In-work policies in Europe: killing two birds with one stone?*

MICRESA WP5: the role of increased labour market participation in poverty reduction

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June, 2004 - PRELIMINARY VERSION

Abstract

Earning an income is probably the best way of avoiding poverty and social exclusion, hence the recent trend of promoting employment through in-work benefits in OECD countries. Yet, the relative consensus on the need for 'making work pay' policies is muddied by a number of concerns relative to the design of the reforms and the treatment of the family dimension. Using the integrated microsimulation of European tax-benefit systems EUROMOD, we simulate two types of in-work benefits. The first one is a purely individualized policy while the second is means-tested on family income, in the fashion of the British Working Family Tax Credit. Both reforms are built on the same cost basis and simulated in three European countries which experience severe poverty traps, namely Finland, France and Germany. The potential labor supply responses to the reforms and the subsequent redistributive impacts are assessed for each country using a structural discrete-choice labor supply model. We compare how both reforms achieve poverty reduction and social inclusion (measured as the number of transitions into activity). All three countries present different initial conditions, including institutional environment, existing tax-benefit systems and distribution of incomes and wages. These sources of heterogeneity are exploited together with different labor supply sensitivities to explain the cross-country differences in the impact of the reforms.

Key Words : tax-benefit systems, in-work benefits, microsimulation, household labor supply, multinomial logit.

JEL Classification : C25, C52, H31, J22.

*__Acknowledgements__ : We are grateful to Tim Callan for in-depth comments of the first draft. We also thank Tony Atkinson, Denis Beninger, François Bourguignon, Seija and Pekka Ilmakunnas, Herwig Immervoll, Cathal O'Donoghues, Holly Sutherland, Heikki Vittamäki and Sile O'Dorchai for useful comments and advices. All errors or omissions remain ours. EUROMOD relies on the following micro-data: Enquête Budget des Ménages made available by INSEE, the German Socio-Economic Panel Study made available by DIW and the Income Distribution Survey made available by Statistics Finland.

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1 Introduction

Poverty has been reduced in many industrialized countries by the development of large-scale welfare systems which include generous social assistance schemes for the poorest. However, there is a well-known risk that the instruments used for this purpose generate social exclusion by making work financially unattractive, especially to less productive workers. Consequently, the recent trend in OECD countries has been to promote selfsufficiency as the best way to escaping both poverty and social exclusion. To provide protection against both plagues requires finding benefit schemes which not only guarantee sufficient income, but also make work financially attractive, in comparison with remaining inactive or unemployed. To what extent and at which cost it is possible to improve existing tax-benefit systems in Europe on both accounts is the general subject of this paper.

More precisely, we shall focus on the difficult issues surrounding the design of in-work benefits in Europe. Following the pioneering measures in the US and the UK - the *Earned Income Tax Credit* (EITC hereafter) and the *Working Family Tax Credit* (WFTC hereafter) respectively -, several European countries have implemented policies aimed at 'making work pay'. Yet, the relative consensus on the need for this type of reforms is muddied by concerns about efficient policy design, given the framework conditions and the general objectives pursued. Firstly, the treatment of the family dimension is a crucial issue which has only been superficially explored. Policies which are means-tested on household income, such as the EITC or the WFTC, are known to be well targeted at households in need but may also discourage the work of women in two-earner couples. Secondly, both redistributive and efficiency objectives cannot always be reconciled in a single policy measure. This difficulty is illustrated by the recent changes in the UK tax system where the WFTC has indeed been splitted into two distinct policies serving different objectives: a working tax credit to create incentives to work and a child tax credit to redistribute toward families and children. Thirdly, the success of an in-work policy depends crucially on the design of the reform in relation with the initial conditions. This relates not only to the institutional context in which the policy implementation takes place (existing tax-benefit system, presence of a minimum wage, etc.) but also the shape of wage and income distributions in the country, the size of labor supply sensitivities and the relative shares of different household typologies.

In this paper, we address these aspects in a comprehensive way by comparing the effects of two reforms in three European countries - Finland, France and Germany - which all experience inactivity trap phenomena. The first policy is a purely individualized in-work benefit while the second is means-tested on family income. Using an integrated microsimulation of European tax-benefit systems (EUROMOD), we simulate both reforms for each country. To analyse the potential effects on incentives and redistribution, we combine the microsimulation with structural models of labor supply which are estimated on comparable datasets across countries. The scenarios of reforms are tailored to have the same budgetary cost - after possible behavioral responses - so that both cross-country and cross-reform comparisons are allowed.

To clarify policy analysis, we compare the reforms in the light of two clear-cut policy goals, namely the reduction of poverty and the reduction of social exclusion. The first objective aims at reducing the share of households whose income is lower than the pre-reform poverty line while the second simply aims at maximizing the share of people encouraged to take a job after the reform. Specifically, we question which of the suggested in-work benefits succeeds best on each account and whether the incentive effect of in-work transfers is significant in poverty reduction. More broadly, we discuss what can be achieved by each instrument given the social policy agenda for each country.

The layout of the paper is as follows. In Section 2, we present the recent trend in policies aimed at

'making work pay' in Europe and survey the academic literature on cross-country analyses of tax-benefit systems. Section 3 outlines the structure of two types of in-work transfers and details the choices made regarding the simulations and the design of these policies. Section 4 presents labor supply estimations and compares the elasticities in the three countries. Section 5 analyses the potential effects of the reform on incentives and redistribution and suggests interpretations of the cross-country and cross-reform differences. Section 6 concludes.

2 In-work policies in Europe

'Making Work Pay' (MWP) policies have been suggested primarily to offset the disincentive effects of generous social assistance schemes on employment. In this first section we recall the importance of inactivity traps, focusing on the three countries we examine. It is followed by a brief summary of the recent trends in MWP policies in industrialized countries. Finally, we survey the related literature on cross-country analysis of tax-benefit systems and argue that the present paper is among the very first ones to address policy simulations in a truly comparative and comprehensive way.

2.1 Social assistance and poverty traps in Finland, France and Germany

Being conceived as a last resort safety net, social assistance has a subsidiary role which implies that almost all of the claimant's own and some the claimant's relatives' income sources are assessed for eligibility. Given the minimum income level, which varies in accordance to particular individual and family conditions, eligible individuals are entitled to a complementary transfer to fill the gap between recognized resources and the minimum income level. The principal drawback of most minimum income schemes is that each additional euro earned by the claimant is automatically offset by the loss of a euro of social assistance. Consequently, households at the bottom of the income distribution are characterized by a very high level of effective marginal tax rates (EMTR hereafter), often around and sometimes even above 100%[1].

In the three countries we examine, minimum income schemes share common features although they may diverge with respect to relative generosity and eligibility conditions. Child allowances are disregarded for example both in Germany and in France, but not in Finland. Moreover, in Germany to be eligibile the claimant's assets must be under a certain threshold level, allthough a low level labor income is disregarded, thus reducing the extent of the poverty trap. Most other taxable income is considered for social assistance assessment, although the latter is not only net of social security contributions in France but also of personal income tax in Germany and Finland. Finally, the unit used for the income assessment may be as large as the household, as in Finland, or exclude some household's members, such as grown up children or dependent parents as is the case in Germany.

German social assistance is relatively more generous than in Finland and in France. Maximum amounts for a lone parent with two children corresponded in 1998 to 9627, 6283 and 5432 EUR in the three respective countries. Aggregate spending on social assistance varied from 1.3% of GDP in Germany to 0.6% in Finland. In France, even if the minimum income is seen as the main cause for high EMTRs, housing benefits as well as other means-tested family benefits also contribute to nonconvexities of the budget set for low-wage households. As a result of the interaction of different instruments a transition from inactivity to activity could paradoxically imply in France a loss of disposable income.

[1] EMTRs exceeding 100% are typically caused by the simultanious withdrawal of social assistance and other means tested benefits (primarily housing allowances - as in the case of France), following an increase in market income.

A simple way to illustrate how institutions may discourage work is to draw household budget curves. Figures 1, 2 and 3 represent the budget constraint of an hypothetical household - a one-earner couple with children - in France, Germany and Finland respectively. The earner is assumed to be an employee, in activity for 12 months per year. For cross-country homogeneity, we assume the same wage rate of 6 EUR in the three graphs, which corresponds to the French minimum wage. Budget curves used in this paper represent original income (gross earnings) on the horizontal axis and disposable income on the vertical axis. Gross earnings increase lineary from 0 to 200% of the refernce salary (i.e. the salary corresponding to working full time at an hourly wage of 6 EUR per hour). Up to the first half of the horizontal axis the change is due to increasing working effort, and weekely hours worked increase from 0 to 40. Once the 40 hours limit is reached, however, gross earnings increase due to a change in the wage rate which increases linearly from 6 to 12 EUR. The graphs display the decomposition into the main instruments, namely income tax, social security contributions, total family/child benefits and social assistance (minimum income).

The curves show some interesting features of the concerned countries with respect to the size of child benefits or the relative importance of social contributions and income taxation.[2] However, the crucial aspect here is the relatively flat region which characterizes all three countries and clearly illustrates the inactivity trap. The same feature can be found for all family configurations with the exception of two-earner couples.[3] The safety net is comparable in France and Finland but France relies on a combination of minimum income and generous housing benefits. The relatively higher contribution of housing benefit and the fact that it is phased out at a much lower rate than minimum income explains that the flat segment is shorter in France than in Finland. On the other hand, the simultanious withdrawal of income assistance and housing allowance generates a slightly negative slope in the very first segment in the case of France. More generous minimum income in Germany makes this segment longer than in Finland. However, things are slightly more complex in Germany. Indeed, small amounts of labor income (70 EUR per month) are competely disregarded for social assistance assessment, whilst additional earnings are partially disregarded (30% disregards on residual net labor income, up to a total disregard of 140 EUR). Such feature implies implicit marginal tax rates to be significantly lower than 100%, in the first two positively sloped segments. Moreover until gross earnings reach 300 EUR and working time is lower than 15 hours, there is no liabilituy to social security contributions.

It is interesting to note how reduced taxation on low earnings does not automatically increase incentives to take up work. Since social assistance is mostly computed with respect to net income, within the income assistance benefit range, what is given back with one hand in the form of lower taxes and contributions is taken back with the other in the form of lower social assistance. The German example indirectly shows that redesigning traditional fiscal instruments, such as income brackets and tax rates may not be an adequate response in the context of sofisticated and generous welfare systems. On the other hand, it shall be argued, the excemption to social security contributions may increase financial incentives to take up work outside the range of income assistance, i.e. it is a clear incentive to secondary earners.

A common way to characterize potential work disincentives consists in computing the distribution of EMTRs in the population. EMTRs indeed measure the size of the distortions generated by the tax-benefit system, that is, the fraction which is levied from marginal additional income. This includes increased

[2] See in-depth descriptions of the tax-benefit systems in Bargain and Terraz (2001) for France, Grabka (2001) for Germany and Viitamäki (2001) for Finland.

[3] Budget curves for other household types (single individual with or without children, two-earner couples with or without children, etc.) are available from the authors upon request.

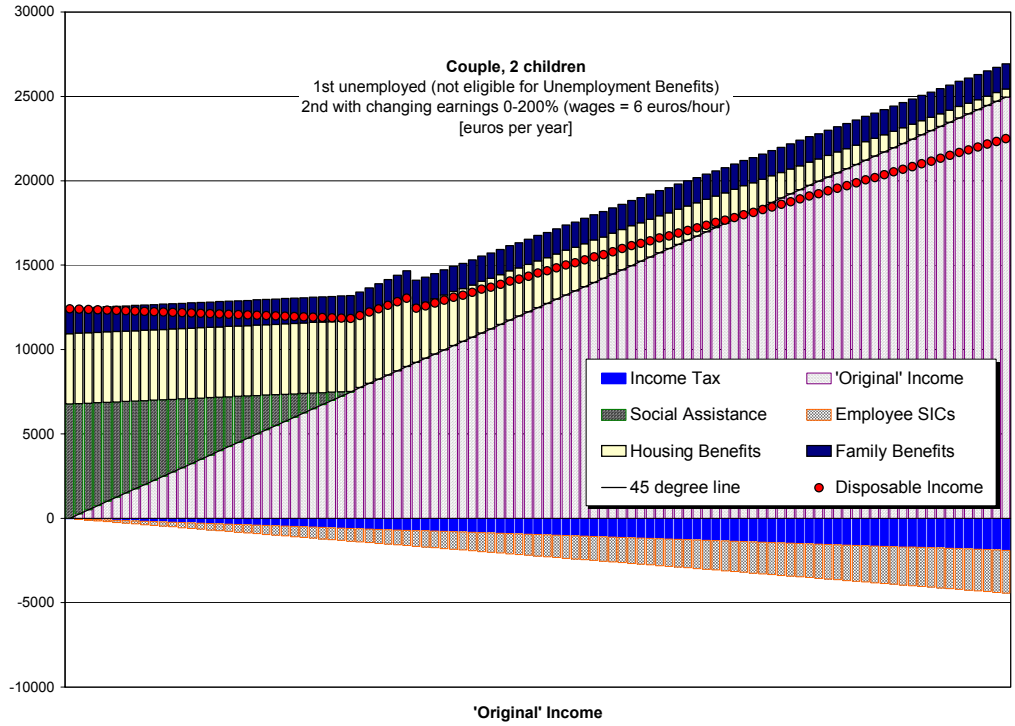

Figure 1: Budget constraint for a one-earner couple with children (France)

taxes to be paid but also the partial loss of means tested benefits. Changes in EMTRs then correspond to changes in implicit wages, that is responses in terms of working hours due to substitution effects.[4]

In principle, EMTRs could be computed analytically as one minus the first derivative of the budget constraint. However, the complexity of the tax-benefit system forces us to rely on a numerical approximation. It consists simply of increasing gross employment income of household heads (defined as the main earner in the household) by a uniform amount dy and to use microsimulation to compute the corresponding variation in disposable income ΔC. The resulting EMTR is then written as:

$$EMTR = 1 - \frac{dC}{dy}$$

We choose a uniform gross income increment $dy = 1500$ EUR per year for all three countries.[5] This increment can correspond to increased work hours.[6] It could alternatively correspond to a pay rise; the difference in interpretation is not innocuous as shall be seen in our simulations.

