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Lifetime income distribution: households versus individuals

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Equivalent lifetime income is more equally distributed than individual (non-equivalent) lifetime income. The assumption that lifetime income inequality is smaller than the annual income inequality is confirmed by our results. However, the difference between both appears to be rather small, in particular with respect to the older generations.

I. INTRODUCTION

Treating income and income (re)distribution in a particular year is generally accepted to be too simplistic (see e.g. Pestieau, 1989; Klevmarken, 1983 and Atkinson, 1983). Doing so fails to take account of changes in, e.g., the population structure, the labour market structure, and so on. As a consequence, annual analysis differs from a lifetime analysis. There is, therefore, a growing interest in intergenerational redistribution, an approach which is hampered by the absence of sufficient (longitudinal) data, however. This limitation can be overcome by using a microsimulation approach, which makes it possible to follow one or more generations using (most of) the relevant information with respect to the socioeconomic environment.

This paper shows the lifetime income (re)distribution for the Netherlands, both for individuals and for households. A comparison with the income inequality in the year 1989 has also been made. We present the results for four birth cohorts (Section 3), but first we give some information about the microsimulation model that was used (Section 2). Section 4 concludes.

II. THE MICROSIMULATION MODEL NEDYMAS

The microsimulation model NEDYMAS¹ (see Nelissen, 1994) was employed. This is a dynamic cross-sectional microsimulation model for the Netherlands. The start population was derived

from the Dutch 1947 Census data and as a consequence, the first generation which could be followed over time was the generation born in 1930. NEDYMAS has been organized modularly and is a recursive model. First, all demographic transitions were made in the model, then education was considered, and thereafter changes in economic activity – with the resulting labour income. Finally, the income transfers and taxes were modelled. Our simulation model was not able to simulate capital income, because it did not contain a module for private consumption. So savings could not be determined and as a consequence neither could wealth or income from wealth. Further, it should be noted that from 1995 onwards, the social security premiums were determined endogenously on the basis of simulated benefits and income. For a more extensive description of the model, see Nelissen (1994).

The income components were adjusted for changes in the standard of living (up to 1990) and discounted to 1990, using a discount rate of 2%. Persons who were involved in migration were excluded from our calculations. The calculations were based on ten runs with a different set of random numbers, all starting with a micro database of 10 000 persons in the year 1947. The simulation results were based on observations for an average of 923 persons born in the years 1930–35 (called cohort 1930); 1 667 persons born between 1936 and 1945 (cohort 1940); 2 297 persons born between 1946 and 1955 (cohort 1950) and 2 363 persons born in the period 1956–65 (cohort 1960). The redistributive impact was measured by comparison with the gross wages.

¹NEDYMAS is an acronym for the Netherlands' Dynamic Micro-Analytic Simulation model.

III. SIMULATION RESULTS

We present first some general results for the case in which the household is the income unit. We defined a household as a group of two or more persons who live together, who jointly consume the income and who jointly manage the household, as well as persons who manage a household of their own (single persons).

To make the welfare positions of households (which differ in size and composition) comparable, equivalent income must be used. For that purpose, we used the results of Diederer (1983), who applied an empirical-subjective approach.² The equivalence scale was applied to each income component and the sum of all the equivalent income components was imputed each year to each individual in the household unit.

The simulation results with respect to household income inequality are given in Table 1. Equivalent lifetime gross wages³ are on average Dfl. 3 148 500 per individual for cohort 1930; Dfl. 3 466 700 (cohort 1940); Dfl. 3 721 700 (cohort 1950) and Dfl. 3 719 300 (cohort 1960). Equivalent wage income grew somewhat faster among women than among men, which can be explained by the increasing labour force participation of single women over that time.

Social security contributions rose from an average of Dfl. 582 000 per individual for cohort 1930 to Dfl. 964 700 for the youngest generation – in other words a rise from 18.5% to 25.9% of gross wages. The social security benefits increased less: from Dfl. 1 012 300 to Dfl. 1 262 400. The net benefit from the social security system amounts to Dfl. 430 300 for cohort 1930; Dfl. 418 400 for cohort 1940; Dfl. 328 000 for cohort 1950 and Dfl. 297 700 for cohort 1960. The gain from the social security system thus declined rapidly, especially when measured as a percentage of gross wages.

Equivalent before-tax lifetime income amounted to Dfl. 3 578 800 for cohort 1930, whereas it amounted to Dfl. 4 017 000 for the youngest cohort. Lifetime income therefore increased less rapidly than lifetime wages. The difference in lifetime income between the youngest and oldest cohort was 12.2%, as opposed to 18.1% for the lifetime wages.

The Theil coefficient for the employers' gross wages amounted to 0.161 for cohort 1930 and decreased to 0.116 for cohort 1960. The Theil coefficient for lifetime income (lifetime wages plus net social security benefit) was 26% below the Theil coefficient for lifetime wages for both cohort 1930 and cohort 1940; 22% below for cohort 1950 and 25% for cohort 1960. The redistributive impact of the social security system therefore appears to be almost constant.

