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Altruism and fairness in a public pension system¹

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Abstract

This paper empirically examines whether feelings of altruism and fairness towards members of other generations affect people's evaluation of the public pension system. The data come from a large-scale survey carried out among a representative sample of the Dutch population in January 1994. The questionnaire asked respondents to evaluate changes in the pension system which would have different income effects for different generations. We find that young and middle-aged people, indeed, seem to be affected by feelings of altruism and fairness, whereas the elderly appear to be less altruistic.

JEL classification: H55; D63

Keywords: Public pensions; Direct utility measurement; Ageing

1. Introduction

The drop in population growth rates in recent decades has led to increasing contribution rates of Pay-As-You-Go-financed (PAYG) public pension schemes. This trend is expected to continue in the next two or three decades. The change in the population growth rates raises some major policy questions. First, will the young people support maintaining the PAYG-system even though the intergenerational redistributions

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engendered by the system will diminish their lifetime incomes? Second, will the elderly consent to decreasing their pension benefits in order to protect the younger generation against the above-mentioned negative effect on their lifetime income? Relevant to the issue are also other, non-monetary considerations. Do solidarity, altruism and fairness play a role in the functioning of a public pension system? How do people evaluate their situation if the structure of the scheme changes and, consequently, the extent of fairness and (required) solidarity changes? What is a fair rate of return for various generations?

Empirical answers to these questions can be obtained by explicitly introducing considerations of altruism and fairness in economic modelling. Numerous psychological and economic experimental studies have already established that norms of fairness can affect market outcomes. De Vries (1991), for instance, argued that many people believe that certain norms of social justice determine the boundaries for tolerable behaviour. Moreover, he claimed that people maximize their own well-being within these boundaries (see De Vries, 1991, p. 58). In experimental settings several other authors (e.g. Fehr et al., 1993, Kahneman et al., 1986a and Burrows and Loomes, 1994) have concluded that people value fairness. Kahneman et al. (1986b), Piron and Fernandez (1995), and Frey and Pommerehne (1993), on the other hand, have used questionnaires to examine notions of fairness.

Quantitative results on the impact of altruism and fairness are however, scarce. Furthermore, the aforementioned surveys considered effects of fairness in a firm-related context, whereas we focus on the role of fairness in the public sector. Here, the individual's utility is assumed to be affected by the income of other generations (altruism) and by the ratio of pension benefits to contributions (fairness). The statistical model permits testing whether the coefficients of altruism and fairness are significantly different from zero. It also enables us to assess the quantitative importance of altruism versus fairness. As most pension plans are mandatory, which implies that individuals cannot directly disclose their preferences regarding these pension plans, we cannot use standard revealed preference methods in our empirical analysis. Therefore, we have opted for stated preference methods (see, e.g. Kroes and Sheldon, 1988). We asked individuals to evaluate various situations in which their own income position, the income position of others, and the ratio of pension benefits to contributions changed. Respondents were thus not asked to evaluate fairness or altruism directly, but had to evaluate the outcomes of the pension system under various scenarios. The possible impact of feelings of altruism and fairness can then be inferred from the statistical model. The results show that both altruism and fairness play a significant role.

We now present the statistical model in Section 2. Section 3 shows the estimation results, whereas Section 4 concludes the discussion.

2. Specification and data

2.1. Specification

Individuals are grouped into one of three generations, namely, the young (25–44 years old), the middle-aged (45–64 years) and the old generation (older than

65 years).² Altruism is taken into consideration by incorporating the income, or more generally the well-being, of other individuals in an individual's utility function. Fairness is taken into consideration by incorporating the rates of return on pension contributions in this utility function. The rate of return is given by the ratio of pension benefits to contributions. It should be noted that altruism and fairness can lead to comparable effects, but this need not be the case. For example, an increase in the pension benefits of a generation having low incomes and low rates of return might be supported by other generations for both altruistic and fairness considerations. If however, the generation happens to have a relatively high income, altruism and fairness might point in opposite directions.