Figure 4 shows the distribution of mean EMTR by decile of equivalized disposable income for the whole population, EMTRs being averaged over active and potentially active households of each decile

[4] In a labor market strongly constrained by institutional and demand-side rigidities, it is however very unlikely that workers have the possibility to vary their working time freely, unless they are self-employed.

[5] Note also that the step of 1500 euros is larger than what one may think of as 'marginal'. Yet, this choice corresponds to an additional productive effort that can be seen as more realistic than an additional euro of income. Indeed, it corresponds to around 5 additional hours per week for a worker paid at the minimum wage.

[6] Hours worked are then increased proportionally for those already in work. This is important as one of the reforms simulated in this paper shall depend not only on income levels but also on weekly work duration.

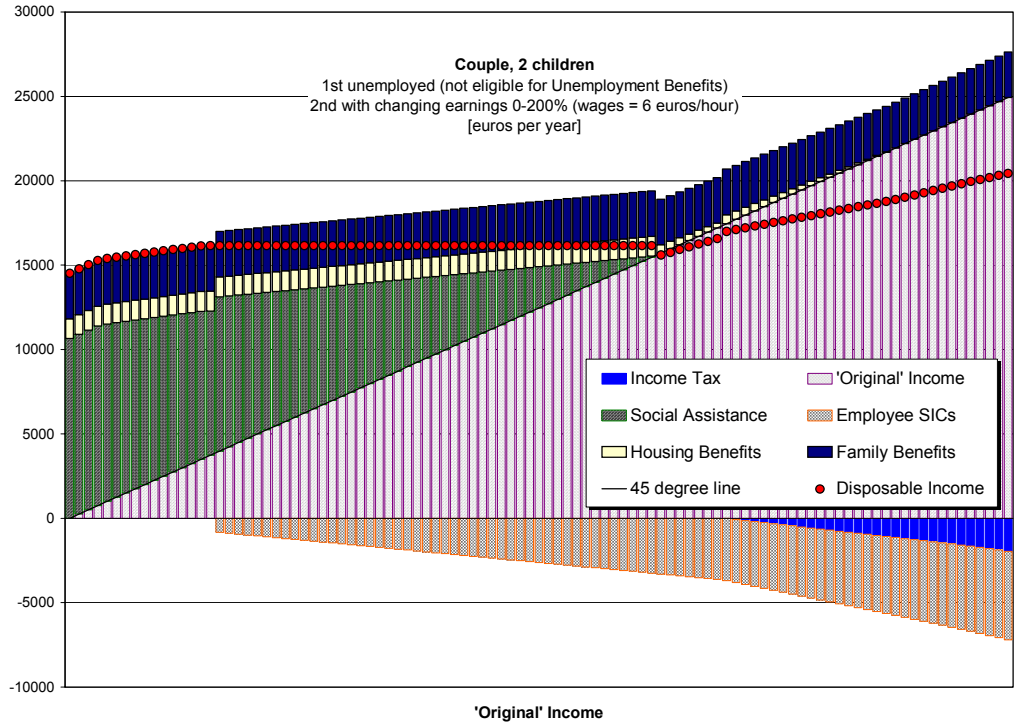

Figure 2: Budget constraint for a one-earner couple with children (Germany)

only(i.e household head must be between 25 and 60 years old, neither disabled, nor in full time education or retired).

The U-shaped distribution we found is now typical in France and Finland where tax-benefit systems generate high EMTRs at both ends of the distribution. In the upper part, these rates are explained by the progressivity of the income tax schedule whereas they are due to the means-testing of social assistance at the bottom. In France however, the overall level of taxation is lower so that EMTRs are larger at the bottom of the distribution. In both countries, potential traps are important considering the high mean EMTRs in the first decile. Anomalies in the rest of the distribution are mainly due to thresholds in means-tested transfers to families, in income tax rebate (in France) or to changes in tax rates.

In Germany, the aforementioned disregard of a certain amount of labor income for social assistance assessment explains lower EMTR levels for the first decile.[7] In addition, higher incomes are exempted from social security contributions after a ceiling of around 3,000 EUR (in 1998). These features explain the inverse pattern of EMTRs found for Germany. Note that the exemption of low earnings from social security contribution and personal income tax plays a marginal role in lowering EMTRs in the very first decile, at least for inactive people.[8] The exemption mainly serves to lower EMTRs for secondary earners,

[7] In our EMTR computations, an increment of 1500 EUR per year corresponds to 125 EUR per month of gross earnings; only around 35 EUR will be considered in the income assessment, implying a benefit withdrawal rate of around 30% for someone switching from inactivity to activity. Additional disregards for workers with children may bring the withdrawal rate down to 0, which explains the relatively larger fraction of households facing very low EMTRs in Germany.

[8] Social assistance withdrawal automatically offsets all reductions in tax and contribution rates since income assessment is computed on net income.

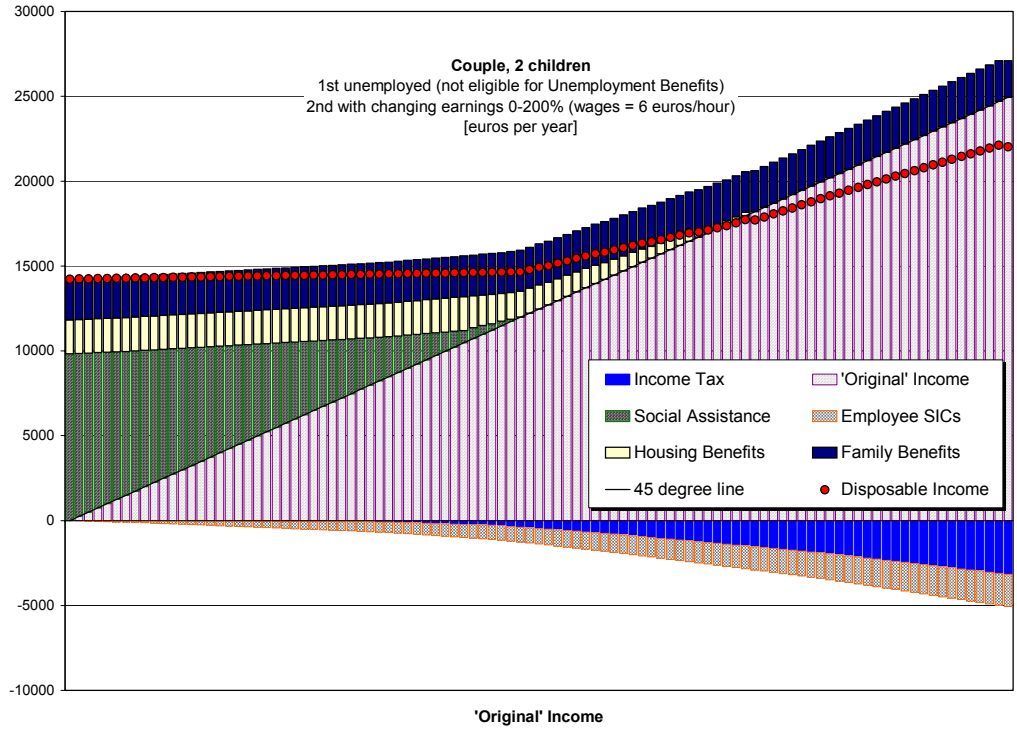

Figure 3: Budget constraint for a one-earner couple with children (Finland)

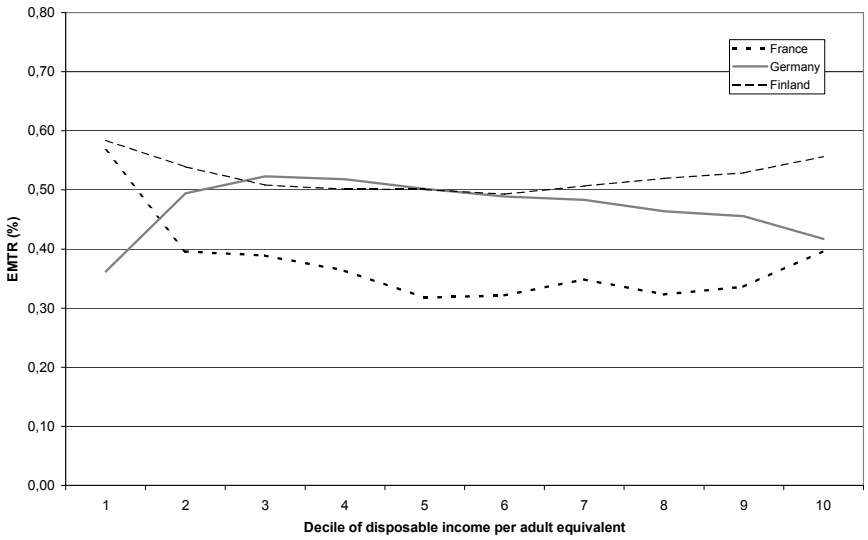

Figure 4: Distribution of average EMTRs for active and potentially active households.

EMTR	France		Germany		Finland	
	Authors' calculations	Immervoll (2002)	Authors' calculations	Immervoll (2002)	Authors' calculations	Immervoll (2002)
<0.1	0,5%	5,1%	5,0%	5,1%	0,5%	12,9%
in [0.1; 0.2]	3,2%	3,0%	5,5%	1,0%	0,2%	0,8%
in [0.2; 0.3]	21,3%	22,5%	2,5%	3,6%	2,6%	6,0%
in [0.3; 0.4]	53,0%	49,9%	10,9%	11,7%	4,9%	7,4%
in [0.4; 0.5]	12,9%	12,8%	17,2%	18,6%	32,9%	35,4%
in [0.5; 0.6]	3,6%	2,2%	50,0%	50,1%	45,6%	30,1%
in [0.6; 0.7]	1,0%	0,9%	3,1%	4,1%	7,6%	2,5%
> 0.7	4,4%	3,6%	5,9%	5,8%	5,7%	4,9%

Authors' calculations: using EUROMOD and an absolute increment of 1500 euros/year
Immervoll (2002)'s calculation: using EUROMOD and a relative increment of 3% of the labor income.

Figure 5: Distribution of EMTRs

i.e. earners who are not entitled to income assistance.[9]

Moreover, means-tested transfers are characterized by high phase-out rates in Germany and Finland, as it is the case with housing benefits in the budget curves above. We have already mentioned that the minimum income ended at lower levels of income in France as a larger role was played by housing benefits in assuring social assistance. These features, together with a higher level of taxation in Finland and Germany, explain why EMTRs are still quite high in the 3rd, 4th and 5th deciles in these two countries compared to France.[10]

Finally, it is important to note that the distribution of EMTRs is quite heterogenous within each decile, due to the complexity of tax-benefit systems and the fact that deciles are computed on income per unit of consumption. To illustrate this point, notice for instance that the EMTR of the first decile does not reach 100%, which would be the case were it composed only by low-skilled inactive singles in the benefit range.

Figure 5 presents the distribution of EMTRs in different brackets and compares our findings with those of Immervoll (2002). Although different definitions to compute EMTRs are used, results are close enough to derive similar conclusions.[11] In all three countries, between 4 and 6% of the active or potentially active population face EMTRs above 70%. The concerned population is concentrated in the lower part of the distribution, although some heterogeneity can be found across countries on the exact location of these households in the income distribution (see figure 4). Withdrawal of means-tested transfers- minimum income in France and additional housing benefits in Finland and Germany - is the main cause for high implicit taxation on lower deciles. Most interesting for our analysis, is the fact that this feature is common to the three countries we examine while they present wide heterogeneity on other accounts (generosity

[9] This could partly explain the differences in EMTRs between men and women. According to our calculations, the percentage of men facing low EMTRs (below 10%) is about 3% whereas it is almost 16% for women.

[10] Similar trends can be found for Germany and France in Bourguignon (1997), p.38. Differences in the overall levels of the curves come from the fact that EMTRs are computed on incomes net of social contributions in Bourguignon (1997) and on gross incomes here. In the case of Germany, a major difference is due to the tax reform introduced in 1996: following a constitutional court ruling, a no tax area was introduced, up to almost 6000 EUR per year. Also, since the reference year in Bourguignon (1997), the additional disregard has been brought up from 15% to 30% of income higher than 70 EUR.

[11] Note that the definition of EMTR when computed numerically is arbitrary and may condition the results to some extent. In particular, the resulting EMTR depends on the family member whose income is incremented, the concept of income to be incremented (gross, net, etc.) and the type of increment (absolute or relative amount). See Immervoll (2002) for an in-depth discussion.

of social assistance, level of income taxation, etc.). In all three countries, poverty trap phenomena are sufficiently large so that national advisors should extensively promote job-enhancing policies.

2.2 'Making work pay' policies

Previous results on the detrimental role of social assistance on incentives are confirmed by Immervoll (2002) for several other European countries. Overall, a consensus seems to emerge on the need for MWP policies in Europe and on essential aspects of their design (see Duncan, 2003). This view is nevertheless muddied on the one hand by concerns regarding the relative efficiency of such instruments in redistributing income and increasing work incentives and on the other hand by the fact that there is no unique definition of a MWP policy. We briefly describe these aspects and the recent trends in MWP policies in some European countries, with a particular attention to the countries at stake.

2.2.1 A brief survey of MWP policies

Firstly, it is important to recall that the MWP expression encompasses two types of policies aimed at enhancing employment opportunities. On the one hand, some policies act on the demand-side by reducing the cost of hiring low-skilled workers. Cuts in taxes or social contributions paid by employers have been introduced in several countries throughout much of the late 80s and the 90s (Austria, Belgium, France, the Netherlands and to some extent in the UK through a progressive contribution scheme). Other countries have targeted employment subsidies to employers of youngsters, long-term unemployed and welfare recipients. An in depth discussion on demand side MWP policies is provided in Martin and Grubb (2001).

On the other hand, some MWP policies are designed to create incentives to take up low paid work. In-work benefits have been in place for a long time in the US with the EITC and in the UK with the *Family Credit* and its successors. Canada, Ireland and New Zealand have also had a relatively long experience of such schemes. Since 2000, MWP policies have been spreading rapidly in Europe and some important changes have occured in the UK. The official objective set forth by policy makers is double: (i) to expand employment by increasing work incentives, (ii) to increase income of disadvantaged groups (see Pearson, 2002). The second objective is clearly redistributive and in-work benefits seem an interesting way to redistribute to a subset of the poor population known as the 'working poor'. Such instruments are undoubtedly more politically acceptable than a rise in social assistance - given the feared increase in work disincentives - and more efficient than an increase in the minimum wage, which might push up wage rates above the market equilibrium and hence lower the employment rate.

