

Financial Incentives for Mothers to Enter Paid Work: The Current Tax and Transfer System

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Abstract

The aim of this paper is to analyse incentive effects from the current tax and transfer system on sole parents and married mothers. Two approaches are used in the analysis: microsimulation and program evaluation. The last approach could only be used for a subgroup of sole parents. Both approaches examine the effects on the probability of employment and average working hours. Effects on budget constraints (net incomes across the labour supply range between 0 and 50 hours per week) and marginal effective tax rates (METRs) are also examined using the microsimulation approach. These results show that in particular for mothers in households with low household incomes high METRs are present for some income ranges. However, the results from examining the METRs and from microsimulation and program evaluation show that compared with the system as it was in January 2000, the current tax and transfer system has improved the work incentives for sole parents and married mothers to a small extent.

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1. Introduction

This paper looks at current tax and social security transfer arrangements and their influence on work incentives for mothers. To achieve this, we revisit an analysis of the Australian New Tax System (ANTS) by Kalb *et al.* (2003). The Australian New Tax System (ANTS) introduced by the government in July 2000 has not been changed substantially since then. It includes a number of initiatives, which may have had implications for mothers' labour supply incentives, such as: ¹

- A decrease in marginal income tax rates and an increase in the tax free threshold;
- A decrease in the taper rate from 50 to 40 per cent for Parenting Payment Single;
- Family Tax Benefit (FTB) part A and part B were introduced to replace a range of family assistance schemes existing before ANTS. Along with this several changes were introduced, such as an increase in the taper free family income level; replacement of the “sudden death” income test of minimum level family payments by a 30 per cent taper rate; a reduction of the 50 per cent taper rate of the maximum level family payments to 30 per cent; and
- An increase in the income threshold over which the Parenting Payment Partnered was reduced.

Kalb *et al.* (2003) also evaluated the impacts of ANTS using the Melbourne Institute Tax and Transfer Simulator model (MITTS), a behavioural microsimulation model. A short description of this model can be found in Kalb *et al.* (2003).² The current evaluation is different from this earlier paper in several ways. First, because the 1999-2000 Survey of Income and Housing Costs (SIHC) was not available when their study was conducted, they used the 1997-1998 SIHC data and updated these data to represent the current situation, while in the current study we use the newly released 1999-2000 SIHC data.³

¹ See Kalb *et al.* (2003) for a detailed description of the new policies and a comparison with the previous system. Appendix A contains a set of summary tables describing the changes introduced in July 2000.

² More details on MITTS can be found in Creedy *et al.* (2002) and a discussion, including some simplified examples, of behavioural microsimulation modelling is given in Creedy and Kalb (forthcoming).

³ The data were updated by applying the consumer price index to incomes and the female and male average weekly earnings index to wage rates. In addition, we estimated labour supply changes that would result

Second, the labour supply effect was only one of the components to be examined in the evaluation in Kalb *et al.* (2003). The current paper focuses on the effects of the ANTS policy components on labour supply and the marginal effective tax rates (METRs) and presents more detailed simulation results on labour supply changes. Third, the earlier paper examined all household groups; that is, married couples with and without children, single men, single women, and sole parents, while the current paper concentrates on the impacts for sole parents and married mothers. Finally, in addition to the simulation results for some components of the change, an evaluation study is carried out for sole parents so a comparison can be made between the predicted outcomes resulting from different approaches. This is the first study in Australia that compares simulation outcomes with evaluation outcomes directly.⁴

Gregory *et al.* (2003) also analysed the July 2000 policy changes using the Longitudinal Data Survey (LDS). This paper further contributes to the analysis of this policy change by creating a more complete picture of the effect for the total population of sole parents (not just for FaCS customers) and it adds partnered parents to the analysis.

The report is structured as follows. Section two gives a brief discussion of the effect of the policy change on net incomes and marginal effective tax rates across a range of labour supply levels for some hypothetical single and partnered mothers. Simulation of the complete ANTS package is presented in Section three, followed by results for five separate components of the ANTS package in Section four. A policy evaluation of the components of the ANTS package that are specific for sole mothers is discussed in Section five, first introducing the methodology followed by the results. Unfortunately, the data for married mothers is not of sufficient quality to allow such an evaluation, not even of the overall effect of the package. Even with better quality data, the analysis would have been more complicated for married mothers. Therefore, there is no evaluation for married mothers in Section five. Section six compares the outcomes from Section five

from differences in the tax and transfer system in the year the data was observed and the system in January 2000.

⁴ Doiron (2004) compares the outcome of her evaluation of a policy change for sole parents in the late 1980s with similar (but not exactly the same) changes reported in separate simulation studies. She finds these outcomes from different sources support each other with regard to the size of these effects.

with the corresponding microsimulation outcomes using MITTS. Section seven concludes.

2. Change in Incentives Resulting from ANTS

Before presenting the results from the simulation study, we examine the average marginal effective tax rates (METRs) before and after the change in Section 2.1 to obtain an idea of how the reform changed financial incentives for sole parents and married mothers in Australia. Specific examples of how net incomes and METRs are affected across a range of working hours from 0 to 50 hours per week are given in Section 2.2.

2.1 Marginal effective tax rates (METRs)

Tables 1a and 1b present the changes in the distribution of METRs. For sole parents, we see a clear decrease in METRs among those who previously faced a METR over 60 per cent. Under the new policy, no sole parent is expected to face a METR of more than 100 per cent and 40 per cent of those previously facing a METR between 90 and 100 per cent are expected to experience a drop in METR to a level between 60 and 70 per cent. This is a clear improvement in work incentives for these sole parents.

Table 1a: Change in the distribution of METRs (row percentage) – sole parents

Post-reform	0	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	>100	Total
Pre-reform													
0	98.05	0.73	0.79	0.27	0	0	0.17	0	0	0	0	0	51.23
0-10	0	0	0	0	0	0	0	0	0	0	0	0	0
10-20	0	0	100	0	0	0	0	0	0	0	0	0	0.41
20-30	0	0	0	0	100	0	0	0	0	0	0	0	0.13
30-40	0	0	0	5.65	63.37	3.17	2.35	25.47	0	0	0	0	6.91
40-50	0	0	0	0	34.17	33.21	27.42	2.8	2.41	0	0	0	19.28
50-60	0	0	0	0	0	58.44	0	41.56	0	0	0	0	0.59
60-70	0	0	0	0	0	0	26.56	71.23	0	2.21	0	0	7.91
70-80	0	0	0	0	0	0	0	77.38	22.62	0	0	0	3.40
80-90	0	0	0	2.09	1.92	0	19.33	71.97	4.69	0	0	0	7.45
90-100	0	0	0	0	0	0	0	39.35	0	0	60.65	0	0.86
>100	0	0	0	0	0	0	20.67	70.68	8.66	0	0	0	1.84
Total	50.23	0.37	0.81	0.68	11.24	6.96	9.45	17.81	1.74	0.18	0.52	0	100

However, Table 1a also shows some increases in METR among those who previously faced a METR lower than 50 per cent. About 25 per cent of sole parents who previously

faced a 30 to 40 per cent METR are expected to have a METR between 60 and 70 per cent after the change. These groups of sole parents might have become eligible for income support as a result of more generous withdrawal rates. This new group on income support now falls in the range where the Parenting Payment Single is withdrawn, which adds 40 per cent to their METRs. In addition, it appears that a very small group of sole parents (0.13 per cent), who previously faced a 20 to 30 per cent METR can now expect to have this increased to a level between 30 and 40 per cent.

Table 1b: Change in the distribution of METRs (row percentage) – married mothers

Post-reform	0	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	>100	Total
Pre-reform													
0	64.69	0	0.34	34.97	0	0	0	0	0	0	0	0	27.51
0-10	0	0	0	0	0	0	100	0	0	0	0	0	0.12
10-20	1.88	0	62.14	1.55	0	29.22	1.96	0	1.84	0	0	1.41	7.15
20-30	13.69	0	40.17	21.03	11.68	7.77	3.04	2.07	0.31	0	0	0.24	17.82
30-40	0.32	0	0	1.21	82.56	0.2	0.15	15.56	0	0	0	0	18.92
40-50	4.99	0	2.63	16.1	35.45	34.2	0	3.99	2.37	0.27	0	0	17.78
50-60	0	0	0	0	0	0	0	91.24	8.76	0	0	0	0.36
60-70	0	0	16.88	0.78	5.71	38.04	5.82	10	17.47	5.29	0	0	2.94
70-80	3.91	0	0	24.28	1.52	12.59	9.9	5.5	31.45	9.56	0	1.3	3.38
80-90	0	0	0	9.85	0	0	0	25.96	51.8	6.75	0	5.64	2.10
90-100	0	0	0	36.03	0	3.02	15.86	16.56	0	0	3.71	24.83	0.83
>100	0	0	24.14	16.86	3.13	0	8.37	0	36.95	0	0	10.56	1.09
Total	21.45	0	12.92	18.1	24.26	11.16	1.56	5.51	3.71	0.67	0.03	0.63	100

The pattern of changes among married mothers is much less clear than the pattern for sole parents. Table 1b shows that there are expected increases and decreases in METR across the whole range of previous METR levels. We can make two general statements. First, among those who were subject to a pre-reform METR of less than 20 per cent, more married mothers are expected to have an increase than a decrease in METR. Second, among those who were subject to a METR over 60 per cent, more married mothers are expected to experience a decrease than an increase. While the new policy is expected to reduce the METR for 36 per cent of those married mothers who were previously subject to a 90 to 100 per cent METR, it is also expected to increase the METR to more than 100 per cent for a quarter of them. The complexity of the changes of METRs for married mothers is probably due to the interaction between the husbands' and wives' incomes.

Overall, the policy change increases the proportion of sole parents on METRs between 0 and 40 per cent, and to a larger extent, it increases the proportion between 50 and 70 per cent. The increase in the latter group is largely due to the substantial decrease in the group with a METR of over 70 per cent. Similarly, the policy change increases the proportion of married mothers on METRs between 10 and 40 per cent, and to a lesser extent, it increases the proportion between 50 and 80 per cent.

Because in general, the new policy is expected to reduce the previously very high METRs—in particular for those previously facing high METRs who were out of the labour force or at low labour supply levels—the overall incentive effect of the new policy is expected to be positive. This assumes that the negative effect on labour supply through the increase of some individuals' METRs is relatively minor.

Tables 2a and 2b present the changes in the distribution of METR for those who were working for wages and salaries under the base system. In general, the pattern of changes is similar to the pattern observed in Tables 1a and 1b. A clear difference between the two sets of tables is that a much smaller proportion amongst the workers is at a zero METR. For sole parents, the relative size of the other groups increased by the same proportion, except for those between 20 and 30 per cent and those between 90 and 100 per cent. These two groups were already small when everyone was included. The first group completely disappears and the second group is much smaller after excluding the non-wage and salary earners. Apparently, these two groups contained several sole parents who were not working for wages and salaries.

For married mothers, excluding those who are not wage and salary workers reduces the proportion with METRs in between 50 and 80 per cent in addition to the reduction in the proportion of those at zero per cent. This indicates that even some of the mothers who are currently not working for wages and salaries could face relatively high METRs.

Table 2a: Change in the distribution of METR (row percentage) – sole parents who worked for wages or salaries in pre-reform situation

Post-reform	0	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	>100	Total
Pre-reform													
0	74.01	13.63	9.25	0	0	0	3.11	0	0	0	0	0	5.82
0-10	0	0	0	0	0	0	0	0	0	0	0	0	0
10-20	0	0	100	0	0	0	0	0	0	0	0	0	0.87
30-40	0	0	0	6.05	60.77	3.39	2.51	27.27	0	0	0	0	13.71
40-50	0	0	0	0	32.35	35.13	26.85	3.05	2.62	0	0	0	37.58
50-60	0	0	0	0	0	49.63	0	50.37	0	0	0	0	1.03
60-70	0	0	0	0	0	0	22.75	74.85	0	2.4	0	0	15.51
70-80	0	0	0	0	0	0	0	79.15	20.85	0	0	0	6.14
80-90	0	0	0	2.16	1.98	0	16.75	74.28	4.84	0	0	0	15.34
90-100	0	0	0	0	0	0	0	100	0	0	0	0	0.72
>100	0	0	0	0	0	0	24.66	65.01	10.33	0	0	0	3.28
Total	4.31	0.79	1.4	1.16	20.8	14.17	17.52	36.12	3.35	0.37	0	0	100

Table 2b: Change in the distribution of METR (row percentage) – married mothers who worked for wages or salaries in pre-reform situation

Post-reform	0	0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	>100	Total
Pre-reform													
0	100	0	0	0	0	0	0	0	0	0	0	0	0.39
0-10	0	0	0	0	0	0	100	0	0	0	0	0	0.23
10-20	0.55	0	64.64	1.89	0	29.07	0.65	0	2.26	0	0	0.94	11.04
20-30	4.21	0	54.67	7.08	17.12	9.83	3.5	2.69	0.5	0	0	0.4	20.73
30-40	0	0	0	1.31	82.2	0.21	0.16	16.11	0	0	0	0	33.04
40-50	0	0	0	0	46.04	44.84	0	5.72	3.4	0	0	0	23.45
50-60	0	0	0	0	0	0	0	100	0	0	0	0	0.21
60-70	0	0	0	0	0	25.29	9.8	20.62	38.69	5.59	0	0	2.25
70-80	0	0	0	18.15	0	10	5.25	7.09	38.73	20.27	0	0.51	3.01
80-90	0	0	0	12.89	0	0	0	33.99	39.59	8.84	0	4.69	3.03
90-100	0	0	0	37.91	0	0	11.83	20.76	0	0	4.65	24.86	1.24
>100	0	0	36.16	25.25	4.69	0	2.03	0	31.89	0	0	0	1.38
Total	1.32	0	18.97	3.87	41.57	16.7	1.63	9.4	4.82	1	0.06	0.65	100

A few main components of the ANTS package were important in causing these METR changes. Taking away the accumulation of different payments and rebates related to the presence of dependent children in the household, and replacing it by one payment with one reduced taper rate, decreased METRs for middle-income sole parents and for married mothers with employed partners. The reduction in the Parenting Payment taper rate for sole parents by 10 per cent was another factor, which lowered METRs for sole parents.

On the other hand, these wider tapering out ranges resulted in an increase in METRs for mothers, who are at the high end of the income range and were not eligible for the payment before the introduction of the ANTS package. Small reductions in METRs resulted from the income tax changes for employed mothers.

2.2 Budget constraints for hypothetical households

This subsection examines changes in net incomes and METRs of selected hypothetical sole parents and married mothers. All figures are presented in the Appendices.

2.2.1 Sole parents

In all hypothetical cases presented in Appendix B, sole parents are assumed to pay a rent of \$110 per week and we vary their hourly wage from \$10 to \$25 and the number of dependent children from 1 to 3.

Before describing the details of the changes, we first summarize the expected effect of the change. The incentive effect on participation resulting from the new policy might be relatively small, given the fact that those sole parents who were not working under the old policy were less likely to have the potential to earn a high wage. However, the new policy may create relatively larger incentives for those who were working part time under the old system (and earning a medium level wage) to work full time under the new system.

With the introduction of ANTS, net incomes increase at all labour supply levels for all sole parents. The increase in net income increases with the number of children, but this increase is relatively small and cannot be seen directly from the figures. Sole parents with higher wage rates who are working close to full time hours tend to have the largest increase in net income when comparing the pre- and post-reform situation. In general, at all wage rates considered, net incomes increase with working hours except for a few ranges of income where the sole parent's METR is larger than 1 (or 100 per cent).

The above observations are confirmed by the changes in METR before and after ANTS for the same hypothetical households. For those with a very low earning potential (\$10 wage rate), the post-reform METR does not change much compared with the pre-reform METR. In contrast, for those who could earn a wage rate of \$15 or more, there are

several working hour ranges where the METR substantially decreases. For the examples chosen in Appendix B, the new METRs show fewer fluctuations across the income range and the peaks in METRs are flattened to lower levels. In the larger part of the hours range, METRs are reduced, but for a limited range of incomes there is an increase.

In SIHC 1999-2000, the predicted wage rate for sole parents, who were not working, is about \$10. From the METR, it seems the new policy does create a slightly increased incentive for them to work, but not as much as for sole parents with higher wage levels. In SIHC 1999-2000, over 80 per cent of sole parents had one or two children and the median hourly wage rate of those who were working was about \$15. From the changes in METR, such a household would benefit substantially from the new policies if they would work full time. In other words, if they were working part time the new policy created a higher incentive for them to increase their labour supply to full-time hours than under the old policy through a higher marginal wage rate, although on the other hand the higher net income at that hours level might cause them to reduce labour supply. For sole parents with 2 children, who could earn \$20 per hour, the new system might create more of an incentive to reduce working hours slightly if they were working full time under the old system, given the lower marginal wage rate at full-time hours under the new system and the increased net income.

2.2.2 Married mothers

Given the importance of the household's income for the receipt of income support and family payments, and the importance of the partner's income in determining the eligibility for particular rebates, we present four sets of hypothetical cases. Each set of hypothetical cases assumes a different level of earnings for the partner.

In all hypothetical cases presented in Appendix C, the households, in which married mothers live, are assumed to pay no rent. The mothers' hourly wage ranges between \$10 and \$25, and the number of dependent children from 1 to 3. The husband is not working. Similar cases are presented in: Appendix D, with the difference that the husband is now assumed to work 20 hours at a wage of \$20 per hour; Appendix E where the husband is assumed to work 40 hours at a wage of \$20 per hour; and Appendix F where the husband is assumed to work 40 hours at a wage of \$25 per hour.

Before going into the detail of the effect on METRs for each type of married woman, we summarize the effect on METRs more generally. Compared to the two groups of married women with lowest partner's earnings, the group married to higher income earners seems to benefit more from the reform in terms of increased net incomes across the complete hours range of labour supply. In addition, the range of hours over which the METRs improve seems wider for these women in higher-income families than for women married to non-participating or low-income husbands.

(a) The husband is not working

If both the husband and the wife are not working, the new system increases family net income and this increase is slightly (but hardly noticeable in the figures of Appendix C) larger for families with more children. The increase in net income does not always increase with working hours of the spouse. The difference in net income between the two systems goes up and down when the spouse decides to work more hours. There are even some hours points where the net income would be the same (or extremely close) under the new and the old system. For instance, if the wife's wage rate were \$15, working 30 to 32 hours per week under the new system would produce roughly the same net family income as under the old system.

For working hours at the part-time level, the new system does little to reduce the METR. In fact, there are hours points at which METRs are worse under the new system and for some income ranges, METRs are even increased above 100 per cent. Only in limited hours regions, depending on the wage rate and the number of children, has the new system improved METRs. Therefore, if the husband is not working, the additional incentive effect of the new system on married mothers' labour supply is expected to be small.

(b) The husband is working 20 hours per week at a wage rate of \$20

Under the old system, at low labour supply levels the METRs of wives of low-income husbands were over 100 per cent, which could lead to a decrease in net family incomes if the wives currently working around those hours points were to increase their labour supply. The new system has removed this extreme disincentive effect to participate for this group, so that net family incomes always increase with the wives' working hours.

This should increase the probability of participation in the labour force for this subgroup. Unfortunately, the new system also creates higher METRs than the old system for some working hours ranges. For instance, under the new system the METR faced by part-time working mothers with one child and a wage over \$10 per hour, or with two children and a wage over \$15 per hour, or with three children and a wage over \$20 per hour, is higher than in the old system. The new system also increases the METR in the full-time hours range faced by mothers with two or three children and a wage of \$10 or by mothers on a wage of \$15 with three children.

(c) The husband is working 40 hours per week at a wage rate of \$20

Similar to sole parents, for families with one or two children, the increase in family net income increases mostly with the working hours of the mother. The new system substantially reduces the METR at the initial work hours. In general, under the new system the METR faced by these mothers is relatively low and has improved considerably compared to the old system.

For families with three children the increase in family net income is mostly, but not always, increasing with the mothers' working hours. Although the new system reduces the METRs at initial working hours, it also introduces higher METRs directly following the reduction over the initial range. The new system also increases the METRs somewhat for mothers with two or three children and a wage of \$20 per hour if they work full-time.

Comparing families with different numbers of children, it can be seen that when the mother is not working, the new system increases the net incomes of families with three children much more than those with one child. This is probably due to the fact that families with three children are still eligible for a larger amount of family payments, whereas for families with one child a larger proportion has already been tapered out. This difference in net income disappears when the mother is working full time, but as a result, women with more children face higher METRs at low hours of labour supply, while family payments are tapered out.

Compared to the previous two groups of married women, this group seems to benefit more in terms of increased net incomes across the complete hours range of labour supply. Although there are increased METRs for some groups, the range of hours over which the

METR improve seems wider than for women married to non-participating or low-income husbands.

(d) The husband is working 40 hours per week at a wage rate of \$25

The new system also reduces the METR at the initial working hours substantially for this group. The METR levels are very similar to those for married women married to men working 40 hours per week at a wage rate of \$20. The main difference between these two groups is that the group with the higher wage for the husband experiences a larger increase in net income, presumably through the larger income tax cut for the husband.

3. Simulated effects of all changes in ANTS

In this section, we first examine the full effect of all changes in the ANTS package. Two simulations are carried out. We present the forward simulation results using 1999-2000 SHIC data, in which the January 2000 tax and transfer system is used as the base (or pre-reform) system and ANTS as the post-reform system. Backward simulation results using 2000-01 SHIC data, where we reverse the policy changes, are reported in Appendix G. Thus in the backward simulation, ANTS is used as the pre-reform system and the January 2000 system as the post-reform system. The backward simulation serves a confirmation purpose only. We expect the two simulations to produce opposite effects of a similar size and this is indeed the case. Only the forward simulation results are discussed in this section.

3.1 Expectations regarding the effects

Before discussing the simulation results in this section, we describe briefly our expectation regarding the effect from theory. The effect of reductions in the marginal income tax rates (including the increase in the tax-free threshold) on labour supply is ambiguous because the reductions increase the after tax wage rate of employed people. On the one hand, the increase in the after-tax wage rates implies that workers can take home more income if their working hours remain unchanged, which will reduce labour supply (the income effect). However, on the other hand, the increase in the after-tax wage rates raises the opportunity cost of leisure and makes employment more attractive (the

substitution effect). The income and substitution effects operate in opposite directions. Therefore, the net effect on labour supply is an empirical issue.

Similarly, the effect of a change in income support benefit thresholds and taper rates results in income and substitution effects working in opposite directions. These changes might cause additional people to be eligible for payments. The labour supply effects for these newly eligible people may be different from those who are eligible under both the old and new policy. That is, while an increase in taper free threshold and a decrease in the taper rate in theory may have an ambiguous effect on the labour supply of payment recipients (and probably has a positive effect on individuals who are currently out of the labour force); the effect on the newly eligible individuals is unambiguously negative. This is because the newly eligible families are subject to an additional taper rate, resulting in a higher marginal effective tax rate, while at the same time experiencing a higher level of income at the same labour supply level, both of which have a negative effect on labour supply. Generally speaking, a change in income tax policy affects a broader population than a change in income support policy.

3.2 Effect of the total ANTS package

The aggregated labour supply responses to the introduction of ANTS are presented in Table 3. The policy change leads to a net increase in the expected labour supply for single parents and married mothers. Although the policy reform causes some people to reduce their labour supply, this is outweighed by those who would like to increase their labour supply. The results also show that among those who already worked under the old system, the proportion who increase working hours dominates those who reduce working hours, producing an overall increase in average working hours. The increase in average working hours is larger for sole parents than for married mothers. It also appears that the policy change motivates relatively more sole parent employees than married mother employees to increase their working hours. These findings are confirmed by the reverse microsimulation with 2001 SIHC data. That is, when the policy changes were reversed, simulated labour supply is expected to fall (see Appendix G).

These results confirm the finding by Kalb *et al.* (2003) that ANTS has a positive effect on labour supply of married mothers and sole parents. However, the magnitudes of the

simulated effects are somewhat different. For instance, Kalb *et al.* (2003) found that the effect on labour force participation is larger for married mothers than for sole parents (2.4 versus 1.5 percentage points). The current paper finds that this effect is very similar for married mothers and sole parents. In addition, we now find a somewhat larger effect on sole parents' working hours than in Kalb *et al.* (2003). The proportion of "workers working more" has increased, in particular. This could have been caused, at least partly, through the larger percentage of individuals in employment in SIHC 1999/2000 compared to SIHC 1997/1998. The increase in the observed percentage of employed individuals from SIHC 1997/1998 to SIHC 1999/2000 was less substantial for married mothers.

Table 3: Summary of labour supply responses

	SIHC 1999/2000	
	Married mothers	Single parents
all workers (%base)	60.78	51.9
wage & salary workers (%base)	52.34	47.05
wage & salary workers (%post)	53.75	48.32
non-work-->work (%)	1.62	1.76
work-->non-work (%)	0.21	0.49
workers working more	0.62	2.65
workers working less	0.21	0.34
average hours change	0.44	1.01

The results in Table 3 appear to be consistent with the budget constraints for sole parents, outlined in Section 2.2.1, where it was found that the incentive to enter the labour force for non-participating sole parents, who are mostly on low wages, may be smaller than the incentive for part-time workers on medium wages to increase their labour supply. For the hypothetical examples given in Section 2 it also appeared that the incentives increased more for sole parents than for married women.

Table 4 presents the labour supply transition results. From the table, it is evident that increases in working hours dominate decreases, especially among sole parents. Most sole parents who worked less than 35 hours per week under the old system are expected to increase working hours under the new system. There are not many sole parents or married mothers, who work more than 40 hours, but among those sole parents, who worked 35 hours or more, some are expected to increase their working hours whereas the largest proportion decrease labour supply after the policy change. This is consistent with

the observation made in Section 3.1 that for persons who already were payment recipients in the base system (that is, individuals who have low labour supply) the substitution effect might dominate the income effect, while for persons on higher incomes, who are newly drawn onto the payment through the lower taper rate, the opposite may occur.

Table 4: Labour supply transitions – SIHC 1999/2000

From pre-reform to post-reform: rows to columns (row percentage)												
Hours	0	5	10	15	20	25	30	35	40	45	50	Total
Sole parents												
0	96.7	-	0.2	0.1	0.1	0.3	0.4	0.5	0.5	0.5	0.7	52.9
5	0.2	90.6	0.1	0.1	0.4	0.5	1.4	1.3	1.4	2.3	1.8	4.9
10	-	-	93.0	0.0	0.2	0.1	0.7	2.5	1.1	0.9	1.4	4.3
15	0.9	-	0.1	80.0	0.1	0.4	0.9	1.0	8.3	5.7	2.6	3.7
20	0.4	-	0.0	0.0	88.7	0.4	1.0	2.3	3.9	1.8	1.4	4.6
25	0.1	-	-	-	-	97.5	0.4	0.3	0.5	0.4	0.7	3.4
30	0.2	-	-	-	-	0.1	96.8	0.2	0.3	1.6	0.9	2.5
35	1.2	0.0	0.1	0.5	0.1	0.1	0.4	95.7	0.4	0.6	0.8	4.5
40	2.4	-	0.0	0.1	0.1	0.2	0.5	0.5	92.7	0.6	3.0	12.6
45	1.3	-	0.3	-	-	-	0.5	0.2	0.4	96.6	0.7	2.0
50	1.0	-	0.0	-	0.0	0.1	0.2	0.8	0.2	0.2	97.4	4.5
Total	51.7	4.5	4.2	3.1	4.2	3.6	2.9	5.0	12.6	2.9	5.6	100
Married mothers												
0	96.6	0.1	0.3	0.3	0.4	0.3	0.6	0.6	0.3	0.2	0.2	47.7
5	0.5	98.6	-	0.3	-	0.2	0.4	0.0	-	-	-	1.9
10	0.0	-	98.9	-	0.1	0.3	0.1	0.3	0.0	0.1	0.1	4.8
15	-	-	0.1	96.2	0.8	0.3	0.9	0.7	0.2	0.5	0.2	5.1
20	0.1	0.1	0.1	0.0	98.2	0.2	0.1	0.3	0.2	0.3	0.4	7.4
25	0.5	0.1	0.0	0.0	0.2	97.4	0.2	0.5	0.3	0.4	0.3	5.6
30	0.3	0.1	0.1	0.0	0.2	0.1	97.8	0.4	0.4	0.1	0.5	5.7
35	0.3	0.3	0.3	0.0	0.0	0.0	0.1	97.8	0.7	0.3	0.2	5.5
40	1.3	-	0.0	0.2	0.3	0.1	0.2	0.0	97.8	0.2	0.0	10.5
45	0.0	-	-	-	-	-	-	-	0.4	99.4	0.1	2.0
50	-	-	-	-	0.1	-	-	0.1	-	-	99.8	3.9
Total	46.2	2.0	4.9	5.0	7.6	5.7	6.0	5.8	10.5	2.2	4.1	100

The pattern of working hours changes is different for married mothers. Overall, it is clear that married mothers are much less likely to change their labour supply after the change, given the higher percentages on the diagonal in the table. There are also relatively more married mothers, who worked less than full time (35 hours or less) under the old system, and who are expected to reduce their working hours after the policy change. The reduction of working hours by married mothers at low labour supply levels may be due to the interaction between husbands' and wives' labour supplies and the means testing of

some income support payments on family income. In addition, there may be an extra income effect resulting from an increased income capacity by the husband after introducing ANTS.

Tables 5a and 5b present the distribution of changes in predicted working hours by selected characteristics of sole parents and married mothers. The last row of Table 5a shows that we expect 68 per cent of sole parents to remain at their original working hours after the policy changes, 28 per cent to increase and 4 per cent to decrease labour supply. Among those sole parents, who are expected to increase working hours, most of them are expected to increase labour supply by 1 to 5 hours only. Table 5b shows that we expect 84 per cent of married mothers to remain at their original working hours, 14 per cent to increase and 2 per cent to decrease labour supply. Again, among those married mothers, who are expected to increase working hours, most of them are expected to increase their labour supply by 1 to 5 hours.

Comparing the average change in predicted working hours by individual and household characteristics, some clear differences are found. Among sole parents, those aged between 30 and 40 are predicted to increase working hours the most.⁵ This may be because the children of sole parents in this age group are most likely to have reached school age, while the sole parents themselves are still far from the usual retirement age. This is supported by the changes in predicted hours by the age of the youngest child, which shows that sole parents with a youngest child aged between 5 and 14 have the largest labour supply response to the policy change. Sole parents, whose youngest child is over 14, may have a smaller response because they are already more likely to work full time before the change. As for the number of children, except for those with four or more children, sole parents with fewer children are predicted to have a larger change in working hours.⁶ It also appears that those with non-degree post-school qualifications were expected to increase the working hours the most and those without post-school qualifications are expected to have the smallest change in hours.

⁵ Sole parents aged 55 to 59 are predicted to increase their working hours by 2.6, but the proportion of sole parents in this age group is very small.

⁶ The group of sole parents with four or more children is very small.

Table 5a: Change in predicted working hours of sole parents – SIHC 1999/2000

	Decrease in hours (row percentages)				Increase in hours (row percentages)			Average (hours)
	> 10	5 -10	1 - 5	None	1 - 5	5 - 10	> 10	
Age								
15to19	-	-	-	100	-	-	-	0
20to24	-	-	-	90	10	-	-	0.26
25to29	-	-	2	81	14	1	2	0.78
30to34	-	-	-	71	23	2	4	1.36
35to39	1	1	3	60	27	2	5	1.63
40to44	1	-	3	67	24	4	-	0.53
45to49	-	2	9	53	33	1	2	0.9
50to54	-	8	-	76	10	4	2	0.43
55to59	-	-	14	16	57	13	-	2.66
60to64	-	-	-	100	-	-	-	0
Number of children								
One dependent	0	1	4	66	21	4	3	1.04
Two dependents	0	1	2	71	24	1	2	0.89
Three dep.	-	-	3	67	27	4	-	0.76
Four dep.	-	-	-	73	19	-	8	2.19
Age of youngest children								
0-2 yrs	-	-	1	90	7	1	1	0.49
3-4 yrs	1	-	-	77	20	-	2	0.53
5-9 yrs	-	1	2	62	29	3	3	1.49
10-14 yrs	-	-	2	62	31	3	1	1.13
15 +	1	4	10	57	18	5	4	0.89
Highest qualification								
at school	-	-	-	100	-	-	-	0
no qualification	0	0	2	74	19	3	1	0.83
other post-school	0	1	4	57	32	2	4	1.35
degree and higher	-	4	5	72	11	3	4	0.93
Employment status								
employed	1	2	6	72	14	4	3	0.72
non-part	-	-	-	65	31	2	2	1.38
unemployed	-	-	-	57	43	-	-	1.09
Total	0.4	0.94	2.97	67.95	22.7	2.64	2.4	1.01

Among married mothers, the differences in predicted labour supply changes between different age groups are much smaller than for sole parents. Those with one dependent child are predicted to increase working hours relatively more than married mothers with more children. Although married mothers with a youngest child aged over school age are predicted to increase their working hours somewhat more than those with a youngest child under school age, the difference is small. Similarly, mothers between 30 and 40

years of age (and between 55 and 59 years) seem to respond somewhat more but the difference is again small.

Table 5b: Change in predicted working hours of married mothers – SIHC 1999/2000

	Decrease in hours (row percentages)			None	Increase in hours (row percentages)			Average (hours)
	> 10	5 -10	1 - 5		1 - 5	5 - 10	> 10	
Age								
15to19	-	-	-	92	8	-	-	0.22
20to24	-	-	-	95	3	2	-	0.42
25to29	1	0	1	86	9	2	-	0.41
30to34	1	-	2	84	12	1	1	0.52
35to39	0	0	1	82	15	1	1	0.58
40to44	-	0	1	86	12	1	-	0.3
45to49	1	1	1	81	14	2	1	0.41
50to54	-	-	1	92	7	-	-	0.16
55to59	-	-	-	77	16	6	-	0.94
60to64	-	-	-	100	-	-	-	0
Number of children								
One dependent	0	0	1	81	15	2	1	0.69
Two dependents	0	0	2	86	11	1	-	0.3
Three dep.	1	0	2	84	11	1	1	0.32
Four dep.	-	0	0	91	5	4	-	0.43
Age of youngest								
0-2 yrs	0	0	1	88	10	1	-	0.25
3-4 yrs	0	-	2	84	12	2	-	0.3
5-9 yrs	0	-	1	83	13	1	1	0.66
10-14 yrs	-	0	2	84	12	1	1	0.49
15 +	1	0	-	81	15	3	0	0.49
Highest qualification								
no qualification	0	0	1	85	11	1	1	0.47
other post-school	0	0	1	85	12	1	0	0.36
degree and higher	-	-	2	79	17	2	0	0.54
Employment status								
employed	0	0	2	92	5	1	0	0
non-part	-	-	-	74	24	2	1	0.98
unemployed	-	-	-	57	28	7	9	2.9
Total	0.3	0.23	1.28	84.22	12.17	1.26	0.55	0.44

Tables 6a and 6b present the distribution of changes in working probability by the same selected characteristics as the changes in working hours. Table 6a shows that 70 per cent of all sole parents are predicted to have no change in the probability of working, 25 per cent are expected to have an increase and 5 per cent to have a decrease in probability. For

married mothers these numbers are 79, 20 and 1 per cent, respectively (see Table 6b). For both groups, in the majority of cases the probability is expected to increase by less than 10 percentage points. The average overall change is slightly larger for married mothers than for sole parents.

Table 6a: Change in work probability of sole parents – SIHC 1999/2000

	Decrease in percentage points (row percentages)				Increase in percentage points (row percentages)			Average in percentage points
	> 50	10 - 50	2 - 10	none	2 - 10	10 - 50	> 50	
Age								
15to19	-	-	-	-	100	-	-	2
20to24	-	-	-	74	25	1	-	0.82
25to29	-	-	4	79	16	1	-	0.72
30to34	-	-	1	73	26	0	-	1
35to39	-	1	5	67	23	5	-	2.19
40to44	-	1	6	73	15	5	-	0.48
45to49	-	4	3	61	25	7	-	2.33
50to54	-	8	4	69	13	6	-	0.26
55to59	-	-	11	32	26	31	-	3.63
60to64	-	-	-	100	-	-	-	0
Number of children								
One dependent	-	2	4	71	18	4	-	1.12
Two dependents	-	0	3	69	23	4	-	1.33
Three dep.	-	-	4	66	26	4	-	1.56
Four dep.	-	-	-	75	15	11	-	1.78
Age of youngest child								
0-2 yrs	-	-	3	82	14	1	-	0.46
3-4 yrs	-	1	-	74	23	1	-	0.56
5-9 yrs	-	-	3	68	25	4	-	1.51
10-14yrs	-	-	3	61	28	8	-	2.41
15 +	-	7	7	72	8	6	-	0.61
Highest qualification								
at school	-	-	-	100	-	-	-	0
no qualification	-	1	3	69	24	3	-	1.2
other post-school	-	2	4	68	22	4	-	1.38
degree and higher	-	2	5	81	2	10	-	1.33
Employment status								
employed	-	3	7	90	-	-	-	-0.94
non-part	-	-	-	48	43	9	-	3.72
unemployed	-	-	-	48	46	7	-	3.34
Total	-	1.35	3.62	70.07	20.74	4.23	-	1.27

Table 6b: Change in work probability of married mothers – SIHC 1999/2000

	Decrease in percentage points (row percentages)				Increase in percentage points (row percentages)			Average in percentage points
	> 50	10 - 50	2 - 10	none	2 - 10	10 - 50	> 50	
Age								
15to19	-	-	-	80	12	8	-	1.88
20to24	-	-	-	57	41	2	-	1.75
25to29	-	1	0	70	25	4	-	2.08
30to34	-	1	1	78	17	3	1	1.88
35to39	-	0	1	76	18	5	1	1.81
40to44	-	0	1	88	9	2	-	0.66
45to49	1	1	1	80	11	6	-	0.89
50to54	-	-	1	88	10	0	-	0.45
55to59	-	-	-	74	18	8	-	2.8
60to64	-	-	-	100	-	-	-	0.23
Number of children								
One dependent	0	-	-	77	17	5	1	1.98
Two dependents	-	0	1	81	14	3	-	1.05
Three dep.	-	2	1	76	18	2	1	1.21
Four dep.	-	0	0	82	13	5	-	1.33
Age of youngest child								
0-2 yrs	-	1	0	73	24	2	-	1.24
3-4 yrs	-	1	1	75	20	3	-	1.29
5-9 yrs	-	0	1	82	11	4	1	1.86
10-14 yrs	-	1	2	84	10	3	1	1.45
15 +	1	-	1	81	11	7	-	1.13
Highest qualification								
no qualification	0	0	1	76	18	4	1	1.71
other post-school	-	1	0	81	14	4	-	1.06
degree and higher	-	0	1	83	11	4	-	1.1
Employment status								
employed	0	1	1	97	0	0	-	-0.3
non-part	-	-	-	52	39	9	1	3.55
unemployed	-	-	-	35	39	19	6	10.49
Total	0.1	0.53	0.82	78.84	15.55	3.78	0.37	1.41

Among sole parents and married mothers, the change in the predicted probability of working varies with age. For both groups, the biggest increase in working probability is predicted to occur among the relatively old age group 55-59, which contains only few sole parents. For married mothers, the increase in the probability of working is predicted to be larger for those aged under 40 years than for those over 40 years. For sole parents

there is no clear age pattern. Among sole parents, the working probability appears to increase with the number of children and the level of qualification, but no such pattern is observed for married mothers. Regarding the level of qualification, the reverse seems to occur for married mothers, with the effect being largest for the lowest qualified group. As for the age of the youngest child, it appears that the probability of working is expected to increase with the age of the youngest child up to the age of 14 for sole parents and up to the age of 10 for married mothers. The expected change in probability is largest for children of school age (between 5 and 14 years old). For married mothers, there is a clear difference in the change in probability for those who are unemployed and those who are not participating in the labour force. Unemployed individuals are expected to have the largest increase in working probability. There is much less difference between these two groups for sole parents.

Summarising our findings, the above results for the full ANTS package are similar to the earlier simulation results by Kalb *et al.* (2003), which were based on older data. The effect for sole parents is somewhat larger than in the previous study and that of married mothers is slightly smaller. The increase for sole parents may have been caused, at least partly, by the substantial increase in sole parents, who are now working for wages or salaries, given that in particular the percentage of “workers working more” increased compared to the earlier results. The expected changes are highest for women with children of school age, who themselves are in between 30 and 40 years old, and for women with fewer dependent children. There appears to be no clear difference in the effect for women of different education levels. The most obvious difference is for sole parents with other post-school qualifications, who are more likely to increase labour supply than the lower and higher educated sole parents. For married women, the lowest educated group seems most likely to enter the labour market after the reform.

4 Impacts of separate policy components

The simulations in this section ignore any interactions between different policy components. The effect of separate components is evaluated by taking out one

component from the complete ANTS package and examining the effect of putting this component back into the system. Five separate components are discussed in subsections. They are the following: the changes in tax rates and tax thresholds, the decrease in pension taper rate, the introduction of Family Tax Benefit part A, the introduction of Family Tax Benefit part B and the increase in the income threshold for Parenting Payment Partnered. For details on the changes, see Appendix A.

4.1 Changes in tax rates and tax thresholds

In this simulation, the full ANTS package is the post-reform system. The base system is created by replacing the tax rates and thresholds in the ANTS package with the tax system as it was in January 2000.

As mentioned earlier, theoretically the net effect on labour supply of the increase in tax thresholds and the decrease in the tax rates is ambiguous. The simulation results in Table 7a show that this change increases labour supply for sole parents and married mothers. Not only are more single parents and married mothers expected to want to work under the new tax system than under the old system, but also among those who were working in the old system, the group expected to increase labour supply is larger than the group expected to decrease their working hours. As a result, average working hours increase for both groups.

Table 7a: Summary of labour supply response

	Sole parents	Married mothers
all workers (%base)	51.90	60.78
wage & salary workers (%base)	47.05	52.34
wage & salary workers (%post)	48.22	52.87
non-work-->work (%)	1.22	0.70
work-->non-work (%)	0.05	0.17
workers working more	2.05	0.64
workers working less	0.09	0.10
average hours change	0.84	0.26

Table 7b shows that most of those, who would like to increase their working hours, are expected to increase labour supply by 1 to 5 hours. Further, among those who are predicted to increase their probability of working, the majority is expected to increase their working probability by less than 10 percentage points.

Table 7b: Changes in predicted hours and working probability

Change in predicted hours (row percentage)								
	Decrease in hours				Increase in hours			Average hours
	> 10	5 - 10	1 - 5	None	1 - 5	5 - 10	> 10	
Sole parents	-	-	0.99	76.5	19.25	1.95	1.31	0.84
Married mothers	0.19	0.08	0.56	91.74	6.31	0.63	0.49	0.26

Change in working probability (row percentage)								
	Decrease in percentage points				Increase in percentage points			Average in percentage points
	> 50	10 - 50	2 - 10	None	2 - 10	10 - 50	> 50	
Sole parents	-	-	0.73	76.54	20.55	2.18	-	1.17
Married mothers	0.1	0.21	1.04	88.74	8.49	1.24	0.17	0.53

Table 7c presents the labour supply transitions for the tax policy change. Sole parents, who worked less than 40 hours per week under the old system, are expected to increase their working hours. Only for sole parents with working hours over 40 hours per week, some individuals are expected to reduce their working hours. This is probably due to the income effect, which dominates the substitution effect for high-income earners. For people at lower incomes, the substitution effect is still more important.

