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ABSTRACT

Using a new comprehensive tax-benefit model, JUTTA, this paper examines how labour supply incentives – both to participate in the labour force (the "extensive" margin) and to supply extra hours of work (the "incentive" margin) – have changed in Finland in 1995-2007. The results reveal that the average participation tax rate has decreased by 10 percentage points to 62 per cent. Despite the significant improvement in incentives, some of the unemployed who have children, especially single parents, are still in an unemployment trap, i.e. the disposable family income does not significantly increase if the person is employed. We therefore present simulations where the social security system is reformed, without reducing minimum benefits, so that the income dependence of some of the benefits is reduced. This reform redistributes income to the poor and, at the same time, improves the incentives to participate in the labour force. We also compare the effects of this policy with those of a set of more traditional type of policies, consisting of across-the-board tax cuts and increases in income support.

JEL Classification: H24, I38, J22

Keywords: microsimulation, labour supply, extensive margin, efficiency-equity trade-off

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1 Introduction

Recent empirical work on labour supply has emphasised the role of participation decision (often called the "extensive" margin), which has often found to be more important than the decision on working hours (the "intensive margin"). This literature has been surveyed by, for instance, Eissa et al. (2004). While working hours are typically very unresponsive to tax changes (Blundell & MaCurdy, 1999), evidence from the Earned Income Tax Credit in the US and the Working Families Tax Credit in the UK suggests that the participation decision of certain groups, such as low-income single mothers, can be quite elastic to the joint effects of the tax-benefit system when an unemployed person becomes employed.

The structure of labour supply responses also has important implications for the optimal design of income maintenance and income taxation systems. Saez (2002) demonstrates that if participation responses for low-income employers are substantial and the intensive responses are small, the optimal policy may involve low, or even negative, marginal tax rates at low incomes, which are then "paid back" by increasing marginal tax rates at medium and high-income levels. This is in marked contrast to much of the classic analysis of optimal taxation, initiated by Mirrlees (1971), that has concentrated on intensive responses and typically recommended high marginal tax rates at low incomes.

These findings have also inspired interesting policy-oriented work on reforming the current welfare systems in high-income countries. An interesting example is the work by Immervoll et al. (2007), who compare the distributional merits of the traditional type of demogrant policy to those of in-work benefits in countries covered by the EUROMOD microsimulation model. With plausible parameter estimates, they argue, the in-work-benefit policy leads to smaller, or even non-existent, efficiency costs than increasing transfers to those not working. Methodologically speaking, they first calculate the so-called participation tax rates, which measure the benefit for an unemployed person to become employed, then simulate changes to these tax rates and finally obtain estimates of the potential employment effects. Bargain & Orsini (2006b,a) perform a similar exercise for three countries, including Finland. They compare two in-work benefit schemes, one similar to the Working Tax Credit in the UK that is means-tested based on family income and another individualised scheme.

The purpose of this paper is to present more detailed calculations in the similar issue on one country, Finland. Using a new, comprehensive, Finnish tax-benefit model, JUTTA, we first calculate how labour supply incentives have changed in Finland in 1995-2007 by calculating participation and effective marginal tax rates. We find that despite a clear improvement in labour supply incentives over time, there are still individuals whose participation tax rates are so high that they gain little from becoming employed. These unemployment traps typically affect low-income families with small children, in particular, single parents. We then propose a policy package that is intended to alleviate unemployment traps. A mechanical way

to achieve this would involve lowering the level of income support for those not working. This policy would, however, lead to troublesome distributional impacts. We therefore design our "incentive package", as we call it, so that it does not involve cuts to the social security level but rather reduces the income dependence of some of the elements of social security, including income maintenance systems and housing subsidies. We then compare the incentive and potential employment effects of this policy with those of two alternative, more traditional type of policies, including across-the-board tax cuts and increasing income support.

The paper is organised as follows. The second section describes the data and the microsimulation methods we use. Section 3 presents the evolution of labour supply incentives in Finland in 1995-2007. Section 4 introduces the reform packages we consider and their impacts on incentives and income distribution. Section 5 discusses the potential employment effects. Conclusions are offered in Section 6.

2 Data and methods

We use the most recent Income Distribution Survey of Statistics Finland, from the year 2004. The data describe the distribution of the annual income of households and income differentials between different population groups. The statistics describe the amount of disposable income and its formation from different sources when taking taxation and income transfers into consideration. Income distribution statistics represent a sample survey whose final sample size is approximately 10,000 households. The data on households and their members are collected with interviews and from administrative registers. In the interviews, the size and structure of households are established and background data are collected on the household members' occupations, activity on the labour market, dwelling, untaxed income and other matters that have a bearing on the subsistence of households. The vast majority of data on income and on classification variables (e.g. level of education, marital status) are obtained from registers.

While the data are always based on 2004 values, we evaluate the effects of taxes and benefits based on legislation from various years, covering 1995-2007. This implies that our results reveal the changes to work incentives that arise because of the reforms to the tax and benefit systems, and not because of changes in the population structure. This is a desirable feature of the analysis, since the legislation part is something the government can directly have an effect on.

We deal with two main tax rates. The first notion is a participation tax rate, which describes the incentives for becoming employed. This is an average tax rate, calculated for an individual that is first unemployed and then employed. The second concept is an effective marginal tax rate, which describes the incentive to supply a small additional amount of work, either for an already employed person or someone who is unemployed but has some part-time earnings.

The participation tax rate is calculated following the idea in Immervoll et al. (2007). Let us denote the direct taxes paid by an unemployed person by t_u, and by t_l the direct taxes paid by an employed person. Similarly, the social security benefits of an unemployed person are denoted by b_u and those of an employed person by b_l. The net tax rate, τ, is defined as the difference between taxes paid and benefits received, i.e. $\tau_i = t_i - b_i$, where i is u or l. The participation tax rate is, in turn, the change in the net tax rate when a person becomes employed. It is convenient to descrive this as a proportion of the gross wage the person can earn when employed. This ratio is then the participation tax rate,

$$\text{participation tax rate} = \frac{\tau_l - \tau_u}{w} \tag{1}$$

where w denotes the gross wage.

The practical steps to arrive at the participation tax rates are the following. We pick all unemployed persons from the data and calculate the monthly net tax for these persons for the unemployment months. We then convert the unemployed to full-year unemployed by multiplying the monthly net tax by 12. We then estimate a hypothetical gross wage rate for these persons with regression techniques. We run separate regressions for men and women and take into account their education level, the field of education, work experience, marital status, earlier unemployment spells etc. The wage regression results are presented in an appendix.

These regressions are then used to predict the gross wages the persons would earn if they became employed. With this gross wage, the microsimulation model is used to calculate the taxes and benefits for these hypothetical workers, assuming that they work for the full year. The participation tax rate is then derived using the difference in the net tax when employed and unemployed.

The microsimulation model we use, JUTTA, calculates all relevant social transfers (except pensions) and direct taxes for all persons and households in the sample. When participation tax rates are calculated, we first pick from the sample persons with an unemployment record or benefits. Then those with partial unemployment benefit are excluded and about 2 500 persons are left in the sample.

Most of these persons have been unemployed only some months in the year, but in the hypothetical simulation we first convert them to full-year unemployed. Their earned incomes, pensions and other individual benefits (sickness and parental allowances, child home care allowances and study grants) are eliminated, but the individual average monthly unemployment benefit is extended to the whole year. Unemployment-related training allowances are treated in an analogous way.

In the second stage of the calculations these same persons have the predicted wage as their income for 12 months. Now again all pensions and other individual benefits are eliminated. When we calculate taxes in this simulation, average work-related allowances (travelling ex-

penses and trade union fees) are assumed.

In both simulations the housing allowance and the means-tested income support is calculated for all families in the sample. In the first simulation, when the persons are unemployed, these benefits have quite an important effect. Also, in both simulations, families having children under school age pay day-care fees according to the income schedule. Of course, the fees are higher when the persons are employed.

If there are two or more unemployed persons in the same household, those benefits or payments which are not individual but take into account the whole household income are distributed among these persons. This affects day-care fees, housing allowance and income support.

Using the results of the two simulations it is possible to calculate the participation tax rate. These calculations are repeated for different years of legislation: 1995, 2000, 2004 and 2007. When the legislation year differs from the year of the data (2004), the monetary parameters of the legislation are adjusted with the cost of living index.

The effective marginal tax rate is calculated for all households in the data set who have wage income. It takes into account the increase in taxes paid and benefits lost as a percentage of a small wage income increase (1 per cent of wage income).

3 Changes in work incentives from 1995 to 2007

Work incentives among the unemployed – Participation tax rates

Changes in participation tax rates, which we interpret as being related to the incentive to participate in the labour force, are tabulated below for different family types, age groups, quintile groups of disposable income and the type of unemployment.