Wise economic governance should naturally establish a subtle mix of actions on supply and demand, and fix a minimum wage in order to maintain a sound labor market equilibrium with decent wages for workers and low employer costs. Yet, this goes far beyond the scope of this paper which specifically addresses the incentive issue and explores the appropriateness of in-work transfers with respect to specific institutional conditions. Consequently, we shall refer to MWP policies only in terms of labor-supply enhancing transfers in what follows.

2.2.2 Individual versus family-based MWP schemes

A crucial aspect in the design of a MWP scheme is the treatment of the family dimension and the targeting of the reform. To simplify this aspect and ignoring for the moment the issues related to the presence of children in the household, we consider only two broad groups of possible schemes.

On the one hand, some countries have introduced family-based measures, that is, in-work transfers which depend on household size and which are means-tested on family income. This type of reform, similar to the EITC and WFTC, is known to be well-targeted to poor families. However, while the reform unequivocally encourages the participation of singles, it is often the case that it discourages second-earners in couples, bringing about a gender bias against the participation of women. Moreover, the generosity of the reform implies a high taper rate in the phasing-out of the measure and, hence, large increases in EMTRs and potential disincentives at the intensive margin (see Eissa and Hoynes, 1998, and Blundell et al., 2000).

On the other hand, some countries have experienced purely individualised measures, conditioned by individual wage or earnings. A low-paid individual in a well-off family could well receive some transfers in this case. Then, if built on the same cost-basis as a family-based scheme, an individual measure would clearly imply smaller amounts and a larger number of recipients. This policy is thought of as having greater incentive effects than the family-based alternative. Indeed, it is not means-tested on family income and hence has no discouraging effects on second-earners in a couple. However, if eligibility conditions are to broad, the size of the benefit could be insufficient to stimulate a transition towards activity or from part-time to full time.

It appears that this fundamental difference in the treatment of the household dimension could have a serious impact on the way reforms contribute to specific policy objectives. Targeting low-income families rather than low-wage workers, a WFTC-type scheme is likely to achieve more redistribution, at least through its direct effect. The concern for efficiency would instead lead to promote individualized schemes as they are unambiguously more efficient at the intensive margin and do not discourage the participation of married women. Efficiency and redistributive objectives seem somewhat contradictory while they are both quoted to justify investments in MWP measures. Things are in fact even more intricate given that enhancing employment is viewed by many as a way to reduce poverty through increased labor income. In this respect, it must be noted that single parent households are among the poorest[12], and WFTC-type schemes may provide larger transfers to such vulnerable groups (and hence larger positive incentives) than individual reforms. To disentangle these various aspects, we suggest in the next section an in-depth investigation of the role of family-based and individual MWP in achieving social inclusion and poverty reduction both on the overall and for specific groups of the population.

2.2.3 Recent trends in the UK and in Belgium

Before illustrating the recent trends in the three countries we focus on, it is important to briefly sketch the UK experience which serves as a benchmark in our study as well as for policy makers interested in implementing own MWP policies. As we shall continue to oppose family-based and individual types of measures in the rest of the paper, it is also interesting to review the Belgian reform which gives an interesting example of an individualized policy.

The *Working Family Tax Credit* (WFTC) introduced in the UK in October 1999 is a more generous variant of the *Family Credit* (FC).[13] It is a transfer to households where at least one of the adults is in paid work (employment or self-employment) for at least 16 hours per week. It tops up jointly assessed income. Once income reaches a threshold level, the maximum amount is tapered away, at a rate of 55%

[12] According to Buchel, Mertens and Orsini (2003), poverty risk for single mothers is 3 to 5 time larger than the poverty risk for the whole population in the UK and Germany, respectively. In France and Finland too lone mothers face a considerably higher poverty rates (around twice the poverty rate of the whole population).

[13] See evaluation of the FC by Duncan and Giles (1996).

on net income (to be compared to 20% in the EITC system and 50% in the *Self-sufficiency program* in Canada); income is assessed after income tax and contributions have been paid; the maximum amount of benefit increases with the presence and number of children, but is paid at the same rate for couples and individuals; a premium is paid if at least 30 weekly hours are worked by at least one of the eligible adults.

Introduced by a major reform in April 2003, the new structure involves two separate credits: a refundable Child Tax Credit (CTC) to support children in low-income families, regardless of the work status of the parents, and a Working Tax Credit (WTC) now extended to childless singles and couples. The former component regroups most of the main elements in the tax-benefit system for children (with the exception of the child benefit); this includes the child elements in Income Support and in the WFTC, child additions to contributory benefits and the Children's Tax Credit (a "true" tax credit of modest size). Note that this instrument targets an additional UK-specific social policy objective: the reduction of child poverty. The WTC is aimed at supporting low earnings and encouraging labor market participation; it covers both parents and childless workers (with some restrictions) in paid work for 16 (or 30) hours per week. Thus it extends the in-work transfer to single individuals and couples without dependent children. Note that there was a 48% premium per child in the WFTC scheme. This is no longer the case with the new WTC but the basic amount is larger for lone parents and couples ($£3,025$ per year in 2003) than for childless singles ($£1,525$). The combined components make total transfers more generous than under the WFTC for households with children. For instance, the maximum entitlement per year for a lone parent with one child is $£3,180$ in 1998 (FC), $£4,160$ in 2001 (WFTC) and $£3,025$ (WTC) plus $£1,990$ (family and child elements of the CTC) in 2003.[14]

No ex-post evaluation of the WFTC reform is yet available and studies rely on ex-ante predictions based on microsimulation software and structural models of labor supply. Using the Family Resource Survey and the tax-benefit model TAXBEN3, Blundell et al. (2000) evaluate the distributional changes and the labor supply responses to the WFTC.[15] It is found that nearly 80% of lone parents in part-time employment (between 16 and 30 hours per week) are to benefit from the reform. As for couples, the credit seems more generous for one-earner households, a third of which would benefit from it. The impact on hours is ambiguous as the number of households with an EMTR above 70% decrease by around $450,000$ while households with an EMTR above 50% increase by about the same amount. This is due to a lower taper rate (55% instead of 70% with the FC) entailing a smaller positive impact on EMTRs but for a larger number of people. As shown in Figure 6, the net change in participation rate would consist of an increase by 2.2 percentage points for single mothers ($34,000$ individuals) and a decrease by 0.57 percentage points ($20,000$ individuals) for married women with employed partners. Combining all the behavioral effects, the WFTC leads to a small increase in overall participation, by just above $27,000$ individuals. Labor supply responses to the WFTC should act to reduce the cost of the program by around 14%. Consequently, the distributive impact of the reform - rather than the incentive effects - should be appealed to, to justify the large cost of the reform. On the efficiency side, it has been recommended to view the credit in combination with other policy measures which could restore incentives for those living in couples, as for instance, an increase in the minimum wage or an income tax reform (a 10% starting rate).

In August 2001 the Belgian government introduced a refundable earned income tax credit (*Crédit*

[14] These figures represent basic amounts, without premium for working more than 30 hours. Premium for children depends on the age of the children in the FC scheme and the figure given here assumes the lowest premium rate (25.3%).

[15] See also Duncan and Giles (1998), Dilnot and McCrae (1999) or Gregg et al. (1999).

Household type	Simulated responses to WFTC (%)							
	non-work to work	work to non-work	part-time to full-time	full-time to part-time	net effect on employment	nb	net effect on employment (2)	nb (2)
single mothers	2.2	0	0.5	0.2	2.2	34 000	1,9%	28 600
women in couples, partner working	0.2	0.7	0	0.1	-0.5	-20 000	-0,8%	-29 050
women in couples, partner not working	1.3	0	0.4	0.1	1.3	11 000	1,8%	14 610
men in couples, partner working	0	-0.3	- (*)	-	-0.3	-10 500	0,1%	1 790
men in couples, partner not working	0.4	0	-	-	0.4	13 000	0,5%	16 820
total						27 500		32 770

Note (*): on data evidence, men in the model are restricted to a choice between not working and full-time employment.
Figures from Blundell, Duncan, Meghir and McCrae (2000) except (2) from Gregg, Johnson and Reed (IFS, 1999)

Figure 6: Labor supply responses to the WFTC in the UK

d'impôt sur les bas revenus de l'activité professionnelle). One of the major objectives was to reduce the burden on labor income in general and of taxpayers with low earning capacity in particular. The Belgian tax credit is being implemented on a progressive basis. As in the case for the income taxation schedule, the credit is totally individualised. It is computed on the basis of all income from professional activities (including wages and self employment income), net of professional deductions and of earned income subject to separate taxation. Income from part time employment is not considered, provided that the number of hours worked is less than a third of usual working time, nor the income of the self employed, provided that self employment represents an accessory activity. Eligibility is conditional on having a yearly gross income between $3,850$ and $16,680$ EUR so that the measure targets workers with an income around the minimum wage (figures refer to the 2003 system and apply to 2002 incomes). The phasing-in is relatively sharp whereas the phase-out segment starts at $12,840$ EUR. In 2005, the maximum yearly amount of the benefit should reach 510 EUR.[16]

2.2.4 ***MWP policies in France, Germany and Finland***

Neither Finland nor Germany have introduced in work transfers *stricto sensu* but have focused on income tax allowances and reduction of social contributions for low income. In France, a refundable tax credit has been implemented. In addition to a brief description of the newly introduced reforms, it is shown below that their generosity is far below the level of transfers implied by the Bristish reforms. This is an additional motivation for the present study as we suggest what would happen in Finland, France and Germany, would these countries have dedicated the same budgetary expenses as the UK to MWP transfers.

France The issue of poverty traps has been widely debated in France as proved by the large number of related studies from national experts, and notably Bourguignon (1997), Bourguignon and Chiappori (1998), Laroque and Salanié (1999), Godino et al. (1999) and Pisani-Ferry (2000). Following the recommendation of these authors, the French government has introduced in 2001 a refundable earned income tax credit known as *Prime pour l'Emploi* (PPE).

[16] See *Service Publique Fédérale Finances* (2003).

To be eligible, at least one member of the household must be employed. The measure is conditionned on both family and individual resources so that a poor individual in a rich family would not be entitled to the credit. Household taxable income must be lower than 11,972 EUR per year (2003 figures) for a single plus additional increments per dependent child.[17] Each worker in the household has right to a tax credit, provided that her or his individual taxable income falls between 3,265 EUR and 23,207 EUR per year. In the early versions of the tax credit, these amounts corresponded to 0.3 and 1.4 times the yearly income of a worker receiving the minimum wage. Note that these amounts are close to those applied in the Belgian reform. The tax credit is computed as 4.4% of the individual's labor income, expressed in full-year and full-time equivalent. As a result, the level of tax credit is conditional on the work duration and distinguishes between low skills and low efforts. The maximum amount of credit (443 EUR) is obtained for a full-time and full-year activity paid at the minimum wage rate. In 2003, a 45% premium for part-time work has been introduced. Later versions of the reform are presented in Carrez (2002).

Germany In 2000, the German parliament has adopted a large reform of the income tax system in which the basic personal allowance was significantly raised and tax rates are significantly lowered. A description and complete analysis of the reforms can be found in Haan and Steiner (2004).

The official objective of the reform is to decrease the overall tax burden, especially on low-paid workers in order to stimulate employment. The reform is being progressively phased in over the 2000-2005 period. By 2005, the tax rate in the first tax bracket should have fallen to 15% (from 22.9% in 2000) while the top rate should have been cut to 42% (from 51% in 2000) conform to international standards. The personal income tax allowance will be increased from 6,902 up to 7,664 EUR in 2005, but will continue to be non-refundable. Hence, the maximum net gain obtained in the first tax bracket will be around 1,115 EUR per year.

In addition, several proposals have been made to subsidize low-wage earners through extended exemptions from social contribution payments. Three of them have ranked high on the German policital agenda and have been reviewed by Bonin, Kempe and Schneider (2002). Interestingly enough, with respect to the previous discussion on individual vs. family-based policies, two of these proposals employ subsidy schemes based on individual earnings whereas the third subsidy derives from a joint income assessment in the couple.The CSU (resp. social democrat) proposal consists in exempting monthly earnings below 400 EUR (resp. 510) from contributions to social insurance, which raises the 2002 income bound by 75 EUR, and in phasing-out the exemption until gross earnings reach 800 EUR (resp. 1280). Under the other policy model (the so-called Mainzer model), entitlement to the reduction is depending on a joint assesment of household labor income and the lower and upper bounds of the phase-out region are respectively 650 and 1590 EUR for singles and twice these amounts for couples. This way, the policy covers a wider range of earnings, including a large share of one-earner couples. Bonin, Kempe and Schneider find very small estimates for the wage elasticities and conclude that these subsidy policies will not very effective.New orientations tend to privilege workfare concepts, that is, to render social benefits conditional on work ('*mini-jobs*').

Finland In Finland, reforms have occured mainly in the 1996-2002 period, following the recommendations of a working group whose proposals are analyzed by Laine (2002). The most important policy

[17] This is doubled for a married couple, which amounts to 3.1 times the labor income of a worker paid at the minimum wage. Bargain (2004b) shows that this is sufficiently high to avoid the discouragement of second earners encountered with the WFTC.

measure is the introduction of an *earned income allowance* in municipal taxation of employment income in 1997 in order to increase financial incentives to take up work. In order to reach very low earners, the deduction concerns income taxation for municipalities (rather than state income tax which is paid on yearly income above 8,006 EUR). The maximum allowance was 925 EUR in 1998 and it has increased progressively up to 3,550 EUR, in the 1996-2004 period.

Unlike the refundable tax credits, the effect of such an allowance is limited since the gain (in terms of disposable income) corresponds to the deduction times the marginal tax rate. With an average municipal tax rate of 19.5% (excl. church tax), it then turns out that taxes saved yearly reach a maximum of around 190 EUR in 1998 and 692 EUR in 2004. Such small amounts - net gain of 16 EUR per month in 1998 - convey to the idea that the actual reforms should not be an impediment to further simulations of more generous MWP schemes for our year of reference (1998).

