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Lifetime income redistribution by social security

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Abstract. This paper discusses the redistributive impact of the Dutch social security system on lifetime basis. Net benefits appear to be positive for the birth generations up to 1960. Social insurances show a declining net benefit, whereas for occupational pensions the reverse holds. It is generally assumed that flat-rated social security schemes are more redistributive ones than wage-related schemes. However, the Dutch social security system shows that on a lifetime basis the redistributive impact of flat-rated general insurances does not necessarily largely differ from the wage-related employee insurances. Social assistance schemes result in a very large income redistribution in view of the small amounts involved. Social insurances and social assistance schemes have an income equalizing effect. On the contrary, occupational pensions increase income inequality.

1. Introduction

Research into the field of the redistributive impact of social security schemes on lifetime income is very scarce. In their survey article on the effect of income transfer programmes on – among other things – the income distribution, Danziger et al. (1981: 1014) state "...no studies measure the redistributive effect of all transfers using a lifetime or even a multiyear accounting period". This situation did not change in the 1980s. This does not however mean that studies on the lifetime redistributive impact of social security schemes are not available at all. An overview can be found in Nelissen (1994, Chap. 2). But, all these studies are limited to only one aspect of social security, viz. pensions provisions. Especially the redistributive impact of the Old Age Insurance (OAI) in the United States has been the subject of discussion. Nelissen (1994) is the first study that measures the

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redistributive impact of the social security system on a lifetime basis in a realistic way. It is carried out by means of microsimulation and applied to the Netherlands. Other approximations of lifetime social security incidence are from Davies et al. (1984) and Harding (1993) and Falkingham et al. (1993). Davies et al. only use an average net benefit for all schemes together, only discriminating by age, but not in the course of time, whereas Harding and Falkingham et al. start from a hypothetical cohort, keeping constant all parameters at the 1986-level and 1985-level, respectively.

The current definition of social security in its broad sense in the Netherlands considers social security as the totality of legal measures which are aimed at guaranteeing continuity in the spending opportunities. On the basis of this definition, one can divide social security into four components: (1) social insurances; (2) occupational pensions; (3) social assistance and (4) direct payments by the employer. Social insurances are all legal arrangements which are primarily aimed at *income redistribution* between persons or social groups whereby the right to a benefit is based on the insurance concept. Voluntary insurances, for which participation depends on legalized entry requirements, are also considered social insurances. In the Netherlands, the social insurances are characterised by a dualistic system, namely a combination of a flat-rated (but not means-tested) minimum system covering the whole population (called *general insurances*) and a wage-related system for employees (called *employee insurances*). In both cases contributions depend on the income and have to be paid up to a ceiling. The first one starts from the solidarity principle, whereas the latter has the equivalence or insurance principle as its starting-point. Both are financed by the pay-as-you-go system. These two types of social insurances cover about 40 and 30%, respectively, of the total social security expenditures in the Netherlands. The general insurances include the old-age state pension (AOW), the widow state pension (AWW), the disability state pension (AAW), the family allowances (AKW) and the state provision for health costs (AWBZ). The net pensions for a family, a one-parent family and a single person amount to 100, 90 and 70%, respectively, of the net minimum wage (about Dfl. 23070 or $ 12800 in 1994). The employee insurances are the sickness benefit (ZW), the disability benefit (WAO), the unemployment benefit (WW) and (up to a certain income limit) the health care costs provision for employees (ZFW). Here, the gross benefit for the ZW, WAO and WW amounts to 70% of the last earned income, up to a maximum of Dfl. 74360 for $ 41300 in 1994.

Occupational pensions include all arrangements, which primarily are aimed at the *redistribution of the income of persons over time.* They are based on a labour relation. These pension insurances are financed by a capital reserve system. So, a relationship is created between the insured person and the pension fund. The insured person has a personal claim to the pension fund, so to speak. In contrast, the old-age state pension (AOW) has not been based on a labour relations and is financed by the pay-as-you-go system. Contributions for the occupational pensions generally depend on the income. The benefits are mostly related to the last earned wage income and are supplementary to the old-age state pension. The occupational pensions cover about 12% of total social security expenditures. Social assistance schemes include all arrangements in the field of social security, where the (means-tested) benefits are *financed directly by the state.* No specific premiums are levied: these provisions are financed by public funds. The General Social Assistance Act (ABW) forms the most important social assistance scheme.

Its maximum benefits equal those for the general insurances. The social assistance schemes also cover about 12% of total social security expenditures. Direct payments by the employer refer to payments to (former) employees on the basis of a *labour relation.* It mainly concern benefits towards (former) public servants. The benefits are wage-related, with the exception of the child allowances. No contributions have been levied. The benefits are also financed via public funding. They form about 5% of the social security expenditures.

In this article we will compare the amounts involved on a lifetime basis and the lifetime redistributive impact of these types of social security schemes. We first give some information on the used microsimulation model. Then we go into the results (Sect. 3), whereas Sect. 4 concludes. In this, we will limit ourselves to the vertical income redistribution.

2. The microsimulation model NEDYMAS

The applied model, called NEDYMAS – which stands for *NE*therlands *DY*namic *M*icro-*A*nalytic *S*imulation model (see Nelissen 1991, 1993, 1994) – is a dynamic cross-sectional model. Dynamic microsimulation comes initially from the ideas of Orcutt (see Orcutt et al. 1976, 1986). An overview of the ins and outs of the microsimulation approach, especially with respect to social policy, can be found in Citro and Hanushek (1991). The dynamic approach implies that demographic processes are explicitly simulated, which means that the size of the microdata base changes during the simulation period. The sample passes through time year by year. For each person in the micro database one examines which personal characteristics change, and to what extent, each year. The principle of microsimulation is simple. To illustrate this, I will use the modelling of mortality. The decision whether an individual will or will not undergo a potential transition, is simulated with the aid of the Monte Carlo method. In view of this, the conditional probability of an individual undergoing that event has to be given. For example, for a 77-year-old divorced woman the probability of dying was 6.75% in 1968. We then randomly draw a number from the uniform [0, 1] distribution. If this number is smaller than or equal to 0.0675 (the probability of dying), the woman is expected to die. If the number is larger than 0.0675, the woman will remain alive. If she dies, we then check to see if she had dependent children (who have become orphans). So, decisions (or events) at the level of an individual can have implications for other individuals. Microsimulation creates a synthetic database which reflects the (developments in the) demographic and economic structure of the population. A stylised example is given in Fig. 1.

