FINAL REPORT PROJECT AG/00/138 (MIMOD)

MICROSIMULATION MODEL FOR SOCIAL SECURITY MIMOSIS AND EUROMOD

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1 INTRODUCTION

In this report we describe the activities carried out under project AG/00/138 funded by the Belgian Federal Science Policy and how it builds on and further refines work done in projects AG/01/86 and AG/01/116.

The main objectives of project AG/00/138 were to further validate the microsimulation model for social security, MIMOSIS, especially by comparing it with other models and data and by use of MIMOSIS for evaluation of (hypothetical) policy reforms. One of the tasks of this project was to update the legislation to 2007, through updates of the parameter files and, where needed, adjustments to the source code. This also allows a comparison of changes in, for example, the fiscal burden from 2001 to 2007.

In section 2 we will compare the data underlying MIMOSIS with other datasets such as the PSBH, the Household Budget Survey and the EU-SILC for different income variables and demographic characteristics. We include PSBH and Household Budget Survey as those data also pertain to 2001, while the version of EU-SILC we use is for incomes of 2004.

Section 3 describes MIMOSIS relative to the European wide microsimulation model EUROMOD both qualitatively and quantitatively. The qualitative comparison will focus on the differences in flexibility and scope of the two models while the quantitative comparison will include basic summary statistics, such as poverty rate, inequality, average incomes, etc., that are standard output to the two models.

Section 4 presents the results of three simulation exercises. Three different simulations/calculations are presented: the adaption of social minima to poverty thresholds, an analysis of the distributional effects of 8 years of "purple" policy, and the calculation of effective average and marginal tax rates. The first and second application simulate policy reforms, carried out in a static framework, i.e. they only show the "morning after" effects of a policy change without taking into account second order effects through changes in economic agents' behaviour. The first simulation looks at the effects of changing the social minima to bring them in line with poverty thresholds while the second one analyses how 8 years of "purple" policy has affected the income distribution. The third simulation is meant to give an idea of the effective tax rates facing different groups of the population. As such it is not a simulation of a change in policy but nevertheless provides policy makers with an idea of how work (dis)incentives are distributed among the population. Moreover, we will confront the 2001 effective tax rates with those resulting under the 2007 legislation for the same underlying population as an indication of how fiscal incentives have changed between 2001 and 2007.

As the development of a microsimulation model of the scope and detail of MIMOSIS is a continuously ongoing task, some of the work described in this report will be continued and analyzed in more detail in follow-up studies and working papers. Therefore, interpretation of the results reported here must be done with this caveat in mind.

2 DATA: MIMOSIS VS EU-SILC, BUDGET SURVEY AND PSBH

In this section we present some tables with (mainly) monetary variables for the different data sources, i.e. MIMOSIS (2001), EU-SILC 2005 (incomes 2004), Budget Survey 2001 (HBS), and Panel Study of Belgian Households 2001 (PSBH). In case of the EU-SILC the monetary variables will thus have to be adjusted for inflation to make them comparable.

All numbers in the tables are weighted by the respective weighting factors in the different surveys. We assume that all surveys are representative and that by weighting we capture the same (Belgian) population.[1]

Results that are presented for income deciles are always based on the same definition: deciles are based on equivalent net disposable household income. The equivalence scale used is the modified OECD-scale, i.e. 1 for the head of household, 0.5 for any additional adults (14 and older) and 0.3 for children. Each decile contains 10% of all households.

Many of the results shown in this section *for the three surveys* are based on EUROMOD. The budget survey, for example, does not contain information on gross incomes. Those were obtained by a 'net-to-gross' conversion module available in EUROMOD. Remark that if gross income variables were available in the original dataset no such conversion was necessary and the original variables were used instead.

2.1 COMPARISON OF MONETARY VARIABLES

In this subsection we compare monetary variables between datasets. If the variables should not be available in a specific dataset then the cell in question will contain the value "n/a".

Of course, all variables should be defined in a similar way in all datasets. For this we refer to Commission Regulation (EC) No 1980/2003.

In Table 2-1 we show the mean and median gross incomes per decile. Gross incomes include social security contributions. The table shows that there is quite some difference in mean and median between the different data sources, especially for the lower income deciles. For a large part this can be explained by the fact that in the administrative data of MIMOSIS some income components are missing, e.g. income from real estate of financial assets. The difference between the different survey data is somewhat less pronounced than that between MIMOSIS and the survey data. In surveys respondents have to report income figures by themselves, in MIMOSIS they come from administrative data sources. Furthermore, a survey or other dataset that is representative for some household characteristic not necessarily carries over that representativity to the income distribution. The EU-SILC data seem to be closest, in general, to the MIMOSIS data.

[1] In the case of the EU-SILC we also assume that population demographics have remained more or less constant between 2001 and 2005.

TABLE 2-1 MEAN AND MEDIAN GROSS INCOME IN EURO PER MONTH

	mean net taxable income				median net taxable income			
decile	MIMOSIS	EU-SILC	HBS	PSBH	MIMOSIS	EU-SILC	HBS	PSBH
1	346.69	882.96	973.22	612.45	266.65	834.63	842.84	599.90
2	956.39	1233.08	1309.36	1194.35	866.02	1080.73	1172.55	1140.63
3	1271.00	1447.52	1524.67	1515.23	1127.12	1331.04	1435.89	1367.66
4	1447.91	1719.25	1959.46	1948.05	1370.12	1584.59	1785.12	1739.50
5	1723.62	2118.54	2254.32	2349.20	1643.78	1886.83	2094.04	2181.30
6	2250.37	2624.57	2733.02	2877.76	2052.72	2400.71	2659.63	2714.68
7	2887.41	3187.91	3293.31	3252.29	2671.61	2914.48	3182.38	3016.41
8	3514.71	3647.47	3657.41	3913.24	3383.78	3510.41	3498.00	3840.93
9	4285.55	4256.95	4706.10	4577.11	4105.02	3971.87	4560.38	4457.06
10	6508.75	7397.02	7453.80	7304.28	5787.49	5942.41	6628.35	6193.62
Total	2519.22	2850.62	2985.55	2953.05	1897.95	2237.80	2378.10	2408.38

In Table 2-2 we show the mean and median *disposable* incomes per decile. Deciles are based on equivalent disposable household income as explained in the introduction to this section. In Table 2-3 we summarize the results of Table 2-1 and Table 2-2 in the form of average tax rates that we define as (grossY-netY)/grossY, where Y means income. It allows for a validation of the tax-benefit legislation that underlies the different data sources, either implicitly or explicitly. Remember that all net amounts for the surveys (EU-SILC, HBS and PSBH) are obtained by running EUROMOD on them.

The pattern for gross incomes carries forward to disposable incomes, which is also confirmed in the average tax rates that are very similar across data sources. The budget survey clearly indicates the highest average tax rates. Remember that gross incomes are not observed in the budget survey and that they are "reverse engineered" from the disposable incomes, i.e. in EUROMOD an algorithm searches for the gross income distribution that, after running the tax-benefit legislation on it, reproduces the original disposable income distribution as close as possible. In the gross income concept there may be income components, however, that are not taxed and hence average tax rates in the budget survey are likely to be overestimated.

TABLE 2-2 MEAN AND MEDIAN DISPOSABLE INCOME IN EURO PER MONTH

	mean disposable income				median disposable income			
decile	MIMOSIS	EU-SILC	HBS	PSBH	MIMOSIS	EU-SILC	HBS	PSBH
1	346.07	840.00	841.36	595.35	266.65	824.62	822.21	575.11
2	934.11	1145.92	1221.30	1145.90	856.65	1067.47	1130.84	1111.80
3	1198.13	1302.07	1373.45	1389.57	1108.89	1293.63	1331.81	1315.97
4	1305.91	1508.68	1658.31	1708.67	1285.02	1472.93	1551.80	1591.70
5	1472.43	1770.07	1862.71	1981.98	1408.99	1676.63	1756.18	1821.87
6	1808.46	2107.58	2148.69	2299.89	1669.03	1958.46	2004.07	2078.98
7	2207.44	2447.08	2529.55	2525.74	2021.47	2240.61	2281.29	2291.24
8	2570.60	2734.07	2742.96	2933.63	2486.02	2576.89	2494.14	2915.08
9	2990.99	3054.40	3370.63	3329.64	2849.67	2888.82	3218.39	3162.49
10	4096.41	4679.87	4816.89	4885.31	3814.39	4091.92	4512.63	4208.30
Total	1893.04	2158.47	2256.03	2278.72	1536.18	1800.28	1885.35	1958.54

TABLE 2-3 AVERAGE TAX RATES

decile	MIMOSIS	EU-SILC	HBS	PSBH
1	0.06	2.15	3.53	1.60
2	1.58	4.34	5.63	3.24
3	4.08	7.85	9.67	7.09
4	7.94	10.83	15.61	11.54
5	12.84	15.23	19.55	15.12
6	18.99	18.88	24.05	19.52
7	23.37	22.79	26.50	21.51
8	26.79	24.98	29.88	24.23
9	30.12	27.94	33.07	26.99
10	35.62	33.49	39.33	31.68
Total	16.14	16.90	20.74	16.56

In Table 2-4 and Table 2-5 we repeat the information of Table 2-1 and Table 2-2 but now for equivalent income. The equivalence scale used is the modified OECD-scale as explained above. The survey data are again quite close together, especially for the upper part of the income distribution, with MIMOSIS reporting the lowest incomes. For the upper half of the income distribution the median incomes are quite close for all data sources, which seems to imply a somewhat more skewed income distribution in MIMOSIS than in the surveys for the upper half of the income distribution.

TABLE 2-4 MEAN AND MEDIAN EQUIVALENT GROSS INCOMES IN EURO PER MONTH

	mean equivalent gross income				median equivalent gross income			
	MIMOSIS	EU-SILC	HBS	PSBH	MIMOSIS	EU-SILC	HBS	PSBH
1	234.93	552.88	661.19	409.49	193.07	624.78	649.90	502.03
2	593.38	825.01	860.22	779.99	591.47	798.85	843.06	770.55
3	789.70	996.74	1029.33	999.36	774.58	958.29	1017.08	983.34
4	960.94	1146.61	1229.26	1196.71	946.61	1117.74	1194.18	1176.19
5	1129.26	1357.24	1419.89	1407.32	1126.22	1348.99	1407.78	1391.19
6	1377.99	1598.93	1655.70	1670.21	1376.67	1599.79	1637.22	1665.03
7	1671.61	1889.52	1902.12	1910.08	1674.02	1868.52	1880.07	1918.39
8	2015.83	2174.97	2191.95	2218.35	2011.98	2165.14	2167.94	2232.21
9	2493.32	2627.14	2657.89	2672.87	2482.65	2591.90	2604.60	2675.37
10	3859.61	4879.12	4450.00	4396.01	3398.42	3560.57	3846.38	3688.77
Total	1512.64	1804.20	1805.20	1765.22	1247.45	1488.00	1513.48	1526.09

TABLE 2-5 MEAN AND MEDIAN DISPOSABLE EQUIVALENT INCOMES IN EURO PER MONTH

	mean equivalent disposable income				median equivalent disposable income			
	MIMOSIS	EU-SILC	HBS	PSBH	MIMOSIS	EU-SILC	HBS	PSBH
1	234.66	528.70	577.17	401.29	193.07	613.83	633.72	502.03
2	582.51	777.14	808.61	751.16	583.80	779.18	810.36	755.25
3	753.14	907.81	929.44	923.68	748.35	906.46	928.74	921.73
4	879.01	1012.94	1041.12	1052.16	880.40	1012.90	1037.74	1049.84
5	977.98	1139.52	1161.95	1186.80	976.45	1140.97	1162.79	1187.55
6	1110.89	1288.50	1287.37	1334.69	1111.07	1284.45	1281.56	1336.59
7	1275.29	1446.34	1444.18	1489.18	1274.04	1444.06	1446.75	1485.99
8	1471.30	1624.06	1620.88	1667.10	1468.64	1617.23	1617.88	1666.13
9	1737.00	1881.92	1882.42	1941.32	1732.86	1873.54	1871.29	1924.59
10	2425.08	3036.75	2856.73	2935.72	2217.17	2413.96	2474.64	2492.11
Total	1144.68	1364.04	1360.65	1367.80	1039.48	1205.85	1220.14	1255.78

2.2 INCOME BY ECONOMIC STATUS

Here we present the income for different economic status. The amounts are on household level: e.g. the status is determined by the status of the head of household and the incomes of all family members are summed.

Table 2-6 shows the distribution of households by economic status. MIMOSIS and PSBH report a higher percentage of self-employed than the other two sources. The budget survey (HBS) and the PSBH report quite low percentages of unemployed households (though it should be noted that the economic status is determined by the head of household, so it might as well be that the other sources overestimate the number of unemployed heads of household). Budget survey and to a lesser extent PSBH have more households with a full-time working head than MIMOSIS and EU-SILC. The difference seems to be (partly) captured by the number of part-time working heads of household. Table 2-7, Table 2-8, and Table 2-9 report respectively gross, net and average tax rate by economic status. The self-employed income is clearly much less in the administrative data (MIMOSIS) than in the survey data, whereas gross income of employees is very similar in the four data sources (a little spike in the PSBH). Unemployment income is somewhat less similar but still

quite close, with the budget survey diverging somewhat more from the others. Except for the employees the average tax rates are quite divergent in the four datasets. Full-time and part-time workers face similar tax rates in all data sources, albeit a bit higher in MIMOSIS for full-time workers than in the other sources.

TABLE 2-6 ECONOMIC STATUS: % OF POPULATION

	MIMOSIS	EU-SILC	HBS	PSBH
self-employed	10.33	6.60	6.47	9.09
employee	40.91	40.94	46.88	42.75
unemployed	9.25	8.06	3.95	3.99
full-time	32.71	34.68	42.92	38.83
part-time	8.20	6.26	3.96	3.92

TABLE 2-7 ECONOMIC STATUS: AVERAGE GROSS INCOME IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
self-employed	2958.41	4949.81	5478.12	3808.60
employee	3739.52	3638.40	3588.98	4063.42
unemployed	1459.24	1886.38	1174.90	1527.92
full-time	4087.23	3764.59	3682.11	4190.43
part-time	2352.06	2939.46	2578.85	2805.15

TABLE 2-8 ECONOMIC STATUS: AVERAGE DISPOSABLE INCOME IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
self-employed	2154.26	3198.13	3590.70	2827.43
employee	2649.20	2698.93	2738.91	3015.28
unemployed	1301.08	1533.30	1129.41	1383.38
full-time	2849.32	2776.56	2798.31	3097.44
part-time	1850.65	2268.97	2094.62	2201.33

TABLE 2-9 ECONOMIC STATUS: AVERAGE TAX RATE

	MIMOSIS	EU-SILC	HBS	PSBH
self-employed	18.97	24.78	30.94	20.84
employee	25.61	23.04	21.14	23.06
unemployed	5.20	9.33	2.73	6.34
full-time	27.91	23.81	21.55	23.65
part-time	16.41	18.77	16.65	17.12

2.3 INCOME BY FAMILY TYPE

Here we show the same tables as before but now by family type. MIMOSIS and EU-SILC show very similar population patterns according to family status as is shown in Table 2-10. The surveys HBS and PSBH show a different pattern and also diverge from each other. The budget survey and the PSBH show significantly less single households than do the EU-SILC and MIMOSIS and the budget survey counts more pensioners than any other dataset. Again we see quite substantial differences in incomes between the datasets, especially for singles without children. The same holds true for average tax rates but to a much lesser extent.

TABLE 2-10 FAMILY TYPE: % OF POPULATION

	MIMOSIS	EU-SILC	HBS	PSBH
single, no children	20.94	20.49	14.18	16.85
single, with children	8.44	9.47	7.96	5.60
couple, no children	14.64	13.03	11.07	15.72
couple, with children	29.74	27.54	32.53	34.48
pensioner	26.25	29.48	34.26	27.35

TABLE 2-11 FAMILY TYPE: AVERAGE GROSS INCOME IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
single, no children	1359.17	2122.61	2017.74	1642.06
single, with children	2086.28	2416.10	2595.95	2241.98
couple, no children	2884.84	3334.40	3645.94	3478.55
couple, with children	4092.39	4390.92	4528.81	4388.30
pensioner	1603.79	1843.58	1797.91	1795.49

TABLE 2-12 FAMILY TYPE: AVERAGE DISPOSABLE INCOME IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
single, no children	1010.33	1488.09	1463.28	1249.39
single, with children	1659.50	1897.00	2097.34	1829.51
couple, no children	2077.44	2456.37	2570.19	2551.45
couple, with children	2972.75	3278.29	3405.29	3329.72
pensioner	1350.56	1530.73	1428.25	1523.55

TABLE 2-13 FAMILY TYPE: AVERAGE TAX RATE

	MIMOSIS	EU-SILC	HBS	PSBH
single, no children	14.28	17.50	19.93	17.30
single, with children	12.98	15.47	15.16	13.45
couple, no children	20.22	20.93	24.72	19.27
couple, with children	21.74	21.37	20.48	20.33
pensioner	10.03	11.00	14.39	10.46

2.4 ALL INCOME VARIABLES FROM EC REGULATION 1980/2003

In the tables that follow we list (most of) the income variables in EU-SILC (as described in EC regulation 1980/2003). The deciles are again based on equivalent disposable household income and the averages for the income concepts shown are on the household level. Since we want to "judge" the data underlying MIMOSIS we only list the variables that are in MIMOSIS. This excludes e.g. imputed rent, income from property, mortgage interest payments, etc.

As far as the primary income distribution for employees is concerned MIMOSIS seems to indicate a more unequal distribution than do the surveys (Table 2-14). Family allowances are substantially higher in the PSBH, which is probably indicative of some sort of measurement error or a misinterpretation of variables on our part (Table 2-15). Unemployment benefits in Table 2-16 show a similar pattern for MIMOSIS, PSBH and HBS (except for the first decile). Unemployment

benefits as defined in the EU-SILC clearly capture some extra benefits that are not captured in the definition of the other data sources. It is implausible to find such substantive amounts of unemployment benefits in the high income deciles. Probably this is due to inclusion of severance pays and other like benefits that could not be separated from the true unemployment benefits. Old age benefits are quite high in MIMOSIS in the middle of the income distribution while they are high relative to the other sources for the top income deciles in the HBS (Table 2-17). Survivor pensions, on the other hand, are substantially higher in the PSBH data than in any other dataset (Table 2-18). Sickness benefits are high in MIMOSIS and HBS and low in EU-SILC and PSBH (Table 2-19). Disability benefits don't really show a clear pattern of differences between datasets. Overall, disability benefits are quite similar across datasets, with EU-SILC being the most generous (Table 2-20). Social assistance benefits are similar between MIMOSIS and EU-SILC, with the former showing quite a substantial average for the first decile (Table 2-21). It might seem odd to still find households receiving social assistance benefits in the top of the income distribution. In general, social assistance is an individual right and the means of other household members are not always (fully) taken into account when determining eligibility to and the amount of social assistance benefits.

TABLE 2-14 GROSS EMPLOYEE INCOME IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	28.75	119.13	209.85	25.51
2	209.04	295.23	365.13	303.40
3	446.41	435.51	509.93	541.92
4	537.54	718.09	814.99	1041.44
5	961.59	1125.59	1005.95	1393.49
6	1718.16	1720.98	1585.75	2121.45
7	2791.56	2474.66	2085.74	2461.52
8	3851.11	3089.81	2403.40	3373.89
9	5106.79	3652.83	3024.52	3537.70
10	7872.99	5731.25	3616.18	4638.75
Total	2352.37	1935.76	1561.73	1942.42

TABLE 2-15 FAMILY/CHILDREN-RELATED ALLOWANCE IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	73.87	82.38	n/a	90.36
2	103.86	73.93	n/a	180.94
3	87.70	55.45	n/a	201.64
4	57.17	60.74	n/a	268.26
5	71.91	66.11	n/a	260.11
6	88.40	83.61	n/a	306.32
7	94.89	89.20	n/a	240.13
8	90.24	78.44	n/a	251.67
9	75.24	66.64	n/a	160.28
10	53.46	60.01	n/a	106.69
Total	79.67	71.66	n/a	206.59

TABLE 2-16 UNEMPLOYMENT BENEFITS IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	28.41	174.13	200.28	32.30
2	232.37	231.92	156.47	124.35
3	214.03	135.57	137.77	102.89
4	110.44	128.82	109.69	64.37
5	90.13	148.22	102.45	58.24
6	68.80	147.25	61.13	54.33
7	64.72	122.40	73.79	38.64
8	46.63	140.73	57.90	42.30
9	37.78	160.68	49.21	30.83
10	22.92	557.45	24.79	23.34
Total	91.62	194.71	97.37	57.18

TABLE 2-17 OLD-AGE BENEFITS (A.O. PENSIONS, EARLY RETIREMENT, SURVIVOR (AFTER AGE 65), …) IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	91.05	226.67	357.70	63.56
2	365.63	338.70	522.43	470.66
3	489.28	505.25	636.13	606.63
4	882.33	529.12	661.66	489.83
5	894.03	490.77	670.64	580.97
6	795.07	438.83	587.51	474.48
7	528.46	283.03	535.49	414.98
8	457.51	199.36	570.26	214.74
9	365.58	255.11	495.68	215.60
10	279.90	140.35	422.84	272.23
Total	514.88	340.67	546.01	380.24

TABLE 2-18 SURVIVORS' BENEFITS (AGED 64 OR LESS) IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	1.65	18.26	n/a	0
2	9.73	20.50	n/a	15.74
3	11.59	17.57	n/a	25.97
4	21.23	23.92	n/a	28.88
5	33.38	10.92	n/a	15.74
6	32.37	16.94	n/a	29.66
7	22.50	13.76	n/a	39.48
8	18.65	4.76	n/a	28.64
9	15.97	12.10	n/a	76.13
10	12.36	4.50	n/a	82.11
Total	17.94	14.33	n/a	34.21

TABLE 2-19 SICKNESS BENEFITS IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	0.62	10.54	16.40	0
2	4.63	15.80	27.88	2.26
3	9.85	16.31	29.08	4.71
4	8.73	9.29	34.56	16.95
5	16.03	14.18	38.29	6.76
6	24.47	10.06	52.33	7.70
7	36.14	13.11	58.36	1.31
8	50.11	11.53	56.37	6.13
9	64.82	5.06	56.59	7.24
10	77.16	8.14	101.61	18.24
Total	29.26	11.41	47.13	7.13

TABLE 2-20 DISABILITY BENEFITS IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	13.82	54.29	46.40	4.28
2	44.69	57.06	61.92	50.54
3	65.78	59.00	46.08	22.32
4	33.09	66.63	51.98	32.48
5	29.09	78.96	40.36	39.98
6	28.15	55.66	27.91	38.79
7	29.88	33.36	32.64	31.18
8	24.49	26.82	24.75	30.67
9	16.52	13.41	16.18	34.55
10	7.95	15.63	23.45	9.26
Total	29.34	46.09	37.17	29.42

TABLE 2-21 SOCIAL ASSISTANCE IN EURO PER MONTH

	MIMOSIS	EU-SILC	HBS	PSBH
1	93.34	45.89	n/a	1.31
2	5.96	9.19	n/a	0.55
3	2.21	4.01	n/a	0.65
4	0.87	0.50	n/a	0.93
5	0.84	2.78	n/a	0.00
6	0.69	0.42	n/a	0.45
7	0.63	0.73	n/a	0.00
8	0.41	0.37	n/a	0.00
9	0.23	0.04	n/a	0.00
10	0.20	0.57	n/a	0.00
Total	10.54	6.46	n/a	0.39

3 MIMOSIS VS EUROMOD: DIFFERENCES AND SIMILARITIES

While both EUROMOD and MIMOSIS are tax benefit models there are some differences between the two that will be discussed in this section. The main differences lie in the underlying dataset, the choice and scope of modeling and the baseline policy year. Those differences will of course be revealed in the basic statistics but also in the kind of simulations, both static and behavioural, that can or could be run with both models.