Married mothers are clearly less affected by the change than sole parents are. Differently from sole parents, there are some mothers across the full range of labour supply, who are expected to reduce working hours. This is probably due to income effects arising from the husband's increased net income level. However, overall, the effect is clearly dominated by increases in expected working hours.

Table 7c: Labour supply transitions

From pre-reform to post-reform: rows to columns												
	0	5	10	15	20	25	30	35	40	45	50	Total
single parents transition table												
0	97.7	0	0.1	0.1	0.3	0.3	0.2	0.3	0.3	0.2	0.4	52.9
5	-	93	0.1	0.1	0	0.2	0.8	0.7	1.2	1.7	2.2	4.9
10	-	-	95.7	0	0.7	0	0.4	1.4	0.4	0.1	1.1	4.3
15	-	-	-	88.3	-	0.1	0.8	1.7	1.6	4.6	2.9	3.7
20	-	-	-	-	93.2	0	0.7	1.2	2.5	1.1	1.3	4.6
25	-	-	-	-	-	95.2	0.3	0.1	0.4	2.2	1.7	3.4
30	-	-	-	-	-	-	96.6	0.2	0.4	1.4	1.4	2.5
35	-	-	-	-	-	-	-	97.4	0.7	0.8	1.1	4.5
40	0.3	-	-	-	-	-	0.2	-	96.3	0.7	2.6	12.6
45	0.2	-	-	0.2	0.6	0.3	0.4	-	0.2	97.9	0.2	2
50	-	-	-	-	0	0.1	0.1	0.3	0.2	0.1	99.2	4.5
Total	51.8	4.6	4.2	3.4	4.4	3.4	2.7	4.8	12.6	2.7	5.5	100

Table 7c: Continued

	From pre-reform to post-reform: rows to columns											
	0	5	10	15	20	25	30	35	40	45	50	Total
married mothers' transition table												
0	98.5	0	0	0.1	0.1	0.1	0.3	0.4	0.1	0.1	0.1	47.7
5	-	99.4	-	0	-	0.2	-	0.4	-	-	-	1.9
10	0.3	-	98.0	-	0.1	0.3	0.1	0.6	0.1	0.3	0.3	4.8
15	-	-	-	96.4	0.8	0.2	0.9	0.5	0.4	0.5	0.2	5.1
20	0.2	0	0	0	98.3	0.2	0.1	0.3	0.3	0.2	0.3	7.4
25	0.2	-	0	0	-	97.9	0.3	0.5	0.3	0.4	0.3	5.6
30	0.1	-	-	0	-	0.1	98.4	0.6	0.3	0.1	0.4	5.7
35	0.1	-	0	-	-	0	0.1	98.8	0.6	0.1	0.3	5.5
40	1.1	0	-	-	0.2	0.1	0.2	0.2	98.1	0.1	0	10.5
45	-	-	-	-	-	-	-	-	0.4	99.5	0.1	2
50	-	-	-	-	0	-	0	0.1	0	0.1	99.8	3.9
Total	47.1	1.9	4.7	4.9	7.4	5.6	5.9	5.8	10.5	2.1	4	100

4.2 Decrease in the pension taper rate

For this component of policy change, only those who are receiving benefits at the pension rate are affected. Parenting Payment Single is paid at pension rates, which means sole parents are expected to be affected by this policy component. Although couples could receive an Age Pension or Disability Pension, the labour supply changes of persons receiving these two pensions are not simulated in MITTS. Therefore, the effect of this policy component is only examined for sole parents.

The effects of this policy component are simulated by replacing the 40 per cent pension taper rate in the July 2000 system by 50 per cent and using this as the base system. The reform system is the July 2000 system keeping the 40 per cent pension taper rate unchanged.

As shown in Table 8a, the participation rate is predicted to increase by about 2 per cent, in response to this policy component, and the average labour supply is predicted to increase by about half an hour. It appears that these results are driven by an increase in participation rather than by increased working hours of those who were already working under the base system. Indeed, among those who were working under the base system, the proportion of single parents who would like to reduce the working hours is greater

than the proportion who would like to increase working hours. Nevertheless, the increase in participation flows on to a net increase in the average working hours as well.

Table 8a: Summary of labour supply response

	Sole parents
all workers (%base)	51.9
wage & salary workers(%base)	47.05
wage & salary workers(%post)	49.04
non-work-->work (%)	2.08
work-->non-work (%)	0.09
workers working more	0.27
workers working less	0.93
average hours change	0.49

As for the overall package it is clear from Table 8b, that the majority of expected changes in the average hours of work and the probability of working is relatively modest, less than 5 hours and less than 10 percentage points respectively.

From Table 8c, it appears that for those sole parents who previously worked less than 25 hours per week, working hours are predicted to increase, while for those who previously worked 25 or more hours per week, working hours are predicted to decrease. This shows clearly the opposite effects of a reduction in the withdrawal rate for different groups in the population. It is also obvious that the dominance of the negative effect starts at a lower labour supply level than for the income tax reform. The overall effect is still positive, which means the positive effect for non-participants and sole parents working few hours outweigh the negative effect for sole parents already working a substantial number of hours. The high level of non-participation in this group makes policies aimed at encouraging new entrants in the labour market potentially very effective.

Table 8b: Changes in predicted hours and working probability

Change in predicted hours (row percentage)								
	Decrease in hours				Increase in hours			Average hours
	> 10	5 - 10	1 - 5	None	1 - 5	5 - 10	> 10	
Sole parents	-	0.43	6.42	70.35	21.38	0.87	0.54	0.49

Change in working probability(row percentage)								
	Decrease in percentage points				Increase in percentage points			Average in percentage points
	> 50	10 - 50	2 - 10	None	2 - 10	10 - 50	> 50	
Sole parents	-	0.26	0.47	69.27	24.11	5.89	-	1.99

Table 8c: Labour supply transitions

Hours	0	5	10	15	20	25	30	35	40	45	50	Total
0	96.1	0	0.2	0.3	0.5	0.6	0.5	0.6	0.6	0.4	0.2	52.9
5	0.5	97.8	0.1	0.2	0.4	0.5	0.2	0.3	-	-	-	4.9
10	0.5	-	95.8	0.1	0.6	0.1	1.1	1.8	0.1	0	-	4.3
15	-	-	-	99.8	-	0.1	0.1	-	-	0.1	-	3.7
20	-	-	-	-	99.8	0.1	0.1	-	-	-	-	4.6
25	-	-	-	-	0.2	99.8	-	-	-	-	-	3.4
30	-	-	-	0.2	0.1	0.2	99.4	0	-	-	-	2.5
35	-	0	0.2	0.8	0.4	0.9	0.5	97.2	-	-	-	4.5
40	0.4	0.1	0.1	1.3	1.2	1	0.9	0.2	94.9	-	-	12.6
45	-	-	0.4	0.6	0.8	0.6	0.1	0.4	0.1	97	-	2
50	-	0.1	0.1	0.4	0.8	0.6	0.3	0.3	0	-	97.3	4.5
Total	51	4.8	4.3	4.1	5.1	3.9	3	4.9	12.2	2.2	4.5	100

4.3 Introducing Family Tax Benefit part A

FTB A replaced three former family related payments: Family Allowance (including Minimum Family Allowance), Family Tax Payment A and Family Tax Assistance A. Under FTB-A, payment rates and income test thresholds were increased by more than the inflation rate, with the payment tapered out at a more gradual rate than in the old system.

In this simulation, we use the July 2000 system as the post-reform system. To form the base system, we take the FTB-A from the July 2000 system and put back the Family Allowance, Family Tax Payment Part A, Family Tax Assistance Part A, and all associated payment rates, income thresholds and taper rate as they were in January 2000.

This change has different impacts on sole parents and married mothers as can be seen in Table 9a. For sole parents, it is expected to have a relatively large positive labour supply effect: over 2 per cent more sole parents are expected to work after the introduction of FTB-A, and average working hours are expected to increase by 1.4 hours. From Table 9c, it can be seen that the working hours are expected to increase for almost all sole parents whose previous working hours were less than full time. As before, Table 9b shows that most increases in the probability of working or in the predicted hours of work are relatively modest.

This policy alone would have a negative labour supply effect on married mothers, although the magnitude is small. Examining Table 9b, we can see that nothing is

expected to happen for a large proportion of married mothers and that for most married mothers, who are expected to respond, the response is likely to be modest. About 0.40 per cent of married mothers are expected to withdraw from employment and the average working hours are expected to decrease by 0.2 hours. Table 9c shows that this change is expected to push previously working married mothers out of employment rather than causing them to reduce their working hours.

Table 9a: Summary of labour supply response

	Sole parents	Married mothers
all workers (%base)	51.9	60.78
wage & salary workers (%base)	47.05	52.34
wage & salary workers (%post)	49.29	51.96
non-work-->work (%)	2.31	0.50
work-->non-work (%)	0.07	0.88
workers working more	2.74	0.16
workers working less	0.22	0.24
average hours change	1.43	-0.16

Table 9b: Changes in predicted hours and working probability

Change in predicted hours (row percentage)								
	Decrease in hours				Increase in hours			Average hours
	> 10	5 -10	1 - 5	None	1 - 5	5 - 10	> 10	
Sole parents	-	0.28	0.61	65.04	27.58	3.35	3.14	1.43
Married mothers	0.33	1.2	5.86	90.04	2.06	0.29	0.22	-0.16

Change in working probability(row percentage)								
	Decrease in percentage points				Increase in percentage points			Average in percentage points
	> 50	10 - 50	2 - 10	None	2 - 10	10 - 50	> 50	
Sole parents	-	0.28	0.36	70.85	20.73	7.78	-	2.24
Married mothers	0.05	2.2	8.31	83.88	4.39	1.06	0.09	-0.39

This component of family payments is linked with FTB-B. In the next subsection, we see that the effects of introducing FTB-B are the reverse of FTB-A. These two components of family payments were set up to address two separate issues. FTB-A is meant to provide support to families on relatively low incomes whereas FTB-B is meant to provide additional support to single-income earners (including sole parents). Therefore, sole parents are relatively worse off than before when only looking at the introduction of

FTB-A. The sudden death of the payment and the higher taper rates in the January 2000 system provided disincentives for sole parent workers, which were taken away by the ANTS package.

Table 9c: Labour supply transitions

Hours	0	5	10	15	20	25	30	35	40	45	50	Total
Sole parents												
0	95.6	0	0.1	0.2	0.5	0.5	0.5	0.6	0.6	0.6	0.6	52.9
5	0.4	88.1	0.1	0.2	0.3	0.5	1.4	1.3	1.6	2.7	3.4	4.9
10	-	-	92	0	0.5	0.1	0.6	1.7	1	2	2	4.3
15	-	-	-	79.6	-	0.6	1.2	1.9	7.7	5.1	3.8	3.7
20	-	-	-	-	89.6	0.4	0.3	0.9	3.8	1.1	3.8	4.6
25	-	-	-	-	-	95.5	0.1	1.1	0.8	1.8	0.8	3.4
30	-	-	-	-	-	-	95.8	0.5	0.2	1.7	1.8	2.5
35	-	-	-	-	0	-	0.1	97.3	1.1	0.6	0.8	4.5
40	-	-	-	-	0.1	0.1	0.1	0.5	97.4	0.3	1.5	12.6
45	-	-	-	-	-	0	0.9	0.5	0.4	98	0.1	2
50	1.2	-	-	-	-	-	0.3	1.1	0.3	0.1	97	4.5
Total	50.7	4.3	4.1	3.1	4.4	3.6	2.9	5.2	13.3	3	5.6	100
Married mothers												
0	99	0.1	0.1	0.1	0.1	0.1	0.3	0.1	0	0	0	47.7
5	0.1	99.8	-	-	-	0.1	-	-	-	-	-	1.9
10	0.7	0	99.1	-	0.1	-	0	-	-	0.1	-	4.8
15	1.5	0	-	97.1	0.7	0.2	0	0.4	0.1	0	-	5.1
20	1.3	0.2	0.1	0.1	98.1	0	0	0	0.1	0.1	0.1	7.4
25	3.5	0.4	0	0.1	0.2	95.7	0	0.1	0	0	0	5.6
30	1.6	0.4	0	0	0.2	0	97.3	0.3	0	0	0.1	5.7
35	2.1	0.3	0.3	0.1	0.1	0	0.1	96.8	0.1	0	-	5.5
40	2.2	0	0	0	0.1	0.1	0.1	0.1	97.2	0.1	0	10.5
45	1.1	-	0.1	0.1	0.1	0.2	0	0	0	98.4	-	2
50	0.6	0.1	-	-	0.3	0	0	0.2	0	0	98.7	3.9
Total	48	2	4.8	5	7.5	5.4	5.8	5.4	10.2	2	3.9	100

4.4 Introducing Family Tax Benefit part B

The FTB-B is a combination and simplification of six former forms of assistance, three social security payments and three forms of assistance available through the taxation system, which were all available to single-income earner families (including sole parent families) (see Appendix A, Table A.3). To simulate the effects of introducing FTB-B, we use ANTS as the post-reform system. The base system is created by taking FTB-B from ANTS and replacing it with the old payments of January 2000.

Tables 10a to 10c present the simulation results of introducing FTB-B. In contrast to the introduction of FTB-A, the introduction of FTB-B has a negative effect on sole parents' labour supply and a positive effect on married mothers. The negative effect for sole parents is likely to have been caused by the replacement of two tax rebates (which are only received if sufficient tax is paid in a year) with fortnightly payments received by all sole parents and single-income earners. As a result being out of the labour force has become more attractive.

Table 10a: Summary of labour supply response

	Sole parents	Married mothers
all workers (%base)	51.9	60.78
wage & salary workers (%base)	47.05	52.34
wage & salary workers (%post)	39.8	53.37
non-work-->work (%)	0.08	1.09
work-->non-work (%)	7.33	0.06
workers working more	0.23	0.05
workers working less	0.78	0.04
average hours change	-2.54	0.27

Table 10b: Changes in predicted hours and working probability

Change in predicted hours (row percentage)								
	Decrease in hours				Increase in hours			Average hours
	> 10	5 - 10	1 - 5	None	1 - 5	5 - 10	> 10	
Sole parents	9.22	7.75	9.26	73	0.26	0.5	-	-2.54
Married mothers	0.1	0.02	0.37	91.97	6.83	0.34	0.38	0.27

Change in working probability(row percentage)								
	Decrease in percentage points				Increase in percentage points			Average in percentage points
	> 50	10 - 50	2 - 10	None	2 - 10	10 - 50	> 50	
Sole parents	4.54	15.88	8.48	70.48	0.42	0.2	-	-7.25
Married mothers	-	0.17	0.26	83.91	13.74	1.63	0.29	1.03

Similar to the effect of FTB-A, the impact on sole parents is substantial, while the impact on married mothers is relatively small. With the introduction of the FTB-B, 7 per cent of sole parents would like to stop working, and 1 per cent of married mothers would like to enter employment. In terms of the impact on labour supply, average working hours for sole parents are expected to drop by 2.5 hours, while changes for married mothers are small. Unlike the results in the previous sections, the effect of this component of ANTS is expected to cause more substantial decreases in the probability of working and the

predicted average working hours of sole parents (see Table 10b). Table 10c shows that introducing the FTB-B causes sole parents to exit the labour force rather than causing them to reduce working hours. This occurs across the whole range of working hours options.

Table 10c: Labour supply transitions

Hours	0	5	10	15	20	25	30	35	40	45	50	Total
Sole parents												
0	99.8	0	-	-	0	0	0	0	0	0	0	52.9
5	0.4	99.6	-	-	-	-	-	-	-	-	-	4.9
10	3.8	0.5	95.7	-	-	-	-	-	-	-	-	4.3
15	33.8	1	0.2	65	-	-	-	-	-	-	-	3.7
20	11.8	0.7	1.4	0.2	83.1	-	0.5	0.2	1.8	0.2	0.1	4.6
25	12.3	0.7	0.5	0.2	-	86.4	-	-	-	-	-	3.4
30	15.9	1	0.3	0	0.1	-	82.5	-	-	-	0.2	2.5
35	6.7	0.4	0.3	0.7	0.1	0.1	0.2	90.9	0.2	0.2	0.2	4.5
40	25.4	0.8	0.7	0.3	0.1	0.2	0.2	0.1	71.8	0.1	0.5	12.6
45	23.7	0.6	1.1	0.5	0	0.1	0	0.1	-	73.7	0.2	2
50	12.4	1.1	0.2	0.2	0.4	0.1	0.1	0.1	0	0.1	85.2	4.5
Total	60.2	5.2	4.4	2.5	3.8	3	2.1	4.2	9.1	1.5	4	100
Married mothers												
0	97.7	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.1	0.1	0.2	47.7
5	0.5	98.9	-	0.3	-	-	-	0.3	-	-	-	1.9
10	0	0.1	99.9	-	-	-	-	0	-	-	-	4.8
15	0	-	0.1	99.7	-	-	-	-	0.2	0	-	5.1
20	0.1	0	0	-	99.8	-	-	-	0	-	-	7.4
25	0.1	0	0	-	-	99.8	-	-	-	0	-	5.6
30	0.1	0.1	-	-	-	-	99.8	-	-	-	-	5.7
35	0.3	-	0	-	-	-	-	99.2	0.5	-	-	5.5
40	0	0	0	-	-	0.1	-	-	99.9	-	-	10.5
45	0.7	-	-	-	-	-	-	-	-	99.3	-	2
50	0	-	-	-	-	-	-	-	-	-	100	3.9
Total	46.6	2	4.9	5.2	7.5	5.7	5.9	5.6	10.6	2	4	100

4.5 Increase in the income threshold for Parenting Payment Partnered

In the January 2000 system, the Parenting Payment Partnered was reduced by 70 per cent for every dollar of income above \$140 per fortnight. This threshold is increased to \$243 in the new system. This change only has an impact on married mothers' labour supply. It means that for the group of married mothers, who are eligible for Parenting Payment Partnered, the withdrawal rate for income between \$140 and \$243 has decreased from 70 to 50 per cent.

In simulating this change, the July 2000 system is used as the post-reform policy. The base system is formed by replacing the \$243 threshold in the July 2000 system by \$140. Tables 11a to 11c present the simulation results for this change alone. It is evident that the impact of this change is negligible.

Table 11a: Summary of labour supply response

Married mothers	
all workers (%base)	60.78
wage & salary workers (%base)	52.34
wage & salary workers (%post)	52.36
non-work-->work (%)	0.01
work-->non-work (%)	0
workers working more	0
workers working less	0.01
average hours change	0

Table 11b: Changes in predicted hours and working probability

Change in predicted hours (row percentage)								
	Decrease in hours				Increase in hours			Average hours
	> 10	5 - 10	1 - 5	None	1 - 5	5 - 10	> 10	
Married mothers	-	-	0.12	99.87	0.01	-	-	0

Change in working probability(row percentage)								
	Decrease in percentage points				Increase in percentage points			Average in percentage points
	> 50	10 - 50	2 - 10	None	2 - 10	10 - 50	> 50	
Married mothers	-	-	-	99.92	0.08	-	-	0.01

Table 11c: Labour supply transitions

Hours	0	5	10	15	20	25	30	35	40	45	50	Total
0	100	-	0	0	0	0	-	-	-	-	-	47.7
5	-	100	-	-	-	-	-	-	-	-	-	1.9
10	-	-	99.9	0	-	0	-	-	-	-	-	4.8
15	-	-	-	100	-	-	-	-	-	-	-	5.1
20	-	-	-	0	100	-	-	-	-	-	-	7.4
25	-	0.1	-	-	-	99.9	-	-	-	-	-	5.6
30	-	-	-	-	-	-	100	-	-	-	-	5.7
35	-	-	-	-	-	-	-	100	-	-	-	5.5
40	-	-	-	0	-	-	-	-	100	-	-	10.5
45	-	-	0.1	-	-	-	-	-	-	99.9	-	2
50	-	-	-	-	-	-	-	-	-	-	100	3.9
Total	47.6	1.9	4.8	5.1	7.5	5.6	5.7	5.5	10.5	2	3.9	100

4.6 Summary

Comparing the effects of separate components of the ANTS reform, we find results that are very similar to the earlier results, for each of the components and overall. In the current study, sole parents are predicted to have slightly higher effects when the expected response is positive and slightly lower effects when the expected response is negative, compared to the earlier study.

The net effect of all changes for sole parents and married mothers is positive. The negative effects resulting from the introduction of some components is outweighed by the positive effects of other components, such as the income tax change, which is expected to have a positive effect on all groups.

For sole parents the largest positive effect on labour supply is expected to be caused by the introduction of FTB-A, followed by the income tax change. The reduction in taper rate has a larger effect on the participation rate but given the counteracting effect through workers working fewer hours the average increase in labour supply is lower. The introduction of FTB-B has a large negative effect on labour supply, caused by the replacement of a rebate, which could only be received while paying tax, by additional fortnightly payments to all sole parents.

The effects of the separate components were much smaller for married mothers. The change in income tax and the introduction of FTB-B are predicted to have an equally sized effect on average labour supply, with the FTB-B having a larger effect on labour force participation. Before the change, entering the labour force could be costly for second earners. This was due to the dependent spouse rebate, which started tapering out at an annual income of \$282, and to the increases in tax-free thresholds, which were only available to households with low-income second earners. Introducing FTB-A is predicted to have a small negative effect on average labour supply and labour force participation through the higher generosity of the payment and the decrease in taper rate. The higher family incomes for married mothers resulted in the income effect being more dominant than the substitution effect, whereas for sole parents the reverse is true.

5 Evaluation for Sole Parents Using the Difference-in-Difference Approach

In this section, we focus on the evaluation of the actual labour supply change in response to the change in the Parenting Payment Single taper rate and to some of the relative rates of family payments, rebates and pensions. We start with a definition of the treatment and control groups, the parameters of interest, and a general discussion of methodology in the first subsection; followed by a description of the data in the second subsection. The third subsection includes a more detailed discussion of the econometrics underlying the modelling and the final subsection discusses the estimation results.

5.1 Methodology

The treatment group is defined as all sole parents with children less than 16 years of age, because they are in principle eligible for Parenting Payment Single. Although only individuals in this group with income not exceeding a certain threshold are eligible for this sole parent pension, in principle, all of them are subject to this policy change irrespective of their income. The reason for this is that income is at least partly determined by labour supply behaviour and labour supply could be affected by the reduction in taper rates. Therefore, all sole parents with children aged under 16 are potentially eligible for sole parent pension as long as they do not have a large amount of income from non-labour sources rendering them ineligible for the income support payment.

The next task is to find a comparison group that is similar to the treatment group but did not experience the same policy changes. Here, we use sole parents whose youngest child is 16 or 17 years old as control group. Since the age of the youngest child is likely to affect the level of labour supply, we cannot compare the treatment and control group directly. Thus, a difference-in-difference approach is applied to obtain the treatment effects. A difference-in-difference estimator measures the excess outcome growth (or decline) for the treatment group compared to the control group, while controlling for other observed factors that may affect the outcome.

$$\text{Policy Effect} = [E(Y_{t_1}^T | X) - E(Y_{t_0}^T | X)] - [E(Y_{t_1}^C | X) - E(Y_{t_0}^C | X)] \quad (1)$$

where $Y_{t_1}^T, Y_{t_0}^T$ denotes the outcomes for the treatment group before and after the policy change respectively and $Y_{t_1}^C, Y_{t_0}^C$ denotes the outcomes for the control group in the two periods.

This method is based on the assumption that the treatment and control groups have similar time trends when their circumstances are the same. However, we suspect that sole parents with very young children may have a different time trend compared with the comparison group, possibly due to the different demands on the mother with regard to the required child-caring time. Moreover, the effect of changes in childcare cost and availability over time may vary by the age of children. To avoid this problem, we restrict the treatment group sample to sole parents whose youngest child is aged 14 or 15. Since the youngest children in the households in the restricted treatment and control groups are all of secondary school age, it is likely that the time effects are similar between these two groups. It is possible to test this assumption using data from two pre-policy-change periods. We discuss this in detail shortly.

Due to the sample restriction, the parameter estimated here is not the effect of treatment on the treated in general. Instead, it is the effect of treatment for those whose youngest child is aged 14 or 15. It is important to note that those with younger children are likely to have different treatment effects from the group evaluated in this section. The results from the microsimulation approach suggest that the policy effects are smaller for sole parents with children under school age.

5.2 Data

Data from both the SIHC and the Census can potentially be used in this evaluation. The former is better in terms of the timing of the survey whereas the latter has the advantage of a large sample size. The SIHC is available for the years 1999/2000 and 2000/2001. This covers the year right before and the year right after the policy changes. However, only around 60 sole parents in the restricted treatment group are part of the survey each year. Therefore, the sample is not sufficiently large to draw reliable statistical inferences. Moreover, the age of the youngest child is reported in one age band for 10 to 14 year olds

in the SIHC 2000/2001. Including sole parents with children aged less than 13 in our treatment group, the treatment and control group may no longer be similar enough.

For the above reasons, we use the 1996 and 2001 Census data in the main analysis and the SIHC data only in a descriptive analysis to crosscheck the results. The main drawback of the census data is that the pre-policy change period is four years prior to the policy change in which we are interested. Other larger or smaller changes may have occurred during the period. However, to our knowledge, there were no other relevant policy changes in this period that were applied differently to the treatment and control groups. Therefore, we believe that an analysis using the 1996 and 2001 Census data is informative with regard to analysing the reduction in taper rate of Parenting Payment Single and changes to the relative rates of some income support payments and family payments.

Unfortunately, there is no household identifier in the 1996 census confidentialised unit record file (CURF). This identifier is the key to generate information on the age and number of children in a household to construct relevant comparison groups. The lack of household identifiers in the 1996 Census CURF data has been overcome after some discussion with the Australian Bureau of Statistics (ABS). Although it is not possible to match all individual records into households, fortunately there is no problem for one-family and two-family households, which contain all sole-parent families in the 1 per cent sample of the 1996 Census. As a check, we apply the same program to the 2001 Census data and compare the generated household identifier with the one already in the CURF. The results showed that there is no difference between these two identifiers.

The summary statistics of individuals' characteristics for the Census 1996 and 2001 by treatment and control group are presented in Table 12. The table shows that the treatment and control groups in the same year have similar characteristics, except that individuals in the control group are slightly older, which is to be expected as the youngest child is older for the control group. Comparing the sample across years, small differences in age distribution, educational attainment and the area of residence also exist. However, only the age distribution and the proportion living in a major urban area exhibit differences at the 10 per cent level.

Table 12: Summary statistics for the Census 1996 and 2001

	<i>Census 2001 (post-policy change)</i>				<i>Census 1996 (pre- policy change)</i>			
	<i>Treatment</i>		<i>Control</i>		<i>Treatment</i>		<i>Control</i>	
	mean	std err	mean	Std err	mean	std err	mean	std err
Male	0.209	0.017	0.235	0.020	0.180	0.018	0.218	0.021
age <40	0.203	0.017	0.083	0.013	0.252	0.021	0.122	0.017
age 40-44	0.348	0.020	0.303	0.021	0.350	0.023	0.324	0.024
age 45-49	0.264	0.019	0.322	0.022	0.269	0.021	0.329	0.024
age >=50	0.185	0.016	0.292	0.021	0.129	0.016	0.225	0.021
Degree	0.114	0.013	0.154	0.017	0.120	0.015	0.137	0.018
Qualification	0.285	0.019	0.267	0.020	0.252	0.021	0.293	0.023
no qualification	0.601	0.021	0.580	0.023	0.628	0.023	0.570	0.025
Australian born	0.677	0.020	0.689	0.021	0.693	0.022	0.674	0.024
born in ESC	0.178	0.016	0.160	0.017	0.171	0.018	0.189	0.020
born in NESC	0.144	0.015	0.151	0.017	0.136	0.016	0.137	0.018
Major urban	0.586	0.021	0.603	0.023	0.646	0.023	0.635	0.025
Home: fully owned	0.203	0.017	0.262	0.020	0.225	0.020	0.272	0.023
Home: purchased	0.317	0.020	0.316	0.021	0.323	0.022	0.295	0.023
private rental	0.280	0.019	0.245	0.020	0.274	0.021	0.241	0.022
government rental	0.200	0.017	0.177	0.018	0.178	0.018	0.192	0.020
lives with relatives	0.050	0.009	0.051	0.010	0.056	0.011	0.054	0.012
has other children	0.465	0.021	0.405	0.023	0.488	0.024	0.396	0.025
Employed	0.642	0.020	0.682	0.022	0.621	0.023	0.687	0.024
Employed FT	0.351	0.020	0.418	0.023	0.363	0.023	0.456	0.025
In labour force	0.733	0.019	0.785	0.019	0.706	0.022	0.821	0.020
Average hours	20.270	0.826	22.762	0.927	19.878	0.897	24.070	0.998
Number of obs.	561		469		449		386	

5.3 Econometric modelling

We implement the difference-in-difference estimators through two different econometric methods — conventional regression (such as OLS or probit regression, depending on the outcome variable of interest) and matching methods (Blundell and Costa Dias, 2000). Both methods operate under the assumption that the time effects are the same between treatment and control group. As mentioned before, this assumption can be indirectly

tested using data from two pre-policy-change periods. The idea is that if the assumption is true, we should find a zero difference-in-difference outcome in the absence of policy changes. Unfortunately, we are not able to use Census 1991 data because of the lack of household identifiers in the CURF. We therefore perform the test using the 1997/1998 and 1999/2000 SIHC data. Due to the small sample size, the test is applied using regression only. The estimated difference-in-difference outcome is not significantly different from zero (see Appendix J). However, these results are indicative only. It is not appropriate to draw strong conclusions based on the results from such a small sample.

Turning our attention to the modelling issues, for a continuous outcome Y , the underlying model is

$$Y = X\beta + \varepsilon \quad (2)$$

X is a vector including the individuals' characteristics, a post policy period dummy, a treatment dummy and the interaction of post policy and treatment dummies (for details on explanatory variables and functional forms, see the tables in Appendix J).

Unfortunately, the working hours information is only available in fairly large categories in the census data; therefore, interval regression is implemented. Interval regression is similar to an ordered probit with the cut-off points fixed (Wooldridge, 2001).⁷ The coefficients (β) are interpreted as if we had observed the latent point data Y^* (for which we only know a lower and upper bound) and had estimated equation (2) by OLS. The underlying assumption is that outcome Y^* conditional on X satisfies the classical linear model assumptions (Wooldridge, 2001). Nevertheless, it is not appropriate to interpret the coefficients of the post policy and treatment dummies interaction term as the treatment effect because working hours are censored at zero. To calculate the treatment effect, we first predict the working hours in the four different states (treatment and control in pre-

⁷The log likelihood function can be written as follows:

$$L = -\frac{1}{2} \sum_{j \in C} \left\{ \left(\frac{y_j^* - X\beta}{\sigma} \right)^2 + \log 2\pi\sigma^2 \right\} + \sum_{j \in L} \log \Phi \left(\frac{y_{Lj} - X\beta}{\sigma} \right) + \sum_{j \in R} \log \left\{ 1 - \Phi \left(\frac{y_{Rj} - X\beta}{\sigma} \right) \right\} + \sum_{j \in I} \log \left\{ \Phi \left(\frac{y_{2j} - X\beta}{\sigma} \right) - \Phi \left(\frac{y_{1j} - X\beta}{\sigma} \right) \right\}$$

where $\Phi(\cdot)$ is the standard cumulative normal; $j \in C$ denotes observations with observed point data y_j^* ; $j \in L$ and $j \in R$ denote observations which are left censored and right censored respectively; and observations $j \in I$ are intervals for which we only know that the unobserved y_j^* is in the interval $[y_{1j}, y_{2j}]$ (Stata Reference S-Z version 8, 2003).

and post-policy period) for each observation. Since negative predicted hours in fact imply zero working hours, these are recoded to zero. Second, we calculate the difference in predicted hours between pre- and post-policy periods for the treatment and control state separately. Then the treatment effect is the difference in the average change between the two states.

For binary outcome variables, such as an employment dummy (1=employed and 0=not employed), the probit model is applied:

$$prob(y = 1) = \int_{-\infty}^z [(2\pi)^{-1/2} \exp(-v^2 / 2)] dv, \quad \text{where } z = X\beta + \varepsilon \quad (3)$$

The policy effects are calculated using the difference-in-difference predicted probability of being in the outcome state (for example, employed) for each observation, holding all characteristics the same, but varying the group to which they belong (treatment or control group, and pre- or post-policy period). The difference-in-difference predicted effect resulting from belonging to a particular group on the probability of being in a particular outcome state is averaged across all observations.

Conventional regression is applied under the assumption that there is no self-selection into the treatment group. Since the treatment group is defined by the age of the youngest child, we expect that the self-selection problem is not severe. However, it is expected that younger sole parents are more likely to be in the treatment group as they are more likely to have children under 16 years of age. This is a type of selection into treatment (although it is by nature). Another potential sample selection problem arises from the “decision-making” process of being a sole parent. That is, those who are able to support themselves (by having a job or being eligible for sole parent pension) are more likely to separate from their partners if their marriage encounters problems. To correct for selection into treatment caused by observables, we apply matching difference-in-difference estimators (Blundell *et al.*, 2001).

When the matching difference-in-difference approach is used, the treatment group in 2001 is matched with the treatment group in 1996 and with the control groups in 1996 and 2001 separately. That is, the matching estimator that matches the non-treated to the treated is applied three times. The sole parents whose youngest child is aged under 16 in

2001 are regarded as the treated ($D=1$). The group of sole parents whose youngest child is aged 16 or over in 2001 is the non-treated or control group ($D=0$) for the first matching, and the treatment and control groups in 1996 are regarded as the non-treated for the second and third matching. The matching difference-in-difference outcome is calculated by differencing the mean outcome for the treated and the weighted mean of matched non-treated from the first matching. From this, the difference between the weighted means of the non-treated from the second and the third matching is subtracted. The difference-in-difference mean matched outcomes are then considered to be the treatment effect.

A formal mathematical description of this matching difference-in-difference estimation method is:

$$Effect = (1/n) \left\{ \sum_{i \in D=1} [Y_{pi} - \sum_{j \in D=0} w_1(i,j)Y_{w1j} - \sum_{j \in D=0} w_2(i,j)Y_{w2j} + \sum_{j \in D=0} w_3(i,j)Y_{w3j}] \right\} \quad (4)$$

Where n is the number of treated observations; D is the indicator for treated and non-treated; $w_1(i,j)$, $w_2(i,j)$ and $w_3(i,j)$ are the weights placed on the j^{th} potential non-treated group observation in constructing a comparison for the i^{th} treated observation in the first, second and third matchings; Y_{pi} is the outcome for the i^{th} treated observation; and the j^{th} non-treated group observation for the first, second and third matchings are denoted as Y_{w1j} , Y_{w2j} and Y_{w3j} .

Different matching algorithms can be applied to generate the weights for the matched control groups in the above equation (for a detailed discussion, see Smith and Todd, 2004). We use local linear matching as the basic procedure (for reasons outlined below) and, in addition, apply two alternative matching algorithms—nearest neighbour matching and calliper matching— as a sensitivity analysis. All three matching algorithms match treated and non-treated observations based on the estimated propensity score of being treated. The propensity score indicates the probability of being treated, which is estimated using a probit equation. In this paper, linear predictions from a probit equation instead of the normal distribution transformed propensity score are used.⁸ The functional form of the propensity score estimation is determined based on the results of a balancing test (see

⁸ For detailed steps of these matching procedures, see Borland and Tseng (2003).

Dehejia and Wahba, 1999, 2002; or Smith and Todd, 2004). The non-treated observations can be used as counterfactuals to multiple treatment observations, which is often called “matching with replacement” in the literature.

In nearest neighbour matching, the weights are defined as:

$$w(i, j) \in \{0, 1\}; \text{ and}$$

$$w(i, k) = \begin{cases} 1, & \text{if } |X_k \beta - X_i \beta| = \min(|X_j \beta - X_i \beta|), \forall j = 1, 2, \dots, J \\ 0, & \text{otherwise} \end{cases} \quad (5)$$

That is, the weight of a non-treated observation for a given treated observation equals one, if the distance between its propensity score and the propensity score of the treated observation is the shortest among all non-treated observations, otherwise the weight is zero.

In calliper matching, the weights are defined as

$$w_m(i, j) = G_m^{ij} / \left[\sum_{j \in \{D=0\}} G_m^{ij} \right]; \text{ and}$$

$$G_m^{ij} = G[(X_i \hat{\beta}_m - X_j \hat{\beta}_m) / a_{95\%}]; \quad m=1, 2, \text{ and } 3 \quad (6)$$

where G_m^{ij} is the kernel for the i^{th} treated and the j^{th} non-treated observations for the m^{th} matching, $X_i \hat{\beta}_m$ and $X_j \hat{\beta}_m$ are linear predicted propensity scores for the respective treated and non-treated observations in the matching sample, and $a_{95\%}$ represents the use of a 95 per cent confidence interval bandwidth around $X_i \hat{\beta}_m$ (this interval is called the calliper). In this approach, the biweight kernel is used. In other words, only non-treated observations falling within the 95 per cent confidence interval of a treatment observation are included to calculate the weighted average matched outcome for that treatment observation.

Our procedure of local linear matching is based on Heckman *et al.* (1997, p.631). The approach is as follows: (i) Regress Y on P (where Y = the outcome and P = the predicted propensity score) for the non-treated group in the calliper for the treated observation j; (ii) Use the regression result and the value of P (for a treated observation j) to predict Y (denoted Y_p); (iii) Use $Y - Y_p$ as the treatment effect for observation j in the treatment

group. In this study, we use LP (the linear prediction $X_i\hat{\beta}_m$ from a probit model) instead of P. For the outcome measures of employment and full-time employment, a probit model is used to account for the binomial outcome; and for the outcome measure of working hours, an OLS regression is applied.⁹

Comparing the three matching algorithms, the nearest neighbour matching approach approximates the treated observation's counterfactual by the outcome of the closest non-treated observation. A problem could arise from the fact that the nearest neighbour of the treated observation may not be the true nearest neighbour, because the propensity score is an estimated value with a standard error attached to it. Moreover, outcomes may vary across observations with the same characteristics. The calliper matching, therefore, incorporates all outcomes of non-treated observations whose propensity scores are within the 95 per cent confidence interval of the treated observation's propensity score. Although a kernel weight is applied to take into account the distance between treated and non-treated observations' propensity scores, there is a trade-off between minimising differences and minimising the possible errors. Local linear matching is a modified version of calliper matching. The idea is to take into account the possible correlation between the propensity score and the outcome. Since it is possible that all matched non-treated observations' propensity scores are smaller (or larger) than the treated observation's propensity score, the weighted average of outcomes of the non-treated observations would be biased if outcomes are correlated with the propensity scores. If this is the case, the weighted average of outcomes would need to be adjusted. This has been addressed in the local linear matching approach.

The three different matching methods are all consistent, that is they converge to the results of exact matching (match exactly on characteristics) as the sample size grows (Smith, 2000). However, they may provide different results in a small sample. There is no easy rule that determines which matching method is superior.

⁹ We did not use interval regression for two reasons: 1) the number of control observations that fall into the callipers of some treatment observations is small, thus interval regression may not be suitable; and 2) interval regression is much more demanding than OLS in terms of computation time, which would increase the already considerable amount of time required to apply the local linear matching approach.

The matching estimator, irrespective of the type of matching algorithm that is used, relies on a conditional independence assumption (CIA). That is, conditional on a set of observable factors or propensity scores, the treatment participation is unrelated to the outcomes in the absence of treatment. Unfortunately, this assumption cannot be tested due to the missing counterfactuals. The plausibility of the CIA is usually justified through the richness of the data. Although the data available in the Census are not as rich as we would like them to be, it is unlikely to be a serious problem because the treated and non-treated groups are not compared directly. Instead, the matching difference-in-difference approach is used to difference out the effect of the youngest child's age and any effects from the business cycle. It is expected that the treated and non-treated groups have different outcomes even if we could condition on a rich set of characteristics, because either the age of their youngest child, the time period or both age of the youngest child and time period are different. However, the change in outcomes is expected to be the same for treatment and control group in the absence of treatment.

We consider the matching difference-in-difference method as our main approach for the reason that the matching is a semi-parametric method. It avoids imposing the functional form restrictions implicit in a linear regression. Smith and Todd (2004) suggest that avoiding these functional form restrictions can be important in reducing bias. However, the results of regressions could be improved by adding higher-order terms and interaction terms.

Another key difference between the matching and regression approach is that matching highlights the “common support” problem. This is the problem that for some treatment group observations no non-treated observation, with a close enough propensity score to be a match, can be found.¹⁰ When the support problem exists, matching produces results for those treated observations with analogues only (that is, treated observations without analogues are dropped). This is different from the results obtained from the regression approach where the common support problem is ignored (Smith, 2000). Although matching cannot solve the support problem, but only highlights it, it is still preferred because the results generated from poor matches are not meaningful. Therefore it is better

¹⁰ It is not important that some observations in the non-treated group cannot be matched because the parameter of interest is the effect of treatment on the treated.

to have clean but restricted results rather than the results obtained by averaging over good and bad matches.

It can be difficult to deal with the support problem in the comparison of the matching difference-in-difference estimator with simple matching, because different treated observations may encounter this support problem in the three different matching approaches. Thus, different observations might be dropped in the three approaches. This would make it difficult to interpret the results and require a different approach to reduce the sample to observations with common support in all three approaches. Fortunately, the samples used in this paper do not suffer from this support problem.

Summarising the discussion in this subsection, for this specific evaluation task, matching difference-in-difference approaches are preferred over regression. Although the common support problem is negligible due to the similarity between treatment and control group, the semi-parametric nature of matching approach is better at handling the possible heterogeneous treatment effects across individuals. Of the different matching algorithms, local linear matching is preferred, because it takes into account most of the problems that could occur. In nearest neighbour matching, only one individual from the control group is matched to the individual from the treatment group. As a result, the approach is more likely to suffer from estimation or measurement errors. Calliper matching overcomes this problem by matching all individuals from the control group within a certain distance to the individual from the treatment group, but unlike local linear matching, it does not correct for potential correlation between propensity scores and the outcomes.

In the separate estimation for the subsamples by age and education, however, calliper matching is preferred. Due to the smaller size of these subsamples, some treatment observations have very few (less than 10) control observations in their matching groups (see appendix table J3 for the distribution over matching group sizes). As mentioned, local linear matching approximates the counterfactual outcome of a treatment observation by the predicted outcome based on the regression of outcomes on propensity scores for matched control observations. When the number of matched control observations is small, this regression can be problematic and may generate unrealistic out of sample predictions.