Table 1 presents by type of household the average participation tax rate (panel a), cell size (panel b) and the population share as well as the number of persons who have more than 80 and 100 per cent tax rates, respectively (panels c-f). The overall average participation tax rate has declined from 72.2 per cent in 1995 to 62.4 in 1997. Most of this decline – 5.6 percentage points – occurred between 1995 and 2000, even if a substantial decline took place thereafter.

The share of persons with participation tax rates in excess of 80 and 100 per cent has also declined quite substantially – both shares have been roughly halved from 31.8 and 5.3 per cent in 1995 to 15.4 and 2.5 per cent, respectively. Thus, in the overall population, the occurrence of very high participation tax rates, which leave no cash in hand from becoming employed, affects but a small minority.

Figure 1 shows average participation tax rates conditional on the predicted monthly income, based on a lowess smooth, across the years for the unemployed. We see that the shape of this expected mean participation tax rate remains, by and large, the same acoss the years,

Table 1 Participation tax rates by household type

(a) Average

	1995	2000	2004	2007
Single person	77.1	71.5	68.5	67.6
Childless couple	67.2	62.6	60.3	59.0
Lone parent	85.1	79.6	77.3	73.4
Two parents	77.5	71.0	68.6	64.9
Others	62.1	57.4	54.5	53.5
Total	72.2	66.8	64.2	62.4

(b) Cell Size

	1995	2000	2004	2007
Single person	381	383	383	383
Childless couple	777	784	785	786
Lone parent	90	91	91	91
Two parents	630	637	637	637
Others	554	555	556	557
Total	2432	2450	2452	2454

(c) Tax >80 (share)

	1995	2000	2004	2007
Single person	41.2	22.7	14.3	13.8
Childless couple	20.0	14.5	12.2	12.1
Lone parent	67.6	47.5	43.4	27.7
Two parents	40.9	29.6	26.5	22.5
Others	16.1	12.5	11.7	10.9
Total	31.8	21.3	17.3	15.4

(d) Tax >80 (persons)

	1995	2000	2004	2007
Single person	32509	18054	11392	10951
Childless couple	18265	13369	11301	11166
Lone parent	8199	5758	5263	3362
Two parents	23790	17461	15678	13298
Others	5744	4477	4181	3923
Total	87832	59202	48379	43087

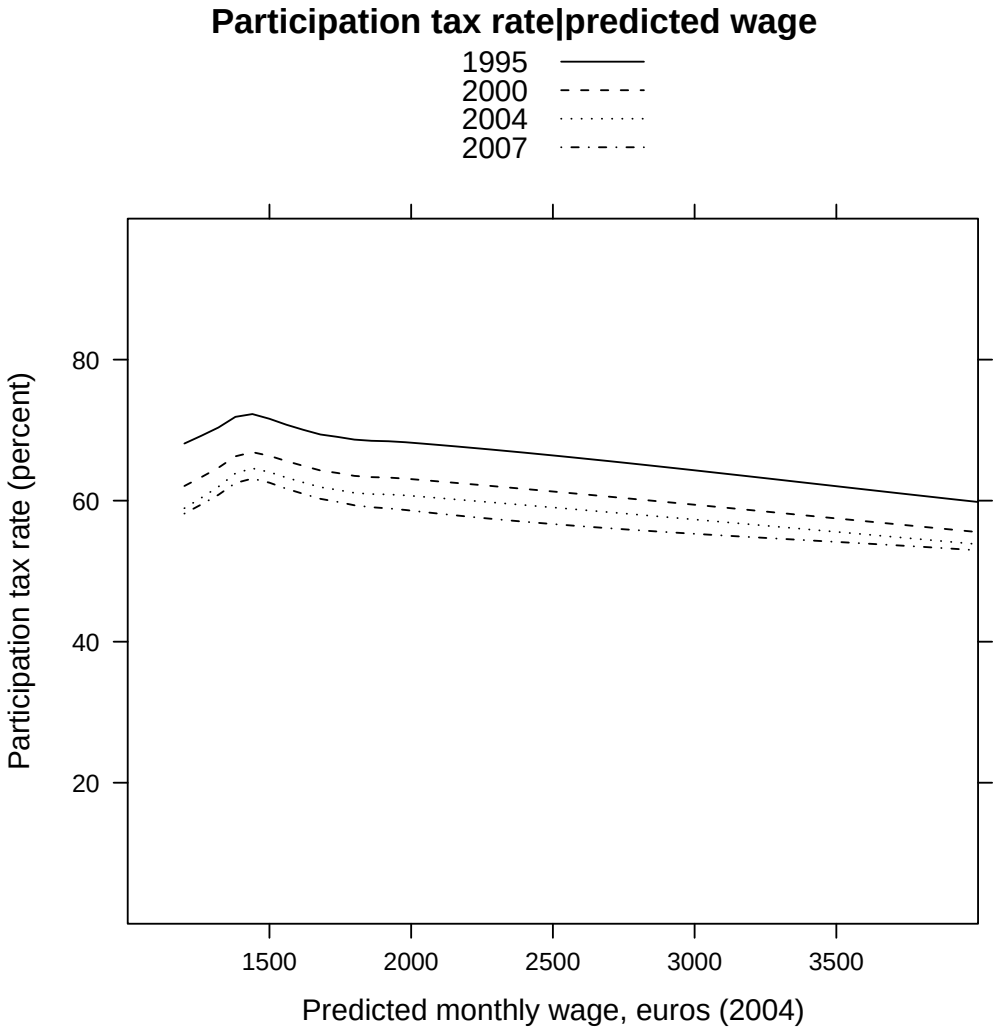
(e) Tax >100 (share)

	1995	2000	2004	2007
Single person	1.7	1.3	1.3	1.3
Childless couple	2.9	1.9	3.0	2.0
Lone parent	7.6	5.2	6.5	0.5
Two parents	12.8	9.5	8.0	4.9
Others	4.3	2.8	2.6	2.9
Total	5.3	3.8	3.8	2.5

(f) Tax >100 (persons)

	1995	2000	2004	2007
Single person	1338	1019	1019	1019
Childless couple	2645	1771	2740	1846
Lone parent	924	632	786	60
Two parents	7452	5622	4751	2892
Others	1545	1003	937	1034
Total	14598	10557	10623	7111

Figure 1 participation tax rates by predicted monthly wages



but the schedule declines across all wage levels. There is some tendency for the slope to flatten at a high level of predicted wages between 2005 and 2007. Note, however, that the steep increase in participation tax rates about 1200 euros (which is our minimum wage) to 1500 euros has, if anything, become more steep, even if at a lower starting level, between 1995 and 2007.

We next turn to the participation tax rates in different types of households, also shown in Table 1. We see that the average participation tax rates declined in all groups, with lone- and two-parent households registering the largest percentage point declines. However, the rates faced by unemployed lone parents, especially, are still quite high – three-quarters of every euro earned will, on average, be lost to increased taxes and reduced social benefits on their becoming employed. A comparison of singe persons with two-parent housholds, both of whom started off with similar average participation tax rates, show that two-parent housholds' participation tax rates have declined by more than those of single (childless) person households.

Inspection of the shares of very high participation tax rates by household type also reveals some differences, even if the direction of change is similar in all cases. The share of lone-parent families with more than 80 per cent rates has declined from 67.6 to 27.7 per cent – a large decline, but one which still leaves them with the greatest share of high rates. Notably, the share of single-person households with more than 80 per cent rates also declined quite substantially, from 41.2 to 13.8 per cent. (We should note that the statistical reliability of the estimates per household type of persons with more than 100 per cent rates is in doubt, due to small cell sizes.)

We show the participation tax rates tabulated across quintile groups of equivalised disposable income in Table 2. We should bear in mind that these quintile groups are based on the equivalent disposable income of the households in which the unemployed lived in 2004 (the latest year of data at our disposal). Average participation tax rates declined across the whole distribution of income. The participation tax rates are the highest at the lower end of the distribution – as one might expect, given that the low end receives most transfers. The decline in participation tax rates has also been most pronounced in the lower end. Thus, the range of variation in average participation tax rates has declined from (lowest to richest) 76.5–67.7 per cent to 64.9–61.1 per cent, a substantial compression.

Participation tax rates by the type of unemployment a person has experienced is examined in Table 3 and in Figure 2. While the average participation tax rate has declined in all categories – earnings-related unemployment compensation, flat-rate unemployment benefit and labour market support, as well as the "mixed" category[1] – the earnings-related category had the highest average rate both in 1995 and in 2007. In 2007, almost two thirds of the earned euro on becoming employed from earnings-related unemployment was lost to taxes. This contrasts with the 57.7 percentage average participation tax rate that those on flate-rate unemployment compensation face.