Table 3-1 gives a brief overview of the differences (and similarities) between the two models as far as data, legislation, scope, modeling choices, and technicalities are concerned.

TABLE 3-1 MIMOSIS VERSUS EUROMOD: AN OVERVIEW

	MIMOSIS	EUROMOD
Scope	• Belgium • Tax Benefit	• 15 EU-countries (extended to 27 in the future) • Tax benefit +indirect taxes +non-cash benefits +tax evasion
Data	• Administrative • 2001 • 305019 individuals	• BE: PSBH 2001 • Update for EU-SILC05 (incomes 2004) • 7336 individuals
Legislation	• 2001 • Update for 2002-2009	• 1998 to 2005 • Update for 2005-2010
Modeling	• All benefits, even pensions • Not healthcare expenses • No behaviour • Disposable income: parts missing	• No unemployment benefits or pensions • Not healthcare expenses • No behaviour • Disposable income: comprehensive
Technical	• Exe-file (Fortran) • (quite) hard coded • No user interface • Not publicly available	• C++ • Flexible (through use of pre-defined functions) • Excel user interface • Publicly available

A first quantitative comparison concerns the underlying data with respect to demographic characteristics.

3.1 MIMOSIS VERSUS EUROMOD: DEMOGRAPHICS

In Table 3-2 we show the distribution of households according to age of the household head in the two datasets, i.e. administrative data of MIMOSIS versus PSBH survey data of EUROMOD. In the administrative data the head of the household, taken from the national register, is the person that manages the household affairs or contributes the largest part of household income. If a head is missing then the oldest member is appointed head of household. In EUROMOD the head of

household is the richest person in the household. If equally rich the oldest household member is taken as the head of household. Both definitions are thus very similar.

As far as demographics are concerned both underlying datasets show a similar pattern. The absolute number of households in Belgium is larger in MIMOSIS than it is in EUROMOD. This might be due to the sample design, but can also be due to slight differences in the definition of a household, although we have tried to keep definitions as similar as possible.

The MIMOSIS dataset seems to have more households with a head of household that is in (upper) working age, from 35 to 65, and less with a head that is older than 65 (except 70 to 75). Younger households are also more prevalent in the MIMOSIS dataset with about 45,000 households with a head younger than 25 more in MIMOSIS than in EUROMOD.

Regions are represented quite equally, percentage-wise, in both datasets.

Table 3-3 shows the distribution of households in both datasets according to household type. Here we see a big discrepancy between the two datasets for singles, where MIMOSIS counts about 250,000 less singles in Belgium than does the PSBH. We have no direct explanation for this, moreover since there is no one other category that shows the reverse pattern.

TABLE 3-2 MIMOSIS VERSUS EUROMOD: DEMOGRAPHICS

	EUROMOD		MIMOSIS	
Age head of household	Number of households	% of population	Number of households	% of population
<=25	116,474	2.8	161,995	3.7
>25 and <=30	328,323	7.8	306,553	7.1
>30 and <=35	407,349	9.6	401,403	9.3
>35 and <=40	431,325	10.2	453,687	10.5
>40 and <=45	474,787	11.2	441,827	10.2
>45 and <=50	413,564	9.8	422,709	9.7
>50 and <=55	361,765	8.6	413,446	9.5
>55 and <=60	285,059	6.8	317,552	7.3
>60 and <=65	259,863	6.2	311,593	7.2
>65 and <=70	326,617	7.7	313,610	7.2
>70 and <=75	282,987	6.7	311,429	7.2
>75 and <=80	268,418	6.4	265,806	6.1
>80 and <=85	148,202	3.5	120,027	2.8
>85 and <=90	89,639	2.1	74,113	1.7
>90	30,143	0.7	24,848	0.6
Region				
Brussels	458,810	10.9	474,480	10.9
Flanders	2,352,726	55.7	2,446,617	56.4
Wallonia	1,412,979	33.5	1,419,501	32.7
Total	4,224,515	100	4,340,598	100

TABLE 3-3 MIMOSIS VERSUS EUROMOD: HOUSEHOLD TYPES

	EUROMOD		MIMOSIS	
	Number of households	% of population	Number of households	% of population
couple, no child	1,610,255	38.1	1,365,344	31.5
couple, one child	435,803	10.3	463,095	10.7
couple, two children	380,229	9.0	454,710	10.5
couple, three or more children	130,504	3.1	218,794	5.0
single, no child	1,541,339	36.5	1,531,978	35.3
single, one child	84,679	2.0	183,057	4.2
single, two children	37,562	0.9	85,503	2.0
single, three or more children	4,144	0.1	38,117	0.9
Total	4,224,515	100	4,340,598	100

Finally, in Table 3-4 we show the distribution of Belgian households according to economic status of the head of the households in the two models. The number or employees is quite similar in the two underlying dataset. The number of civil servants, unemployed and inactive heads of household show large differences however.

The difference in the number of civil servants is probably due in part to the fact that in the PSBH, the dataset underlying EUROMOD, a person is classified as "civil servant" if (s)he works for an organization in the public sector. In MIMOSIS however a distinction is made between civil servants and wage earners in the public sector who have the same statute as wage earners on the private labour market. The differences in unemployed and inactive seem to be partly absorbed in the "other" category in EUROMOD. It is possible that no clear classification was possible based on the survey data and that those individuals were assigned to the "other" category. It is safe to say that unemployed and inactive households are underrepresented or misallocated in EUROMOD.

The number of employee and pensioner households are quite similar in both datasets, both in absolute number as in percentage terms. For "employees" this is rather unexpected as we would have expected the differences in civil servants and employees to more or less balance out, which is clearly not the case.

TABLE 3-4 MIMOSIS VERSUS EUROMOD: ECONOMIC STATUS HOUSEHOLD HEAD

	EUROMOD		MIMOSIS	
	Number of households	% of population	Number of households	% of population
other	530,177	12.6	151,361	3.5
employee	1,361,552	32.2	1,429,979	32.9
civil servant	685,479	16.2	348,948	8.0
self-employed	303,365	7.2	453,816	10.5
pensioner	1,114,133	26.4	1,138,482	26.2
unemployed	145,515	3.4	394,611	9.1
inactive	84,294	2.0	423,401	9.8
Total	4,224,515	100	4,340,598	100

3.2 MIMOSIS VERSUS EUROMOD: INCOME CONCEPTS AND BASIC STATISTICS

In this section we look at the distribution of income in the two models and will also look at some basic statistics such as inequality and poverty.

In Table 3-5 we show some summary statistics for different income components. As can be seen both median and mean gross labour and self-employment income is higher and more concentrated in EUROMOD than it is in MIMOSIS. The replacement incomes from pension and unemployment are more similar in median and mean as well as in standard deviation. Disposable income on the other hand is again quite different with households in EUROMOD having, on average, about €7,000 more in disposable income than households in MIMOSIS. The latter may be due to the fact that in MIMOSIS data on income from property, equity, and other financial and non-financial assets is lacking while in EUROMOD they are included in the disposable income component.

In Figure 1 we focus on the distribution of gross labour income for employees and civil servants. In general the two distributions are quite similar, except for the first bracket where we find far more individuals with a low gross labour income (<=€5,000) in MIMOSIS than in EUROMOD. The picture for self-employment income and unemployment benefits is quite different as can be seen in Figure 2 and Figure 3. Remember that self-employment income is from administrative data sources for MIMOSIS and from survey data for EUROMOD. The same goes for unemployment benefits, although here we show the simulated benefits for MIMOSIS. Nevertheless, aggregate unemployment benefits in MIMOSIS correspond reasonably well with external sources and remember that the classification "unemployed" is based on administrative data.

TABLE 3-5 DIFFERENT INCOME CONCEPTS IN EUROMOD AND MIMOSIS: SUMMARY STATISTICS (EURO PER YEAR)

	EUROMOD			MIMOSIS		
	Median	Mean	Standard deviation	Median	Mean	Standard deviation
Gross labour income	25285	27797	16721	23753	26102	20813
Gross self-employment income	19060	24360	23832	15937	20246	42640
Gross unemployment income	5949	6288	4233	5397	6128	3754
Gross pension income	12315	12239	8546	11755	12769	7338
Disposable income	22733	27102	20399	17262	20954	14131

FIGURE 1 MIMOSIS VERSUS EUROMOD: GROSS YEARLY LABOUR INCOME EMPLOYEES AND CIVIL SERVANTS

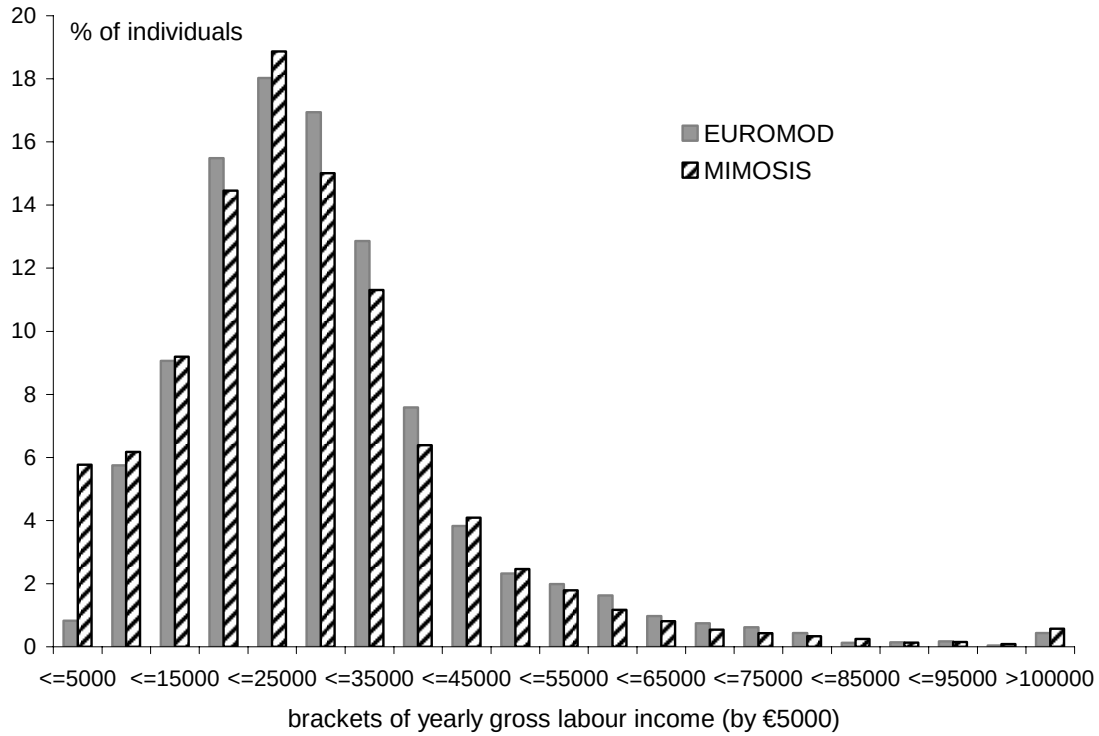


FIGURE 2 MIMOSIS VERSUS EUROMOD: GROSS YEARLY SELF-EMPLOYMENT INCOME

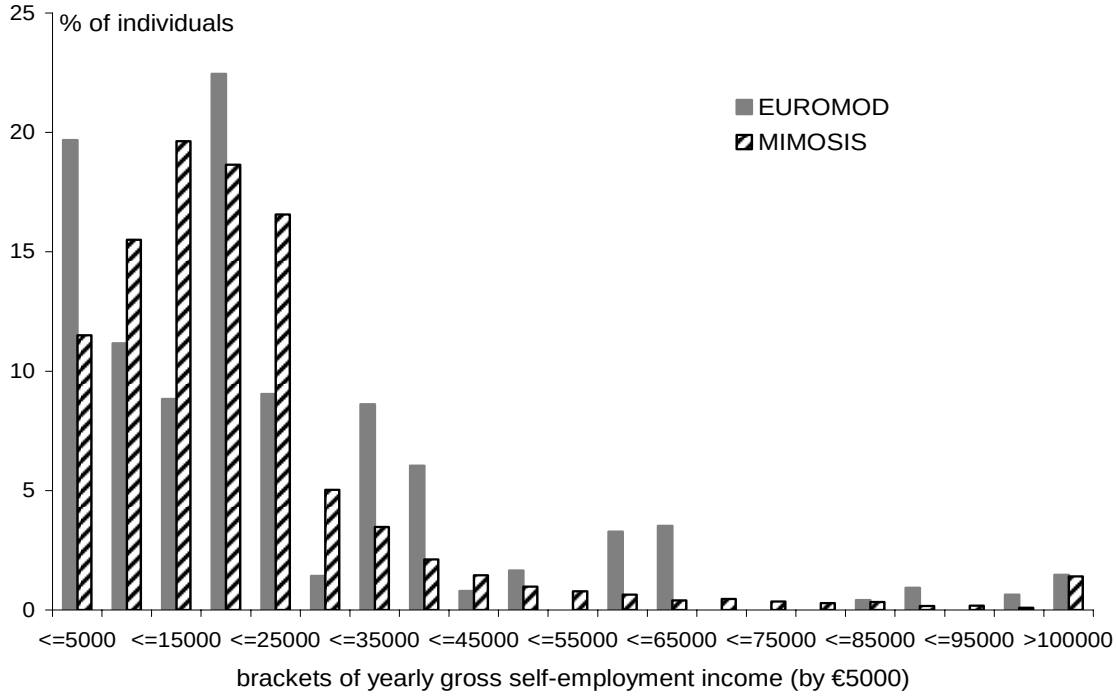
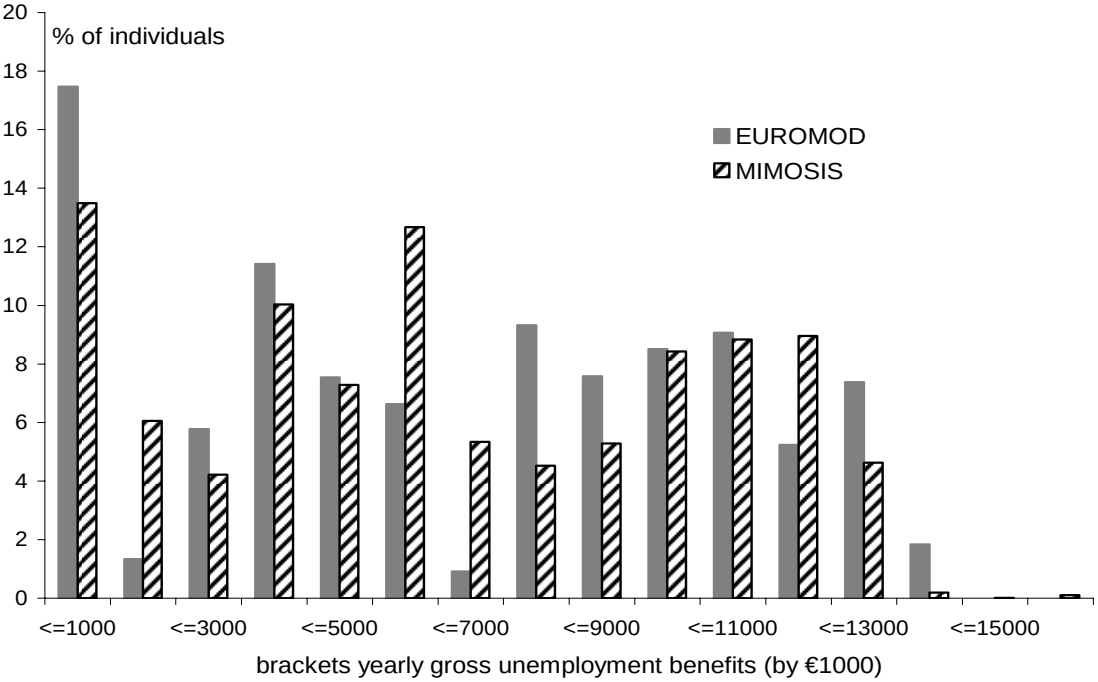


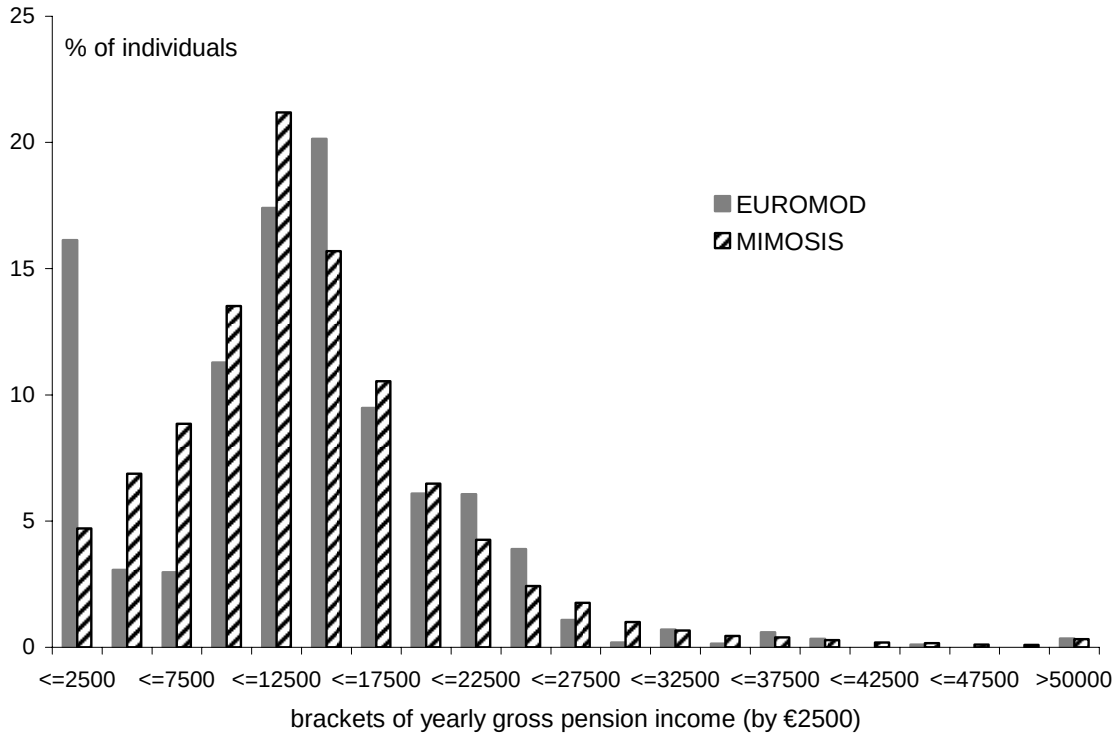
FIGURE 3 MIMOSIS VERSUS EUROMOD: GROSS YEARLY UNEMPLOYMENT BENEFITS



In Figure 4 the distribution of gross pension income is shown. In both models the distribution is quite similar except for the first bracket that shows a much higher density of low pension incomes

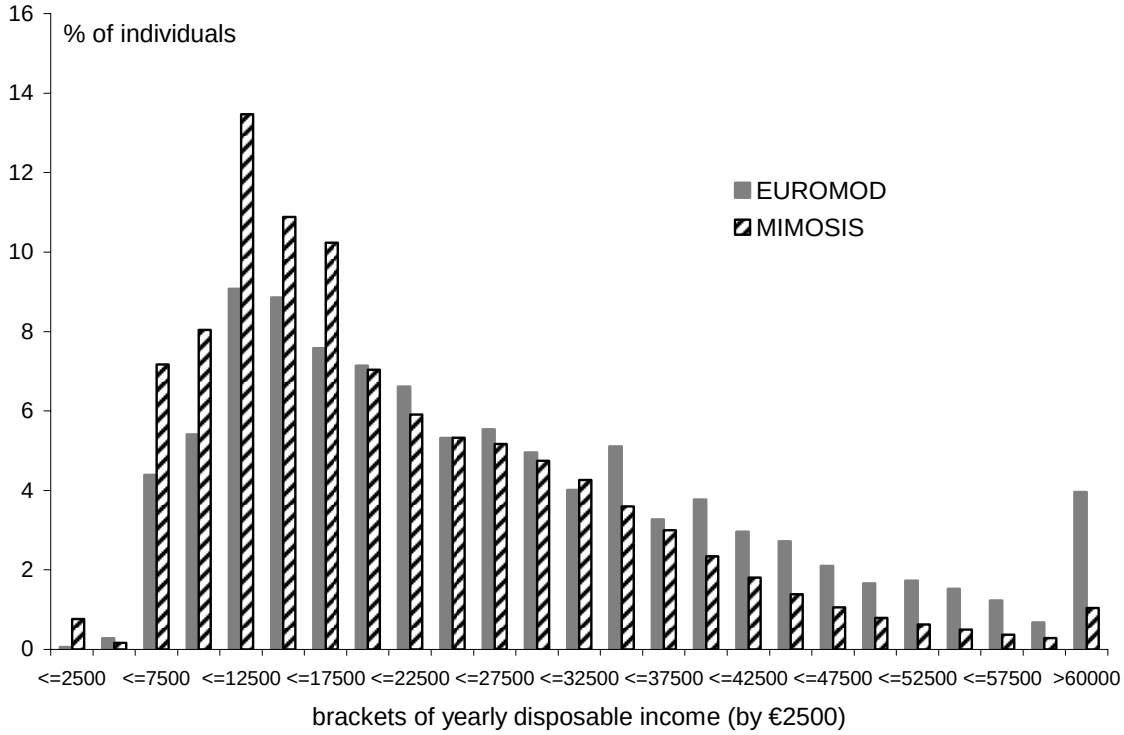
in EUROMOD than in MIMOSIS. Similar to the remark made for self-employment income: the pensions in MIMOSIS are from administrative data sources while those in EUROMOD are from survey questions, i.e. pension amounts are not simulated in MIMOSIS or in EUROMOD.

FIGURE 4 MIMOSIS VERSUS EUROMOD: YEARLY GROSS PENSION INCOME



The distribution of disposable income is shown in Figure 5. Here we see what we already implicitly saw in the summary statistics: the distribution has a fatter tail in EUROMOD than in MIMOSIS where more individuals are situated in the lower ranges. We already mentioned that this could be due to missing data on income from financial and other assets, which seems plausible given the shape of the two distributions: more individuals with higher incomes in EUROMOD than in MIMOSIS. The Gini coefficient of 22.9 in MIMOSIS compares to one of 25.8 in EUROMOD: not surprisingly, adding income from other sources than labour increases inequality.