The net benefits and gross wages by decile are given in Table 1. This clearly shows that the net effect of the social security system for all deciles diminishes over time.

The employers' gross wage of decile 2 up to and including

Table 1. Results with respect to household lifetime earnings inequality^a

		1930	1940	1950	1960
<i>Wage income</i>					
Employers' gross wages		3149	3467	3722	3719
of which men		3429	3719	3898	3962
women		2864	3205	3537	3458
<i>Social security income</i>					
Contributions		582	707	850	965
Benefits ^b		1012	1125	1178	1262
Net benefits		430	418	328	298
Lifetime income		3579	3885	4050	4017
<i>Inequality</i>					
Theil coeff. gross wages		0.161	0.133	0.125	0.116
lifetime income		0.119	0.097	0.097	0.087
<i>Income distribution</i>					
Wages decile	1	835	1019	870	1000
(Dfl. *1000)	2	1441	1739	1901	1956
	3	1835	2164	2401	2462
	4	2213	2549	2848	2894
	5	2607	2936	3274	3302
	6	3016	3334	3719	3741
	7	3512	3817	4203	4237
	8	4117	4439	4810	4819
	9	5034	5308	5682	5631
	10	7331	7392	7737	7476
Net social security	1	622	659	484	602
benefits	2	605	599	583	576
	3	569	543	525	493
	4	516	498	394	371
	5	402	457	383	328
	6	420	385	291	231
	7	370	352	208	130
	8	286	282	184	95
	9	281	189	70	-18
	10	74	-12	-82	-209

^aStandard deviations are available from the author upon request.

^bWith the exclusion of health care benefits.

decile 8 is larger the younger the cohort is. However, the deciles 9 and 10 of cohort 1960 have a lower wage than the comparable deciles of cohort 1950. The picture for the lowest decile is somewhat different. If we look at the ratio of the wages in decile 10 and decile 2, we see that this ratio is lower the younger the cohort is. It amounts to 5.1 for cohort 1930 and 3.8 for 1960. After social security, the ratio is 2.7 and 2.4, respectively. Here, we also see that the redistributive impact of the social security system diminishes over time.

Table 2 shows the results when an individual is the income unit. Equivalence scales have not been applied here, and household members do not profit from the income of any other household member. The income components are only given to the person who actually receives that income.

²Here a single adult counts for 0.70. Two adults count for 1.00 and each subsequent adult adds 0.30 to this value. The value for a child depends on its age and the number of children in the household. The average values are 0.11 (children below the age of six years old), 0.15 (children aged six to 11 years) and 0.20 (children aged 12–17 years).

³Gross wages include employers' contributions.

⁴On the other hand, NEDYMAS includes all persons, whereas the annual results with respect to non-equivalent income only refer to persons with a positive income.

The gross wages are now considerably less. The average lifetime gross wage income (including social security contributions by the employer) amounts to Dfl. 1 714 000 for the oldest cohort and decreases to Dfl. 1 458 000 for the youngest cohort. Note that we look at the average income per person, and not at the average income per wage-earner. In particular, the average wage income among men decreases. The gap between male and female earnings therefore becomes smaller, the younger the cohort is. The gross wages are considerably larger, if the household is the income unit. The difference between both income concepts (individual versus equivalent household income) increases. These differences between the two income concepts also hold with regard to social security contributions and benefits. This results in lifetime income decreasing from cohort 1940 on. Net benefits are considerably larger for women than for men. The differences in lifetime income between men and women are smaller than for the gross wages, but they are much larger if an individual is the income unit rather than the household.

Lifetime income is now distributed more unequally. The Theil

coefficient of gross wages for the situation in which the individual is the income unit, is about three times that for the situation in which the household is the income unit. This proportion has not significantly diminished in the course of time. The impact of the social security system reduces income inequality by about 30%. This results in a Theil coefficient of 0.319 for the cohort 1930, declining to 0.224 for the youngest generation. Income inequality is larger for women than for men and the same holds for the reduction in the income inequality as a consequence of the social security system.

The distribution of lifetime wages and net benefits is illustrated in the second part of Table 2. The differences between the individual and the household approach are clear.

In Table 3 lifetime income inequality has been compared with income inequality for the year 1989. However, the comparison is not perfect, because Trimp (1992) and NCBS (1992) include capital income, whereas the NEDYMAS results do not. This probably results in an underestimation of the income inequality by NEDYMAS.⁴ NCBS (1992: table 2.2.4) gives the income distribution with respect to the equivalent after-tax income in 1989. The Theil coefficient amounts to 0.102. The Theil coefficient for equivalent after-tax lifetime income as calculated by NEDYMAS (i.e. without capital income) amounts to 0.101 for cohort 1930; 0.083 for both cohort 1940 and 1950, and 0.068 for cohort 1960. This means that the annual income inequality (for the year 1989) is only 1% larger than the lifetime income inequality for persons born in 1930 – and almost 50% larger than the lifetime income inequality for persons born in 1960.

