of the transferor. Figure 1 displays the shares of participants who do not differentiate at all between recipients of different

6 To test for statistical significance of in-group favoritism, we compared transfers to the different out-groups (i.e. recipients from a different age group than that of the decision-maker) pairwise with the transfer to a recipient of one's own age group using two-sided Wilcoxon-Matched-Pairs Signed Ranks (WMPSR) tests. The tests yield significant differences in all cases (with two-sided p-values of  $p < 0.01$ ).

Table 2. Expected transfers from different age groups (in euros)

	<i>Exp(Transfer_Y)</i>	<i>Exp(Transfer_M)</i>	<i>Exp(Transfer_0)</i>	<i>Average expected transfer of age group</i>
<i>Sender_Y</i>	19.69	25.48	30.01	25.06
<i>Sender_M</i>	17.36	26.85	27.80	24.00
<i>Sender_0</i>	18.49	24.24	32.95	25.23
<i>Average expected transfer from age group</i>	18.27	25.66	30.04	24.66

age groups and contrasts them with the prevalence of favoritism towards both the in-group and the out-group.<sup>7</sup>

The above figure shows that the majority of participants (more than 50% for each age group) do not discriminate between recipients of different age groups.<sup>8</sup> However, substantial shares of participants favor their own age group. For young, middle-aged and old participants these shares account for 34.9%, 27.4% and 39.4%, respectively.<sup>9</sup> Moreover, a minority of young and old participants (9.6% and 11.6%) and, interestingly, a relatively large share of middle-aged participants (29.6%) favor at least one recipient from another generation relative to the recipient from the same generation.<sup>10</sup> Together the reported evidence shows that for a non-negligible share of the participants, inter-generational solidarity does not receive the same weight as intra-generational solidarity.

In the next step, we explore the expectations that participants had concerning the transfers they would receive from other participants belonging to their own and other age groups. Table 2 reports the average expected amounts in euros.

There is substantial unwarranted pessimism regarding the transfers received. On average, expected transfers are lower than actual transfers in most cases, sometimes substantially lower (cf. Table 1). In all cases, participants expected the transfers they

7 Our classification implies that the shares in Figure 1 do not add up to one because a participant can be classified as both in-group and out-group favoring.

8 The shares of senders who do not differentiate are similar across age cohorts. Only the share of old senders with equal transfers is marginally significantly lower than that of middle-aged senders ( $p = 0.09$ , two-sided two sample tests of proportions). The other age group comparisons are not significant at conventional significance levels ( $p > 0.10$ ).

9 Two sample tests of proportions yield significant differences in the shares between old and medium-aged senders ( $p < 0.01$ , two-sided two sample tests of proportions) and a marginally significant difference between young and medium-aged senders ( $p = 0.10$ , two-sided). Old and young senders do not differ in the shares of in-group favoring ( $p = 0.35$ , two-sided).

10 A comparison of middle-aged senders to either young or old senders yields significant differences in the shares of out-group favoritism ( $p < 0.01$ , two-sided two sample tests of proportions). Old and young senders do not differ in the degree of out-group favoritism ( $p = 0.54$ , two-sided).

*Table 3. Assessment of benefits of the Dutch pension system*

	Benefit_Y	Benefit_M	Benefit_0
Young participants	14.02	31.10	66.46
Middle-aged participants	12.93	20.19	63.09
Old participants	21.14	30.89	49.19
All participants	15.96	26.27	59.15

Note: The table displays the share of participants, expressed in percentage terms, who agree that the Dutch pension system mainly benefits young (Benefit\_Y), middle-aged (Benefit\_M) and old citizens (Benefit\_0), respectively.

would receive to increase with the age of the sender. For young participants, this leads to a remarkable mismatch between expected and actually received transfers. They expected to receive the highest transfers from old participants (€30.01) and the lowest from young participants (€19.69), while actual transfers show the opposite pattern (€27.47 vs. €33.33; see Table 1).<sup>11</sup>

Next we analyze participants' attitudes towards the Dutch pension system as well as their general attitudes towards other age generations. We measured these using questionnaires. The questions concerning the Dutch pension system build on questions from surveys conducted by Vrooman et al. (2014) and Hoff (2015), which we adjusted for our study where necessary. The English translation of the questions can be found in the appendix.

We start with the perception of participants regarding the way the benefits of the Dutch pension system are distributed across different age cohorts. Participants had to assess whether the Dutch pension system mainly benefits young, middle-aged or old citizens (variables Benefit\_Y, Benefit\_M and Benefit\_0, respectively). Table 3 reports the share of participants who agree with the respective statement, separately for each age group.

It is apparent from the table that the majority of participants believe that old citizens in particular benefit from the current pension system in the Netherlands, whereas only a small share of the participants agree that the system works mainly to the benefit of the young. At the same time, there is a remarkable difference between young and middle-aged participants on the one hand and old participants on the other hand. More than 63% of the former group perceives the Dutch pension system as benefiting the old, while for the latter group this holds for only 49%.