2.3 Cross-country comparisons

2.3.1 Related literature

Too often, national and international studies related to tax-benefit systems rely on case-studies with hypothetical/representative households. This way, no clear conclusions can be drawn on the appropriateness of a given policy measure with respect to specific institutional circumstances and policy objectives. It is therefore important to go one (or two) step(s) further and to make use of behavioral microsimulation models in order to assess precisely the overall incentive and redistributive impacts of alternative policies. We suggest to conduct such an effort in a European perspective.

In fact, it is remarkable that only few studies carry out cross-country comparisons using simple static microsimulation. The pioneering work of Atkinson, Bourguignon and Chiappori (1988) evaluates the redistributive potential of French and British tax-benefit systems by simulating the distributional effects of imposing the French system on the British population and *vice versa*. De Lathouwer (1996) simulates the effect of imposing the Dutch unemployment benefit scheme on Belgian income distribution data. Bourguignon et al. (1997) use the prototype of the integrated European microsimulation model EUROMOD to simulate common reforms on French, British and Italian data.

There are even fewer cross-country studies which combine microsimulation and labor supply behavioral models. Spadaro (2004) extends the work of Bourguignon and al. (1997) by introducing behavioral responses into the simulations. Relying on a calibration approach, he analyses tax reforms under different assumptions regarding the size of labor supply elasticities. Immervoll et al. (2003) follow the same path and include the possibility to distinguish between elasticities of working hours and elasticities of participation, relying on Saez (2002). Other studies rely more traditionally on econometric estimations. Callan, Dex, Smith and Vlasblom (1999) estimate an homogeneous labor supply model for four European countries and simulate the different income tax principles applied in the respective countries (separate taxation and splitting systems). Their results suggest that the income tax scheme is a significant determinant of female labor supply and explains the discrepancies in labor force participation rates across these countries. These are, to our knowledge, almost the only studies available.

While the number of national studies using both microsimulation and labor supply modeling has dramatically increased over recent years,[18] the scarcity of similar analyses in a cross-country perspective can easily be explained by the difficulty to obtain comparable information for several countries. The

[18] This phenomenon is due to the development of national microsimulation software and to the revival of the labor supply literature through the development of discrete choice models (see Van Soest and Das, 2000).

datasets we relied upon have been rendered homogenous in the framework of the EUROMOD tax-benefit microsimulation model, as described in the appendices. Moreover, the microsimulation software allows for the simulation of the whole complexity of each European tax benefit system. In addition, we have carefully estimated labor supply models with similar specifications and very close variable definitions. Such a consistent framework offers a unique chance to perform cross-country analysis in both a comprehensive and robust way.

2.3.2 Framework conditions

It is important to review the initial conditions which determine whether a given MWP policy can achieve its objectives. These include the institutional framework - i.e. the existing tax-benefit system and the presence of a minimum wage, or wide-ranging tripartite bargaining systems -, the distribution of wages and incomes in a country as well as the size and distribution of the labor supply elasticities. Even though the importance of these initial conditions has been stressed in previous studies, they have not been sufficiently exploited in large-scale analyses and even less from a multi-country comparative perspective.[19] The present paper contributes significantly on this account and provides useful guidelines for the design of MWP policies.

First of all, the size of labor supply elasticities with respect to exogenous changes in the budget constraint is absolutely crucial. We focus extensively on this aspect in Section 4 and attempt to estimate as precisely as possible the elasticities of labor supply as well as the size of potential responses to the simulated reforms.

Secondly, it seems fundamental to understand how the existing tax-benefit system interacts with the reform. This aspect is carefully explored in the following sections. Pearson (2002) and Pearson and Scarpetta (2000) state that if tax rates are already high, the phasing-out of MWP payments may raise the EMTR to unacceptably high levels. We argue that not only income taxation but all means-tested instruments must be systematically controlled. To do so, we analyse how the distribution of EMTRs is affected by the simulated reforms in each country in order to characterize the potential (dis)incentive effects of the reforms at the intensive margin.

Thirdly, the structure of earnings is an important initial condition to determine the feasibility of a MWP policy. For instance, a narrow distribution of incomes may imply very large costs or very small amounts of transfer per household, and hence a small impact on work incentives. Depending on the shape of the earnings distribution, the number of households in the phase-out range (where EMTRs increase) may also be large. Note that these aspects depend on the type of reform we examine. In the case of the WFTC, the distribution of incomes net of tax and social contributions matters for the level of the distributed amounts. The participation rate or the distribution of working hours matter matters with respect to the number of eligible households because of the 16 hours condition. In the case of a wage subsidy, as we shall see, the distribution of wages must be considered.

Some remarks must be made at this stage. Pearson and Scarpetta (2000) argue that in a country with high levels of taxes and benefits and a concentrated earnings distribution - the case of Finland -, MWP policies may have high fiscal costs and risk reinforcing disincentive effects related to higher EMTRs. Firstly, it should be underlined that not only the degree of concentration of the income and wage distributions per se matters, but rather the shape of these distributions in the benefit range. As we shall see, infact, the cost of the reform is not the highest in Finland, although wages are arguably overall

[19] See Pearson and Scarpetta (2000), Bertola (2000), Gradus and Julsing (2000).

more concentrated than in France. Secondly, the level of EMTRs is not the only aspect that matters when we are concerned with incentives. Following the bulk of the recent literature on labor supply, we concentrate more specifically on participation decisions, which are known to depend on average tax rates (or equivalently on financial gains delivered from work). In the case of Finland, we will see that very low participation elasticities imply high efficiency costs of the reforms.

Finally, setting a high minimum wage while subsidising employer costs could have an identical effect as having lower minimum wage and subsidising in-work income. The choice to subsidise employers rather than employees depends on what works best in a particular institutional setting. This in turn depends in particular on which of the two categories is more sensitive to prices.[20] We exclusively study work incentives in this paper; however, we eventually show that in Finland, supply-side reforms may not be appropriate so that attention should also be given to demand-side aspects.

3 Simulation of in-work transfers in three European countries

We now suggest two types of MWP policies built, for each country, on the same cost basis. Scenarios of reforms are designed as closely as possible across countries.

3.1 General description of the reforms

The reforms simulated hereafter are in line with the two broad groups of policies surveyed in the previous section, that is, individual versus household-based in-work transfers. As justified below, it has appeared natural to opt on the one hand for a modified version of the WFTC, a measure conditional on family income, and, on the other hand, for an individual low-wage subsidy. These reforms shall henceforth be referred to as the working tax credit (WTC) and the low-wage subsidy (LWS). The WTC we suggest is based on the essential features of the 2001 British WFTC, extended to childless singles or couples. We now describe and compare the main features of both reforms.

Firstly, it should be noted that our WTC does not correspond to the reform implemented in the UK in 2003 and mentioned in Section 2. In the new British system, the child premia for couples is universalized in a new instrument (the Child Tax Credit). Instead, we have maintained the child element within the WFTC working tax credit. Policies aimed at recreating significant financial difference between social assistance and paid work must be scaled on family size just as social assistance benefits, in order to tailor the financial gain from taking up work to the income level guaranteed by minimum schemes.[21] By definition, the individual wage subsidy does not account for the family dimension nor for the presence of other incomes.

Both reforms should target those with a significant degree of participation. This can be done by phasing-in the instrument; this is the choice retained for the LWS as the amount of transfer is proportional to work duration. Alternatively, payments can be made discontinuously conditional on hours worked. With the WFTC, hence with our WTC, 16 hours are necessary to become eligible and a premium is given

[20] Even when policies target employees, there is a strong case for imposing a minimum wage rate as this would prevent firms from offseting the impact of MWP by reducing wages proportionally. This has indeed been the rationale for the introduction of a minimum wage in the UK when the WFTC started to be paid through the pay package.

[21] Optimally, child increments should have been set according to the equivalence scales of national social assistance schemes. For comparability purposes, we have opted for a homogeneous choice across countries, namely the equivalence scale of the 2001 WFTC.

above 30 hours.[22]

By construction, each reform is meant to emphasize one of the two policy objectives (even if they both attempt to simultaniously cover incentive and redistributive issues). In this respect, the WTC reform is phased out in order to increase targeting and reduce budgetary costs. At the same time, the LWS is set out as a merely incentive measure; it is not phased-out but simply conditionned on the wage rate.

Another crucial aspect is the interaction of the reforms with existing policy instruments. The LWS is simply added to existing tax-benefit instruments. The WTC interacts with several instruments which are currently substantially different across countries. In this respect, we have continuously tried to balance international comparability and overall coherence in each institutional setting, as detailed below.

Finally, it is possible to finance the reforms by direct taxation, through, for instance, an increase in the higher rates of the income tax schedule. In such case, the subsequent additional changes in labor supply would somehow interfere with the effects of MWP policies in a way which would complicate comparisons between both reforms. Consequently, we simply assume alternative ways to let the reforms be financially neutral. One could in particular think of an increase in indirect taxation (essentially a proportional tax on consumption) which would not affect neither labor supply behavior nor vertical distribution. More importantly, reforms are calibrated in such a way that they reach the same real cost (after behavioral responses).

3.2 A family-based working tax credit

3.2.1 Design and simulation hypotheses

The rules of the WTC are based on the description given in section 2 for the 2001 WFTC. Eligibility requires that at least one of the adults is in paid work for at least 16 hours per week. The formula to compute total household entitlement is as follows:

$$WTC = B - \max(0; (z - \theta)t)$$

with B the maximum theoretical amount, θ the threshold or disregard, t the taper rate and z the jointly assessed income of the household. According to 2001 WFTC rules, the taper rate t equals 55%. Note that this correspond roughly to 37% on gross income in the UK but to different percentages across the countries we examine. The maximum amount of benefit B is 74.6 EUR/week for a childless household.[23] A 20% premium is paid if the eligible person works at least 30 hours per week. Maximum entitlement does not depend on the number of adults but increases by 49% per dependent child. We retain the definition of a qualifying child used for social assistance in each country. Again, this is consistent with the incentive role of the transfer. The threshold θ amounts to 128.3 EUR per week.[24] Other features of the WFTC are taken into account.[25]

[22] It is assumed that authorities are able to collect information relative to work duration or hourly wage in a reliable way and with no additional administrative cost.

[23] This figure corresponds to the £54/week in the 2001 WFTC rules, which correspond to £50.6 in 1998 prices (inflation of 6.8% over the three year period).

[24] This figure corresponds to £92.9/week in 2001 which gives £87 in 1998 prices. For B and θ, absolute amounts are taken from the British reform and simply converted using 1998 exchange rates (0.67833 £/euro). Alternatively, we could have chosen relative amounts computed as a function of a national reference such as the average equivalized income. Results would possibly have been sensitive to the reference figure chosen.

[25] This includes the childcare credit and a further condition that the family should have less than £8000 worth of capital. These are not modelled since information on childcare is not reliable and wealth is ill-defined in the data.

In the assessment of family income z, all main sources are included net of income tax and social security contributions. These include earnings, self-employment income, unemployment benefits, pensions, irregular incomes, capital income and maintenance income (contrary to the WFTC rules, we include children's earnings in addition to adults' labour income).[26] In the UK, the income assessment for the WFTC is the same as for social assistance (*Income Support*) so that all family benefits are included with the exception of the Child Benefit, the Maternity Benefit and the Statutory Maternity Pay plus small UK-specific disregards on maintenance payments and war pensions. In a similar way, we have made sure that in France, the assessment is the same as for the *Revenu Minimum d'Insertion (*minimum income scheme, RMI hereafter) and *Allocation pour Parents Isolés* (minimum income for lone parents, API hereafter), with the exception of the most generous child benefit (*Allocation Familiale*).[27] In Finland and Germany too, WTC assessment is modelled along the lines of existing social assistance benefits, in the sense that the same incomes and assessment unit are used; yet, as in France, child benefits are excluded from income assessment and some of the disregards used in Germany do not apply either (namely the disregard on low earned income).

The other sensitive issue in modelling WTC concerns the way it interacts with the rest of the system. WTC is not itself part of the income tax base or of the resource base to compute means tested family benefits (in France) but enters income assessment of minimum income schemes (*Income Support* in the UK, *Toimeentulotuki* in Finland, RMI/API in France and *Sozialhilfe* in Germany).[28] Differently from the UK, we model income from WTC not to enter the assessment for housing benefits as the latter often interact with minimum income schemes (by entering the income assessment of social assistance, either directly, in Finland, or as a lump-sum, in France).

3.2.2 Impact on budget curves

We now look at ideal budget constraints to comment on the interaction of the reform with existing instruments. It must be stressed that these examples are merely illustrative, as they refer to virtual/synthetic households, and we shall not generalise them too widely.

In Figure 7, we illustrate the budget constraint of a single individual (here for Germany).[29] The 16 hours threshold is particularly evident as it marks the WTC eligibility as well as the 30 hours premium. The main groups of tax-benefit instruments are pictured and their interaction with the WTC appears clearly. The two dotted lines represent disposable income before and after the reform. The difference between these two lines corresponds to the net gain for the household which is depicted in Figure 8. It appears to be much smaller than the amount of the transfer, which is due to the fact that the WTC enters income assessment for social assistance. This effect occurs in all countries and is maximum in the case of Germany, due to a more generous safety net. Figure 8 shows that the maximum net gains are in a range between $10,000$ and $15,000$ euros instead of between the $5,000 - 10,000$ EUR as initially targeted by the reform. It appears however that in all countries, the reform recreates a significant financial

[26] In the UK, income from capital is not itself included but an assumed tariff income is calculated instead.

[27] Other means-tested components of the transfers for children are accounted for; housing benefit is not included directly but though a lump-sum computed according to the rules of the RMI/API (see Bargain and Terraz, 2001, for a description).

[28] Note that in Germany, the level of social assistance impacts in turn on the type and level of housing benefits, since *Sozialhilfe* recipients are entitled to an increased amount. Similarly, in France, a positive level of social assistance implies that labor income or replacement income (unemployment benefits) are not accounted for in the income assessment for the computation of housing benefits. In Finland, on the other hand, eligibility conditions for social assistance and housing benefits are independent, so that the WTC interacts less with existing instruments.

[29] Budget curves under the WTC scenario for all three countries and for all typical household types (single, single plus children, one- and two-earner couples with children) are available upon request.