The conditional mean curves, which related the average participation tax rate to different levels of predicted wages reveal some interesting differences between the groups. Those on earnings-related unemployment benefits face a steep decline in rates at the low levels of monthly wages, whereafter the profile is quite flat. The largest changes across time also occur at lower levels of wages. The profile for those on flat-rate unemployment compensation, by contrast, declines more evenly, even if here, too, the curve flattens out at about 2500 euros per month in 2007.

[1]The "mixed" cases are those who, within the sample, had received several different types of unemployment compensation, e.g., those who exhausted their earnings-related benefits and moved onto flat-rate support.

Table 2 participation tax rates by quintile group of disposable income

(a) Average

	1995	2000	2004	2007
1	76.5	70.4	67.0	64.9
2	70.5	65.2	62.6	60.4
3	69.9	64.8	63.0	61.1
4	68.0	63.6	61.7	61.0
5	67.7	63.8	62.1	61.1
Total	72.2	66.8	64.2	62.4

(b) Cell Size

	1995	2000	2004	2007
1	872	880	880	880
2	563	565	567	568
3	407	412	412	412
4	356	359	359	359
5	234	234	234	235
Total	2432	2450	2452	2454

(c) Tax >80 (share)

	1995	2000	2004	2007
1	37.8	26.4	20.0	17.1
2	29.7	17.7	14.4	11.3
3	31.5	21.1	18.3	18.8
4	25.2	18.7	17.0	16.7
5	19.0	10.3	10.7	9.9
Total	31.8	21.3	17.3	15.4

(d) Tax >80 (persons)

	1995	2000	2004	2007
1	49349	34693	26309	22429
2	17145	10231	8419	6597
3	12574	8573	7456	7650
4	7998	5953	5405	5325
5	3162	1713	1787	1648
Total	87832	59202	48379	43087

(e) Tax >100 (share)

	1995	2000	2004	2007
1	7.9	5.3	5.3	2.6
2	2.8	2.3	1.5	1.5
3	5.5	4.1	4.8	3.7
4	4.0	3.1	3.6	3.6
5	1.3	0.9	1.3	1.3
Total	5.3	3.8	3.8	2.5

(f) Tax >100 (persons)

	1995	2000	2004	2007
1	10267	6999	6980	3365
2	1590	1350	878	886
3	2205	1656	1934	1508
4	1273	975	1151	1131
5	209	150	209	209
Total	14598	10557	10623	7111

Table 3 Participation tax rates by type of unemployment compensation

(a) Average

	1995	2000	2004	2007
No unemp comp	NA	NA	NA	NA
Earnings-related	74.6	70.1	68.3	66.2
Flat rate	67.6	62.4	59.4	57.7
Labour market support	69.5	63.0	59.6	58.2
Mixed	74.9	70.4	68.0	65.8
Total	72.2	66.8	64.2	62.4

(b) Cell Size

	1995	2000	2004	2007
No unemp comp	NA	NA	NA	NA
Earnings-related	1002	1002	1002	1002
Flat rate	157	159	159	159
Labour market support	907	921	923	924
Mixed	366	368	368	369
Total	2432	2450	2452	2454

(c) Tax >80 (share)

	1995	2000	2004	2007
No unemp comp	NA	NA	NA	NA
Earnings-related	37.0	25.3	22.1	19.6
Flat rate	23.8	19.4	11.3	13.2
Labour market support	25.7	15.0	11.7	10.1
Mixed	37.4	28.1	22.5	19.6
Total	31.8	21.3	17.3	15.4

(d) Tax >80 (persons)

	1995	2000	2004	2007
No unemp comp	NA	NA	NA	NA
Earnings-related	36543	24998	21819	19416
Flat rate	3313	2848	1660	1938
Labour market support	31122	18315	14386	12366
Mixed	15955	11979	9598	8367
Total	87832	59202	48379	43087

(e) Tax >100 (share)

	1995	2000	2004	2007
No unemp comp	NA	NA	NA	NA
Earnings-related	5.5	3.9	4.0	3.6
Flat rate	2.6	1.1	4.6	0.2
Labour market support	5.0	3.4	2.9	1.6
Mixed	6.8	5.8	5.3	3.3
Total	5.3	3.8	3.8	2.5

(f) Tax >100 (persons)

	1995	2000	2004	2007
No unemp comp	NA	NA	NA	NA
Earnings-related	5411	3806	3989	3554
Flat rate	359	166	673	27
Labour market support	5995	4186	3544	2009
Mixed	2917	2488	2263	1398
Total	14598	10557	10623	7111

Figure 2 Participation tax rates by predicted monthly wages and type of unemployment compensation

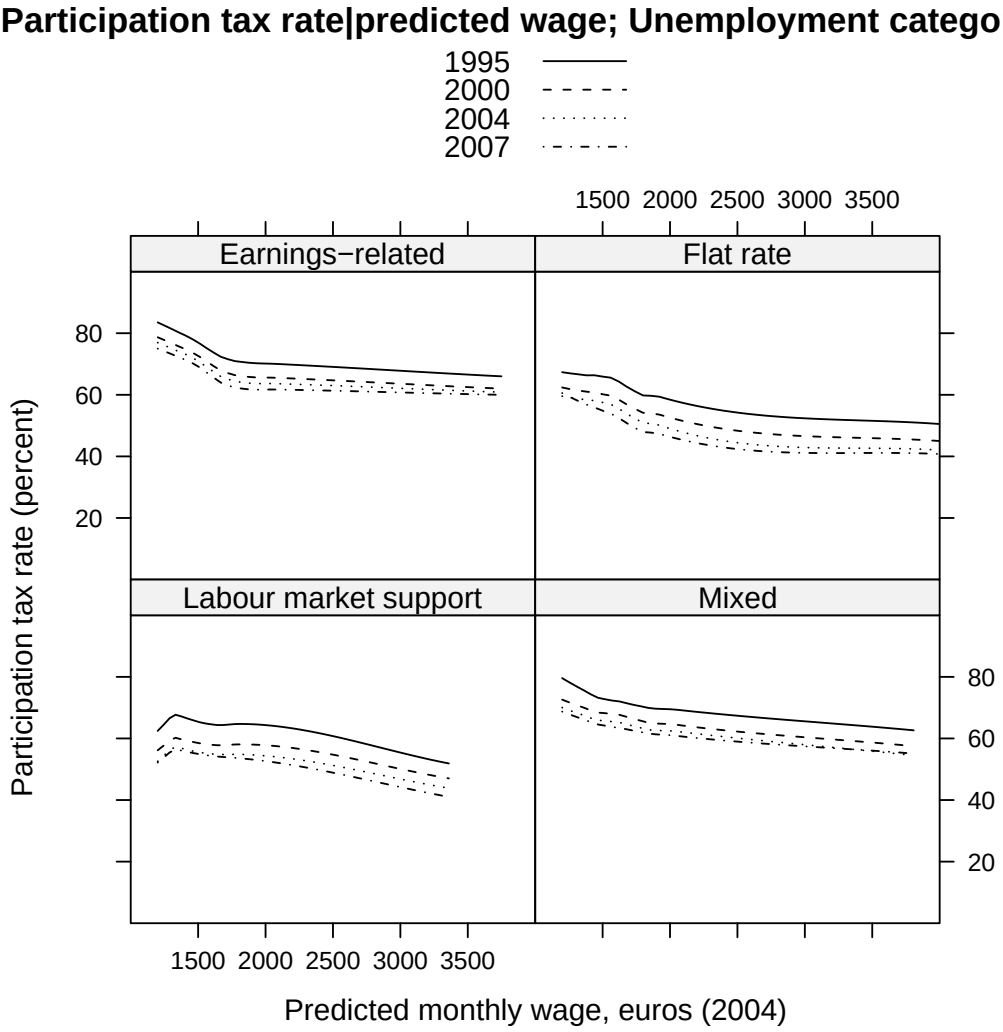
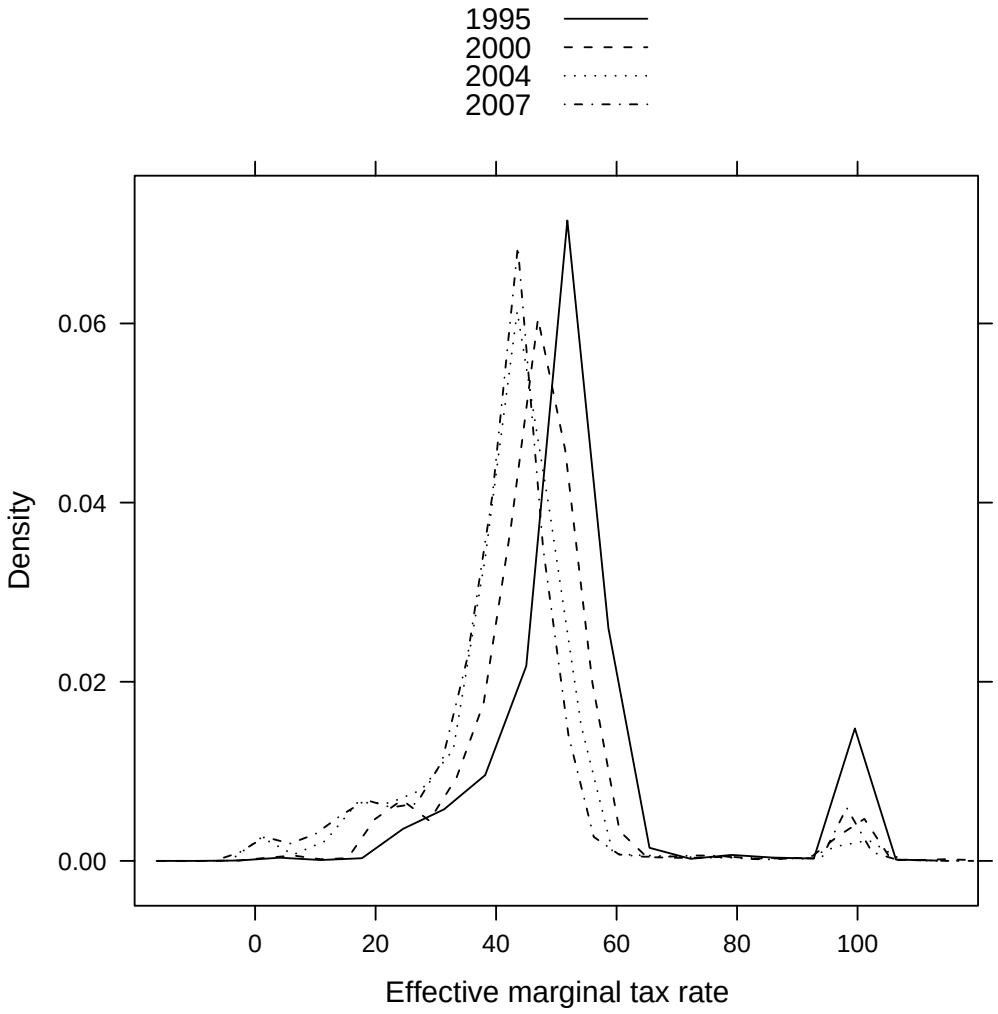