11 All but one of the within age-group differences of expectations are significant at  $p < 0.01$  (two-sided WMPSR tests). The exception is expected transfers by middle-aged participants from the middle-aged and the old ( $p = 0.06$ , two-sided WMPSR test). Average expected transfers using the weighted data mirror the qualitative patterns from Table 2 (see Table A3 in the appendix).

*Table 4. Views on solidarity and willingness to support the young and the old*

	Under_Pressure	Share_0	Share_Y
Young participants	60.98	37.80	26.22
Middle-aged participants	69.52	22.54	21.27
Old participants	67.07	12.20	11.38
All participants	66.76	22.48	19.03

Note: The table displays the shares of participants in % who agree with the statement that is the basis for the variables Under\_Pressure, Share\_0 and Share\_Y.

Next we analyze participants' views on general solidarity. Table 4 shows that, irrespective of the age group that participants belong to, the majority of them (more than 60% in each age group) agree with the statement that solidarity between the old and the young is under pressure in the Netherlands (Under\_Pressure variable). At the same time, relatively few participants state that they are willing to give up some of their income to support older (Share\_0) or younger people (Share\_Y). Interestingly, the average stated willingness to share one's income is lowest among old participants and highest among young participants. A possible explanation for this finding might be found in other survey studies, which show that social capital, e.g. generalized trust, trust in institutions and trust in politics, is much higher among younger than older age groups in Dutch society (CBS 2019). It is perceivable that higher social capital is positively related to the willingness to financially support the elderly as younger citizens may expect that later generations will also help them when they become older. However, in our study we find that the share of participants who agree that most people can be trusted is lowest among the young (Young: 63%, Middle-aged: 72%, Old: 68%).

The following result pertains to participants' preferences regarding collective and individual pension arrangements and how these relate to the participants' age. Specifically, participants were asked to imagine the situation that they started work for a new employer where they could then choose between different pension arrangements with varying individual responsibility. They could choose between a fully individual and a fully collective pension scheme, or a scheme consisting of a mix of collective and individual components.<sup>12</sup>

<sup>12</sup> The exact wording of the question can be found in Table A1 in the appendix. We recognize that the formulation of the question only tests participants' attitudes towards the abstract concept of each system but does not control for their understanding of the characteristics and risks of the specific systems.

Figure 2. Preferences regarding different pension arrangements (in %)

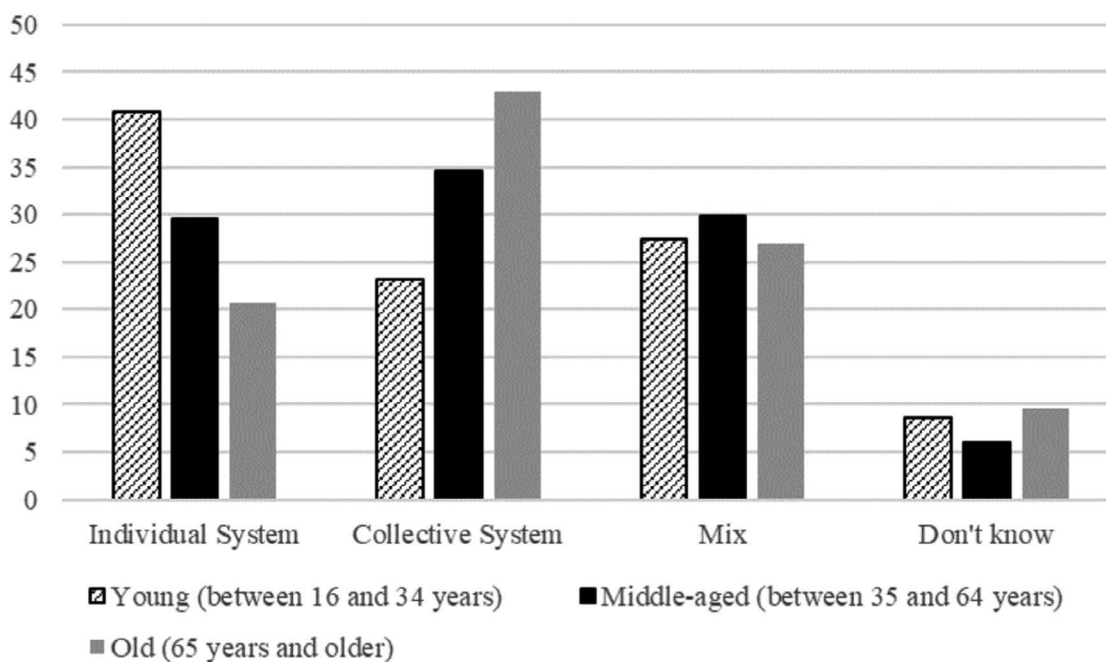


Figure 2 shows that preferences regarding pension systems involving different degrees of solidarity are diverse within our Dutch population sample and that preferences differ across age cohorts. The older a participant, the higher the likelihood that he or she will select the fully collective scheme, while the opposite pattern holds for the fully individual scheme.