The utility for an individual of generation k ($k=y, m, o$) in pension system scenario s is represented by the following logarithmic function:

$$\ln U_s^k = \alpha_0^k + \alpha^k Y_s^k + \beta^k (Y_s^h + Y_s^i) + \sum_{g=y,m,o} (\gamma_g^k r_{g,s}^k + \delta_g^k r_{g,s}^{k^2}) + \phi_{1,s} \text{partner} + \phi_{2,s} \text{gender} \\ + \phi_{3,s} \text{age} \quad g, h, i, k = y, m, o; \quad h \neq i \neq k \quad (1)$$

where U_s^k denotes the utility in scenario s of an individual belonging to generation k , Y_s^k denotes the discounted lifetime income of the respondent in scenario s and $Y_s^h + Y_s^i$ denotes the sum of discounted lifetime incomes of the representative individuals of the other two generations in scenario s .³ The lifetime income for a young individual in scenario s reads $Y_s^y = \ln y_{y,s}^y + R^{-1} \ln y_{m,s}^y + R^{-2} \ln y_{o,s}^y$ with R a discount factor over 20 years and $y_{k,s}^y$ ($k = y, m, o$) the income in scenarios s when young, middle-aged and old, respectively, Y_s^m and Y_s^o are defined analogously. Note that it is assumed here that the effects of the individual background characteristics, partner (0=no, 1=yes), gender (0=female, 1=male) and age, depend on the particular scenario the subject is evaluating (see below).

The effect of altruism is indicated by the parameter β^k .⁴ The first conjecture then reads:

Conjecture 1: Individuals are altruistic with respect to members of other generations, that is, $\beta^k > 0$.

² A distinction into three instead of two generations (young, who would then be 25–64 years of age, and the elderly) is motivated by the fact that the middle-aged share characteristics of the two other groups. Like the young, they pay a contribution to the public pension scheme. Just like the elderly, however, they will usually prefer a PAYG-system to a Capital Reserve (CR) system, as in the latter system the time left to generate high returns on their contributions is (too) short. In general, therefore, young and middle-aged individuals will not evaluate alternative scenarios similarly.

³ A representative individual is an individual of the same gender and with the same marital status as the respondent. Representative individuals for the young, the middle-aged and the old generation are 35, 55, and 70 years old, respectively.

⁴ It follows from Eq. (1) that we have implicitly assumed that the incomes of the other two generations are weighted equally. This assumption is not obvious. It could, for instance, be the case that younger people feel affectionate towards the old generation but not towards the middle-aged generation. However, the estimation of a model with separate income variables was hampered by multicollinearity problems.

The variable $r_{g,s}^k$ is the actual rate of return of the PAYG-system for generation g in scenario s .⁵ As we will see in Table 5, these rates of return are substantially different across generations. Regarding the rates of return we conjecture that individuals adhere to a notion of an optimal rate of return for themselves, as well as for other individuals. Therefore:

Conjecture II: Individuals prefer an ‘optimal’ rate of return r_g^{k*} and dislike rates of return that are too high or too low compared with this optimal rate. That is, $\delta_g^k < 0$ and $\gamma_g^k > 0$.⁶

The ‘optimal’ rate of return for generation g as perceived by generation k (r_g^{k*}) can be calculated from the estimated parameters as $-\gamma_g^k/2\delta_g^k$. Note that we allow for the possibility that an individual desires a rate of return for him- or herself that is different from the rate of return he or she desires for other generations. In particular, altruistic subjects might regard a relatively low rate of return for themselves as fair. On the other hand, selfish people might consider their own rate of return never to be too high. In particular, they might regard the rate r_g^{k*} as a minimum instead of as an optimum. Typically, this would result in $\gamma_k^k > 0$ and $\delta_k^k = 0$.

Some additional remarks should be made with respect to the specification and the estimation of the utility function. Usually, it is assumed that utility is determined by consumption possibilities. However, data on consumption are not available. Therefore, lifetime income is used as a proxy. Furthermore, current income is supposed to be equal to disposable income, which is defined as gross income minus taxes and savings. As the development of a person’s income is not measured, future income and thus future consumption of the younger people are unknown. We have assumed that future income is affected just by changes in public pension benefits and contributions. For young respondents this implies that their before-tax household income in middle age (y_m^y) equals their current household income (y_y^y). Another problem was the respondents’ income in old age. Typically, retirement income consists of a public pension payment supplemented with a complementary pension payment from a firm-related pension plan. However, the data revealed that most respondents (except the elderly people) had no idea about the size of their own or their partner’s complementary pension. Based on this observation, we decided to use only the public pension benefit as an indication for retirement income of the young and middle-age respondents, y_o^y and y_o^m .⁷

⁵ The actual rate of return of the PAYG-system is defined as the discounted pension benefits divided by the discounted pension contributions made during the entire life. The actual rates of return are calculated from Nelissen (1994), assuming a real discount rate of 2% and a real growth rate of the economy of 2% a year. We have divided the ages in categories of five years, that is, 25–30 years, 30–35 years etc. The actual rate of return for the respondent is approximated by the average rate of return for the age category s /he belongs to, whereas the actual rates of return for the other two generations are given by the average rates of return for the representative members of those generations.