FIGURE 5 MIMOSIS VERSUS EUROMOD: YEARLY DISPOSABLE INCOME



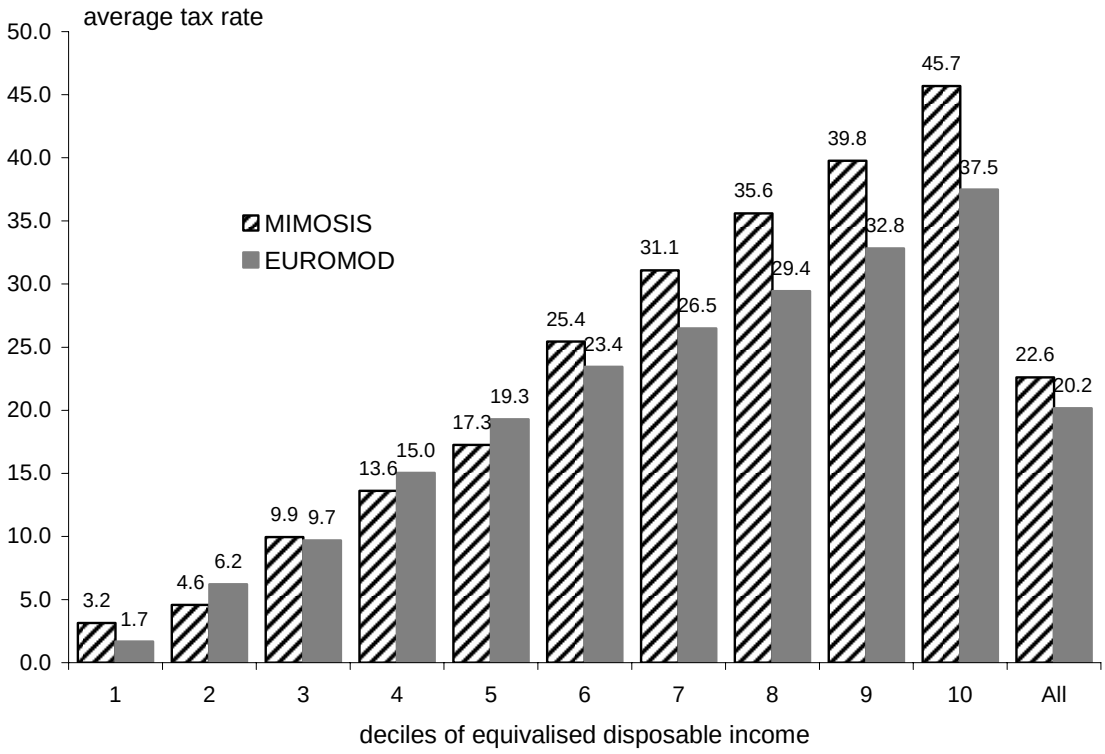
3.3 MIMOSIS VERSUS EUROMOD: AVERAGE AND MARGINAL TAX RATES

In this section we compare average and marginal tax rates calculated with EUROMOD and MIMOSIS on their respective datasets. We first look at tax rates for the entire population in Figure 6. Average tax rates, defined as the difference between gross and net income as a percentage of gross income, are in general higher in MIMOSIS than in EUROMOD especially for the higher deciles. This is not surprising knowing that disposable income is considerably higher in EUROMOD as is shown in Table 3-6. Deciles are based on equivalent disposable household income.

TABLE 3-6 MIMOSIS VERSUS EUROMOD: AVERAGE DISPOSABLE INCOME PER DECILE (EURO PER YEAR)

Decile of equivalent disposable income	EUROMOD	MIMOSIS
1	9162	8540
2	14215	10712
3	16457	14406
4	19770	16015
5	23336	16659
6	26788	19881
7	29829	22763
8	34373	27433
9	39033	31224
10	58128	41908
All	27102	20954

FIGURE 6 MIMOSIS VERSUS EUROMOD: AVERAGE TAX RATES ENTIRE POPULATION



Marginal tax rates are calculated by increasing gross income by 3% (standard practice in the literature) and simulating what happens to net disposable income, i.e. how much of the extra income gets taxed away. We show results for the entire population and for employees only.

Table 3-7 shows the effective marginal tax rates for the entire population. Also here MIMOSIS produces higher rates but the pattern is very similar across the models especially from the third decile onward. The same holds when we look at the subgroup of employees only in Table 3-8. In general, employees in the lower income deciles face higher marginal tax rates than non-employees.

TABLE 3-7 MIMOSIS VERSUS EUROMOD: EFFECTIVE MARGINAL TAX RATES ENTIRE POPULATION

Decile of equivalent disposable income	EUROMOD	MIMOSIS
1	52.8	66.6
2	59.5	47.4
3	48.0	48.1
4	48.1	52.6
5	53.7	56.5
6	52.2	55.2
7	51.7	56.0
8	52.5	56.8
9	53.4	58.6
10	55.3	61.0
All	52.9	56.5

TABLE 3-8 MIMOSIS VERSUS EUROMOD: EFFECTIVE MARGINAL TAX RATES SUBPOPULATION OF EMPLOYEES

Decile of equivalent disposable income	EUROMOD	MIMOSIS
1	66.0	64.5
2	68.8	55.5
3	49.7	50.8
4	49.0	55.0
5	54.6	56.1
6	52.0	56.8
7	51.6	57.5
8	52.6	57.6
9	53.7	59.3
10	55.2	61.4
All	53.6	57.9

3.4 CONCLUSION

We can conclude that MIMOSIS models a larger part of the tax benefit system than EUROMOD does since it also models unemployment benefits and pensions, two policy domains that are currently not modeled in EUROMOD.

As far as representativity of the dataset is concerned MIMOSIS seems to capture fewer couples without children, more singles with children and more unemployed than does EUROMOD. Probably this is due to slightly different definitions of the household concept and also to lack of or poor information on economic status in the survey data. Remember that the number of unemployed was unrealistically low in the EUROMOD data.

Both models produce similar results and patterns for average and effective marginal tax rates, both for the entire population as for the subgroup of employees. This can also be seen as a validation of the coding of the tax benefit legislation in general and the personal income tax module in particular.

It is not surprising that the dataset underlying MIMOSIS is much richer than the survey data underlying EUROMOD. It is probably also more accurate for many variables. For certain relevant income concepts, such as income from employment on the private and public labour market and replacement incomes, MIMOSIS is definitely a superior source of information than survey data, especially for income from employment. This information is obtained directly from the employers and used by social security and tax authorities to calculate contributions and withholding taxes. Still, it needs to be reminded that there are certain disposable income components that are not captured in MIMOSIS and that make it less suitable for *comprehensively* describing the distribution of living standards. Moreover, constructing and subsequently maintaining such a rich dataset is a very tedious and time-consuming task.

4 MIMOSIS IN ACTION: THREE APPLICATIONS

In this section we present three applications of MIMOSIS. The first application analyses distributional effects of increasing social minima to the poverty threshold. A second application assesses the effects of 8 years of "purple" policies on the distribution of incomes, inequality and poverty. The third and final application can be seen as a complement to the second one. It analyses average and marginal effective tax rates and if or how they have changed from 2001 to 2007. While all simulations are static, the third one provides insights on effects of policies from 2001 to 2007 on incentives to supply labour without actually quantifying these effects, if any. Although we compared average and marginal tax rates between EUROMOD and MIMOSIS for 2001 in section 3.3, this could not be done for 2007 as this legislation is not (yet) available in EUROMOD at the time of writing. The same holds for the simulation of the effects of 8 years of "purple" policies on the distribution of incomes. As for the adaptation of social minima, some of them or either not observed or not simulated in EUROMOD (or both). We thought that including the 2007 legislation in the simulations, besides providing valuable insights in the evolution of the income distribution and economic incentives over time, also gives yet another example(s) of the strength and applicability of MIMOSIS.

4.1 ADAPTING SOCIAL MINIMA TO THE POVERTY THRESHOLD IN BELGIUM: INSIGHTS AND IMPLICATIONS OF POTENTIAL POLICY REFORMS

In this application we use MIMOSIS to simulate the budgetary and redistributive impact of alternative reforms. The aim of these hypothetical reforms is to adapt the Belgian social minima to the poverty thresholds. Several simulations are performed using two alternative scenarios, SILC 2004 and 2005 poverty thresholds, and three different reform designs. The results show that the redistributive impact of these reforms, even for the less ambitious among them, is significant for many categories of the population under the poverty threshold. With a budgetary cost of 118.5 Million €, the poverty rate is expected to diminish from 13.9% to 11.0%, with a higher decrease in poverty rates among the out of work population, the single and single-parent households and the intermediate age categories of the population (30 to 59 years old).

4.1.1 Introduction

The Open Method of Coordination (OMC) adopted by the European Union in its Lisbon 2000 meeting, fixed a series of social inclusion targets, among which the reduction of poverty. These targets were associated with specific indicators defined at the EU Laeken 2001 meeting, known today as the EU National Action Plan Inclusion Indicators (NAP-Incl framework).

In this application we are interested in two of these indicators, the poverty rate and the poverty gap, as measured for Belgium, and on the potential impact on them of hypothetical reforms of social minima. For this purpose we use MIMOSIS for the baseline scenario.

The aim of these hypothetical reforms is to increase the social minimum allowances to above the Belgian poverty threshold as measured in the Survey on Income and Living Conditions (SILC).[2] As minimum allowances are earnings tested, the effect of these reforms will be the increase of allowances for all the beneficiaries in the Baseline scenario, on the one hand, and the arrival of new beneficiaries, on the other hand. The main assumption underlying our simulations is that individuals' labour market participation is not affected by the reforms. In a future extension of this study we plan to integrate endogenous individuals' behaviour as well.

Several simulations are performed using two alternative scenarios and three reform designs. They are inspired by a law proposition made to the Chamber (Wetsvoorstel Leefloon, 2008), and the objective is not only to estimate the impact of these reforms on income distribution, but at the same time to provide an estimation of their budgetary cost.

The two scenarios consist in an increase of social minima, mainly the subsistence allowance received by the social assistance beneficiaries, to the poverty threshold computed using SILC 2004 (Scenario 1) and SILC 2005 (Scenario 2) respectively, plus a supplement corresponding to a 2% threshold increase.

Under Reforms A and B, only subsistence allowance levels are adapted and under Reform C all other social minima also increase up to the same minimum thresholds. The distinction between Reform A and B is that in the first of them the allowance assigned to a person living with a partner who earns any kind of income, is maintained at its actual level of 2/3 of the single household allowance, and in Reform B it is upgraded to 1/1. The same adaptation as in Reform B is also applied to Reform C.

The results show that the redistributive impact of these reforms, even for the less ambitious of them, is significant for many categories of the population under the poverty threshold. With a budgetary cost of 118.5 Million € for the first reform and first scenario, the poverty rate is expected to diminish from 13.9% to 11.0%, with a higher decrease in poverty rates among the out of work population, the single and single-parent households and the intermediate age categories of the population (30 to 59 years old).

In the next section we present the scenarios and the reform design. Section 4.1.3 shows their budgetary cost and section 4.1.4 their redistributive impact. Section 4.1.5 concludes.

4.1.2 Scenarios and reform design

Our simulations were performed using two alternative scenarios and three reform designs.

The two scenarios consist in an increase of social minima, mainly the subsistence allowance received by the social assistance beneficiaries, to the poverty threshold computed using EU-SILC 2004 (Scenario 1) and 2005 (Scenario 2) respectively, plus a supplement corresponding to a 2% threshold increase.

The Belgian poverty thresholds for a single household were 777 € per month for EU-SILC 2004, and 822 € per month for EU-SILC 2005 (FPS Economy, 2007) in 2003 prices.

[2] In Belgium, SILC is run jointly by EUROSTAT and the National Institute of Statistics (NIS-INS).

For the design of the three alternative reforms we adopt an individual perspective. More precisely, it is on the basis of the percentage increase of the minimum subsistence allowance corresponding to a single household that the other social minima are adapted.

Under Reforms A and B, only minimum subsistence levels are adapted and under Reform C all other social minima also increase up to the same minimum thresholds. The distinction between Reform A and B being that in the first of them the allowance assigned for a person living with a partner who earns any kind of income, is maintained as its actual level of 2/3 of the one-person household allowance, and in Reform B it is upgraded to 1/1. The same adaptation is applied to Reform C.

Reform A

The reference amount taken into account for the adaptation of the allowance is the single household. The percentage increase is then also applied to the other categories of beneficiaries. This adaptation is granted to all people aged less than 65 years old and being entitled to the subsistence allowance based on an earning test.

In Table 4-1, we sum up the adaptations brought to minimum income with this measure. For each possible minimum allowance and each threshold, it displays the reference amount, that is, the one which is currently given, the amount granted with the reform and the percentage difference between both. Taking as a reference the one-person household amount, we adapt it to reach 792.54 € (777 € * 1.02). For other categories we apply the actual legislation. Individuals with partners who earn an income receive 2/3 of the single household allowance (528.36€) and the allowance of individuals with partners without any income is increased by 33% (1,056.7 2€). The same applies for the Scenario 2 as reported in Table 4-1.

We observe that the reference amount is below the threshold for both scenarios and needs to be adapted, + 15.9 % for Scenario 1 and + 22.6 % for Scenario 2.

Reform B

Reform B follows mostly Reform A. It also consists in an increase of the minimum subsistence allowance above the poverty line. But this time, the allowance for an individual with a partner who earns any kind of income, is upgraded to the level of the single household allowance. This is part of the reform included in the law proposal and goes in the direction of an individualisation of social allowances.

Table 4-1 summarizes the situation after the reform for this category of beneficiaries. The increase reaches 73.8 % in Scenario 1 and 83.9 % in Scenario 2 for beneficiaries having a partner with income. This represents almost 60 % of extra income compared to Reform A.

Reform C

The last reform carried out proceeds in the same way as in Reform B, but takes into account all minimum social allowances. Table A1 in the Appendix reports the adaptations for each one of the social protection schemes concerned by this reform. More than 30 minima are considered, other than subsistence allowances. Several of them do not need adaptation in Scenario 1 as they are higher than the minimum thresholds (792.5 € and 1,056.7 for single and couple households, respectively). Under Scenario 2 there is still the case, but only for three of them.

TABLE 4-1 ADAPTATION SUBSISTENCE ALLOWANCE

Beneficiary	Baseline	Scenario 1		Scenario 2	
	million €	million €	%	million €	%
Reform A					
Partner with income	455.96	528.36	15.9	558.96	22.6
Single	683.95	792.54	15.9	838.44	22.6
Individual without income	911.93	1.056.72	15.9	1.117.92	22.6
Reforms B and C *					
Partner with income	455,96	792,54	73,8	838,44	83,9
Single	683,95	792,54	15,9	838,44	22,6
Individual without income	911,93	1.056,72	15,9	1.117,92	22,6

* For other details on Reform C, see Table A1 in the Appendix.

4.1.3 Budgetary impact of the reform

As noted before, all the reforms were simulated assuming that the 2001 legal rules are of application. To be able to have a more realistic evaluation of the budgetary cost of each of these reforms, we apply the same percentage increase, simulated for 2001, to the corresponding budget in 2008.

In other words, the different reforms were simulated through a three-step procedure:

1. Use of 2001 nominal amounts, adapted with the percentage change of the amounts that the legislator plans to introduce for 2008.
2. Computation of the percentage change in the 2001 budget before and after the reform.
3. Application of the percentage change in the simulated budget to the 2008 framed budget.

These results are reported in Table 4-2. The first column shows the percentage change estimated with 2001 data. In the second column is presented the framed budget from 2008, collected through external sources (FOD Sociale Zekerheid, 2008). The last column presents the estimated change, in millions of €, accordingly to the 2008 budget. The detailed results for Reform C are presented in Table A.2 in the Appendix.

Note first that reforms have two expected effects as a result of social minima adaptations. One corresponds to the increase of allowances for those who are already beneficiaries in the Baseline scenario and the other to the budgetary cost of new beneficiaries driven by the increase of earning

test thresholds. Note that for the other schemes included in the Reform C, only the first effect is considered, as beneficiaries are not submitted to the earning tests.

None of the scenarios under Reforms A and B have a budgetary cost that exceeds 230 million Euros, the cheapest being Reform A, Scenario 1, that demands a budget increase of 118.5 million Euros (+ 24.7 %). Reform C is much more expensive, ranging from 815.3 million for Scenario 1 to 1,254.1 million Euros in Scenario 2. The most expensive items in Reform C are the increase of unemployment allowances (369.5 millions Euros, + 6.1 %) and wage-earners disability benefits (243.4 millions Euros, + 6.0 %).

TABLE 4-2 BUDGETARY IMPACT OF REFORMS

Scenarios	2001 Baseline	2008 Projection	
	Budget increase (%)	Total budget (million €)	Budget increase (million €)
Reform A			
Scenario 1	24.7	479.4	118.5
Scenario 2	36.9	479.4	176.8
Reform B			
Scenario 1	34.3	479.4	164.7
Scenario 2	47.4	479.4	227.3
Reform C			
Scenario 1	*	*	815.3
Scenario 2	*	*	1,254.1

* For the details on Reform C budget impact, see Table A2 in the Appendix.

4.1.4 Redistributive impact of the reforms

We computed poverty rates and poverty gaps before and after each reform for some socio-economic and demographic categories. For this purpose, we use as poverty threshold the 60% of the equivalized household income computed using the OECD equivalence scale definition (1 for the head of the household; 0.5 for the other adult and 0.3 for children, aged less than 16). Accordingly with the Baseline scenario, MIMOSIS 2001, the poverty rate is 13.9% and the average poverty gap corresponds to 14.5% of the income poverty threshold.

We first look at the redistributive impact of the three reforms by socio-economic status. Individuals belong either to the working or the out-of-work population and are classified in sub-categories based on their main individual source of income. Poverty rates and average poverty gaps for these categories are reported in Table 4-3.

First of all, it appears from Table 4-3 that for the whole population the effect of reforms on the poverty rate varies from 2.9% points (Reform A, Scenario 1) to 4.4% points (Reform C, Scenario 2) with, as expected, a higher impact under Scenario 2 for all three simulated reforms.

Second, these reforms appear to have a potential impact among working poor. This category represents 3.1% of wage-earners in the Baseline scenario and diminishes to near 2.5% and 2.0% in Scenarios 1 and 2, respectively.

Third, among self-employed workers, poverty is high (15.9%) and comparable with the situation observed among the unemployed. The impact of reforms on this category of the population is however lower, from 2% to 4% poverty rate points. The explanation comes from the household composition. Self-employed belong, proportionally more than unemployed, to households in which partners have their own income. As a consequence, they beneficiate less of social minima attributed on behalf of household's earning test scrutiny.

Looking to the out-of-work categories, we remark that poverty among pensioners, 12.9% in the Baseline scenario, is slightly affected by reforms. On the one hand, it is due to the fact that Reforms A and B only concern upbringing of social minima allowances, not retirement pensions. On the other hand, even if Reform C does this, minimum pension amounts are already higher than the threshold in both scenarios (see Table A1 in Appendix).

On the contrary, this is not the case among the other "out of work" categories. Poverty rates decrease dramatically for most of them in all scenarios, particularly among the sick and disabled individuals beneficiating of specific allowances. From the baseline situation, 21.9% poverty rate, reforms indicate a potential decrease of 8.5% (Reform A, Scenario 1) to near 13 % points (Reform C, Scenario 2).

But compared to the sick and disabled category, which represents 1.8% of total population, the unemployed and "other adult" out of work categories represent a more considerable target for social minima allowances reforms. These groups represent approximately 20% of the population and in both cases the impact of reforms could potentially extract from poverty one out of three individuals, including all family members.

Other than the poverty rate, the poverty gap measure helps us to grasp the depth of poverty. Therefore, as for the poverty rate, we see a decrease in the poverty gap for working categories, mainly for wage earners and self-employed.

On the contrary, the poverty gap doesn't decrease much for the out-of-work categories. This can be explained by the fact that Reforms A and B do not involve changes in the retirement, disability or unemployment benefits, and thus do not change their situation.

However, the change is still not substantial, or even null, when applying Reform C which involves the adaptation of minima by other social schemes, except for disabled. This can have two explanations. First, these benefits are already above the poverty line (see Table A1 in the Appendix). Second, a certain part of the out-of-work poor was close to the poverty threshold before the reforms and crossed it thanks to them, while others extremely poorer get better with the reform.

We also simulated the impact of reforms on poverty by age. The results are reported in Table 4-4. We observe a decrease in poverty rates in intermediate categories, up to 5% points among the 30 to 59 years old. This is due in part to the fact that the subsistence allowances are mainly available for the 18 to 65 population but, unexpectedly, there is no significant difference between

Reforms A and B with respect to Reform C which is the more expensive in budgetary terms, as indicated before.

There is almost no impact for the very old group (75 years old and more). They are not concerned by Reforms A and B, but the effect of Reform C is also extremely limited. On the contrary, children benefit indirectly from the reforms (from 2.2% to 3.9% points depending of the reform scenario), as well as the 60 to 74 years old category in a lower extent (1.5% to 2.4% points).

Table 4-4, bottom, also reports the effect of reforms on the poverty gap by age categories. The biggest impact corresponds to the 30 to 59 years old categories. Summing up, the reform of minima subsistence allowances seems to have its potential in alleviating poverty among these categories of the population.

Family composition is another important dimension of poverty. Table 4-5 presents the impact of the reforms on single, single-parent and couples, with and without children, and other households.

We observe a huge decrease in the poverty rate among single households. They represent near 15 % of the total population and one over four of them was poor in 2001, accordingly to the Baseline scenario. Under the three simulated reforms, and the alternative scenarios, more of half of them would be out of poverty. Comparatively, single-parent households are a small population category but also suffering of high poverty rates. This is the category that appears to be the most sensible to the simulated reforms.

On the contrary, the impact of reforms is lower, as expected, among families composed of two adults with, or without, children. The higher impact among them, near 4% poverty rate points, is observed for families composed of two adults and more than two children under Reform C, Scenario 2. Under Reform C family allowances are also adapted, thus benefiting mainly to larger families.

Table 4-6 reports poverty rates by regions and, standardized household, income deciles. The greatest impact (close to 10.0% points) of simulated reforms concerns the Brussels region. This is the region with the highest proportion on minimum subsistence allowances beneficiaries. The second biggest decrease is in Wallonia, then in Flanders.

The results by income deciles show that in the 2001 Baseline situation all individuals in the first decile were poor, while 20% to 40% of them would be out of poverty after the reform, mainly among the Brussels population.

In the second decile, more than one third of the population was poor in 2001 in the three regions. As for the first decile of the population, we observe a dramatic decline in poverty after the reforms, from 10% to 20% points depending of region and the selected reforms and scenarios. As for the whole regional population level, the impact of reforms is higher in Brussels, followed by Wallonia and Flanders.