5.4 Results

Table 13 shows the difference-in-difference estimates of policy effects in the form of changes in four different outcome measures. These are the participation rate, the employment rate, the full-time employment rate and average working hours. It is important to bear in mind that these effects only apply to sole parents whose youngest child is aged 14 or 15 years. The policy changes may have had different effects for sole parents with children younger than 14 years.

The first two rows in the table are calculated from the means of the treatment and control populations.¹¹ The sample size in the SIHC is too small (around 60 observations for each year), to obtain reliable results. We therefore focus on the results of the Census. Without taking into account the differences in individuals' characteristics and just comparing the outcomes observed in the raw data, the policy change increased the participation rate by 6.3 percentage points. The employment rate and full-time employment rate were raised by 2.5 and 2.6 percentage points respectively and this translated into an increase in average working hours by 1.7 hours.

After conditioning on individuals' characteristics, the estimates still show a positive policy effect although this is statistically insignificant, irrespective of the estimation method used. In terms of the magnitude of the effect for a given measure, it varies across the different methods but not to a large extent, except for the participation rate when this is estimated using nearest neighbour matching. For our sample, controlling for differences in individuals' characteristics does not change the magnitude of the effects much, except for the full-time employment rate measure. The effect measured by the change in full-time employment rate increases from 2.6 percentage points, as derived from the raw data, to 5.9 percentage points (using local linear matching) after controlling for the individuals' characteristics. This may be due to a change in the characteristics of individuals who work full-time from the earlier to the later sample, whereas the composition of individuals in other labour status categories may have remained more stable.

¹¹ The sample of the treatment group in the SIHC includes only sole parents whose youngest child is 15 years old. See Section 5.2 for a detailed discussion.

Table 13: Estimated effect of the policy changes

	In labour force (%)	Employed (%)	Full-time employed (%)	Working hours
<i>difference-in-difference of the means (without conditioning on characteristics)</i>				
raw data (census)	6.320	2.456	2.618	1.700
raw data (SIHC)	-10.868	-26.424	-28.462	-1.258
<i>Estimated effects from difference-in difference estimators</i>				
Local linear matching	6.281 (4.344)	2.184 (4.847)	5.896 (5.081)	2.418 (2.682)
Calliper matching	5.369 (4.129)	1.845 (4.626)	5.02 (4.712)	2.425 (1.907)
Nearest neighbour matching	1.549 (6.157)	3.897 (7.377)	6.116 (7.396)	3.450 (3.050)
Regressions (interval and Probit)	6.695 (3.823)	2.970 (4.321)	3.392 (4.410)	2.192 (2.017)

Notes: 1. Standard errors in parentheses are obtained through a bootstrapping approach with 400 replications.

2. For the binary outcome variables, the policy changes are presented as changes in percentage points in the proportion employed, full-time employed and not in labour force.

3. See appendix J for the coefficients of the probit and interval estimation. The results of the propensity score probit model estimation are available from the authors on request.

Table 14 presents the policy effects by educational attainment and age. The results were estimated by applying the calliper difference-in-difference method separately for different target groups. The table indicates that there is heterogeneity in policy effects across the groups. The policy change has a significant positive effect on the participation rate of sole parents without post-school qualifications but a negative (insignificant) effect for those with post-school qualifications. The effect on the employment rate for the lower educational group is also fairly large, almost 9 percentage points and it is close to being significant at the 10 per cent level. However, at the same time as the decrease in the overall employment rate, the full-time employment rate for those with qualifications increased by 8.3 percentage points, which implies that more highly educated individuals shifted from part-time to full-time work after the policy changes.

Table 14: Estimated effect of policy changes using calliper matching by subgroups

	In labour force (%)	Employed (%)	Full-time employed (%)	Working hours
<i>By education:</i>				
with post school qualification	-4.600 (5.480)	-5.707 (6.444)	8.336 (7.409)	1.601 (2.913)
without post school qualification	12.487 (5.682)	8.956 (6.140)	4.000 (6.505)	3.802 (2.522)
<i>By age:</i>				
younger than 45 years	4.261 (5.423)	1.984 (6.516)	11.046 (6.954)	3.555 (2.706)
45 years or older	11.078 (6.212)	6.060 (6.380)	2.961 (6.390)	2.998 (2.564)

Overall, sole parents without qualifications have a larger positive response to the policy changes than those with qualifications and this is also reflected in the larger increase in their average working hours. This may be due to the fact that individuals without qualifications have lower incomes and are therefore more likely to be on welfare, which means the policy changes are more relevant to them. Moreover, a large proportion of those with qualifications were already in the labour force before the policy change, which makes it more difficult to raise the participation rate further and, in addition, the income effect resulting from the reduction in METRs may become more dominant than the substitution effect for this group.

The bottom two rows of Table 14 show that the average effects are all positive for both age groups. The larger positive effects are on the full-time employment rate for younger sole parents and on the participation rate for older sole parents. For sole parents who are aged 45 or above, the effect on the participation rate is 11.1 percentage points, while the effect on the employment rate is much lower, at 6.1 percentage points. The effect on the full-time employment rate is even smaller. A possible explanation for this could be that even though the policy change seems to increase their incentive to look for work, it may be more difficult for older sole parents to get a job, since they are likely to have been out of the labour market for longer and obtaining a job can be more difficult for people over a certain age anyway.

6 Comparison of the Two Approaches for Sole Parents

In the previous section, post-reform evaluation methods were used to assess the effect of the ANTS package for sole parents. This provides us with the opportunity to compare the predictions from microsimulation with an evaluation based on pre- and post-reform data. This can be used to validate results from behavioural microsimulation modelling, which have the advantage of being available before the actual introduction of a new policy. This means they have the potential of being used in the development of new policies. However, to be used in such a way requires a certain amount of confidence in the results.

In the previous section, it was determined for which group of the population we could compare the outcomes from the alternative approaches. Here, sole parents with a youngest child of 14 or 15 years old, who are still eligible for Parenting Payment Single, (the treatment group) were compared to sole parents with a youngest child of 16 or 17 years old, who are no longer eligible for this payment (the control group). The assumption is that these two groups are fairly comparable (see Table 12 in the previous section). This allows us to examine the change in labour force participation and average hours worked for the treatment and control groups before and after the introduction of the ANTS package and use the difference in change for these two groups as a measure of the policy effect.

As discussed in the previous section, several issues could affect the outcome and the method hinges on finding a suitable control group. Therefore, we do not extrapolate the results to sole parents with a youngest child under 14 years of age because there would not be an appropriate control group for them. Given the relatively small subgroup, we need a large enough sample to get decent-sized treatment and control groups. Therefore, the SIHC could not be used for this purpose. Given the comparison over time of two similar groups where the members in principle only differ with regard to their eligibility for Parenting Payment Single, the differences between these two groups only reflect the reduction of the pension taper rate and differences between the relative changes in income support payments and family payments for children under 16 and for children 16 years of age or over.

Table 15 presents the different results from MITTS for the relevant subgroup of sole parents in the SIHC 1999/2000. The subgroup in the first panel of the table consists of 51 sole parents only. For this reason, we confirmed the results by simulating the effect of the full ANTS package backwards as well, starting from the SIHC 2000/2001. This gives similar results to the forward simulation, providing more confidence in the results for this small sample.

Table 15 Summary of labour supply responses for sole parents

	Full ANTS package	Full ANTS backward simulation	Decrease in pension rate	All changes except income tax changes
with a youngest child of 14 or 15 years old				
all workers (%base)	61.18	66.26	61.18	61.18
Wage & salary workers (%base)	58.87	56.54	58.87	58.87
Wage & salary workers (%post)	62.75	53.77	61.43	59.37
non-work-->work (%)	3.88	0.96	3.06	2.47
work-->non-work (%)	0.00	3.73	0.51	1.98
workers working more	2.74	0.58	0.26	1.96
workers working less	0.59	3.18	1.76	1.31
average hours change	2.27	-1.55	0.49	0.56
with a youngest child of 16 or 17 years old				
all workers (%base)	67.52	78.29		67.52
Wage & salary workers (%base)	59.68	64.24		59.68
Wage & salary workers (%post)	57.86	65.41		55.90
non-work-->work (%)	0.00	1.27		0.00
work-->non-work (%)	1.82	0.09		3.78
workers working more	4.36	0.32		1.93
workers working less	0.00	1.23		0.03
average hours change	-0.20	0.23		-1.30

In addition, simulation of some components of the ANTS package was done separately. First, the effect of the decrease in pension rate is examined in isolation, given that this was relevant for the treatment group but not for the control group in the previous section. The effect of this is much smaller than the effect of the full package.

It is difficult to do the exact simulation that would represent the same change as measured by the evaluation study, given that for both the control and treatment group, family payments are likely to have changed, but to a different extent as have the relative levels of the different income support payments. Therefore, we also looked at the effect of all changes except for the income tax changes (the base system was the January 2000

system and the reform system was the July 2000 system with the income tax left at the January 2000 level). This effect is still much smaller than the overall change. The true policy effect measured by the evaluation is in between the decrease in pension rate alone and the effect of all changes minus the income tax change. Given that some of the family payment changes had a large negative impact on the labour supply, the true effect may be larger than the two results in Table 15.

Although it is difficult to replicate the exact policy change implied by the comparison in the evaluation approach in Section 5, we can compare the simulation results for the group of sole parents with a youngest child of 14 or 15 years old with the results for the group of sole parents with a youngest child of 16 or 17 years old. This provides an indication of how similar the difference in predicted changes by the microsimulation model is to the observed relative changes after the reform. Given the small sample size for sole parents, both forward (29 observations) and backward (39 observations) simulations are presented. The same simulations as for the group with younger children are carried out (except of course the reduction in the pension taper rate). The results are presented in the lower panel of Table 15. It is clear that the overall effect for this group is much smaller than for the group of sole parents with younger children, and it is slightly negative.

For each of the simulations, we can calculate the same measures as used in the evaluation approaches, except for the separate labour force participation. Table 16 compares the results from the different MITTS simulations with the results from local linear matching in the previous section. In addition, the difference in simulation results for sole parents with a youngest child of 14 or 15 years old versus sole parents with a youngest child of 16 or 17 years old is calculated and presented in the two rows in italics. The results in these rows are very close to the results from local linear matching, except that a lower probability of full-time employment and a higher probability of part-time employment are predicted. The latter might be due to a limited number of part-time jobs being available; that is, even if some sole parents prefer a part-time job they may not be able to find one and decide not to participate in the labour force or work full-time.

Table 16 shows that the results from the simulation and evaluation approaches are in the same direction and if anything, the results from microsimulation appear to be on the

conservative side. A concern with behavioural microsimulation is usual that it may overestimate the actual effect. None of the results from the differences-in-differences matching approaches for the complete sample are significant, but there are some significant effects for subgroups such as sole parents without post-school qualifications or sole parents separated by being aged under or over 45 years.

Table 16 Comparison of the estimated effect for sole parents with a youngest child of 14 or 15 years old

Change in:	Average hours (in hours)	Probability of employment (in %-points)	Probability of full-time emp. (in %- points)
Local Linear Matching	2.4	2.2	5.9
Simulation of reduction in pension rate	0.5	2.6	-0.2
Simulation of all changes except income tax changes (a)	0.6	0.5	1.4
Simulation of all changes except income tax changes for sole parents with youngest child of 16 or 17 (b)	-1.3	-3.8	-1.9
<i>Difference in effect of all changes except income tax changes (a – b)</i>	<i>1.9</i>	<i>4.3</i>	<i>3.3</i>
Simulation of full ANTS package (c)	2.3	3.9	5.5
Simulation of full ANTS package for sole parents with youngest child of 16 or 17 (d)	-0.2	-1.8	0.2
<i>Difference in full effect (c – d)</i>	<i>2.5</i>	<i>5.7</i>	<i>5.3</i>

7 Conclusion

The first aim of this paper is to examine the incentive effects from the current system. Given that at the time of writing the structure of the current system is still very similar to the ANTS package as it was introduced in July 2000, we use the July 2000 system to evaluate the incentives faced by sole parents and partnered mothers in different circumstances. METRs for mothers at different wage rates and with a different family composition are examined across a range of labour supply from 0 hours per week to 50 hours per week. For married mothers, the husbands' income and labour force participation is varied as well. From this, we conclude that, although the ANTS package has reduced the most extreme METRs in place before July 2000, there are considerable hours ranges for the different groups where the METR is still over 70 per cent, in

particular for married mothers. Among the group of married mothers, METRs seem especially high for mothers married to an unemployed husband.

Similar to Gregory *et al.* (2003), we conclude that METRs are still high; however, we do believe they have improved considerably for large ranges of income. Even if these are not incomes at which the majority of mothers are located, they could improve incentives by making alternatives to non-participation more attractive. We also agree that the income tax changes are unlikely to have had a very large effect on incentives, but by including sole parents and married mothers who are not on income support in our analysis, we conclude that these changes are more relevant than they appear to be from Gregory *et al.* (2003).

The simulation results (obtained using MITTS) with regard to the effect of the ANTS package are similar to the earlier simulation results by Kalb *et al.* (2003), which were based on older data. The effect for sole parents is somewhat larger than in the previous study and that of married mothers is slightly smaller, but both effects are still positive. The increase for sole parents may have been caused, at least partly, by the substantial increase in sole parents, who are now working for wages or salaries, given that in particular the percentage of “workers working more” increased compared to the earlier results. The expected changes are highest for women with children of school age, who themselves are in between 30 and 40 years old, and for women with fewer dependent children. Differences in the effect for women of different education levels appear to be ambiguous. Comparing the effects of separate components of the ANTS reform, we find results that are very similar to the earlier results, for each of the components. In the current study, sole parents are predicted to have slightly higher effects when the expected response is positive and slightly lower effects when the expected response is negative, compared to the earlier study. Similar to the earlier results, we find that the change in Family Tax Benefit part A had a relatively large positive impact on sole parents’ labour supply, confirming the observation by Gregory *et al.* (2003) that almost all income and work incentive changes flowed from the changed taper rates and base rate of Family Tax Benefit part A. However, at the same time the changes to Family Tax Benefit part B had a large negative effect on the labour supply of sole parents, which again is similar to what was found before. The negative effect for sole parents is likely to have been caused by

the replacement of a rebate, which could only be received while paying tax (for which most sole parents would need to be employed), by additional fortnightly payments to all sole parents. As a result being out of the labour force has become more attractive.

For a subgroup of sole parents, an evaluation study was carried out to compare the results of an alternative approach with the simulation results. Although none of the effects was significant for the overall group of sole parents with a youngest child of 14 or 15 years old, some significant effects were found when this sample was separated by age of the mother or education level of the mother. In addition, the point estimates for the effects on average hours, probability of employment and the probability of full-time employment (in particular, when using the most rigorous approach of local linear matching) are remarkably close to the results found for the same subgroup of sole parents through microsimulation using MITTS. The evaluation approach resulted in slightly larger effects than the effects predicted by MITTS except for the results on the probability of part-time employment, which was higher in the simulation. The latter might be due to a relatively low number of part-time jobs that is available.

Similar conclusions were drawn by Doiron (2004). When she compared the results from her evaluation study of the late 1980s changes to payments for sole parents to the effects of comparable changes to the tax and transfer system as calculated by MITTS, she found that the evaluation seemed to estimate similar but somewhat larger effects than behavioural microsimulation had done for comparable hypothetical policy changes.

After these analyses, we are somewhat more positive about the incentive effects of the ANTS package for sole parents than Gregory *et al.* (2003) are. We suspect that this is partly due to the inclusion of mothers who are not on income support as they are likely to benefit more from the income tax changes and some of the family payment changes. We find both from behavioural microsimulation and from a difference-in-difference matching evaluation, that there is a considerable increase in employment and in full-time employment in particular, indicating that some of the part-time workers seemed to be motivated to prefer to change to full-time employment. The effects found are not enormous, but the policy changes seemed to have had some modest positive effects on labour supply.

References

Blundell, R. and Costa Dias, M. (2000), "Evaluation Methods for Non-Experimental Data", *Fiscal Studies*, vol. 21, no. 4, pp.427-468.

Blundell, R., Costa Dias, M., Meghir, C. and Van Reenen, J. (2001), "Evaluating the employment impact of mandatory job-search assistance: the UK New Deal Gateway", WP01/20, Institute for Fiscal Studies.

Borland, J. and Tseng, Y. (2003), "How do administrative arrangements affect exit from unemployment payments? The case of the Job Seeker Diary in Australia", *Melbourne Institute Working Paper* no. 27/03.

Creedy, J., Duncan, A.S., Harris, M., and Scutella, R. (2002) *Microsimulation Modelling of Taxation and The Labour Market: The Melbourne Institute Tax and Transfer Simulator*. Cheltenham: Edward Elgar.

Creedy, J. and Kalb, G. (forthcoming), "Discrete Hours Labour Supply Modelling: Specification, Estimation and Simulation", forthcoming in *Journal of Economic Surveys*.

Dehejia, R. and S. Wahba (1999), "Causal effects in nonexperimental studies: Reevaluating the evaluation of training programs", *Journal of the American Statistical Association*, 94, 1053-1062.

Dehejia, R. and S. Wahba (2002), "Propensity score matching for nonexperimental causal studies", *Review of Economics and Statistics*, 84, 151-161.

Doiron, D.J. (2004), "Welfare Reform and the Labour Supply of Lone Parents in Australia: A Natural Experiment Approach", *The Economic Record*, 80(249), 157-176.

Gregory, R.G., Klug, E., and Thapa P. (2003) "Lone Mothers Work and Welfare, An Assessment of the July 2000 Tax and Welfare Reforms", Paper prepared for the Social Policy Evaluation and Analysis Centre, Research School of Social Sciences, Australian National University.

Heckman, J., Ichimura, H. and Todd, P. (1997), "Matching as an econometric evaluation estimator", *Review of Economic Studies*, 64, 605-654.

Kalb, G., H. Kew and R. Scutella (2003), "Effects of the Australian New Tax System on Government Expenditure; With and Without Behavioural Changes". Melbourne Institute Working Paper Series, WP No. 9/03, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne.

Smith, J. (2000), "A Critical Survey of Empirical Methods for Evaluating Active Labor Market Policies," *UWO Department of Economics Working Papers 20006*, University of Western Ontario, Department of Economics.

Smith, J and P. Todd (2004), "Does matching overcome Lalonde's critique of nonexperimental estimators?" forthcoming, *Journal of Econometrics*.

StataCorp. (2003), *Base References Manual*, Volume 4 S-Z, Release 8.0, College Station, TX: Stata Corporation.

Wooldridge J. (2001), *Econometric Analysis of Cross Section and Panel Data*, the MIT Press, Cambridge, Massachusetts London, England.

Appendix A: Details of the tax and social security system

Table A.1 Taxation rates

1999/2000		2000/2001	
Income range in \$ per week	Tax rate	Income range in \$ per week	Tax rate
0 – 103.56	Nil	0 – 115.07	nil
103.57 – 396.99	0.20	115.08 – 383.56	0.17
397.00 – 728.77	0.34	383.57 – 958.90	0.30
728.78 – 958.90	0.43	958.91 – 1150.68	0.42
More than 958.90	0.47	More than 1150.68	0.47

Table A.2 Medicare levy

1999/2000		2000/2001	
If income is more than (in \$ per week)	Levy rate	If income is more than (in \$ per week)	Levy rate
256.78 (single)	1.5%	265.18 (single)	1.5%
433.31+40.27×nr of children (family)	1.5%	447.48+40.27×nr of children (family)	1.5%
Shade-in percentage	20%	Shade-in percentage	20%
958.90 for singles, additional Medicare levy ^a	1.0%	990.27 for singles, additional Medicare levy ^a	1.0%
1917.81 + 28.77×(nr of children –1) for families, additional Medicare levy ^a	1.0%	1980.54 + 28.77×(nr of children –1) for families, additional Medicare levy ^a	1.0%
No shade in		No shade in	

Note a) additional Medicare levy is only payable for those who do not have private health insurance.

Table A.3 Family Assistance

January 2000		July 2000	
For all families with children			
<i>Family Allowance</i>		<i>Family Tax Assistance part A</i>	
Minimum rate per week ≤ 3 children	\$12.00	Minimum rate per week	\$18.69
		Minimum rate per week (18 to 24 yr old)	\$25.06
Large family supplement for fourth and each subsequent child	\$3.95	Large family supplement for fourth and each subsequent child	\$4.00
Maximum basic rate per week for 0-12 yr old	\$50.80	Maximum basic rate per week for 0-12 yr old	\$58.10
Maximum basic rate per week for 13-15 yr old	\$66.10	Maximum basic rate per week for 13-15 yr old	\$73.64
Maximum basic rate per week for 16-17 yr old	\$12.00	Maximum basic rate per week for 16-17 yr old	\$18.69
Maximum basic rate per week for 18-24 yr old	\$25.00	Maximum basic rate per week for 18-24 yr old	\$25.06
Minimum rate payable for annual income below	$\$67,134 + \$3,359 \times$ (number of children - 1)	Minimum rate payable for annual income below	$\$73,000 + \$3,000 \times$ (number of children - 1)
Maximum rate payable for annual income below	$\$23,800 + \$624 \times$ (number of children - 1)	Maximum rate payable for annual income below	\$28,200
Taper rate for minimum rate	“Sudden death”	Taper rate for both payments	0.3
Taper rate for more- than-minimum rate	0.5		
<i>Family Tax Payment part A</i>			
Rate per child per week	\$3.85		
Payable to families receiving the	More-than- minimum Family Allowance		
<i>Family Tax Initiative part A</i>			
Tax free threshold increases by	$\$1,000 \times$ number of dependent children		
For families with income less than	$\$70,000 + \$3,000 \times$ (number of children - 1)		

Table A.3: continued

<i>For single-income families with children</i>		<i>Family Tax Assistance part B</i>	
<i>Basic Parenting Allowance</i>			
Maximum rate per week if youngest is <16 yrs old	\$33.10	Maximum rate per week if youngest child 5-18 yrs old	\$34.79
		Maximum rate per week if youngest child 0-4 yrs old	\$49.91
Maximum rate payable to second earners with weekly income of less than	\$30.00	Maximum rate payable to all sole parents or second earners with annual income of less than	\$1616.00 (per week: \$31.08)
Taper rate	0.5 (up to \$70) 0.7 (over \$70)	Taper rate	0.3
<i>Family Tax Payment part B (with child under 5 years)</i>			
Maximum rate per week per family with a 0-4 yr old	\$9.62		
Payable to all sole parents			
Payable to second earners with weekly income below	\$87.90		
<i>Family Tax Assistance part B (with child under 5 years)</i>			
Tax free threshold for family with a 0-4 yr old increases by	\$2500		
Payable when second earner's annual income less than \$4573 and household income less than	\$65,000+ \$3000×(number of children – 1)		
<i>Guardian Allowance</i>			
Maximum rate per week per family	\$18.35		
Payable to sole parents who	get more-than-minimum Family Allowance		
<i>Dependent Spouse Rebate (with children)</i>			
Maximum rate per year	\$1452		
Maximum rate payable for spouse with children under 16 years and annual income below	\$282		
Taper rate	0.25		
<i>For single-income families with children</i>			
<i>Sole Parent Rebate</i>			
Maximum rate	\$1243		

Table A.4 Weekly allowances

January 2000		July 2000	
Maximum rate single	\$163.35	Maximum rate single	\$172.45
Maximum rate sole parent/ single 60 years or older	\$176.70	Maximum rate sole parent/ single 60 years or older	\$186.50
Maximum rate couple (per person)	\$147.35	Maximum rate couple (per person)	\$155.50
Free area for income below	\$30.00	Free area for income below	\$31.00
Taper rate of 0.5 for income below	\$70.00	Taper rate of 0.5 for women on parenting allowance partnered (with children under 16 years) with income below	\$121.50
		Taper rate of 0.5 for all others for income below	\$72.00
Taper rate of 0.7 for income over	\$70.00	Taper rate of 0.7 for women on parenting allowance partnered (with children under 16 years) with income over	\$121.50
		Taper rate of 0.7 for income over	\$72.00
<i>Youth allowance (for 16-20 yr olds and 16-24 yr old students)</i>			
Maximum rate for 16-17 yr olds (live at home)	\$74.00	Maximum rate for 16-17 yr olds (live at home)	\$76.95
Maximum rate for 18-20 yr olds (live at home)	\$88.95	Maximum rate for 18-20 yr olds (live at home)	\$92.50
Maximum rate for 16-20 yr olds (live away/student/couple)	\$135.15	Maximum rate for 16-20 yr olds (live away/student/couple)	\$140.55
Maximum rate for 16-20 yr old singles with children	\$177.05	Maximum rate for 16-20 yr old singles with children	\$184.15
Maximum rate for 16-20 yr old couples with children	\$148.40	Maximum rate for 16-20 yr old singles with children	\$154.35
Free area for income below (students)	\$115.00	Free area for income below (students)	\$118.00
Free area for income below	\$30.00	Free area for income below	\$31.00
Taper rate of 0.5 for income below (students)	\$155.00	Taper rate of 0.5 for income below (students)	\$159.00
Taper rate of 0.5 for income below	\$70.00	Taper rate of 0.5 for income below	\$71.00
Taper rate of 0.7 for income over (students)	\$155.00	Taper rate of 0.7 for income over (students)	\$159.00
Taper rate of 0.7 for income over	\$70.00	Taper rate of 0.7 for income over	\$71.00

Table A.5 Weekly Pensions and Parenting Payment Single

January 2000		July 2000	
Maximum rate single	\$183.25	Maximum rate single	\$193.45
Maximum rate couple (per person)	\$152.95	Maximum rate couple (per person)	\$161.45
Free area for income below (singles)	\$51.00+\$12.00×nr of children	Free area for income below (singles)	\$53.00+\$12.30× nr of children
Free area for income below (couples)	\$90.00+\$12.00×nr of children	Free area for income below (couples)	\$94.00+\$12.30× nr of children
Taper rate of 0.5 for income over	Free area	Taper rate of 0.4 for income over	Free area

Appendix B: Budget constraints and METRs for sole parents

Figure 1a: Budget constraint –sole parents with 1 child aged less than 13, wage rate \$10 and rent \$110/wk

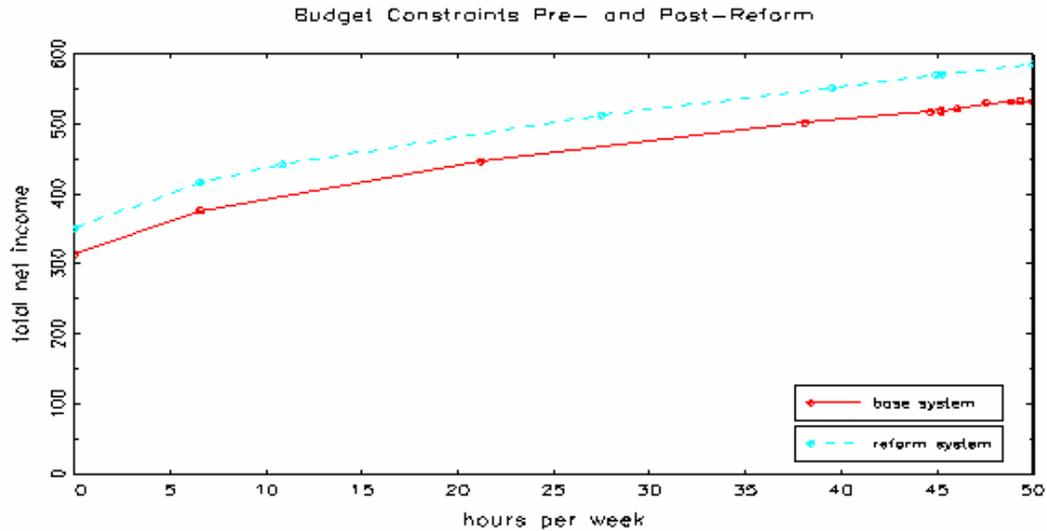


Figure 1b: METR –sole parents with 1 child aged less than 13, wage rate \$10 and rent \$110/wk

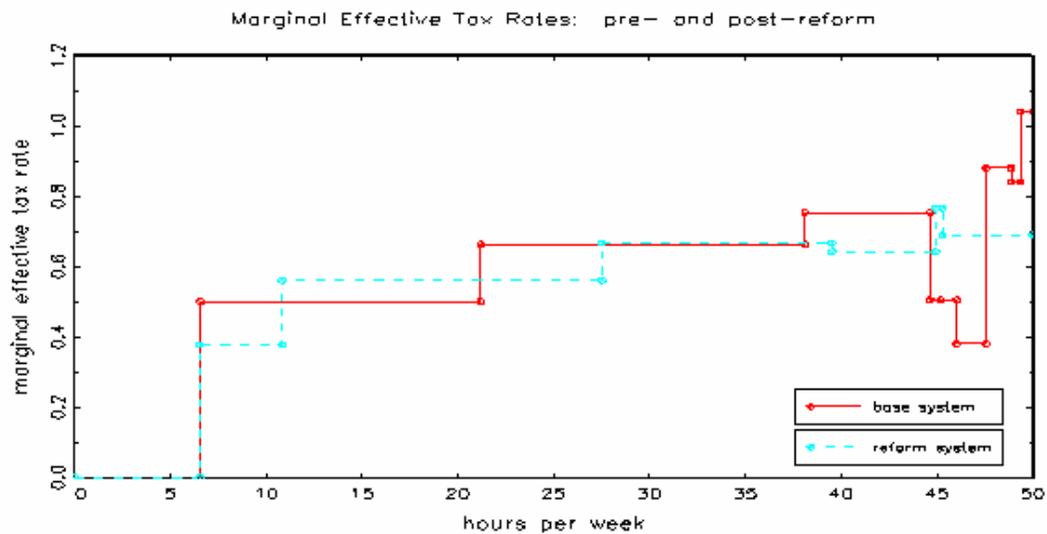


Figure 2a: Budget constraint –sole parents with 1 child aged less than 13, wage rate \$15 and rent \$110/wk

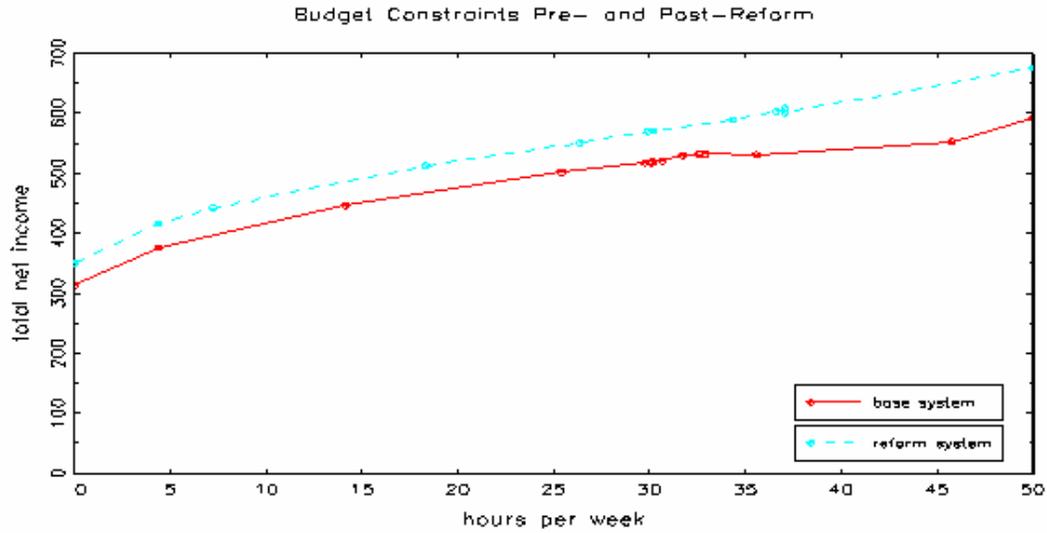


Figure 2b: METR –sole parents with 1 child aged less than 13, wage rate \$15 and rent \$110/wk

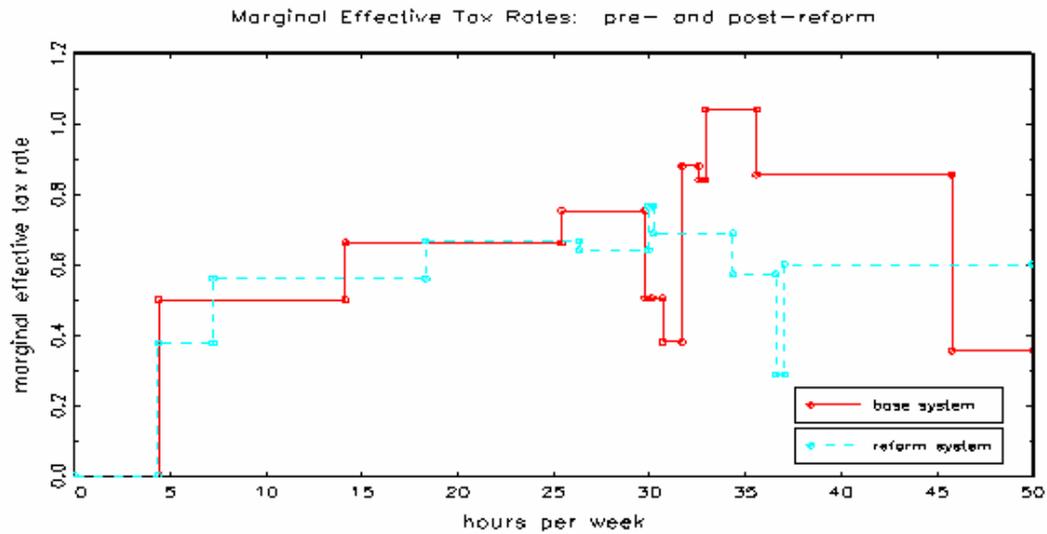


Figure 3a: Budget constraint –sole parents with 1 child aged less than 13, wage rate \$20 and rent \$110/wk

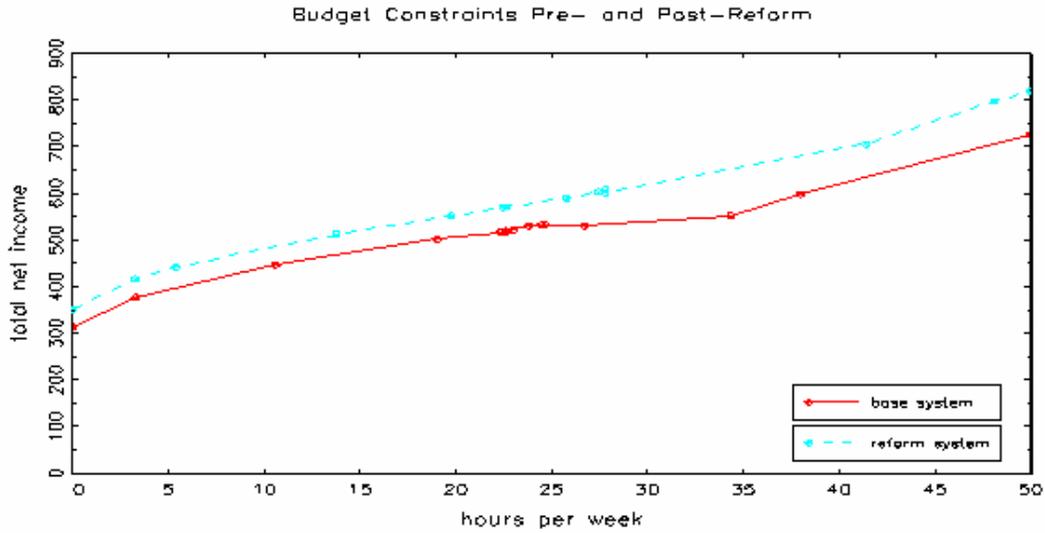


Figure 3b: METR –sole parents with 1 child aged less than 13, wage rate \$20 and rent \$110/wk

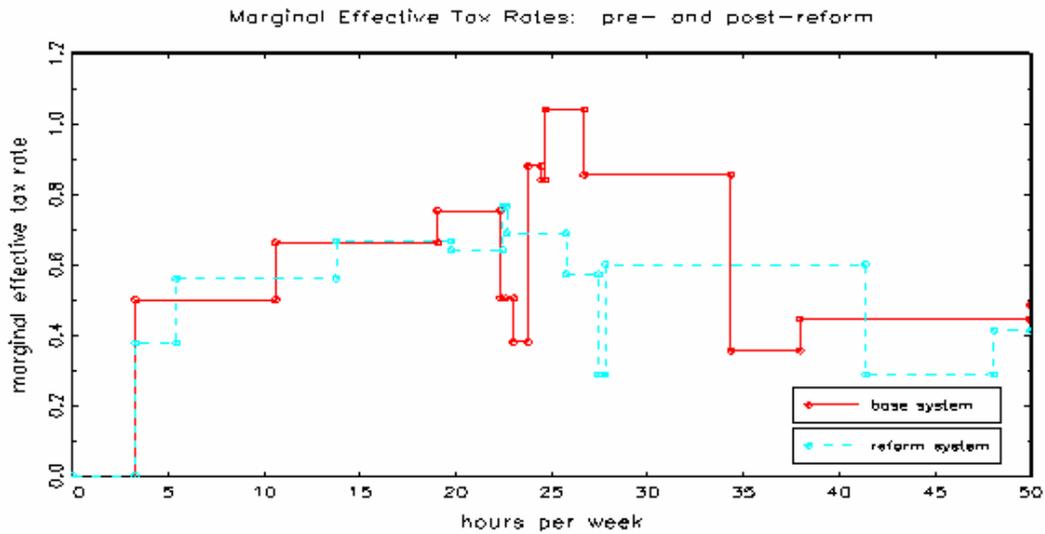


Figure 4a: Budget constraint –sole parents with 1 child aged less than 13, wage rate \$25 and rent \$110/wk

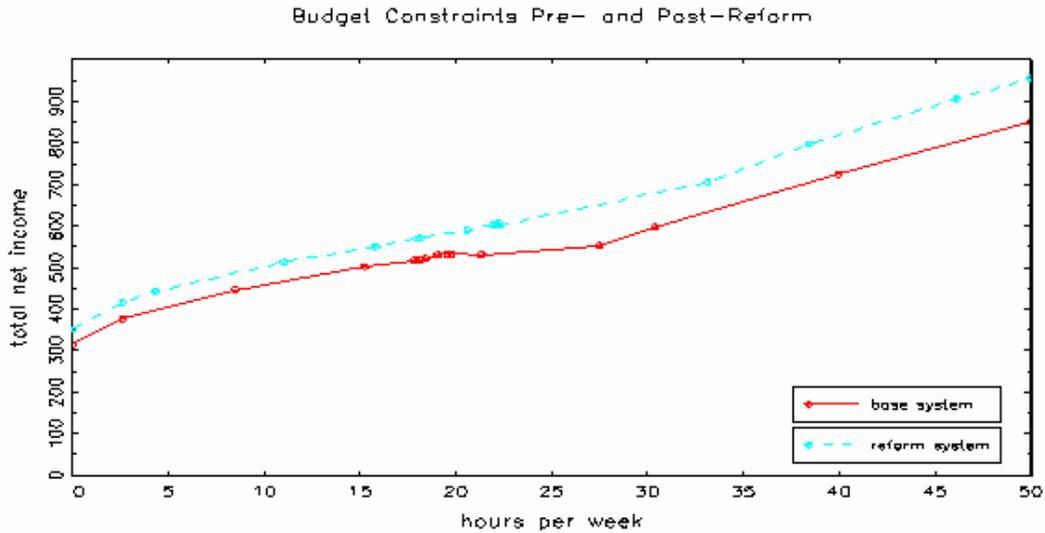


Figure 4b: METR –sole parents with 1 child aged less than 13, wage rate \$25 and rent \$110/wk

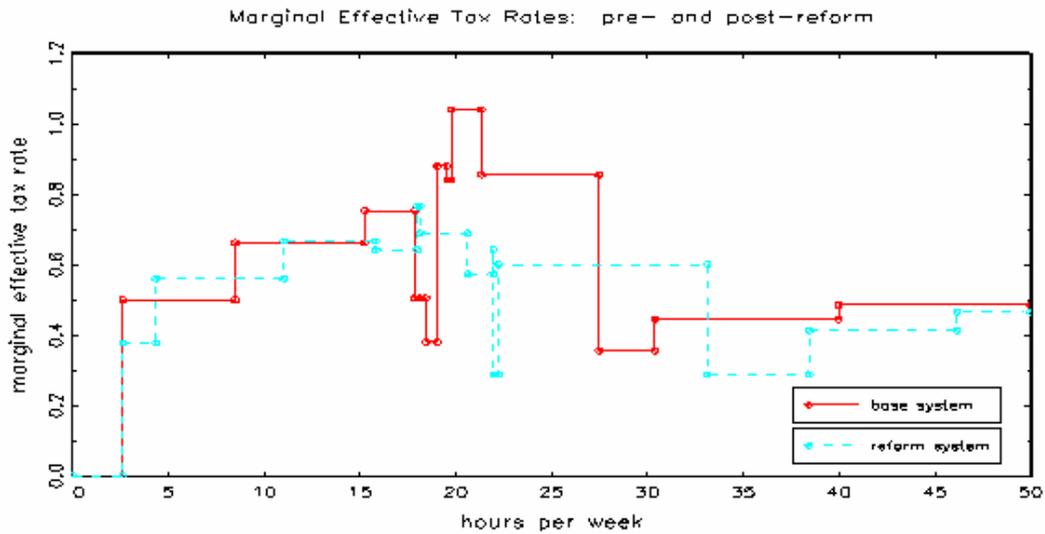


Figure 5a: Budget constraint –sole parents with 2 children aged less than 13, wage rate \$10 and rent \$110/wk

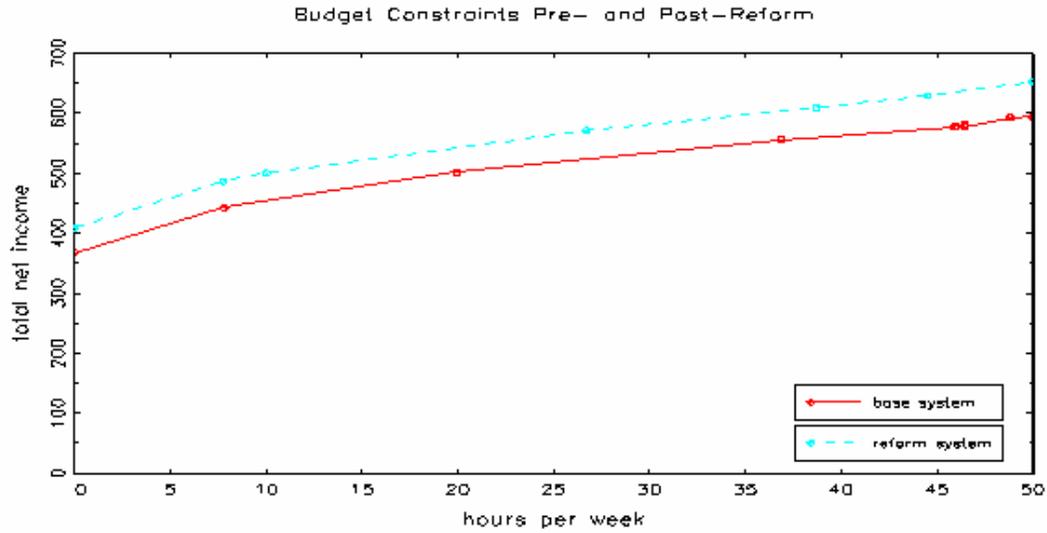


Figure 5b: METR –sole parents with 2 children aged less than 13, wage rate \$10 and rent \$110/wk