Figure 3 Distribution of effective marginal tax rates

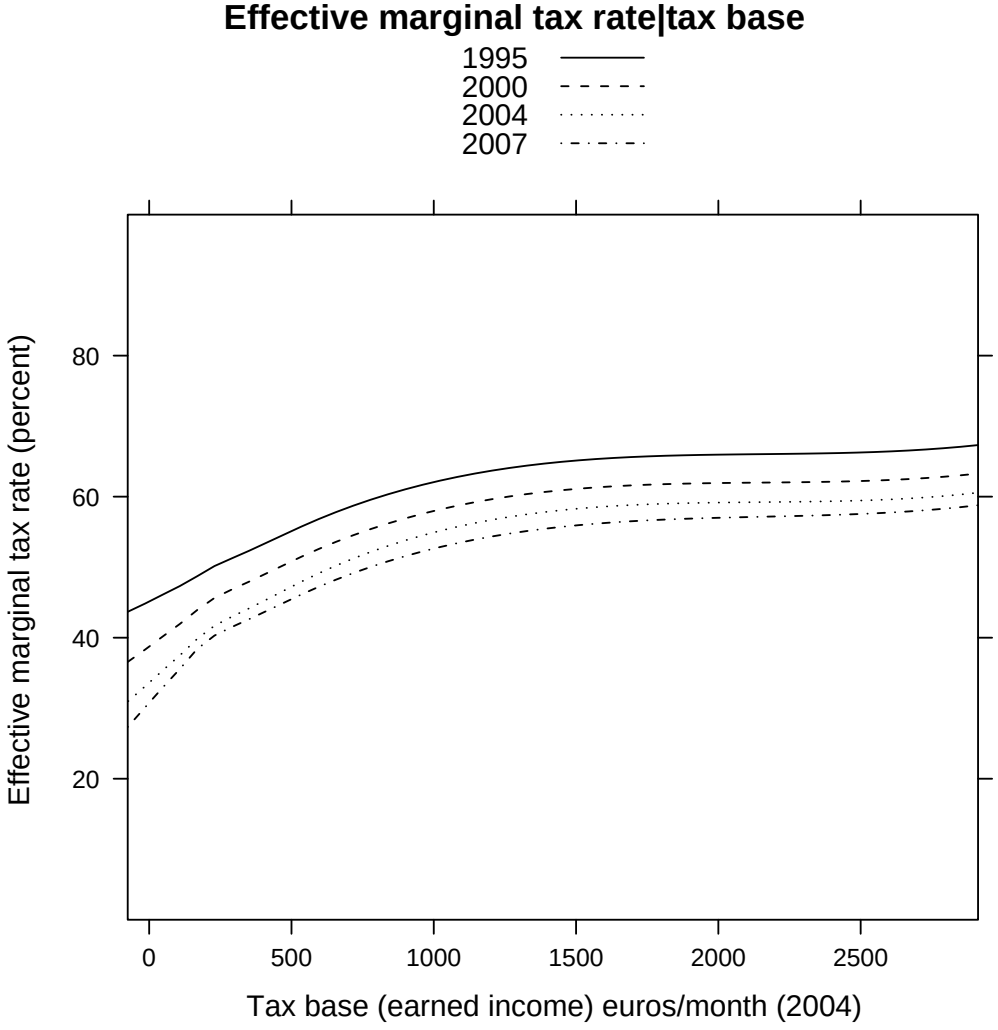


Work incentives among the population – Effective marginal tax rates

We next turn to the effective marginal tax rates among the whole population. Figure 3 shows the simulated distribution (as estimated by a kernel density) of the effective marginal tax rates in 1995, 2000, 2004 and 2007. We note that the distribution in all years has two disctinct modes, a lower one at 100 per cent and a more substantial spike near the mean of the distribution. The spike in the density at 100 per cent declined after 1995, but was in fact higher in 2007 than in either 2000 or 2004. Thus, while reduced, we still have a substantial proportion of the population who face very high effective marginal tax rates.

The more substantial spike close to the mean, by contrast, has moved substantially to the left, indicating reduced effective marginal tax rates for much of the population. The largest shift occurred between 1995 and 2000, but even between 2004 and 2007, the density moved a little further to the left, reflecting lowered income tax rates across those years.

Figure 4 Effective marginal tax rates by monthly earned income



The change in the tax function, as measured by the conditional mean (lowess) curve for different levels of the tax base (earned income) is shown in Figure 4. The predominant feature of the change over time in this schedule is its steady decline. Note, however, that there is an increase in the steepness of the tax schedule for very low monthly incomes between 2004 and 2007. The near-uniform downward shift in the tax schedule reflects the policy, followed by the three governments in power since 1995 of lowering taxes by the same percentage amount in all income classes.

In Table 4, we show the distribution of the effective marginal tax rates for different household types, as well as for the whole population. Between 1995 and 2007, the average effective marginal tax rates declined from 53.4 to 42.0 per cent, a decline of 11.4 percentage points. The decline in the average was the largest for single-person households and smallest for persons in lone-parent households. We see from panel 3h that the share of lone-parent households with rates in excess of 90 per cent did not change by much – from 15.8 to 13.3 – and that most

of this decline occurred between 1995 and 2000. By contrast, we see from comparing panels 3e and 3f that between 1995 and 2007, the bulk of the population, in all household types, has shifted from facing an effective marginal tax rate in excess of 50 per cent to one that is lower. This is the tabulated version of the shift to the left in the large spike in the density, shown in Figure 3.

We tabulate the effective marginal tax rates by quintile group of equivalent household income in Table 11. The average rates, shown in panel 10a, are U-shaped, with the lowest poorest and the richest groups having the highest rates – 48.5 and 44.5 in 2007, respectively. The decline between 1995 and 2007 was the greatest in the poorest quintile group, which started out with 62.1 per cent. Inspection of the distribution of rates, however, reveals that the high average effective marginal tax rate among those in the poorest quintile appears to be driven by the fact that more than one in four of them has a rate that is greater than 90 per cent (see panel 10h. Thus, the very high effective marginal tax rates, the smaller spike around 100 per cent in Figure 3, is almost exclusively concentrated on the poorest fifth of the population.