TABLE 4-3 POVERTY RATE AND POVERTY GAP BY SOCIO-ECONOMIC STATUS

Categories	Population	Baseline	Reform A		Reform B		Reform C	
			Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
	%	Poverty rate (%)						
Working								
Wage-earners	26.4	3.1	2.6	2.0	2.5	2.0	2.4	1.8
Civil servants	5.6	0.7	0.6	0.6	0.6	0.6	0.6	0.6
Self employed	6.2	15.9	14.1	12.2	13.9	11.9	13.8	11.7
Out of work								
Pensioner	15.1	12.9	12.4	12.3	12.2	12.2	12.2	11.9
Sick/disabled	1.8	21.9	13.4	13.2	13.1	12.8	8.2	7.8
Unemployed	6.4	16.0	10.3	9.6	9.9	9.2	8.6	7.1
Other: adult	13.7	35.9	24.9	24.4	24.0	23.5	23.2	22.3
student	24.7	15.3	13.1	12.4	12.9	12.2	12.4	11.3
All	100.0	13.9	11.0	10.4	10.8	10.2	10.3	9.5
	%	Poverty income gap (%)						
Working								
Wage-earners	26.4	14.3	9.6	11.5	9.3	11.3	9.2	11.5
Civil servants	5.6	11.4	9.2	8.8	9.2	8.3	9.1	8.3
Self employed	6.2	18.0	13.9	13.4	13.8	13.3	13.8	13.3
Out of work								
Pensioners	15.1	11.2	11.2	11.2	11.2	11.2	11.2	10.1
Sick/disabled	1.8	11.2	9.1	4.1	9.1	4.1	9.1	4.7
Unemployed	6.4	11.2	11.0	10.1	10.9	9.9	10.2	8.6
Other: adult	13.7	14.5	14.5	14.2	14.5	14.3	14.5	13.4
student	24.7	17.5	16.2	14.9	16.1	14.7	16.3	15.0
All	100.0	14.5	13.9	12.9	13.8	12.9	14.1	13.0

TABLE 4-4 POVERTY RATE AND POVERTY GAP BY AGE CATEGORY

Age categories	Population	Baseline	Reform A		Reform B		Reform C	
			Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
	%	Poverty rate (%)						
< 15	17.2	13.5	11.3	10.7	11.2	10.6	10.7	9.6
15-29	18.4	14.9	11.3	10.3	10.9	10.0	10.4	9.2
30-44	22.6	12.6	8.5	7.8	8.3	7.5	7.9	7.0
45-59	19.5	12.6	8.8	8.3	8.5	8.0	7.8	7.1
60-74	14.4	16.3	14.8	14.8	14.6	14.5	14.2	14.0
75 +	7.8	15.5	15.5	15.4	15.4	15.3	15.3	15.1
All	100.0	13.9	11.0	10.4	10.8	10.2	10.3	9.5
	%	Poverty income gap (%)						
<15	17.2	14.3	13.9	12.3	13.8	12.1	13.8	12.1
15-29	18.4	14.6	13.5	15.2	13.3	15.0	13.2	15.1
30-44	22.6	14.5	9.9	11.9	9.7	11.8	9.2	11.7
45-59	19.5	14.5	9.1	8.4	9.1	8.2	9.1	8.9
60-74	14.4	14.5	12.2	12.8	12.2	12.9	12.9	13.4
75 +	7.8	11.2	11.2	11.2	11.2	11.2	11.2	10.1
All	100.0	14.5	13.9	12.9	13.8	12.9	14.1	13.0

TABLE 4-5 POVERTY RATE BY HOUSEHOLD TYPE

Household type	Population	Baseline	Reform A		Reform B		Reform C	
			Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
Single	%	Poverty rate (%)						
1 adult, 0 child	14.8	24.7	11.7	10.2	11.7	10.2	11.7	10.0
Single-parent	%	Poverty rate (%)						
1 adult, 1 child	1.8	14.1	4.9	4.8	4.7	4.6	4.7	4.4
1 adult, 2 children	1.4	18.8	4.3	2.8	4.3	2.8	4.3	2.8
1 adult, > 2 childr.	0.7	14.7	4.6	3.2	4.6	3.2	4.6	3.2
Couples and other	%	Poverty rate (%)						
2 adults, 0 child	25.4	13.2	12.4	12.0	12.0	11.6	11.3	10.8
2 adults, 1 child	8.4	11.6	10.6	9.8	10.5	9.6	10.1	9.1
2 adults, 2 children	12.1	10.7	10.1	9.7	10.0	9.7	9.7	9.3
2 adults, > 2 childr.	6.4	15.0	14.1	13.3	14.0	13.3	13.2	11.3
Other	28.9	10.6	10.2	10.0	9.8	9.6	9.2	8.8
All	100.0	13.9	11.0	10.4	10.8	10.2	10.3	9.5

TABLE 4-6 POVERTY RATE BY REGION AND INCOME DECILE

Regions	Baseline	Reform A		Reform B		Reform C	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 1	Scenario 2
All							
Brussels	25.0	16.9	15.9	16.5	15.5	15.7	14.1
Flanders	11.2	9.3	8.9	9.1	8.7	8.8	8.3
Wallonia	15.8	12.4	11.6	12.1	11.4	11.4	10.4
All	13.9	11.0	10.4	10.8	10.2	10.3	9.5
1st income decile							
Brussels	100.0	67.8	63.9	65.8	61.7	64.7	59.7
Flanders	100.0	84.7	81.0	82.8	79.0	82.1	78.0
Wallonia	100.0	80.2	75.7	78.0	73.4	76.8	71.4
All	100.0	80.1	76.1	78.1	74.0	77.2	72.4
2nd income decile							
Brussels	39.8	27.2	25.2	27.0	25.2	22.4	17.3
Flanders	34.5	27.4	26.2	27.1	26.0	24.0	21.7
Wallonia	35.8	26.5	24.7	26.1	24.4	21.5	18.0
All	35.7	27.0	25.5	26.7	25.3	22.8	19.7

4.1.5 Conclusion

In this paper, we simulate the budgetary cost and potential redistributive impact of alternative reforms. The aim of these hypothetical reforms is to fight social exclusion by adapting Belgian social minima to poverty thresholds. Several simulations are performed using alternative scenarios and different reform designs. The baseline for these simulations is MIMOSIS that models all aspects of the Belgian Social Security on the basis of a representative sample composed of more than 300 000 individuals in 2001.

The results show that the redistributive impact of these reforms, even for the less ambitious among them, is significant for many categories of the population under the poverty threshold. With a budgetary cost of 118.5 Million €, the poverty rate is expected to diminish from 13.9% to 11.0%, with a higher decrease in poverty rates among the out of work population, the single and single-parent households and the intermediate age categories of the population (30 to 59 years old).

However, the results presented here are preliminary and subject to bias. Mainly, they rely on the huge assumption that individuals' behaviour, among others labour market participation, is not affected by the reforms. In a future extension of this study, we plan to integrate potential endogenous individuals' responses to the upgrade of social minima allowances.

4.2 An evaluation of tax-benefit reforms in Belgium 2001-2007

For eight years (1999-2007) Belgium was governed by a "purple" coalition of socialist and liberal parties (including also the green parties for the first 4 years). The coalition agreement included topics as increasing the employment rate, combating poverty, modernizing the social security system and decreasing the tax burden.

In this application we evaluate the tax-benefit measures that were implemented from 2001 to 2007 in terms of equity and efficiency. What was the overall effect and that of the separate measures on budget, income inequality, poverty and employment? How did these measures interact with one another?

4.2.1 "Purple reign": a new paradigm for social-economic policies

After the elections of 1999 a coalition of socialist, liberal and green parties came to power in Belgium. This government was named the 'purple coalition' (1999-2007), as socialist and liberal parties formed the main players. This 'purple' character became even more pronounced when the green parties exited after a dramatic loss in the 2003 elections. This coalition was a novel combination in Belgian national politics, as both political families were typically considered to be at opposing end of the ideological spectrum. The liberal parties put most emphasis on lowering the tax burden, whereas the socialist parties advocated the maintenance and extension of the welfare state (see also De Grauwe, 2007). Both political families subscribed to the 'Lisbon' targets for increasing employment levels, which was summarised under the heading of the "active welfare state". Until now, no systematic evaluation has taken place of the effect of socio-economic policies during these 8 years on the income position of the population. To what extent have personal taxes

decreased (a major aim of the liberals)? How important have changes in social benefits been for the income position of more vulnerable groups (an important topic for the socialists)? Our paper wants to contribute to such a systematic evaluation.

In this simulation we evaluate the effect of tax-benefit polices on the micro-level, and more specifically for private households. We analyse the tax-benefit measures that were implemented from 2001 to 2007 in terms of mainly equity, and to a lesser extent efficiency. What was the overall effect and that of the separate measures on budget, income inequality and poverty? We first provide a brief overview of the major tax-benefit policies that took place under 'purple reign'. We limit ourselves to interventions in personal income taxes, social security contributions and social benefits. In the next section we present the microsimulation model that we use, namely MIMOSIS, which runs on a large administrative database. Section 4 gives the results in terms of the effect on poverty, inequality, as well as gainers and losers. We look at overall effects, as well as in more detail to different policy sectors and specific groups. The last section concludes.

4.2.2 An overview of major policy changes

In this subsection we discuss the policy changes that took place during the period 2001-2007 that are relevant for microsimulation evaluation. We present the policies according to their policy fields: personal income taxes, social security contributions and social benefits.

4.2.2.1 Personal income taxes

From tax year 2002 until 2005, a major reform on personal income taxes was introduced. This reform had four goals: 1) alleviation of the tax burden on labour incomes; 2) impartial treatment of different forms of cohabitation; 3) improvement of the compensation for dependent children and 4) creation of ecological tax incentives. The first three goals are described in detail below. The last goal is not incorporated in the microsimulation model, and, hence, could not be taken into account. The budgetary impact of the measures of this last goal are limited, compared to the other measures.

The first goal is achieved by the abolition of the two highest marginal tax rates (55 and 52.5%) such that the highest rate in 2007 is 50%. To determine a lump sum amount on work related expenses, the rates applied on gross taxable income of employees have been augmented. The middle brackets for the personal income taxes have been broadened. A refundable tax credit for low labour incomes was first introduced and later abolished during the period 2001-2007. This tax credit, however, remained in force for self-employed and statutory civil servants. For employees with low wages it was transformed into a social security contribution reduction ("work bonus"). To comply with the second goal, legally cohabitating couples are treated in the same way as married couples (so they can also qualify for the marital quotient). The way couples are treated has changed considerably: the marital splitting rule will only be applied if it results in a tax advantage. Furthermore, all income sources that give rise to the net taxable occupational income concept on which the marital splitting rule is applied, should be redistributed from one partner to the other, using the proportion that the different income sources take in the income of highest income earner. The tax exemption for married partners has been increased to the level of a single. Finally for the

third goal, eligibility for an increased tax exemption for single parents has been broadened and the tax credit for dependent children was made refundable up to a ceiling.

4.2.2.2 SOCIAL SECURITY CONTRIBUTIONS

Employers' social security contributions have been reduced by combined structural and target deductions. Target groups consist of the elderly, low paid and low skilled employees and have been constructed to improve labour market participation of the particular groups.

On employees' side, there has been an introduction and extension of the "work bonus". This entails a reduction of employees' social security contributions. It has been installed to instantly increase the net wage from low wage employment.

4.2.2.3 SOCIAL BENEFITS

In 2006 an additional supplement was paid for children aged 6 or older and younger than 18 if these children are still attending school (the so called "**school premium**").

The **income guarantee benefit** for unemployed persons ensures that a formerly unemployed employee can never have income losses even with part time employment. The income guarantee is paid as a supplement to labour income. This benefit was a lump sum in 2001 and has been reformed to a system where the benefit is dependent on the number of hours worked. Whether this is a benefit loss or gain depends on the number of hours worked: the employee loses if he or she works less than 70% of a full time. To smooth transition between the two systems, the employee entitled to the income guarantee before 2005 has the right to claim the highest benefit.

A new career break system for employees in the private sector, called "**time credit**", was introduced. Measures were taken to activate unemployment benefits, such as the Activa job scheme. Within this job scheme part of the wages is paid by the unemployment agency when long-term unemployed are employed. The part of the wages that is paid, is then called "employment benefit".

To be classified as person with dependent family the other household member(s) of the **sick and disabled** cannot have an income that amounts to more than a monthly ceiling; this ceiling was raised in the time period considered. Since January 1st 2003 there are minimum benefits for employees in primary disablement from the 7th month of primary disablement on. The disability benefit for singles has been improved from 45% to 50% of the lost wage.

From July 1997 onwards, the women's official retirement age is gradually increased. Between 2001 and 2007 the women's retirement age shifted from 62 to 64 years of age. The minimum **pensions** have been indexed and improved. A strengthening of the minimim income guarantee for elderly has taken place.

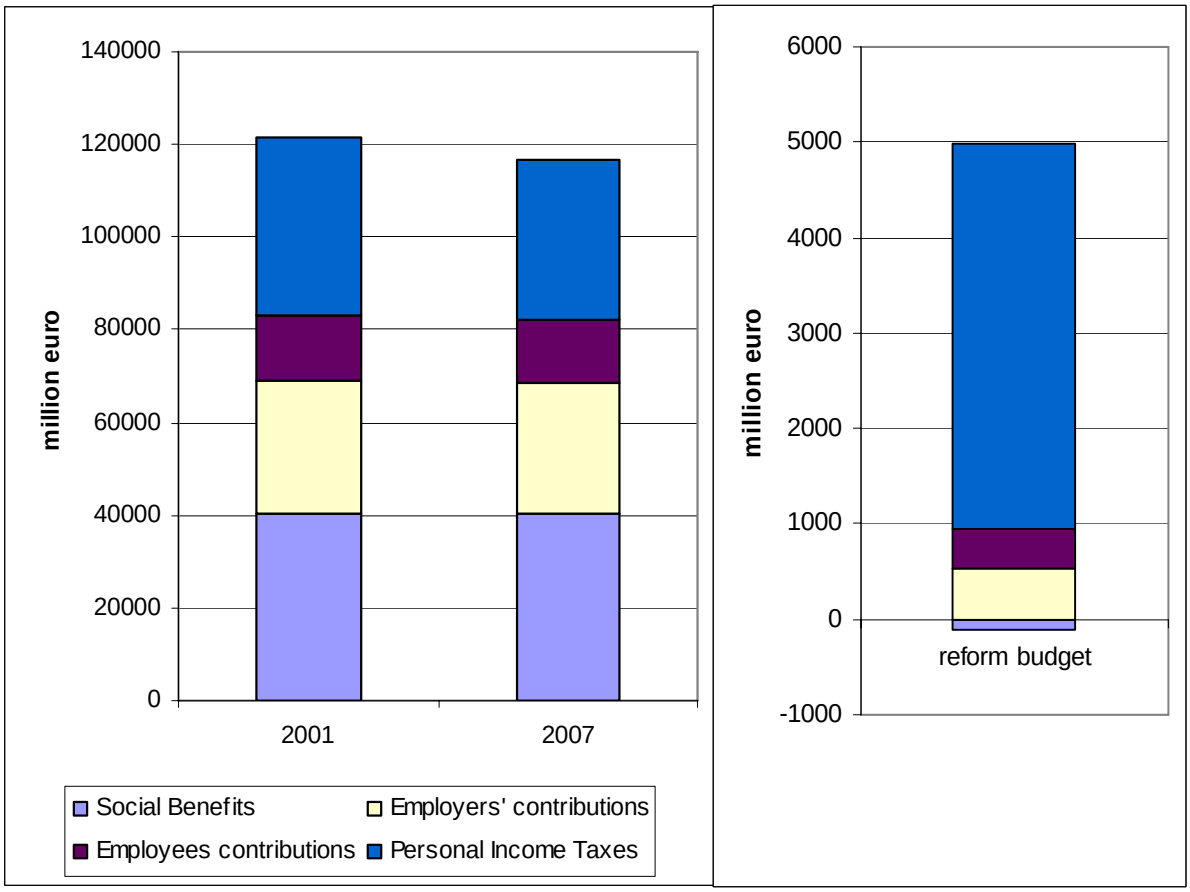
The minimum social assistance level has been individualised and improved throughout the period 2001-2007. We will not further discuss this because of the difficulties to implement the social assistance scheme in the microsimulation model used.

4.2.3 Results

4.2.3.1 Overall budgetary effects

The budgetary impact of the reform as resulted from the microsimulation is relatively large. From 2001 to 2007 the real budget spent on policy reforms in MIMOSIS over the entire period is approximately € 5 billion in 2007 prices. It entails a substantial decrease in personal income taxes paid which amounts to almost 80% of the total budget change. Social security contributions for employees (and some social benefit recipients) and employers are almost equally lowered by approximately 10% each. We find a small real decrease in the total sum of social benefits. In nominal terms this translates in a sharp increase of € 4.5 billion. This means that social benefits in total did not keep up with the consumer price index applied, in spite of efforts to strengthen most social benefits schemes.

FIGURE 7 BUDGET SHARES OF REFORMS 2001-2007. LEFT: SHARE OF DIFFERENT COMPONENTS IN TOTAL BUDGET; RIGHT: SHARE OF DIFFERENT COMPONENTS IN BUDGET CHANGE



4.2.3.2 OVERALL POVERTY EFFECTS

We have calculated at-risk-of-poverty rates on equivalised household income. The standard European poverty line of 60% of median equivalised household income is used. The modified OESO equivalence scale is adopted. The results are different depending on the choice of the year poverty line is calculated for. If the poverty line of the corresponding year is used, a small but significant increase in at-risk-of-poverty-rates is found. In contrast to this, if we compute the rate of individuals in 2007 below the inflated poverty line of 2001, we find a smaller poverty rate for 2007. A climb in poverty lines between 2001 and 2007 is the argument for this contrasting picture. Figure 8 shows the two different poverty lines and the three different at-risk-of-poverty-rates. Table 4-7 summarises the at-risk-of-poverty-rates and the (squared) poverty gaps. For these two last statistics, no significant differences between 2001 and 2007 are found.

FIGURE 8 EFFECTS ON POVERTY RISK AND POVERTY LINE

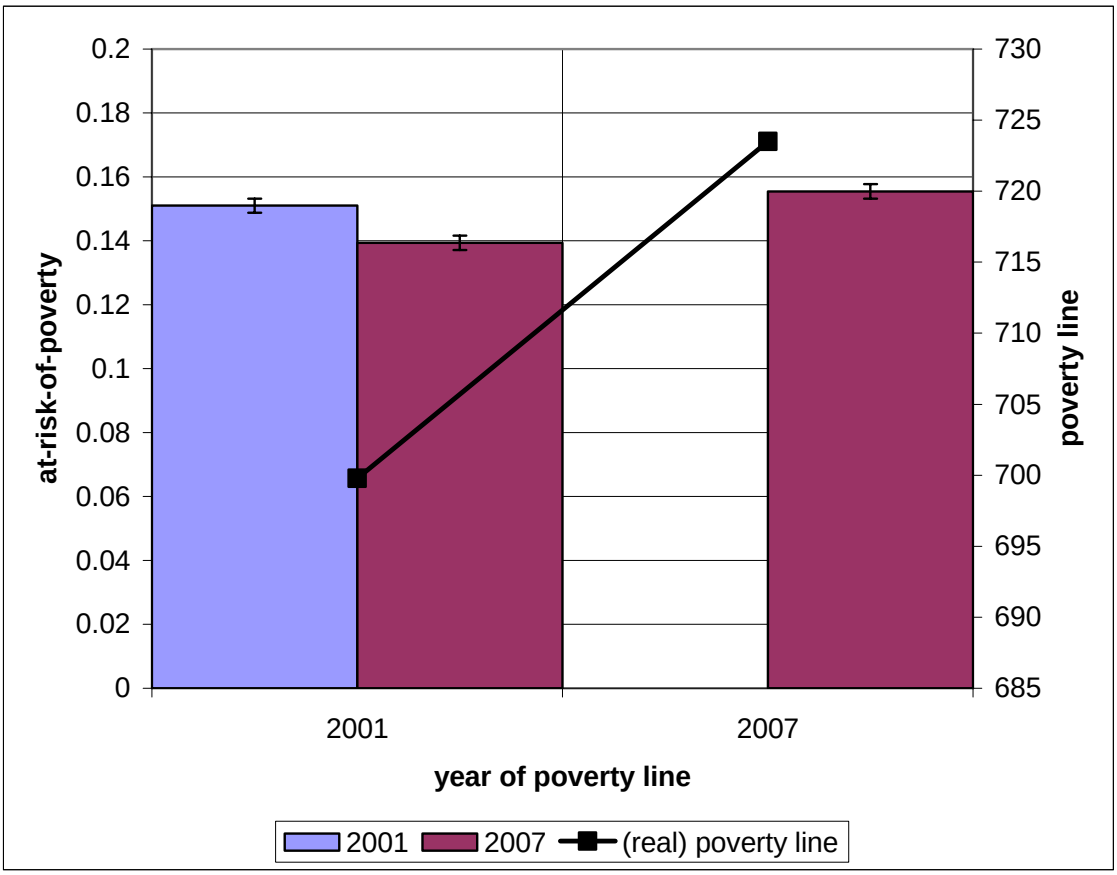


TABLE 4-7 POVERTY INDICES

	2001 (poverty line 2001)	2007 (poverty line 2007)	2007 (real poverty line 2001)
at-risk-of-poverty rate	15.10%	15.55%*	13.94%*
poverty gap	6.51%	6.67%	6.26%
squared poverty gap	4.61%	4.71%	4.53%

* significant difference between 2001 and 2007 at 5% confidence level.

4.2.3.3 OVERALL INEQUALITY EFFECTS

To further quantify the effects on income inequality, several inequality indices are taken into consideration: the general entropy (GE), Gini and Atkinson (A) indices. In Table 4-8, inequality indices are summarised for the two years, based on equivalised disposable household income of all individuals. Individuals with disposable income equal to 0 have been left out. To check for significant differences, confidence intervals (95%) are used, taking into account stratification at household level and using bootstrap techniques (Biewen & Jenkins, 2003). The results in Table 4-8 show that for all inequality indices, from 2001 to 2007 not much has changed in overall income

inequality. For only one sensitivity parameter, inequality rises significantly (i.e. GE(0) and A(1)). The Gini coefficient also displays a significant rise in inequality from 2001 to 2007.

TABLE 4-8 INEQUALITY INDICES

	2001	2007
GE(-1)	0.710268	0.734079
GE(0)*	0.126533	0.132493
GE(1)	0.105996	0.11119
GE(2)	0.132585	0.14608
GE(3)	0.490587	0.654211
GINI*	0.242114	0.246829
A(0.5)	0.0546	0.057035
A(1)*	0.118855	0.124091
A(1.5)	0.212771	0.222101
A(2)	0.586868	0.59484
A(2.5)	0.974448	0.974749

*significant difference between 2001 and 2007 at 5% confidence level.

The reported inequality indices point to a rise in inequality if higher weight is attached to changes in the distribution at middle income levels.

4.2.3.4 WINNERS AND LOSERS

The simulation of the reforms results in 83.39% of the population that wins, 1.92% maintains the status quo and 14.69% loses.

Table 4-9 shows a more detailed picture of who wins and loses with the reform. It shows equivalised average monthly incomes, in 2007 prices and per equivalent income decile, i.e. we divide the entire population of individuals in deciles of equivalised disposable household income in 2001 (prices 2007). All reported numbers are average monthly incomes in € of 2007. After disposable income per year and the absolute and relative gains, gains in personal income taxes (PIT), social benefits (SB) and social security contributions for employees (SSC) are calculated. This allows breaking down the absolute gain in separate income components.

Column 5 in Table 4-9 shows the relative gain as the ratio of the absolute gain in average disposable income to the average disposable income in 2001. The relative gain is higher than average from the 5th decile and above. This indicates that changes in average disposable income per decile have been quite progressive between 2001 and 2007. The last three columns give insight

in the policy reform behind the changes in disposable income. It is mainly the personal income taxes that seem to be the driving force behind real income differences. Indeed we find above average fall down in taxed paid from the 6th decile onwards. Lowered social security contributions on the other hand seem to be more in favour of lower income deciles, but on average have a far smaller impact on disposable income. Social benefits slightly decrease on average, although the picture is not very clear.

TABLE 4-9 DISTRIBUTION AND COMPONENTS OF DISPOSABLE INCOME: ENTIRE POPULATION (IN EUROS PER MONTH)

Deciles of disposable 2001 income	Disposable income 2001	Disposable income 2007	Change in disposable income	Relative change	Change in Personal Income Taxes	Change in Social Benefits	Change Social Security Contributions employee
1	274.53	279.13	4.60	1.68%	-2.89	-0.54	-2.30
2	694.02	714.28	20.26	2.92%	-9.48	6.04	-4.81
3	858.98	884.54	25.57	2.98%	-19.97	-0.03	-5.72
4	982.65	1023.29	40.63	4.13%	-41.08	-5.82	-5.43
5	1088.43	1139.91	51.48	4.73%	-47.76	-2.99	-6.75
6	1213.40	1272.38	58.98	4.86%	-54.58	-3.13	-7.44
7	1348.05	1409.95	61.90	4.59%	-57.07	-2.04	-6.46
8	1509.11	1579.87	70.76	4.69%	-64.93	-0.93	-6.19
9	1726.47	1807.28	80.81	4.68%	-75.13	-0.06	-4.36
10	2337.27	2466.89	129.62	5.55%	-125.62	0.19	0.38
Total	1203.06	1257.52	54.45	4.53%	-49.84	-0.93	-4.91

In the next tables, we use a different subset of the population each time. For different income sources, we take the population with a positive income on the component in 2001. Again, all incomes are at household level and equivalised average monthly incomes. The deciles remain fixed and each decile represents 10% of the entire population.