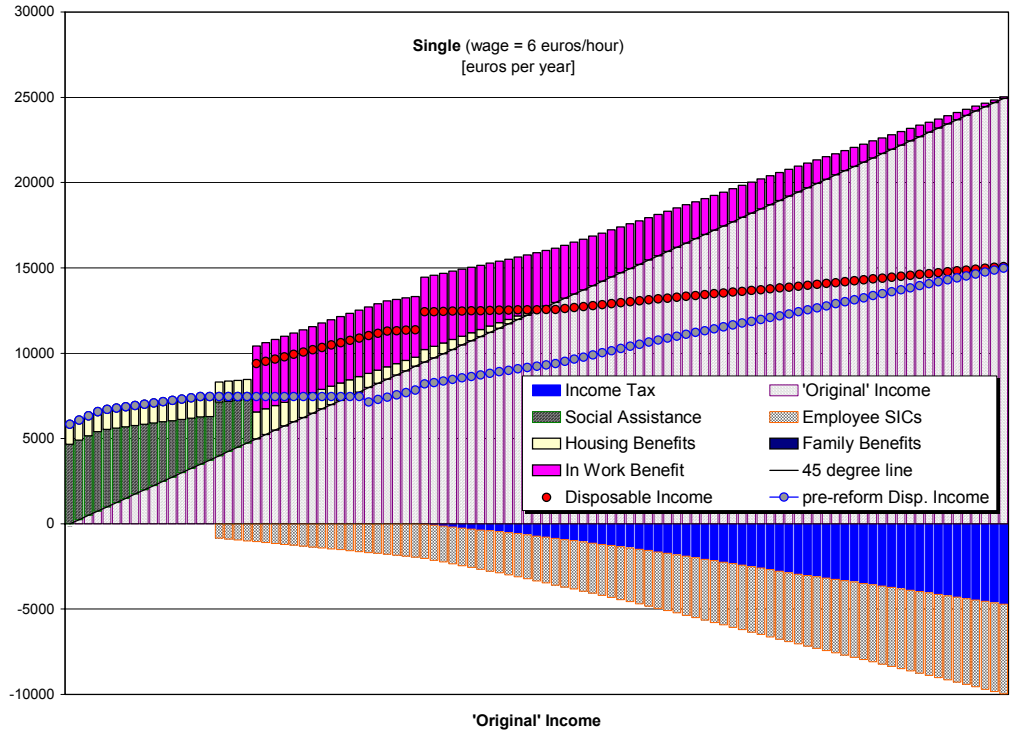

Figure 7: Impact of the reform on the budget curve of a single individual (Germany)

difference between non-participation and full-time activity, unambiguously enhancing the probability of participation for single individuals or lone parents.

Figure 9 shows the budget constraint of the second-earner in a couple (here for France), conditional on the first-earner working 40 hours a week. This means that income at zero hours increases because of the WFTC received by the first-earner and that the amount of transfer decreases as the second-earner increases the working time, meaning thatthe financial incentive to work decreases. The dashed line represents the indifference curve tangent to the new budget constraint. Clearly, the second-earner will reduce hours or move out of work in this example.

3.3 An individual wage subsidy

3.3.1 Design and simulation hypotheses

The LWS reform consists of increasing individual labor income $y = wh$ by a percentage A. The reform requires that the authorities are able to observe (with no additional costs) the hourly wage rate w or, equivalently, yearly work duration. The wage subsidy decreases if the wage rate is larger than a lower bound αW until it falls to zero at an upper bound βW. Both bounds are expressed as factors α and β times a reference wage W. These three parameters may be chosen to optimally tailor the reform to the wage distribution in each country. A natural choice for the reference wage W could be the official wage floor in the country. Unfortunately, there is no minimum wage in Germany and Finland in our year of reference (1998). Instead, we opt for the 10% value in the wage distribution of each country, corresponding to 6.09 EUR per hour for France (close to the 1998 French minimum wage), 6.79 for

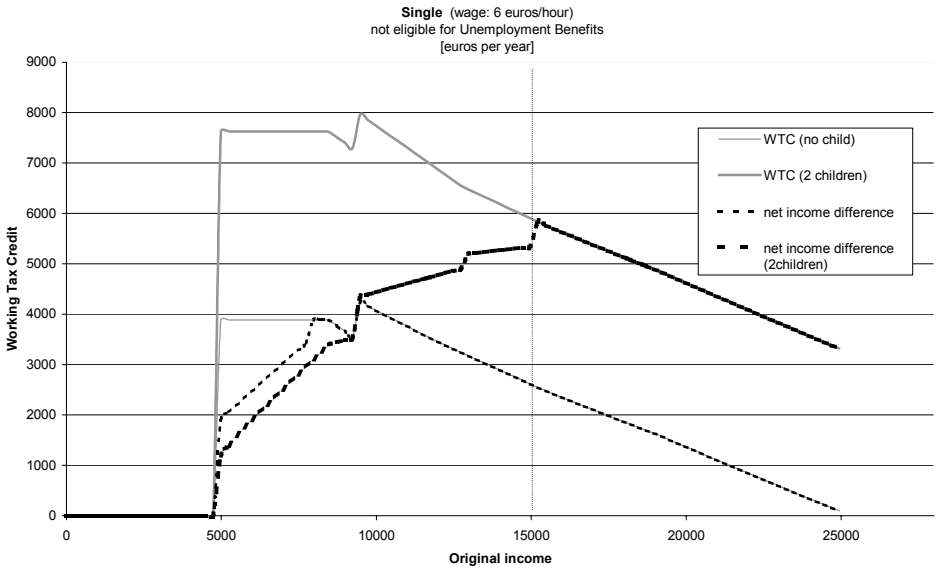

Figure 8: WTC reform for a single individual (Germany)

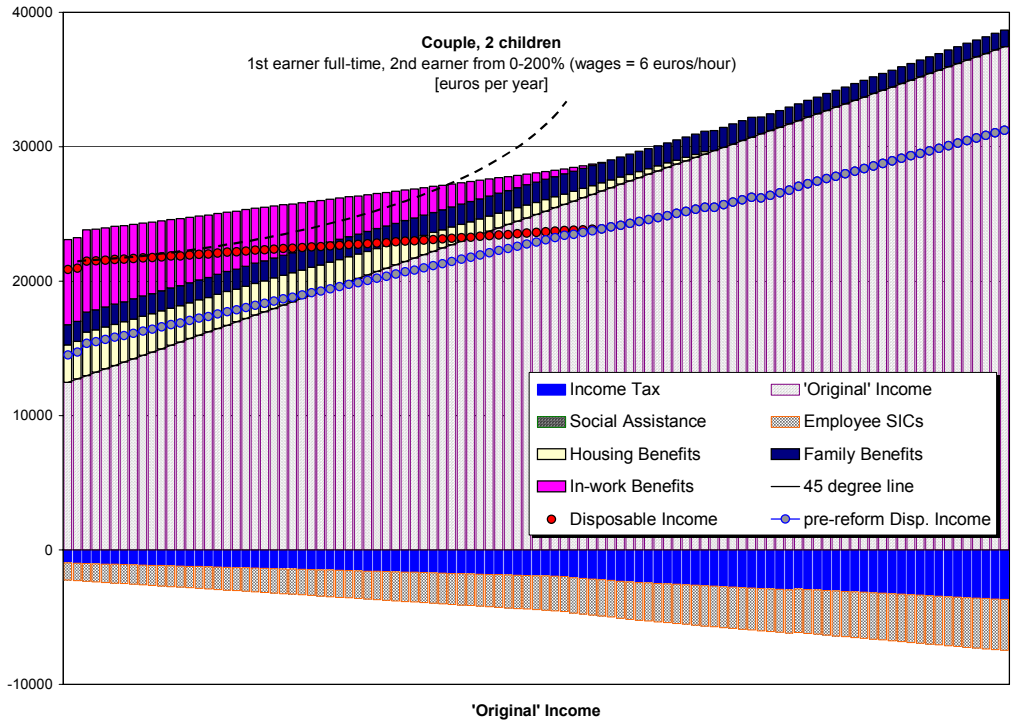

Figure 9: Impact of the reform on the budget curve of a two-earner couple with two children (France)

Finland and 7.42 for Germany. To reduce the number of degrees of freedom, we simply fix homogeneous values across countries ($\alpha = 1$ and $\beta = 1.4$).

The supplement factor A is country-specific and calibrated in order to reach the same budgetary cost for both WTC and LWS reforms. After calibration, we find $A = 12\%$ for Finland, 20.5% for France and 13% for Germany. The formula to compute the level of the LWS is written as follows:

$$\begin{aligned} LWS &= Ay \quad \text{if } w/W \leq \alpha \\ LWS &= KAy \quad \text{if } w/W \in [\alpha, \beta] \end{aligned}$$

with $K = \frac{(\beta - w/W)}{\beta - \alpha} \in [0, 1]$.

3.3.2 Impact on budget curves

The impact of the LWS is shown in Figure 10 in the case of a single individual (here for Finland). We have mentioned already that budget curves as represented in our study assume that labor income increase is due to an increase in work duration up to 40 hours (first half of the X axis) and to pay rises beyond (second half of the X axis). This way, the amount of wage supplement Awh increases linearly with working hours (phasing-in) at a flat rate Aw so that the slope of the budget curve gets steeper. After hitting 40 hours, the wage rate increases and the benefit starts to decrease as soon as it exceeds the reference wage (6.79 EUR for Finland). The LWS clearly appears as a new layer on top of all existing instruments.

3.4 Distribution of working hours, earnings and wage rates

We have previously reviewed the different types of framework conditions which are of potential of relevance when designing and evaluating MWP policies. The crucial question of the size of the labor supply elasticities is the subject of the next section. The way the WTC interacts with the existing system is also an important aspect which has been investigated in the previous budget curve analysis. We focus here on the structural differences across countries which may explain differences in the cost and targeting of each reform.

Figure 11 details the participation rate of each country's population, and more precisely the proportion of households where at least one member works at least 16 hours a week, that is, the proportion of households theoretically entitled to the WTC. Eligibility also depends on household income but differences in previous figures appear large enough across countries to predict a higher rate of eligibility in Finland than in France and higher in the latter than in Germany.

The distribution of wage rates and labor incomes is also important to explain the impact of the reforms. Figure 12 reveals that for female workers, the distribution of wage rates in Finland is slightly more concentrated than in France, whereas it is wider in Germany. This observation seems in line with the literature on wage inequalities which usually places France between Scandinavian countries on one side and the UK and Germany on the other. Moreover, the proportion of women working full-time is larger in Finland. This reinforces the differences in the level of concentration across countries - especially between France and Finland - when it comes to the distribution of labor incomes, also represented in Figure 12.[30] More importantly, the shape of the distribution is different across countries. In particular,

[30] Similar graphs for men are not provided as no significant differences in concentrations appear across countries or between the distribution of wage rates and the distribution of labor incomes. The differences in the shapes of the distributions across countries reinforce the present analysis for women.

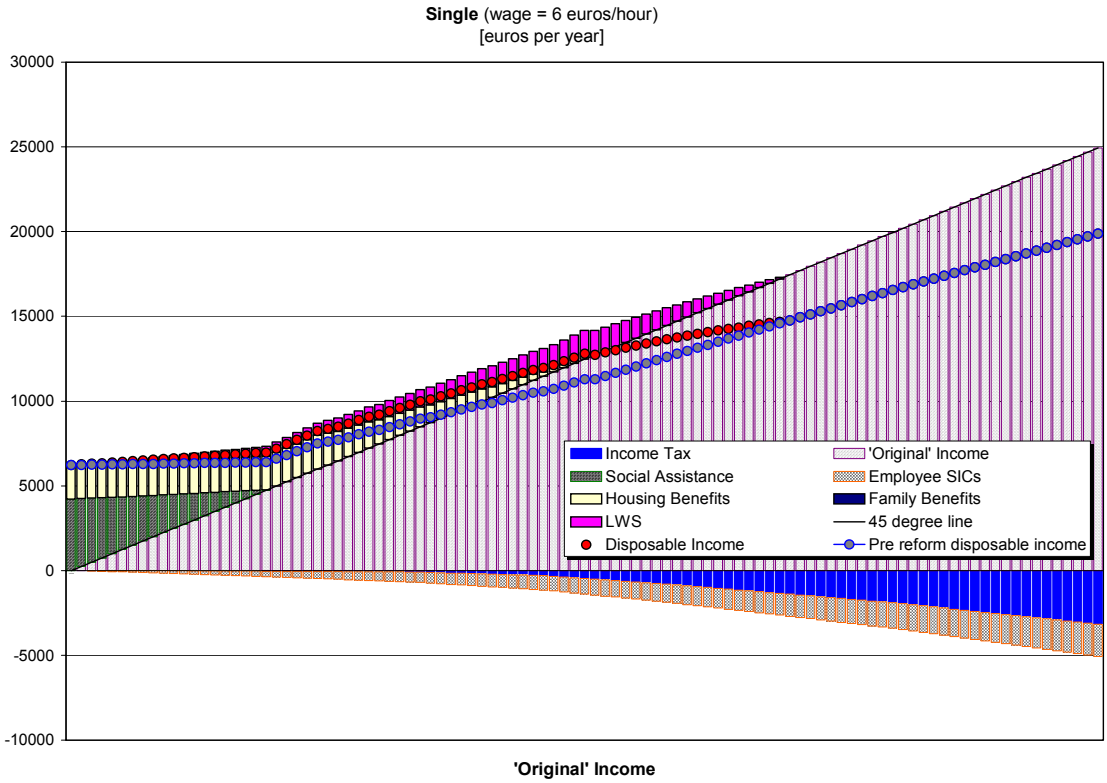

Figure 10: Impact of the reform on the budget curve of a single individual (Finland)

	France	Germany	Finland
household in work	59,4%	51,4%	79,2%
household with h>15 h/week	58,4%	50,6%	78,1%

Source: authors' computation.