At the heart of microsimulation modelling is its state representation of the components of the system of interest. To execute this representation, first draw a list of attributes for each individual in the sample. Next, after the adaptation of a micro-representation, specify an initial population. It would have been preferable to use a real sample of individuals and households along with their attributes. However, such a sample is not available. A first useable sample can be derived from the 1947 Census data; see Nelissen (1991, 1994). So, the model simulates all events from 1947. Each year the characteristics of the individuals (and thus the households) are updated, if necessary. The modules which are used in the current version of NEDYMAS and the sequence of treatment are given in Table 1. Like all microsimulation models, NEDYMAS is a recursive model. First,

Fig. 1. An example of microsimulation[a]

1986 (sample data)						1987 (aged data)					
	ID	Age	Sex	Job	Income		ID	Age	Sex	Job	Income
Household 1						Household 1					
P1	1	47	M	Yes	38000	P1	1	48	M	Yes	38000
P2	2	44	F	No	0	P2	2	45	F	No	0
P3	3	20	M	Yes	23000	P3	4	16	M	No	0
P4	4	15	M	No	0						
Household 2						Household 2					
P1	5	79	F	No	14000	P1	3	21	M	Yes	25000
						P2	8	19	F	No	0
Household 3						Household 3					
P1	6	37	M	Yes	32000	P1	6	38	M	Yes	35200
P2	7	38	F	No	0	P2	7	39	F	Yes	14175
P3	8	18	F	No	0						
Household 4						Household 4					
.						.					
.						.					
.						.					

[a] Pi = i^{th} person in the household; ID = identification number
Source: Hellwig (1988)

all demographic transitions are made in the model. Next education is considered, and thereafter changes in economic activity, with the resulting labour income. Lastly, the income transfers and taxes are modelled. With the exception of the occupational pensions – which have been considered as social security income – the simulation model is not able to simulate capital income, because it does not contain a module for private consumption. So, savings cannot be determined and as a consequence neither can wealth or income from wealth. Therefore, the analysis is limited to the redistributive impact of the social security system with respect to lifetime *labour* income. Because the model does not contain a module for capital income, taxes are imposed only on wages and social security income. So, only a part of all tax transfers are considered. So, the model is not able to take fully account of the redistributive impact via public funding of the schemes under consideration. Therefore, we here show both the redistributive impact of the social security benefits and of the social security contributions without and with general revenue financing. In the latter case, we assume that the deficits are financed by government via the income tax receipts. Further, it has been assumed that the (procentual) contribution from public funds remains unchanged from 1993 on.

The various transition rates are based on observations, if available. However, especially for the period 1947–1965 additional assumptions had to be made. The future demographic transition rates are based on the forecasts of the Netherlands Central Bureau of Statistics. The transition probabilities with respect to the education submodules are held constant at the 1988-level, whereas the future developments in the field of labour participation and unemployment are based on forecasts of Department of Social Affairs (1984). It will be assumed here that national income grows annualy by 2%. Further, it should be noted, that from

Table 1. Programme module sequencing for each individual in NEDYMAS

A. Demographic module	
1. Immigration	2. Emigration
3. Old people's home	4. Death
5. Marriage	6. Divorce
7. Child custody	8. Dehabitation[1]
9. Cohabitation selection	10. Fertility
11. Splitting-off children	
B. Labour and income module (first part)	
12. Education	13. Scholarship
14. Income percentile	15. Labour supply
16. Transitions from school	17. Transitions from disablement
18. Transitions from military service	19. Transitions from being employed
20. Transitions from being unemployed	21. Transitions from the state houseman/housewife
22. Retirement	23. Labour income
C. Social security module	
24. Private pension premiums	25. Pension premiums for civil servants
26. Deduction civil servants	27. Old-age state pension benefits
28. Widowers state pension benefits	29. Widow, widower and orphan pensions for civil servants
30. Family allowances	31. Disability state pension benefits
32. Sickness insurance benefits	33. Disability insurance benefits
34. Disability pensions civil servants	35. Old-age pensions for civil servants
36. Unempl. benefits civil servants	37. Unemployment insurance benefits
38. Unemployment provision benefits	39. Supplementary benefits
40. Provision older and partly disabled employees	41. Social assistance benefits
43. Health insurance contributions	42. Sickness insurance contributions
45. Unemployment insurance contr.	44. Disability insurance contributions
47. Widowers state pension contr.	46. Old-age state pension contributions
49. Family allowances contributions	48. Disability state pension contributions
51. Contributions civil servants pension fund	50. Exceptional medical expenses contributions
B. Labour and income module (second part)	
52. Taxes	

[1] In this paper we use the term "cohabitation" only for people living together without being married. If they decide to dissolve their consensual union, we speak of "dehabitation".

1991 onwards, the social security contributions are determined endogeneously on the basis of the simulated benefits and income. A comparison of simulated data with real data can be found in Nelissen (1991, 1993).