Table 4 Effective marginal tax rates by household type

(a) Average

	1995	2000	2004	2007
Single person	55.2	50.2	45.4	42.4
Childless couple	50.7	46.2	41.1	38.8
Lone parent	61.7	55.7	52.9	52.6
Two parents	54.9	50.8	46.5	44.7
Others	50.3	45.6	41.5	40.1
Total	53.4	48.8	44.2	42.0

(b) Cell Size

	1995	2000	2004	2007
Single person	1388	1386	1371	1378
Childless couple	3100	3102	3053	3076
Lone parent	259	265	264	265
Two parents	2640	2665	2669	2660
Others	1649	1648	1645	1643
Total	9036	9066	9002	9022

(c) Tax % -20 (share)

	1995	2000	2004	2007
Single person	0.9	1.7	6.8	11.9
Childless couple	0.7	1.9	6.8	10.5
Lone parent	1.7	2.5	3.8	4.0
Two parents	0.7	1.0	1.9	2.6
Others	0.9	1.6	4.9	6.0
Total	0.8	1.6	5.2	8.2

(d) Tax % $20-40$ (share)

	1995	2000	2004	2007
Single person	11.5	19.5	30.7	28.9
Childless couple	11.3	18.1	29.3	32.0
Lone parent	6.9	6.8	19.2	18.5
Two parents	2.8	5.9	15.3	19.9
Others	9.0	17.0	29.7	34.8
Total	8.8	14.9	25.8	27.9

(e) Tax % $40-50$ (share)

	1995	2000	2004	2007
Single person	22.0	50.4	46.7	47.6
Childless couple	28.5	53.9	54.9	51.7
Lone parent	10.8	47.5	43.4	46.4
Two parents	19.3	47.1	64.6	64.7
Others	31.6	56.1	54.8	51.4
Total	24.0	51.2	54.6	53.6

(f) Tax % $50-60$ (share)

	1995	2000	2004	2007
Single person	49.5	16.7	5.0	2.4
Childless couple	52.1	22.1	6.7	3.6
Lone parent	48.9	22.8	10.3	6.8
Two parents	63.1	39.2	13.0	8.0
Others	52.7	23.3	8.6	5.5
Total	54.1	25.1	8.1	4.7

(g) Tax % $60-90$ (share)

	1995	2000	2004	2007
Single person	3.7	0.7	0.9	1.3
Childless couple	4.5	1.2	0.4	0.4
Lone parent	16.0	6.2	10.1	11.1
Two parents	9.1	2.5	1.9	1.6
Others	4.2	0.6	0.5	0.9
Total	5.8	1.5	1.3	1.5

(h) Tax % $90-$ (share)

	1995	2000	2004	2007
Single person	12.5	10.9	9.9	7.9
Childless couple	2.8	2.7	2.1	1.8
Lone parent	15.8	14.3	13.2	13.3
Two parents	4.9	4.3	3.3	3.1
Others	1.7	1.4	1.4	1.3
Total	6.4	5.7	4.9	4.2

Table 5 Effective marginal tax rates by quintile group of disposable income

(a) Average

	1995	2000	2004	2007
1	62.1	57.3	51.9	48.5
2	50.0	45.2	39.1	36.9
3	50.1	45.5	40.5	38.6
4	51.5	46.8	42.9	41.1
5	54.6	50.2	46.5	44.5
Total	53.4	48.8	44.2	42.0

(b) Cell Size

	1995	2000	2004	2007
1	1361	1389	1380	1385
2	1382	1384	1370	1368
3	1649	1649	1632	1642
4	1930	1931	1918	1924
5	2714	2713	2702	2703
Total	9036	9066	9002	9022

(c) Tax % -20 (share)

	1995	2000	2004	2007
1	3.4	4.9	16.6	26.9
2	0.7	2.1	8.3	12.0
3	0.6	1.3	3.6	5.7
4	0.2	0.7	1.8	3.0
5	0.3	0.4	1.2	1.6
Total	0.8	1.6	5.2	8.2

(d) Tax % $20-40$ (share)

	1995	2000	2004	2007
1	30.3	35.7	33.7	26.6
2	15.1	28.2	47.2	49.5
3	5.0	13.7	36.3	41.0
4	2.3	6.3	18.6	22.4
5	1.8	3.5	7.4	11.1
Total	8.8	14.9	25.8	27.9

(e) Tax % $40-50$ (share)

	1995	2000	2004	2007
1	14.4	15.5	12.2	12.2
2	42.0	51.2	35.7	31.7
3	37.3	69.0	55.8	51.3
4	24.1	72.7	75.0	72.4
5	9.0	39.8	71.1	75.2
Total	24.0	51.2	54.6	53.6

(f) Tax % $50-60$ (share)

	1995	2000	2004	2007
1	9.8	8.1	3.9	2.5
2	31.3	11.9	3.7	2.8
3	54.2	13.5	3.4	1.5
4	71.7	19.8	4.2	1.9
5	76.6	55.6	20.0	11.8
Total	54.1	25.1	8.1	4.7

(g) Tax % $60-90$ (share)

	1995	2000	2004	2007
1	6.0	4.1	4.8	6.0
2	6.1	2.3	2.5	2.7
3	2.1	1.7	0.5	0.2
4	1.6	0.3	0.2	0.2
5	12.0	0.5	0.1	0.1
Total	5.8	1.5	1.3	1.5

(h) Tax % $90-$ (share)

	1995	2000	2004	2007
1	36.1	31.7	28.8	25.7
2	4.9	4.4	2.6	1.4
3	0.9	0.7	0.4	0.3
4	0.2	0.2	0.2	0.1
5	0.4	0.2	0.2	0.2
Total	6.4	5.7	4.9	4.2

Table 6 Simulated and realised levels of inequality

	1995	2000	2004
Overall inequality log(p90/p10)			
Simulated	105.2	112.1	113.8
Realised	94.6	109.1	113.1
Inequality at low end log(p50/p10)			
Simulated	52.8	58.7	60.0
Realised	49.2	56.7	59.3

Changes to transfers and taxes and the distribution of income

We close our examination of the changes in taxes and transfers after 1995 with examining how the distribution of income has changed. As 2004 is the latest year for which the actual distribution is measured, we stop our examination at that year. Our strategy here is the following. We compare the *actual* change in the distribution of income with that which would have occurred using the 2004 data but with taxes and transfers simulated in the years 1995, 2000 and 2004. We report the $\log(p90/p10)$, along with inequality below the median in the form of $\log(p50/p10)$.

Overall inequality increased from 94.6 to 113.1, an increase of 18.5 points. When we simulate the policy change, inequality increases from an initially higher level, 105.2 to 113.8, an increase of 8.6 points. Thus, changes of tax and transfer policies capture a little less than half of the increase in the gap between the 90th to the 10th percentile of disposable income.

Compare this to the gap between the median and the 10th percentile. The log ratio increased from 49.2 in 1995 to 59.3 in 2004, an increase of 10.1 points. The simulated log ratio increased from 52.8 to 60.0, an increase of 8.2 points. By simulating the 1995 legislation to the 2004 data, we are able to capture about eight tenths of the actual change in the gap between the 10th percentile of the median across these years. Put in other terms, changes in taxes and transfers between 1995 and 2004 account for the vast majority of the relative decline of the 10th percentile relative to the median.

4 Reforming the tax and benefit system

We compare three different reform models. Our main emphasis is on an 'Incentive package' that is intended to decrease both the participation tax rate and the effective marginal tax rates. While it would be easy to reduce the participation tax rate simply by lowering the benefit levels for the unemployed, this would not necessarily be desirable from the distributional point of view. Indeed, without distributional concerns, one could dismantle the whole social security system and there would be no traps left whatsoever. We therefore design the incentive package so that the minimum benefit levels are not decreased; we rather reduce the income dependence of many of these benefits, with the intention that some of the employed would obtain some benefits as well. As a comparison, we also design a traditional type of packages, one with across-the-board tax cuts and another with increases to the redistributive demogrants.

As mentioned, the incentive package is designed to improve the incentives to obtain work and to accept small side jobs for the unemployed. Since most of those who face high participation tax rates are families, many of the measures we introduce are targeted at low-income families with small children.

The measures include the following:

1. Dismantling the means-testing of unemployment assistance. The minimum level of unemployment assistance is now dependent on the family income. This means that if an unemployed person decides to accept a part-time job, his family may lose income because unemployment benefits can decrease. The dismantling of this means testing is likely to reduce the effective marginal tax rates of a family with an unemployed person.

2. The daycare fees are reduced for employed persons by letting a family earn 500 euros earned income in a month without increases to the daycare fees. This measure is intended to reduce the participation tax rate for families with children who are not yet at school.

3. The earned income tax credit is made dependent on the number of children in the family. The maximum amount of the tax credit is increased by 1000 euros per year for each under-aged child. The credit will be assigned to the highest-income earner in the family. Single parents obtain the credit themselves.