We also asked participants to assess different aspects of solidarity within a pension fund. Specifically, we asked them to rate the inherent solidarity between different groups of citizens that membership in a pension fund implies. First, healthy persons contribute to the pensions of persons with work disabilities (Solidarity\_Health); second, due to the differences in life expectancies, men contribute to the pensions of women (Solidarity\_Gender); finally, young people contribute to the pensions of old people (Solidarity\_Age), because the former pay relatively too high premiums.

Table 5. Attitudes towards pension solidarity for different domains

	Solidarity_Health	Solidarity_Gender	Solidarity_Age
Young participants	60.12	13.50	9.21
Middle-aged participants	55.10	14.33	12.74
Old participants	64.58	9.17	11.66
All participants	59.42	12.42	11.58

Note: The table displays the shares of participants in % who state that the respective aspect of solidarity within a pension fund is either a "good thing" or a "very good thing".

*Table 6. Self-stated measures for altruism towards different age groups*

	Altruism_G	Altruism_Y	Altruism_M	Altruism_O
Young participants	7.01	6.41	5.78	7.19
Middle-aged participants	7.12	5.92	5.67	6.40
Old participants	7.39	5.76	5.31	6.15
All participants	7.18	5.98	5.58	6.50

Note: The table reports average answers to the altruism questions related to sharing without receiving anything in return, with a value of 1 indicating that the participant is "completely unwilling to do so" and a value of 11 as "very willing to do so". "Don't know" answers are excluded from this analysis.

Participants had to rate pension solidarity related to each of these three aspects on a five-point scale ranging from a "very bad thing" to a "very good thing".<sup>13</sup> Table 5 reports the percentage of participants rating the statement as either a good thing or a very good thing.

The table shows that participants from different age groups do not differ strongly in their assessment of the solidarity domains induced by the collective pension system. Specifically, the majority of participants consider solidarity to persons with work disabilities as positive, while only a small fraction of participants (irrespective of own age) expresses a positive opinion concerning solidarity with respect to gender and age.

Finally, we also elicited survey measures of social preferences towards different age groups. We used a question measuring general altruism from the preference survey module of Falk et al. (2016) and Falk et al. (2018), which asks about a participant's general willingness to give something for a good cause without expecting something in return (Altruism\_G, measured on a scale of 1 to 11, with higher values indicating higher willingness to give). To capture potential differences of stated altruism within and across generations, we added similar questions to our survey, in which we asked about participants' willingness to give to people from the three age groups included

<sup>13</sup> We recognize that one should be cautious in interpreting stated attitudes in the different domains solely in terms of ex-ante solidarity. A positive attitude towards solidarity in a specific domain might also partially capture self-interest, for instance due to the risk of becoming unable to work at some point in time and thus the expectation of becoming the recipient of the solidarity of others. With the questions as stated, we cannot distinguish clearly between these motives. The survey measures also do not take into account that specific characteristics of pension funds might also entail solidarity in the opposite direction of what the survey question describes (such as indexation related to different groups of pension fund members, which may entail solidarity from old to young pension fund members).

in our experiment (Altruism\_Y, Altruism\_M and Altruism\_0). Table 6 presents the average altruism scores separately for each age group.

One implication of Table 6 is that the differences in average altruism scores across age groups are only partially consistent with the experimentally elicited solidarity preferences reported in Table 1. The group of old participants reports the highest level of altruism towards old members, consistent with the observed in-group favoritism in the experiment. Similarly, middle-aged participants report the highest level of altruism towards old participants, consistent with the result that solidarity preferences are strongest towards this latter group. On the contrary, however, the reported altruism scores of young participants are not in line with the observed in-group favoritism in solidarity preferences, as young participants state the highest average level of altruism towards old citizens. Generally, in-group favoritism appears less pronounced in stated altruism than in elicited solidarity preferences.

In the following regression analyses, we link the solidarity preferences revealed in the experiment to both the survey measures of altruism and solidarity in the pension system, as well as to register data on demographic and socio-economic backgrounds. In the models, the dependent variable is the transfer to a recipient belonging to a specific age group, that is, the strength of solidarity preferences towards this age group (denoted as *Transfer\_Y*, *Transfer\_M*, and *Transfer\_0*, respectively). We use Tobit models to account for the censored nature of our dependent variable (participants could not transfer less than zero euros and not more than 80 euros). As independent variables, we include the age group of the participant who makes the transfer (this is a dummy variable, denoted as *Young participant* for young and *Old participant* for old participants, respectively, while middle-aged participants are the reference group) and the expectations that a participant has regarding the transfer that he or she will receive on average from a member of the age group he or she makes the transfer to (denoted as *Expected transfer from young/middle-aged/old participant*).