Figure 11: Female participation rate across countries

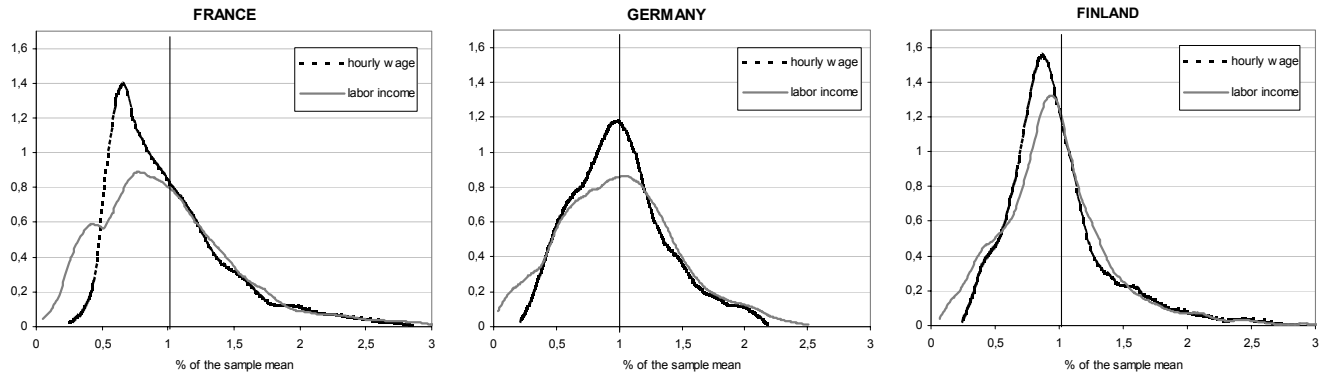

Figure 12: Distribution of hourly wage rate vs labor income for women

it is remarkable that a larger density of workers is found in a lower income range in France compared to Finland. This way, it is likely that a greater proportion of households will be found in the flat segment of the WTC in France, i.e. a larger density of the population in the phase-out region or above it in Finland. This could imply smaller average amounts of WTC in Finland and, to some extent, partly offset the differences in theoretical eligibility which we explained above by differences in participation rates. Naturally, this analysis should be refined to account for the fact that the net impact of the WTC on budget curves depends on interactions with the existing system, as seen in Figure 8.

In the case of the LWS policy, the differences in wage rate distributions matter. In addition to the observations above, it is remarkable that the log-normal distribution for France presents a much steeper tail on the left-hand side, due to the existence of a wage floor. Wage rates are concentrated in lower ranges in France and Finland; the same feature applies for the male wage, not represented here. Yet, the concentration is more important than the shape of the distribution here since the lower bound of the LWS depends on a country-specific wage reference W (the wage value at the frontier of the first decile) while the width of the phase-out region is identical across countries. Higher concentration in Finland then implies relatively more eligible individuals, *ceteris paribus*.

3.5 Distribution of household typologies

A final aspect that needs to be considered in designing in work benefits is the relative share of different houshold typologies. As broadly explained in the previous sections family-based reforms tend to have a differential impact on different household typologies, so not only the relative share of singles and couples, but also the relative importance of single (male) breadwinner and two earner households becomes a crucial aspect. Figure 13 shows the relative shares of different household typologies in France, Finland and Germany and compares them with the UK. The households considered are headed by potentially active singles or couples. Elderly households as well as more complex household structures (like three generation households) are not included in the sample which nevertheless contains more than 60% of all households. A first striking aspect is the difference between France on the one side and Germany and Finland on the other: The share of households with a single adult is about 10% lower in France than in the latter two countries. The reverse is obviously true for couples. The UK is somewhere in between Germany and Finland on the one side and France on the other. Yet it is characterised by a

	France		Germany		Finland		United Kingdom	
	adult inactive	Female adult active	Female adult inactive	Female adult active	Female adult inactive	Female adult active	adult inactive	Female adult active
Single males	8.0		12.6		13.4		10.8	
Single females	2.5	5.9	3.6	8.6	4.8	6.8	2.4	4.5
Single mothers	0.4	3.1	1.7	2.7	1.4	2.7	2.8	2.8
Total single adult households	*19.9*		*29.1*		*29.1*		*23.3*	
Couples, no children	5.4	9.4	4.8	11.1	3.7	7.9	5.1	12.2
Couples with children	7.5	21.1	6.7	9.6	6.9	13.8	6.6	14.3
Total couples	*43.4*		*32.2*		*32.3*		*38.2*	

Source: Authors' calculations based on Euromod datasets

Figure 13: Percentage distribution of household typologies

significantly higher share of single mothers, and especially non working lone mothers. On the contrary, the percentage of lone mothers is lowest in France. Particularly small is also the share of inactive single mothers, arguably one of the most targeted groups in the family-based reform.

The above considerations may lead us to predict a very different effect of the family-based reform in France, as compared to Germany and Finland. On the one hand the potential incentives will be targeting a smaller population, a high share of which is already in employment, while on the other hand the potentially negative incentives will hit a larger share of the population, characterised by relatively high rates of employment for women in couples. Germany and Finland on the other hand share a quite similar structure of household typologies, although they clearly differ with respect to the role of female employment: potential incentives may therefore be expected to be more significant in Germany than in France.

4 Labor supply modeling

A key issue in determining the impact of reforms is the elasticity of labor supply to exogenous changes in budget constraints.

4.1 Discrete choice model of female labor supply

To model labor supply, we rely on a recently developed technique based on structural unitary model with discrete work hours.[31] Discrete-choice models make use of an explicit parametrization of consumption-leisure preferences and the problem is reduced to utility-maximization among a discrete set of possibilities, which allows to avoid the computational and analytical difficulties encountered in the continuous setting of Hausman (1981,1985). The main advantage derives from the possibility to account for nonlinearities and nonconvexities in the budget sets. It also simultaneously explains the participation decision and the choice of working hours. For these reasons, discrete models have been used extensively for ex-ante evaluation of current or topical tax-benefit reforms.[32]

[31] We do not attempt to model intrahousehold interactions and the possible impact of reforms on the balance of power within couples. Indeed, no simple econometric techniques are available yet to estimate a collective model of labor supply when accounting for participation decisions as well as nonlinear tax benefit systems. See Laisney (2002, ed.) for a general discussion.

[32] See Van Soest (1995) for the Netherlands, Hoynes (1996) for the US and Blundell et al. (2000) for the UK, among others.

Following many examples in the literature, we focus solely on female labor supply. This choice is usually motivated by the fact that female participation is lower and their working hour are more variable than men's, as female work is often regarded as a second source of earnings.[33] At the same time, male labor supply is known to be very inelastic to moderately sized exogenous changes in the budget constraint.[34] An option would be to model only participation decisions for men. However, in the countries we examine, the number of inactive men appears too small to do so (less than 1% of the husbands in France and 5% in Germany). Moreover, it is well-known that male inactivity is mostly explained by demand-side rationing in these three countries.

The model, based on Van Soest (1995), is described in the Appendix. Female labor supply is supposed to vary discretely between full-time, part-time and non-participation. This strategy incorporates explicitly the evidence that most salary workers are constrained to choose among a limited set of options due to social/institutional norms and demand-side rigidities. Concentrations of hours around part-time and full-time work is evident in the distributions of hours provided in the Appendix. Self-employed workers may have more fredom to choose in a continuous range of hours but are not included in our selection.

Note that one of the most prominent aspects of modern literature on labor supply, as surveyed by Heckman (1993), is the fact that labor supply responsiveness is much larger at the extensive margin.[35] In this respect, our modelling strategy focuses mainly on participation decisions. Note that the possible variations in working hours are partly captured by the part-time option. As a result, the WTC reform is expected to display larger negative responses in this intensive margin. Indeed, the tax credit implies much larger increases in EMTRs, as described below.

We have previously surveyed cross-country analysis relying on behavioral microsimulation. In particular, it is interesting to compare our approach with the alternative strategies of Spadaro (2004) and Immervoll et al. (2003). These authors acknowledge the lack of consensus in the literature regarding the size of elasticities and simply postulate different levels of labor supply responsiveness. They analyse the impact of tax reforms on social welfare and evaluate the sensitivity of their results with respect to the different elasticity regimes.[36] In the present paper, we rely more traditionally on the econometric approach which enables us to capture differences in labor supply sensitivity across countries; this is an important initial condition to explain how the reforms achieve their objectives.[37] Note that our strategy allows for flexible functional forms and does not impose the iso-elasticity assumption retained in the calibration approach. We also check the sensitivity of our results with respect to different levels of labor supply responsiveness (see below); the computation of bootstrapped confidence intervals is described in the Appendix.

[33] See Laroque and Salanié (2002) for a recent comprehensive discussion.

[34] This has been justified on sociological grounds and proved extensively in labor supply literature (see surveys from Pencavel,1986, Blundell, 1993, and more recently Blundell and MaCurdy, 2000).

[35] The most recent and convincing proofs are precisely provided by natural experiments related to in-work transfers. For instance, Meyer (2003) studies the changes in the *Earned Income Tax Credit* in the US between 1990 and 1996. He shows that nearly all of the labor supply adjustment by single mothers in response to these changes occured at the extensive margin. The small adjustment in working hours is merely explained by behaviors and not connected to an explanation in term of rationing of worked hours (the US labor market presenting a much more continuous distribution of work hours than in continental Europe).

[36] Meyer (2003) argues that policy simulations that do not recognize different levels of responsiveness of participation and working hours margin may be misleading. Relying on Saez (2002), Immervoll et al. (2003) account for both types of elasticities.

[37] Note, however, that an interesting complementary evaluation of the two reforms we examine would consists in assuming identical elasticities across countries. This way, only the differences in existing tax-benefit systems and wage/income structures would explain cross-country differences in the effects of the reforms.

country	women in couples		single women	
	wage + 1%	wage + 10%	wage + 1%	wage + 10%
France	0.62% [0.54; 0.74]	5.91% [5.2; 6.5]	0.12% [0.07; 0.16]	1.09% [0.8; 1.4]
Finland	0.15% [0.11; 0.19]	1.42% [1.0; 1.8]	0.28% [0.19; 0.39]	2.66% [1.8; 3.4]
Germany	0.40% [0.32; 0.47]	3.77% [3.1; 4.5]	0.16% [0.10; 0.22]	1.44% [0.9; 1.8]

Elasticities are computed using averaged simulated transitions; figures in brackets give a bootstrapped 90% confidence interval of the elasticity

Figure 14: Change in female average work hours

country	women in couples		single women	
	wage + 1%	wage + 10%	wage + 1%	wage + 10%
France	0.55% [0.48; 0.65]	5.20% [4.6;5.8]	0.07% [0.03; 0.10]	0.61% [0.4; 0.7]
Finland	0.15% [0.11; 0.19]	1.40% [1.0; 1.7]	0.27% [0.19; 0.39]	2.61% [1.8; 3.3]
Germany	0.33% [0.25; 0.39]	3.22% [2.7; 3.8]	0.13% [0.07; 0.19]	1.19% [0.8; 1.5]

Elasticities are computed using averaged simulated transitions; figures in brackets give a bootstrapped 90% confidence interval of the elasticity

Figure 15: Change in female participation rate

4.2 Labor supply sensitivity

Estimation results are presented in the Appendix and estimates are used to compute elasticities. In many studies, elasticities are evaluated at the sample mean. As pointed out by Van Soest and Das (2000), this is not very informative - in a highly nonlinear model like ours - which focuses on the consequence of wage changes for a heterogeneous population. Instead, wage-elasticities can be computed numerically and averaged over the whole sample. To do so, we increase female wage rates uniformly by 1% and 10% and simulate in each case the subsequent change in average work duration and in the participation rate.

Elasticities presented in Figures 14 and 15 are in line with recent labor supply literature (see Blundell and MaCurdy, 2000). The fact that single women appear to be much less responsive to financial incentives than married women is conform to the literature (except in Finland). Overall, elasticities are moderately sized, suggesting a relatively small potential response to tax-benefit reforms. We now turn to country-specific comparisons with related studies using a similar type of methodology to ours; by construction, elasticities of working hours implicitly account for participation effects in the present paper and in all the studies quoted below.

For France, elasticities compare well with recent findings, even if slightly higher, which can be due simply to different data selection hypotheses. Bargain (2004a), indeed, focuses on married/cohabiting females with working partners and who are available for work; in the present study, both spouses must be potentially active. Choné et al. (2003) study only couples with at least one child under th age of seven. Participation elasticities lie around 0.3 in both studies when the censorship effect of the minimum wage is not accounted for. Overall, these small values convey to the idea that there may not be as much scope

for incentive reforms as thought in previous studies of the participation of married women in France.[38]

In Germany, results are in the range of recent estimates provided by Bonin, Kempe and Schneider (2002), Haan (2004), Steiner and Wrohlich (2003) and Haan and Steiner (2004). All these studies rely on the GSOEP (2000 wave in the first study, 2001 in the second and third studies and 2002 in the last one). Bonin et al. (2002) find own wage-elasticities of 0.27 with respect to working hours and 0.20 with respect to participation for women in couples while Haan (2003) finds 0.32 and 0.13 respectively; results from Steiner and Wrohlich are very close to the latter. Our elasticities are slightly higher probably because we do not account for the joint decision of men and women in couples. When husbands' labor supply is assumed fixed, Haan and Steiner (2004) find elasticities of 0.39 regarding working hours for women in couples; they also provide estimates for single women and find elasticities of 0.13. In line with related studies on Germany, we find that elasticities are markedly smaller for East German females.

There are few studies carrying out labor supply estimations for Finland. For the year 1987 (before the Finnish recession), Ilmakunnas (1992) considers only working women in couple and finds uncompensated wage-elasticities in a range between 0.09 and 0.11. Elasticities found by Kuismanen (1997) are even smaller. In both cases, it is difficult to compare these results with ours, as participation effects do not seem to be accounted for. Kuismanen (2000) finds very small responses to important changes in the tax system and Laine (2002) provides difference-in-difference estimations of the impact of the 1996-2001 reforms in Finland, finding very moderate effects. Overall, it seems that labor supply responsiveness is extremely small in Finland, which is line with our findings. Larger elasticities for singles than for married women remain surprising however and require further investigation.

5 Tax reform analysis

5.1 Tax reform analysis without behavioral responses

This 'first-round' analysis consists simply in assessing the cost and targeting of each reform when no behavioral response is taken into account. This is usually done by static microsimulations and in this study, we make use of the European integrated tax-benefit model EUROMOD described in the Appendix. Moreover, the potential impact of the reforms on hours and participation can be characterized by variations in the distribution of EMTRs and the financial gains to work respectively. The direction of these variations gives useful intuitive insights to explain the labor supply responses found in the 'second-round' analysis which follows.