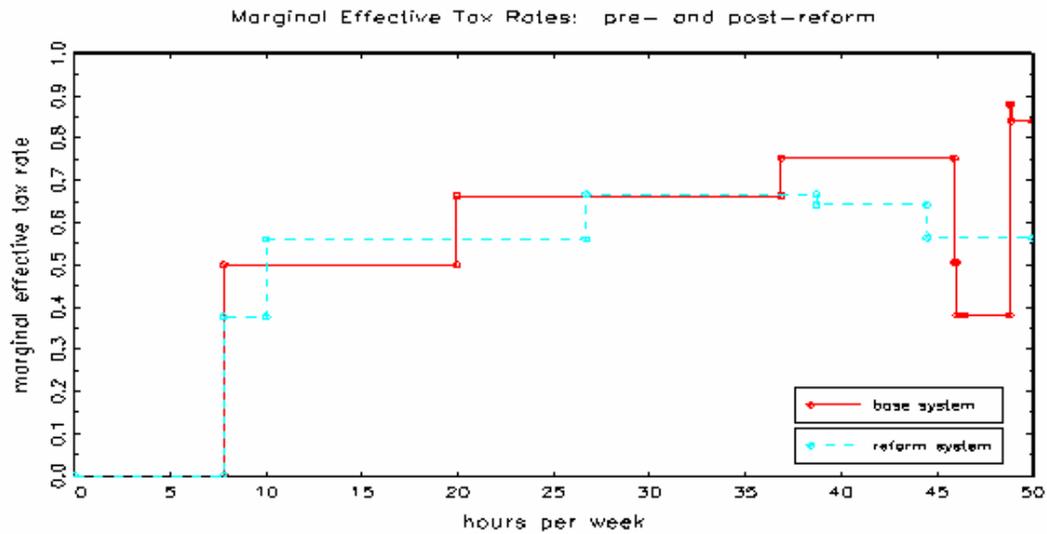


Figure 6a: Budget constraint –sole parents with 2 children aged less than 13, wage rate \$15 and rent \$110/wk

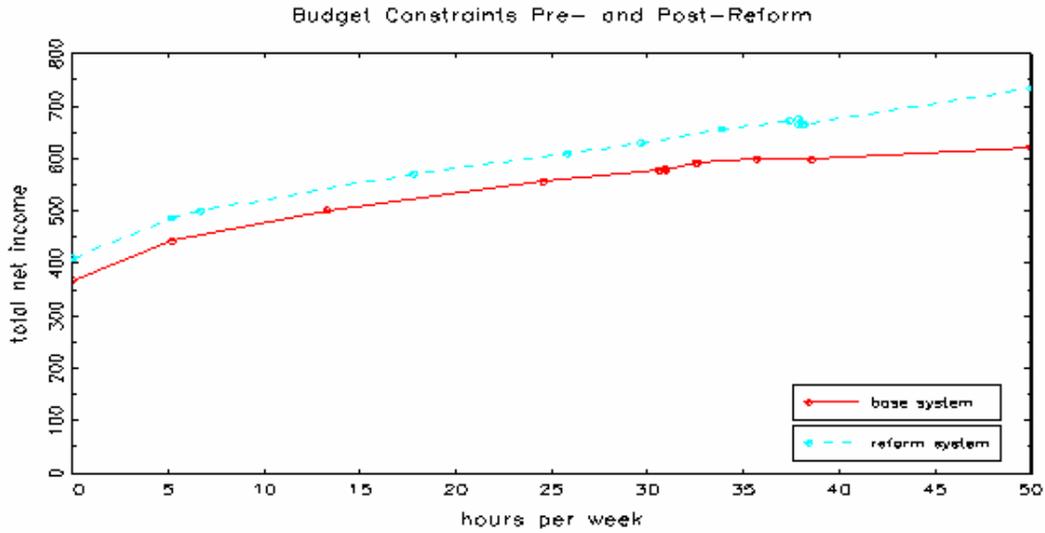


Figure 6b: METR –sole parents with 2 children aged less than 13, wage rate \$15 and rent \$110/wk

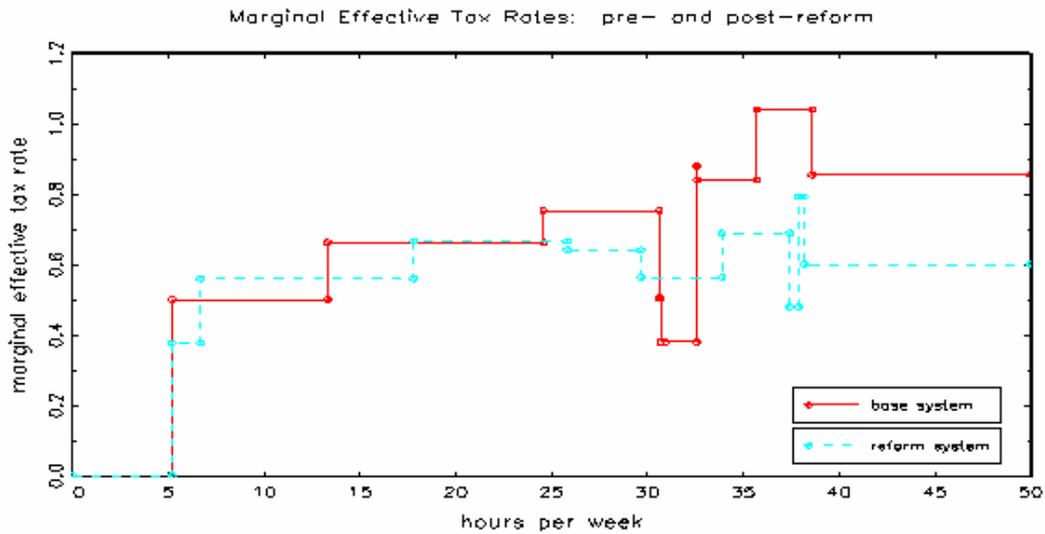


Figure 7a: Budget constraint –sole parents with 2 children aged less than 13, wage rate \$20 and rent \$110/wk

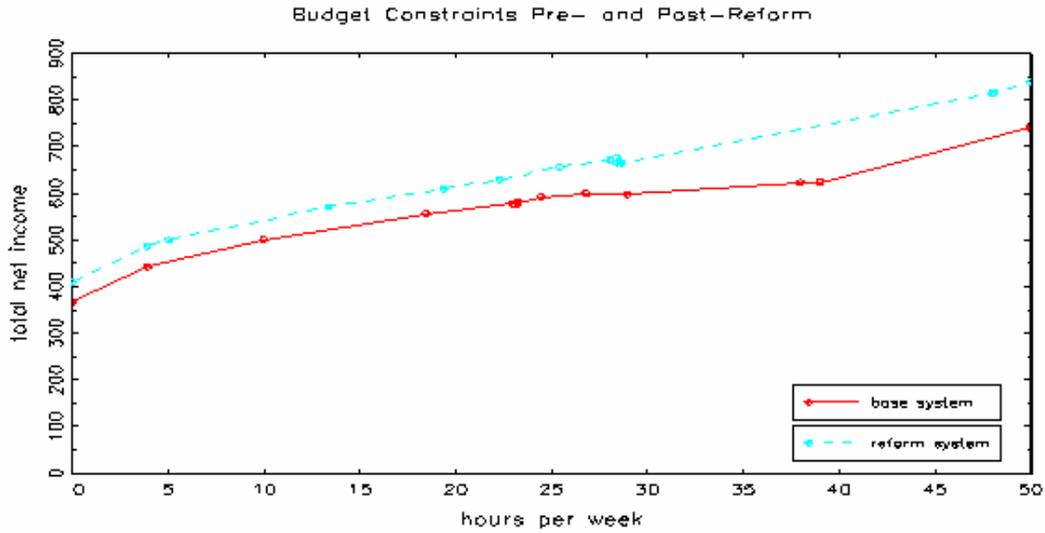


Figure 7b: METR –sole parents with 2 children aged less than 13, wage rate \$20 and rent \$110/wk

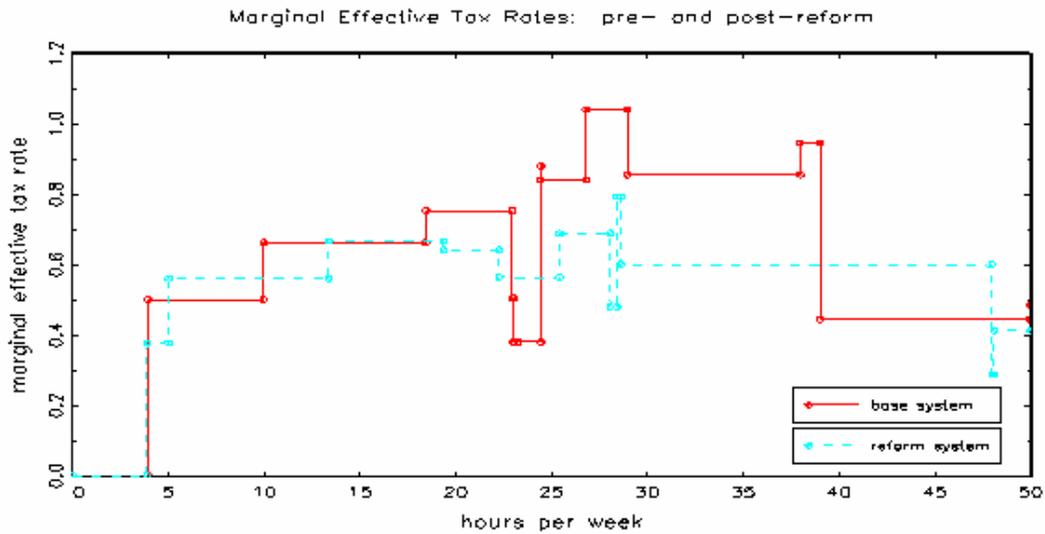


Figure 8a: Budget constraint –sole parents with 2 children aged less than 13, wage rate \$25 and rent \$110/wk

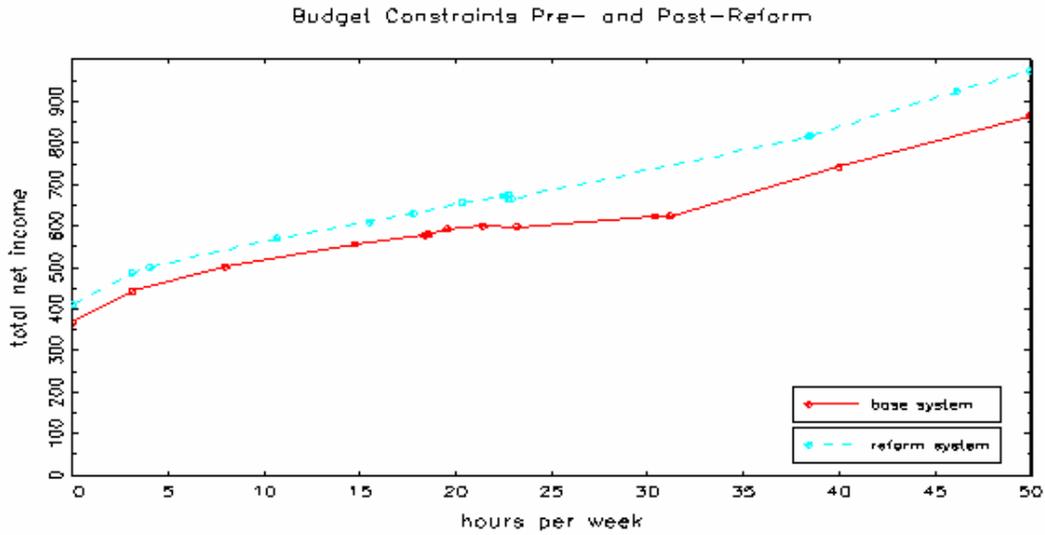


Figure 8b: METR –sole parents with 2 children aged less than 13, wage rate \$25 and rent \$110/wk

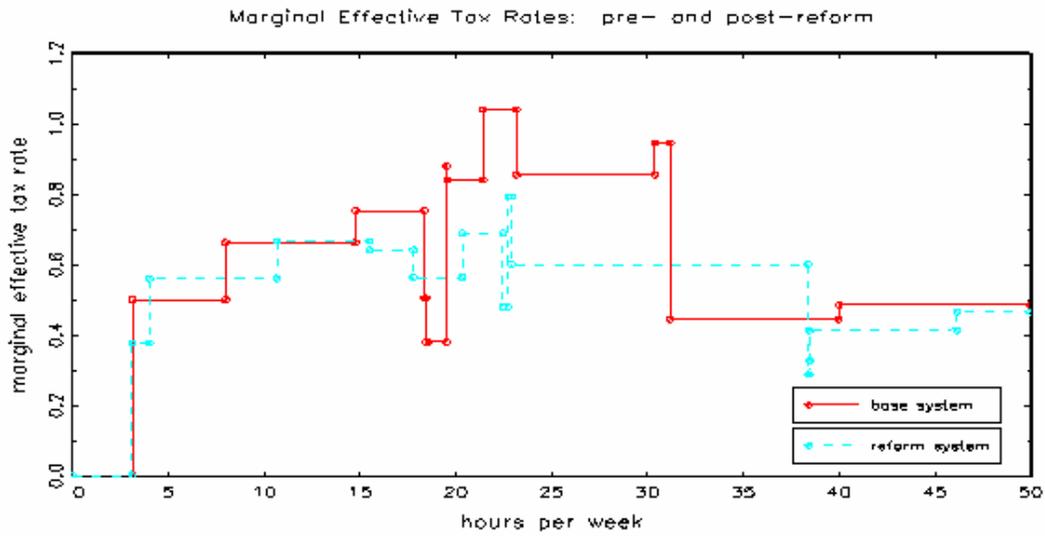


Figure 9a: Budget constraint –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$10 and rent \$110/wk

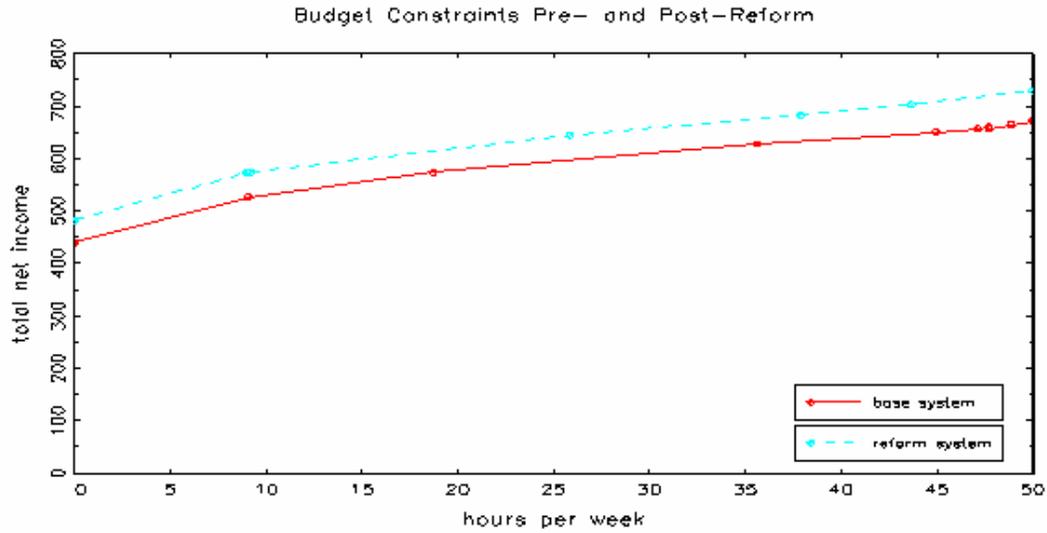


Figure 9b: METR –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$10 and rent \$110/wk

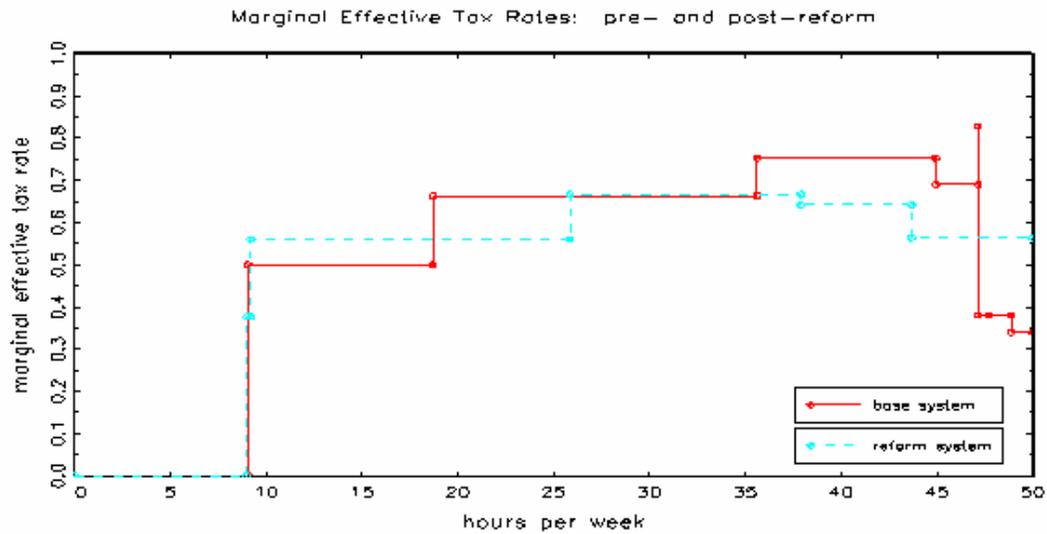


Figure 10a: Budget constraint –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$15 and rent \$110/wk

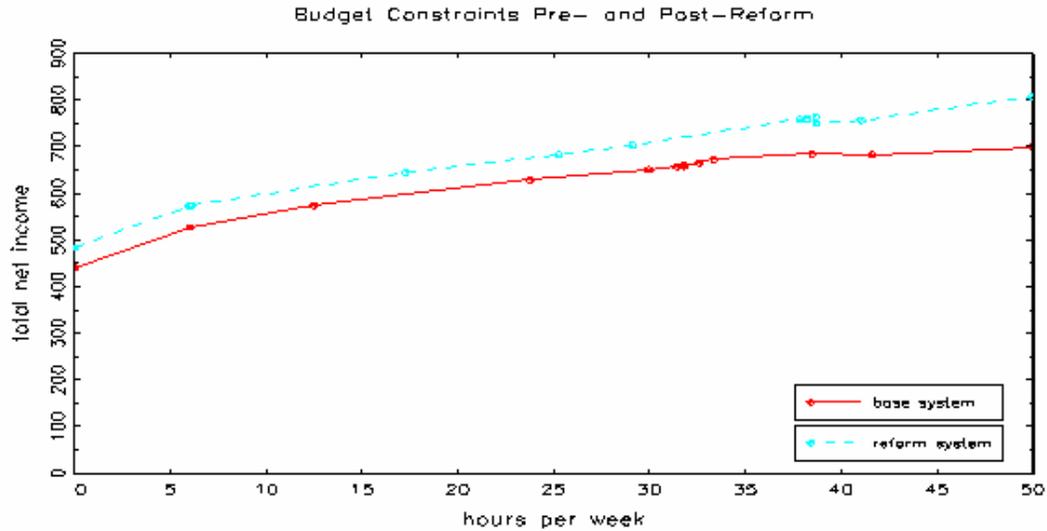


Figure 10b: METR –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$15 and rent \$110/wk

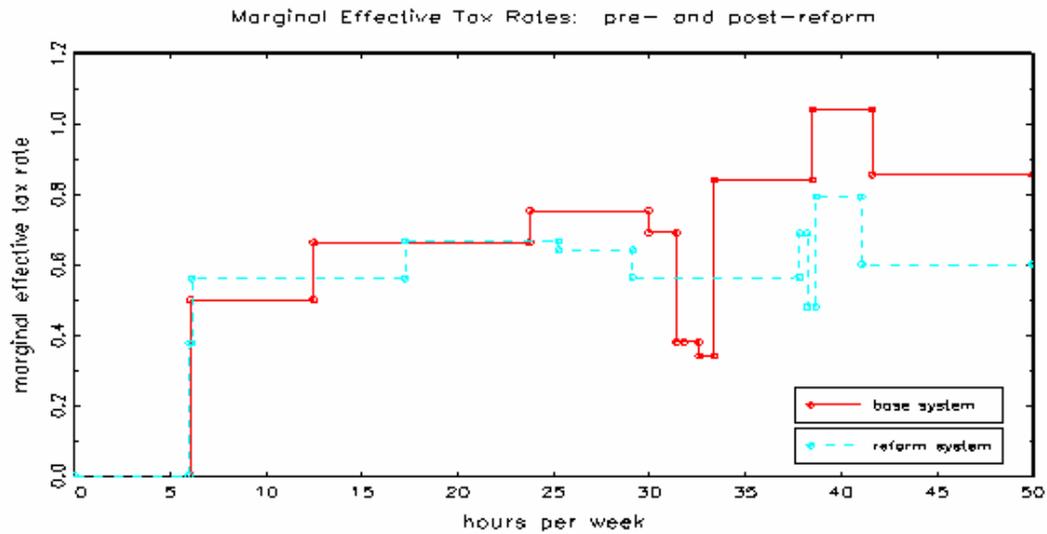


Figure 11a: Budget constraint –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$20 and rent \$110/wk

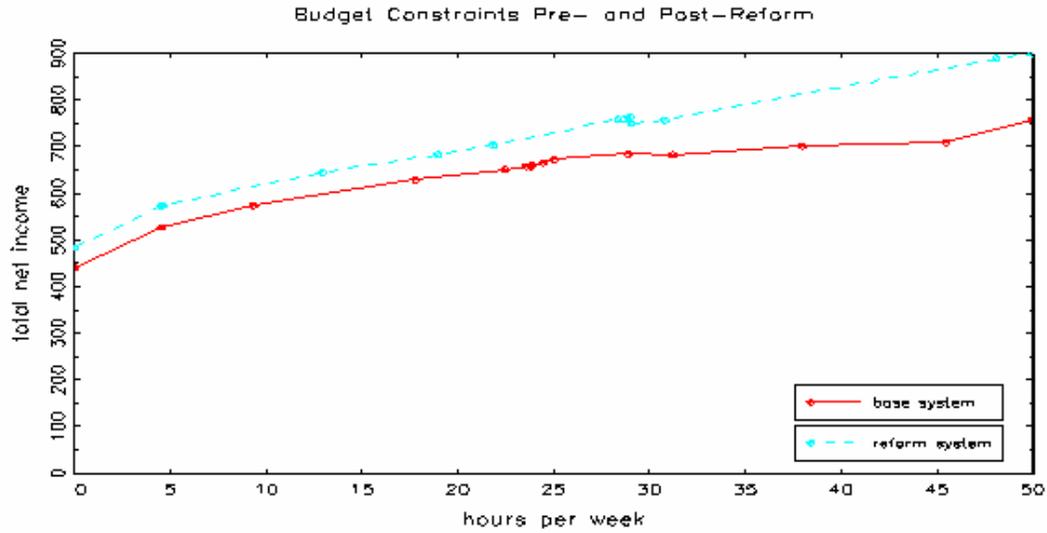


Figure 11b: METRs –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$15 and rent \$110/wk

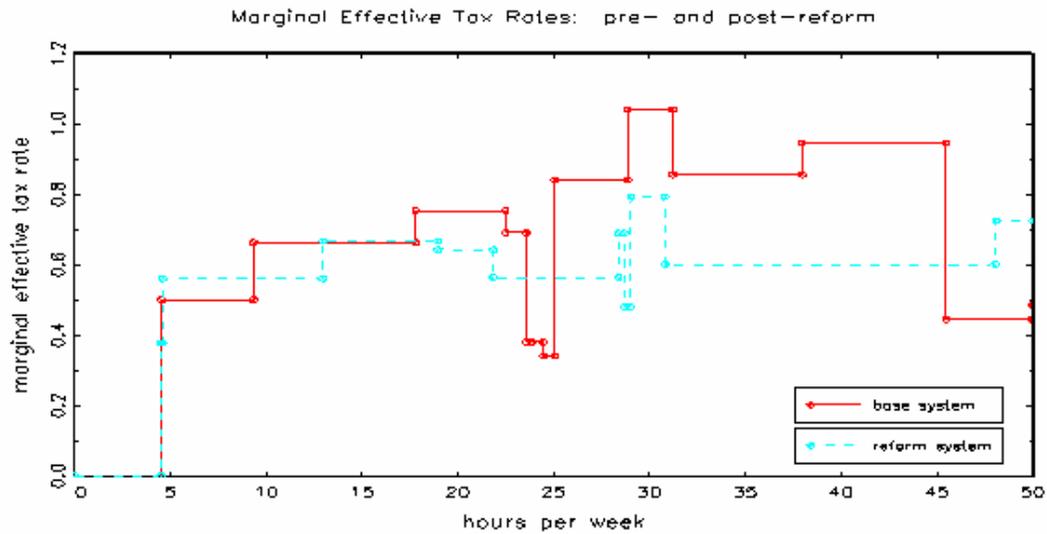


Figure 12a: Budget constraint –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$25 and rent \$110/wk

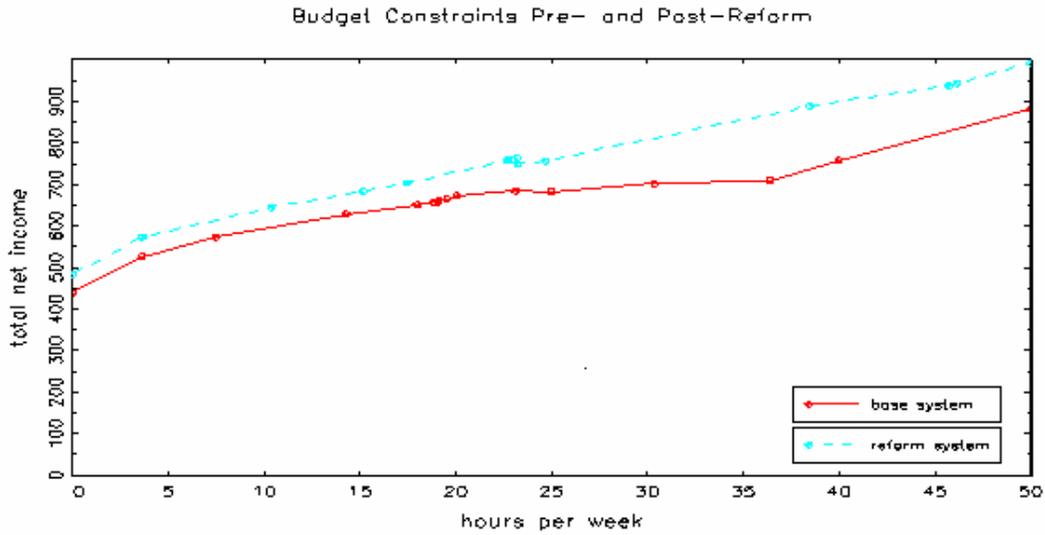
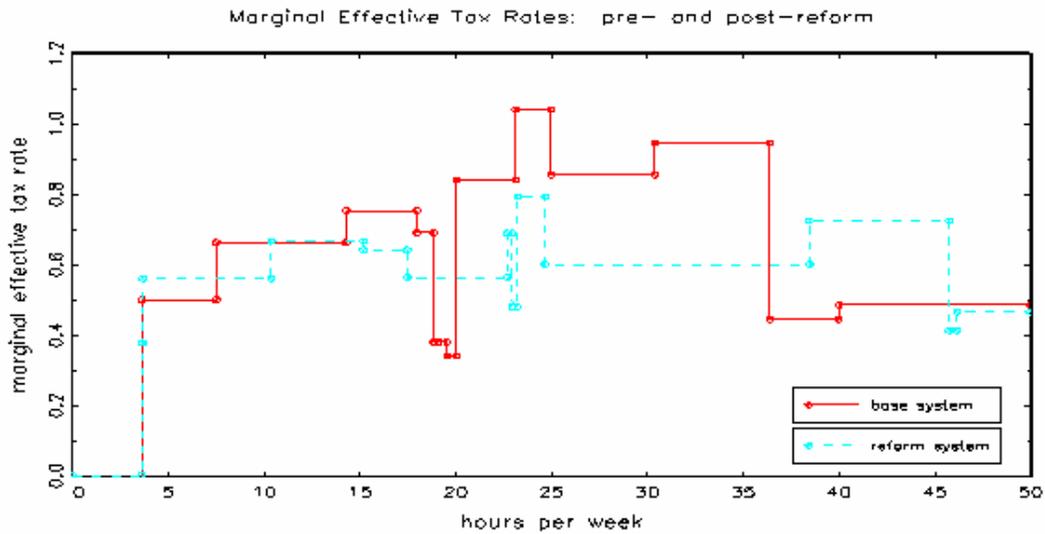


Figure 12b: METRs –sole parents with 3 children, 2 aged less than 13 and 1 aged over 13, wage rate \$25 and rent \$110/wk



Appendix C: Budget constraints and METRs for married mothers – husband is not working