We also add survey measures as explanatory variables. We include dummy variables *Benefit\_Y*, *Benefit\_M* and *Benefit\_0*, which are equal to one if the participant agrees that the Dutch pension system predominantly benefits the respective age groups. In addition, we include dummy variables indicating whether the participant agreed with different statements about solidarity (*Under\_Pressure*, *Share\_Y*, *Share\_0*), capturing a preference for either a fully individual or a fully collective pension system (*Preference for collective/individual system*) and indicating that the participant considers several aspects of pension solidarity to be positive (*Solidarity\_Health*, *Solidarity\_Gender*, *Solidarity\_Age*). Additionally, we include the survey measures for altruism towards a generalized other and towards others from the three different age

Table 7. Significant determinants of solidarity preferences towards different age groups

Model	1	2	3
Dependent Variable	Transfer_Y	Transfer_M	Transfer_0
Young participant		–**	–***
Old participant	–**	–***	
Expected transfer from young participant	+***		
Expected transfer from middle-aged participant		+***	
Expected transfer from old participant			+***
Under_Pressure	+**		
Share_Y	+***		
Preference for individual system		–*	–**
Altruism_G	+**	+**	+**
Altruism_Y	+***		
Altruism_M		+***	
Altruism_0			+***

Note: Models 1, 2 and 3 use the transfer in euros to young, middle-aged and old participants, respectively, as dependent variables. The models are Tobit specifications to account for the fact that transfers are bounded by 0 euros and 80 euros.

\*, \*\* and \*\*\* denote significance levels of 10%, 5% and 1%, respectively. The reference group consists of middle-aged participants. +/- denote the signs of the significant coefficients. An empty cell refers to an insignificant coefficient. The coefficients of independent variables not listed in the table are insignificant in all specifications.

groups (*Altruism\_G/Y/M/O*) as well as a measure for generalized trust (*Generalized\_Trust*, a dummy variable equal to one if a person agrees that “Most people can be trusted”).

To make the presentation of the results of our regression analysis more concise, Table 7 lists only the qualitative effects of significant coefficients. Full details of the regression models can be found in the appendix (Table A4).

A first result to notice is that the regression analyses provide further support for the inter-generational differentiation already observed in the descriptive statistics. In all three models, some of the age group dummies are negative and significant, indicating that participants from a particular age group transfer less to participants of the respective age group relative to the reference group of middle-aged participants. Moreover, in all models the coefficient of participants' beliefs about the transfer from members of the respective age group has a significant and positive effect, indicating that anticipated reciprocity motives are important determinants of solidarity preferences.

In the analyzed specifications, some of the survey measures correlate significantly with the strength of solidarity preferences. In Model 1, solidarity preferences towards young recipients correlate positively for participants who agree that solidarity is under

pressure. In addition, in this model, the sign of *Share\_Y* is positive and significant, suggesting that people who state that they are willing to share part of their income with young citizens show stronger solidarity preferences towards this group of recipients.

Interestingly, stated preferences about pension systems also correlate significantly with solidarity preferences. Specifically, participants who favor an individual pension system show weaker solidarity preferences towards medium-aged and old recipients. Finally, the survey variables that capture stated altruism (both general altruism and altruism towards specific age groups) exhibit a positive relation with solidarity preferences in all specifications. All other survey variables remain insignificant in the models.

We ran additional regressions adding demographic and socioeconomic control variables to the previous analyses. As demographic control variables, we included dummy variables for female participants (*Female*), for participants who are married or in a partnership (*Married or partnership*), and for having no affiliation with any religious community (*No religious affiliation*). In addition, we controlled for the number of children in the household (*No. of kids in household*). As control variables for socio-economic backgrounds, we use the *Welfare percentile* (a variable generated by CBS that ranks individuals according to combined income and wealth) as well as a categorical variable for a person's *Education level* (with the lowest value referring to primary school and the highest referring to a university degree). As a proxy for a person's general willingness to contribute to public goods, we include a dummy variable equal to one if a participant stated not having participated in the most recent parliamentary election (*Non-voter*). Previous research has revealed the public good character of voting decisions (see, for example, Schram 2004) and shown a positive correlation between an experimental measure for cooperativeness and the likelihood of turning out in a national election (Barr et al. 2014). We also control for participants' living environment, by including dummy variables for the degree of urbanization as well as for the Dutch province where the participant lives.<sup>14</sup> An overview of significant results when adding these demographic and socioeconomic variables can be found in Table 8 (detailed results can be found in the appendix, Table A5).

With few exceptions, the estimated effects of the survey measures do not significantly change when adding these control variables. However, the stated preference for an individual pension system is not significant anymore in the model for solidarity

14 The additional control variables were either elicited as part of our study or retrieved from administrative data.

*Table 8. Significant determinants of solidarity preferences towards different age groups, controlling for demographic and socioeconomic backgrounds*

Model	1	2	3
Dependent Variable	Transfer_Y	Transfer_M	Transfer_0
Young participant			-**
Old participant	-**	-***	
Expected transfer from young participant	+***		
Expected transfer from middle-aged participant		+***	
Expected transfer from old participant			+***
Under_Pressure	+**		
Share_Y	+**		
Share_0		-*	
Preference for individual system			-*
Altruism_G	+	+	+
Altruism_Y	+***		
Generalized_trust			-*
Altruism_M		+***	
Altruism_0			+***
Welfare percentile	+		
Education level	+**	+	+***
Female		+	+**
Married or in partnership			+**
Non-voter	-**		-***

Note: Models 1, 2 and 3 use the transfer in euros to young, middle-aged and old participants as dependent variables. The models are Tobit specifications to account for the fact that transfers are bounded by 0 euros and 80 euros.