5.1.1 Cost and distributional analysis

The static analysis of the WTC is summarized in Figure 17. Figure 16 reveals the relative cost of the reform as a proportion of the country's total 1998 GDP, which allows for straightforward cross-country comparison. It appears that the apparent cost is slightly smaller in Germany (0.36% of GDP) than in France or Finland (around 0.40% of GDP). In absolute terms, the cost of 5.8 billion EUR in France and 7.6 billion in Germany can be compared to the £5 billion spent in 2001 in the UK on the WFTC (7.3 billion EUR).

[38] In Blundell and Laisney (1988) and Bourguignon and Magnac (1990), elasticities obtained using the Hausman technique appear implausibly high (above 1). Bourguignon and Magnac find their results to be very sensitive to several aspects of the specification; when fixed costs are added to the model, the wage-elasticity becomes extremely small (0.05) as it captures only the variations in hours at the mean point and not changes in participation for the whole sample.

	France	Germany	Finland
WTC (apparent cost)	0,404%	0,356%	0,394%
WTC (net cost)	0,395%	0,289%	0,383%
LWS (cost)	0,571%	0,350%	0,406%

Figure 16: Relative cost of the reform in % of 1998 total GDP.

As expected in the discussion on framework conditions, the number of recipients is larger in Finland (10.6% of the households) than in France (10.1%) and in Germany (9%). Results are nevertheless reasonably comparable across countries. The difference between France and Finland is not as large as could be expected when looking at participation rates only. As mentioned above, part of the difference is offset by the fact that earnings are concentrated in higher ranges of income in Finland, which also explains the somewhat lower level of the average benefit (39 EUR per week versus 43 in Germany and 49 in France).

The reform targets the first half of the distribution of equivalized incomes, just as in the UK, with the exception of the first decile which is composed mainly of inactive households which are not concerned by the reform.

The net cost (i.e. total variation in disposable income) is naturally lower than the apparent cost (total expenditure on the WTC by the government) as the introduction of the WTC partially crowds out spending on social assistance. For instance, in France, the difference between apparent (5.86 billion EUR) and net costs (5.741) is explained for 97% by the subsequent decrease in social assistance (RMI/API). The difference is especially large in Germany (around 20%), certainly due to the generosity of the German minimum income scheme. In fact, the previous budget curve analysis revealed that working 16 hours at minimum wage in France and in Finland is sufficient to exit the segment of income assistance while the same does not hold for Germany.

The static analysis of the LWS is summarized in Figure 18. As discussed in the review of MWP policies, the individual LWS reform is by nature less targeted than the family-based WTC. Indeed, the number of recipient households is twice as large as than with the WTC; the policy measures attain individuals in all income deciles as low-wage individuals can be found in richer families. Note that there is no difference between apparent and net costs as the LWS does not interact with the rest of the system.

The cost of the reform is calibrated so that post-response costs of both reforms are as close as possible. As we shall show below, important negative responses in France imply a relatively larger post-response cost for the WTC and hence also for the LWS; moreover, important positive responses to the LWS imply an even larger pre-response cost for the LWS in France. This mainly explains the important differences in cost and in the number of people concerned by the LWS reform.

Furthermore, it appears that the impact of the LWS depends on structural factors as discussed previously. As shown in Figure 12, hourly wages are rather concentrated at the lower end of the distribution in France and Finland, which explains a relatively larger number of eligible individuals (22.9% of the households contain at least one eligible individual). Figure 12 presents average amounts per household (and not per individual); differences between France and Finland simply result from a much higher total cost in France for an identical proportion of recipients in both countries. Once again, Germany stands inbetween as both total cost and total number of recipients are smaller (due to a more dispersed wage distribution). Unlike the WTC, the size of the average subsidy is almost constant across household types. Couples are slightly above the average simply because there can be more than one eligible individual per

		all	singles	lone parents	couples	couples with children
France						
apparent cost	(billion euros/year)	5,859	22,5%	20,3%	2,3%	54,9%
net cost	(billion euros/year)	5,741	22,5%	19,9%	2,3%	55,4%
recipients	nb of hh	2 316 233	34,3%	16,3%	4,5%	44,9%
	% of population	10,1%				
net average amount	(euros/week)	49	32	60	25	59
net max amount	(euros/week)	205	90	194	62	205
Germany						
apparent cost	(billion euros/year)	7,662	20,9%	23,7%	2,2%	53,2%
net cost	(billion euros/year)	6,221	23,9%	21,4%	2,0%	52,8%
recipients	nb of hh	3 443 208	31,6%	15,7%	4,2%	48,5%
	% of population	9,0%				
net average amount	(euros/week)	43	28	65	23	47
net max amount	(euros/week)	149	90	120	57	149
Finland						
apparent cost	(billion euros/year)	0,506	41,9%	18,0%	1,3%	38,9%
net cost	(billion euros/year)	0,492	42,1%	18,4%	1,1%	38,4%
recipients	nb of hh	248 663	53,7%	14,4%	1,7%	30,2%
	% of population	10,6%				
net average amount	(euros/week)	39	31	49	30	50
net max amount	(euros/week)	248	90	159	53	248

Source: authors' computations using EUROMOD

Figure 17: Descriptive statistics for the WTC reform

couple.

5.1.2 Characterization of potential effects on working hours through EMTRs

The potential impact of the reforms on work hours can be characterized by the variations in the distribution of EMTRs. With the WTC, EMTRs should increase in the phase-out range as the amount of transfer decreases with increments in gross income. To see this, notice that the new EMTR can be decomposed as follows:

$$\begin{aligned} EMTR^{new} &= 1 - \frac{dC^{new} + dWTC}{dy} \\ &= 1 - \frac{dC^{new}}{dy} + \frac{dz}{dy}t \quad \text{for } z > \theta \end{aligned}$$

with dC^{new} the variation in disposable income when not accounting for the WTC but only for its impact on other instruments (e.g. on social assistance). Two effects actually come into play. Firstly, the EMTR increases by the level of the taper rate $t = 55\%$, corrected by the fact that this withdrawal rate applies to the income concept z (labor income net of tax and social security contributions plus some benefits) rather than to gross earnings y. This way, for an increment dy homogeneous across countries, the corresponding variation dz should be smaller in Finland and Germany since taxes and social contributions are higher in those countries than in France; hence the increase in the EMTR is smaller in both of these countries. Secondly, the WTC interacts with other instruments and in particular with social assistance so that

		all	singles	lone parents	couples	couples with children
France						
cost	(billion euros/year)	8,206	15,4%	6,8%	23,3%	54,4%
recipients	nb of hh	5 277 893	17,5%	7,8%	21,3%	53,4%
	% of population	22,9%				
average amount	(euros/week)	30	26	26	33	30
max amount	(euros/week)	111				
Germany						
cost	(billion euros/year)	7,476	13,4%	11,0%	28,0%	47,6%
recipients	nb of hh	6 334 906	13,6%	11,7%	27,4%	47,4%
	% of population	16,6%				
average amount	(euros/week)	23	22	21	23	23
max amount	(euros/week)	81				
Finland						
cost	(billion euros/year)	0,545	20,1%	8,1%	23,9%	47,9%
recipients	nb of hh	538 521	23,9%	8,6%	26,1%	41,4%
	% of population	22,9%				
average amount	(euros/week)	19	16	18	18	23
max amount	(euros/week)	83				

Source: authors' computations using EUROMOD

Figure 18: Descriptive statistics for the LWS reform

$dC' \geq dC$ in the phase-out region. Therefore, the increase in EMTRs for WTC recipients in this region should not be larger than the taper rate on gross income $\frac{dz}{dy}t$.

Indeed, figure 19 shows that EMTRs increase substantially for deciles 3, 4 and 5, given the large phasing-out of the benefit; the rise is indeed more important in France where taxation is relatively lower. Finland starts out from a situation of high marginal income tax rates so that a smaller part of the gross increase of 1500 EUR will be taxed away in the phase-out region. The same applies to Germany, although the increase in the EMTR is somewhat sharper. This is probably related to the greater importance of (flat rate) social security contributions rather than of progressive income taxation, as is the case in Finland. This way, low earnings are relatively less taxed in Finland; this could explain why the EMTR rises alreadyin the second decile while it raises only from the third decile onwards in Germany.

There is no phasing-in but the 16 hours threshold for eligibility may induce negative EMTRs in the cases where the EMTR increment makes the household eligible for the WTC. EMTRs decrease in the two first deciles in Germany as some workers may experience a negative EMTR if they are just at the boundary of the WTC, which is more often the case in Germany due to lower participation rates and lower activity levels. The first decile's average EMTRs remain unchanged in France and Finland since most households are inactive. This way, the WTC crowds out spending on social assistance and implicitly taxation of additional earnings switches from 100% (withdrawal rates of minimum income schemes) to 55% at most (or $\frac{dz}{dy}t$ if we consider gross income). The reform mostly targets the first half of the distribution so that EMTRs of deciles 6 to 10 hardly change.

Previous findings are confirmed by Figure 20. It shows that the proportion of households with EMTRs in the range of $40-60\%$ tend to decrease. At the same time, the proportion of very high EMTRs (above 70%) increases from around 4.2 to 7.1% in Germany and Finland and from 3.8 to 11.3% in France. This last result is not fully comparable to those of Blundell et al. (2000) who find the proportion of higher

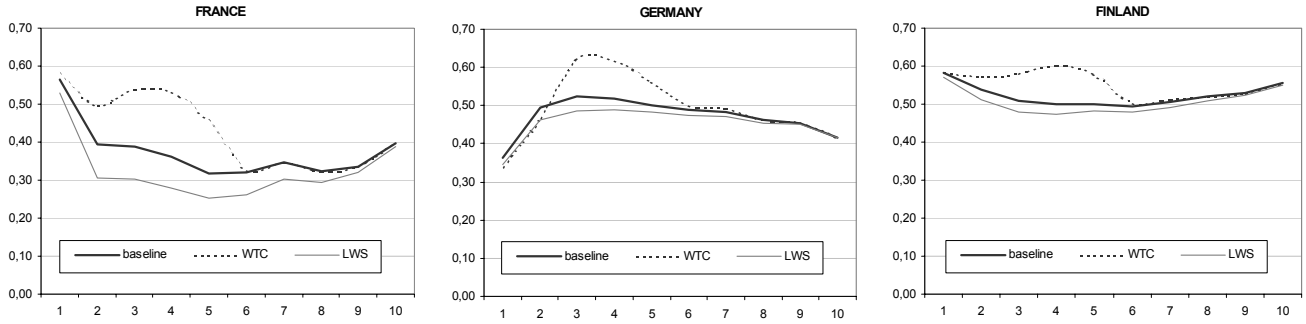

Figure 19: Distribution of EMTRs per decile of disposable income per adult equivalent

EMTR	France			Germany			Finland		
	baseline	WTC	LWS	baseline	WTC	LWS	baseline	WTC	LWS
<0	0,1	0,2	0,5	0,6	0,8	1,2	0,0	0,0	0,0
in [0.0; 0.1]	0,5	0,5	4,9	4,3	4,3	4,7	0,5	0,5	0,5
in [0.1; 0.2]	3,2	3,1	16,4	5,5	5,4	5,5	0,2	0,2	0,8
in [0.2; 0.3]	21,3	20,5	21,2	2,5	2,2	2,9	2,6	2,6	4,3
in [0.3; 0.4]	53,0	44,1	40,6	10,9	10,7	13,0	4,9	4,6	9,9
in [0.4; 0.5]	12,9	10,5	9,3	17,2	15,6	18,2	32,9	28,5	29,1
in [0.5; 0.6]	3,6	3,1	2,1	50,0	44,0	46,1	45,6	43,1	43,4
in [0.6; 0.7]	1,0	3,1	0,8	3,1	3,2	2,9	7,6	7,1	7,0
in [0.7; 0.8]	0,5	3,6	0,7	1,6	6,8	1,5	1,5	6,3	1,1
> 0.8	3,8	11,3	3,5	4,3	7,1	4,1	4,2	7,1	4,0

Source: authors' calculations using EUROMOD

Figure 20: Impact of the reforms on the distribution of EMTRs

rates to decrease. This is mainly due to the fact that the authors confront the introduction of the WFTC to a baseline situation with an in-work transfer (the Family Credit) already in place. The new reform introduced in the UK consisted precisely in decreasing the taper rate of the tax credit from 70% (FC) to 55% (WFTC), in order to modify a situation in which the proportion of EMTRs above 70% was extremely high (14, 8% according to Bourguignon, 1997). It is nevertheless interesting to note that the increase in the effective marginal tax rates predicted by Blundell et al. (2000) for households who had became eligible for the WFTC after the reform, is in line with our results.

The impact of the LWS reform on the EMTR is simply written as:

$$\begin{aligned} EMTR^{new} &= 1 - \frac{dC + dLWS}{dy} \\ &= EMTR - \frac{dLWS}{dy} \\ &= EMTR - AK \end{aligned}$$

with $K = 1$ if $w/W \leq \alpha$ and $K \in [0, 1]$ if $w/W \in [\alpha, \beta]$. In this case, dC does not vary after the reform as the LWS does not interact with the rest of the system. EMTR can only decrease and at most by the level (in percentage points) of the wage subsidy A.

As seen in Figure 19, the LWS reform shifts the EMTR downwards along the whole income distribution. The fact that this effect is widely distributed is not surprinsing as low-wage workers can be found in all deciles. Yet the strongest reduction occours between the 2nd and the 4th decile as the subsidy mostly targets very low wages (between 0 and 10% of the wage distribution). In a comparative perspective, note that both the magnitude and the range of the reduction are wider in France. This should not come as a surprise since the relatively higher net cost of WTC in France implies a larger amount of wage subsidy.

As mentioned before, the definition of the EMTR is crucial. Indeed, if incremental gross income corresponds to a pay rise due to increased efforts or human capital accumulation, then the variation of the LWS with respect to w is what matters:

$$\begin{aligned} EMTR^{new} &= EMTR - \frac{dLWS}{hdw} \\ &= EMTR - A\frac{(\beta - 2w/W)}{\beta - \alpha} \quad \text{if } w/W \in [\alpha, \beta] \end{aligned}$$

In this case, EMTRs will increase if $w/W > \beta/2$. With the values retained in this exercise, this will be the case for all workers in the range $[\alpha, \beta]$. This aspect is ignored in the present study although it is important as it illustrates the fact that the tax burden can also generate productivity traps.