Table 4-10 presents the results of the reform on average unemployment benefits (UB) per income decile of 2001. Households with one or more members with UB are selected. The results show that the progressivity of disposable income gains are somewhat offset by UB. The relative gains in UB tend to have a more equal distribution over the income decile compared with the relative gains in disposable income of the whole population (see Table 4-9, column 6). The proportion of UB recipients per decile indicates that individuals who receive UB or who live in a household with a member that receives UB, are mostly present in the lower deciles. The incidence in the total decile finally, gives the percentage of UB recipients per decile of the whole population. In the second decile, almost 40% of individuals receive UB. It is clear that the incidence of UB recipients drops by deciles.

TABLE 4-10 DISTRIBUTION AND COMPONENTS OF DISPOSABLE INCOME: UNEMPLOYED (RECEIVING UNEMPLOYMENT BENEFITS IN 2001; ABSOLUTE AMOUNTS IN EUROS PER MONTH)

Deciles of disposable 2001 income	Disposable income 2001	Change in disposable income	Relative change	Unemployment Benefits (UB) 2001	Change in UB	Relative change	% of all UB-recipients per decile	% of decile receiving UB
1	447.44	11.96	2.67%	261.11	6.48	2.48%	7.29%	13.94%
2	692.40	28.78	4.16%	407.43	19.03	4.67%	19.38%	36.96%
3	855.87	31.74	3.71%	330.20	4.41	1.34%	13.83%	26.74%
4	980.15	48.47	4.95%	242.11	9.18	3.79%	9.37%	17.98%
5	1090.19	58.26	5.34%	188.37	5.03	2.67%	9.74%	18.68%
6	1211.83	62.83	5.18%	180.19	4.20	2.33%	10.01%	19.19%
7	1346.30	70.23	5.22%	148.59	3.42	2.30%	9.24%	17.72%
8	1506.67	78.70	5.22%	140.86	4.83	3.43%	8.29%	15.91%
9	1723.09	87.44	5.07%	133.01	4.49	3.37%	7.62%	14.61%
10	2231.86	125.52	5.62%	126.84	3.31	2.61%	5.23%	10.02%

Table 4-11 is similar to Table 4-10 but for individuals receiving pension benefits (PENS). Again, only individuals who receive pension benefits themselves or who have a household member that receives pension benefits are selected. The results show that pension benefit recipients find themselves mostly in the lower-middle income deciles. Almost half of the 4th decile exists of people entitled to pension benefits. We find that on average pension benefit recipients lose in all deciles. In the smallest deciles relative losses are smaller than in higher deciles.

TABLE 4-11 DISTRIBUTION AND COMPONENTS OF DISPOSABLE INCOME: PENSIONERS (AT LEAST ONE PERSON IN HOUSEHOLD RECEIVING PENSION BENEFITS IN 2001; ABSOLUTE AMOUNTS IN EUROS PER MONTH)

Deciles of disposable 2001 income	Disposable income 2001	Change in disposable income	Relative change	Pensions Benefits (PENS) 2001	Change in PENS	Relative change	% of all PENS-recipients per decile	% of decile receiving PENS
1	390.67	-13.37	-3.42%	360.57	-15.80	-4.38%	7.84%	20.70%
2	691.30	-8.52	-1.23%	610.64	-16.85	-2.76%	10.17%	26.76%
3	861.98	-6.11	-0.71%	729.09	-19.17	-2.63%	11.10%	29.60%
4	985.84	30.19	3.06%	936.21	-21.02	-2.25%	16.83%	44.51%
5	1086.77	43.61	4.01%	1036.85	-17.46	-1.68%	13.86%	36.67%
6	1211.39	52.59	4.34%	1088.84	-17.30	-1.59%	10.88%	28.79%
7	1344.85	46.20	3.44%	1105.40	-13.83	-1.25%	8.98%	23.76%
8	1510.48	56.83	3.76%	1153.66	-12.47	-1.08%	7.98%	21.11%
9	1721.44	72.23	4.20%	1179.44	-9.93	-0.84%	6.65%	17.59%
10	2244.98	107.48	4.79%	1551.84	-6.96	-0.45%	5.69%	15.06%

Table 4-12 summarizes the results for the population subgroup of personal income tax (PIT) payers. In the lowest population decile, only a fraction of individuals lives in a household that has to pay income taxes. From the 5th decile on, almost all individuals are indebted to pay taxes. The results indicate that on average, income taxes are lowered for all deciles. The relative changes decrease by decile, while the absolute changes increase. In terms of disposable income, the relative change remains more or less constant over deciles. Hence, the decrease in relative changes in personal income taxes by decile is not reflected in similar sharp results for disposable income for households paying income taxes. The last column of Table 4-12 shows that the reform in personal income taxes is regressive. This column presents for each decile the income share of the sum of gains in taxes. The richest decile which contains 12.55% of all tax payers, receives 25.26% of all gains in taxes which accounts for a relative decline in taxes of 7.41%.

TABLE 4-12 DISTRIBUTION AND COMPONENTS OF DISPOSABLE INCOME: INCOME TAX PAYERS (PAYING PERSONAL INCOME TAXES IN 2001; ABSOLUTE AMOUNTS IN EUROS PER MONTH)

Deciles of disposable 2001 income (Disp Y)	Disp Y 2001	Change in disp Y	Relative change	Personal Income Taxes (PIT) 2001	Change in PIT	Relative change	% of all PIT-payers per decile	% of decile liable to pay PIT	reform income share
1	506.5	34.99	6.91%	35.05	-23.99	-68.44%	0.95%	7.55%	0.37%
2	703.9	36.15	5.14%	76.30	-23.58	-30.91%	4.93%	39.04%	1.86%
3	866.3	38.98	4.50%	138.50	-30.26	-21.85%	8.25%	66.24%	4.00%
4	983.7	48.55	4.94%	173.75	-46.89	-26.99%	11.02%	87.76%	8.27%
5	1089.0	52.64	4.83%	259.76	-49.22	-18.95%	12.21%	97.30%	9.63%
6	1213.4	59.45	4.90%	381.10	-54.94	-14.42%	12.47%	99.34%	10.98%
7	1348.1	62.10	4.61%	515.82	-57.22	-11.09%	12.52%	99.75%	11.48%
8	1509.1	70.76	4.69%	671.61	-64.93	-9.67%	12.55%	100.00%	13.05%
9	1726.5	80.81	4.68%	906.17	-75.13	-8.29%	12.55%	100.00%	15.11%
10	2337.3	129.62	5.55%	1694.91	-125.62	-7.41%	12.55%	100.00%	25.26%

Table 4-13 shows that people receiving disability benefits (DISAB) are represented more than average in the lowest 3 income deciles. We find that relative gains in disability benefits are also bigger in these 3 deciles compared with higher deciles. This does not translate in a large difference between deciles in terms of relative disposable income gains.

TABLE 4-13 DISTRIBUTION AND COMPONENTS OF DISPOSABLE INCOME: DISABLED (RECEIVING DISABILITY BENEFITS IN 2001; ABSOLUTE AMOUNTS IN EUROS PER MONTH)

Deciles of disposable 2001income (Disp Y)	Disp Y 2001	Change in disp Y	Relative change	Disability Benefits 2001 (DISAB)	Change in DISAB	Relative change	% of all DISAB-recipients per decile	% of decile receiving DISAB
1	426.55	36.36	8.52%	279.25	36.56	13.09%	12.60%	5.35%
2	687.35	60.67	8.83%	430.12	57.49	13.37%	15.66%	6.63%
3	852.83	71.56	8.39%	547.94	61.58	11.24%	17.84%	7.66%
4	980.18	77.65	7.92%	454.70	45.41	9.99%	9.56%	4.07%
5	1089.64	88.26	8.10%	442.72	46.82	10.58%	9.99%	4.25%
6	1208.36	78.10	6.46%	470.06	15.80	3.36%	9.40%	4.00%
7	1347.05	84.66	6.28%	520.91	-0.54	-0.10%	8.59%	3.66%
8	1507.88	98.24	6.51%	466.98	6.18	1.32%	7.90%	3.36%
9	1715.61	114.81	6.69%	500.40	8.29	1.66%	5.74%	2.45%
10	2172.13	156.97	7.23%	494.53	24.87	5.03%	2.73%	1.16%

If a household member receives benefits in case of primary disablement (with benefits in case of sickness and benefits in case of maternity, SICK), individuals are selected and results are shown in Table 4-14. In contrast with disability benefits, SICK beneficiaries are situated more in higher income deciles. This is due to the maternity benefits, which are paid out to all income categories. Relative gains in SICK benefits seem to decline with income deciles on average, but these gains are rather limited for all deciles.

TABLE 4-14 DISTRIBUTION AND COMPONENTS OF MONTHLY DISPOSABLE INCOME: SICK (RECEIVING SICKNESS BENEFITS IN 2001)

Deciles of disposable 2001 income (Disp Y)	Disp Y 2001	Change in disp Y	Relative change	Sickness Benefits 2001 (SICK)	Change in SICK	Relative change	% of all SICK-recipients per decile	% of decile receiving SICK
1	466.45	37.51	8.04%	221.74	22.48	10.14%	0.94%	0.39%
2	716.65	35.69	4.98%	269.58	7.91	2.94%	3.27%	1.37%
3	869.62	58.82	6.76%	300.11	7.95	2.65%	5.75%	2.43%
4	981.85	62.95	6.41%	335.52	10.74	3.20%	5.80%	2.44%
5	1093.40	70.73	6.47%	357.98	9.71	2.71%	8.80%	3.70%
6	1216.86	80.78	6.64%	392.28	10.19	2.60%	11.52%	4.84%
7	1350.18	87.08	6.45%	432.52	10.26	2.37%	12.77%	5.37%
8	1511.59	94.07	6.22%	512.24	8.47	1.65%	15.28%	6.42%
9	1728.21	98.51	5.70%	609.20	5.41	0.89%	17.87%	7.51%
10	2231.98	118.28	5.30%	885.29	4.38	0.49%	17.99%	7.56%

The same analysis as above has been conducted for family allowances. Only marginal changes could be detected therefore results are left out.

Table 4-15 finally presents the income results of the reforms for all active individuals. An individual is active if he or she can be categorized as a self-employed (principal activity and before retirement age) or a blue- or white-collar worker on the private or public labour market. Table 4-15 depicts per decile the total active population and each category of activity status separately. All active individuals have substantial relative gains in disposable income compared to the results for all individuals together as can be found in Table 4-9. The active population is unequally distributed over the deciles, as can be seen in the one but last column. From the 6th decile on, there are more active individuals than average. More or less the same unequal distribution holds for white-collar workers and to a lesser extent for blue-collar workers. The last ones are more frequently present in lower income deciles. For the self-employed, frequency distribution over income deciles is much more equal. For all active individuals, relative gains in disposable income fall by income deciles. For self-employed and blue-collar workers the same holds more or less. For white-collar workers on the other hand, relative gains in disposable income make more erratic jumps.

TABLE 4-15 DISTRIBUTION AND COMPONENTS OF DISPOSABLE INCOME: ACTIVE POPULATION (IN EUROS PER MONTH)

Deciles of disposable income 2001 (Disp Y)		Disp Y 2001	Relative change	Change in PIT	Total change in SB	Change SSC employee	% of activity type per decile	% of decile with respective activity type
1	active population	406.59	7.05%	-12.91	3.47	-12.72	2.53%	9.43%
	Self employed	406.51	7.77%	-27.55	3.58	-1.44	7.78%	4.19%
	Blue-collar	405.87	6.68%	-1.13	4.79	-21.22	2.64%	3.38%
	White-collar	408.07	6.08%	-1.33	0.83	-22.68	0.97%	1.86%
2	active population	696.43	5.67%	-21.83	3.89	-14.11	4.20%	15.60%
	Self employed	693.48	6.55%	-38.76	5.18	-2.37	10.45%	5.61%
	Blue-collar	697.51	5.34%	-10.53	3.33	-23.42	4.82%	6.16%
	White-collar	699.01	4.91%	-15.21	2.90	-16.32	2.01%	3.83%
3	active population	863.79	5.32%	-30.73	2.89	-12.62	5.76%	21.71%
	Self employed	858.05	6.08%	-44.40	5.61	-3.01	10.94%	5.95%
	Blue-collar	864.67	5.26%	-23.99	1.86	-19.65	7.22%	9.35%
	White-collar	867.86	4.72%	-27.85	1.87	-11.30	3.32%	6.40%
4	active population	982.46	5.48%	-37.05	2.20	-14.83	5.94%	22.23%
	Self employed	980.94	6.05%	-50.14	6.28	-3.82	8.67%	4.68%
	Blue-collar	982.53	5.62%	-32.32	1.27	-21.69	7.81%	10.03%
	White-collar	983.32	4.94%	-35.21	0.90	-12.52	3.92%	7.51%
5	active population	1091.68	5.41%	-42.56	2.63	-14.09	8.11%	30.33%
	Self employed	1088.45	5.47%	-50.46	5.74	-4.05	9.77%	5.27%
	Blue-collar	1091.20	5.66%	-38.81	2.22	-20.82	10.24%	13.15%
	White-collar	1093.64	5.11%	-43.21	1.71	-11.10	6.22%	11.90%
6	active population	1215.67	5.03%	-47.88	1.42	-11.96	10.68%	39.91%
	Self employed	1214.33	5.13%	-53.45	5.52	-3.65	11.14%	6.01%
	Blue-collar	1214.96	5.31%	-44.76	1.39	-18.34	12.98%	16.67%
	White-collar	1216.83	4.73%	-48.96	0.02	-8.69	9.00%	17.23%
7	active population	1349.81	4.88%	-55.11	1.30	-9.44	12.87%	48.13%
	Self employed	1349.14	4.94%	-57.54	6.43	-1.71	10.91%	5.89%
	Blue-collar	1348.62	5.13%	-52.02	1.49	-15.64	14.10%	18.10%
	White-collar	1350.87	4.69%	-56.84	-0.10	-6.68	12.60%	24.13%

Deciles of disposable income 2001 (Disp Y)		Disp Y 2001	Relative change	Change in PIT	Total change in SB	Change SSC employee	% of activity type per decile	% of decile with respective activity type
8	active population	1510.18	4.84%	-62.86	1.05	-8.98	14.42%	53.91%
	Self employed	1507.41	5.02%	-65.19	7.13	-0.95	9.00%	4.86%
	Blue-collar	1509.95	5.02%	-59.44	1.54	-14.75	14.87%	19.09%
	White-collar	1510.78	4.70%	-64.67	-0.24	-6.60	15.65%	29.96%
9	active population	1729.15	4.63%	-71.77	0.96	-6.67	16.71%	62.47%
	Self employed	1723.39	4.65%	-72.88	4.71	4.65	9.28%	5.01%
	Blue-collar	1724.71	4.83%	-68.82	1.06	-13.34	14.82%	19.03%
	White-collar	1732.10	4.53%	-73.09	0.42	-4.84	20.07%	38.43%
10	active population	2326.03	5.21%	-115.93	0.72	-0.99	18.78%	70.21%
	Self employed	2592.04	6.57%	-165.54	2.71	26.39	12.06%	6.52%
	Blue-collar	2134.42	4.66%	-88.27	1.50	-9.23	10.50%	13.49%
	White-collar	2342.99	5.15%	-116.92	0.26	-2.33	26.23%	50.21%

Another way to rank individuals is according to the absolute gain in disposable income they received after the reforms. On the basis of this ranking, new deciles have been constructed. From this point, distribution of income (components) is analyzed by deciles of gains in disposable income.

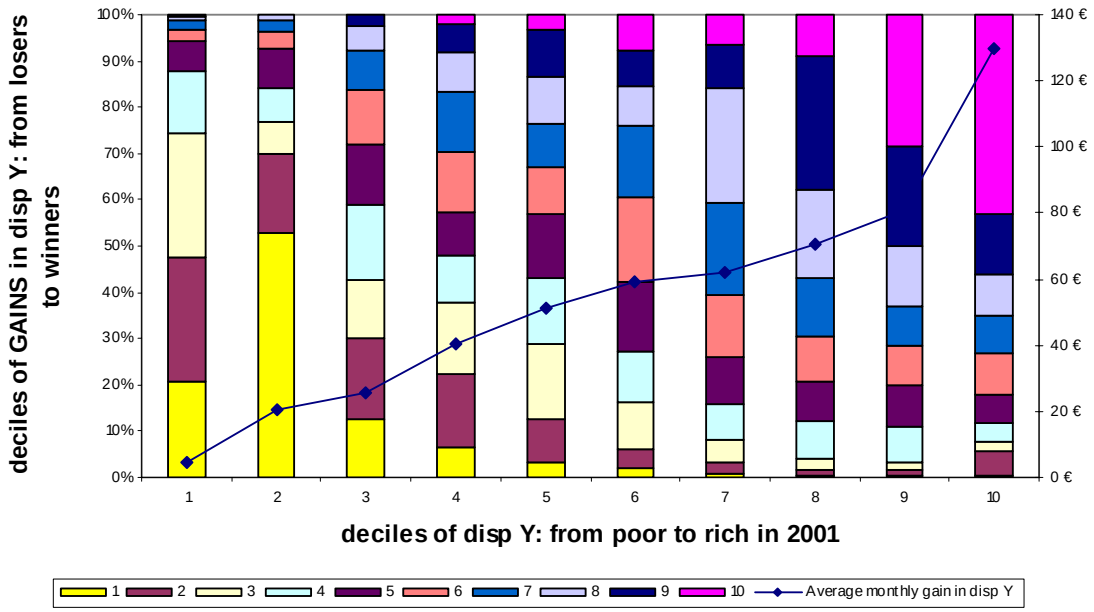
Table 4-16 summarizes average disposable income in 2001, average and relative gains in disposable income from 2001 to 2007, average gains in PIT, SB and SSC by deciles of gains. All individuals in the first "decile" lose as a result of the reforms, whereas from the second "decile" changes in disposable income are all positive. Although ranked according to absolute income gains, relative gains in disposable income move similarly. The entire first decile exists out of losers, whose gains in personal income taxes, if any, are offset by losses in social benefits. The second decile is populated mainly by individuals that neither win nor lose or gain only little. The average disposable income of the second decile is somehow biased downwards by the presence of zero-income households. Nevertheless, from the 3rd decile on, we find increasing average disposable incomes in 2001 and – more importantly – increasing relative gains in disposable income. For all deciles except the first 2, gains in PIT have the strongest impact on average disposable income gains.

TABLE 4-16 FROM LOSERS TO WINNERS: AVERAGE MONTHLY DISPOSABLE INCOME (DECILES OF INCOME GAINS)

Deciles of disposable income changes (losers to winners)	Disposable income 2001	Change in disposable income	Relative change	Change in PIT	Total change in SB	Change SSC employee
1	767.56	-21.70	-2.83%	-7.56	-29.70	-0.41
2	518.40	0.11	0.02%	-5.20	-5.48	-0.39
3	959.46	15.49	1.61%	-17.24	-4.67	-2.95
4	1080.23	32.68	3.02%	-26.14	1.46	-5.08
5	1153.65	46.46	4.03%	-38.68	2.25	-5.48
6	1248.80	58.58	4.69%	-49.07	2.98	-6.24
7	1355.86	69.67	5.14%	-61.49	0.86	-6.79
8	1471.45	81.17	5.52%	-72.50	0.55	-7.34
9	1591.73	97.39	6.12%	-85.29	1.98	-8.75
10	1883.50	164.67	8.74%	-135.24	20.51	-5.63

Figure 9 crosses the deciles of disposable income in 2001 (horizontal axis) with the deciles of absolute gains in disposable income from 2001 to 2007 (left vertical axis). The line represents the average gain in disposable income by deciles of disposable income in 2001 (right vertical axis). This picture shows that poor individuals are overrepresented with losers and small winners after the reform. Inversely, wealthier individuals are frequently situated in large winning deciles.

FIGURE 9 FROM LOSERS TO WINNERS: DECILES OF DISPOSABLE INCOMES VERSUS DECILES OF DISPOSABLE INCOME GAINS



In the remainder, we try to find out if the level of gains in disposable income is linked with certain household or individual characteristics. Table 4-17 gives per decile of gains the average number of household members, of children (-18) of elderly (+64) and age. Remind that now again, the entire population is again divided into 10 equal groups of gains deciles. The average member of household members rises with the level of gains (by deciles). This could be assigned to the policies in favour of dependent children up until the 7th decile. From the 8th decile, a decline in the average number of household members takes place. At the same time, this could also indicate the equivalence scale adopted is not useful in this analysis, because gains are equivalised. If gains were not equivalised, ranking could be different and it is not clear what direction the average number of household members could go in. The average number of children points to the same conclusions. The presence of children in the total population per decile follows more or less the same pattern. The distribution over deciles of the average number of elderly follows a U-shaped pattern and the same holds for the frequency of elderly in the population. A very clear result comes from the average age: losers and small and large winners tend to be older and median winners tend to be the youngest on average.

TABLE 4-17 FROM LOSERS TO WINNERS: DEMOGRAPHIC CHARACTERISTICS

Deciles of disposable income changes (losers to winners)	Disposable income 2001	Change in disposable income	Average number of HH members	Average number of -18 years old	Proportion of -18 year old people	Average number of +64 years old	Proportion of +64 year old people	Average age
1	767.56	-21.70	2.25	0.49	10.63%	0.91	56.57%	58.66
2	518.40	0.11	2.60	0.86	20.03%	0.43	27.36%	44.56
3	959.46	15.49	3.05	0.99	21.74%	0.48	28.99%	43.99
4	1080.23	32.68	3.23	1.04	23.72%	0.23	11.35%	35.97
5	1153.65	46.46	3.43	1.17	26.33%	0.10	3.71%	31.63
6	1248.80	58.58	3.47	1.12	25.60%	0.07	2.71%	31.93
7	1355.86	69.67	3.55	1.13	26.65%	0.12	4.81%	32.51
8	1471.45	81.17	3.37	0.98	24.09%	0.20	9.16%	34.97
9	1591.73	97.39	3.09	0.67	17.09%	0.27	12.30%	38.66
10	1883.50	164.67	2.79	0.44	10.89%	0.33	15.55%	44.37

Table 4-18 gives frequencies of activity status per decile of gains in disposable income. The main income component is used to characterize the entire household. E.g. if a household has 1 member with a small labour income, and 1 receiving a disability benefit larger than the labour income, all household members are described as disabled. The proportion of individuals in working households rapidly increases with the deciles of gains until the median winner. After this, the 8th, 9th and 10th decile show much less working households. The unemployed households follow the opposite direction in the small deciles: a large number of losers and small winners are described as living in an unemployed household, while individuals winning more than the median tend to have very little chance of living in an unemployed household. The proportion of retired households follows the U-shaped patterns exactly the inversed of the working households. Individuals in disabled households follow a rather erratic pattern and seem to be overrepresented with the small winners in the 3th and 4th decile, together with a large presence in the highest decile. Other households have no income, only family allowances or 2 components with the exact same level of income. Not surprisingly, the second decile, with individuals maintaining the status quo has a large number of individuals in other households.