\*, \*\* and \*\*\* denote significance levels of 10%, 5% and 1%, respectively. The reference group consists of middle-aged participants. +/- denote the signs of the significant coefficients. An empty cell refers to an insignificant coefficient. The coefficients of independent variables not listed in the table are insignificant in all specifications. All models include controls for the degree of urbanization and the province where a participant lives.

preferences towards middle-aged participants and becomes only weakly significant for solidarity preferences towards old participants. Additionally, in the model measuring solidarity preferences towards old participants (Model 3), the effect of stated high generalized trust, which was insignificant without added controls, becomes marginally significantly negative.

Next to checking the robustness of results, the extended models provide further interesting insights on the role of demographic and socio-economic background variables for solidarity preferences. First, the welfare of a participant has only a weak effect. Solidarity with young recipients increases only marginally significantly with higher welfare percentiles, and no significant effect is found for solidarity towards the

middle-age and old age groups. Second, higher educational attainment is significantly positively related to solidarity preferences towards young and old participants and marginally significantly positively related towards middle-aged participants. Third, female participants exhibit significantly stronger solidarity preferences towards middle-aged (at the 10% level) and old participants (at the 5% level) but not towards young participants. This adds evidence to earlier findings suggesting that women tend to be more generous than men and that their generosity is also more context-dependent than that of men (see, e.g., Croson and Gneezy, 2009; Engel, 2011; Niederle, 2016). Fourth, participants who are married or in a partnership show stronger solidarity preferences only towards old participants. Finally, non-voters exhibit significantly weaker solidarity preferences towards young and old participants but not towards middle-aged participants.

In addition to the analyses based on unweighted data presented here, we estimated the models, whose results are reported in Tables 7 and 8, also with data adjusted with population weights to account for a potential non-response bias. An overview of the significant effects can be found in Tables A6 and A7 in the appendix (detailed results of the specifications are available on request). In these models, our general conclusions regarding in-group favoritism and the impact of beliefs, stated altruism, and the demographic and socio-economic backgrounds of participants remain largely the same. However, with few exceptions, the effects of variables related to stated attitudes towards pension solidarity and pension systems vanish in the weighted models.<sup>15</sup> Overall, we thus observe only a relatively weak link between the survey measures for attitudes towards pension solidarity and our incentivized behavioral measure of solidarity preferences.

15 In a few cases, other variables concerning stated attitudes become significant (for example, the variable *Benefit\_Y* in Model 3, Table A7).

## 5. Discussion and conclusion

We used incentivized methods from experimental economics to elicit intra- and inter-generational solidarity preferences among a representative sample of the Dutch population. In addition we used survey measures to investigate opinions on the Dutch pension system, with emphasis on the question whether the solidarity inherent in the system is under pressure. The main findings from our study are summarized in Table 9.

Our results show first that, on average, participants exhibit both intra- and inter-generational preferences for solidarity but, second, that the solidarity preferences of a significant share of participants are clearly biased towards their own age group. Interestingly, in our sample, across all age groups, Dutch citizens appear on average to be unnecessarily pessimistic about the solidarity attitudes of their fellow citizens, as expected intra- and inter-generational solidarity is much lower than actual solidarity. Remarkably, the young do not expect much solidarity from their own generation but do expect strong solidarity from the old generation, whereas revealed solidarity preferences show the almost exactly opposite pattern. That is, the young show more solidarity towards their own age group than they themselves expect from them, but they receive far less solidarity from the old age group than they expect from this age group. This points to potential inter-generational solidarity tensions due to unfulfilled expectations.

From the survey we see that all age groups generally agree that solidarity between the young and the old is under pressure. At the same time, relatively few participants

*Table 9. Overview of main results*

<b>Experimental measures</b>
<ul style="list-style-type: none"> <li>• Generally, participants exhibit clear intra- and inter-generational solidarity preferences.</li> <li>• A significant share of participants displays a bias towards their own age group.</li> <li>• On average, participants expect substantially less solidarity than they actually receive.</li> </ul>
<b>Survey measures</b>
<ul style="list-style-type: none"> <li>• A large share of participants agree that solidarity between young and old is under pressure.</li> <li>• Only a minority expresses willingness to give up income to support others.</li> <li>• A high share of young participants state a preference for an individual pension system, whereas a large fraction of old participants state favoring a collective pension system.</li> </ul>
<b>Relation between experimental and survey measures and administrative data</b>
<ul style="list-style-type: none"> <li>• Opinions on the Dutch pension system correlate to some extent with solidarity preferences.</li> <li>• Overall, correlations between experimental and survey measures of solidarity preferences are rather weak.</li> <li>• Higher education levels and being a woman are related to stronger solidarity preferences.</li> <li>• The welfare status of a participant has little effect on solidarity preferences.</li> <li>• The impact of demographic and socio-economic background variables tends to differ across age groups.</li> </ul>

state to be willing to give up more income to support other people. In particular, the fraction of participants who agree to share more with a specific age group is generally lowest among the old generation. Interestingly, a relatively high share of young participants state a preference for an individual pension system over a collective system, while the opposite holds for the old generation. Together, these results point to increasing tension between the generations, which calls for expectation management and better communication of expectations between the generations. The diverging preferences regarding individual pension systems may call for generation-focused pension policies. We note, however, that the existing data do not allow us to distinguish between an age and cohort effect. That would require data from long-term longitudinal studies.