Figure 1a: Budget constraint – 1 child under 13, wife’s wage rate \$10

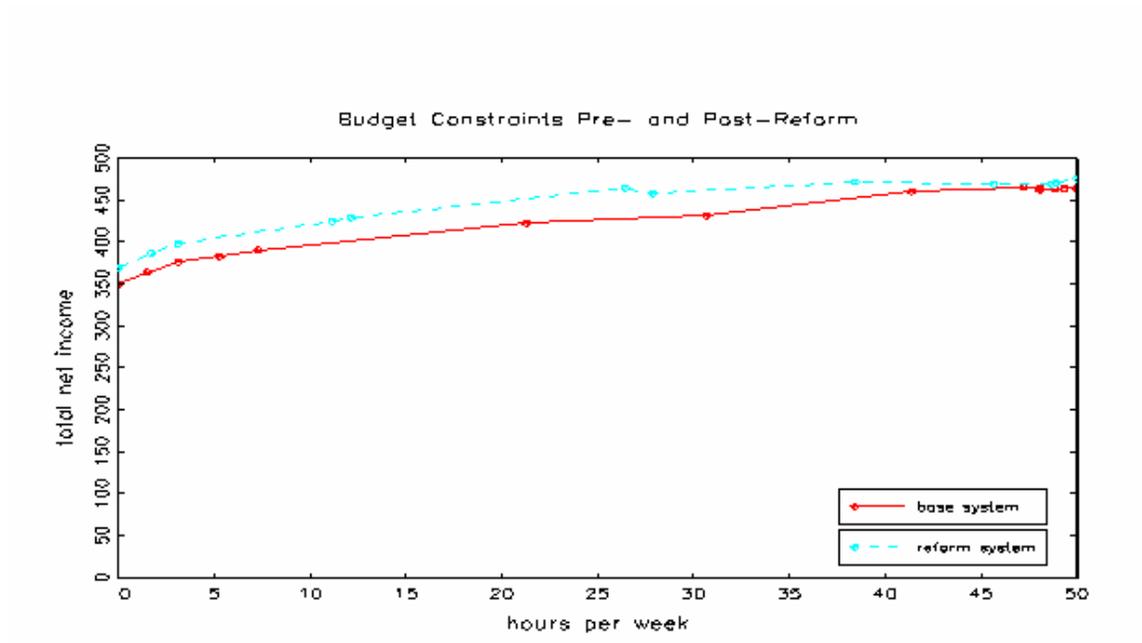


Figure 1b: Wife’s METR – 1 child under 13, wife’s wage rate \$10

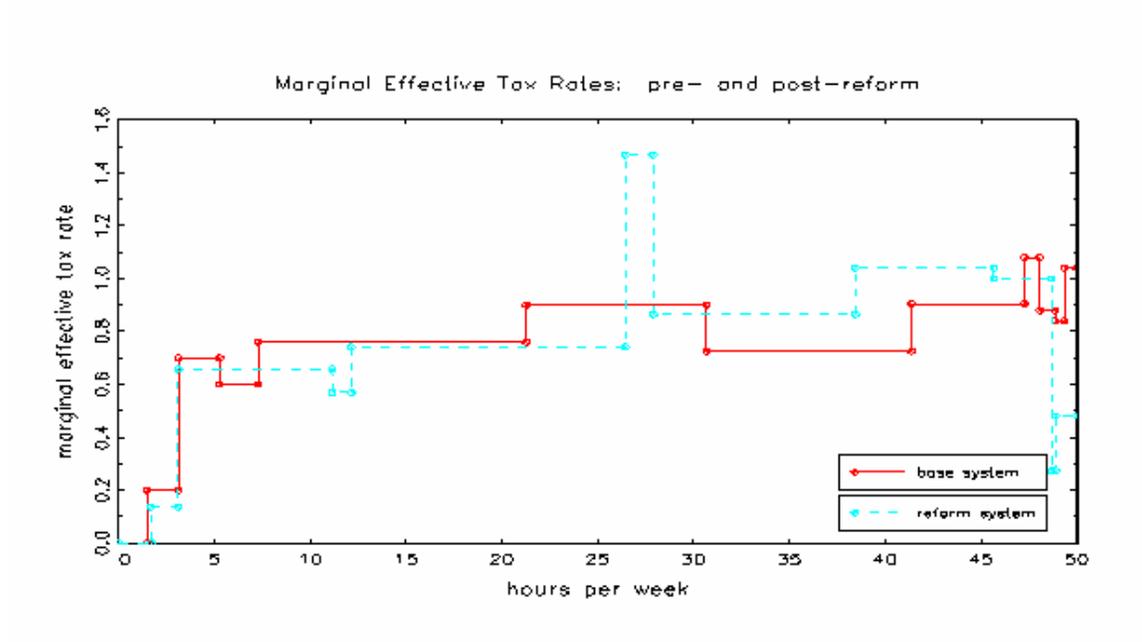


Figure 2a: Budget constraint – 1 child under 13, wife’s wage rate \$15

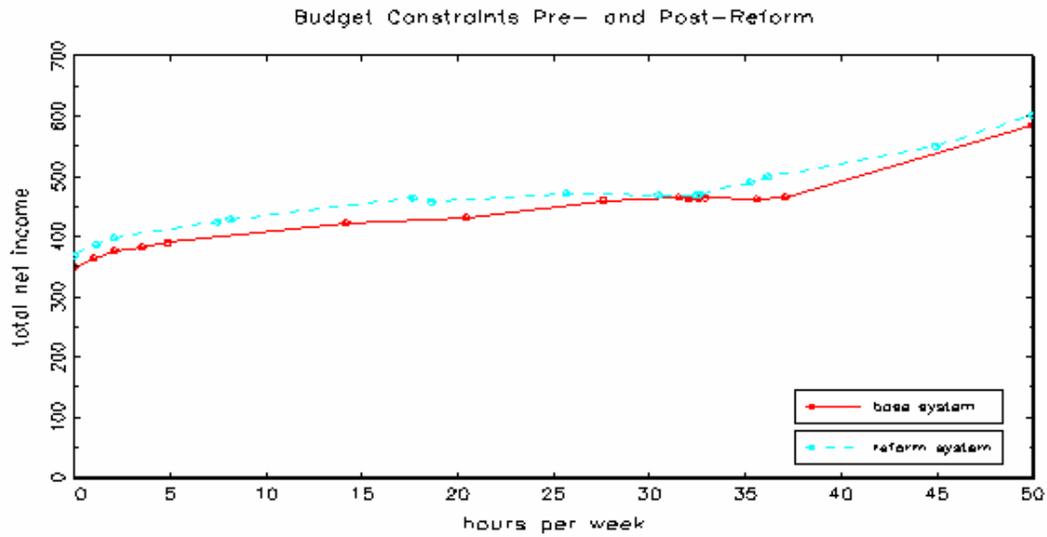


Figure 2b: Wife’s METR – 1 child under 13, wife’s wage rate \$15

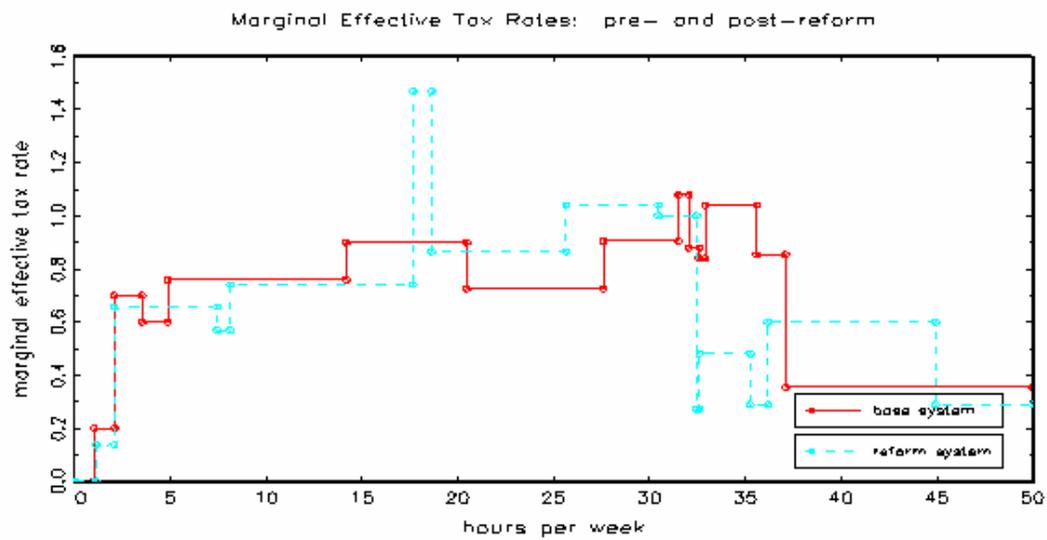


Figure 3a: Budget constraint – 1 child under 13, wife’s wage rate \$20

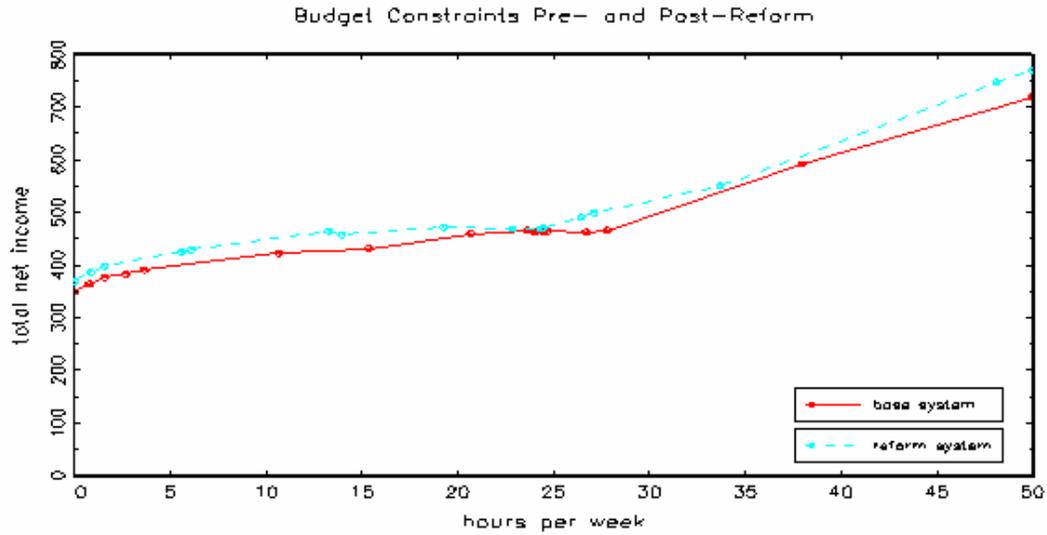


Figure 3b: Wife’s METR – 1 child under 13, wife’s wage rate \$20

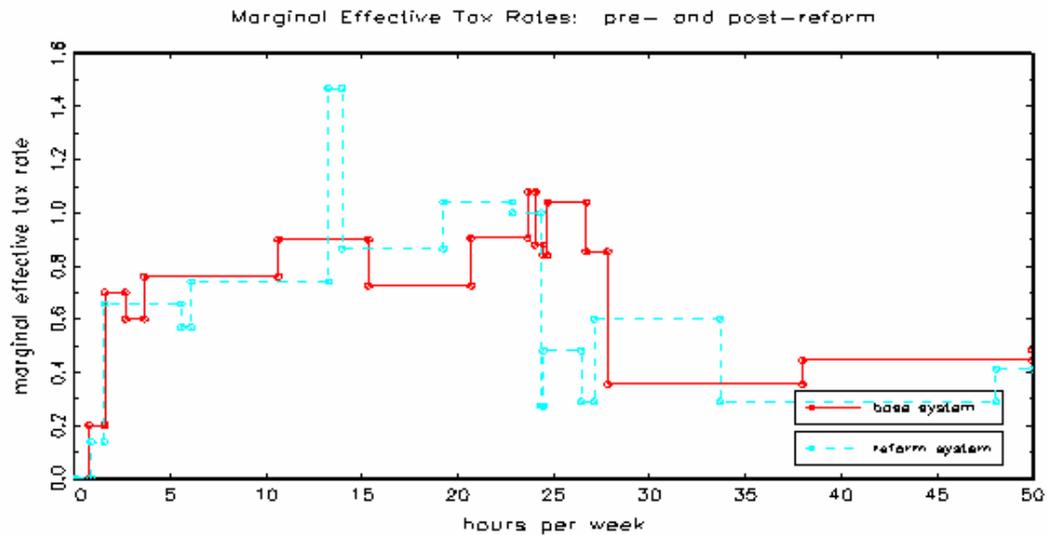


Figure 4a: Budget constraint – 1 child under13, wife’s wage rate \$25

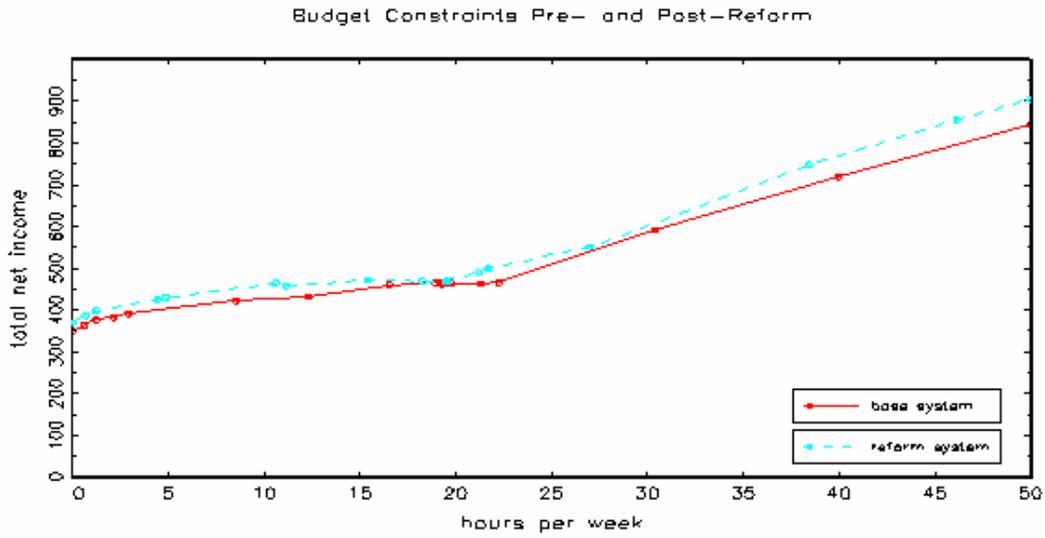


Figure 4b: Wife’s METR – 1 child under 13, wife’s wage rate \$25

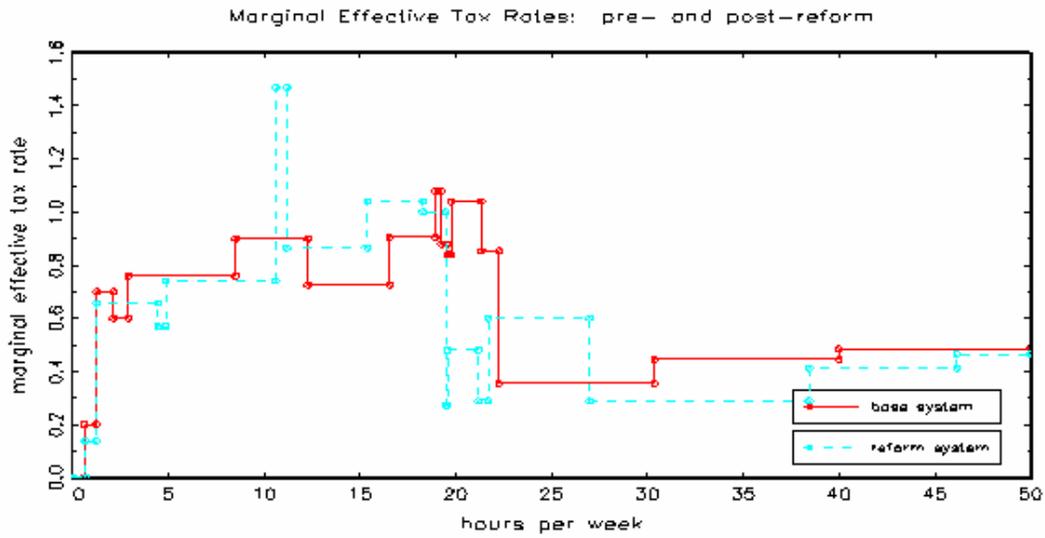


Figure 5a: Budget constraint – 2 children under 13, wife’s wage rate \$15

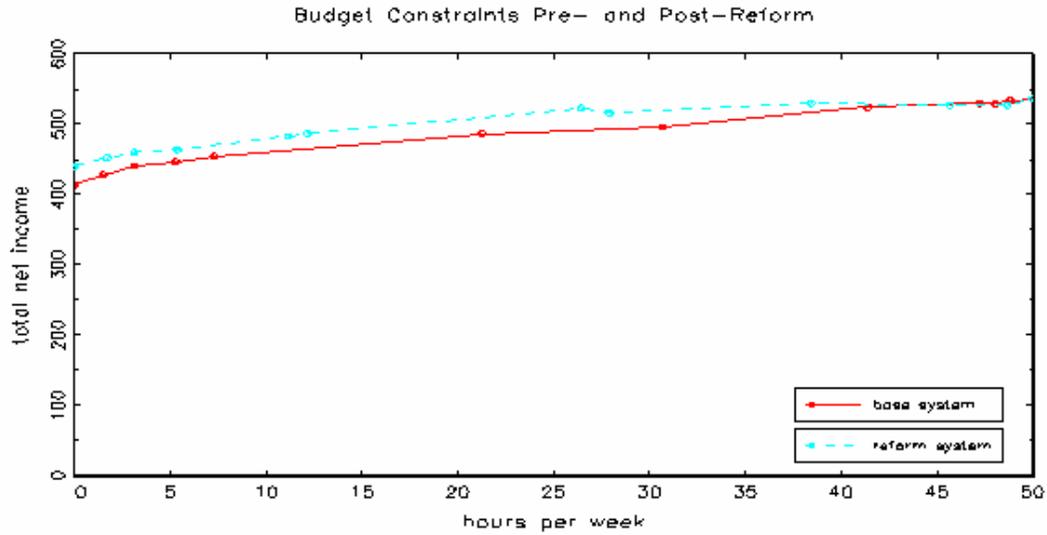


Figure 5b: Wife’s METR – 2 children under 13, wife’s wage rate \$10

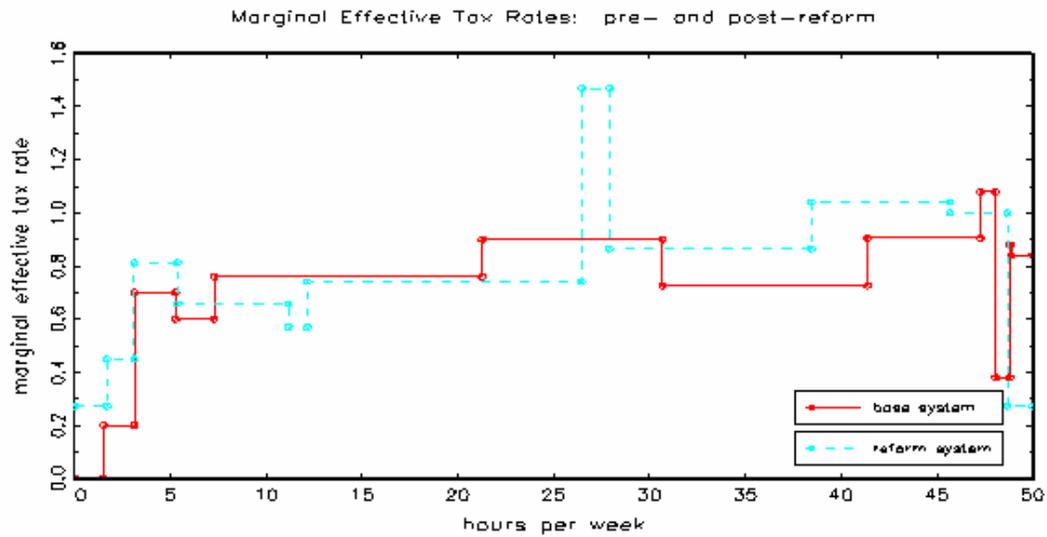


Figure 6a: Budget constraint – 2 children under 13, wife’s wage rate \$15

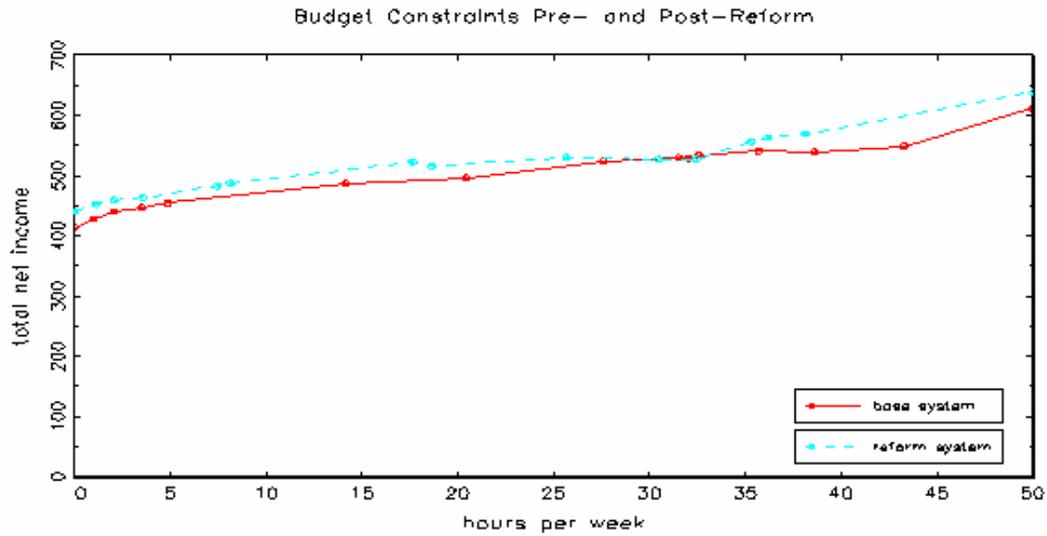


Figure 6b: Wife’s METR – 2 children under 13, wife’s wage rate \$15

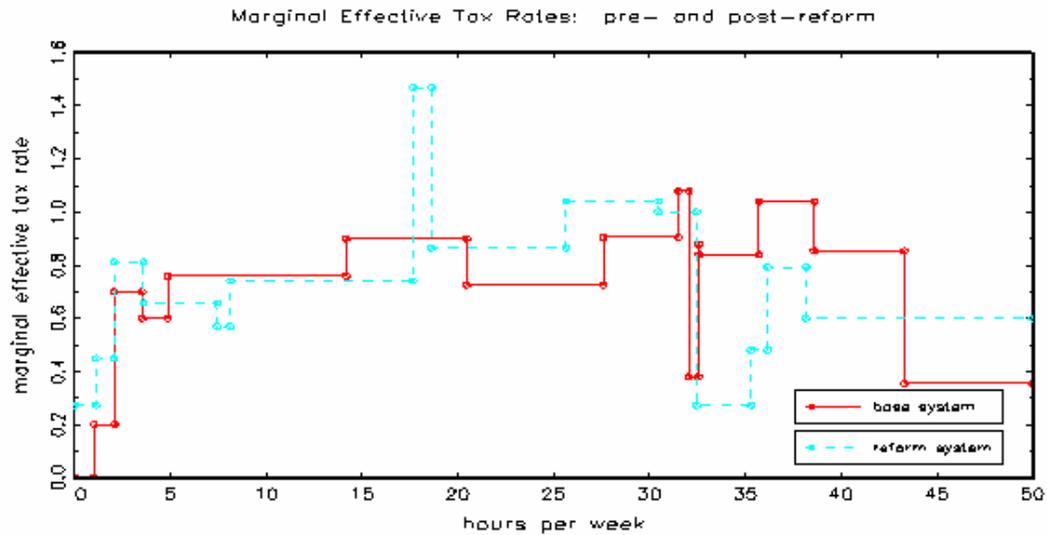


Figure 7a: Budget constraint – 2 children under 13, wife’s wage rate \$20

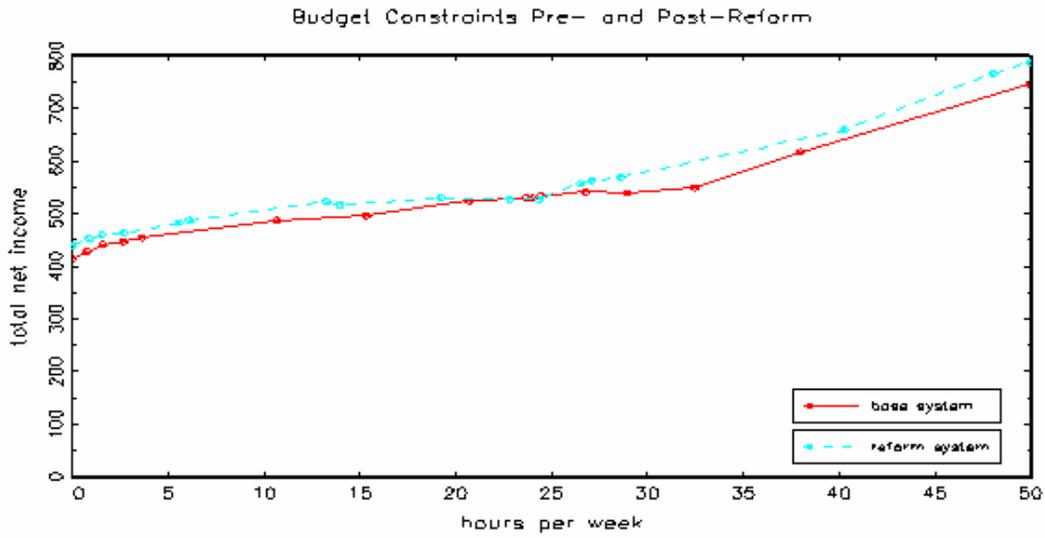


Figure 7b: Wife’s METR – 2 children under 13, wife’s wage rate \$20

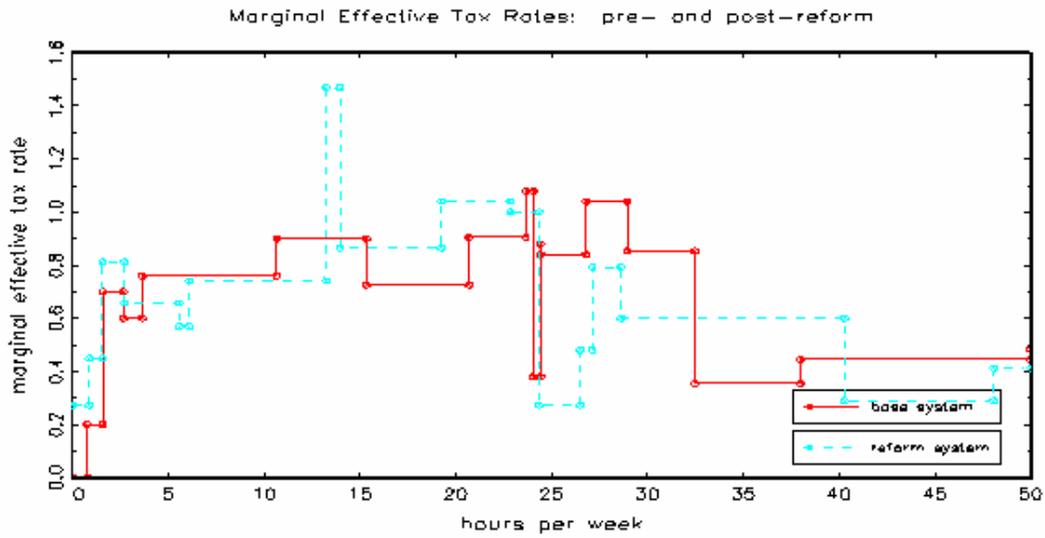


Figure 8a: Budget constraint – 2 children under 13, wife’s wage rate \$25

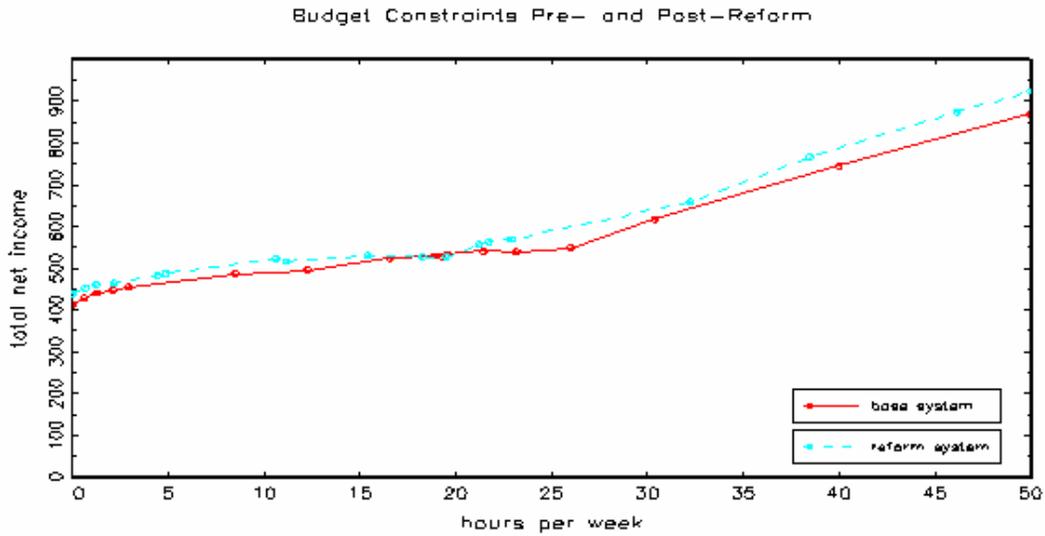


Figure 8b: Wife’s METR – 2 children under 13, wife’s wage rate \$25

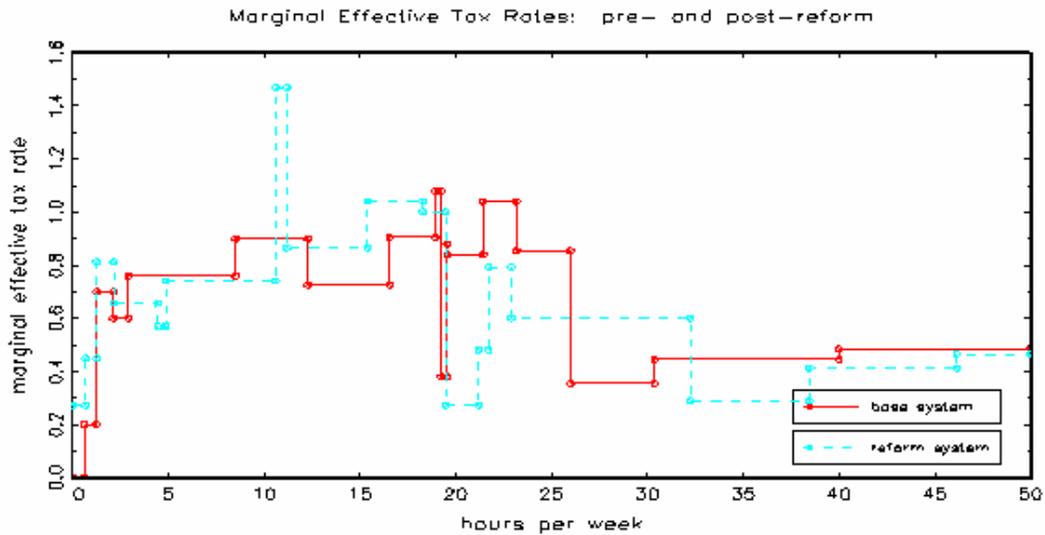


Figure 9a: Budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage rate \$10

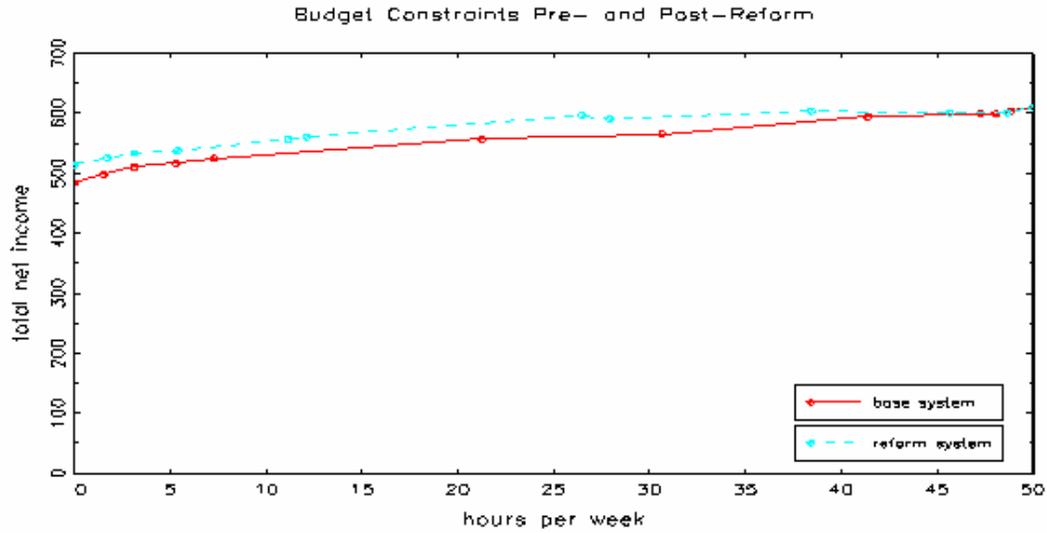


Figure 9b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage rate \$10

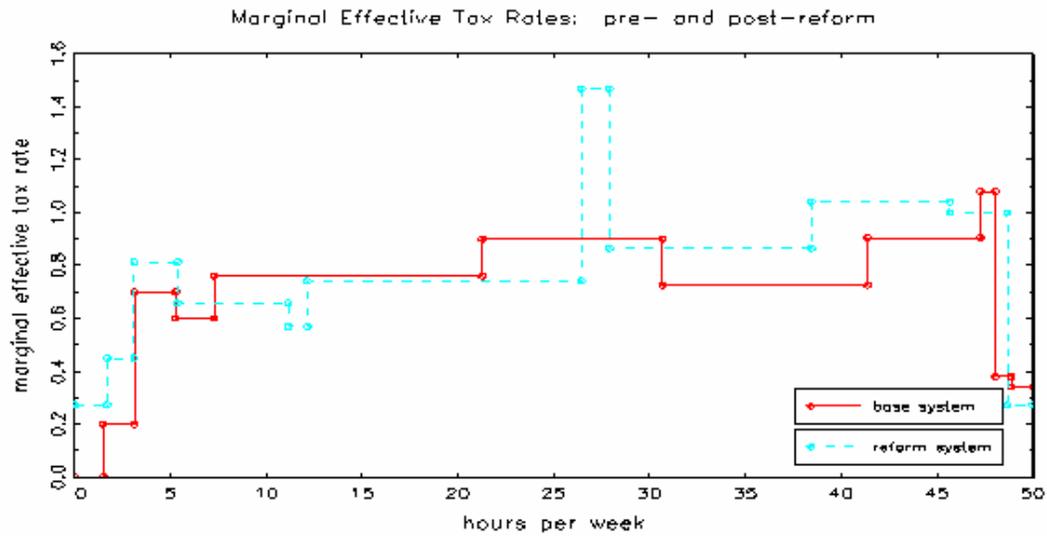


Figure 10a: Budget constraint—3 children, 2 under 13, 1 over 13, wife’s wage rate \$15



Figure 10b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage rate \$15

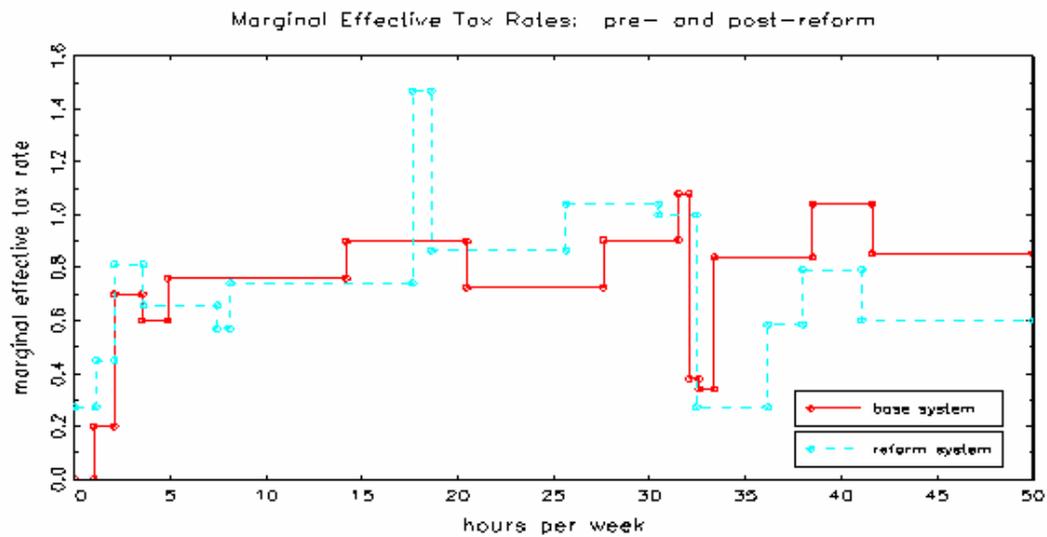


Figure 11a: Budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage rate \$20

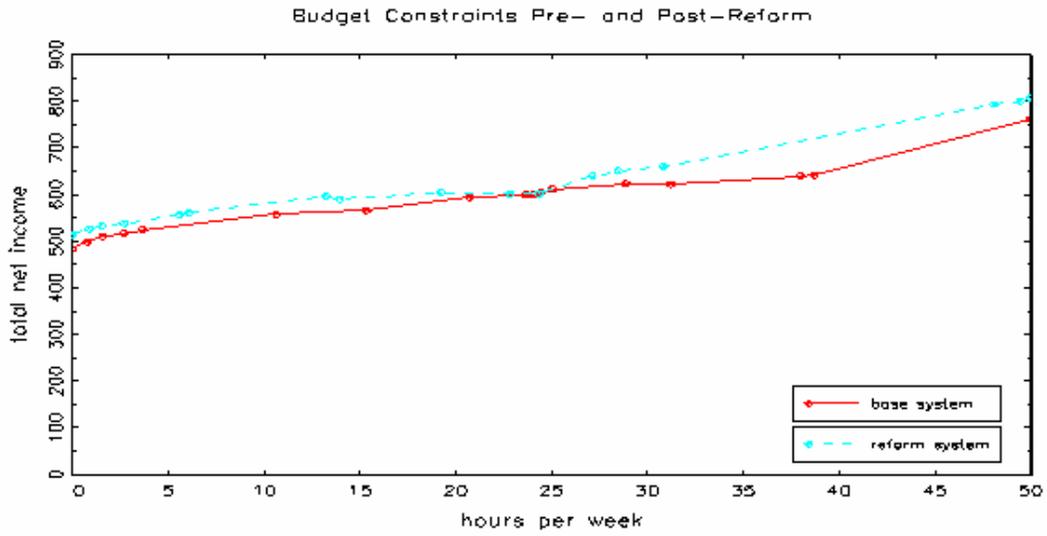


Figure 11b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage rate \$20

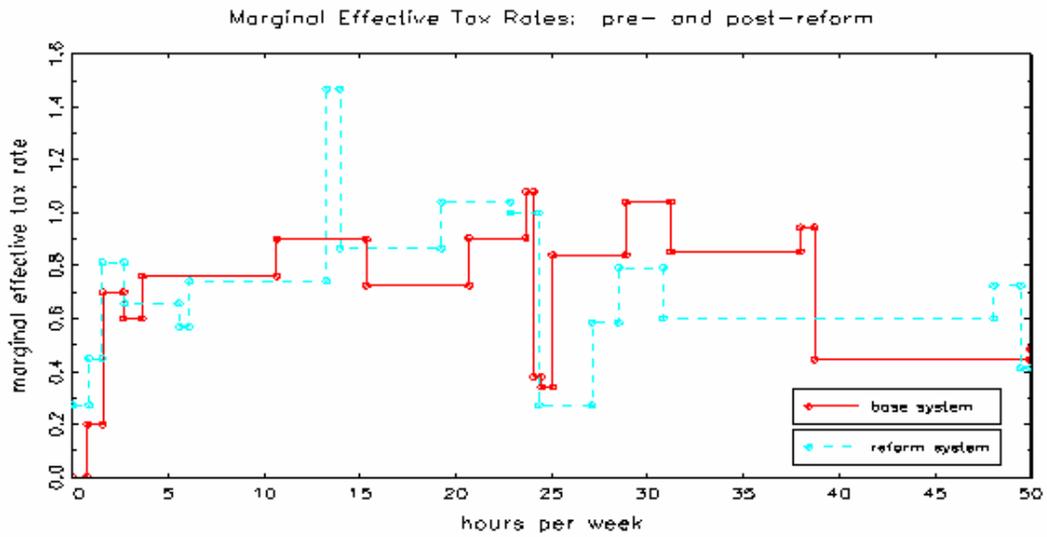


Figure 12a: Budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage rate \$25

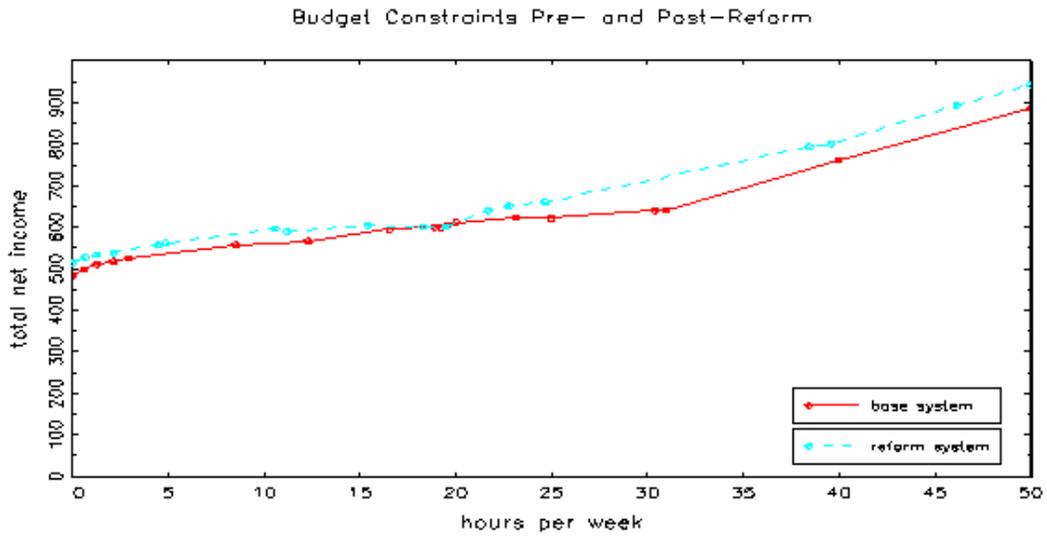
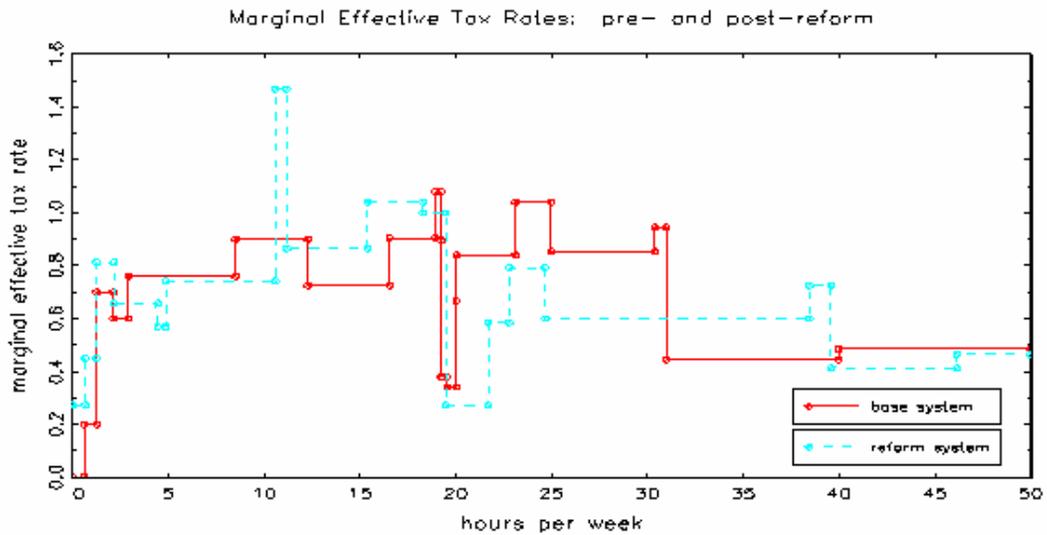


Figure 12b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage rate \$25



Appendix D: Budget constraints and METRs for married mothers– husband is working 20 hours with wage rate \$20