With respect to individual income, Trimp (1992: Table 6) gives us the Theil coefficient for the gross income (gross wages plus gross capital income plus gross benefits) for the year 1989 (0.342). The corresponding lifetime figures (for gross wages plus gross benefits) are 0.332 for cohort 1930; 0.290 for cohort 1940; 0.243 for cohort 1950 and 0.224 for cohort 1960. This means that the annual income inequality (for the year 1989) is about 3% larger than the lifetime income inequality for persons born in 1930, and 53% larger than the lifetime income inequality for persons born in 1960.

The average age of all persons living in the Netherlands in 1989 is somewhat less than 35 years, whereas the average age of the

Table 2. *Results with respect to individual lifetime earnings inequality^a*

		1930	1940	1950	1960
<i>Wages</i>					
Employers' gross wages		1714	1746	1583	1458
of which men		2800	2708	2323	2069
women		582	723	786	816
<i>Social security income</i>					
Contributions		345	409	456	451
Benefits ^b		614	638	611	568
Net benefits		269	229	155	116
Lifetime income		1982	2124	1891	1682
<i>Inequality</i>					
Theil coeff. gross wages		0.498	0.423	0.352	0.334
lifetime income		0.319	0.283	0.236	0.224
<i>Income distribution</i>					
Wages decile	1	28	81	77	79
(Dfl. *1000)	2	151	259	301	319
	3	322	460	509	517
	4	582	714	733	720
	5	920	1030	1001	942
	6	1306	1384	1330	1221
	7	1782	1862	1734	1571
	8	2457	2476	2228	2036
	9	3467	3384	3020	2776
	10	6170	5801	4953	4449
Net social security	1	328	327	198	189
benefits	2	405	366	295	259
	3	402	350	249	191
	4	368	308	242	172
	5	313	277	163	136
	6	313	263	152	100
	7	213	125	72	3
	8	74	24	-36	-71
	9	1	-42	-145	-182
	10	-146	-204	-295	-285

^aStandard deviations are available from the author upon request.

^bWith the exclusion of health care benefits.

Table 3. *A comparison of lifetime and annual income inequality via the Theil coefficient*

	Cohort	1930	1940	1950	1960	Year
						1989
<i>Income unit: household</i>						
Employees' gross wages						
+ gross benefits	0.111	0.097	0.089	0.077		
After-tax	0.101	0.083	0.083	0.068	0.102 ^a	
<i>Income unit: individuals</i>						
Employees' gross wages						
+ gross benefits	0.332	0.290	0.243	0.224	0.342 ^a	

^aIncluding gross capital income.

Sources: Trimp (1992), NCBS (1992) and own calculations.

⁵The difference between the household gross wages for cohort 1950 and cohort 1960 do not differ significantly.

income-earners is about 45 years. If we compare the annual income inequality with the lifetime income inequality for the cohort that represents the persons with the corresponding average age, we find that the annual income inequality with respect to the non-equivalent individual income is about 28% larger than the income inequality on a lifetime basis (in this case the average of cohorts 1940 and 1950), whereas the annual income inequality is 35% larger if we consider equivalent household income (in this case the average of cohorts 1950 and 1960). From this point of view, the results suggest that both annual equivalent household and annual non-equivalent individual income are distributed more unequally than the corresponding lifetime incomes. Nevertheless, we also see that the difference between the annual and lifetime income inequalities is smaller the older the cohort is, and probably the lifetime income inequality for cohorts born in 1920 or before is even larger than the annual income inequality in 1989. However, the annual income inequality almost halved between 1938 and 1976 (see Pen and Tinbergen, 1976). If we therefore compare the lifetime income inequality with the *average* annual income inequality, we also find a lifetime inequality for the older cohorts which is significantly smaller than the (average) annual one.

IV. CONCLUSION

The analysis shows some interesting points. Individual lifetime gross wages decrease, whereas equivalent wages increase.⁵ The latter increase for both men and women, with the exception of women's gross wages in the youngest cohort, which are below the level of the foregoing generation. Lifetime individual gross wages for men decrease, whereas those for females increase. Social security contributions increase in both cases, though benefits only do so for the cases in which the household is the income unit. In cases where the individual is the income unit, benefits decrease from cohort 1940 on. Lifetime income – defined as gross wages plus social security benefits minus social security contributions – is 12% higher for cohort 1960 than for cohort 1930 where the household is the income unit, whereas cohort 1930's lifetime income is 18% higher than that of cohort 1960, where the individual is the income unit.

Income inequality as measured by the Theil coefficient indicates that equivalent lifetime income is less unequally distributed than

the individual one.

Generally, it is assumed that lifetime income inequality is smaller than income inequality within a limited period (see e.g. Pestieau, 1990). This is confirmed by our results. However, the difference between both appears to be rather small, in particular with respect to the older generations. Another remarkable point is that if we compare the annual income inequality with the lifetime income inequality of the average cohort (with respect to the income unit), the difference between the two income concepts (equivalent versus non-equivalent) is rather small. In both cases, the difference between the annual and lifetime income inequality amounts to about 30%. This difference is an overestimation, because NEDYMAS does not contain capital income.

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