4. The system of partial unemployment assistance is made less dependent on earned income. The unemployed person is entitled to partial unemployment assistance if he or she earns part-time income. The maximum amount of this type of unemployment benefit is increased and the reduction percentage related to additional earning is lessened. These moves are designed to cut the effective marginal tax rates for the unemployed.

5. The extent of means-testing of housing subsidies is reduced. The current system is very complicated with different marginal effects if income increases. Sometimes the housing subsidy is reduced by 40–60 per cent for each additional euro earned. The complicated piece-wise linear housing subsidy scheme is replaced by a common income-dependence parameter, meaning that the housing subsidy decreases by 16 per cent with a marginal increase of income. This move will reduce the effective tax rates, but it also means that households where one adult is in the labour market can still obtain some housing benefits. The latter effect is likely to affect the participation tax rates.

6. Income support is also made less means tested by increasing the amount of earned income that the person can earn that does not reduce the income support. This measure will mainly reduce the effective tax rates.

7. The universal child benefits are increased for all children, and more for the children of single parents. This policy will increase the family income for all other familes except for those who obtain income support, since income support will be reduced by exactly the same amount by which the child benefits increase. Therefore, this policy change is targeted at cutting the participation tax rates for families.

This policy package will be compared with a universal tax cut for wage income, where the average tax rate is reduced by 1 percentage point for all wage-income earners. Notice that this move will make labour income more desirable than transfer income, since the tax treatment of the transfer income is not changed at the same time. Our other point of comparison is a 'poverty package' where the mimimum benefit levels are increased by cutting taxes on transfer income and increasing the daily allowance for unemployment assistance and other minimum level benefits.

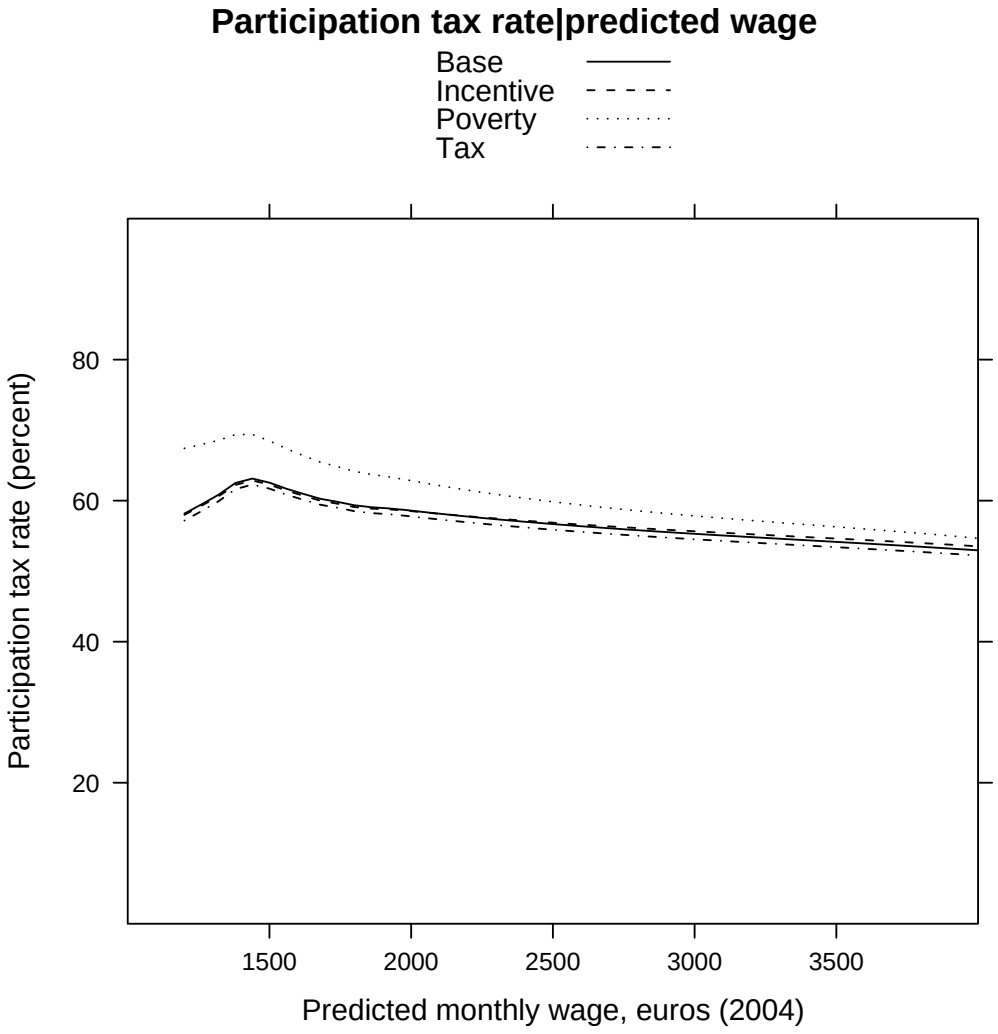
Table 7 compares the impacts of these policies on government revenues, household income, poverty rates and the Gini coefficient. The decile groups are based on the disposable income calculated by the modified OECD equivalence scale. The table reveals that both the incentive package and the poverty package are strongly redistributive, reducing both poverty and inequality, whereas families in the upper decile groups benefit more from the tax cut. The families in the tenth decile group benefit somewhat more than those in the preceding decile group, because of the large share of capital income in the tenth decile group. In the Finnish dual income tax system, the tax rates on labour and capital income are not connected.

We use devices similar to those in Section 3 to examine the consequences of our suggested reforms to work incentives. We begin by showing the average participation tax rates at different levels of the predicted wage (Figure 1). The fact that the conditional mean curve is virtually indistinguishable across any of the reforms underscores the fact that the reforms have a very small effect on work incentives, at least as measured by the participation tax rate. Note,

Table 7 Effects on total budget, income distribution and poverty

	Incentive	Tax	Poverty
Costs (mill. euros)			
Gross	586	616	649
Net	574	585	422
Changes in disposable income			
1. dec. group	2.6%	0.1%	2.6%
2. dec. group	2.2%	0.2%	1.7%
3. dec. group	1.6%	0.4%	1.1%
4. dec. group	1.1%	0.6%	0.6%
5. dec. group	0.8%	0.7%	0.5%
6. dec. group	0.7%	0.8%	0.4%
7. dec. group	0.5%	0.9%	0.3%
8. dec. group	0.4%	0.9%	0.2%
9. dec. group	0.3%	1.0%	0.1%
10. dec. group	0.1%	0.8%	0.1%
Average.	0.7%	0.7%	0.5%
Poverty rate	11.9	13.1	12.1
Changes in number of poor persons			
	-49000	12000	-37700
Gini coefficient	25.8	26.3	25.9

Figure 5 Participation tax rate by predicted monthly wage (2004 euros)



however, a small difference. The tax reform lowers the participation tax rate across all levels of the monthly wage. The incentive reform leads to a little lower rates below approx. 2000 euros per month, and higher rates thereafter. There is, thus, a small rotation in the schedule relative to the base case.

We tabulate the participation tax rates for the reforms by household type in Table 8, showing, apart from the average (panel 7a), the share of those whose participation tax is in excess of 80 (7b) and 100 per cent (7c). The average participation tax rate across all persons (panel 7a) is lowest in the tax reform package at 60.8 per cent, followed by the incentive package at 61.9 per cent. The comparison between the shares of persons with more than 80 or 100 per cent participation tax rates, however, suggests the incentive package may do most for work incentives – 12.4 and 2.3 per cent have rates exceeding 80 and 100 per cent in the incentive package, respectively, while the shares are 13.2 and 2.5 per cent in the tax reform package. Whether or not the tax or the incentive reform package is believed to be superior thus in part

Table 8 Participation tax rate by household type

(a) Average

	Base	Incentive	Tax	Poverty
Single person	67.6	66.4	66.7	71.9
Childless couple	59.0	59.7	58.2	64.9
Lone parent	73.4	66.8	72.6	76.4
Two parents	64.9	64.0	64.1	69.1
Others	53.5	54.0	52.6	60.6
Total	62.4	61.9	61.6	67.6

(b) Tax >80 (share)

	Base	Incentive	Tax	Poverty
Single person	13.8	9.1	12.5	20.7
Childless couple	12.1	12.0	10.9	16.5
Lone parent	27.7	7.8	24.5	33.7
Two parents	22.5	18.2	21.1	24.5
Others	10.9	11.2	10.4	14.5
Total	15.4	12.4	14.2	19.9

(c) Tax >100 (share)

	Base	Incentive	Tax	Poverty
Single person	1.3	1.3	1.3	2.7
Childless couple	2.0	2.5	1.9	2.9
Lone parent	0.5	0.2	0.5	1.5
Two parents	4.9	3.3	4.9	4.9
Others	2.9	2.8	2.9	3.8
Total	2.5	2.3	2.5	3.4

depends on where – among the average, or at the extremes – one believes work incentive problems to be most severe.