The purpose of this study implies that we want to gain more insight into welfare distribution. Thus, the model will have to take into account the consumption possibilities of households and to consider welfare differences between various types of households. To make the welfare positions of different types of households comparable, equivalent income must be used. Economists disagree on this issue and on which equivalence scale should be used. Research in the field of lifetime redistribution inclines towards the application of equivalence scales. With respect to the choice of the equivalence scales, it holds that other scales (e.g. empirical-objective) methods do not result in other conclusions. Of course, the exact figures differ, but the direction of the results does not. See for a discussion

Coulter et al. (1992). We use the results of Diederen (1983), which applies an empirical-subjective approach. The equivalent scale is applied to each income component and the sum of all the equivalent income components is imputed each year to each individual in the household unit. This implies that the income measure takes full account of the variance in household circumstances by attributing the standard of living of the household to each individual residing in that household. For a further discussion, see Harding (1993, pp. 51–55). Lifetime income (or benefit or contribution) is measured by the sum of the (discounted) annual equivalent income (or benefit or contribution) amounts. This can be considered as a type of (discounted) lifetime utility, where the utility function has been de fined as $U(Y) = Y$/equivalence scale. We will speak of equivalent (lifetime) income in stead of lifetime utility. In interpreting the results one should be aware of this.

To determine the redistributional effects of the social security system, we look at the following: (1) the average lifetime wages and the average benefits from and contributions to the social security schemes discerned; (2) the effect of the contributions and benefits on the Theil coefficient; (3) the net social security benefit per decile and (4) the benefit-tax ratio. These four elements are given for the cohorts born in the years 1930–1935 (cohort 1930), 1936–1945 (cohort 1940), 1946–1955 (cohort 1950) and 1956–1965 (cohort 1960). The income components have been adjusted for the household composition (via the equivalence scale) and the resulting amounts have been adjusted for changes in the wage index and discounted to 1990, using a discount rate of 2%, which is about the real interest rate in the Netherlands during the last century. Therefore, the net benefit can be considered as the real gain from the system, or in the terminology of Burkhauser and Warlick (1981), as the transfer component of the scheme(s) under consideration. Moreover, persons who were involved in migration have been excluded in our calculations. The calculations are based on ten runs with a different set of random numbers, all starting with a micro database of 10000 persons in the year 1947. The simulation runs to the year 2060. Thus, the birth generations 1930 up to 1960 can be followed almost completely with respect to their socio-economic life history. In 2060 only 0.8% of the persons born in the year 1960 is still alive and about 5% of those born in 1965. No account has been taken of income and contributions after 2060. The average number of persons per run involved in the simulation amounts to 923 for cohort 1930, 1667 for cohort 1940, 2297 for cohort 1950 and 2363 for cohort 1960. Because ten runs have been used, this implies e.g. for cohort 1930 that the calculations are based on about 9200 individual life histories. The redistributive impact has been measured via comparison with the gross wages, because no data exist to simulate a world in which government is absent. Further, it is assumed that the burden of benefits (contributions) is fully incident upon the person who receives (pays) the benefit (contribution).

3. Simulation results

The simulation results with respect to the lifetime wages, the social security contributions, the part financed via general revenue and the social security benefits, are given in Table 2. Lifetime employers' gross wages (being gross wages including employers' contributions) are on average Dfl. 2588000 for the cohort 1930,

Table 2. Lifetime equivalent wages and social security benefits and contributions (in Dfl. 1000, 1990 prices)[1]

	Cohort 1930 mean	Cohort 1940 mean	Cohort 1950 mean	Cohort 1960 mean
Wages incl. Employers' contributions	2588	3036	3373	3461
Contributions	*475*	*620*	*768*	*932*
of which				
General insurances	209	273	344	438
Employee insurances	116	159	190	215
Occupational pensions	150	188	234	279
Tax financing	*196*	*264*	*298*	*345*
of which				
General insurances	60	76	89	123
Employee insurances	20	45	34	25
Social assistance	95	121	142	153
Direct payments	21	22	33	44
Benefits	*1058*	*1213*	*1359*	*1524*
of which				
General insurances	531	546	556	608
Employee insurances	184	245	249	259
Social assistance	75	102	116	140
Direct payments	21	23	35	44
Occupational pensions	247	297	403	473
Net benefits incl. tax financing	*387*	*329*	*293*	*247*
of which				
General insurances	262	197	123	47
Employee insurances	48	41	25	19
Social assistance	−20	−19	−26	−13
Direct payments	0	1	2	0
Occupational pensions	97	109	169	194
Net benefits excl. tax financing	*583*	*593*	*591*	*592*
of which				
General insurances	322	273	212	170
Employee insurances	68	86	59	44
Social assistance	75	102	116	140
Direct payments	21	23	35	44
Occupational pensions	97	109	169	194

[1] With the exclusion of health care costs.

Dfl. 3036000 (cohort 1940), Dfl. 3373000 (cohort 1950) and Dfl. 3461000 (cohort 1960). This implies the following growth figures: 17.3% for the cohort 1940 in comparison with the cohort 1930, 11.1% (cohort 1950 versus 1940) and 2.6% (cohort 1960 versus 1950). Contributions rise from Dfl. 475000 for cohort 1930 to Dfl. 932000 for the youngest generation, in other words a rise from 18.4 to 26.9% of (employers') gross wages. The contributions for the general insurances are more than doubled between cohort 1930 and 1960, whereas both the contributions for the employee insurances and occupational pensions are almost doubled between cohort 1930 and 1960. The part that is financed via general revenue increased somewhat less: from Dfl. 196000 for cohort 1930 to

Dfl. 345000 for cohort 1960. Half the amount is accountable towards social assistance. The direct payments of the government for (former) public servants have also been completely financed from the general revenue. The payments via the general revenue for the general insurances is considerably, whereas the percentual contribution from public funds for the employee insurances is rather limited. The benefits have increased less than the contributions: from Dfl. 1058000 to Dfl. 1524000. The proportion of the general insurances declines from about the half of the benefits to about 40%, whereas the employee insurances remain constant: somewhat less than 20%. The role of social assistance and the occupational pensions, in particular, increases. The latter form 23% of total benefits for the cohort 1930, against 31% for cohort 1960.