⁶ More specifically, it is assumed that the notions of fairness are determined by the parabolic specification $(r_{g,s}^k - r_g^{k*})^2$. By including $r_{g,s}^k$ and $r_{g,s}^{k^2}$ separately in the regression equations, we can calculate the ‘optimal’ rate of return r_g^{k*} . The parabolic specification of the fairness function is supported by the data (see also Section 3). No assumptions of the value of the optimal rate r_g^{k*} are made beforehand.

⁷ In these scenarios, implicit changes in private pension schemes were taken into account by allowing a substitution of these schemes for the public pension scheme. In particular, the amounts of old-age savings were adjusted in the alternative scenarios. The neglect of private pension schemes does not affect the empirical results as first differences are used in the regression equation (as will be explained later).

As respondents had to evaluate four pension scenarios, for each individual we have four observations of the dependent and independent variables. So, in estimating Eq. (1) for each generation, the total number of observations equals four times the number of respondents in that generation. To correct for individual-specific effects, differences of the relevant variables will be used. That is to say, the difference between the alternative scenario and the basic scenario was calculated for each variable.⁸ Note, however, that as we assumed that the effect of background variables is scenario-specific, these variables cannot be skipped after taking the differences.

2.2. *The questionnaire*

In order to estimate Eq. (1), we held a survey among a representative sample of the Dutch population in January 1994. The questionnaire asked respondents to evaluate the current and future public pension system under various alternative assumptions regarding the size of the pension benefit and the associated contribution rates. Only one individual of each household was questioned, who was not necessarily the head of the household. See Van der Heijden (1996) for further details.

The main part of the survey consisted of five different, partly hypothetical scenarios. All situations were characterized by specific values for the relevant variables: the public pension benefit, public pension contributions, rates of return on pension contributions and on savings. Respondents saw the consequences of a change, not only for their own household, but also for the representative members of the other two generations. For example, a single middle-aged respondent received information about the contribution rate, the public pension benefit, his or her own contribution and the average contribution of the representative young. After explaining a scenario, people were asked to assign a grade between 1.00 and 10.00, with 1.00 the lowest possible grade and 10.00 the highest possible grade. This scale corresponds to the marks used in the Dutch school system. As we referred to this system in the questionnaire, misperception or varying perceptions among respondents is unlikely.

The first scenario involved the present situation, which was called the basic situation (BS). In the basic situation, respondents were given information on the current levels of the public pension benefit, the contribution rate and the average contribution. It was assumed that the present system would not change over time. In other words, the current situation was supposed to be the steady-state situation; the consequences of the ageing process were ignored.

The next scenario also ignored the effects of ageing. In this hypothetical situation, alterations in the steady-state situation occurred by introducing a once-and-for-all randomly determined reduction (LC) or increase (HC) in the contribution rate and thus, because of the PAYG-system, in the public pension benefit. All respondents were

⁸ Taking differences resolves a number of problems, including the following most important one. One of the assumptions of OLS is that the error terms are not correlated with the regressors, that is, the situation variables. However, it is possible that the error term is individual-dependent and correlated with the situation variables due to the presence of individual effects. By splitting the error term in an individual-specific part (independent of the scenario) and a real random term (which just depends on the scenario), and then taking differences between the alternative scenarios and the basic scenario, the individual-specific term disappears and with that the possible correlation with the regressor (see, e.g. Baltagi, 1995).

informed about the effect on the average contribution. The youngest generations were also informed about the results for their own contribution.