The estimated distributions of participation tax rates are shown for lone- and two-parent households in Figure 6. It is very hard to see much difference between the distributions. However, the incentive package seems to have an edge on the base and tax reform cases among lone-parent households, in that the major mode among those for the incentive package is slightly to the left of the others.

Turning next to the participation tax rates by quintile group of disposable income, we note that the average participation tax rate in the lowest quintile group is lowest in the incentive reform package. Intriguingly, only the tax reform package allows for lower average tax rates in the remaining four quintile groups. The reform package designed to alleviate poverty, by contrast, increases participation tax rates.

It is important to look beyond averages, however. The incentive package leads to a sub-

Figure 6 Participation tax rate distribution by household type

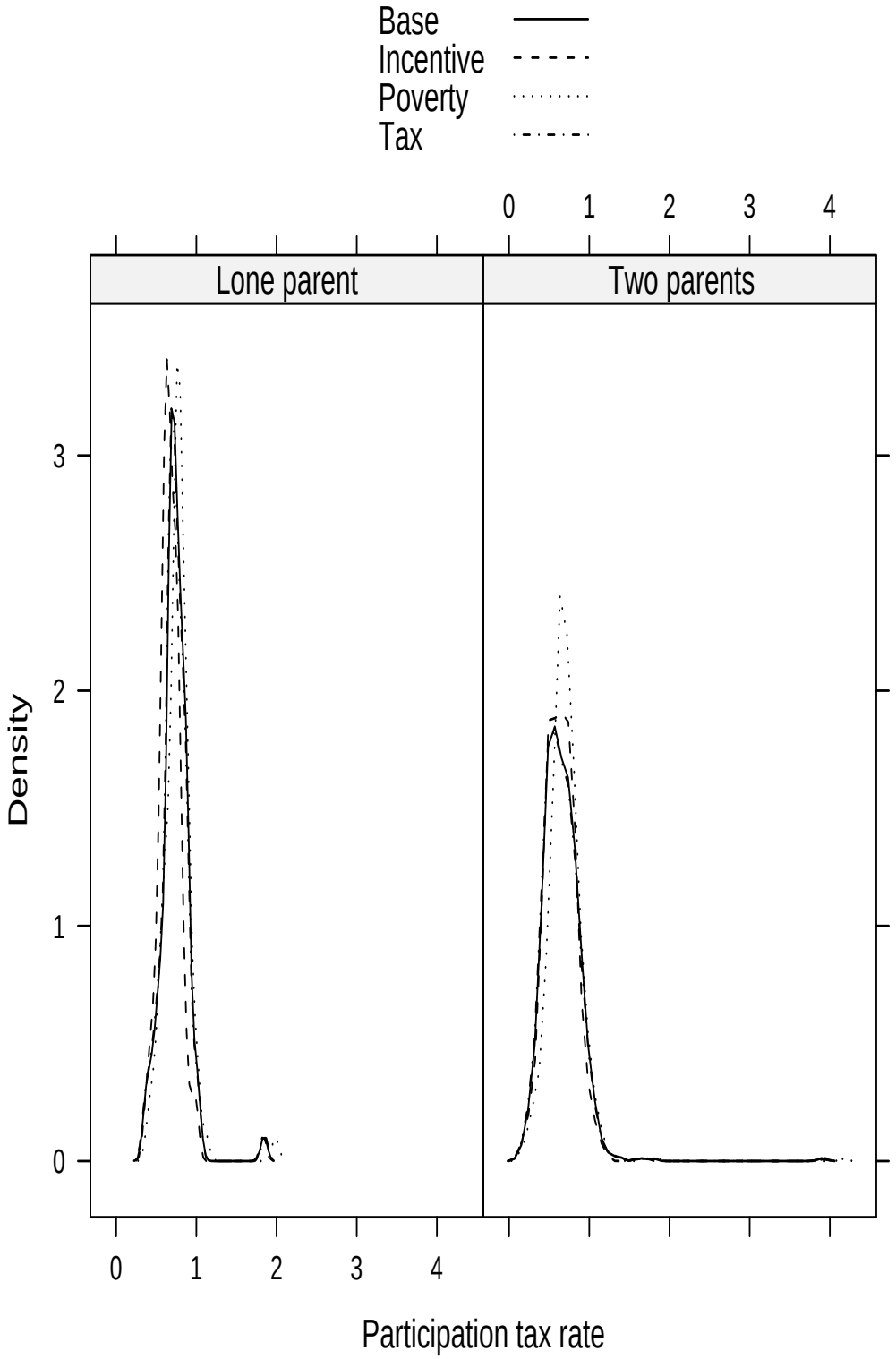


Table 9 Participation tax rate by quintile group of disposable income

(a) Average

	Base	Incentive	Tax	Poverty
1	64.9	63.0	64.0	69.0
2	60.4	60.6	59.5	65.8
3	61.1	61.9	60.3	67.5
4	61.0	61.1	60.2	66.7
5	61.1	61.2	60.3	67.2
Total	62.4	61.9	61.6	67.6

(b) Tax >80 (share)

	Base	Incentive	Tax	Poverty
1	17.1	10.0	15.7	20.3
2	11.3	10.8	10.8	14.4
3	18.8	17.8	15.4	24.0
4	16.7	16.6	16.3	22.8
5	9.9	10.0	9.7	20.0
Total	15.4	12.4	14.2	19.9

(c) Tax >100 (share)

	Base	Incentive	Tax	Poverty
1	2.6	1.5	2.5	2.2
2	1.5	1.7	1.5	2.0
3	3.7	4.6	3.5	6.4
4	3.6	3.6	3.6	5.3
5	1.3	1.3	1.3	4.0
Total	2.5	2.3	2.5	3.4

stantially smaller fraction of those with participation tax rates in excess of 80 per cent – e.g., 10.0 per cent in the poorest quintile group, compared with 17.1 per cent in the base case and 15.7 in the tax package.

The tabulations of participation tax rates by type of unemployment compensation are shown in Table 10. The average rates tell a similar story within different types of compensation than for the total – the tax reform leads to lower average tax rates than the base case, followed by the incentive package. The shares of those with more than 80 per cent rates suggest some interesting differences, however. For those receiving earnings-related unemployment compensation, the aggregate ordering of reforms holds. For those on flat-rate benefits or on labour market support, the incentive package leads to the lowest share facing very high rates – 8.0 per cent and 5.4 per cent under the incentive package, as against 13.2 and 10.1 per cent in the base case and 11.3 and 9.4 per cent under the tax reform package, respectively.

We conclude this section with a look at what happens to simulated effective marginal tax

Table 10 Participation tax rate by type of unemployment compensation

(a) Average

	Base	Incentive	Tax	Poverty
No unemp comp	NA	NA	NA	NA
Earnings-related	66.2	65.8	65.4	70.8
Flat rate	57.7	57.3	56.9	64.5
Labour market support	58.2	57.4	57.3	63.9
Mixed	65.8	65.5	64.9	70.1
Total	62.4	61.9	61.6	67.6

(b) Tax >80 (share)

	Base	Incentive	Tax	Poverty
No unemp comp	NA	NA	NA	NA
Earnings-related	19.6	18.5	18.3	27.8
Flat rate	13.2	8.0	11.3	13.9
Labour market support	10.1	5.4	9.4	12.2
Mixed	19.6	16.6	17.3	22.1
Total	15.4	12.4	14.2	19.9

(c) Tax >100 (share)

	Base	Incentive	Tax	Poverty
No unemp comp	NA	NA	NA	NA
Earnings-related	3.6	3.1	3.5	5.3
Flat rate	0.2	0.6	0.2	1.7
Labour market support	1.6	1.2	1.6	1.3
Mixed	3.3	4.0	3.3	4.6
Total	2.5	2.3	2.5	3.4

rates under the proposed reforms. Table 11 shows the average rates (panel 10a) along with the distribution (panels 10c-10h), tabulated against quintile group of disposable income. Effective marginal tax rates are, on average, 42.0 per cent in the base case. The incentive reform would lead to higher rates – 42.5 and 42.2 per cent – while the proposed tax reform and the poverty package both lead to lower rates.

Again, looking beyond averages reveals interesting differences. The incentive package and the poverty package lead to a reduction of rates in the poorest income quintile group, while the tax reform in fact increases rates for this group. The incentive packages, by contrast, increase rates in the second group above those in the base case, while the tax packages lower them.