The total net benefit from the social security system, also taking account of the contributions via public funding, amounts to Dfl. 387000 for the cohort 1930 (being 15.0% of employers' gross wages), Dfl. 329000 for 1940 (10.8%), Dfl. 293000 for 1950 (8.7%) and Dfl. 247000 for 1960 (7.1%). The gain from the social security system is thus declining rapidly, especially in terms of the percentage of gross wages. This decline can in particular be imputed to the general insurances, whose net benefits decrease by Dfl. 215000 between the oldest and the youngest cohort. Especially the old-age state pension results in a large decrease in the net benefit in the course of time (see Nelissen 1995). The decrease in the net benefit of the employee insurances is smaller: it decreases by Dfl. 29000 between the oldest and the youngest cohort. The net return on the general and employee insurances will be negative from cohort 1970. This cohort is the first one to suffer from the pay-as-you-go system in the social insurance system due to the population greying. For social assistance, the net result is even negative, implying a negative return on the "investments" in the social assistance system for these generations. The net effect of direct payments is close to zero. In contrast with the social insurances, the net effect of the occupational pensions is larger, the later the cohort is born. This is partly due to the index-linked nature of these pensions in combination with a low discount rate, and is also partly due to the extension of the occupational pension system in the course of time. Grosso modo we can say, that the net effect of the social security system becomes smaller, the younger the cohort is; that the net effect of the general and the employee insurances is very small for the youngest cohort and negative for the cohort 1970; and that the occupational pensions result in an increasing net effect.

If we do not take account of contributions via the taxes, the net benefit hardly differs between generations. However, we find analogous trends as in the case we take account of these contributions from public funding. General and employee insurances show a net benefit, which is smaller, the younger the cohort is, whereas occupational pensions and social assistance show the reverse.

Table 3 reports on the redistributive impact of the Dutch social security system as measured by the Theil coefficient. The Theil coefficient for the employers' gross wages is 0.161 for cohort 1930, 0.133 for 1940, 0.125 for 1950 and 0.116 for 1960. So, income inequality within cohorts decreases very fast. The social security benefits result in a decrease in the income inequality, whereas the contributions have a regressive effect. The Theil coefficient for the lifetime wages plus the benefits from the general insurances amounts to 0.114 for cohort 1930, 0.099 for cohort 1940, 0.097 for cohort 1950 and 0.087 for cohort 1960. So, the benefits under the general insurances decrease the Theil coefficient by 23 (cohort 1950) to 29 (cohort 1930) per cent. Analogous, the benefits under the employee insurances

Table 3. Lifetime redistributive impact of social security benefits and contributions (Theil coefficients, differences with respect to the Theil coefficient for gross wages (incl. employers' contributions) and adjusted redistributive impact)

	Excluding general revenue financing				Including general revenue financing			
	1930	1940	1950	1960	1930	1940	1950	1960
Theil coefficient (1) Employers' gross wages	0.161	0.133	0.125	0.116				
Changes in Theil coefficient (% deviation from (1))								
Benefits								
General insurances	−29.5	−25.5	−22.6	−24.8				
Employee insurances	−10.9	−10.5	−9.9	−9.6				
Social assistance	−9.6	−9.4	−9.0	−12.3		idem		
Direct payments	−0.7	−1.0	−1.0	−1.4				
Occupational pensions	+4.2	+4.0	+4.9	+8.3				
Contributions								
General insurances	+8.3	+10.4	+10.8	+14.6	+6.4	+8.1	+8.9	+12.0
Employee insurances	+3.3	+3.6	+3.6	+4.2	+2.5	+3.2	+3.4	+4.0
Social assistance	–	–	–	–	−1.1	−2.0	−2.1	−2.1
Direct payments	–	–	–	–	−0.2	−0.4	−0.5	−0.6
Occupational pensions	+0.8	+1.8	+1.4	+0.7	+0.8	+1.8	+1.4	+0.7
Net benefits								
General ins.	−26.2	−20.6	−17.5	−18.0	−28.5	−22.8	−19.9	−21.3
Employee ins.	−8.7	−8.2	−7.7	−7.0	−9.4	−8.6	−7.9	−7.3
Social assistance	−9.6	−9.4	−9.0	−12.3	−10.5	−11.8	−11.6	−15.0
Direct payments	−0.7	−1.0	−1.0	−1.4	−0.8	−1.1	−1.0	−1.4
Occupational pensions	+4.7	+5.4	+6.0	+9.0	+4.7	+5.4	+6.0	+9.0
Adjusted redistributive impact (%)								
Benefits								
General insurances	−1.44	−1.42	−1.37	−1.41				
Employee insurances	−1.54	−1.30	−1.34	−1.28				
Social assistance	−3.31	−2.80	−2.62	−3.04			idem	
Direct payments	−0.86	−1.32	−0.96	−1.10				
Occupational pensions	+0.44	+0.41	+0.41	+0.61				
Contributions								
General insurances	+1.10	+1.16	+1.06	+1.15	+0.65	+0.70	+0.69	+0.74
Employee insurances	+0.74	+0.68	+0.64	+0.68	+0.48	+0.47	+0.51	+0.58
Social assistance	–	–	–	–	−0.30	−0.50	−0.50	−0.48
Direct payments	–	–	–	–	−0.25	−0.45	−0.47	−0.45
Occupational pensions	+0.14	+0.29	+0.20	+0.09	+0.14	+0.29	+0.20	+0.09
Net benefits								
General ins.	−1.28	−1.15	−1.06	−1.02	−1.39	−1.27	−1.21	−1.21
Employee ins.	−1.23	−1.02	−1.04	−0.94	−1.33	−1.07	−1.07	−0.98
Social assistance	−3.31	−2.80	−2.62	−3.04	−3.62	−3.51	−3.17	−3.71
Direct payments	−0.86	−1.32	−0.96	−1.10	−0.99	−1.45	−1.06	−1.10
Occupational pensions	+0.55	+0.55	+0.50	+0.66	+0.49	+0.55	+0.50	+0.66

lead to a decline of about 10 per cent for the four cohorts. Social assistance benefits have large income equalizing effect. The Theil coefficient decreases by 9 to 12%. In view of the limited amounts involved (see Table 2), the effect is large. Direct payments of the government to their (former) public servants – who at average have a higher income than employees – have an only limited income equalizing effect. Comparing the earnings-related occupational pensions with the old-age state pension, shows the difference clearly: the occupational pension benefits increase the income inequality, whereas the old-age state pension considerably decreases income inequality (see also Nelissen 1994, Sect. 8.2.2).