TABLE 4-18 FROM LOSERS TO WINNERS: SOCIO-ECONOMIC STATUS

Deciles of disposable income changes (losers to winners)	Disposable income 2001	Change in disposable income	Proportion of individuals in working households	Proportion of individuals in unemployed households	Proportion of individuals in retired households	Proportion of individuals in disabled households	Proportion of individuals in other households
1	767.56	-21.70	4.89%	15.18%	72.57%	1.77%	5.59%
2	518.40	0.11	11.80%	19.81%	29.98%	1.52%	36.89%
3	959.46	15.49	48.38%	13.04%	33.39%	4.22%	0.97%
4	1080.23	32.68	78.18%	4.95%	11.68%	4.11%	1.07%
5	1153.65	46.46	91.15%	2.79%	3.88%	1.41%	0.77%
6	1248.80	58.58	92.83%	0.87%	2.85%	2.96%	0.50%
7	1355.86	69.67	92.92%	0.40%	5.52%	0.74%	0.42%
8	1471.45	81.17	87.63%	0.53%	10.77%	0.64%	0.43%
9	1591.73	97.39	81.67%	0.47%	15.55%	1.36%	0.94%
10	1883.50	164.67	67.20%	3.90%	21.92%	5.38%	1.61%
total	1203.06	54.45	65.66%	6.19%	20.81%	2.41%	4.92%

4.2.3.5 CONCLUSION

The objective of this simulation was to analyze the first-order distributive effect of a period of reforms in income taxes and social benefits. From 1999 to 2007, a new government coalition was established. Starting in 2001, a major tax reform took place combined with emphasizing the "active welfare state". This application contributes to the understanding of the impact of the reforms. The reforms from 2001 to 2007 are simulated while keeping the underlying dataset constant. For 2007, incomes of 2001 are inflated but nothing changes with the demographic structure and no behavioural responses to policy reforms are incorporated.

All policy domains have known positive impulses during the period. The results show that personal income taxes have been the major domain of reform. In terms of equivalised disposable income, the largest gains go to middle and higher income deciles, and thus the reform can be characterized as regressive. In general, reforms in unemployment benefits or other social benefits and social security contributions that are in favour of lower income deciles, cannot offset relatively larger gains to higher income deciles from personal income taxes. The active population has gained mostly from reforms in personal income taxes and social security contributions. Blue-collar workers seem to win the least compared with self-employed and white-collar workers. High income groups have larger absolute gains on average. Working couples with children have benefited from the reform more substantially than retired households for example. While unemployed and retired households are on average small winners and even losers, households with working members, have realized relatively large profits.

4.3.1 Introduction

Each year the OECD publishes a report on the effective tax rates facing individuals in different countries (OECD, 2007; also see Carone et al., 2004; Immervoll, 2004). This is done for a set of hypothetical family types where the earnings of one or both partners are taken to be in a range around the Average Production Worker earnings (APW). Taxes include national and local income taxes and standard tax relief, i.e. tax relief that is not related to expenditures made by the households. Social security contributions are own mandatory contributions made by employees. Benefits include family benefits, unemployment benefits, minimum income and housing benefits. Disability and pension benefits as well as income from capital and/or assets are not included.

The hypothetical households and earning ranges are as follows:

- single adults without children; earnings 0-200% APW,
- single adult parents with two children; earnings 0-200% APW,
- one-earner adult couples; earnings first spouse 0-200% APW, second spouse inactive,
- same as previous but with two children,
- two-earner couple; earnings first spouse fixed at 67% APW, earnings second spouse 0-200% APW,
- same as previous but with two children.

The marginal tax rates are calculated at the household level, i.e. taking into account all the interactions between spouses' earnings and the consequences thereof in the tax-benefit legislation. The calculation of effective tax rates at the household level implies the assumption that work decisions are made at the household level.

The OECD methodology has the advantage that it provides a good description of the statutory system, especially if one draws the budget constraint for that specific case. It is easier to spot inactivity traps in the tax-benefit legislation. The representativeness of the typical cases might be questionable, however.

In this application we will calculate effective tax rates facing individuals in Belgium in 2001 and 2007 using MIMOSIS. Unlike the OECD studies, in MIMOSIS we capture full heterogeneity of the population by looking at representative micro-data. The drawback is that the results are harder to "summarize" in pictures or numbers than is the case for the typical households. There exist studies of this kind for European countries, including Belgium, using EUROMOD. For certain countries in EUROMOD, however, – Belgium being one of them – gross wages are not directly observed but obtained by a "reverse calculation" starting from net wages. In MIMOSIS we *do* observe gross earnings directly from administrative data. Our approach for calculating effective marginal tax rates in section 4.3.3 is also slightly different in that we do not calculate effective marginal tax rates by increasing earnings directly in the micro-simulation model as is done in the OECD studies and

also in section 3.3 of this report, but rather by simulating earnings for a given fixed wage rate at different hours of labour supplied.[3]

First we will present some results on average effective tax rates, both by looking at taxes paid as by looking at an overall tax rate incorporating benefits received, to calculate a 'net' tax rate. In section 4.3.3 we will describe the procedure used to determine effective marginal and participation tax rates and present some first preliminary results. Section 4.3.4 provides some concluding remarks for this application. In a sense this application can be seen as complementary to the previous one where we looked at the distributional effects of policy changes between 2001 and 2007. Here we take a first look at how the (dis)incentive effects to supply labour have changed in the same time period.

It should be noted that results in this section are preliminary in that certain interactions were not yet implemented in MIMOSIS at the time of calculation. Results in this section will be updated and possibly contradicted by follow-up analyses in the future. This should be kept in mind when interpreting the results.

4.3.2 Average effective tax rates: 2001-2007

The average effective tax rate for an individual measures the payment to the tax authorities as a fraction of the income on which those taxes are levied. As such we can look at taxes on labour income or at taxes on some broader income concept, e.g. gross income including benefits received. It allows calculating what we could call a 'net' tax rate, i.e. a tax rate that takes into account the benefits received by subtracting from tax payments the benefits and expressing the result as a percentage of gross income.

In describing the 'fiscal burden' in Belgium one often refers to macro numbers, and more particularly tax ratios as a percentage of GDP. Such tax ratios do not always relate the taxes to the relevant tax bases. GDP includes more than labour income alone and an income tax ratio of x % may be the result of a low income tax rate and a broad base or a high income tax rate and a narrow tax base. Moreover, and even if one does assign taxes to the appropriate tax base, it remains that benefits are often not included in such ratios. Especially when one attempts to compare to other countries, the result will be a comparison that ignores institutional differences: what are benefits in one country may be administered through the income tax in another. In the former case the benefits will not be counted in the tax ratio, while in the latter they will.

In this exercise we will sketch a first picture of the incidence of tax payments and how they changed between 2001 and 2007. It should in no way be seen as an approximation of the economic losses experienced by individuals as a result of taxation. For this we would have to incorporate much more information, e.g. on prices and behavioural reactions. Moreover, we would need to simulate a "no-tax" situation to compare the current situation with. In most tables that will follow we show the distribution of taxes over deciles of income. The deciles will be either based on disposable income or equivalent income. In the latter case the equivalence scale used is the OECD-

[3] The change in the earnings can be interpreted as resulting from a change in working hours, e.g. for currently unemployed/inactive or part-time working individuals, or as resulting from a change in the wage rate, e.g. for currently full-time working individuals.

scale, applying a factor of 1 to the first adult, a factor of 0.5 to any additional adults, i.e. persons older than 14 years of age, and a factor of 0.3 for all persons aged 14 or less. If subpopulations are considered deciles are recalculated so that each decile represents 10% of the subpopulation analyzed.

In Table 4-19 we show the effective average tax rates for the population in 2001 and 2007. The tax rates are calculated at the household level as follows:[4]

$$t = \frac{T_{pit} + T_{ssc} + T_{ssb}}{Y_{gross}} = \frac{Y_{gross} - Y_{net}}{Y_{gross}}, \quad (1)$$

where t is the average tax rate; Y_{gross} is gross income broadly defined, i.e. including gross labour income and all social benefits; Y_{net} is disposable household income; T_{pit} is the amount of personal income taxes; T_{ssc} the amount of employee social security contributions and T_{ssb} are contributions due on social benefits. The effective tax rate is thus the sum of taxes paid as a percentage of gross income. Taxes here are defined as personal income taxes, employee social security contributions and social security contributions due on social benefits.

As Table 4-19 shows the overall tax-benefit schedule is progressive in that higher income households in general also pay more gross taxes, both in 2001 as in 2007. We see that both total and for every decile separately the average effective tax rate is lower in 2007 compared to 2001. This is not surprising, knowing that the high tax brackets of 55% and 52.5% have been abolished and that no explicit tax increases have occurred in this period. Additionally, social insurance contributions have been reduced (further) or reductions extended for some low wage earners. Also remember that this represents the same population and hence the same income distribution, albeit inflated to take into account evolutions in the general price level. It is a representation of the 2007 tax system on the 2001 population and income distribution.

When we look at tax rates for households that are active on the labour market, we see in Table 4-20 the same progressive pattern but much less pronounced as in Table 4-19. The average total tax rate for active households is 'only' some 10% higher than the overall average tax rate for the population as a whole. It seems that the lower half of the income distribution of active households has gained somewhat more –in percentage terms– than the upper half of the distribution, although the difference is small (about 1 percentage point).

[4] Remark that taxes are *not* calculated as a percentage of the income concepts on which deciles are based.

TABLE 4-19 AVERAGE EFFECTIVE TAX RATES AT HOUSEHOLD LEVEL: ENTIRE POPULATION

	disposable household income (euro per year)	average tax rate	
deciles	2001	2001	2007
1	8678	3.2	2.1
2	10747	4.6	3.5
3	14443	10.0	8.2
4	15963	13.5	10.2
5	16690	17.4	13.8
6	19934	25.6	21.8
7	22835	31.1	28.0
8	27390	35.6	32.7
9	31253	39.7	37.1
10	41841	45.7	43.2
total	20977	22.6	20.1

TABLE 4-20 AVERAGE EFFECTIVE TAX RATES AT THE HOUSEHOLD LEVEL FOR HOUSEHOLDS THAT ARE ACTIVE ON THE LABOUR MARKET

	disposable household income (euro per year)	average tax rates	
deciles	2001	2001	2007
1	10297	12.8	8.5
2	14261	15.6	11.7
3	17638	21.0	17.2
4	19588	25.1	21.2
5	21237	28.8	25.1
6	22937	31.6	28.3
7	24765	34.6	31.6
8	28396	37.2	34.3
9	31933	40.5	37.9
10	42555	46.2	43.7
total	26809	33.5	30.4

In the welfare system as it currently exists most of the fiscal burden is born by labour income. Therefore in Table 4-21 we only look at average taxes on households where at least one individual works as a wage earner in the private or public sector and that do not receive any replacement income other than family allowances. We show the average tax rates as they are defined in (1) but

also include a broader tax concept by incorporating employers' social security contribution in both the numerator and denominator of (1). Since we are looking at households without replacement income it means that the denominator in (1) is basically the gross labour income if we exclude employers' contributions and gross labour *cost* if we include the employer's contributions. The results in Table 4-21 thus effectively show the taxes on 'labour'.

In the column labeled "average tax on labour income" in Table 4-21 we show the total amount of taxes and contributions paid by the household as a percentage of gross labour income, i.e. apply formula (1) to the subpopulation of households with at least one individual working as a wage earner on the private or public labour market and that do not receive any replacement income other than family allowances. The column labeled "average tax on labour cost" shows the total of taxes and contributions, including employer's social security contributions, as a percentage of gross labour cost, i.e. gross income defined as in (1) *plus* employer's social security contributions. We also show the average personal income tax rate for each decile in the column "average pit-rate".

The table indeed shows that the average tax on labour income born by the employee is higher than for the population as a whole and higher on average than that of the households as defined in Table 4-20. This is especially the case for the lower income deciles where the differences are substantial. The pattern is repeated in 2007 but slightly less so, i.e. the lower income deciles are relatively better off in 2007 as compared to 2001. The average tax on gross labour *costs* is around 53% in 2001 and the dispersion is rather small across the income deciles. In 2007 the tax on labour costs has dropped by about 3 percentage points and is still hovering around 50%.

While in 2001 the top statutory marginal tax rate in the personal income tax schedule was 55% the average personal income tax rate as shown in Table 4-21 (the column "average pit-rate") is well below this rate for all income deciles. In fact, even if we account for social security contributions the average total tax rate never exceeds 50%. This is, of course, also the case in 2007. Remark, though, that the differences in the personal income tax rate between 2001 and 2007 are not that substantial. The biggest driver of the difference in average tax rates between 2001 and 2007 seems to be a reduction in social insurance contributions (or a considerable increase in family allowances).

TABLE 4-21 AVERAGE EFFECTIVE TAX RATES AT HOUSEHOLD LEVEL FOR HOUSEHOLDS WHERE AT LEAST ONE INDIVIDUAL IS WAGE EARNER ON THE PRIVATE OR PUBLIC LABOUR MARKET AND THAT HAVE NO REPLACEMENT INCOME

	2001			2007		
deciles	average tax on labour income	average pit-rate	average tax on labour cost	average tax on labour income	average pit-rate	average tax on labour cost
1	17.4	5.3	36.1	12.6	5.1	32.1
2	22.4	10.6	39.5	19.2	9.8	37.1
3	27.1	15.8	43.6	23.8	13.8	41.1
4	30.6	19.7	46.0	27.3	17.3	43.5
5	33.8	22.9	48.9	30.6	20.6	46.1
6	36.2	25.8	50.7	33.8	23.9	48.9
7	38.5	28.7	52.5	36.6	27.0	50.9
8	40.8	31.4	54.3	39.0	29.7	52.7
9	43.3	34.5	56.2	41.7	32.9	54.7
10	47.9	40.1	59.6	46.5	38.5	58.1
Total	39.6	30.1	53.3	37.4	28.3	51.4

Another way of looking at the distribution of taxes is to consider effective average tax rates by age cohort. Table 4-22 shows results for 6 age cohorts. Again, the figures show that the highest burdens are born by that part of the population that is in working-age range. The tax rates shown are calculated at the household level and the cohorts are based on the age of persons indicated to be the head of household. Apart from the tax rates we also show the constituents that make up total gross income in percentage terms.

As the calculations show most of the taxes paid are born by the middle cohorts, the households with a head of household in the age range 25 to 55. The youngest and oldest cohorts bear the least and the one but oldest cohort is somewhere in between. This pattern is also observed in 2007, as expected. Furthermore, the numbers show that the decrease in personal income taxes is especially observed among the older population whereas the youngest cohort is most affected by a decrease in social insurance contributions between 2001 and 2007. The contributions on social benefits have increased for some and decreased or remained the same for other age cohorts.

Note that the numbers that we have shown do not take into account local taxes or taxes on capital income or assets, such as real estate. On the other hand we also lack information on tax deductible expenses, some of which can be quite important. Examples include mortgage interest payments, contributions to private pension plans, childcare related costs, gifts, etc. The former omission implies an underestimation while the latter implies an overestimation of tax rates. The overall balance between the two obviously depends on several factors, such as type of household, place of residence, homeownership, etc. We also do not take into account tax evasion, i.e. the tax calculations in MIMOSIS are based on the premise that everybody fully pays the taxes he or she owes.

TABLE 4-22 AVERAGE EFFECTIVE TAX RATES AT HOUSEHOLD LEVEL BY AGE COHORT

age head hh	2001				2007			
	personal income tax	employee social security contributions	contributions on social benefits	total taxes	personal income tax	employee social security contributions	contributions on social benefits	total taxes
<25	11.6	6.8	0.1	18.5	11.1	5.5	0.1	16.6
>=25 and <35	18.6	9.0	0.0	27.7	17.6	8.3	0.1	25.9
>=35 and <45	19.3	8.9	0.1	28.3	18.1	8.4	0.1	26.5
>=45 and <55	20.0	8.7	0.1	28.8	18.7	8.1	0.2	26.9
>=55 and <65	15.0	5.1	1.3	21.3	13.1	4.8	1.2	19.1
>=65	9.1	0.8	2.0	11.9	6.9	0.8	1.9	9.6

4.3.3 Effective marginal and participation tax rates

In this subsection we look at the effective marginal tax rates facing individuals in 2001 and 2007. Given the complex interactions in the tax-benefit legislation looking at statutory tax rates to have an idea of the incentive effects of taxation for different groups of individuals can be very misleading. Indeed, even though statutory tax rates for low levels of taxable income are low, the *effective* marginal tax rates of low income individuals can be substantially higher, especially in the case of means-tested or earnings-tested benefits that are (gradually) withdrawn as earnings increase. The effective marginal tax rates measure how much of the extra income is taxed away when an individual increases working hours or enters the labour market from a previous state of inactivity. It are thus the *effective* marginal tax rates that are important in describing the (dis)incentive effects of policies that aim to increase labour force participation among the active population (or any other policies that might have an effect on taxes and benefits or somehow interact with other work-inducing policies).

In order to calculate marginal tax rates we simulated for each head of household and his or her spouse the earnings when they work zero to 40 hours a week. We start with the head of household simulate earnings at 41 different points corresponding to the number of hours worked per week leaving both the wage rate and the earnings of the spouse fixed. We then do the same for the spouse. The effective marginal tax rates are calculated at the household level for each of the spouses separately (if there are more than one) as follows:

$$emtr_i^h = 1 - \frac{\Delta Y_{net}^{h,i}}{\Delta Y_{gross}^{h,i}}, \tag{2}$$

where $emtr_i^h$ is the effective marginal tax rate at household level for household h when changing the amount of labour supplied by individual i; $\Delta Y_{net}^{h,i}$ is the change in disposable household income for household h when individual i changes the number of hours worked; and $\Delta Y_{gross}^{h,i}$ is the corresponding change in gross household labour income. In calculating effective marginal tax rates the change in income will always be with respect to the previous state, i.e. the change when one hour more labour is supplied. For example if an individual changes hours worked from 35 to 36 per week the effective marginal tax rates will be calculated as:

$$emtr = 1 - \frac{Y_{net}^{36} - Y_{net}^{35}}{Y_{gross}^{36} - Y_{gross}^{35}}, \tag{3}$$

where Y_{net}^{35} and Y_{net}^{36} represent net household disposable income at respectively 35 and 36 hours of labour supplied, and similarly for gross household incomes Y_{gross}^{35} and Y_{gross}^{36}. For participation tax rates the reference state is the one where the simulated individual does not work and gets the

social assistance level of income.[5] If an individual enters the labour market at x hours a week, the participation tax rate will be:

$$t_{part} = 1 - \frac{Y_{net}^{x} - Y_{net}^{0}}{Y_{gross}^{x} - Y_{gross}^{0}}, \qquad \text{for } x = 1, ..., 40. \tag{4}$$

Here Y_{net}^{x} and Y_{gross}^{x} are household disposable and gross income respectively when individual i enters the labour market works x hours a week; Y_{net}^{0} and Y_{gross}^{0} are respectively net and gross household income in case individual i does not work.[6] Since there are costs to entering the labour market that are not fully captured by the participation tax rate as calculated in (4) (costs of clothing, transportation costs, child care costs, non pecuniary costs, …), we consider an inactivity trap to occur in a situation where entering the labour market results in a participation tax rate exceeding 80%.[7]

In what follows social security contributions paid by employers are not taken into account in the calculation of effective marginal tax rates. It is assumed that any forward or backward shifting of such contributions is 'absorbed' in the contractual wage. If employers have to pay an amount x of social security contributions and shift a proportion, s, onto employees in the form of a lower wage this is identical to a situation where employees have to pay x and shift part of it, $1-s$, to employers. In the two situations employers 'pay' social security contributions of $(1-s)x$, and hence wages will be the same in both cases. The incidence of social security contributions in the two scenarios is the same and it suffices to look at employee social security contributions only to calculate marginal tax rates (Carone et al., 2004).

In Figure 10 we show the evolution of marginal tax rates between 2001 and 2007 for the entire population. As can be seen the pattern of effective marginal tax rates across the hours worked distribution is quite similar in the two years. The marginal tax rates in 2007 are nearly everywhere below those of 2001. The incentive effects to supply (more) labour have thus slightly improved between 2001 and 2007. In the same graph we also show the participation tax rates for 2001 and 2007. Here we see an even more similar pattern and participation tax rates in 2007 that are consistently below those in 2001. Nevertheless it remains "costly" to start working, even full-time, with a participation tax rate around 55% when going from inactivity to 40 hours of work a week.

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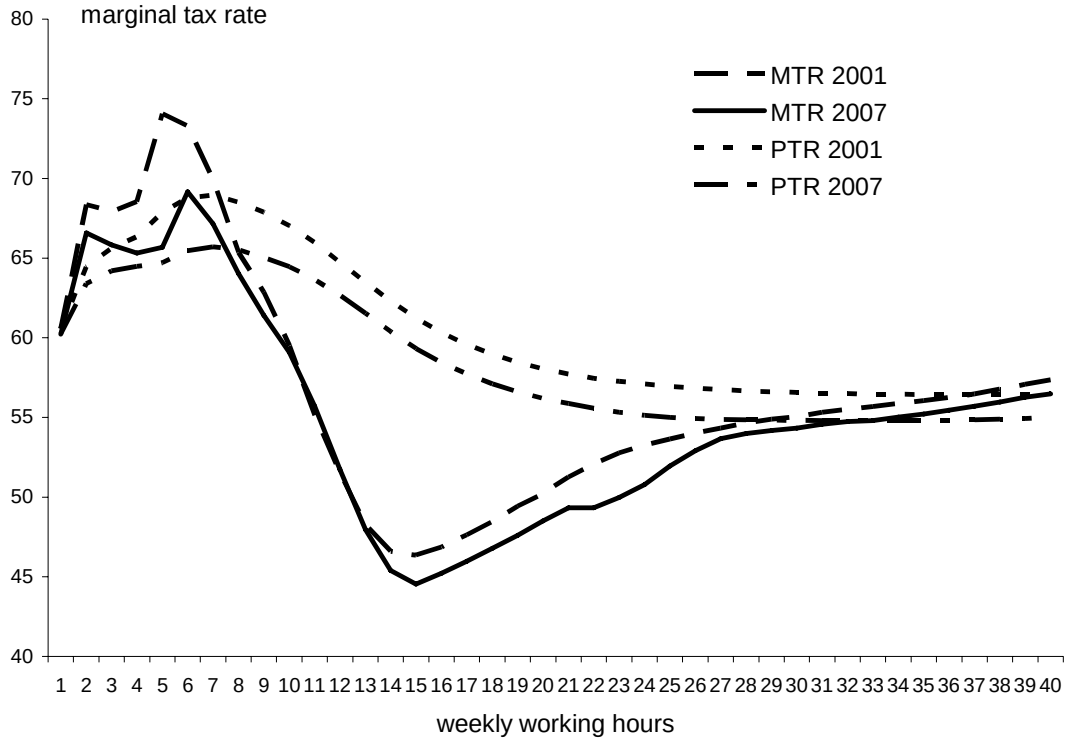
[5] Participation tax rates give an idea of changes in income when one enters the labour market rather than as a consequence of changes in hours of work or in earnings when already working. They are often related to so-called "inactivity traps".

[6] Remember that tax rates are always calculated at the household level when changing the labour supplied by one individual while holding constant the labour market status and hene income of the other member(s).