Our analysis of how administrative data on demographic and socio-economic backgrounds relate to the elicited solidarity preferences shows that variables in both areas have a significant effect. Specifically, women and participants with a higher education tend to show stronger solidarity preferences, whereas non-voters' solidarity preferences are weaker. Yet, the impact of demographic and socio-economic background variables is not the same for participants from all age groups in our setting, suggesting that political decision-makers should take this heterogeneity of preferences into account when designing pension policies that shift the required solidarity between different population groups.

Overall, the link between survey measures on pension-related solidarity questions and revealed solidarity preferences is rather weak. One reason for this may be that surveys measure opinions that have no real consequences, whereas preferences were revealed when using incentivized techniques with monetary consequences. This would imply that opinions and preferences regarding solidarity diverge and that survey measures do not necessarily reflect the actual preferences of citizens. It may therefore be wise for political decision-makers to take this distinction into account when developing new policies that build on intra- and inter-generational solidarity. For instance, policies that are aimed at addressing a preference for more individual responsibility to accumulate pension savings and that would thus affect the inherent degree of solidarity in the pension system should not be based solely on stated preferences.

Related to this, another reason for the divergence between our survey and behavioral measures might be that the elicited solidarity preferences are domain-general, whereas the survey questions refer to specific aspects of pension solidarity. Solidarity in the Dutch pension system refers to transfers and risk sharing with different groups in society, and the nature of possible transfers can be complex (for example, transfers

can manifest themselves in the average premium to be paid, but also in technical insurance risks). Also, while expected solidarity from one group has significant impact on the strength of solidarity preferences in our study, it is far from clear to what extent expected pension solidarity shapes actual pension solidarity in practice. Our measure for solidarity within the general domain cannot capture these complexities. To better understand this issue, it is necessary to develop new survey tools and also new experimental measures for solidarity that are more pension-specific. In that way a more robust link between stated attitudes and actual preferences could be created.

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## Appendix

Table A1. List of Variables and Questions (translated from Dutch)

Variable name	Survey text
Benefit_Y	The Dutch pension system ultimately works to the benefit of younger people aged 16 to 34. (disagree, neutral, agree, don't know)
Benefit_M	The Dutch pension system ultimately works to the benefit of middle-aged people aged 35 to 64. (disagree, neutral, agree, don't know)
Benefit_0	The Dutch pension system ultimately works to the benefit older people above the age of 64. (disagree, neutral, agree, don't know)
Under_Pressure	Solidarity between the young and the old in the Netherlands is under pressure. (disagree, neutral, agree, don't know)
Share_0	I would be willing to give up some of my income to support older people. (disagree, neutral, agree, don't know)
Share_Y	I would be willing to give up some of my income to help young people. (disagree, neutral, agree, don't know)
Preference for pension system:	<p>Imagine the following situation. You start to work for a new employer and are able to choose between the three pension arrangements listed below. Please state which pension arrangement you would choose. (individual system, collective system, mix, don't know)</p> <ul style="list-style-type: none"> <li>- An individual pension scheme in which everyone saves for their own pension. The amount of your pension depends on the total premiums you have paid and on the return on these premiums that is ultimately achieved.</li> <li>- A scheme in which everyone saves in a collective scheme and in which good and bad investment results are spread across all members. In this scheme, the premiums paid and the return on these premiums constitute a combined sum of money from which all pensions are paid.</li> <li>- A scheme in which everyone saves in a collective scheme for a small supplementary pension and pays on top of that into an individual scheme.</li> </ul>
Attitudes towards pension solidarity	The following statements relate to <b>pension funds</b> where <b>everyone pays the same percentage of income as pension premium</b> . Please state your opinion (Very bad thing, Bad thing, Neutral, Good thing, Very good thing)
Solidarity_Health	- In a pension fund, healthy people contribute to the pension savings of those with work disabilities.
Solidarity_Gender	- In a pension fund, men pay relatively too much premium and women too little, because on average they live shorter than women.
Solidarity_Age	- In a pension fund, younger employees contribute relatively too much premium, while older employees contribute relatively too little.
Altruism_Y	How <b>willing or unwilling</b> are you to share with younger people aged 16 to 34 without expecting anything in return? (1: "Completely unwilling to do so" to 11: "Altogether willing to do so", with "Don't know" also possible)
Altruism_M	How <b>willing or unwilling</b> are you to share with middle-aged people aged 35 to 64 without expecting anything in return? (1: "Completely unwilling to do so" to 11: "Very willing to do so", with "Don't know" also possible)
Altruism_0	How <b>willing or unwilling</b> are you to share with older people above 64 without expecting anything in return? (1: "Completely unwilling to do so" to 11: "Very willing to do so", with "Don't know" also possible)
Altruism_G	How willing are you to give to a charity without expecting anything in return? (1: "Completely unwilling to do so" to 11: "Very willing to do so", with "Don't know" also possible)
Generalized_Trust	Do you generally think that most people can be trusted, or do you think that one cannot be careful enough when dealing with others? (0: "One cannot be careful enough"; 1 "Most people can be trusted")