The contributions lead to an enlargement of income inequality. The reason for this is the existence of a maximum premium income. Looking at the social security contributions without taking account of the financing via general revenue, we see that the general insurance contributions increase income inequality by 8% in the oldest generation and by 15% in the youngest one, whereas it is only 3 to 4% for the employee insurances. This difference can be imputed to the higher contribution limit in the latter insurance type. The occupational pension contributions have an only limited income inequality enlarging effect. Taking into account the financing via general revenue, we find that the income inequality increasing effect of the contributions becomes smaller: the taxes have an income equalizing effect. The general insurances increase the Theil coefficient now by two percentage points less. Analogous trends can be found for the employee insurances. The occupational pensions do not have a financing via general revenue. So, here nothing changes. The financing of social assistance and the direct payments results in a small decrease of the income inequality.

The net benefits (including the effect of the financing via general revenue) show the following picture. The general insurances reduce the Theil coefficient by 20 to 29%, whereas employee insurances reduce income inequality by 7 to 9%. The net effect of the social assistance is relatively high, whereas the effect for the direct payments by the government to its (former) public servants is relatively small. At last, we find a large income inequality enlarging effect for the occupational pensions. The increase of the income inequality by the occupational pensions is even larger than the reduction by the employee insurances in the youngest cohort.

So, in practice, we find a larger income equalizing effect for the general insurances in comparison with the employee insurances. However, the effect on the Theil coefficient depends on the amounts involved and the size of the general insurance benefits is considerably larger. To adjust for this, we introduce the *'adjusted redistributive impact'*, which we define as the quotient of the proportional change in the Theil coefficient (with respect to the Theil coefficient for the employers' gross wage) and of the proportion of the scheme involved in the gross wages. So, the adjusted redistributive impact of a scheme shows how much the scheme affects the lifetime income distribution, assuming that the scheme amounts to one per cent of employers' gross lifetime wages. In this way, the measure offers the possibility to compare the redistributive impact of the various schemes in a more sophisticated way because it compares the redistributive impact under the assumption that the various schemes do not differ with respect to their size. These are given in the lower panel of Table 3. The adjusted redistributive impact for all benefits together amounts to −1.3%. E.g. for cohort 1930 we have a benefit from the general insurances of Dfl. 531 000 and the employers' gross wages amounts to Dfl. 2 588 000 (see Table 2), whereas the change in the Theil

coefficient is −29.5%. So, the adjusted redistributive impact equals 0.295/(531 000/2 588 000) = −0.295/0.205 = −1.44. The negative sign says that the scheme has an equalizing effect. If the sign is positive, this implies that the scheme enlarges income inequality. The figure of −1.3% means that the 'average' benefit diminishes the Theil coefficient by 1.3%, if that 'average' benefit would equal one per cent of the employers' gross wages. In terms of the adjusted redistributive impact we find that general insurance benefits have an effect of −1.4%. For the employee insurance benefits we find equalizing effects of the size of −1.3 to −1.5%. This difference between both is surprisingly small. One would expect a larger (negative) value for the general insurances. For the general insurance benefits are flat-rated, whereas the employee insurance benefits are wage-related schemes. The reason for the almost equal value for both types is that benefits under the employee insurances are higher for those persons who receive a benefit on the basis of a high (former) income, but the probability to be eligible for such a benefit is for high-income earners smaller in comparison with a benefit under the general insurances. This of course depends on the type of insurance. It holds in particular for the Unemployment Insurance and the Disablement Insurance. The adjusted redistributive impact of the employee insurances has been diminished in the course of time, whereas it remains rather constant for the general insurances. This trend can be explained by the adaptations in the 1980's, when the minimum income guarantee has been abolished in the employee insurances. Social assistance benefits have a large income equalizing effect as said before: its adjusted redistributive impact is twice that of the general and employees insurances. Direct payments of the government to their (former) public servants have a smaller adjusted redistributive impact than the general and employee insurances. In terms of the adjusted redistributive impact, the income inequality increasing effect of the occupational pension benefits is rather small. It varies between 0.41 and 0.61.

The contributions show the following picture. The adjusted redistributive impact is now defined as the quotient of the percent change in the Theil coefficient (with respect to the Theil coefficient for the employers' gross wages) and the contributions as a percentage of the employers' gross wages. It is for the general insurances again larger than that for the employee insurances. But now, its sign is positive, which means that income inequality is increased by the contributions. The main reason for the difference is that the ceiling for the employee insurances is considerably higher than that for the general insurances (from 1967 on). Between 1967 and 1981, the ceilings for the employee insurances were about one thirds above those for the general insurances; between 1982 and 1989 it was less than 10%, but from 1990 onwards the difference is over 60%. The existence of a ceiling results in an increase of income inequality and the lower the ceiling, the larger the increase is. The occupational pensions have only a small adjusted redistributive impact, which is even not significant for the youngest generation.