In LC, respondents were told that the difference between the contributions paid in BS and LC would be saved. These savings plus the interest earned were then used as a supplement to the lower public pension benefit people would receive when pensioned. For the richer young and middle-aged individuals this implies an increase in lifetime income because of their high contributions in BS. The assumption of a once-and-for-all shock also implies that the income position of the current old always deteriorated in LC. Young and middle-aged individuals were thus asked to trade off their own lifetime income position against the worsened income position of the elderly. Appendix A presents an example to illustrate how the information was shown to the respondents. The consequences of scenario HC were just the other way round. Here, respondents were told that the difference between the higher contributions in this situation and the contributions in BS would reduce the amount of old-age savings in their savings account, or, when people did not have such an account, should be borrowed.

The last two scenarios involved situations that did include the consequences of the ageing process. Two (extreme) hypothetical situations were presented to the subjects.⁹ The fourth scenario, lower benefits (LB), described a situation in which pension contribution rates did not change but in which ageing effects resulted in lower public pension benefits. The last scenario, equal benefits (EB), described the opposite case. In EB, the public pension benefit was equal to the current pension, but the contribution rate increased over time because of the ageing effects. As a result, the income position of the current elderly did not change, whereas the lifetime income position of the working population deteriorated because of the higher contributions.

3. Empirical results

3.1. Estimation results

In total, the sample contained 1103 respondents. After cleaning the data, 944 respondents were left: 225 old, 314 middle-aged and 405 young. The overall response rate including technical non-response (non-response owing to technical problems or holidays) was 70%. The overall response rate corrected for this technical non-response was 83%. Due to constraints of time respondents had to evaluate four scenarios: two of these did not take the ageing process into account (BS and LC or BS and HC), and two did (LB and EB). From the average grades assigned to each scenario it appeared that all generations preferred the status-quo situation.

By applying OLS regression on differences, we estimated the impact of altruism and fairness on the evaluations of the public pension system. We show four specifications: a specification in which the rates of return have not been included (variant 1 in Tables 1–3), a variant in which the rates of return with respect to one's own generation have been included (variant 2), a specification in which all relevant variables have been included

⁹ The values of the relevant variables in these scenarios were calculated from van Dalen (1991).

Table 1
 Estimation results for the younger generation ^a

variant	1	2	3	4
Y^y	1.53 (5.51)	1.10 (3.52)	1.43 (4.52)	1.26 (4.03)
$Y^m + Y^o$	0.24 (5.45)	0.26 (3.55)	-0.53 (-0.99)	0.47 (2.79)
r_y^y		0.94 (5.67)	0.08 (0.16)	0.98 (2.34)
r_y^{y2}		-0.35 (-4.91)	-0.04 (-0.28)	-0.30 (-2.49)
r_m^y			-3.15 (-0.64)	1.16 (1.40)
r_m^{y2}			0.69 (0.61)	-0.31 (-2.11)
r_o^y			1.67 (1.04)	
r_o^{y2}			-0.20 (-0.88)	
partner	-0.08 (-2.86)	-0.07 (-2.56)	-0.09 (-3.10)	-0.08 (-2.72)
gender	-0.01 (-0.38)	-0.01 (-0.47)	-0.01 (-0.47)	-0.01 (-0.34)
age	-0.00 (-1.46)	-0.01 (-2.80)	-0.01 (-1.39)	-0.01 (-1.40)
constant	-0.04 (-0.42)	0.21 (1.70)	0.08 (0.56)	0.12 (0.86)
\bar{R}^2	0.05	0.08	0.10	0.09
AIC	1538	1506	1481	1487

^a *t*-values between parentheses.

Table 2
 Estimation results for the middle-aged generation

variant	1	2	3	4
Y^m	1.00 (3.30)	0.66 (1.96)	-0.12 (-0.37)	0.08 (0.27)
$Y^y + Y^o$	0.28 (2.39)	0.35 (3.04)	-0.48 (-0.38)	0.79 (6.74)
r_y^m			5.36 (0.89)	9.39 (8.82)
r_y^{m2}			-3.09 (-1.08)	-4.72 (-8.32)
r_m^m		0.62 (5.17)	0.11 (0.79)	
r_m^{m2}		-0.12 (-4.78)	-0.00 (-0.07)	
r_o^m			0.89 (0.99)	
r_o^{m2}			-0.07 (-0.90)	
partner	-0.01 (-0.23)	-0.00 (0.07)	-0.00 (-0.05)	0.00 (0.04)
gender	-0.00 (-0.14)	0.01 (0.47)	0.01 (0.17)	0.01 (0.26)
age	0.00 (0.25)	-0.00 (-1.61)	0.00 (0.19)	0.00 (0.29)
constant	-0.22 (-1.68)	0.10 (0.68)	-0.19 (-1.35)	-0.20 (-1.62)
\bar{R}^2	0.11	0.14	0.23	0.23
AIC	1018	995	893	889