*Table A2. Average transfers (in euros) out of €80 to recipients from different age groups (based on population-weighted data)*

	<i>Transfer_Y</i>	<i>Transfer_M</i>	<i>Transfer_0</i>	<i>Average transfer of age group</i>
<i>Sender_Y</i>	32.40	28.16	29.77	30.11
<i>Sender_M</i>	29.71	31.82	33.67	31.73
<i>Sender_0</i>	26.10	26.41	35.11	29.21
<i>Average transfer to age group</i>	29.66	29.53	32.88	30.69

*Table A3. Expected transfers from different age groups (in euros, based on population-weighted data)*

	<i>Exp(Transfer_Y)</i>	<i>Exp(Transfer_M)</i>	<i>Exp(Transfer_0)</i>	<i>Average expected transfer of age group</i>
<i>Sender_Y</i>	18.00	24.73	29.16	23.96
<i>Sender_M</i>	17.27	26.71	26.94	23.64
<i>Sender_0</i>	19.82	24.48	32.40	25.57
<i>Average expected transfer from age group</i>	18.07	25.63	28.84	24.18

Table A4. Determinants of solidarity preferences towards different age groups

Model	1	2	3
Dependent Variable	Transfer_Y	Transfer_M	Transfer_0
Young participant	1.033 [2.083]	-4.463** [1.834]	-7.460*** [1.935]
Old participant	-4.467** [1.909]	-5.255*** [1.678]	-1.051 [1.751]
Expected transfer from young participant	0.461*** [0.043]		
Expected transfer from middle-aged participant		0.596*** [0.042]	
Expected transfer from old participant			0.448*** [0.041]
Benefit_Y	-2.26 [2.458]	-1.559 [2.158]	-3.024 [2.237]
Benefit_M	1.787 [2.027]	-1.471 [1.782]	-0.199 [1.854]
Benefit_0	0.682 [1.667]	0.169 [1.461]	-1.622 [1.524]
Under_Pressure	4.211** [1.710]	2.014 [1.495]	0.012 [1.563]
Share_Y	6.467*** [2.319]	-1.557 [1.977]	-3.111 [2.069]
Share_0	-3.231 [2.101]	-2.061 [1.859]	2.811 [1.971]
Preference for collective system	1.251 [1.923]	0.796 [1.677]	-0.738 [1.747]
Preference for individual system	-1.488 [2.033]	-3.055* [1.790]	-4.130** [1.876]
Solidarity_Health	2.226 [1.765]	1.692 [1.536]	-1.595 [1.605]
Solidarity_Gender	-0.63 [2.470]	-1.199 [2.162]	2.148 [2.256]
Solidarity_Age	-2.196 [2.578]	0.973 [2.251]	2.488 [2.343]
Altruism_G	0.665** [0.301]	0.542** [0.265]	0.546** [0.276]
Altruism_Y	1.256*** [0.372]		
Generalized_Trust	1.083 [1.837]	-1.757 [1.608]	-1.302 [1.676]
Altruism_M		1.089*** [0.322]	
Altruism_0			1.066*** [0.326]
Constant	4.317 [3.532]	7.237** [3.160]	15.035*** [3.346]
Observations	659	657	662
Log-Likelihood	-2479	-2421	-2525

Note: Models 1, 2 and 3 use the transfer in euros to young, middle-aged and old participants, respectively, as the dependent variables. The models are Tobit specifications to account for the fact that transfers are bounded by 0 euros and 80 euros. Standard errors are shown in brackets.

\*, \*\* and \*\*\* denote significance levels of 10%, 5% and 1%, respectively. The reference group consists of middle-aged participants.

*Table A5. Determinants of solidarity preferences towards different age groups, controlling for demographic and socio-economic backgrounds*