Figure 1a: Family budget constraint – 1 child, wife’s wage \$10

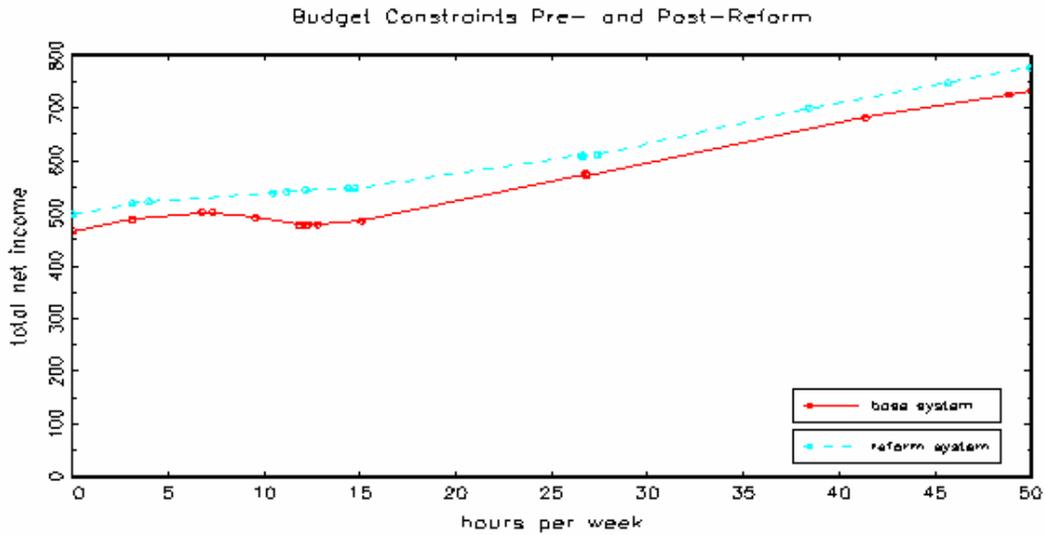


Figure 1b: Wife’s METR – 1 child, wife’s wage \$10

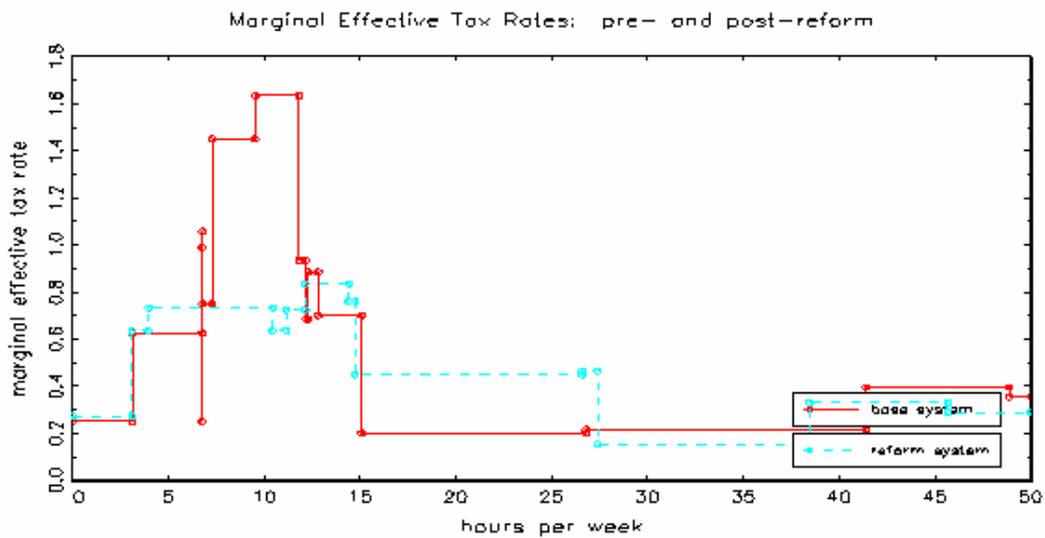


Figure 2a: Family budget constraint – 1 child, wife’s wage \$15

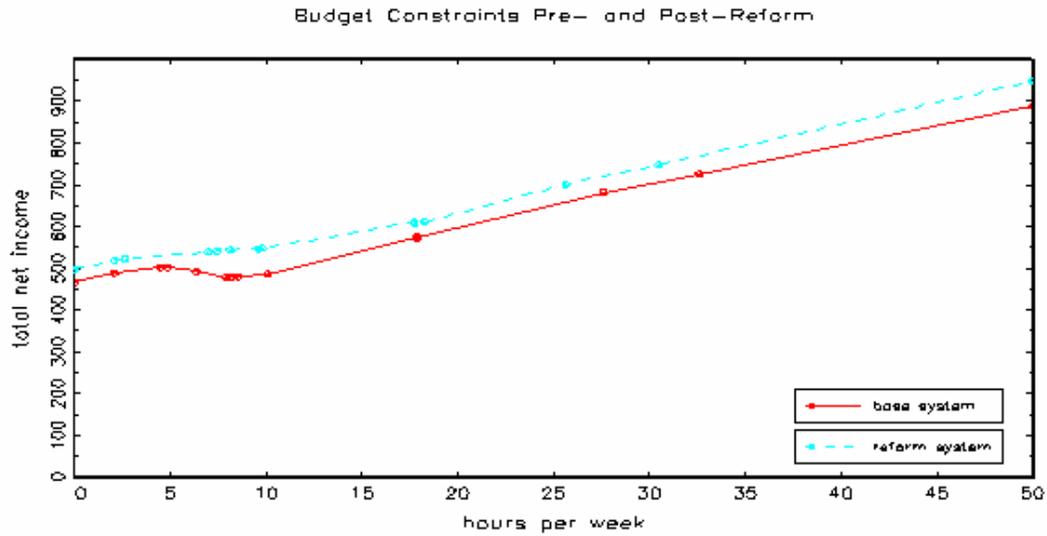


Figure 2b: Wife’s METR – 1 child, wife’s wage \$15

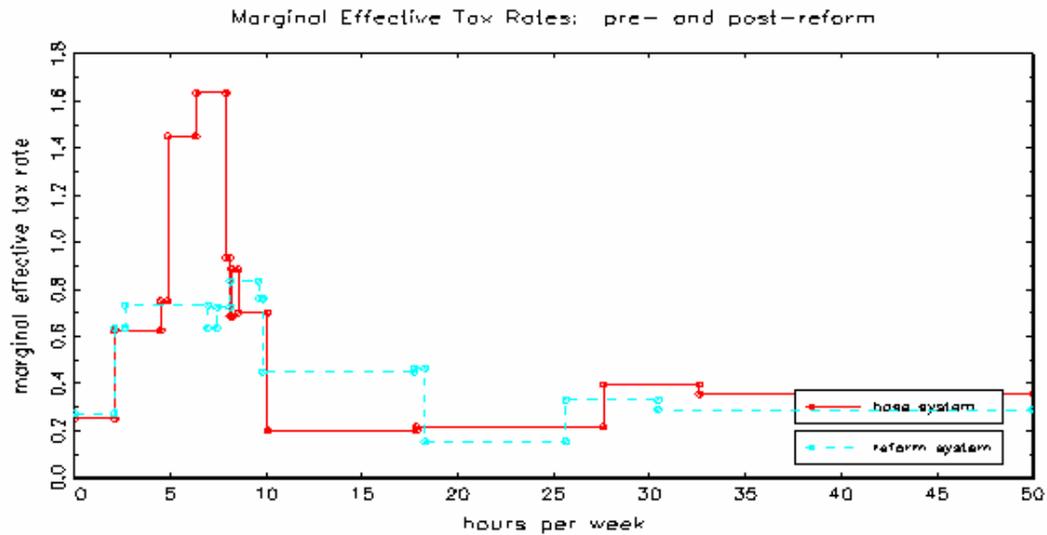


Figure 3a: Family budget constraint – 1 child, wife’s wage \$20

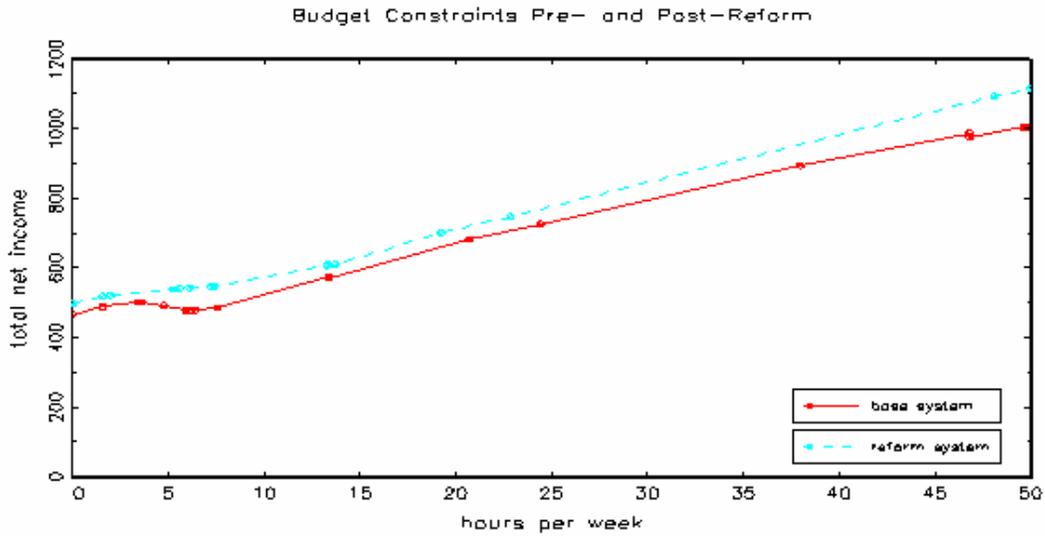


Figure 3b: Wife’s METR – 1 child, wife’s wage \$20

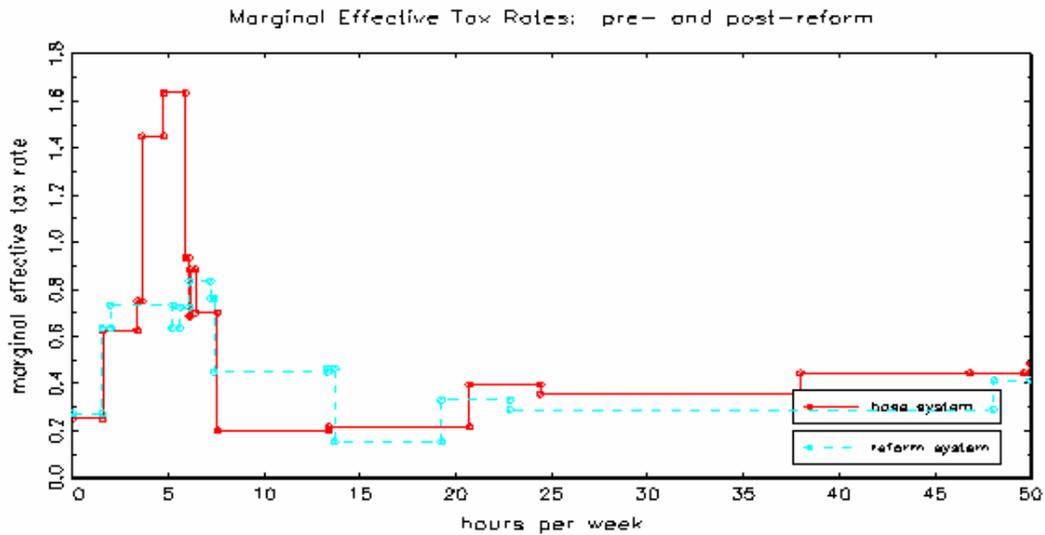


Figure 4a: Family budget constraint – 1 child, wife’s wage \$25

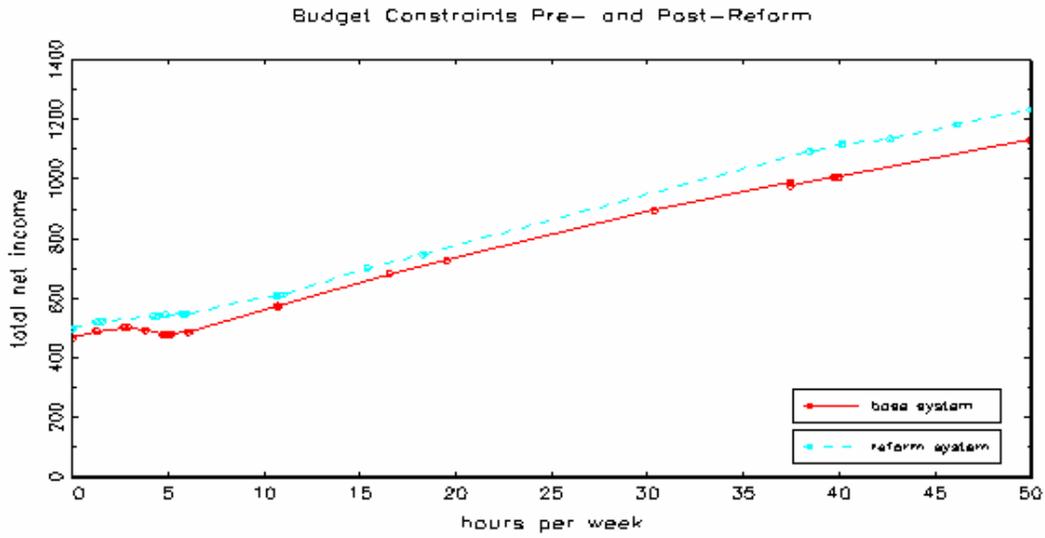


Figure 4b: Wife’s METR – 1 child, wife’s wage \$25

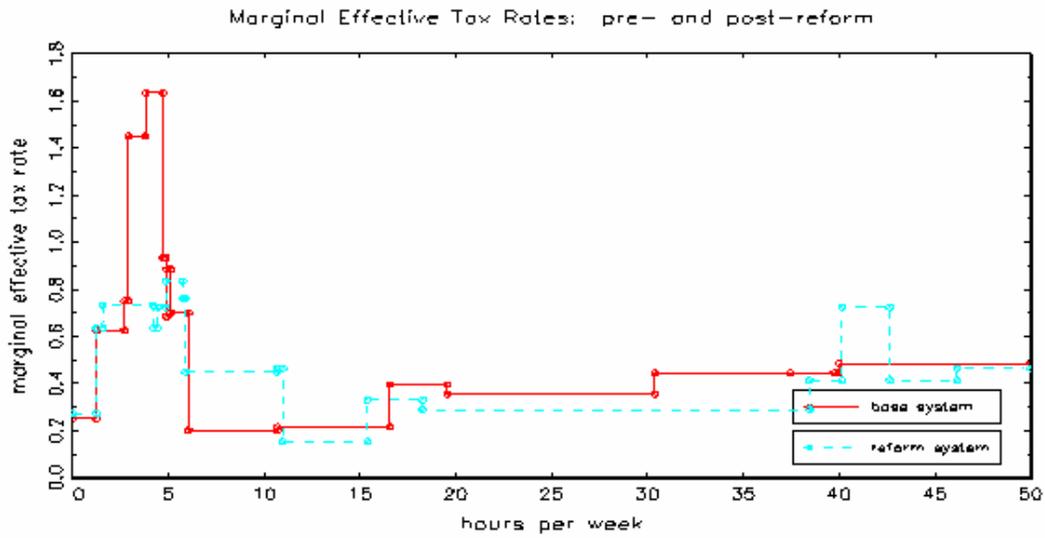


Figure 5a: Family budget constraint – 2 children, wife’s wage \$10

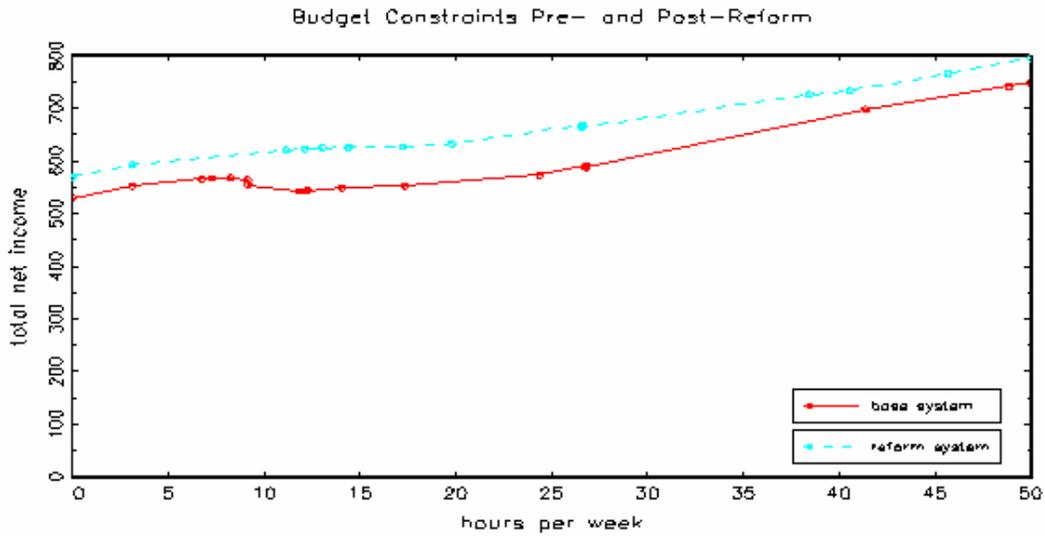


Figure 5b: Wife’s METR – 2 children, wife’s wage \$10

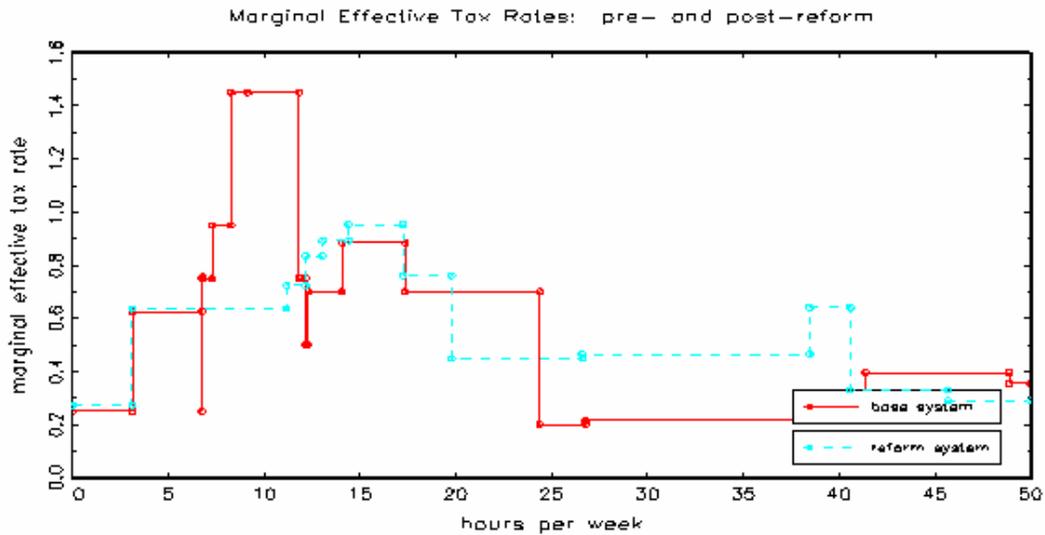


Figure 6a: Family budget constraint – 2 children, wife’s wage \$15

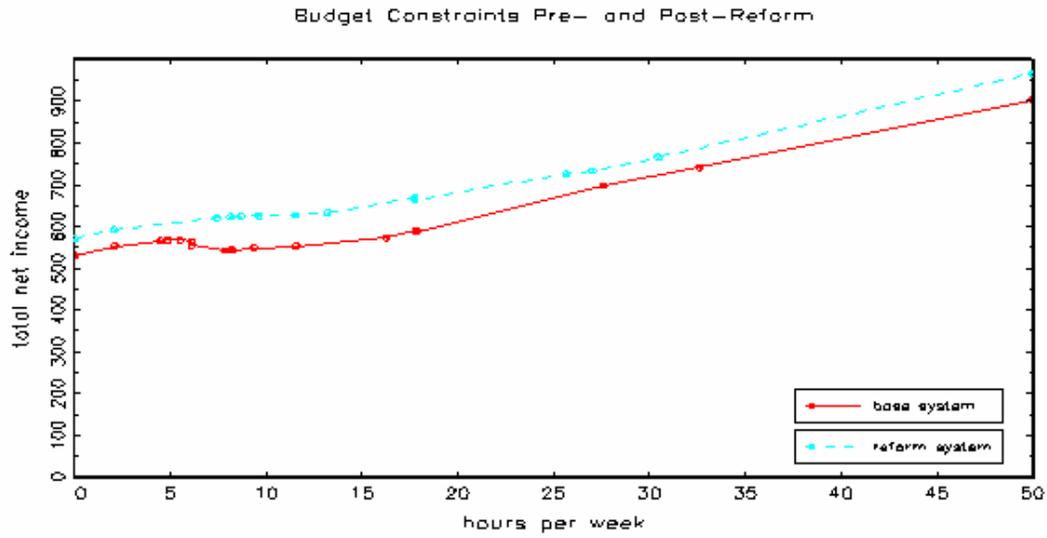


Figure 6b: Wife’s METR – 2 children, wife’s wage \$15

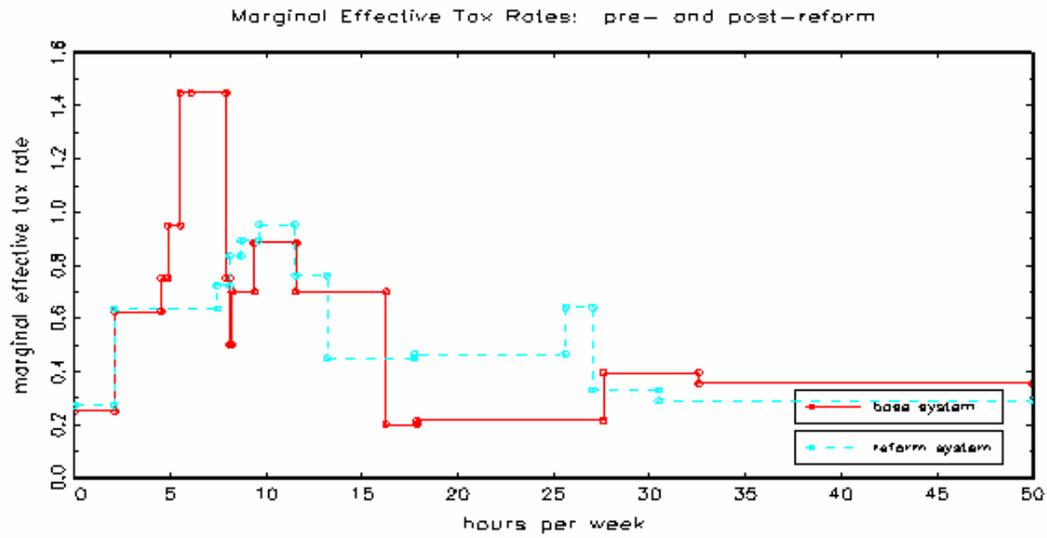


Figure 7a: Family budget constraint – 2 children, wife’s wage \$20

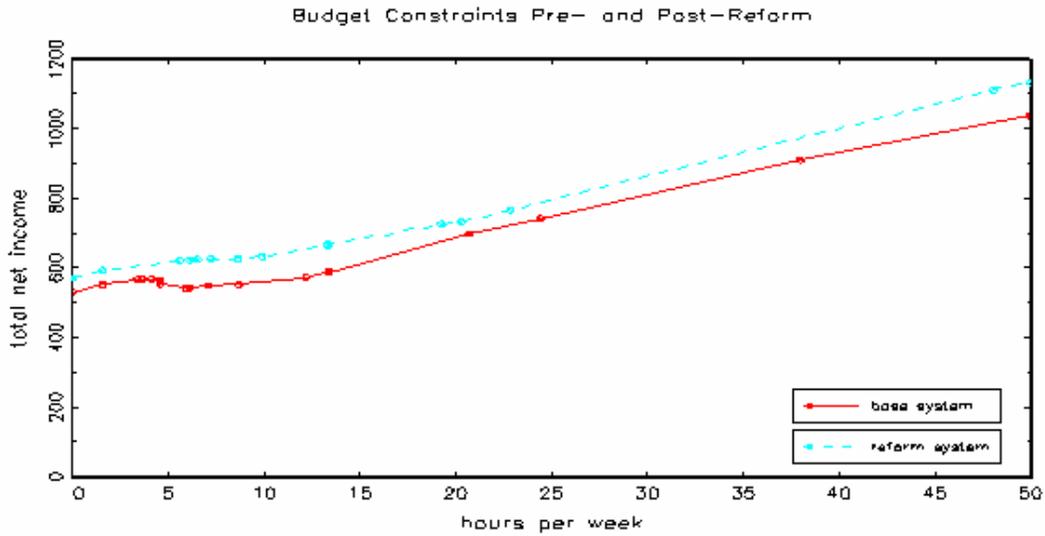


Figure 7b: Wife’s METR – 2 children, wife’s wage \$20

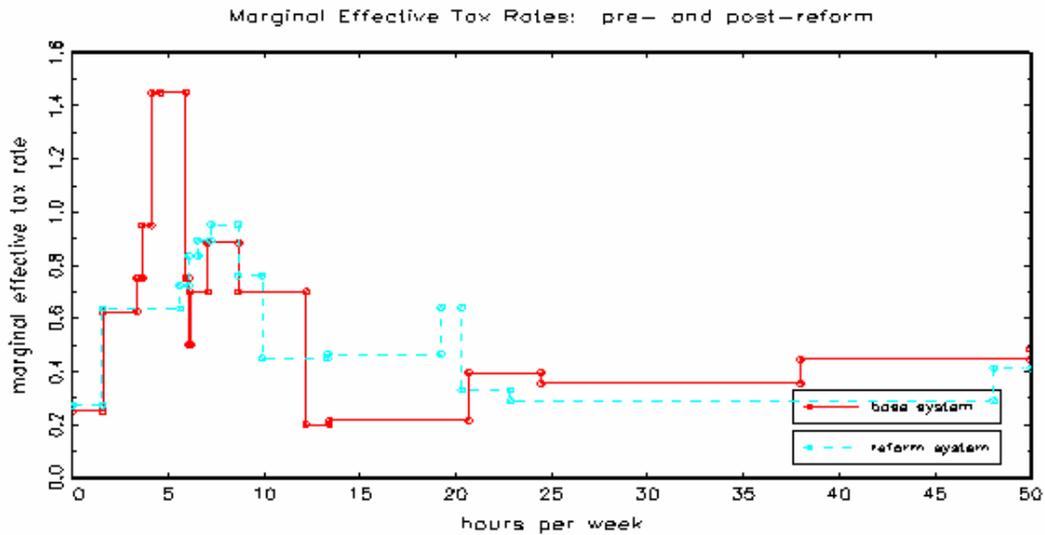


Figure 8a: Family budget constraint – 2 children, wife’s wage \$25

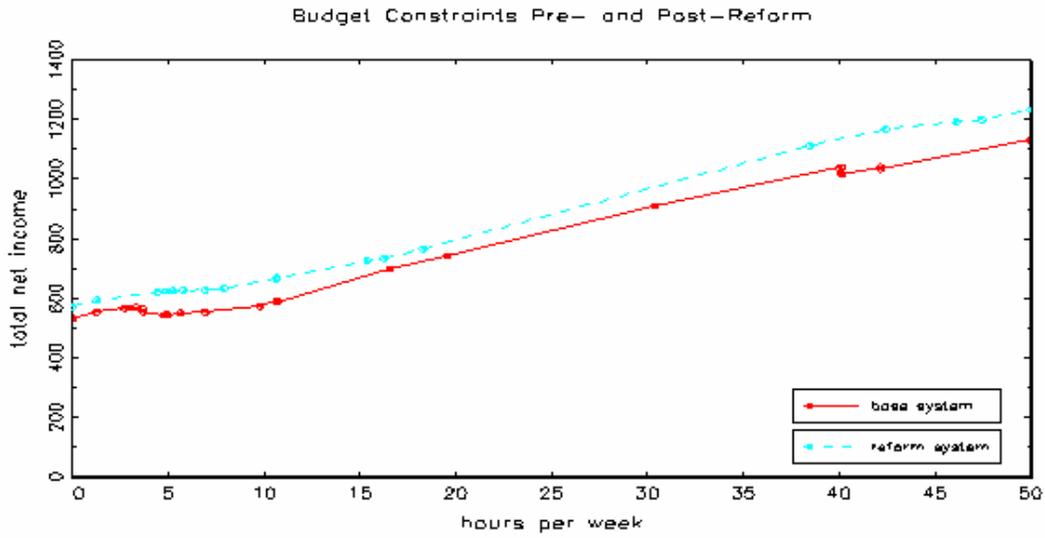


Figure 8b: Wife’s METR – 2 children, wife’s wage \$25

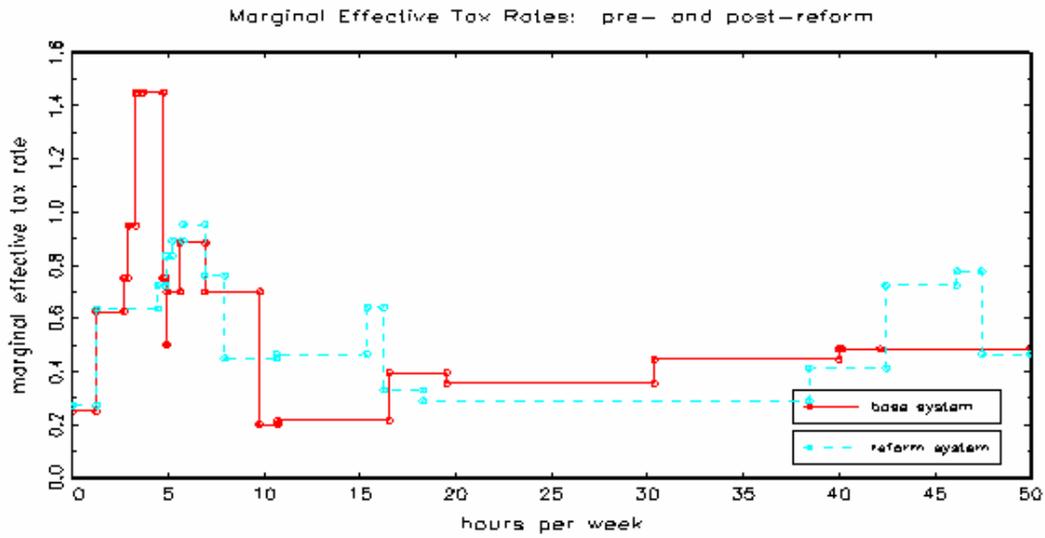


Figure 9a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$10

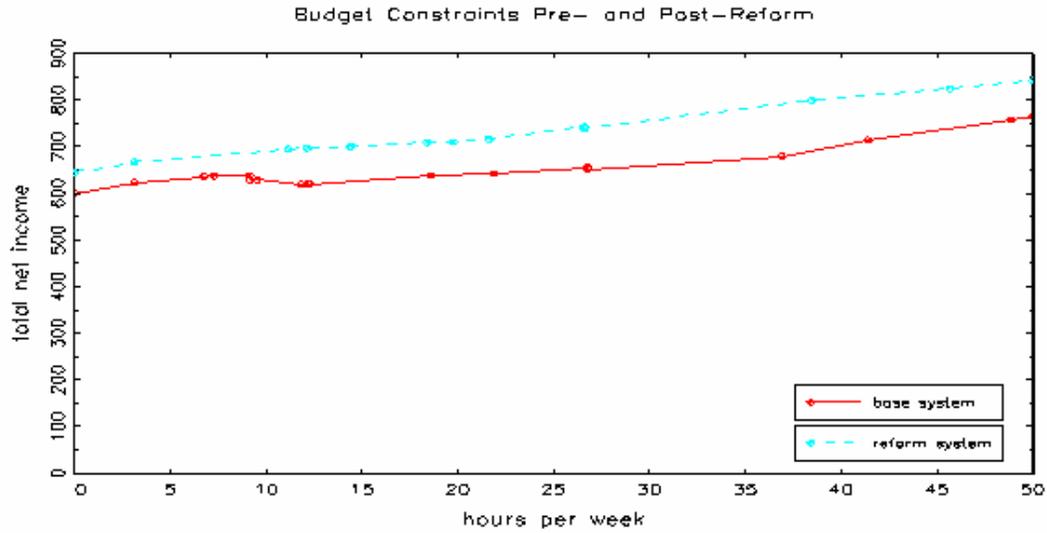


Figure 9b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$10

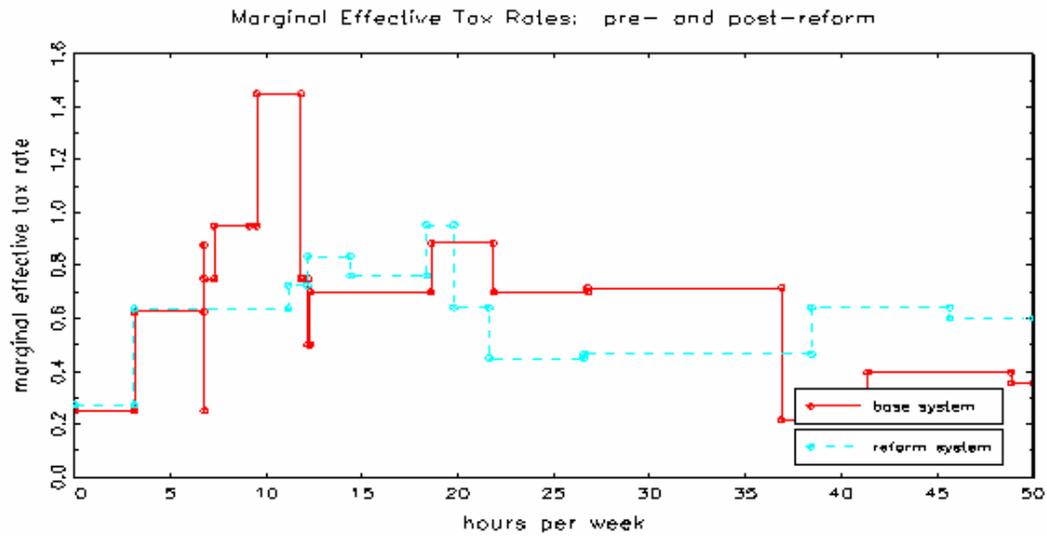


Figure 10a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$15

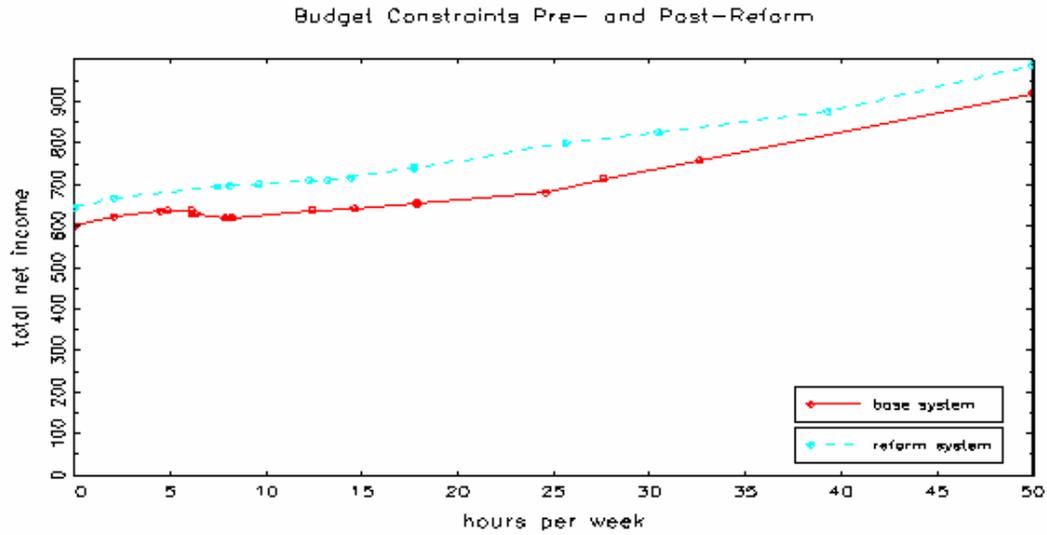


Figure 10b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$15

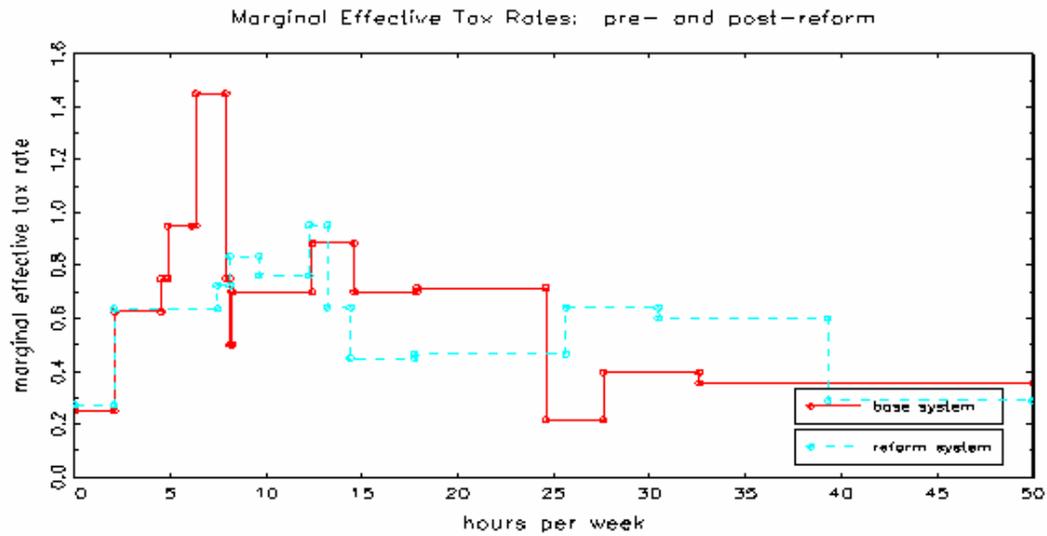


Figure 11a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$20

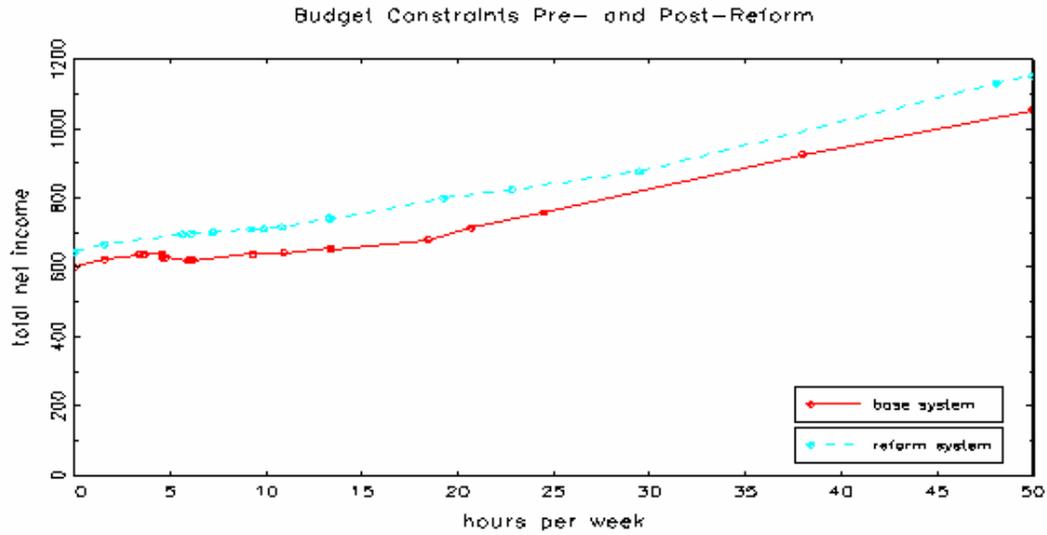


Figure 11b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$20

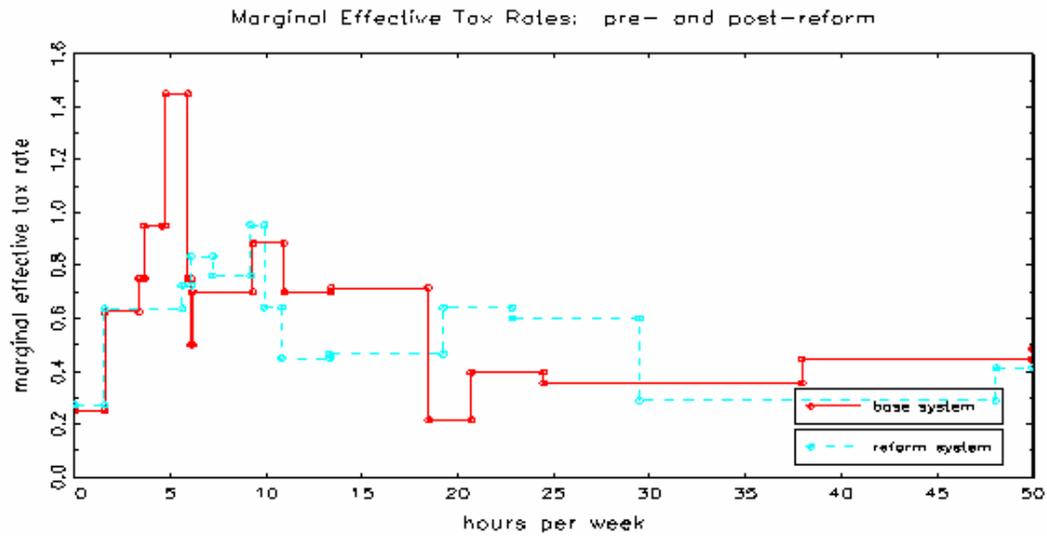


Figure 12a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$25

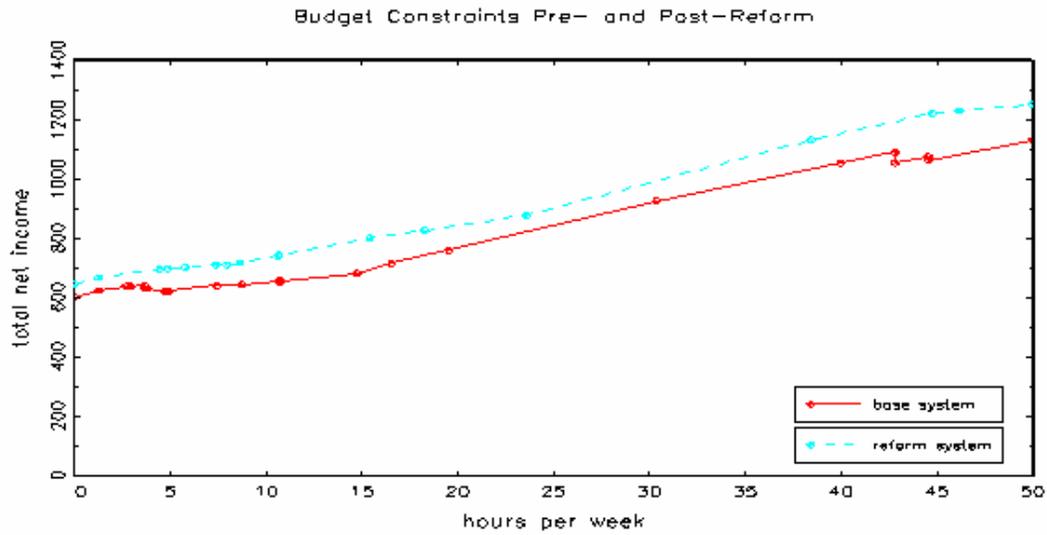
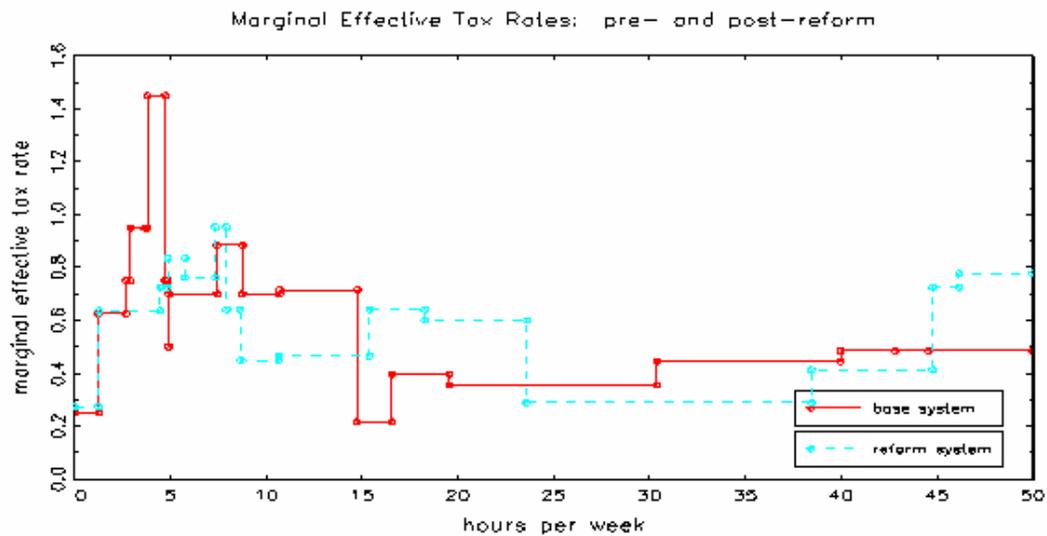


Figure 12b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$25



Appendix E: Budget constraints and METRs for married mothers – husband is working 40 hours with wage rate \$20