(variant 3), and, finally, a variant being the most satisfactory one from both an economic (significant coefficients and correct signs) and statistical (based on the Akaike Information Criterion (AIC)) viewpoint.¹⁰ Although variant 3 is plagued by multi-

¹⁰ We estimated specification (1), in which the coefficients of the background variables may differ across scenarios. However, for all generations *F*-tests show that at the 5%-level none of the coefficients of the background variables ($\phi_{i,s}$, $i, s = 1, 2, 3$) are significantly different across the (differences between) scenarios. For instance, for the variable partner of the old generation the hypothesis $\phi_{1,1} = \phi_{1,2} = \phi_{1,3}$ cannot be rejected. Therefore, and for reasons of presentation, we have chosen to present the results of the models in which the coefficients of the background characteristics are equal across the scenarios.

Table 3
Estimation results for the older generation

variant	1	2	3	4
Y^y	0.58 (3.79)	0.69 (4.52)	0.42 (2.54)	0.46 (3.16)
$Y^y + Y^m$	0.08 (1.49)	0.41 (4.31)	0.62 (1.38)	0.76 (3.62)
r_y^0			13.17 (3.07)	12.76 (6.55)
r_y^{02}			-7.15 (-3.53)	-7.22 (-6.23)
r_m^0			-4.02 (-0.63)	
r_m^{02}			0.90 (0.65)	
r_o^0		0.46 (1.95)	1.24 (0.78)	
r_o^{02}		-0.09 (-3.07)	-0.19 (-0.77)	
partner	0.05 (1.43)	0.07 (1.94)	0.08 (2.05)	0.08 (2.20)
gender	0.07 (2.01)	0.07 (2.15)	0.08 (2.25)	0.08 (2.32)
age	-0.01 (-1.40)	-0.01 (-1.43)	-0.01 (-1.57)	-0.01 (-1.58)
constant	0.06 (0.22)	0.16 (0.64)	0.10 (0.41)	0.05 (0.21)
\bar{R}^2	0.06	0.11	0.13	0.13
AIC	728	695	686	680

collinearity problems, (indirect) indications of the effects of altruism and fairness can be obtained by estimating the other variants and by comparing them with variant 3.

Table 1 presents the estimated coefficients for the younger generation. Obviously, lifetime income of the young respondents themselves (Y^y) plays a key role in the evaluation of the pension system. Its coefficient is significant and positive in all the variants considered. Further, it is rather robust over the specifications; its average value being 1.34. The introduction of altruism, measured via the income of others, and fairness, measured via the rates of return, improves the explanatory power of the equation and the value of the AIC (lower AIC values are better). The estimated coefficient of altruism (i.e. β^k) is lower than that of the generation's own income but significantly positive and robust when at most the rates of return for the young themselves are included (variants 1 and 2). One-sided t -tests show that $\beta^k > 0$ at the 5% level, which supports Conjecture I. Adding the rates of return of the old generation (r_o^y and $r_o^{y^2}$) in addition to altruism leads to problems regarding the statistical significance of the variables and their signs; see variant 3. However, additional estimations not reported here (see Van der Heijden, 1996) show that precise and meaningful estimates for r_o^y and $r_o^{y^2}$ can be obtained when altruism is not included. In that case, two-sided F -tests reveal that the hypothesis that the coefficients of the rates of return of the elderly are equal to zero can be rejected at the 5% level. In addition, one-sided t -tests show that the separate coefficients have the expected sign and that they are significant at the 5% level. Together these results are in favour of Conjecture II that $\gamma > 0$ and $\delta < 0$. From variants 1 and 4, and from additional estimates not reported here, it appears that the estimation results for the rates of return of the young and middle-aged generation even more strongly support Conjecture II: no matter whether or not altruism is included, the values of the estimated coefficients satisfy the supposed parabolic specification. That is, two-sided F -tests that $\gamma = 0$ and $\delta = 0$ and one-sided t -tests that $\gamma \leq 0$ and $\delta \geq 0$ can be rejected at the 5% level. This implies that younger subjects have some idea regarding 'fair' rates of return both for their own and for other

generations. We will come back to that later. Variant 4 is the model with a good, that is, low, AIC value and correct values for all variables included; based on a χ^2 -test we can conclude that the AIC value of variant 4 is not significantly different from that of variant 3. Finally, F -tests confirm that variant 4 is a robust specification. That is, no variables can be excluded while the rates of return of the elderly cannot be included.