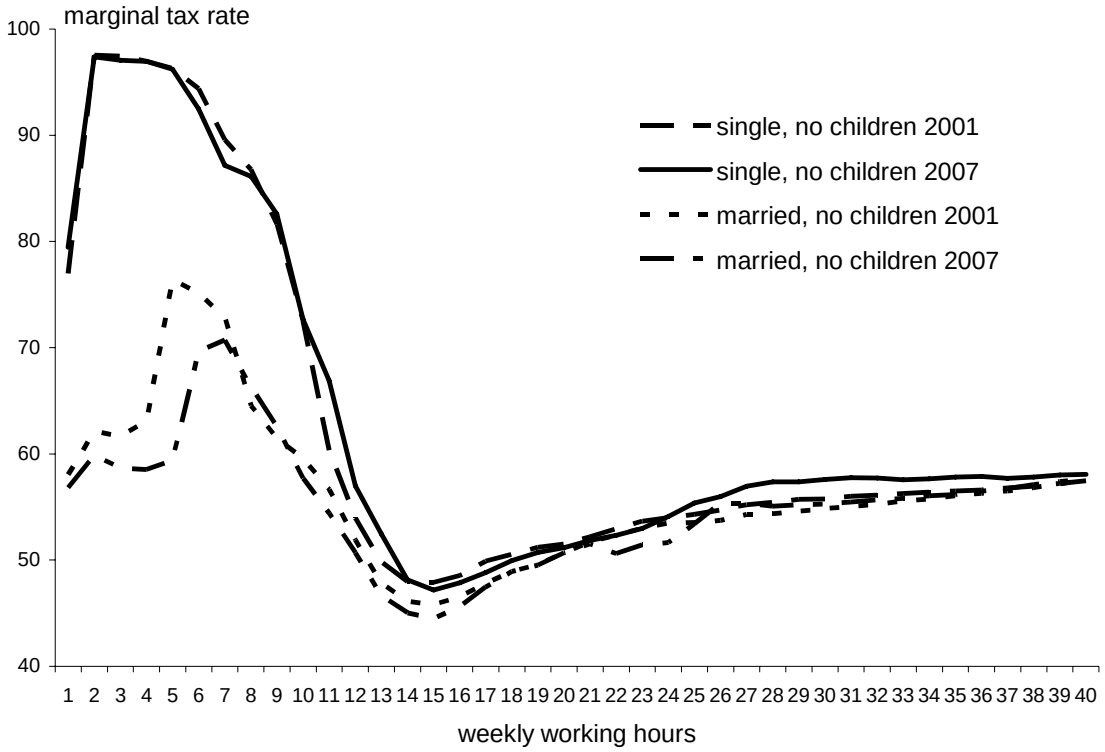
[7] Larmuseau and Lelie (2001) consider tax rates exceeding 85% as identifying an inactivity trap. They consider archetypical households and take into account child care costs, i.e. the 85% is relative to a gain in net income after deducting child care costs.

FIGURE 10 MARGINAL (MTR) AND PARTICIPATION (PTR) TAX RATES IN 2001 AND 2007



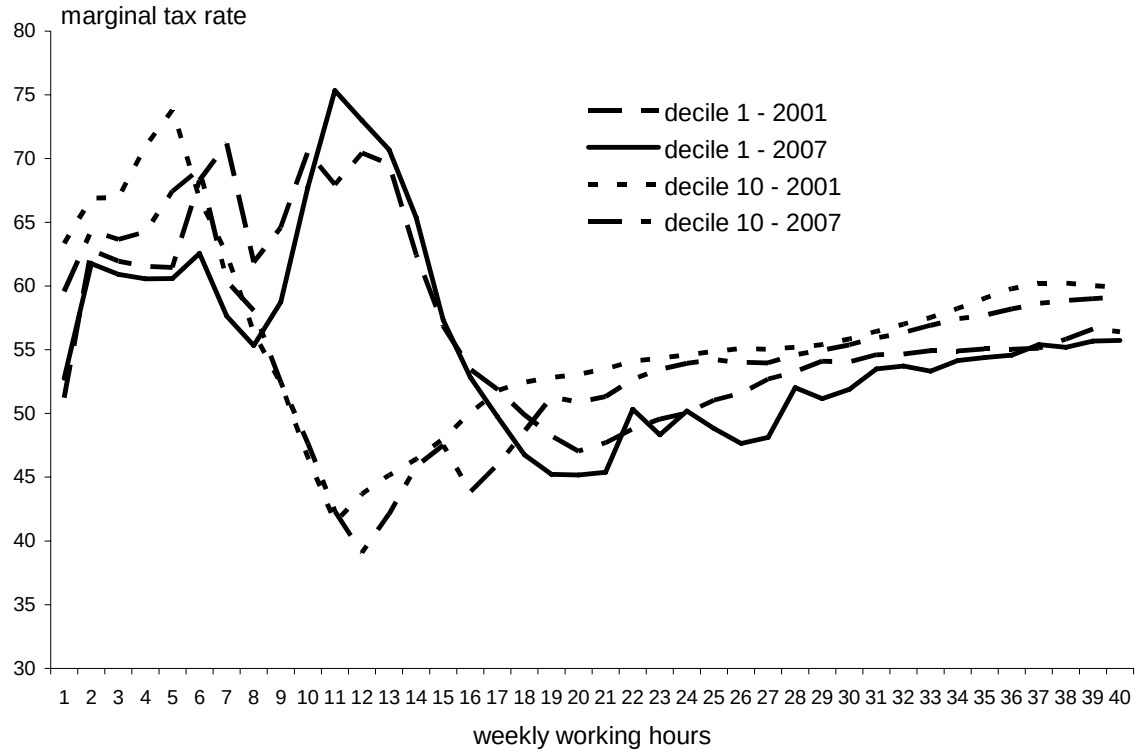
The above figure was for the entire population but we can also look at subgroups. In Figure 11 we draw a similar picture for married couples without children and singles. Here we see that there is quite a substantial difference in marginal tax rates at the low end of the hours distribution with marginal tax rates of more than 90% for singles. As hours worked per week increases the differences between the subgroup are less pronounced and quite similar from part-time work onward (around 19 hours). In this decomposition it is also no longer true that marginal tax rates in 2007 are lower than in 2001: for singles it is actually more or less reversed with marginal tax rates in 2007 that are mostly above those of 2001. At some points this also holds for married couples but to a much lesser extent.

FIGURE 11 MARGINAL TAX RATES IN 2001 AND 2007: MARRIED VERSUS SINGLE, NO CHILDREN



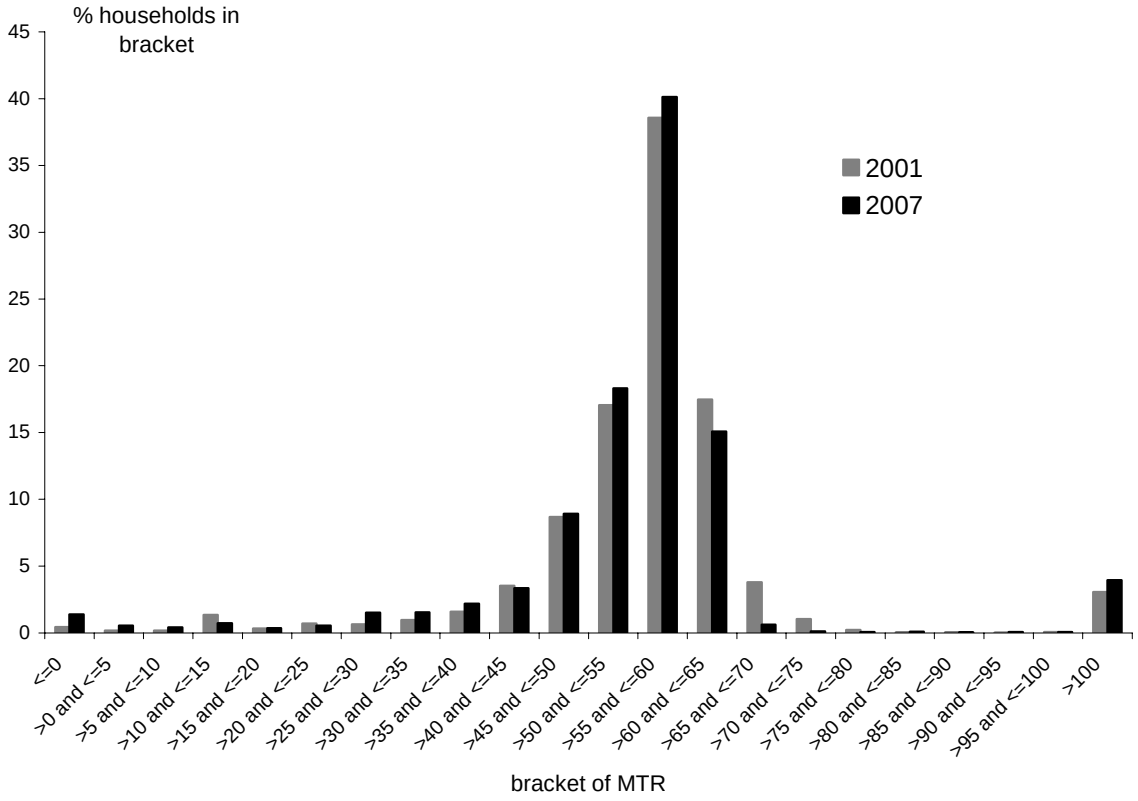
In Figure 12 we make a distinction according to wage and we show the pattern of marginal tax rates for the lowest and the highest wage deciles respectively. From about 8 to 20 weekly working hours we actually see a reverse pattern in marginal tax rates for the two groups, regardless the year of the tax-benefit legislation. In this range lower earning households have considerably higher marginal tax rates, possibly as a result of withdrawal of (means-tested) benefits as they start working more hours. Otherwise, the effective tax rates of lower earning households are below those of their higher earning counterparts. For the two groups marginal tax rates are in general higher under the 2001 legislation than under the 2007 legislation.

FIGURE 12 MARGINAL TAX RATES IN 2001 AND 2007: LOW VERSUS HIGH EARNING HOUSEHOLDS



In the above graphs we have shown the evolution of average marginal tax rates but how many households actually are situated in each marginal tax bracket? In Figure 13 we show the distribution of households over the different effective marginal tax brackets. It seems that the averages shown above do not hide enormous variation. About 70% of all households are situated in the 50% to 65%¨marginal tax bracket. A minor percentage has rather low marginal tax rates while there is a little peak of households that have an effective marginal tax rate of over 100%, i.e. there disposable income decreases when they work one hour extra. In general, in 2007, more households are in the lower and middle brackets than in 2001, except for the highest bracket (>100%) where the 2007 legislation causes more household to face an extremely high effective marginal tax rate than is the case in the 2001 legislation.

FIGURE 13 PERCENTAGE OF HOUSEHOLDS IN EACH MARGINAL TAX BRACKET



In Figure 14 we show the distribution over the effective marginal tax brackets in 2001 for three different socio-economic statuses: employee, civil servant, and self-employed. Employee households face the highest effective marginal tax rates and self-employed the lowest, although there is a non-negligible percentage of self-employed households that face a marginal tax rate that exceeds 100%.[8] The distribution over the bracket range is also much more concentrated for employees and civil servants than for self-employed.

A similar picture for 2007 is shown in Figure 15. The pattern in 2007 is quite similar although the percentage of civil servant households in the 55% to 60% tax bracket has decreased considerably as compared to 2001 and that of employee households has further increased. This increase is accompanied by a decrease of the percentage of employee households in higher brackets. The 2007 system, however, does not seem to have resolved the disincentive effects for some of the households. On the contrary, the percentage of self-employed households facing a marginal tax rate of more than 100% has slightly increased from 7% to 10% and even some civil servant households have come to join this bracket.

[8] Typologies are always with respect to the head of household.

FIGURE 14 PERCENTAGE OF HOUSEHOLDS IN EACH TAX BRACKET ACCORDING TO SOCIO-ECONOMIC STATUS: 2001

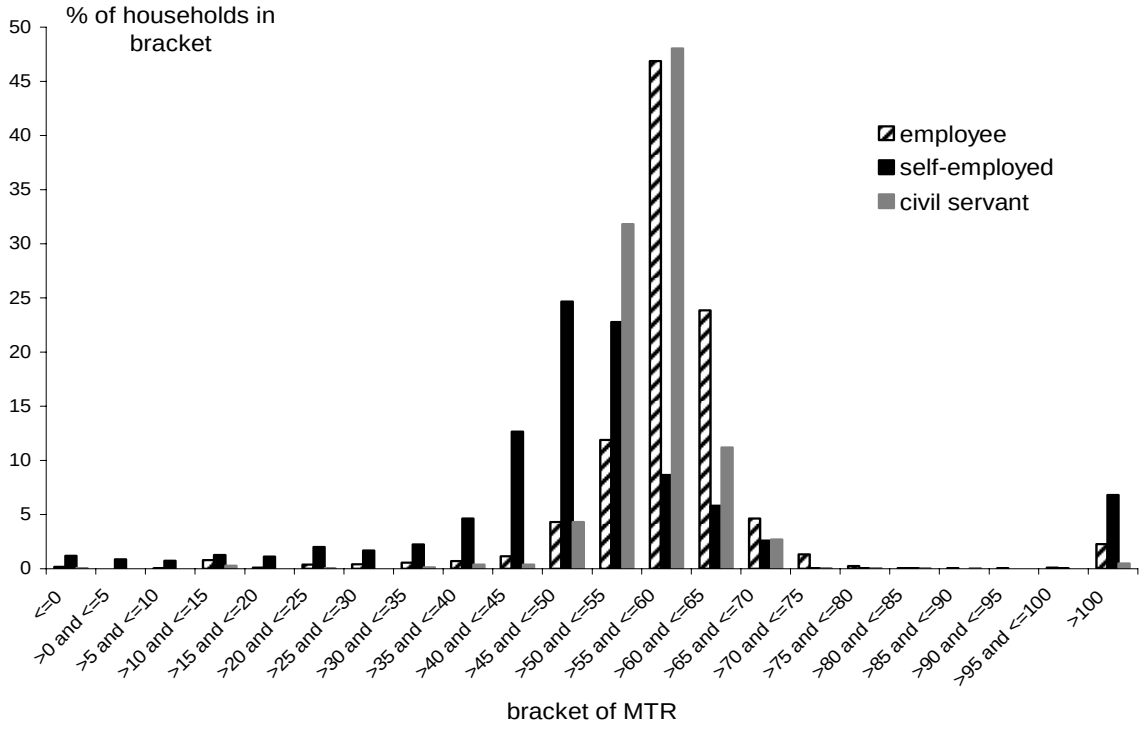
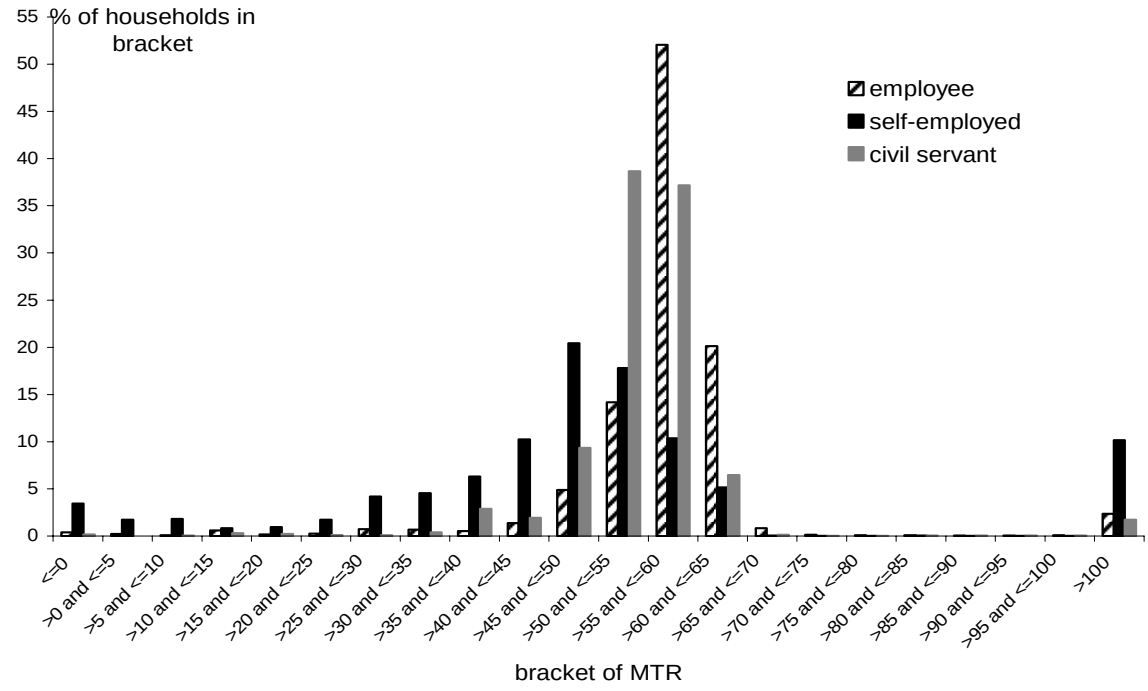


FIGURE 15 PERCENTAGE OF HOUSEHOLDS IN EACH TAX BRACKET ACCORDING TO SOCIO-ECONOMIC STATUS: 2007



In what follows we will look in more detail at the driving factors behind (high) effective marginal tax rates. Indeed, the relative contribution of different tax-benefit instruments to (high)

effective marginal tax rates is of importance when thinking about the effects of policy measures. Moreover, there exists a trade off when devising policies to encourage transition into work that has to do with different labour supply elasticities at the intensive and extensive margin. The former is the labour supply response to changes in wages of people already in work while the latter measures the elasticity of those currently not in paid employment. Policies to encourage transition into the labour market can have adverse effects on the labour supply of those already working, especially at lower levels of earnings, because the in-work benefits that are designed to attract individuals into work are (gradually) decreased as earnings increase. The contributions of different tax-benefit instruments can furthermore help in integrating and coordinating (parts of) the tax-benefit legislation to avoid situations with high marginal effective tax rates.

In Table 4-23 we show such decomposition for the effective marginal tax rate brackets shown in the graphs above. The calculation of the numbers in Table 4-23 is as follows[9]:

$$emtr = \frac{\Delta PIT + \Delta SSC - \Delta FB - \Delta SB - \Delta SA}{\Delta Y_{gross}}, \quad (5)$$

where $emtr$ is the effective marginal tax rate; ΔPIT are the changes in personal income taxes; ΔSSC are the changes in social security contributions; ΔFB are changes in family allowances; ΔSB are changes in other social benefits; and ΔSA the changes in the level of social assistance income. The change in social security contributions are further divided in changes in employee social security contributions and contributions on social benefits. The social benefits include unemployment benefits and sickness and disability benefits. Changes in benefits contribute negatively to the marginal tax rates whereas changes in contributions and taxes contribute positively.

The main drivers of effective marginal tax rates are personal income taxes and social insurance contributions. For the higher tax brackets also changes in unemployment benefits and social assistance levels play a significant role in explaining high marginal tax rates. Note also that changes in family allowance only play a minor role as was to be expected since we only look at simulation here for heads of household. If we were to simulate for all potential suppliers of labour in the household changes in family allowance will become more important. If children still living at home, e.g. students older than 18, start supplying labour this will have an effect on the child allowances received and thus also have an effect on the household effective marginal tax rate.[10]

Participation tax rates never exceed 100% but are in general higher than the marginal tax rates at the lower end of the hours distribution. In fact, participation tax rates are very high for up to 20 hours of work a week and exceed or are near 80% for most deciles up to 15 hours. Moreover, they seem to be highest for higher earning individuals. For most individuals in the earnings distribution, on average, it does not pay to start working at less than 15 hours: the extra income they gain as compared the social assistance level is not worth the extra cost of entering the labour

[9] We dropped super- and subscripts here not to confuse notation. All calculations are still at the household level while hours of work are simulated for one individual at the time.

[10] While calculating effective marginal tax rates at the household level for spouses one might not find this as intuitive when simulating the labour supply of children. Nevertheless and under certain conditions the decision of the child to enter the labour market can and will have an effect on the marginal tax rates of the parents.

market. Notice that the participation tax rate for singles is nearly nowhere below 60% and remember that the reference income here is social assistance.

TABLE 4-23 CONTRIBUTING FACTORS TO TOTAL EFFECTIVE MARGINAL TAX RATE AT HOUSEHOLD LEVEL: HOURS OF WORK SIMULATED FOR HEAD OF HOUSEHOLD

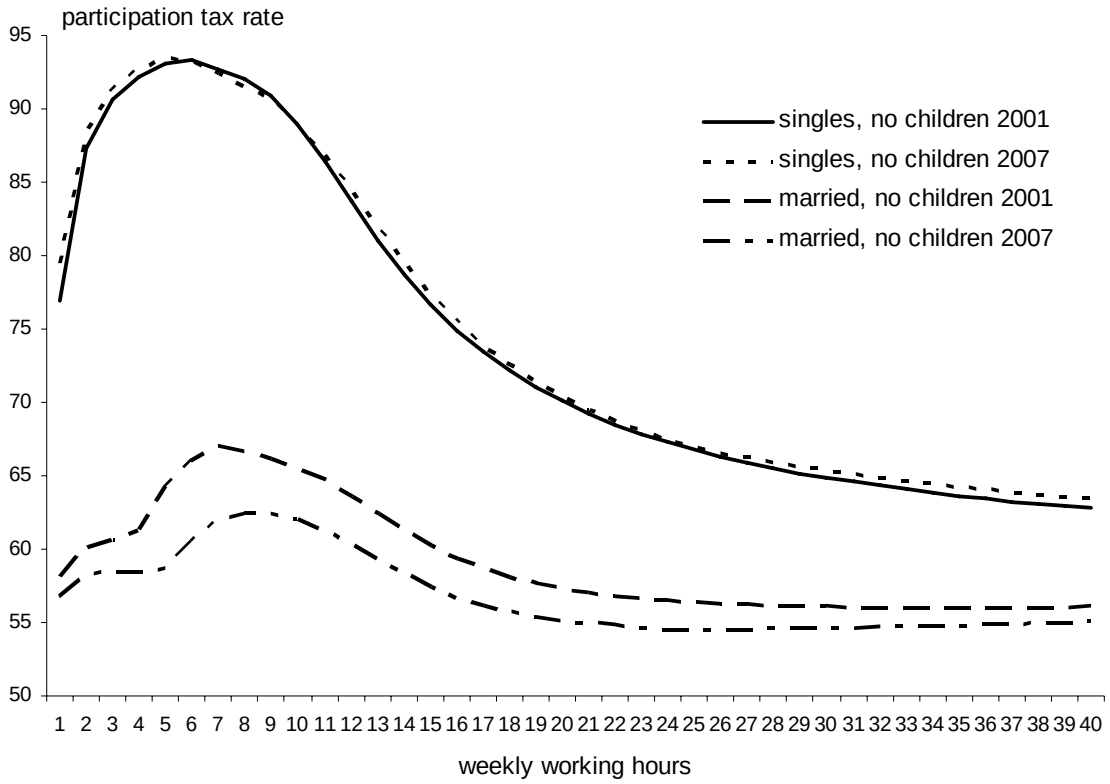
MTR bracket	emtr	personal income taxes	employee social security contributions	unemployment benefits	family allowances	disability	social assistance
<=0	-7.6	-4.1	0.3	-0.1	4.2	0.0	-8.0
>0 and <=5	0.5	0.4	0.3	-0.1	0.0	0.0	0.0
>5 and <=10	8.7	7.9	0.8	0.0	0.0	0.0	0.0
>10 and <=15	12.6	5.0	7.6	0.0	0.0	0.0	0.0
>15 and <=20	17.6	14.1	3.6	0.0	0.0	0.0	0.0
>20 and <=25	22.4	19.1	3.2	0.0	0.0	0.0	0.2
>25 and <=30	28.5	19.8	8.6	0.0	0.0	0.0	0.1
>30 and <=35	32.3	27.2	5.0	0.0	0.0	0.0	0.1
>35 and <=40	37.6	32.2	5.3	0.0	0.0	0.0	0.1
>40 and <=45	42.6	37.3	5.3	0.0	0.0	0.0	0.0
>45 and <=50	47.6	39.3	8.3	0.0	0.0	0.0	0.0
>50 and <=55	53.1	41.0	12.1	0.0	0.0	0.0	0.0
>55 and <=60	57.5	43.8	13.7	0.0	0.0	0.0	0.0
>60 and <=65	61.8	41.7	20.0	0.0	0.0	0.0	0.1
>65 and <=70	66.9	40.7	25.2	0.2	0.0	0.0	0.8
>70 and <=75	71.6	40.6	24.5	1.2	0.0	0.0	5.4
>75 and <=80	77.5	46.4	19.1	5.3	0.0	0.0	6.7
>80 and <=85	82.7	48.1	16.6	5.3	0.0	0.0	12.6
>85 and <=90	86.9	43.3	13.8	17.3	0.0	0.0	12.4
>90 and <=95	92.8	53.2	18.7	20.9	0.0	0.0	0.0
>95 and <=100	97.5	31.1	18.3	40.2	0.0	0.0	7.9
>100	156.2	37.3	6.3	27.5	8.5	0.1	75.9

We already showed the evolution of the participation tax rate over the range of hours worked for the whole population in Figure 10.[11] In the remainder of this section we will present in more detail the participation tax rates and how they have changed between 2001 and 2007. We have already seen in Figure 10 that participation tax rates in 2007 are consistently below those in 2001. We have also seen that the evolution for the population as a whole often masks big differences for subgroups. In Figure 16 we show the evolution of participation tax rates for singles and married couples without children. The pattern is very similar to that for the effective marginal tax rates: singles face considerably higher participation tax rates than do married couples. The difference

[11] Remember that the participation tax rates measures the how much of the earned income is taxed away when entering the labour market (from inactivity) at a certain point in the working hours distribution. The tax rate is always calculated with respect to the income when out of work.