Figure 1a: Family budget constraint – 1 child under 13, wife’s wage \$10

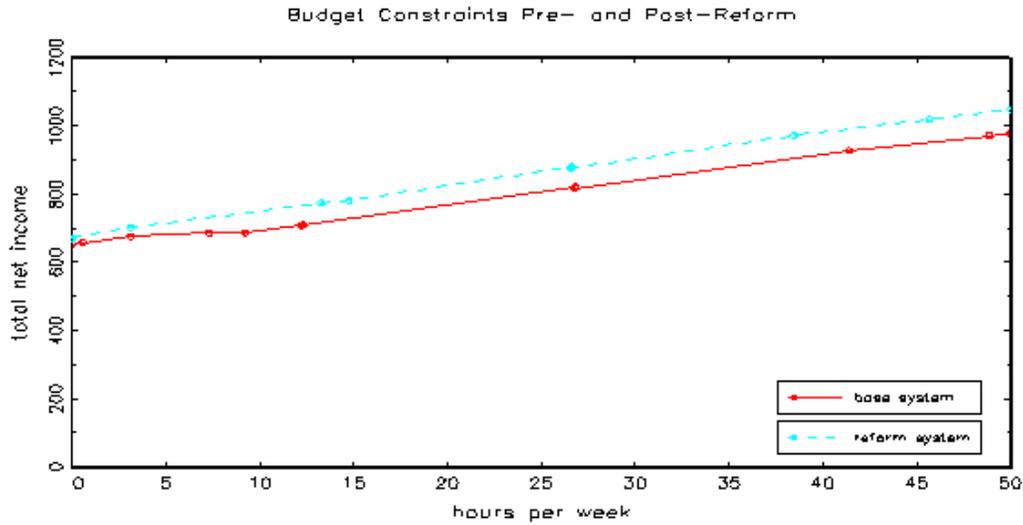


Figure 1b: Wife’s METR – 1 child under 13, wife’s wage \$10

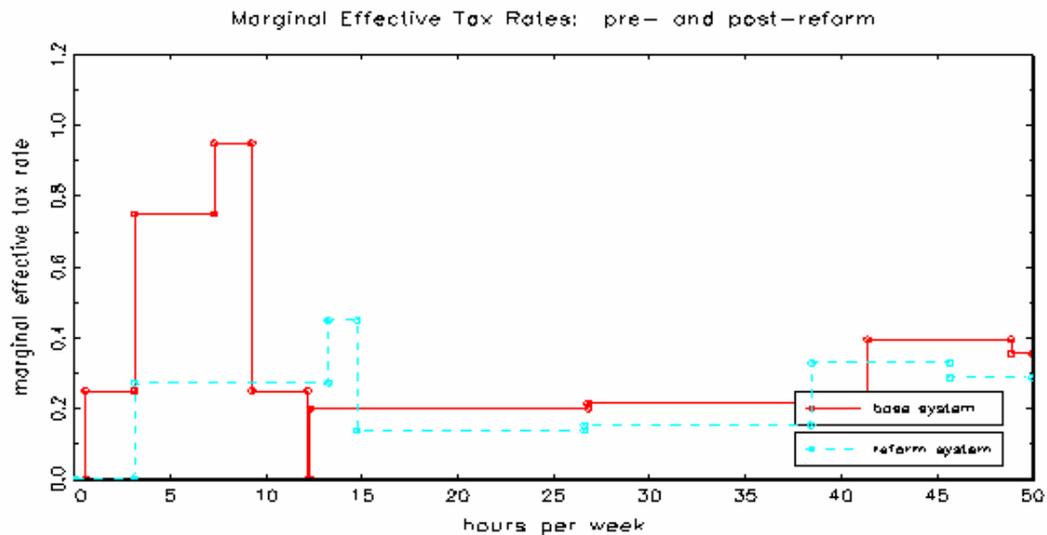


Figure 2a: Family budget constraint – 1 child under 13, wife’s wage \$15

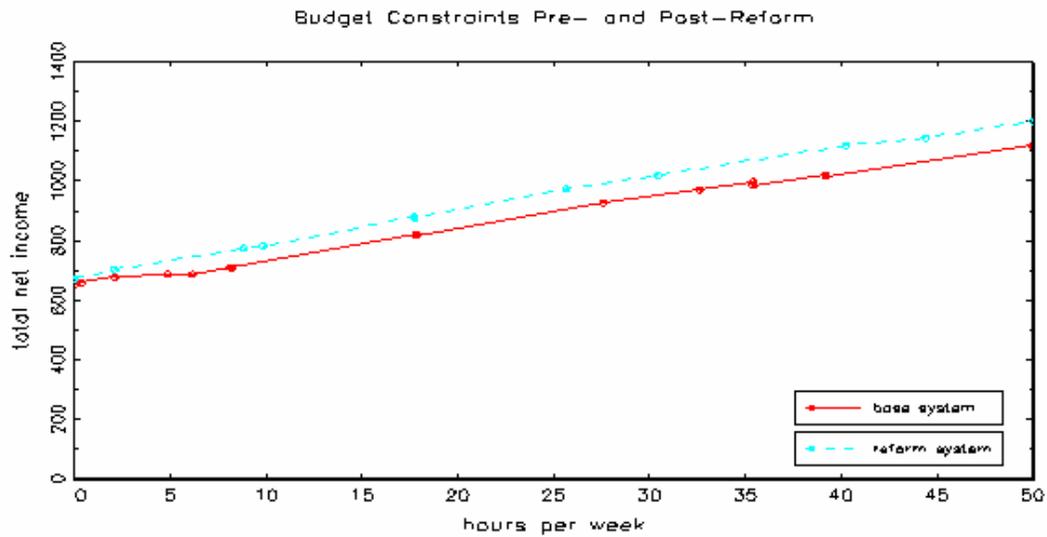


Figure 2b: Wife’s METR – 1 child under 13, wife’s wage \$15

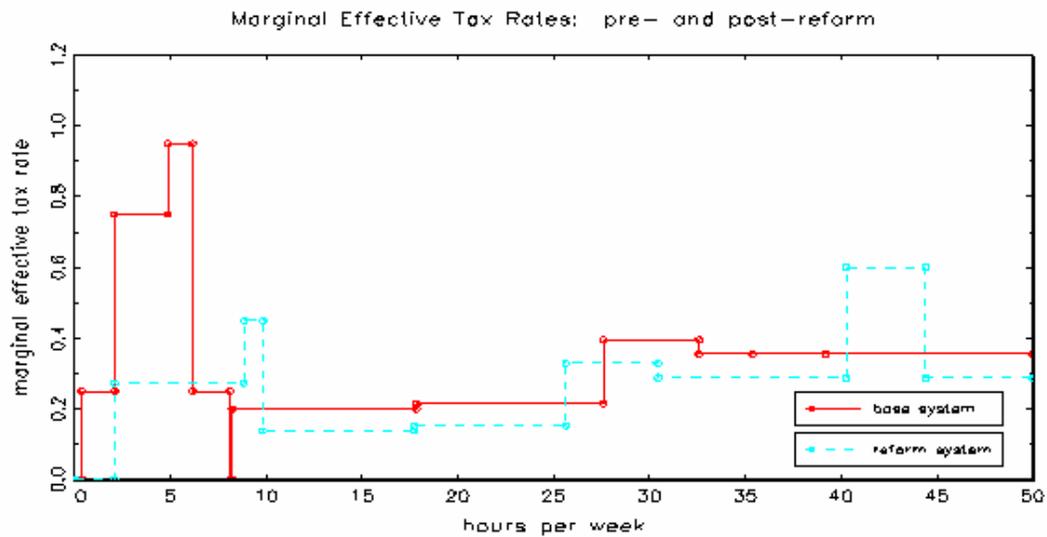


Figure 3a: Family budget constraint – 1 child under 13, wife’s wage \$20

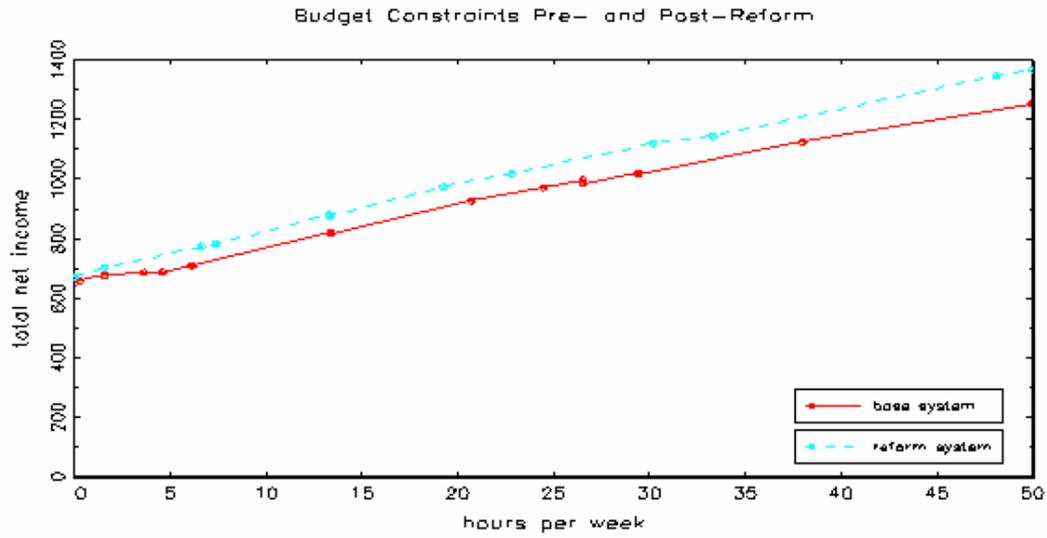


Figure 3b: Wife’s METR – 1 child under 13, wife’s wage \$20

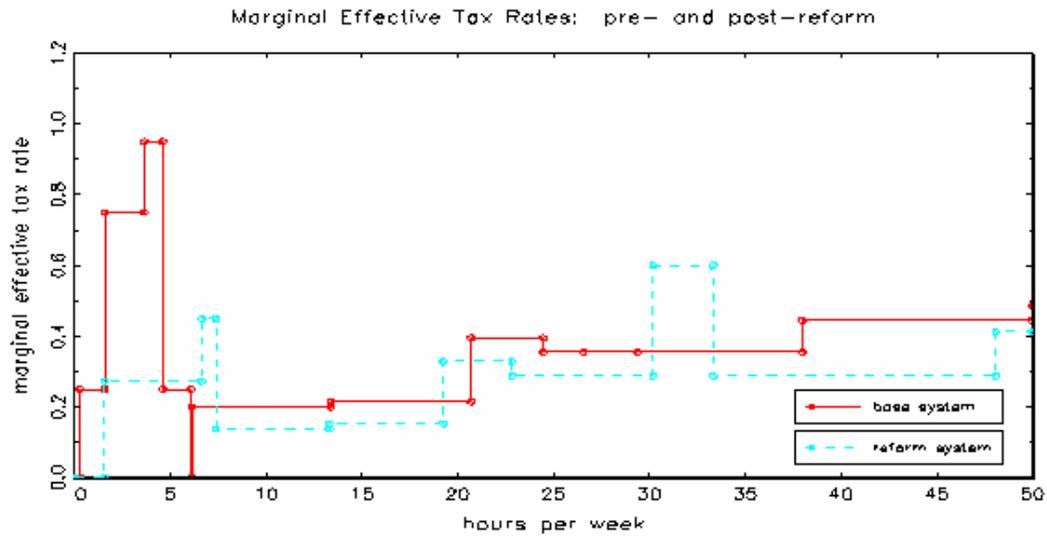


Figure 4a: Family budget constraint – 2 children under 13, wife’s wage \$10

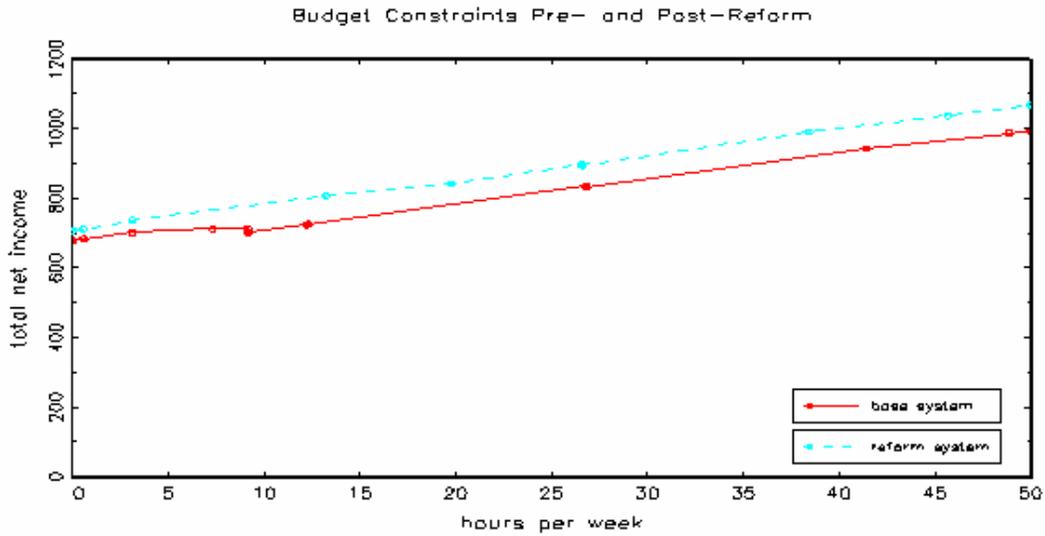


Figure 4b: Wife’s METR – 2 children under 13, wife’s wage \$10

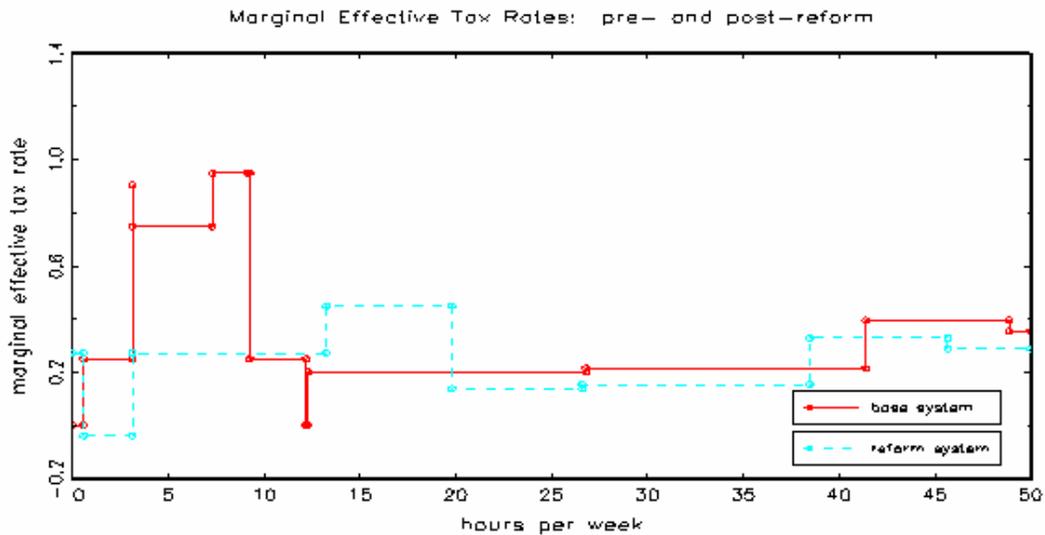


Figure 5a: Family budget constraint – 2 children under 13, wife’s wage \$15

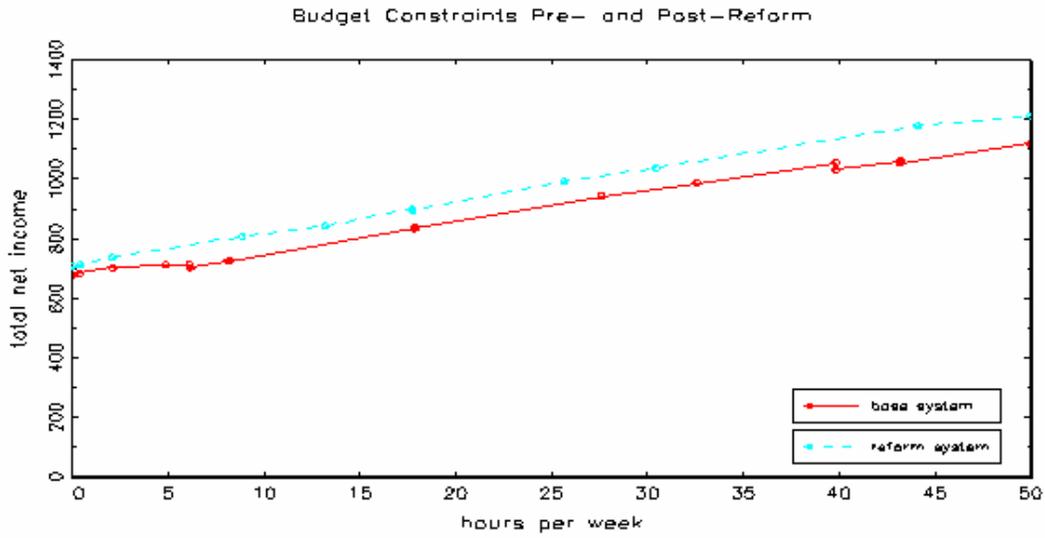


Figure 5b: Wife’s METR – 2 children under 13, wife’s wage \$15

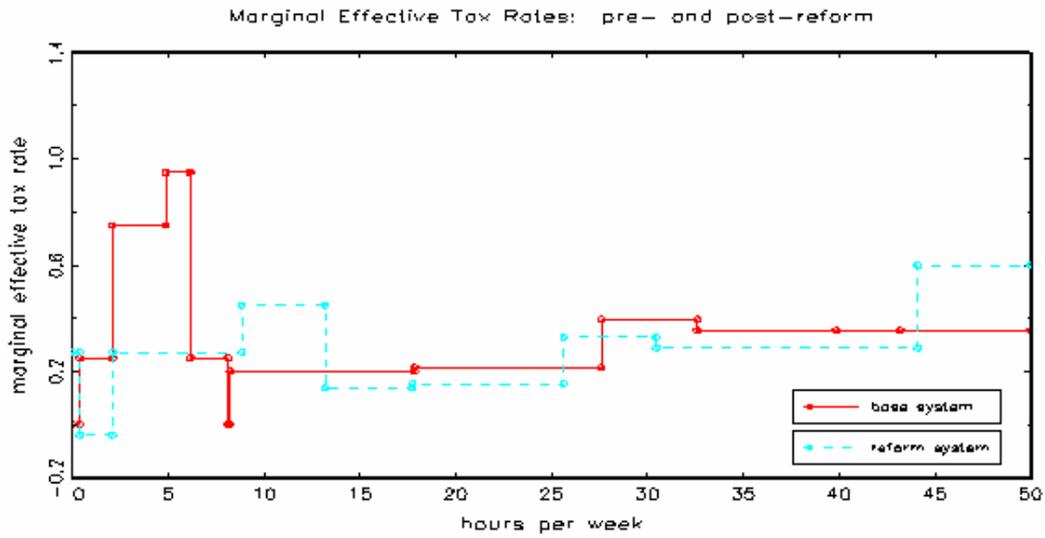


Figure 6a: Family budget constraint – 2 children under 13, wife’s wage \$20

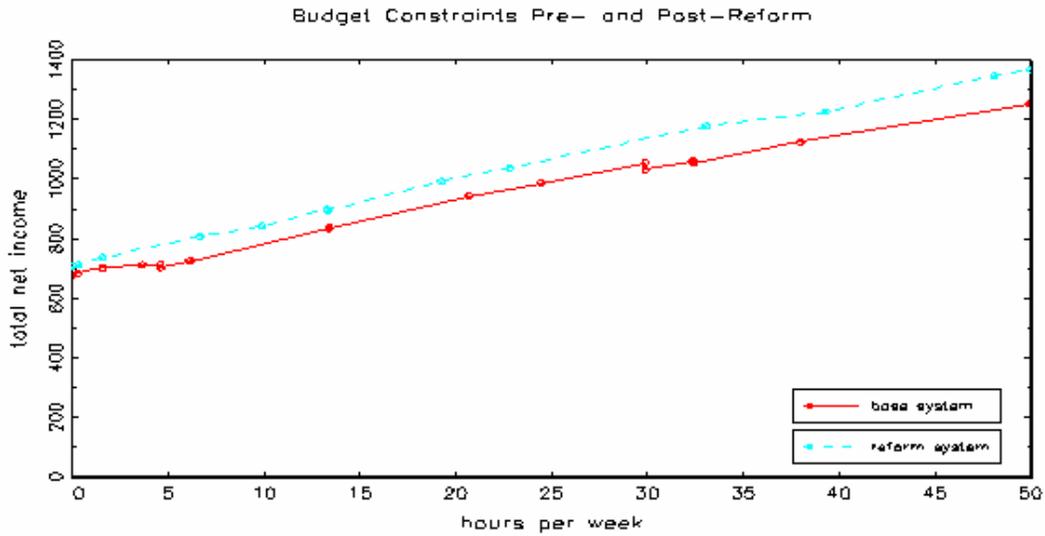


Figure 6b: Wife’s METR – 2 children under 13, wife’s wage \$20

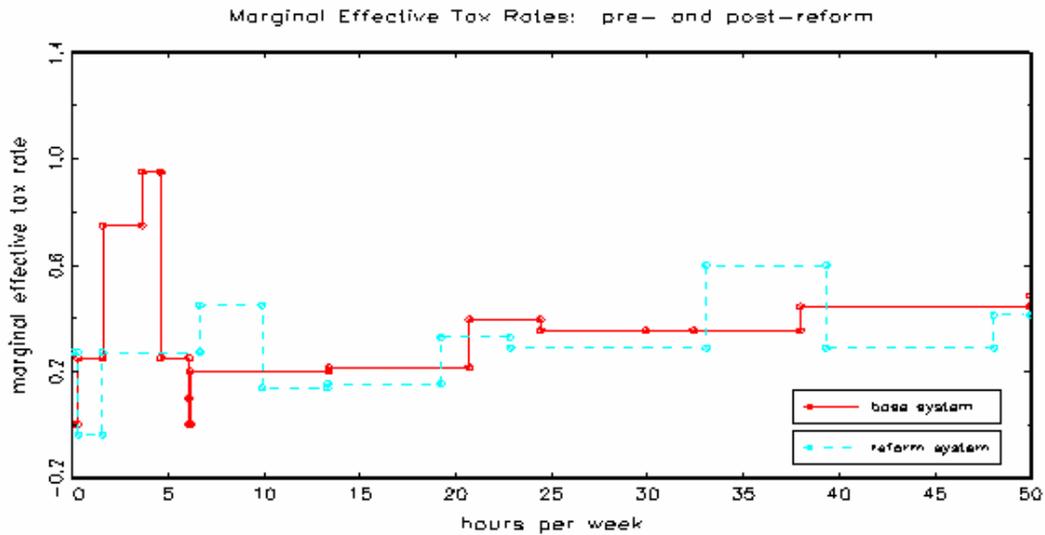


Figure 7a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$10

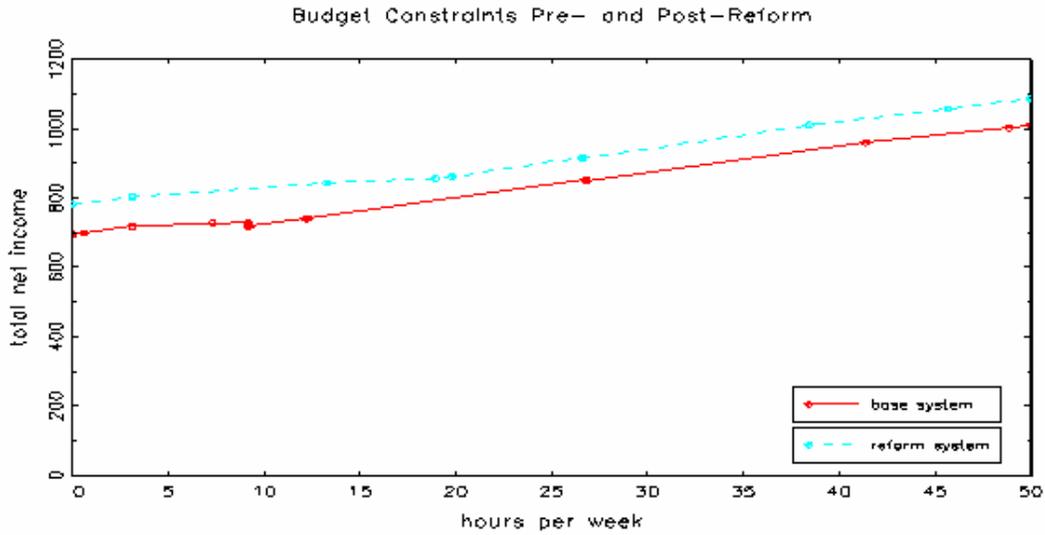


Figure 7b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$10

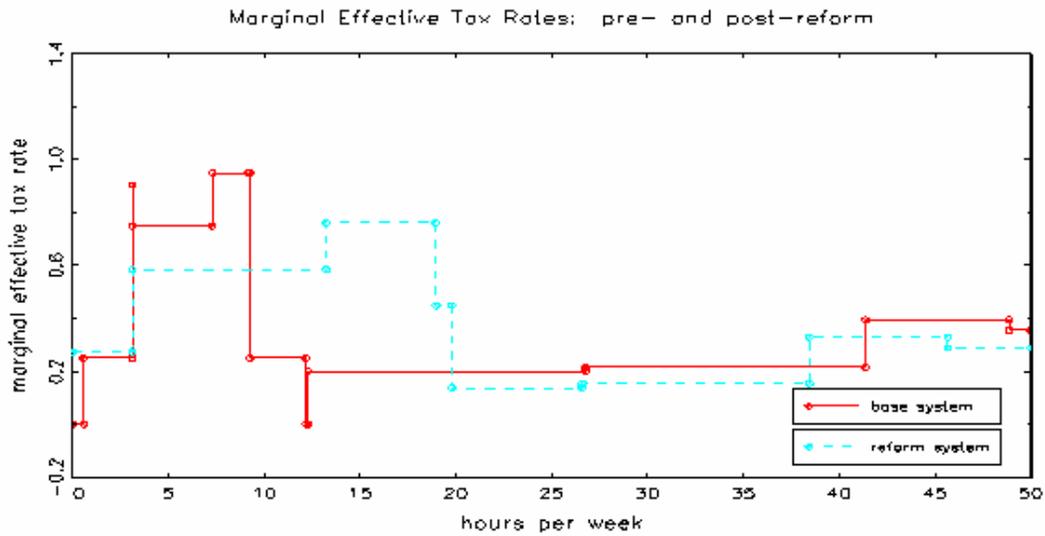


Figure 8a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$15

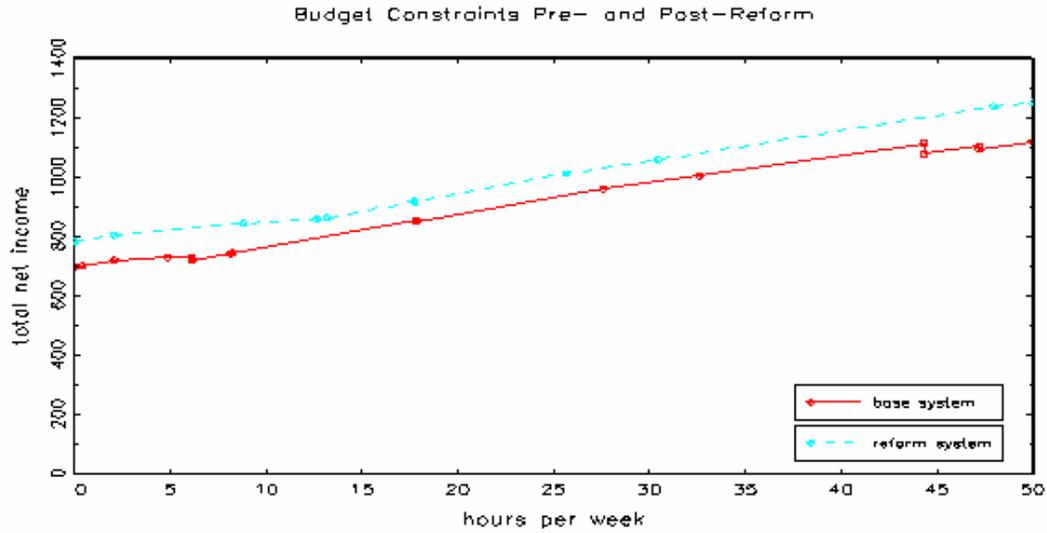


Figure 8b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$15

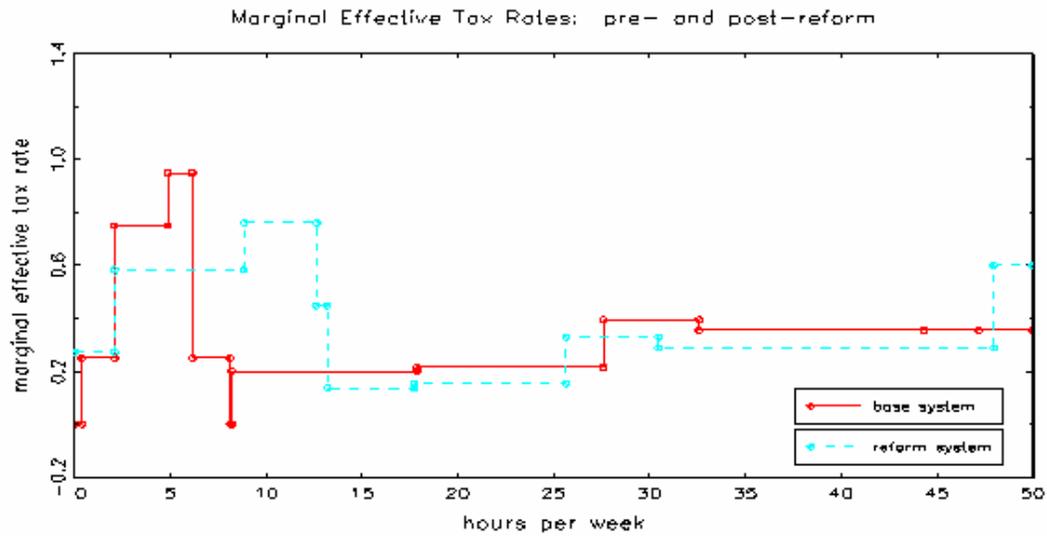


Figure 9a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$20

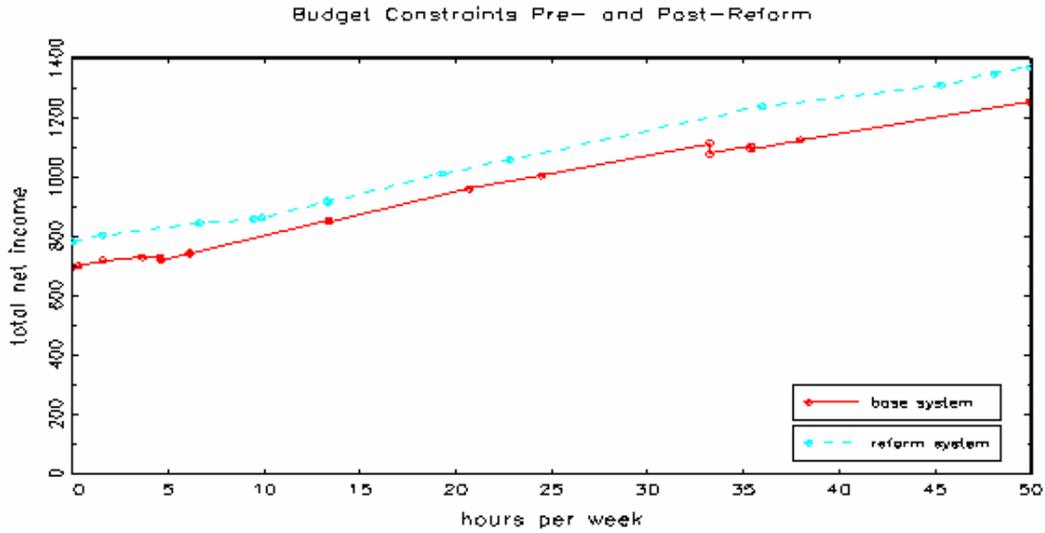
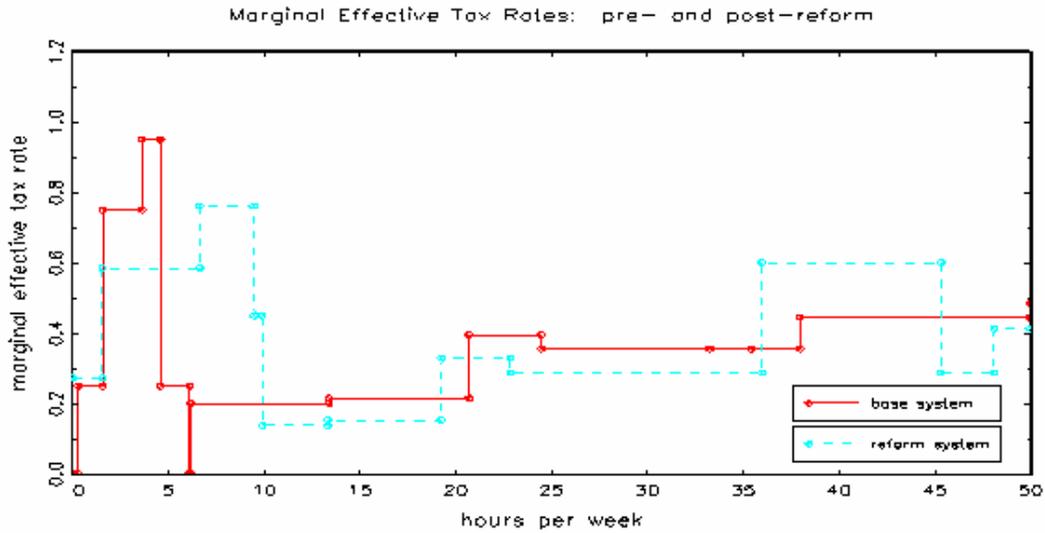


Figure 9b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$20



Appendix F: Budget constraints and METRs for married mothers – husband working 40 hours with wage rate \$25