In all specifications, the coefficients of the background characteristics are rather robust. The coefficient for the presence of a partner is significantly negative. The presence of a partner may be an indicator for the presence of children and thus for the size of the household. This might explain why changes in the system lead to significantly larger losses and smaller gains when a partner is present. Age and gender have a small robust, but mostly insignificant, negative effect. One reason for this age effect could be that older respondents have fewer alternatives to the public pension scheme than do younger individuals. Finally, the intercept term is small and most of the time insignificant.

Table 2 presents the regression results for the middle-aged generation. What stands out quite remarkably is the less robust effect of their own lifetime income (Y^m). Adding altruism, in particular fairness, improves the explanatory power and reduces the AIC. The rates of return of the elderly (r_o^m and $r_o^{m^2}$) appear to interfere with altruism again, but also with the lifetime incomes of the middle-aged (compare variants 1 and 2 with variants 3 and 4). When r_o^m and $r_o^{m^2}$ are not included, the estimated coefficient of altruism is significantly positive; this supports Conjecture I. Furthermore, two-sided F -tests and one-sided t -tests at the 5% level provide evidence for Conjecture II concerning the rates of return of all generations. However, for the rates of return with respect to the older generation, this only holds when altruism is not included (specification not presented here). Although the coefficient of one's own income is not significantly positive, variant 4 gives the best model in terms of AIC; the AIC value is significantly lower than that of variant 3, which is in its turn significantly lower than those of variants 1 and 2. Furthermore, variant 4 is robust when applying F -tests.

Contrary to what was found for the young generation, background characteristics hardly affect the utility of the middle-aged generation. This suggests that the evaluations of the pension system do not depend on the specific scenario they are confronted with.

Table 3 shows that for the elderly their own actual income has a significantly positive effect on the evaluation of the pension system. The estimated coefficients of their own income are robust but considerably smaller compared with those of the other generations. Introduction of altruism and fairness again results in a considerably higher \bar{R}^2 and lower AIC. In favour of Conjecture I, the estimated coefficient of altruism is positive in all variants considered, though not always significant at the 5% level (one-sided t -tests). Moreover, the size of this coefficient in variant 1, that is, without any rates of return, is much lower than for the other two generations. We also find evidence for Conjecture II; all significantly estimated coefficients for the rates of return always satisfy $\gamma > 0$ and $\delta < 0$ and the joint hypothesis $\gamma = 0$ and $\delta = 0$ can be rejected at the 5% level (including additional estimates). Especially, the rates of return of the young generation appear to have a robust and significant effect across all specifications for the elderly. Again, estimation of the full model (variant 3) leads to statistical and interpretation problems. As for the middle-aged generation, variant 4 gives a good and meaningful model for the old generation. This specification, which includes altruism and the rates of return of the

Table 4
Elasticities of own income, altruism and fairness

	young	middle-aged	old
own income	1.34	1.23	0.53
altruism	0.24	0.28	0.08
fairness	0.002 (middle)	0.004 (young)	0.001 (young)
	0.001 (old)	0.003 (old)	0.001 (middle)

young generation, is robust in terms of *F*-tests and its AIC value is significantly lower than the AIC value of variant 3.

The estimated coefficients for the background characteristics are rather robust and significant in almost all variants considered for the old generation. Partner and gender have a significantly positive impact, whereas age has a negative, but insignificant, impact. The presence of a partner results in higher evaluations of changes in the pension system. The reason might be that couples generally have better (occupational) pension claims and that the basic state pension takes into account economies-of-scale effects. The former point also holds for men, which explains the significant result for the variable gender. The negative age effect may be related to the fact that the probability of having an occupational pension in the Netherlands is higher the later one is born. Again, the intercept term does not significantly differ from zero.