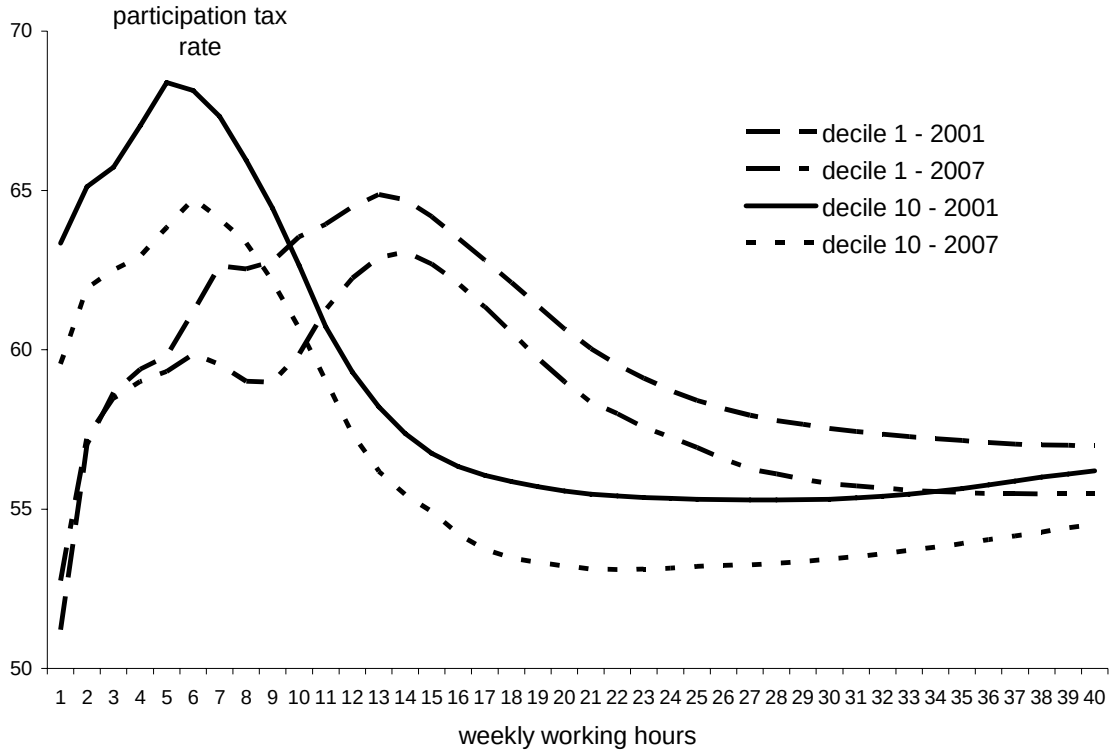
somewhat eases when entry in the labour market is at a sufficiently high number of hours worked but still hovers around 10 percentage points. The changes in the tax legislation seemed to have been more favourable to the incentive effects to participate in the labour market for married couples than for singles. In fact, for the latter the participation tax rates have hardly changed, and have even slightly increased, meaning that they are even less inclined to participate in the labour market than in 2001.

FIGURE 16 PARTICIPATION TAX RATES FOR SINGLES AND MARRIED COUPLES WITHOUT CHILDREN: 2001 VERSUS 2007



When we look at the lowest and highest wage decile we see that for both the participation tax rate has declined in 2007 as compared to 2001. The participation tax rate is higher for high earners at low entry levels, higher for low wage earners at middle entry levels and converging toward high entry levels. There is also a reverse "kink" in the pattern of participation tax rates for low earners between 2001 and 2007 at some of the lower entry levels. Where there is a slight upward spike in participation rates in 2001 at around 7 to 8 hours, the reverse is true in 2007.

FIGURE 17 PARTICIPATION TAX RATES FOR HIGH AND LOW WAGE EARNERS: 2001 VERSUS 2007



In Table 4-24 to Table 4-27 we show the distribution of different demographic groups over a range of participation tax brackets, i.e. what percentage of households of a specific demographic group is situated in each of the tax brackets. We do this for two labour market entry levels: half time and full time.

We see in Table 4-24 and Table 4-25 that entering the labour market in a part-time job is especially "costly" for unmarried couples and singles. If we were to define inactivity traps as situations where the participation tax rate exceeds 80% we see that it are especially unmarried couples and singles, with or without children, that risk being trapped in inactivity. Participation tax rates *in general* are lower for unmarried couples than for married couples, both in 2001 and 2007. That is, unmarried couples are more concentrated --despite the non negligible percentage in the very high tax brackets-- in the lower participation tax brackets. Singles, on the other hand, are generally found in the higher participation tax brackets.

TABLE 4-24 PARTICIPATION TAX RATE: **INACTIVITY TO HALF-TIME, 2001**

	All	married, no children (%)	married, one child (%)	married, two children (%)	married, three or more children (%)	unmarried couple, no children (%)	unmarried couple, one child (%)	unmarried couple, two children (%)	unmarried couple, three or more children (%)	single, no children (%)	single, one child (%)	single, two children (%)	single, three or more children (%)
<=0	0	0	0	0	0	0	0	0	0	0	0	0	0
0-5	0	0	0	0	0	0	0	0	0	0	0	0	0
5-10	0	0	0	0	0	0	0	0	0	0	0	0	0
10-15	0	0	0	0	2	0	0	1	19	0	0	0	3
15-20	1	0	0	1	2	0	1	8	10	0	1	1	2
20-25	3	0	3	2	4	6	14	26	6	0	4	3	3
25-30	5	0	1	1	5	38	29	16	2	1	7	5	4
30-35	4	0	1	3	7	18	11	4	4	4	5	3	2
35-40	5	3	5	6	7	11	5	3	2	4	3	1	2
40-45	8	13	16	14	8	3	4	2	5	0	1	1	2
45-50	15	26	29	30	18	2	3	2	6	1	1	1	3
50-55	11	19	17	20	15	3	3	9	2	2	2	4	2
55-60	4	4	3	3	5	2	10	1	3	4	5	4	3
60-65	4	4	3	3	7	2	3	3	4	4	4	4	2
65-70	4	4	4	4	7	1	2	2	4	6	2	1	4
70-75	11	9	5	7	7	2	2	1	7	29	2	1	19
75-80	11	9	5	5	5	1	1	1	7	29	2	6	16
80-85	6	7	3	2	2	1	0	4	4	12	7	18	9
85-90	3	2	1	0	0	1	2	4	1	2	14	19	8
90-95	2	0	0	0	0	1	1	1	2	1	15	16	9
95-100	1	0	0	0	0	1	1	1	1	0	16	9	3
>100	2	0	0	0	0	7	8	10	14	1	10	3	3

TABLE 4-25 PARTICIPATION TAX RATES: **INACTIVITY TO HALF-TIME, 2007**

	All	married, no children (%)	married, one child (%)	married, two children (%)	married, three or more children (%)	unmarried couple, no children (%)	unmarried couple, one child (%)	unmarried couple, two children (%)	unmarried couple, three or more children (%)	single, no children (%)	single, one child (%)	single, two children (%)	single, three or more children (%)
<=0	0	0	0	0	0	0	0	0	0	0	0	0	0
0-5	0	0	0	0	0	0	0	0	0	0	0	0	0
5-10	0	0	0	0	1	0	0	0	5	0	0	0	0
10-15	1	0	0	0	4	1	0	4	18	0	0	1	3
15-20	2	0	2	2	4	1	4	11	10	0	2	2	2
20-25	4	0	3	2	6	16	19	28	3	0	7	4	4
25-30	6	1	3	5	8	37	26	10	3	2	7	5	3
30-35	6	3	6	7	7	15	6	2	2	6	3	1	2
35-40	6	8	10	9	7	5	4	2	3	1	2	1	2
40-45	11	21	23	20	9	3	4	2	4	1	0	1	2
45-50	15	25	25	28	19	2	3	3	6	1	1	2	2
50-55	4	6	5	5	5	2	4	6	3	3	2	3	2
55-60	4	5	3	3	4	2	9	3	3	4	5	5	3
60-65	3	5	3	3	4	2	2	2	2	3	3	2	2
65-70	4	4	3	3	6	2	2	1	3	7	1	1	4
70-75	9	6	3	6	8	1	1	2	6	25	1	1	12
75-80	10	8	5	4	6	1	1	1	7	27	2	4	15
80-85	6	6	3	2	3	1	1	4	5	15	5	14	12
85-90	3	2	1	1	1	1	2	4	2	5	13	17	6
90-95	2	1	0	0	0	1	2	1	1	1	13	16	9
95-100	1	0	0	0	0	1	2	1	2	0	14	11	8
>100	2	0	0	0	0	7	8	11	14	0	17	8	5

Entering full-time employment shows the same overall pattern but the dispersion is much less and those facing inactivity traps are now 'only' found among the unmarried couples. This applies to both 2001 and 2007 as is shown in Table 4-26 and Table 4-27, with even a slight increase in the percentage of households facing participation tax rates of more than 100%. The 2007 legislation seems not to have been able to eradicate inactivity traps.

TABLE 4-26 PARTICIPATION TAX RATES: **INACTIVITY TO FULL-TIME WORK, 2001**

	All	married, no children (%)	married, one child (%)	married, two children (%)	married, three or more children (%)	unmarried couple, no children (%)	unmarried couple, one child (%)	unmarried couple, two children (%)	unmarried couple, three or more children (%)	single, no children (%)	single, one child (%)	single, two children (%)	single, three or more children (%)
<=0	0	0	0	0	0	0	0	0	0	0	0	0	0
0-5	0	0	0	0	0	0	0	0	0	0	0	0	0
5-10	0	0	0	0	0	0	0	0	0	0	0	0	0
10-15	0	0	0	0	0	0	0	0	0	0	0	0	0
15-20	0	0	0	0	0	0	0	0	0	0	0	0	0
20-25	0	0	0	0	0	0	0	0	2	0	0	0	0
25-30	0	0	0	0	1	0	0	0	4	0	0	0	1
30-35	1	0	1	1	3	0	0	2	14	1	0	0	2
35-40	3	0	3	2	5	8	14	31	15	1	6	4	4
40-45	9	0	2	3	11	54	38	21	7	5	11	7	6
45-50	11	11	17	17	17	14	10	5	8	2	4	3	6
50-55	27	45	48	51	40	4	7	10	6	2	2	4	6
55-60	9	12	9	9	22	4	12	4	10	6	7	6	12
60-65	18	25	16	16	1	4	5	4	10	34	5	5	21
65-70	15	6	2	0	0	2	1	5	9	48	8	22	40
70-75	4	0	0	0	0	2	4	5	2	2	32	42	1
75-80	2	0	0	0	0	2	2	3	2	0	24	7	0
80-85	0	0	0	0	0	0	2	2	1	0	1	0	0
85-90	0	0	0	0	0	0	1	1	2	0	0	0	0
90-95	0	0	0	0	0	1	1	1	3	0	0	0	0
95-100	0	0	0	0	0	1	1	2	2	0	0	0	0
>100	0	0	0	0	0	3	3	4	3	0	0	0	0

TABLE 4-27 PARTICIPATION TAX RATES: **INACTIVITY TO FULL-TIME WORK, 2007**

	All	married, no children (%)	married, one child (%)	married, two children (%)	married, three or more children (%)	unmarried couple, no children (%)	unmarried couple, one child (%)	unmarried couple, two children (%)	unmarried couple, three or more children (%)	single, no children (%)	single, one child (%)	single, two children (%)	single, three or more children (%)
<=0	0	0	0	0	0	0	0	0	0	0	0	0	0
0-5	0	0	0	0	0	0	0	0	0	0	0	0	0
5-10	0	0	0	0	0	0	0	0	0	0	0	0	0
10-15	0	0	0	0	0	0	0	0	0	0	0	0	0
15-20	0	0	0	0	0	0	0	0	0	0	0	0	0
20-25	0	0	0	0	1	0	0	0	2	0	0	0	0
25-30	0	0	1	1	2	1	0	0	5	0	0	0	1
30-35	2	0	3	2	4	1	1	4	17	1	1	1	3
35-40	6	0	3	2	10	22	28	38	12	2	8	6	5
40-45	11	4	8	12	15	48	27	13	7	6	10	5	5
45-50	16	27	32	27	21	7	7	5	9	0	3	2	5
50-55	20	32	31	36	31	3	7	11	6	2	3	5	6
55-60	9	11	8	12	14	4	11	3	7	7	8	7	8
60-65	16	24	13	8	1	3	5	4	8	33	3	2	21
65-70	14	1	1	0	0	2	2	5	10	48	7	18	43
70-75	3	0	0	0	0	2	3	6	2	1	29	41	1
75-80	2	0	0	0	0	2	2	1	2	0	28	11	0
80-85	0	0	0	0	0	1	1	2	2	0	1	0	0
85-90	0	0	0	0	0	1	1	1	1	0	0	0	0
90-95	0	0	0	0	0	0	1	1	2	0	0	0	0
95-100	0	0	0	0	0	1	1	1	3	0	0	0	0
>100	0	0	0	0	0	3	4	5	4	0	0	0	0

4.3.4 Conclusion

We have seen that average tax rates, including employee social insurance contributions, rarely exceed 50% even though the top marginal tax rate in the personal income tax schedule was 55% in 2001 and 50% in 2007. Average tax rates on total labour *cost*, thus including employers' social security contributions, are higher and around 50% on average. Despite the abolition of the two top statutory marginal tax rates of 55% and 52.5%, the tax system in 2007 is still progressive and shows a U-shaped pattern for effective marginal tax rates.

The effective marginal and participation tax rates show that overall work incentives have improved between 2001 and 2007 as indicated by lower effective marginal and participation tax rates. This is not the case for every subgroup however. For singles, for example, marginal tax rates actually increased for certain leisure-labour combination. The participation tax rates even increased—although slightly—in 2007 as compared to 2001 for singles. This is especially so when entering the labour market in a part-time position. Moreover, the 2007 tax system seems not to

have been able to eradicate all inactivity traps. There are actually slightly more households that face a participation tax rate of more than 100% in 2007 than in 2001.

We have also stressed that some information on taxes is lacking in MIMOSIS such as local taxes, property taxes, capital income taxes and the like. On the other hand we also lack information of some important tax deductible expenditures such as mortgage interest payments, contributions to private pension plans, gifts, childcare costs, etc. We feel that especially childcare costs can have a decisive impact on the choice whether or not to supply labour, especially in couples where one of the partners is inactive or unemployed and at the lower end of the wage distribution. When entering the labour market children have to be cared for and costs can be relatively substantial for low wage workers increasing their effective marginal tax rates.

Overall, we can conclude that MIMOSIS is a powerful tool to analyse incentive effects of the tax-benefit system and how they change when policy changes. It is certainly a useful model to study the importance and significance of inactivity traps in more detail, i.e. how much households are affected, what are their characteristics, etc. In the future MIMOSIS will be further refined to build in interaction when employment status changes, e.g. when an individual makes a transition from unemployment to employment the unemployment benefits should be adjusted accordingly.

5 CONCLUSION

The microsimulation model MIMOSIS is a powerful tool for policy and other analyses. It covers a wide and detailed range of policy domains and rules and should thus be of great practical value to policy analysts and policy makers. But also scholars can benefit greatly from models such as MIMOSIS with its rich and very extensive dataset and the possibilities that (creative) use of MIMOSIS offers. Especially now that the legislation has been updated use of MIMOSIS offers interesting possibilities to explore socio-economic issues in more detail.

As the development of a model as wide in scope and detail as MIMOSIS demands ongoing work and effort implies that MIMOSIS still needs further refinement and that some of the results will be updated and explored in more detail in the future. This is especially true for the calculation of effective tax rates where still some adjustments need to be made to the code of MIMOSIS in order to give a reliable description of the distribution of effective tax rates among the population. In particular the transition into work needs to be further refined.

For distributional analyses MIMOSIS is up to date as was shown in the two applications that studied the distributional impact of policy reforms in sections 4.1 and 4.2. These applications showed that MIMOSIS can be used for both interesting and thought-provoking analyses and simulations. The calculation of effective tax rates demonstrates the flexibility of the model and allows addressing other than distributional issues, such as the incentive effects (implicitly) built in the tax-benefit legislation. It also provides all means to estimate behavioural reactions, especially with respect to labour supply as we have shown in the final report of project AG/01/116.

In the future MIMOSIS will continue to be refined, updated, and especially used as a valuable tool for both academic as policy oriented work and analyses. As the model still works with data from 2001 –though interesting in itself– it would be interesting to have an updated dataset somewhere in the future. Some of the analyses in this report, more particularly the evaluation of 8 years of "purple reign", could be given a very interesting extra dimension with an updated dataset.

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7 APPENDIX

TABLE A1 MINIMUM ALLOWANCES ADAPTATIONS UNDER REFORM C

Allowances	Categories	Reference	Scenario 1		Scenario 2	
		Euro	Euro	%	Euro	%
Subsistence	Partner with income	456.0	792.54	73.8	838.44	83.9
	Single	684.0	792.54	15.9	838.4	22.6
	Partner without income	911.9	1,056.7	15.9	1,117.9	22.6
Guaranteed income for elderly	Single	827.6	*	*	838.4	1.3
	Partner or spouse	551.7	*	*	1,117.9	1.3
Disabled	Category A	456.2	792.5	73.7	838.4	83.8
	Category B	684.3	792.5	15.8	838.4	22.5
	Category C	912.4	1,056.7	15.8	1,117.9	22.5
Primary career break for wage earners	Single	684.1	792.5	15.9	838.4	22.6
	Partner	684.1	792.5	15.9	838.4	22.6
	Person with children	911.8	1,056.7	15.9	1,117.9	22.6
Sickness Wage earners	Single	684.1	792.5	15.9	838.4	22.6
	Partner	684.1	792.5	15.9	838.4	22.6
	Person with children	911.8	1,056.7	15.9	1,117.9	22.6
Sickness Self-employed	Single	814.1	*	*	838.4	3.0
	Partner	722.8	792.5	9.6	838.4	16.0
	Person with children	1,081.9	*	*	1,117.9	0.0
Unemployment Without interruption	Single	797.9	*	*	838.4	5.1
	Partner	598.0	792.5	32.5	838.4	40.2
	Partner with children	949.5	1,056.7	11.3	1,117.9	17.7
Unemployment With interruption	Single, 50-54 year old	849.4	*	*	*	*
	Single, 55-64 year old	933.4	*	*	*	*
	Partner, 50-54 year old	690.0	792.5	14.9	838.4	21.5
	Partner, 55-57 year old, without children	768.8	792.5	3.1	838.4	9.1
	Partner, 58-64 year old, without children	845.0	*	*	*	*
	With interruption Partner with children	1,015.0	1,056.7	4.1	1,117.9	10.1
Unemployment Waiting allowances	Single, 21 year old & +	684.3	792.5	15.8	838.4	22.5
	Single 18-20 year old	413.1	792.5	91.8	838.4	102.9
	Single < 18 year old	262.9	792.5	201.5	838.4	219.0
	Partner , > 17 year old	359.6	792.5	120.4	838.4	133.2
	Partner, < 17 year old	225.4	792.5	251.6	838.4	271.9
	Partner, entitled, > 17 year old	383.2	792.5	106.8	838.4	118.8
	Partner, entitled, < 18 year old	238.4	792.5	232.4	838.4	251.7
	Partner with children	925.1	1,056.7	14.2	1,117.9	20.8
Guaranteed pension	Self-employed with children	1,081.9	*	*	1,117.9	0.0
	Single self-employed	814.0	*	*	838.4	3.0
	Survival pension for self-employed	814.01	*	*	838.4	3.0

* Allowance adaptation not necessary.

TABLE A2 BUDGET IMPACT OF REFORM C

Expenditures and receipts Schemes	2001 Baseline	2008 Projection	
	Budget change (%)	Total budget (million €)	Budget increase (million €)
Scenario 1			
Expenditures			**900.0**
Subsistence allowances	30.3	479.4	145.2
Guaranteed income for elderly	0.0	367.4	0.0
Disabled			134.3
Sickness: Wage-earners	6.0	4,084.5	243.4
Sickness: Self-employed	3.8	271.9	10.3
Unemployment	6.1	6,046.7	369.5
Family allowances: Wage-earners	- 0.1	3,807.4	-2.7
Family allowances: Self-employed	0.0	374.8	0.0
Pension: Wage-earners	0.0	15,713.7	0.0
Pension: Self-employed	0.0	2,448.6	0.0
Receipts			**84.7**
Social Security contributions	0.5	2,497.6	13.5
Personal income taxes	0.2	35,610.4	71.2
Total = Expenditures – Receipts			**815.3**
Scenario 2			
Expenditures			**1,383.6**
Subsistence allowances	39.7	479.4	190.3
Guaranteed income for elderly	1.9	367.4	7.1
Disabled			167.8
Sickness: Wage-earners	8.6	4,084.5	350.9
Sickness: Self-employed	6.2	271.9	16.9
Unemployment	10.1	6,046.7	611.3
Family allowances: Wage-earners	-0.1	3,807.4	-3.8
Family allowances: Self-employed	0.0	374.8	0.0
Pension: Wage-earners	0.1	15,713.7	11.0
Pension: Self-employed	1.3	2,448.5	32.1
Receipts			**129.5**
Social Security contributions	0.6	2,497.6	15.5
Personal income taxes	0.3	35,610.4	114.0
Total = Expenditures – Receipts			**1,254.1**

Note: All framed budgets come from FOD Sociale Zekerheid (2008).