Taking into account the financing via general revenue, the general insurances show a considerably lower adjusted redistributive impact. It now amounts to about 0.7% against 1.1% without general revenue financing. Analogous trends can be found for the employee insurances, but the difference is smaller. The financing of the social assistance and the direct payments results in a small decrease of the income inequality. Their redistributive impact (which equals that of the taxes) varies between −0.30 and −0.50%.

Looking at the net benefits (including the effect of the financing via general revenue) we find that the general insurances result in an adjusted redistributive impact which diminishes from −1.39% for the oldest cohort to −1.21% for the two youngest cohorts. For the employee insurances it is −1.33 and −0.98%, respectively. So, there is a different impact, but the difference is only small. The difference with respect to the redistributive impact is potentially only limited and less than 25%. Generally, it is assumed that wage-related schemes have a considerably smaller redistributive impact than flat-rated schemes (see e.g. Barr 1992). The net effect of the social assistance is relatively very high. Its adjusted redistributive impact amounts to two and a half (cohort 1930) to three (cohort 1960) times the impact of the general insurances. On the contrary, the effect for the direct payments by the government to its (former) public servants is smaller that for the general insurances. At last, we find as can be expected an income inequality enlarging effect for the occupational pensions.

The third element with respect to the redistributional impact of the social security system, is the contribution of the two types of social insurances towards income per decile. To that end, the net benefits are also subdivided by the net intracohort and net intergenerational transfers by decile. This is shown in Fig. 2 for the general insurances and in Fig. 3 for the employee insurances. The health costs schemes ZFW and AWBZ have not been included, due to lack of data. Because the occupational pensions and the social assistance show the expected picture and analogous curves for the four cohorts, the figures discerned have not been shown. The direct payment have not been included for reason of the very small amounts involved. The deciles are determined on the basis of the employers' gross wages and the general revenue financing has been included. We see that – with the exception of the transition from decile 1 to decile 2 in the general insurances in cohort 1930 and 1950 and in the employee insurances in cohort 1950 – the net benefit decreases, the higher the decile number. The difference between the net benefit for the second decile and that for the tenth decile (as a percentage of the average net benefit) increases for the general insurances in the course of time from 57% for cohort 1930 via 71% for the intermediate cohorts to 83% for the cohort 1960. The employee insurances show a slightly different picture. Here, the aforementioned ratio for the intermediate cohorts is smaller (55%) than for the youngest and oldest cohort (71 and 73%, respectively). These figures affirm our previous finding that the redistributive impact between both types of insurances does not diverge strongly.

Generally, the net benefit for the general insurances within a decile is lower, the younger the cohort is. The only exception is decile 1 in the two youngest cohorts. The picture for the employee insurances differs: cohort 1940 shows for each decile an equal or a significantly higher net benefit in comparison with the same decile in the cohort 1930. The reason for this is, among other things, the extent to which persons from the two cohorts made use of the unemployment and disability scheme (see Nelissen 1994). The cohorts 1950 and 1960 again show the general picture: the net benefit in a decile is lower the younger the cohort is. As a consequence the decile number for which the net benefit is negative, is lower, the younger the cohort is. The general insurances result in a positive return for all deciles in cohort 1930, whereas the return is negative from decile 7 on in cohort 1960. The net benefit for the employee insurances is negative for decile 8, 9, and 10 in cohort 1930 and even from decile 4 on in the youngest generation, which is of course partly due to the exclusion of the reimbursement of medical consumption.