Model	1	2	3
Dependent Variable	Transfer_Y	Transfer_M	Transfer_0
Young participant	1.375 [2.385]	-3.09 [2.114]	-4.573** [2.171]
Old participant	-5.131** [2.073]	-5.575*** [1.836]	-1.644 [1.870]
Expected transfer from young participant	0.449*** [0.043]		
Expected transfer from middle-aged participant		0.577*** [0.042]	
Expected transfer from old participant			0.432*** [0.040]
Benefit_Y	-2.613 [2.459]	-2.274 [2.184]	-3.491 [2.207]
Benefit_M	2.726 [2.030]	-0.579 [1.805]	0.98 [1.832]
Benefit_0	0.695 [1.663]	0.299 [1.476]	-1.661 [1.503]
Under_Pressure	3.586** [1.717]	1.736 [1.517]	0.08 [1.546]
Share_Y	5.774** [2.302]	-1.83 [1.983]	-3.317 [2.025]
Share_0	-3.223 [2.103]	-3.191* [1.894]	1.997 [1.954]
Preference for collective system	1.619 [1.915]	0.725 [1.689]	-0.309 [1.715]
Preference for individual system	-1.061 [2.050]	-2.94 [1.823]	-3.374* [1.862]
Solidarity_Health	2.171 [1.760]	1.729 [1.547]	-1.73 [1.582]
Solidarity_Gender	-1.512 [2.463]	-1.821 [2.177]	1.78 [2.217]
Solidarity_Age	-0.391 [2.587]	2.088 [2.285]	3.68 [2.323]
Altruism_G	0.595* [0.306]	0.494* [0.273]	0.485* [0.277]
Altruism_Y	1.277*** [0.374]		
Generalized_trust	-1.156 [1.925]	-2.756 [1.704]	-3.070* [1.731]
Altruism_M		1.257*** [0.334]	
Altruism_0			1.045*** [0.321]
Welfare percentile	0.058* [0.034]	0.006 [0.030]	-0.006 [0.031]
Education level	1.169** [0.575]	0.993* [0.511]	1.341*** [0.518]

Model	1	2	3
Dependent Variable	Transfer_Y	Transfer_M	Transfer_0
Female	1.802 [1.620]	2.737* [1.438]	3.158** [1.464]
No. of kids in household	-0.433 [0.869]	-0.377 [0.767]	-1.051 [0.784]
Married or in partnership	0.459 [2.008]	2.412 [1.763]	3.777** [1.804]
No religious affiliation	2.361 [1.641]	0.586 [1.450]	1.061 [1.477]
Non-voter	-8.191** [3.661]	-4.97 [3.271]	-12.991*** [3.278]
Constant	-8.602 [6.349]	-1.912 [5.650]	7.150 [5.784]
Observations	647	645	650
Log-Likelihood	-2418	-2369	-2460

Note: Models 1, 2 and 3 use the transfer in euros to young, middle-aged and old participants as the dependent variables. The models are Tobit specifications to account for the fact that transfers are bounded by 0 euros and 80 euros. Standard errors are listed in brackets.

\*, \*\* and \*\*\* denote significance levels of 10%, 5% and 1%, respectively. The reference group consists of middle-aged participants. All models include controls for the degree of urbanization and the province of residence.

*Table A6. Significant determinants of solidarity preferences towards different age groups – population-weighted models*

Model	1	2	3
Dependent Variable	Transfer_Y	Transfer_M	Transfer_0
Young participant		-*	-***
Old participant	-**	-***	
Expected transfer from young participant	+***		
Expected transfer from middle-aged participant		+***	
Expected transfer from old participant			+***
Share_Y	+**		
Altruism_G	+**	+**	
Generalized_trust	+		
Altruism_Y	+***		
Altruism_M		+**	
Altruism_0			+**

Note: Models 1, 2 and 3 use the transfer in euros to young, middle-aged and old participants, respectively, as the dependent variables. . The models are Tobit specifications to account for the fact that transfers are bounded by 0 euros and 80 euros.

\*, \*\* and \*\*\* denote significance levels of 10%, 5% and 1%, respectively. The reference group consists of middle-aged participants. +/- denote the signs of the significant coefficients. An empty cell refers to a non-significant coefficient. The coefficients of independent variables not listed in the table are non-significant in all specifications.

*Table A7. Significant determinants of solidarity preferences towards different age groups, controlling for demographic and socio-economic backgrounds – population-weighted models*

Model No.	1	2	3
Dependent Variable	Transfer_Y	Transfer_M	Transfer_0
Young participant			–**
Old participant	–**	–***	
Expected transfer from young participant	+***		
Expected transfer from middle-aged participant		+***	
Expected transfer from old participant			+***
Benefit_Y			–**
Under_Pressure			
Share_Y	+*		
Share_0			
Solidarity_Health		+*	
Solidarity_Age			+*
Altruism_G	+*	+*	
Altruism_Y	+***		
Altruism_M		+**	
Altruism_0			+**
Welfare percentile	+**		
Education level			+**
Female		+*	+**
No. of kids in household			–*
Married or in partnership			+**
Non-voter	–**		–***

Note: Models 1, 2 and 3 use the transfer in euros to young, middle-aged and old participants, respectively, as the dependent variables. The models are Tobit specifications to account for the fact that transfers are bounded by 0 euros and 80 euros.

\*, \*\* and \*\*\* denote significance levels of 10%, 5% and 1%, respectively. The reference group consists of middle-aged participants. +/- denote the signs of the significant coefficients. An empty cell refers to a non-significant coefficient. The coefficients of independent variables not listed in the table are non-significant in all specifications. All models include controls for the degree of urbanization and the province of residence.

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