Looking at the distribution of the effective marginal tax rates suggests that the incentive package reduces the proportion of households with very high rates in the poorest quintile group relative to the other reforms and the base case. Comparing the shares of those with rates in excess of 90 per cent and those with rates between 60 and 90 per cent (panels 10h and 10g), the incentive package has 4.2 per cent with more than 90 per cent rates, while the tax package has 27.4 with such high rates. Under the incentive package, 30.2 per cent have rates between 60 and 90 per cent, the tax reform package has 5.0 with marginal tax rates in this range. Thus, the incentive package substantially reduces the proportion of those among the poorest quintile income group who face very high effective marginal tax rates. If we believe that work disincentives are mainly associated with very high marginal tax rates, then the incentive reform, despite not achieving a lower average rate, may lead to greater increases in work incentives for this reason.

Table 11 Effective marginal tax rates by quintile group of disposable income

(a) Average

	Base	Incentive	Poverty	Tax
1	48.5	45.5	45.2	49.2
2	36.9	41.2	37.8	35.0
3	38.6	40.2	38.9	36.4
4	41.1	41.2	41.2	39.4
5	44.5	44.5	44.6	43.2
Total	42.0	42.5	41.7	40.6

(b) Cell size

	Base	Incentive	Poverty	Tax
1	1385	1390	1374	1396
2	1368	1368	1369	1376
3	1642	1642	1641	1644
4	1924	1925	1924	1925
5	2703	2703	2702	2704
Total	9022	9028	9010	9045

(c) Tax % -20 (share)

	Base	Incentive	Poverty	Tax
1	26.9	22.2	26.6	27.1
2	12.0	10.4	9.3	14.7
3	5.7	5.7	5.1	6.6
4	3.0	3.0	2.9	3.2
5	1.6	1.7	1.5	1.9
Total	8.2	7.3	7.5	9.0

(d) Tax % $20-40$ (share)

	Base	Incentive	Poverty	Tax
1	26.6	22.4	28.0	26.8
2	49.5	37.1	47.8	52.7
3	41.0	36.2	39.9	49.4
4	22.4	22.4	21.8	34.5
5	11.1	10.9	11.0	16.3
Total	27.9	24.3	27.5	34.3

(e) Tax % $40-50$ (share)

	Base	Incentive	Poverty	Tax
1	12.2	12.9	14.5	11.2
2	31.7	32.2	35.1	26.3
3	51.3	49.9	52.4	42.6
4	72.4	72.0	73.2	60.4
5	75.2	75.2	75.4	71.5
Total	53.6	53.3	54.9	47.1

(f) Tax % $50-60$ (share)

	Base	Incentive	Poverty	Tax
1	2.5	8.2	4.2	2.5
2	2.8	12.5	4.0	1.7
3	1.5	6.0	2.0	0.9
4	1.9	2.4	1.8	1.6
5	11.8	11.8	11.9	10.2
Total	4.7	8.1	5.2	3.9

(g) Tax % $60-90$ (share)

	Base	Incentive	Poverty	Tax
1	6.0	30.2	6.8	5.0
2	2.7	5.3	2.6	2.6
3	0.2	1.5	0.3	0.2
4	0.2	0.1	0.1	0.2
5	0.1	0.2	0.1	0.0
Total	1.5	5.8	1.5	1.3

(h) Tax % $90-$ (share)

	Base	Incentive	Poverty	Tax
1	25.7	4.2	19.9	27.4
2	1.4	2.4	1.3	1.9
3	0.3	0.7	0.2	0.3
4	0.1	0.2	0.3	0.1
5	0.2	0.1	0.2	0.2
Total	4.2	1.2	3.4	4.6

5 Effects on employment

The JUTTA model is a static microsimulation model and thus does not contain any built-in behavioural equations. To assess the employment effects of the policy reforms, we apply the following, more indirect, approach. We first divide the data into several groups based on family structure and family income. We then apply different labour supply assumptions regarding the different groups.

A key concept we use is the participation elasticity – introduced by Saez (2002) – which measures the percentage change in the employment rate to a percentage change in participation tax. The latter is equal to the percentage change in the difference between disposable income when employed versus unemployed. Since we do not have precise knowledge of the size of this elasticity, we present a range of results for different assumptions for the elasticity.

We follow Immervoll et al. (2007) and consider the following schemes for participation elasticities

1. Homogeneous scenario, where the elasticity is

   0.4 in the first quintile group of disposable income

   0.3 in the second quintile group

   0.2 in the third quintile group

   0.1 in the fourth quintile group

   0 in the fifth quintile group

2. Heterogeneous scenario, where the elasticity is

   0.9 for married women with children and single parents in the first quintile group

   0.6 for married women with children and single parents in the second quintile group

   0.4 for married women with children and single parents in the third quintile group

   0.2 for married women with children and single parents in the fourth quintile group

   0 for all other groups

In both these cases, the average participation elasticity is roughly equal to 0.2. The idea in these scenarios is that, based on empirical evidence from in-work benefits and theoretical

Table 12 Employment rate, employed persons and the price per employed person in different reform packages, %-points

Changes in employment rates by package, %-points

	Incentive	Tax	Poverty
Equal 0.1	-0.00%	0.13%	-0.93%
Homogeneous	0.05%	0.22%	-1.43%
Heterogeneous	0.11%	0.24%	-1.43%

Changes in number employed by package

	Incentive	Tax	Poverty
Equal 0.1	-500	3100	-21800
Homogeneous	-200	4600	-30600
Heterogeneous	200	5500	-34500

Price per employed person (1000 euros)

	Incentive	Tax	Poverty
Equal 0.1		189	
Homogeneous		127	
Heterogeneous		106	

reasoning, low-income households are more responsive to tax and benefit changes at the extensive margin. The heterogeneous scenario also assumes that the participation elasticities tend to concentrate on specific groups, such as females who have small children.

In addition to these scenarios, we also present results based on a uniform elasticity of 0.1. The reason for this is that in an earlier work (Honkanen et al., 2007), we attempted to estimate participation elasticities based on Finnish data. We utilised the repeated cross-section framework of Blundell et al. (1998), since we did not have panel data. In that approach, the data is first divided into a number of cells based on variables that can be assumed to be reasonably exogenous to the tax changes, such as family structure, education structure and other demographic factors. Based on data on group averages, we regressed changes in employment rates on changes in the participation tax rates. The trouble with the Finnish evidence is that there is little variation in the tax treatment of different groups, since the participation tax rate changes were so uniform across income groups (see the analysis in Section 3). Therefore, the parameter estimates tend to be unstable across different estimation specifications. However, a reasonable summary point estimate for the participation tax rate was 0.1, which is why we use it in the employment analysis below. The results are presented in Table 12.

As we do not pretend to have accurate information on the behavioural responses, the re-

sults must be interpreted with caution. They nevertheless give information about the range of responses one can foresee. The data in the table reveal that since the tax cut reduces the participation tax rates, it leads to an improvement in employment rates; the increase, however, is relatively small given the fiscal costs of this measure. The poverty package, which increases the participation tax rates, leads to a small decrease in employment. The employment effects of the incentive package are, however, disappointing. The reason is that the incentive package includes both negative and positive changes to the participation tax rate. The positive changes tend to concentrate on groups who have small labour supply participation rates. Therefore, the overall figures are dominated by those groups whose participation tax rates do not decline or who even experience a reduction in work incentives. This result highlights the difficulties involved in getting certain groups employed simply by tax policy changes.

6 Concluding comments

This paper has examined the changes in work incentives for 1995, 2000, 2004 and 2007, as measured by participation tax rates as well as effective marginal tax rates, using a microsimulation model, with data for 2004. The results suggest that changes to taxes and transfer in Finland in that period have increased work incentives in that both the participation tax rates and the effective marginal tax rate have declined. The bulk of these declines for participation tax rates occurred between 1995 and 2000. We also note that participation tax rates remain quite high for some groups, in particular for lone parent households. Inspection of the distribution of effective marginal tax rates also reveals that while the bulk of the distribution has shifted to the left – accounting for the decline in rates – there is a substantial part of the distribution that remains at rates around 100 per cent, which has not declined substantially.

We experiment with three "packages" to further increase work incentives, one that is specifically designed to increase work incentives, one that relies on income tax reductions and one that is heavily targeted to the very poorest. The greatest average reduction in participation and effective marginal tax rates is the tax reform package, but the incentive package leads to the greatest reduction in those who have very high tax rates. This effect is particularly pronounced among the poorest fifth of households, where the incentive package leads to a substantial reduction in those who have greater than 90 per cent effective marginal tax rates.

The changes in taxes and transfer between 1995 and 2007 have affected groups in too similar a way to allow us to identify labour supply responses – the identifying variation between groups is simply not there. To assess the labour supply response of the different reform package, we calculate the responses under different assumed labour supply elasticities. We allow for both responses that vary across groups, with greatest elasticities among those with low incomes, and for a uniform elasticity. Only the tax reform led to a substantive increase in

employment.

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