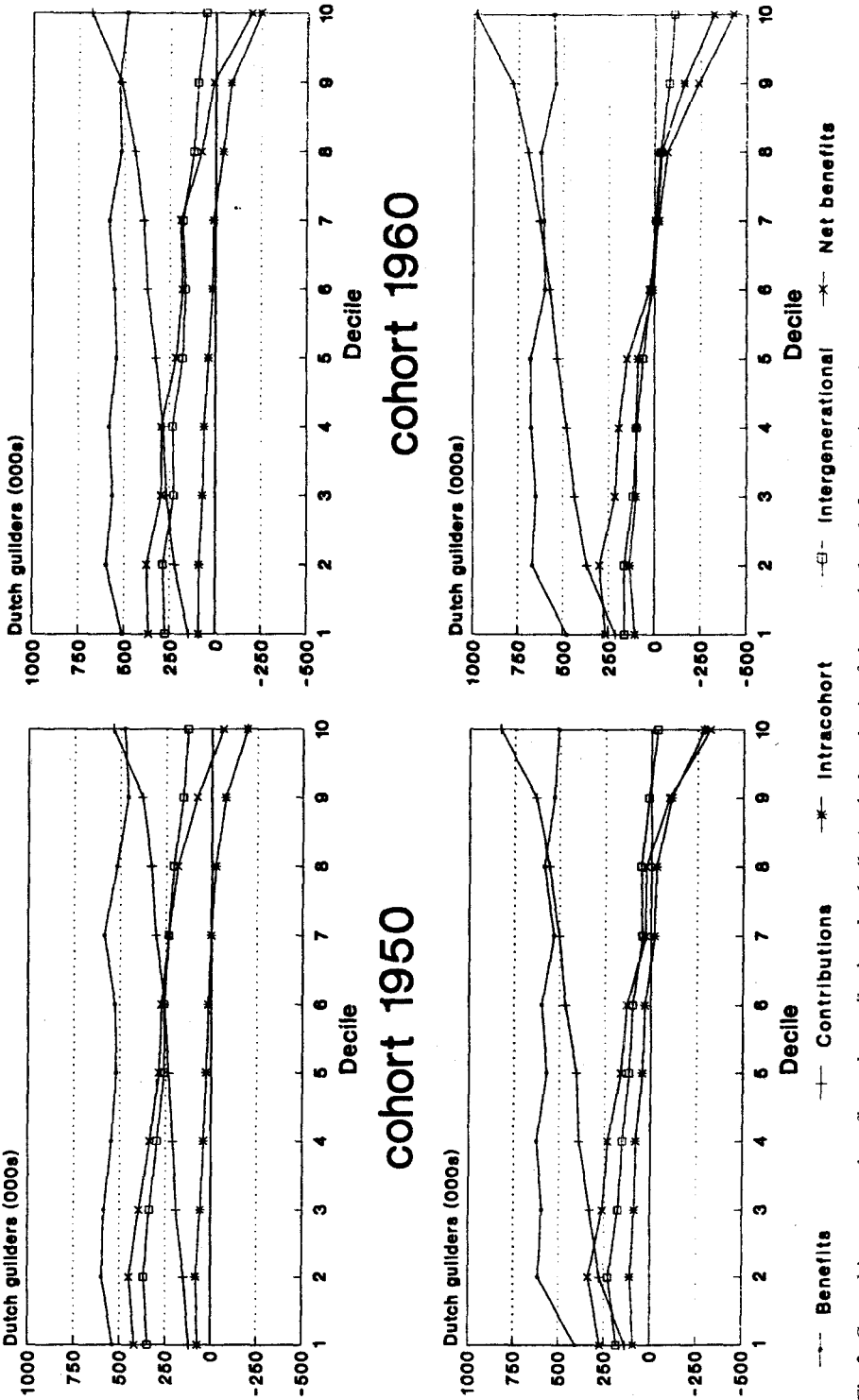

Fig. 2. General insurances: benefits and contributions by decile (ranked on basis of the equivalent before tax income)

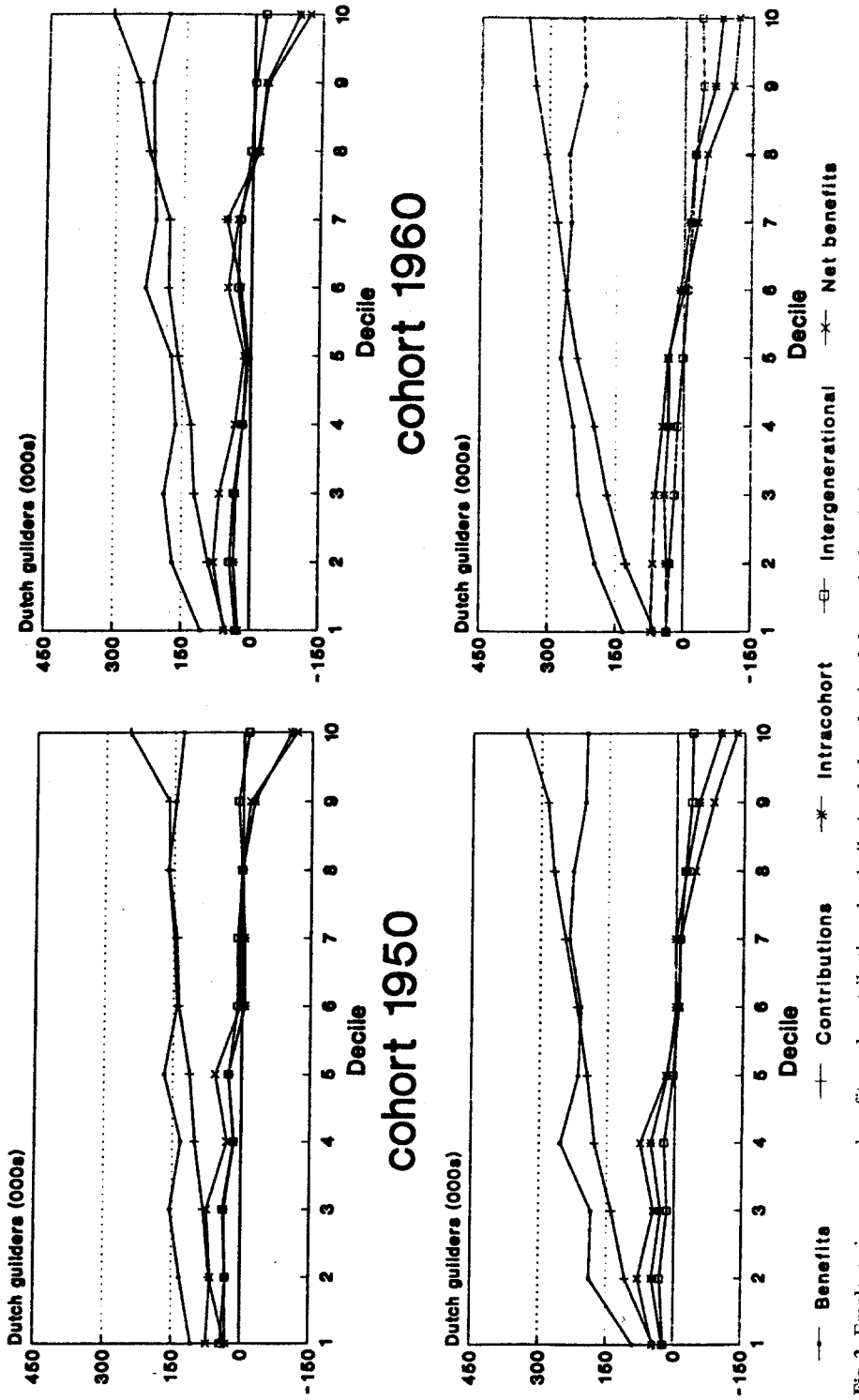

Fig. 3. Employee insurances: benefits and contributions by decile (ranked on basis of the equivalent before tax income)

The net benefit for the occupational pensions is always close to zero, with the exception of the net benefit for the nineth and tenth decile. Moreover, the net benefit is larger, the later the cohort has been born. Here, we find – among other things – the effect of the back-service, which is particularly advantageous for those with relatively high incomes. It also shows why occupational pensions result in an enlargement of income inequality. Social assistance shows a picture for the benefits, contributions and net benefits which is analogous to the general insurances.