3.2. Some specific results with respect to altruism and fairness

Several other results can be inferred from the estimated coefficients. For example, the elasticities of altruism and fairness are useful for comparing the size of the effects of altruism and fairness. The elasticities of one's own income and of altruism, which are given by the estimated coefficients, are given in Table 4, as well as the elasticities of fairness towards each of the other generations.¹¹

Table 4 shows that the elasticities of altruism and 'egoism' are about equal for the young and the middle-aged generation, while for the older generation both elasticities are substantially lower. The ratios of the two elasticities, which might be called the 'degree of egoism' are 5.6, 4.4 and 6.6, respectively. Therefore, the old generation is somewhat less altruistic than the other two generations. For all generations, however, Conjecture I appears to be corroborated.

Finally, we discuss the rates of return preferred by each generation. Recall that the desired or 'optimal' rate of return for generation *g* as perceived by generation *k* (r_g^{k*}) is given by $-\gamma_g^k/2\delta_g^k$. Table 5 presents the optimal rates of return desired by each generation and the average actual rates of return by generation. For the calculation of the table we have considered only significant parameter estimates, also using additional estimates not reported here (see Van der Heijden, 1996). The figures between parentheses denote the standard deviation of the optimal rate of return and the number of specifications used to calculate this rate.

¹¹ When calculating the elasticities of altruism, we considered only those variants in which no rates of return were included. This is motivated by the fact that the rates of return affect the altruism variables.

Table 5
Optimal rates of return

perceived by	optimal rates of return for		
	young	middle-aged	old
young	1.47 (0.14, $n = 4$)	2.37 (0.23, $n = 4$)	4.42 (0.44, $n = 4$)
middle-aged	0.97 (0.03, $n = 6$)	2.69 (0.04, $n = 2$)	5.24 (0.16, $n = 4$)
old	0.91 (0.03, $n = 8$)	2.19 (0.17, $n = 2$)	2.98 (0.72, $n = 2$)
actual rate of return	1.2	2.4	3.5

The calculations of the optimal rates of return yield robust estimates for all generations. Clearly, young respondents take the status-quo rates of return as the preferable rates, which should not be amended too drastically (compare the first and the last row). It is remarkable that the young generation would favour a higher rate of return for the old generation (although that rate is already fairly high). The optimal rates of return for the middle-aged generation (second row) suggest that just like the youngest individuals, middle-aged individuals regard it as fair that the rates of return for the older generations are higher than for the youngest generations. The elderly prefer rates of return for the middle-aged generation and for their own generation close to the actual rates (compare the third and the last row). Finally, from Tables 1, 2 and 3 we already ascertained that Conjecture II cannot be rejected. This conclusion combined with the results of Table 5 imply that all generations consider deviations of the actual rates of return from a perceived optimal rate of return as unfair. In most cases, an increase in the fairness ratio is considered to be fair. The middle-aged and the old generation, however, regard a small loss on the investments in the public pension system for the younger generation as fair.

4. Concluding remarks

This paper has discussed the possible effect of feelings of altruism and fairness on the evaluation of the public pension system. In general, it is assumed that utility of individuals is determined by their own current and (expected) future incomes. In addition to this, it is supposed here that feelings of altruism, expressed by the incomes of members of other generations, and sense of justice or fairness, represented by rates of return of the PAYG pension system, can affect people's utility. The data used for estimating the utility functions were obtained from a large-scale survey carried out among a representative sample of the Dutch population in January 1994. The questionnaire required respondents to evaluate several changes in the public pension system that had varying income effects for different generations. By stating their preferences, respondents also implicitly reported on the degree to which other generations' utility and fairness ratios affect their own utility. The analysis shows that both altruism and fairness can have a substantial impact on lifetime utility; for all generations the AIC value of the model without altruism and fairness is the worst among all possible specifications.

The conjecture that altruism, which in general is not included in empirical studies in the field of pensions, affects utility is supported by the estimation results. This justifies theoretical models in which lifetime consumption or income of other generations is an argument of a generation's utility. Altruism towards other generations is present among all generations, but it is the strongest among the working population. Compared with the effects of the income of the working generations themselves, the elasticity of altruism amounts to about 20% of the elasticity of one's own income. For the old generation, this proportion amounts to about 15%. The elderly thus appear to be somewhat less altruistic. The reason for this is unclear. A possible explanation could be that the elderly are altruistic in other realms, like bequests. However, including bequests (which were also asked for in the survey) in the analysis did not result in another picture. Bequests by themselves had no significant effect on the evaluation, too.