Figure 1a: Family budget constraint – 1 child under 13, wife’s wage \$10

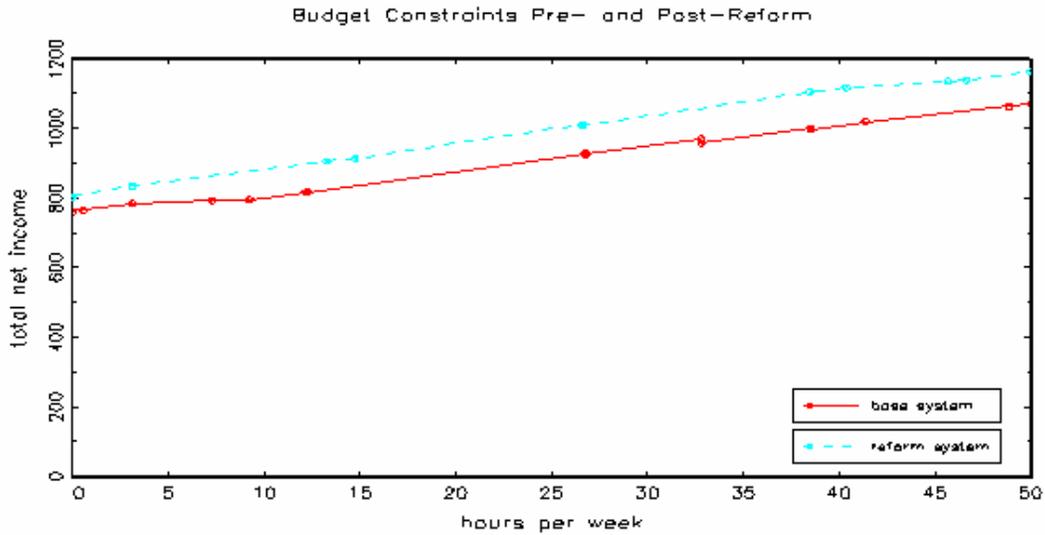


Figure 1b: Wife’s METR – 1 child under 13, wife’s wage \$10

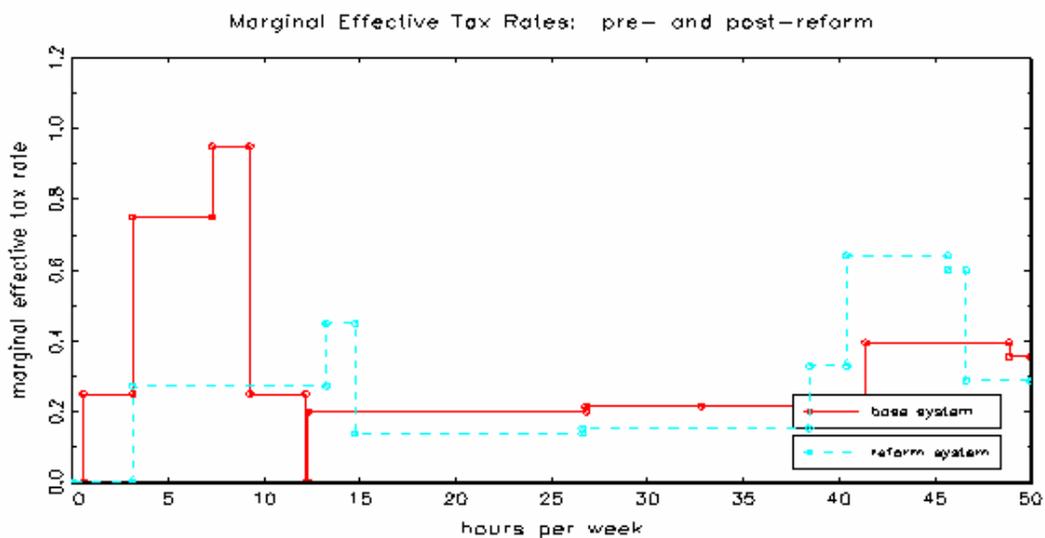


Figure 2a: Family budget constraint – 1 child under 13, wife’s wage \$15

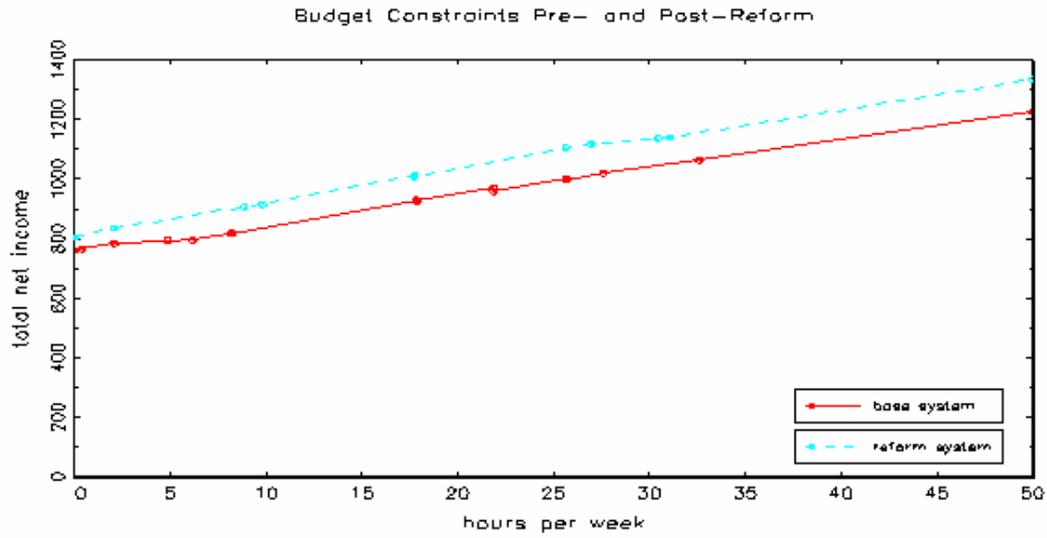


Figure 2b: Wife’s METR – 1 child under 13, wife’s wage \$15

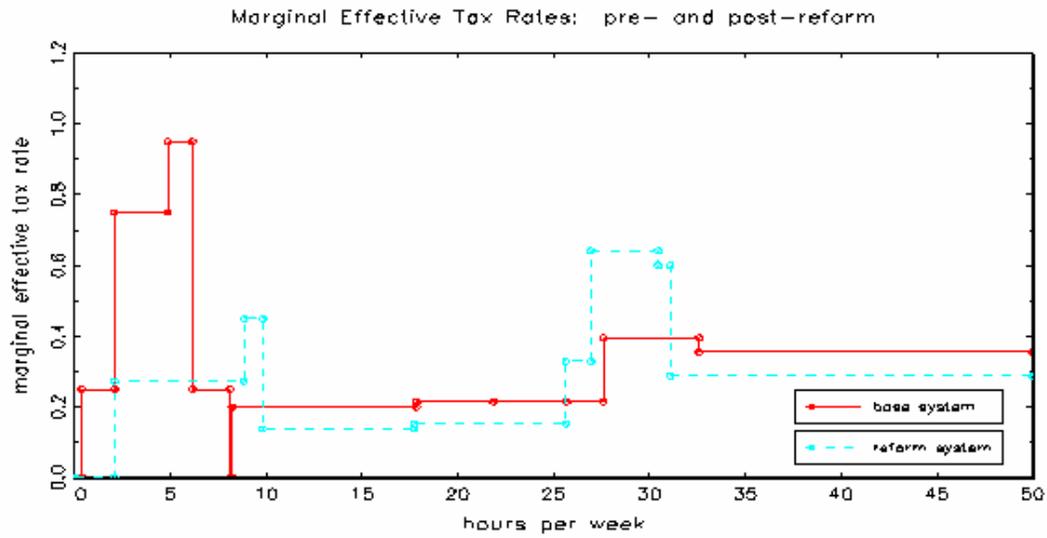


Figure 3a: Family budget constraint – 1 child under 13, wife’s wage \$20

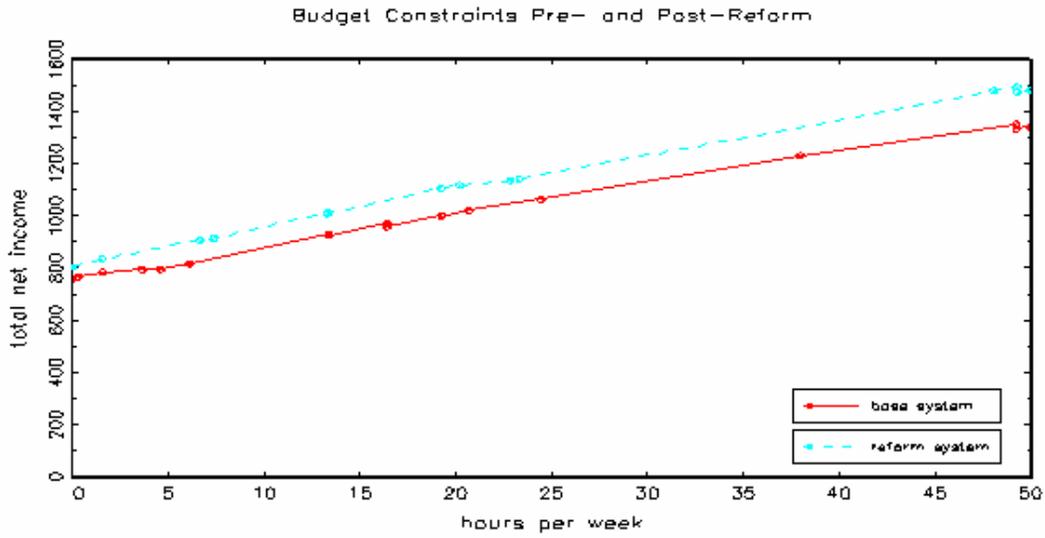


Figure 3b: Wife’s METR – 1 child under 13, wife’s wage \$20

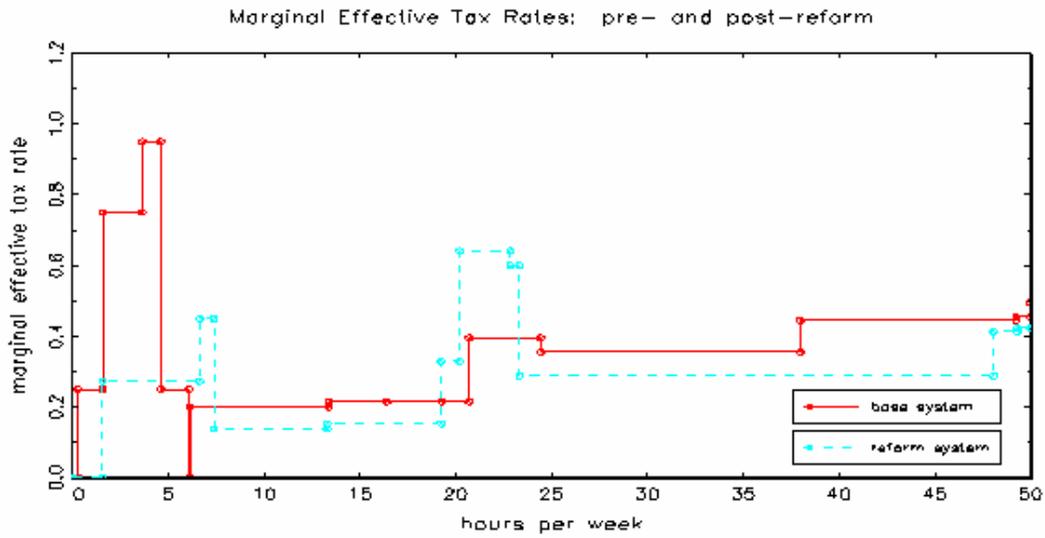


Figure 4a: Family budget constraint – 2 children under 13, wife’s wage \$10

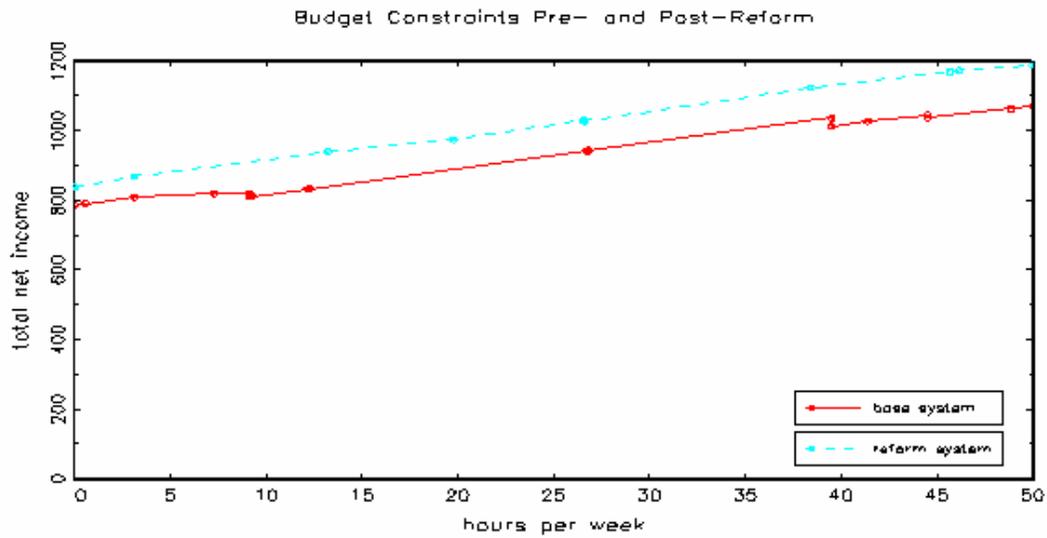


Figure 4b: Wife’s METR – 2 children under 13, wife’s wage \$10

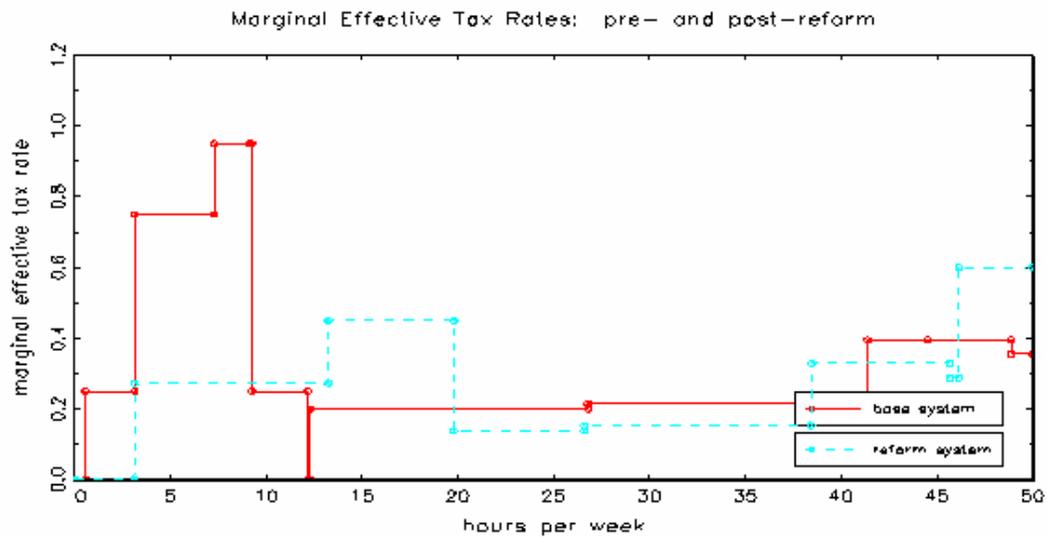


Figure 5a: Family budget constraint – 2 children under 13, wife’s wage \$15

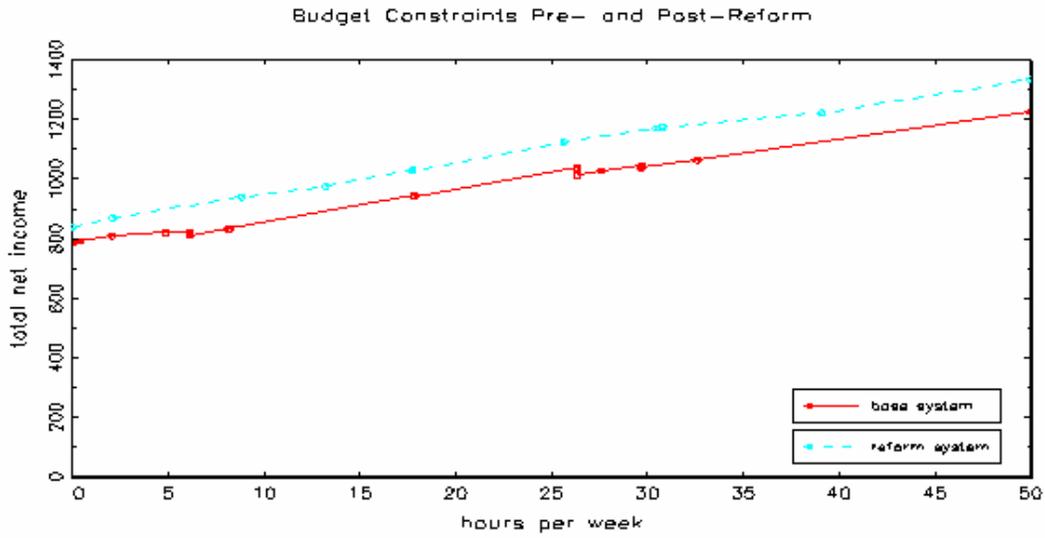


Figure 5b: Wife’s METR – 2 children under 13, wife’s wage \$15

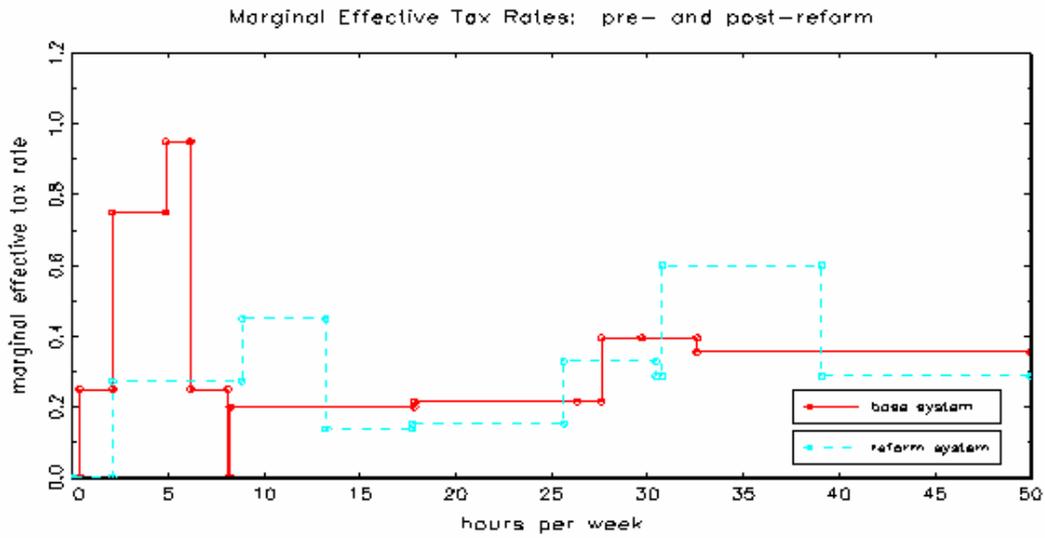


Figure 6a: Family budget constraint – 2 children under 13, wife’s wage \$20

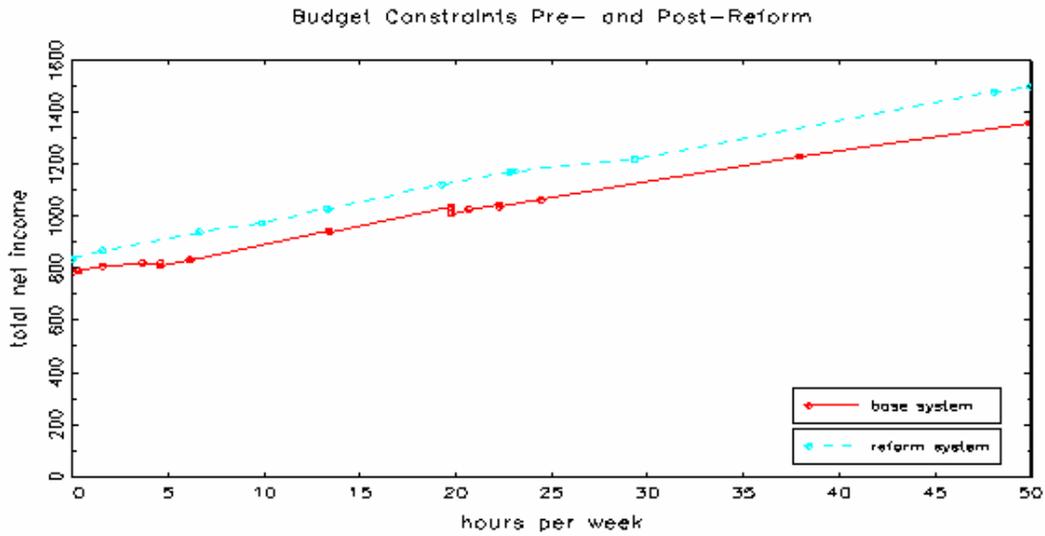


Figure 6b: Wife’s METR – 2 children under 13, wife’s wage \$20

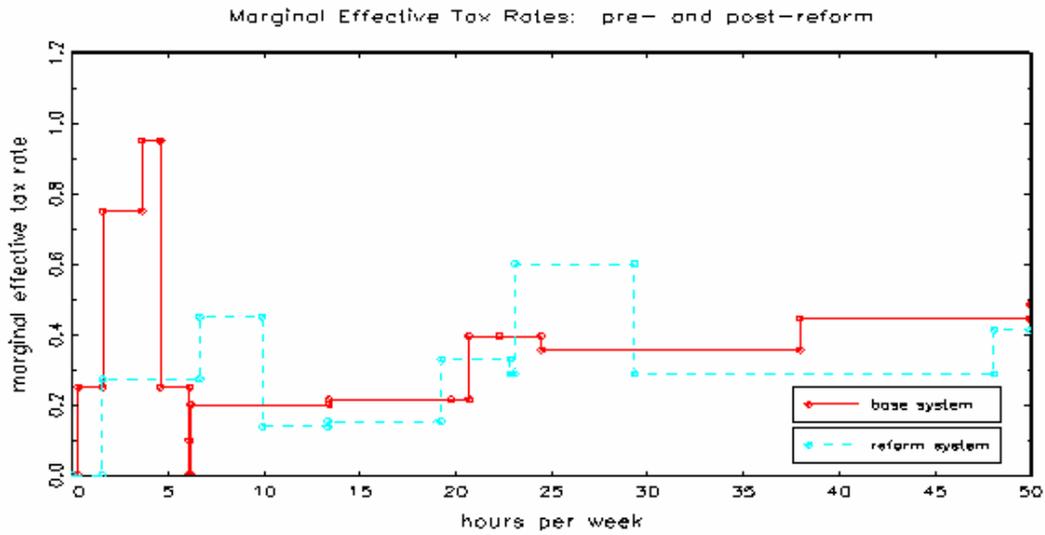


Figure 7a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$10

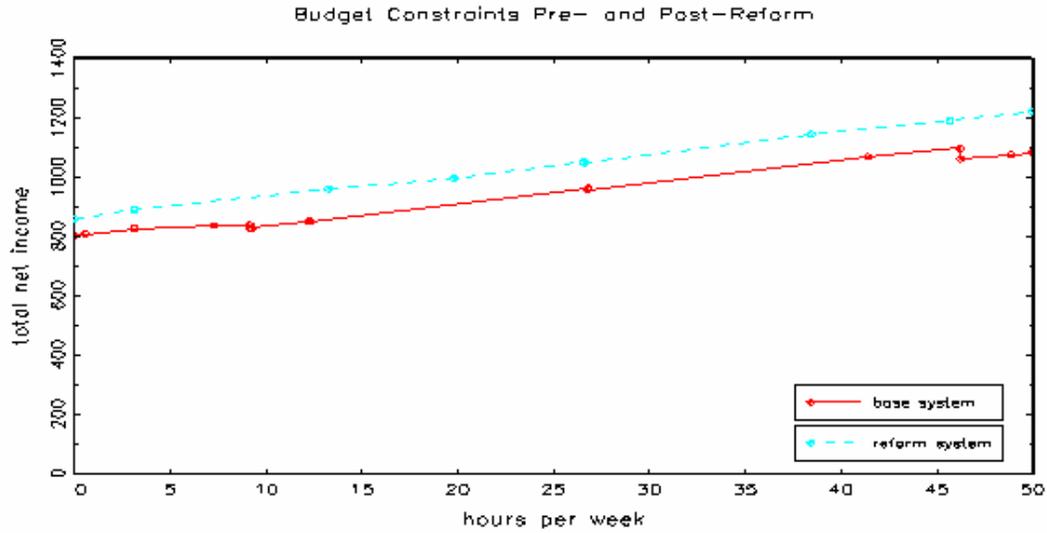


Figure 7b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$10

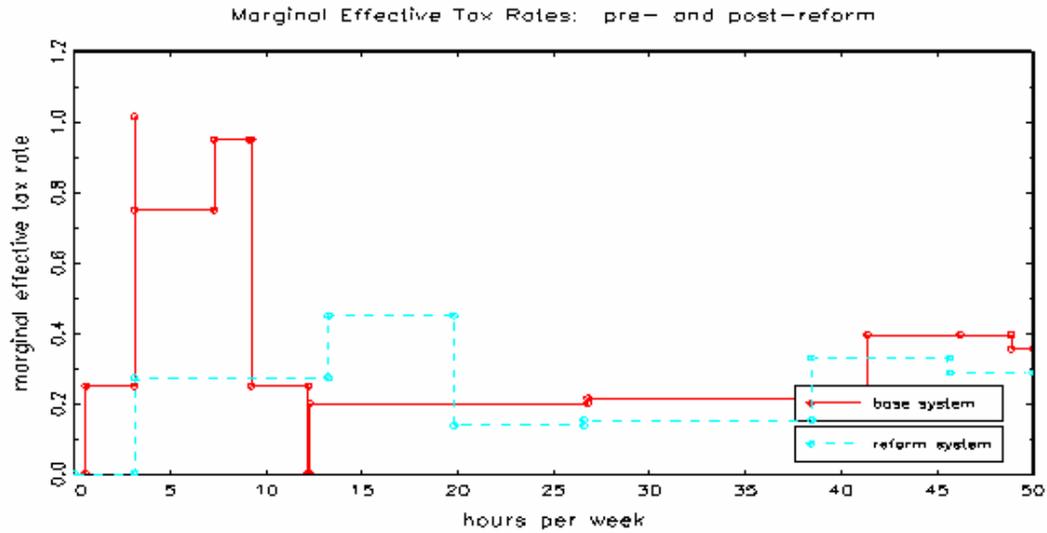


Figure 8a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$15

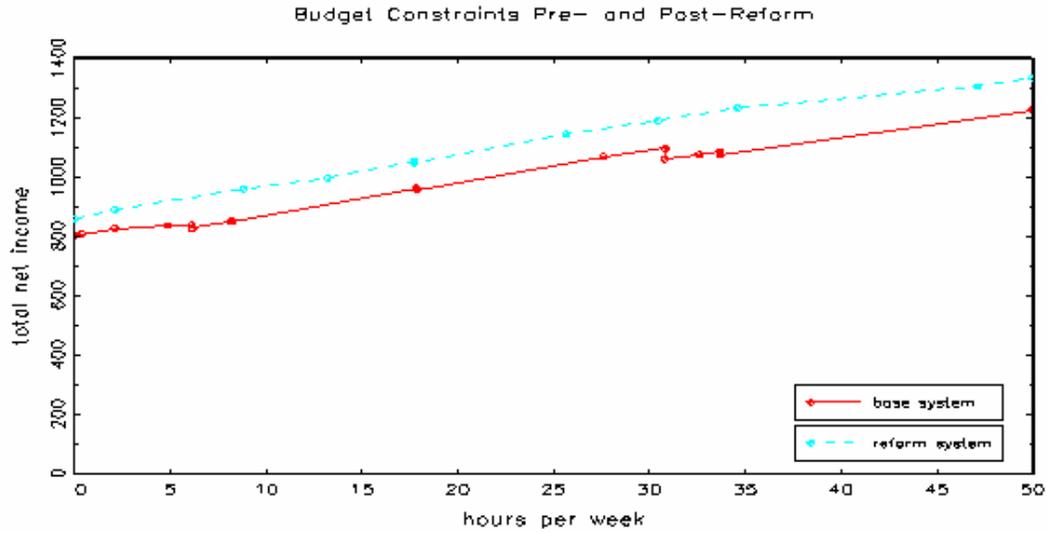


Figure 8b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$15

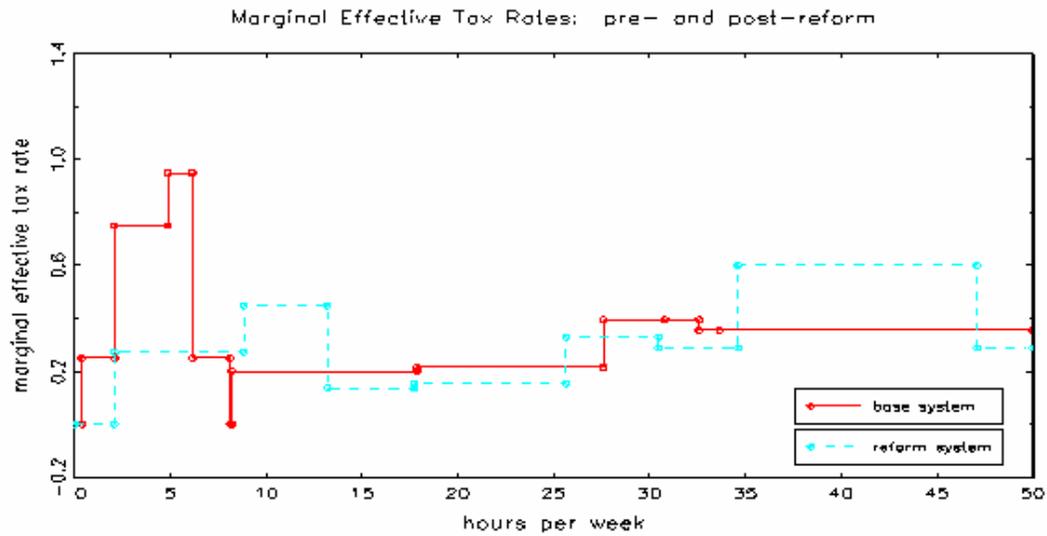


Figure 9a: Family budget constraint – 3 children, 2 under 13, 1 over 13, wife’s wage \$20

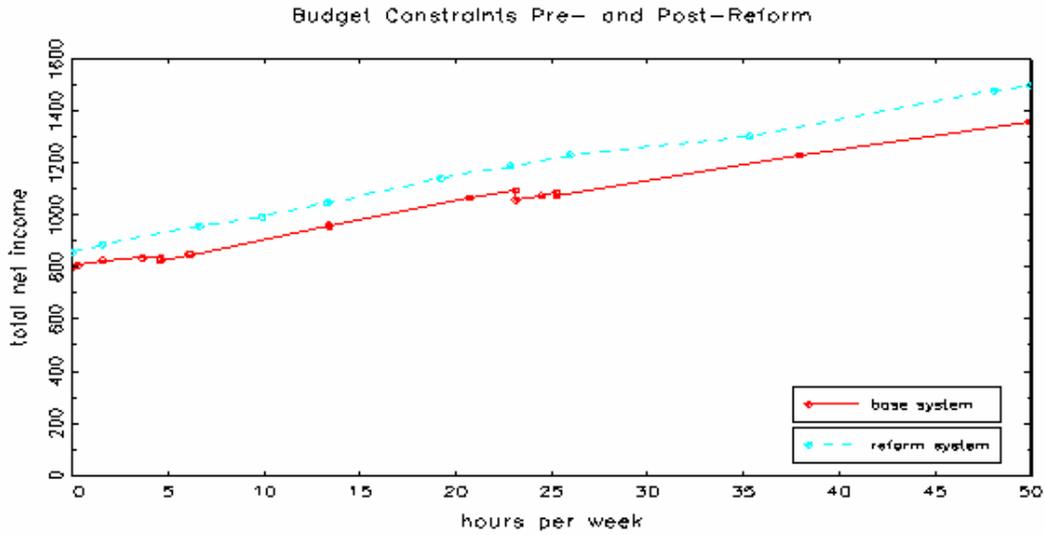
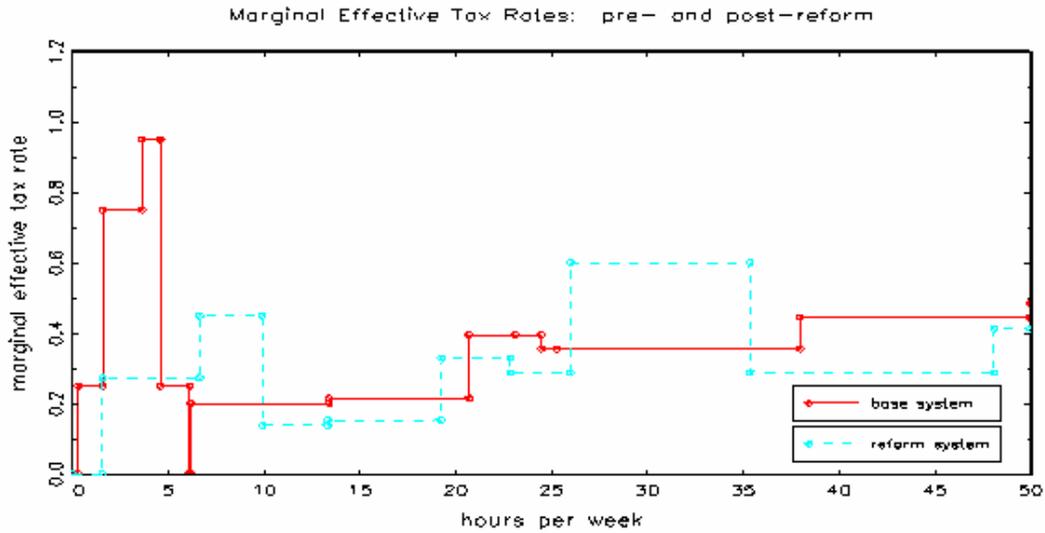


Figure 9b: Wife’s METR – 3 children, 2 under 13, 1 over 13, wife’s wage \$20



Appendix G: Simulations using SIHC 2000/2001

Table G1: Summary labour supply responses

	SIHC 1999/2000		SIHC 2000/2001	
	Married mothers	Single parents	Married mothers	Single parents
all workers (%base)	60.78	51.9	62.41	49.62
wage & salary workers(%base)	52.34	47.05	54.47	42.64
wage & salary workers(%post)	53.75	48.32	52.6	40.95
non-work-->work (%)	1.62	1.76	0.09	1.14
work-->non-work (%)	0.21	0.49	1.95	2.83
workers working more	0.62	2.65	0.15	0.35
workers working less	0.21	0.34	0.43	1.74
average hours change	0.44	1.01	-0.62	-1.08

Table G2: Labour supply transitions – SIHC 2000/2001

Hours	From pre-reform to post-reform: rows to columns											Total
	0	5	10	15	20	25	30	35	40	45	50	
Sole parents												
0	98	0	0	0.2	0.5	0.4	0.3	0.3	0.2	0.1	0.1	57.4
5	0.2	96.4	0	0.1	3	0	0.2	-	0	-	-	2.2
10	0.4	-	99.1	0.2	-	0.3	-	-	-	0.1	-	2.4
15	-	-	-	99.6	0.1	-	0.2	0.1	-	-	-	4
20	-	-	-	0.4	99.6	-	-	-	-	-	-	3.9
25	2.6	0.1	0.5	0.1	0.1	96	-	0.2	0.2	0.1	0.1	2.4
30	2	0	0	0.1	0.4	0	96.7	-	-	0.3	0.3	3.1
35	1.5	0.2	0.3	0.8	1	1.1	0.4	93.8	0.3	0.2	0.5	5.4
40	16.5	0.2	1.1	1.2	1.8	2	1.4	0.8	73.8	0.1	1	14.2
45	11.2	0.2	0	0.8	2.6	0.9	0.8	1.2	0.2	81.8	0.2	1.8
50	2	1.2	-	0.1	0.2	0.5	1	0.7	0.5	0.2	93.6	3.2
Total	59	2.2	2.5	4.4	4.6	2.9	3.4	5.4	10.6	1.6	3.2	100
Married mothers												
0	99.8	0	0	0	0	0	0	0	0	0	0	45.5
5	0.5	99.1	-	0.3	-	-	-	0.1	-	-	-	3
10	3.8	-	95.6	0.1	0.1	-	0.1	0	0.2	0	0.1	3.8
15	3.5	0.2	0	95.9	0	0.1	0.2	-	0	-	-	5.6
20	3.6	-	0.1	0.1	95.6	0.3	0.1	0	0.1	0	0	6.3
25	3.9	0.1	0.3	0	0.1	95.2	0.2	0	0.1	0	-	6.9
30	3.1	0	0	0.2	0.3	0.3	95.7	0	0.1	0.2	-	4.9
35	2.8	0.1	0.1	0.3	0.2	0.3	0.1	95.8	0.1	0.1	0.1	5.3
40	4.5	0.1	0.1	0.1	0.2	0.4	0.2	0.1	94.3	0.1	0	12.7
45	2.8	0.1	0.2	0.3	0.1	0.5	0.1	0	0.1	95.7	0	2.2
50	4.5	0.1	-	0.1	0.4	0.2	0.2	0.9	0.2	0.2	93.4	3.8
Total	47.4	3.1	3.7	5.4	6.2	6.7	4.8	5.2	12	2.1	3.6	100

Table G3a: Change in predicted working hours of sole parents – SIHC 2000/2001

	Decrease in hours (row percentages)				Increase in hours (row percentages)			Average (hours)
	> 10	5 -10	1 - 5	None	1 - 5	5 - 10	> 10	
Age								
15to19	-	-	-	100	-	-	-	0
20to24	-	-	-	98	2	-	-	0.12
25to29	1	-	3	88	8	-	-	-0.12
30to34	14	3	2	71	10	1	-	-2.59
35to39	11	2	6	74	6	1	-	-1.94
40to44	3	3	6	77	10	2	-	-0.6
45to49	1	4	18	66	10	-	-	-0.79
50to54	1	-	18	72	6	3	-	-0.26
55to59	-	-	-	88	3	-	9	1.13
60to64	-	-	-	100	-	-	-	0.47
Number of children								
One dependant	5	3	7	75	8	1	0	-1.1
Two dependants	6	1	7	78	8	0	-	-1.19
Three dep.	6	-	6	78	9	-	-	-1.01
Four dep.	-	9	4	86	1	-	-	-0.42
Age of youngest								
0-2 yrs	0	1	-	96	3	-	-	0.02
3-4 yrs	2	-	-	98	0	-	-	-0.31
5-9 yrs	11	4	8	65	11	0	-	-2.46
10-14 yrs	8	3	11	66	12	-	-	-1.58
15 +	-	1	9	79	6	4	1	0.28
Highest qualification								
at school	-	-	-	100	-	-	-	0
no qualification	5	1	2	84	6	1	0	-0.7
other post-school	8	2	9	72	8	0	-	-1.67
degree and higher	3	5	22	56	14	-	-	-1.26
Employment status								
employed	11	4	14	70	1	-	-	-2.83
non-part	-	-	-	87	12	1	0	0.54
unemployed	-	-	-	72	23	5	-	0.98
Total	5.61	2.11	6.86	76.61	7.73	0.91	0.18	-1.08

Table G3b: Change in predicted working hours of married mothers – SIHC 2000/2001

	Decrease in hours (row percentages)				Increase in hours (row percentages)			Average (hours)
	> 10	5 -10	1 - 5	None	1 - 5	5 - 10	> 10	
Age								
15to19	-	-	-	100	-	-	-	0
20to24	1	2	6	88	2	-	1	-0.36
25to29	1	1	12	86	0	-	0	-0.45
30to34	0	1	8	89	1	-	-	-0.34
35to39	0	1	11	86	2	-	0	-0.31
40to44	0	2	16	81	1	0	-	-0.55
45to49	0	2	14	82	1	-	-	-0.55
50to54	1	1	14	83	1	0	-	-0.6
55to59	2	-	12	84	0	1	1	-0.24
60to64	-	-	2	97	1	-	-	0.02
Number of children								
One dependant	1	2	16	81	0	-	-	-0.74
Two dependants	0	2	17	80	0	-	-	-0.61
Three dep.	1	2	12	84	1	0	-	-0.53
Four dep.	-	2	11	85	2	-	-	-0.29
Age of youngest children								
0-2 yrs	1	2	7	90	0	-	-	-0.39
3-4 yrs	1	1	10	87	1	-	-	-0.45
5-9 yrs	-	1	19	78	1	0	-	-0.5
10-14 yrs	1	4	20	75	0	-	-	-0.91
15 +	1	1	21	77	-	-	-	-0.92
Highest qualification								
no qualification	0	2	11	86	1	-	-	-0.48
other post-school	1	2	19	77	1	-	-	-0.82
degree and higher	0	3	20	76	1	0	-	-0.72
Employment status								
employed	1	3	24	71	0	-	-	-1.04
non-part	-	-	-	99	1	0	-	0.06
unemployed	-	-	-	96	4	-	-	0.08
Total	0.5	2.05	15.24	81.53	0.63	0.05	-	-0.62

Table G4a: Change in work probability of sole parents – SIHC 2000/2001

	Decrease in percentage points				Increase in percentage points			Average in percentage points
	(row percentages)				(row percentages)			
	> 50	10 - 50	2 - 10	none	2 - 10	10 - 50	> 50	
Age								
15to19	-	-	-	100	-	-	-	0.11
20to24	-	-	-	87	13	-	-	0.4
25to29	-	4	-	73	24	-	-	0.19
30to34	3	13	2	53	27	2	-	-5.21
35to39	5	8	3	61	22	1	-	-3.53
40to44	1	4	5	64	22	4	-	-0.21
45to49	-	7	8	72	10	3	-	-0.73
50to54	-	4	9	74	9	3	-	-0.06
55to59	-	-	-	91	-	9	-	2.8
60to64	-	-	-	60	40	-	-	1.4
Number of children								
None	-	-	-	-	-	100	-	17
One dependent	1	8	3	74	13	2	-	-1.78
Two dependents	3	5	4	60	26	2	-	-1.86
Three dep.	2	6	5	57	27	3	-	-1.71
Four dep.	-	9	-	62	29	-	-	0.11
Age of youngest								
0-2 yrs	-	1	-	79	20	-	-	0.49
3-4 yrs	1	1	-	80	18	-	-	-0.44
5-9 yrs	4	12	4	49	27	2	-	-4.83
10-14 yrs	1	10	7	61	21	-	-	-2.43
15 +	-	1	3	84	4	8	-	1.44
Highest qualification								
at school	-	-	-	100	-	-	-	0
no qualification	1	5	2	69	21	2	-	-0.83
other post-school	3	10	4	63	19	1	-	-3.26
degree and higher	1	5	10	68	12	4	-	-1.39
Employment status								
employed	3	13	7	76	-	-	-	-5.7
non-part	-	-	-	59	38	2	-	1.93
unemployed	-	-	-	52	38	11	-	3.39
Total	1.62	6.5	3.56	66.94	19.19	2.19	-	-1.69

Table G4b: Change in work probability of married mothers – SIHC 2000/2001

	Decrease in percentage points				Increase in percentage points			Average in percentage points
	(row percentages)				(row percentages)			
	> 50	10 - 50	2 - 10	none	2 - 10	10 - 50	> 50	
Age								
15to19	-	-	-	100	-	-	-	0
20to24	-	9	1	88	2	-	-	-2.04
25to29	0	6	11	81	2	-	-	-1.59
30to34	0	4	12	82	1	0	-	-1.48
35to39	-	5	16	77	2	-	-	-1.58
40to44	-	8	23	68	2	0	-	-2.39
45to49	-	6	21	73	1	-	-	-1.97
50to54	2	3	17	79	-	-	-	-2.49
55to59	-	5	13	82	-	-	-	-1.54
60to64	-	-	-	100	-	-	-	0
Number of children								
One dependent	0	5	17	77	1	0	-	-1.97
Two dependents	0	6	17	75	1	0	-	-1.93
Three dep.	0	5	16	76	2	0	-	-1.68
Four dep.	-	1	14	81	4	-	-	-1.13
Age of youngest								
0-2 yrs	0	4	8	86	2	-	-	-1.28
3-4 yrs	-	7	11	80	1	1	-	-1.83
5-9 yrs	-	5	21	72	2	0	-	-1.84
10-14 yrs	-	9	21	70	0	-	-	-2.42
15 +	1	3	23	73	1	-	-	-2.19
Highest qualification								
no qualification	0	5	13	81	1	-	-	-1.66
other post-school	0	7	20	71	2	0	-	-2.42
degree and higher	-	4	21	72	2	1	-	-1.51
Employment status								
employed	0	9	26	65	-	-	-	-3.13
non-part	-	-	-	96	4	0	-	0.22
unemployed	-	-	-	93	7	-	-	0.28
Total	0.13	5.43	16.45	76.39	1.43	0.17	-	-1.87

Appendix H: Summary Statistics for the SIHC 1999/2000 and 2000/2001

Table H.1 Age of the mother

	SIHC 1999-2000		SIHC 2000-01	
	Married mothers	Sole parents	Married mothers	Sole parents
No of persons	1,868	555	1,808	598
Age (%)				
15-19	0.43	0.18	0.50	1.17
20-24	3.16	6.67	3.32	6.52
25-29	10.71	12.97	10.79	12.37
30-34	21.31	18.38	18.31	17.73
35-39	24.63	22.16	23.67	18.73
40-44	18.52	20.18	23.62	20.4
45-49	14.94	11.35	12.72	13.88
50-54	4.93	5.95	5.14	6.69
55-59	1.18	1.44	1.49	1.67
60-64	0.16	0.36	0.44	0.50
65plus	0.05	0.36	0.00	0.33

Table H.2 Children's characteristics

	SIHC 1999-2000		SIHC 2000-01	
	Married mothers	Sole parents	Married mothers	Sole parents
No of persons	1,868	555	1,808	598
No of dependent children				
1	33.24	48.65	31.53	51.68
2	42.72	34.59	45.08	32.61
3	18.31	12.43	18.53	11.37
4	5.73	4.32	4.87	4.35
Average no of dependent children	1.97	1.72	1.97	1.68
<i>standard deviation</i>	<i>0.86</i>	<i>0.84</i>	<i>0.83</i>	<i>0.84</i>
Age of youngest children under 15 (%)				
0-2	29.93	20.00	29.42	16.72
3-4	13.33	11.35	12.22	12.21
5-9	22.91	29.73	23.78	27.76
10-14	18.90	23.42	19.91	25.42
15	4.39	4.86	3.48	5.18
16-plus	10.55	10.63	11.17	12.71

Table H.3 Labour market characteristics

	SIHC 1999-2000		SIHC 2000-01	
	Married mothers	Sole parents	Married mothers	Sole parents
No of persons	1,868	555	1,808	598
Employment status (%)				
Employed full-time	27.41	27.03	27.49	29.6
Employed part-time	33.57	26.31	33.74	20.9
Unemployed	2.84	7.03	2.71	10.7
Non-participation	36.19	39.64	36.06	38.8
Highest qualification (%)				
Still at school	0.00	0.18	0.00	0.17
Degree and higher	16.81	10.81	16.98	14.05
Other post-school qualification	30.14	32.43	30.42	32.11
No qualification	53.05	56.58	52.60	53.68

Table H.4 Labour market status by age of the youngest child (SIHC 1999/2000)

Married mothers					
Age of youngest child	full-time	part-time	unemployed	non-participation	total
0-2	14.31	27.55	1.97	56.17	100
3-4	20.48	30.92	6.02	42.57	100
5-9	32.71	41.59	2.80	22.90	100
10-14	36.54	37.39	3.12	22.95	100
15	46.34	29.27	0.00	24.39	100
16plus	37.56	31.47	2.03	28.93	100
All	27.41	33.57	2.84	36.19	100
Sole parents					
Age of youngest child	full-time	part-time	unemployed	non-participation	total
0-2	7.21	25.23	9.91	57.66	100
3-4	19.05	19.05	4.76	57.14	100
5-9	26.06	32.12	7.88	33.94	100
10-14	36.92	24.62	6.92	31.54	100
15	33.33	40.74	3.70	22.22	100
16plus	50.85	16.95	3.39	28.81	100
All	27.03	26.31	7.03	39.64	100

Table H.5 Labour market status by age of the youngest child (SIHC 2000/2001)

Married mothers					
Age of youngest child	full-time	part-time	unemployed	non-participation	total
0-2	38.61	29.70	1.49	30.20	100
3-4	16.92	28.76	1.69	52.63	100
5-9	16.74	35.75	4.07	43.44	100
10-14	26.28	41.16	4.42	28.14	100
15	41.39	33.61	2.22	22.78	100
16plus	47.62	31.75	1.59	19.05	100
All	27.49	33.74	2.71	36.06	100
Sole parents					
Age of youngest child	full-time	part-time	unemployed	non-participation	total
0-2	55.26	19.74	5.26	19.74	100
3-4	7.00	15.00	12.00	66.00	100
5-9	15.07	15.07	8.22	61.64	100
10-14	32.53	24.70	12.65	30.12	100
15	37.50	22.37	8.55	31.58	100
16plus	19.35	29.03	25.81	25.81	100
All	29.60	20.90	10.70	38.80	100

Table H6 Sources and amount of income

	SIHC 1999-2000		SIHC 2000-01	
	Married mothers	Sole parents	Married mothers	Sole parents
No of persons	1,868	555	1,808	598
Principal sources of current (weekly) income				
Income unit income (%)				
not applicable	0.96	0.54	0.66	0.50
wage/salary	76.02	37.48	76.77	36.29
own business	10.44	1.98	10.23	2.84
Government pension/allowance	10.33	55.68	9.85	57.86
superannuation	0.16	0.9	0.28	0.17
property	1.34	0.36	1.55	0.84
other	0.75	3.06	0.66	1.51
Personal income (%)				
not applicable	8.14	0.72	8.63	0.67
wage/salary	50.00	36.94	49.78	36.62
own business	6.26	1.98	6.75	2.84
Government pension/allowance	28.10	55.32	27.16	56.86
superannuation	0.11	1.08	0.06	0.17
property	6.21	0.54	6.69	1.17
other	1.18	3.42	0.94	1.67
Average income in \$ (current weekly)				
Income unit income				
wage/salary	913.65	246.80	986.43	263.19
<i>standard deviation</i>	<i>744.69</i>	<i>343.40</i>	<i>823.39</i>	<i>384.40</i>
total earned income	1035.14	256.70	1126.96	278.15
<i>standard deviation</i>	<i>1114.88</i>	<i>352.21</i>	<i>937.84</i>	<i>391.09</i>
Government pension/allowance	73.65	195.66	86.22	216.39
<i>standard deviation</i>	<i>121.07</i>	<i>131.03</i>	<i>127.46</i>	<i>141.82</i>
total income	1159.99	504.57	1267.25	537.76
<i>standard deviation</i>	<i>1181.07</i>	<i>306.78</i>	<i>969.77</i>	<i>326.36</i>
Personal income in \$ (current weekly)				
wage/salary	250.07	231.97	276.02	250.24
<i>standard deviation</i>	<i>335.28</i>	<i>331.74</i>	<i>383.55</i>	<i>368.15</i>
total earned income	279.84	241.83	315.84	265.11
<i>standard deviation</i>	<i>368.77</i>	<i>340.93</i>	<i>456.02</i>	<i>375.30</i>
Government pension/allowance	40.25	184.91	49.27	205.14
<i>standard deviation</i>	<i>72.81</i>	<i>130.86</i>	<i>81.54</i>	<i>140.34</i>
total income	336.62	477.13	386.97	512.42
<i>standard deviation</i>	<i>365.40</i>	<i>289.10</i>	<i>493.40</i>	<i>311.08</i>

Appendix J: Additional Tables for Section 5

Table J1: Probit and OLS results for the pre-program test using SIHC 1997/98 and 1999/00^a

	In the labour force		Employed		Full-time employed		Hours of work	
	(Probit)		(Probit)		(Probit)		(OLS)	
	Coef.	Std. err	Coef.	Std. err	Coef.	Std. err	Coef.	Std. err
Male	-0.318	0.710	-0.100	0.679	0.540	0.776	5.267	8.924
Age 35-39	-0.036	0.447	0.190	0.382	0.185	0.389	2.094	5.695
Age 40-44	-0.114	0.482	0.643	0.435	-0.036	0.402	3.860	5.805
Age 45-49	-0.480	0.482	0.258	0.432	-0.459	0.421	-3.237	5.937
Age 50+	0.356	0.907	0.713	0.946	0.586	1.059	7.744	14.205
Degree	0.343	0.983	0.457	0.989	0.839	1.024	12.502	14.066
Qualification	0.962	0.903	0.785	0.957	1.079	1.046	12.690	13.757
Male × age 35-39	1.514**	0.555	0.958**	0.431	0.885**	0.371	14.948**	5.559
Male × age 40-44	0.355	0.319	0.407	0.292	0.376	0.293	5.671	4.224
Male × age 44-49	-	-	-1.780*	1.036	-2.309**	1.105	-26.180	24.979
Male × age 50+	-0.311	0.830	-0.471	0.762	-0.517	0.743	-12.692	12.810
Male × degree	-0.552**	0.275	-0.054	0.259	-0.207	0.265	-1.538	3.986
Male × qualification	-0.213	0.295	0.150	0.255	0.313	0.258	4.554	3.815
Born in ESC	1.002**	0.376	0.582*	0.319	0.659**	0.315	7.299	4.643
Born in NESC	0.854**	0.422	0.598	0.367	0.828**	0.361	9.874**	4.949
Major urban	-0.257	0.324	-0.136	0.325	0.251	0.337	-1.108	4.804
Home: purchased	-0.794	0.731	-0.374	0.666	-	-	-13.710**	6.772
Private rental	-0.445	0.343	0.192	0.315	-0.257	0.324	1.809	5.222
Government rental	-0.466	0.400	0.079	0.356	-0.253	0.357	-2.445	5.051
Live with relatives	0.937*	0.558	0.110	0.506	-0.097	0.526	-2.327	7.593
Post policy	0.858	0.535	-0.517	0.471	-0.691	0.451	11.556*	6.661
Year 1999	-0.318	0.710	-0.100	0.679	0.540	0.776	5.267	8.924
Treatment × year 1999	-0.036	0.447	0.190	0.382	0.185	0.389	2.094	5.695
Constant	-0.114	0.482	0.643	0.435	-0.036	0.402	3.860	5.805
(Pseudo) R-squared	0.201		0.126		0.169		0.230	
Chi-squared (19)	30.48		20.14		33.58		.	
No. of obs.	138		141		136		132	

Note: ** and * indicate significance at the 5% and 10% level respectively.

- a) Although in principle a Tobit regression should be used for the hours of work regression, the small number of observations makes this not so relevant.

Table J2: Probit and interval regression estimation results using Census 1996 and 2001

	In the labour force		Employed		Full-time employed		Hours of work	
	(Probit)		(Probit)		(Probit)		(Interval Reg)	
	Coef.	Std. err	Coef.	Std. err	Coef.	Std. err	Coef.	Std. err
Male	-0.050	0.591	-0.187	0.596	0.656	0.586	2.332	14.081
Age 35-39	-0.435	0.269	-0.483**	0.243	-0.330	0.220	-11.848**	4.755
Age 40-44	-0.351	0.266	-0.391	0.239	-0.231	0.213	-9.283**	4.593
Age 45-49	-0.581**	0.267	-0.542**	0.241	-0.256	0.215	-11.652**	4.649
Age 50-54	-0.740**	0.276	-0.622**	0.250	-0.471**	0.226	-14.341**	4.902
Age 55+	-1.164**	0.323	-1.080**	0.301	-0.864**	0.318	-28.209**	6.569
Degree	0.787**	0.141	0.682**	0.120	0.454**	0.104	15.296**	2.180
Qualification	0.462**	0.095	0.427**	0.087	0.195**	0.084	9.028**	1.786
Male × age 35-39	0.161	0.640	0.510	0.646	-0.243	0.631	8.103	15.295
Male × age 40-44	0.508	0.617	0.495	0.619	-0.122	0.605	9.571	14.542
Male × age 45-49	0.446	0.615	0.605	0.623	-0.104	0.609	12.765	14.655
Male × age 50-54	0.361	0.629	0.494	0.636	-0.106	0.622	12.953	15.026
Male × age 55+	0.157	0.657	0.244	0.668	-0.121	0.678	8.264	16.384
Male × degree	0.451	0.482	0.865*	0.486	0.424	0.265	5.501	5.106
Male × qualification	-0.295	0.192	-0.232	0.179	0.135	0.167	-4.651	3.906
Born in ESC	-0.060	0.094	0.023	0.088	0.134	0.083	1.260	1.774
Born in NESC	-0.596**	0.096	-0.652**	0.093	-0.315**	0.096	-14.787**	2.409
Major urban	-0.003	0.072	0.018	0.067	0.071	0.066	1.425	1.443
Home: purchased	0.298**	0.100	0.278**	0.092	0.482**	0.085	8.228**	1.785
Private rental	-0.072	0.097	-0.263**	0.091	0.034	0.091	-3.468*	2.043
Government rental	-0.445**	0.102	-0.502**	0.099	-0.372**	0.106	-12.104**	2.379
Live with relatives	-0.051	0.148	0.081	0.143	0.115	0.136	2.309	3.204
Have other children	0.088	0.070	0.136**	0.066	0.006	0.065	1.995	1.433
Post policy dummy	-0.161	0.105	-0.026	0.095	-0.123	0.091	-1.769	1.989
Treatment	-0.488**	0.104	-0.230**	0.095	-0.285**	0.093	-6.912**	2.022
Treatment × post policy	0.258*	0.138	0.092	0.128	0.096	0.125	3.121	2.720
Constant	1.391**	0.283	0.905**	0.255	-0.163	0.231	24.812**	5.004
(Pseudo) R-squared	0.133		0.126		0.114			
Chi-squared (26)	235.5		264.4		272.8		431.07	
Sigma(σ)							27.060	0.610
No. of obs.	1,865		1,865		1,865		1,865	

Note: ** and * indicate significance at the 5% and 10% level respectively.

Table J3: Frequency distribution of the number of matched observations in the non-treated groups for the treatment observations

	Non-treated groups			Non-treated groups		
	Post-policy control	Pre-policy treatment	Pre-policy control	Post-policy control	Pre-policy treatment	Pre-policy control
No. of matched control obs.						
	<i>Full sample</i>					
1- 5	0	0	0			
6-20	3	0	0			
21-50	53	1	5			
51-100	33	4	24			
101-200	93	39	92			
201-300	111	58	284			
300+	268	459	156			
Total	561	561	561			
	<i>With qualification subsample</i>			<i>Without qualification subsample</i>		
1- 5	4	0	0	0	0	3
6-20	9	0	0	6	0	2
21-50	12	0	9	18	0	8
51-100	13	40	36	95	0	53
101-200	186	184	179	161	34	241
201-300	0	0	0	57	303	30
Total	224	224	224	337	337	337
	<i>Age below 45 subsample</i>			<i>Age above 45 subsample</i>		
1- 5	0	0	0	0	0	0
6-20	11	0	2	0	0	0
21-50	31	0	13	0	3	0
51-100	75	10	110	2	29	4
101-200	192	47	184	36	220	180
201-300	0	252	0	214	0	68
Total	309	309	309	252	252	252