Let us speak of an intracohort contribution if the lifetime benefits for an individual are smaller than his/her lifetime contributions. The intracohort transfer equals the difference between both. The remaining has been considered as an intrapersonal transfer. The latter also holds for the contribution, if lifetime contributions are smaller than the lifetime benefits. Assuming that the intracohort transfers are redistributed over the deciles as a benefit according to the total benefits, the net intracohort (or intragenerational) transfers are limited for most deciles, with the exception of social assistance, where they are relatively very high. The net intracohort transfers are increasing for the general insurances in the course of time, whereas they decrease for the employee insurances. In both cases, the lower deciles have a positive net intracohort transfer, whereas the higher deciles have a intracohort loss. With respect of the occupational pensions, the net intracohort transfers show the same picture like the net benefits. The difference between the net benefits and the net intracohort transfers can be seen as an indication for the intergenerational transfers. In this, one has to keep in mind that the benefits and contributions have been standardized and discounted.

With respect to the benefit-contribution ratio we note the following (see Table 4). Including the contributions via taxes, the benefit-contribution ratio decreases for the total of all social security schemes involved. For cohort 1930, the benefit-contribution ratio amounts to 1.58, for 1940 1.37, for 1950 1.27 and for 1960 1.19. This means that the cohort 1930 gets Dfl. 1.58 for each Dutch guilder invested in the social security system, so that the net gain amounts 58% whereas this is only 19% for the cohort 1960. Notice that this amount results after the application of equivalence scales and discounting. The lower benefit-contribution ratio for cohort 1940 compared to cohort 1930 is particularly due to the general insurances and to a lesser extent to the employee insurances. These benefit-contribution ratios decline by 21 and 11%, respectively. The youngest cohort shows equal benefit-contribution ratios for the general and employee insurances. The benefit-contribution ratio for the occupational pensions is almost

Table 4. The benefit-contribution ratios (based on equivalent income components)

Cohort	Excl. tax financing				Incl. tax financing			
	1930	1940	1950	1960	1930	1940	1950	1960
General insurances	2.54	2.00	1.62	1.39	1.97	1.56	1.28	1.08
Employee insurances	1.59	1.54	1.31	1.20	1.35	1.20	1.11	1.08
Occ. pensions	1.65	1.58	1.72	1.70	1.65	1.58	1.72	1.70
Social assistance	–	–	–	–	0.79	0.84	0.82	0.92
All schemes	2.23	1.96	1.77	1.64	1.58	1.37	1.27	1.19

constant, whereas social assistance shows an increasing ratio. So, comparing the results for cohort 1960 with those of cohort 1930, shows us that the decline in the total benefit-contribution ratio is due in particular to the developments in the general insurances and to a much smaller degree to the developments with respect to the employee insurances. The concerning benefit-contribution ratios decreased by 45.2 and 20.0%, respectively, between cohort 1930 and cohort 1960. As a result of this, the benefit-contribution ratio of both types of insurances do not show any more differences.

5. Conclusion

In this contribution we compared the redistributive impact of five types of social security schemes in the Netherlands: (1) general insurances (flat-rated benefits, earnings-related contributions); (2) employee insurances (earnings-related benefits, earnings-related contributions); (3) social assistance (means-tested, flat-related benefits, financed via public funding); (4) occupational pensions (benefits related to last earned income, earnings-related contributions) and (5) direct payments (earnings-related benefits, financed via public funding). These schemes have been studied for the birth generations 1930, 1940, 1950 and 1960.

It appears that net social security income as a proportion of lifetime wage income is smaller, the later the cohort is born. In particular, the net benefit of the general insurances declines. On the contrary, the net benefit from occupational pensions increases. Social assistance results in a small loss for these four generations: its net benefit is negative if we also take into account tax financing. Lifetime income inequality is diminished considerably by the general insurances. Income inequality, as measured by the Theil coefficient, is reduced by 20 to 29%. Its effect is becoming smaller in the course of time. On the other hand, the income equalizing effect of social assistance increases from 10% for cohort 1930 to 15% for cohort 1960. Employee insurances reduce income inequality somewhat less, to wit 7 (cohort 1960) to 9% (cohort 1930). In contrast to these schemes, occupational pensions do increase income inequality and its effect increases from 5 to 9%.

So, in practice, we find a larger income equalizing effect for the general insurances in comparison with the employee insurances. However, the effect on the Theil coefficient depends on the amounts involved and the size of the general insurance benefits is considerably larger. To adjust for this, we introduced the *'adjusted redistributive impact'*. In these terms, general insurances, employee insurances and direct payments have about the same impact. Social assistance schemes result in a very large income redistribution. As said, occupational pensions increase income inequality, but its increasing impact is smaller than the inequality reducing impact of the social insurances.

The comparison of general and employee insurances shows that on a lifetime basis the redistributive impact of flat-rated insurances does not necessarily largely differ from earnings-related insurances. It is generally assumed that flat-rated insurances, like the general insurances in the Netherlands, are more redistributive than wage-related insurances, like the employee insurances. This has also been confirmed by period analyses (see e.g. Muffels et al. (1986) for the Netherlands). But the Dutch practise shows that on a lifetime basis the income equalizing effect of the flat-rated benefit in comparison with a wage-related benefit (in combina-

tion with a maximum level of the benefit) can be neutralized by a lower contribution ceiling for the former type of insurance.

This implies that a change-over from a system based on general insurances to a system based on employee insurances does not necessarily result in a less redistributive system. It heavily depends on the eligibility conditions and the level of the ceiling. This also holds in case of privatization of social security schemes. Introducing or extension of means-tested elements in general insurances, as is in discussion for the old-age state pension, will increase the income redistributive impact of the social security system. On the other hand, the extension of occupational pensions at cost of the old-age state pension, which is the consequence of the current government policy in the Netherlands via only partly indexation of state pensions, will diminish lifetime income inequality.

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