Although the effect of fairness is rather small in terms of elasticities, we find that fairness clearly determines a generation's utility as well. The conjecture that the rates of return satisfy a parabolic specification is supported by the data. Moreover, all generations seem to have clear ideas about fairness ratios. In view of the multicollinearity problems, it may be striking that the optimal fairness ratios have a very robust character. It is also marked that the population of working age considers a relatively high rate of return for the old generation to be fair. Actually, the younger part of the population would be willing to support an increase of the public pension benefits for reasons of fairness, but not out of altruism.

However, it also appears to be difficult to discriminate between altruistic feelings and fairness motives. This can partly be ascribed to statistical reasons, but in part it might also be due to the fact that individuals themselves make no clear distinction between these concepts. Yet, it should be noted that in studies showing fairness to be a determinant of behaviour (see Kahneman et al., 1986a, Güth et al., 1982 and Binmore et al., 1985 for results in experimental settings), no clear distinction between altruism and fairness is usually made.

The size of the income coefficients implies that the average non-aged person is willing to return one percent of his or her income if the situation of an aged person then increases by at least 5.5 percent. In that case, lifetime utility does not decrease. In the current situation in the Netherlands, a one percent increase in the contribution for the old-age state pension results in an increase in the old-age pension benefit by 6.9 percent. This implies that the current old-age state pension system increases utility for all generations. This possibly explains the point that the system remains acceptable in the Netherlands despite the fact that it does not meet the Aaron condition at the moment. However, the foregoing also implies that the system will come under pressure when demographic changes result in a lower rate of return. Given the current demographic forecast, this will occur in about 2015. An increase in the contribution rate by one percentage point will then result in an increase in the pension benefit by less than 5.5 percent. The rather high dependency ratio in the Netherlands (more than 30% in 2015) means that increases in the old generation's income cannot compensate for the reduced lifetime income of the young and middle-aged themselves. Thus, the elderly's speculation on altruism by the young (as in Veall, 1986) is a risky thing to do in the long run. However, if the elderly claim that a continuation of the PAYG system is 'fair' (as is sometimes done in public discussions in

the Netherlands), future elderly might have a better chance to find support for the system. At any rate, the dominant one-way transfers from the young to the old generation in western welfare states could be a result of these specific forms of intergenerational altruism and notion of fairness.

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Appendix A

Example from the questionnaire

Below we show a part of the questionnaire in order to demonstrate how the information was provided to a (young) respondent. The question involved was as follows: How would you evaluate the situation with lower contribution rates and lower pension benefits? The respondent already had evaluated the basic situation.

	basic situation	situation with lower contributions
contribution rate	14%	9%
own contribution	f 493	f 317
average contribution	f 300	f 193
own public pension	f 1974	f 1269
public pension for an old person	f 1974	f 1269
public pension for a middle-aged person	f 1974	f 1269
own ratio	1.2	1.15
ratio of a middle-aged person	2.4	1.9
ratio of an old person	3.5	2.9
own return on savings	f 0	f 1022
return on savings for a middle-aged person	f 0	f 101
own public pension + savings	f 1974	f 2291
public pension + savings for a middle-aged person	f 1974	f 1370
public pension + savings for an old person	f 1974	f 1269

In this example, the public pension contribution of the (male) respondent in the basic situation (BS) was 493 Dutch guilders, whereas it was 300 Dutch guilders for an average (middle-aged) person. The public pension in the basic situation was 1974 Dutch guilders. In the hypothetical situation with lower contributions (LC), the contribution rate was determined to be 9%. The contribution of the respondent was reduced to 317 Dutch

guilders and that of an average person to 193 Dutch guilders. The pension benefit was reduced to 1269 Dutch guilders. The rates of return decreased because of the lower pensions. For example, the rate of return for a representative old person decreased from 3.5 to 2.9. As it was assumed that differences between contributions in BS and LC would be saved, the respondent would save 176 Dutch guilders per month in a savings account. When that person retired, the account would pay him 1022 Dutch guilders per month, whereas an average male middle-aged person would get 101 Dutch guilders per month (when he would save 107 per month now). The large difference in the return on savings between the young respondent and the average middle-aged individual exists due to a difference in age and in income. For the respondent, the public pension plus savings would amount to 2291 Dutch guilders (which is higher than the current public pension), while it would be only 1370 Dutch guilders for an average middle-aged person. Finally, the current old would receive only 1269 Dutch guilders.

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