5.1.3 Characterization of potential effects on participation through financial gains of work

Contrary to the EMTR analysis, we study the financial gains of work only for the female workers in the samples used for labor supply estimations. This limitation must be kept in mind. We simply simulate the relative increase in disposable income for the household when the female works full or part-time as compared to remaining inactive. The wage rate is computed from the data in case she actually works or is predicted by traditional means otherwise. Figures 21 and 22 describe the financial gain to take a job for single and married women respectively.

Single mothers are relatively more numerous in the poor population than married women so that the well targeted WTC will be more efficient than the LWS to recreate an incentive in this population. This is particularly striking as regards the gain of working part-time, which rises from 47 to 79% (resp. 67 to 91% and 56 to 81%) in France (resp. Germany and Finland) after implementation of the WTC but only to 50% (resp. 70 and 58%) after introduction of the LWS. The average gain of working full-time increases by 7 percentage points in Finland and by more than 10 points in Germany and France; it increases only by half of this when the LWS is introduced. Similarly, the proportion of very low gains (less than 40%) decreases substantially when the WTC is introduced, and this for all three countries.

For married women the picture is completely different. First, it is noticeable and expected that the gain is much smaller than for single individuals; this is especially the case in France and Germany where the earnings of the second-earner are taxed away at the marginal tax rate of the first earner, a consequence of the joint income taxation system. The same holds for the WTC for which income is jointly assessed at the household level. As a result, additional earnings by wives may lead to a loss in WTC entitlement for their working partners. The gain of working full time thus shifts from 58 to 54% (resp. 58 to 53% and 65 to 61%) in France (resp. Germany and Finland). Besides average figures, the distribution in Figure 22 reveals that the proportion of small gains associated to working full-time (less than 30%) will increase drastically in France (from 9.5% to 20% of the selected women) and more moderately in Germany and Finland (from 17 to 23% and from 7.7 to 10.8% respectively). The LWS slightly improves the gains to work (especially full-time) and reduces the proportion of small gains, especially in France and Germany.

% increase in disposable income if she works full-time	France			Germany			Finland		
	baseline	WTC	LWS	baseline	WTC	LWS	baseline	WTC	LWS
<20%	1,1%	0,5%	0,2%	12,8%	4,9%	10,2%	4,4%	1,7%	2,9%
in [20%; 40%[	6,5%	1,7%	2,4%	10,4%	8,6%	9,1%	8,9%	4,6%	9,4%
in [40%; 60%[	11,1%	3,3%	8,3%	9,1%	12,1%	11,5%	9,4%	11,8%	7,9%
in [60%; 80%[	15,8%	9,2%	12,7%	11,0%	11,5%	9,3%	9,4%	8,4%	9,6%
in [80%; 100%[	14,0%	23,6%	23,5%	8,6%	10,4%	9,5%	9,6%	10,3%	9,1%
in [100%; 120%[	10,5%	19,6%	11,5%	6,6%	9,5%	7,7%	7,9%	10,6%	9,4%
in [120%; 140%[	7,7%	8,3%	8,3%	7,3%	6,4%	7,1%	7,7%	7,2%	7,2%
in [140%; 160%[	6,6%	6,6%	6,3%	7,3%	7,5%	7,5%	8,4%	8,9%	8,2%
>160%	26,7%	27,3%	26,9%	26,9%	29,1%	28,3%	34,3%	36,5%	36,3%
average gain to work full time	132,4%	143,9%	138,7%	143,0%	153,2%	148,0%	134,9%	142,2%	138,7%
average gain to work part time	47,0%	78,7%	50,1%	67,2%	90,6%	69,7%	56,2%	81,0%	58,2%

Calculations from the authors using EUROMOD

Figure 21: Impact of the reforms on financial gain to work (single women)

% increase in disposable income if she works full-time	France			Germany			Finland		
	baseline	WTC	LWS	baseline	WTC	LWS	baseline	WTC	LWS
<10%	0,0%	0,7%	0,0%	0,5%	2,6%	0,2%	2,5%	0,9%	1,4%
in [10%; 20%[	2,2%	5,9%	1,7%	5,4%	7,9%	3,0%	1,7%	3,6%	1,9%
in [20%; 30%[	7,3%	13,4%	5,1%	11,4%	12,7%	10,4%	3,5%	6,3%	3,3%
in [30%; 40%[	15,1%	17,9%	11,7%	14,6%	14,6%	12,9%	7,8%	10,0%	7,0%
in [40%; 50%[	18,3%	18,0%	17,1%	17,0%	17,7%	18,6%	13,9%	15,1%	13,5%
in [50%; 60%[	17,8%	14,8%	19,0%	14,6%	12,9%	16,7%	15,4%	16,6%	15,9%
in [60%; 70%[	13,8%	12,1%	17,2%	12,4%	10,8%	13,4%	16,3%	14,0%	17,0%
in [70%; 80%[	9,1%	6,4%	11,5%	7,6%	7,0%	7,8%	13,6%	12,4%	13,7%
>80%	16,4%	10,8%	16,9%	16,5%	13,9%	17,1%	25,4%	21,1%	26,3%
average gain to work full time	57,6%	50,4%	60,1%	57,7%	53,4%	59,5%	65,3%	61,3%	66,3%
average gain to work part time	29,7%	24,5%	31,0%	31,1%	28,6%	32,0%	37,0%	34,6%	37,5%

Calculations from the authors using EUROMOD

Figure 22: Impact of the reforms on financial gain to work (women in couple)

5.2 Tax reform analysis with behavioral adjustments

We now make use of the labor supply estimates to predict behavioral responses to both reforms. The strategy to simulate transition matrices and to derive confidence intervals is presented in the Appendix.

5.2.1 Labor supply responses

Labor supply responses to the WTC are presented in Figure 23. The intuitive results from the analysis of financials gain to work are confirmed by the fact that more than 1.5% of single women sample in Germany and 1.8% in Finland are encouraged to enter the labor market. Even though the size of financial gains was comparable across all countries in Figure 21, results turn out to be much larger in Germany and Finland than in France due to the following two reasond. Firstly, the pre-reform participation rate is comparatively much lower in Germany than in France (79 versus 97%). Secondly, the participation elasticities are substantially larger in Finland, as seen in Figure 15.

Our previous analysis of the financial gain of work revealed a bias towards second-earners, that is, a gender bias towards the female in couples. The proportion of very small gains derived from full-time work increases in France particularly, which explains the large number of women (whose partner works and is eligible to the WTC) which would leave the labor market (4.35% of selected women living in couples). This proportion is smaller in Germany (2.79%) and Finland (1.34%) mainly because participation elasticities are lower for married women in both these countries. In all countries, the associated earnings loss is partly compensated by an increased tax credit on the husband's earnings while additional utility is drawn from more leisure (or domestic production, not modelled as such in the present setting). Institutional framework, earnings distributions and household structure hence reinforce themselves, making the disincentive efect particularly strong in France.

Overall, the disincentive effect for married women prevails so that the net effect on employment is negative in all three countries and proportionnally larger in France (a net 3.14% proportion of the population would withdraw from the labor market) than in Germany and Finland (respectively 0.78 and 0.14%). Confidence intervals displayed in Figure 23 are small enough to confirm the robustness of these results. Finally, transitions from full- to part-time activity for single women are the consequence of the increase in EMTRs decribed previously; this shift is especially important in France (6.17% of selected single women) as it is the country where EMTRs increase the most, and indeed the country where the share of single mothers in employment is highest.

In the UK, the incentive effect of the WFTC on singles only slightly prevailed over the disincentive effect on married women with employed partners (see Blundell et al., 2000, and Gregg et al., 1999). The net effect was too small to draw clear conclusions on the possibility for the WFTC to create work incentives. The conclusion in the British debate was then that the WFTC could only be justified on distributive grounds. It is difficult, though, to compare our results with Bristish findings, even though we rely on a very similar methodology. Indeed, the WFTC was not a new instrument in the British system but simply a replacement of the previous family credit. Also, our WTC is extended to childless households. Interestingly enough, our simulations lead to clear-cut conclusions on the net disincentive effect of the WTC in France and Germany.

Labor supply responses to the LWS are presented in Figure 24. We have stated that the financial gain of working full-time increase twice as much with the WTC than with the LWS in the case of single women. This explains why the positive incentive effects of the LWS on singles' participation is between

Country	Type	Simulated responses to WTC (%)								
		non-work to work	work to non-work	part-time to full-time	full-time to part-time	net effect on employment	average number of hh	90% confidence intervals		in % of the selected population
France	married women	0,03%	4,35%	0,00%	0,07%	-4,32%	-168 405	-147 794	-187 933	-3,14%
	single women	0,51%	0,00%	0,01%	6,17%	0,51%	7 468	4 773	10 109	0,14%
	total						**-160 937**	-143 021	-177 824	-3,00%
Germany	married women	0,55%	2,79%	0,03%	0,22%	-2,24%	-89 992	-71 646	-107 122	-1,36%
	single women	1,56%	0,06%	0,27%	1,30%	1,50%	38 708	25 040	53 361	0,59%
	total						**-51 284**	-46 606	-53 761	-0,78%
Finland	married women	0,17%	1,34%	0,00%	0,04%	-1,17%	-3 846	-3 267	-4 741	-0,77%
	single women	1,85%	0,00%	0,00%	0,45%	1,85%	3 159	2 069	4 562	0,63%
	total						**-687**	-1 198	-179	-0,14%

All percentages computed as a proportion of the specific sub-group (singles, couples) except the last column where percentages correspond to the whole selected population.

Figure 23: Response to the WTC reform

half and two-third that that was found for the WTC reform (18,000 women versus 39,000 women with the WTC in Germany, for instance).

As seen above, the LWS increases financial incentives to work for married women, in particular by reducing the proportion of very small gains. This change combined with larger elasticities in France and to a lesser extent in Germany explains the positive effects on the participation of married women (3.15% of selected women living in couple are induced to enter the labor force in France compared to only 1.6% in Germany and only 0.4% in Finland).

Overall, the joint positive effect on single and married women leads to the clear conclusion that the LWS could significantly improve social inclusion by enhancing employment in France and, to a lesser extent, in Germany.

5.2.2 Cost of the reforms and targeting

Figure 25 details the cost and targeting of each reform before and after behavioral responses. First of all, it should be noted that the net cost after labor supply responses is almost identical for both reforms in each country, the result of our calibration exercise using parameter A. If we note $\sum C$ total disposable income and $\sum y$ the total gross labor income produced in a country, then the effective net tax levied by the government on households is $T = \sum(y - C)$. The real cost of a reform is then $-\Delta T = \sum(\Delta C - \Delta y)$ which might be larger than it seems if the reform implies net disincentive effects, that is, $\Delta y < 0$. This is exactly what happens with the WTC and as negative responses are larger in France, Figure 25 shows that the real cost increases dramatically for this country once responses are accounted for (from 5.7 up to 7.9 billion EUR). The inverse occours in the case of the incentive reform. As the LWS encourages participation to the labor market, its real cost is - as expected - smaller than the pre-response cost (7.9 versus 8.3 billion EUR in France for instance). By the same token, the net average transfer of the WTC increases after responses while the average amount of the LWS decreases. In both cases, the number of

Country	Type	Simulated responses to the LWS (%)								
		non-work to work	work to non-work	part-time to full-time	full-time to part-time	net effect on employment	average number of hh	90% confidence intervals		in % of the selected population
France	married women	3,15%	0,05%	0,52%	0,01%	3,10%	120 704	106 540	135 977	2,25%
	single women	0,33%	0,00%	0,64%	0,00%	0,33%	4 865	3 013	6 787	0,09%
	total						**125 569**	109 553	142 764	2,34%
Germany	married women	1,60%	0,04%	0,27%	0,02%	1,55%	62 422	50 479	76 516	0,95%
	single women	0,70%	0,00%	0,13%	0,00%	0,70%	18 055	11 824	24 643	0,27%
	total						**80 477**	62 303	101 159	1,22%
Finland	married women	0,41%	0,07%	0,02%	0,01%	0,34%	1 115	862	1 329	0,22%
	single women	1,17%	0,00%	0,01%	0,00%	1,17%	2 004	1 406	2 746	0,40%
	total						**3 119**	2 268	4 075	0,62%

All percentages computed as a proportion of the specific sub-group (singles, couples) except the last column where percentages correspond to the whole selected population.

Figure 24: Response to the LWS reform

recipients increases, whether responses are positive or not (from 9 to 9.5% of the household population with the WTC in Germany and from 22.8 to 23.2% with the LWS in France).

Evidently, when labor supply responses are added to the picture, the number of recipients increases by less than the number of 'movers'. Indeed, part of the movers were already entitled to the benefit before the transition. In Germany, this is the case for 23% and 21% of the movers due to the LWS and the WTC respectively. These figures are respectively 44 and 32% in France and 15 and 12.5% in Finland.

5.2.3 Distributive impacts

We now tackle the distributive objective, namely the reduction of poverty. To assess the number of households taken out of poverty by each reform, we hold the poverty line constant and present results for poverty lines defined as 40, 50 and 60% of the median of equivalized disposable income. Estimated poverty rates for France are in line with results reported in Mantovani and Sutherland (2001) derived from 1997 French fiscal data, according to which poverty rates are 2.4%, 6.9% and 12.8% with a poverty line of 40%, 50% and 60% of median household disposable income, respectively. Finland's poverty rates also are also close to Mantovani and Sutherland (2001) who this time use figures derived from the Income Distribution Survey, 1999: 2%, 4% and 9%, respectively. The difference in equivalence scale explains only part of the gap. More important is probably the role of the 100% take-up rate assumed by the microsimulation software, especially with respect to the discrepancies at the very bottom of the distribution. The differences are somewhat larger in Germany, for which Grabka (2001) reports the following poverty rates (using 1999 GSOEP 1999): 4.5%, 8.2% and 13.6%. Is is however well known that take up of Sozialhilfe is particularly low. The full take up hypothesis notwithstanding, the pattern of poverty rates quite closely matches statistics derived from non simulated data. Moreover, the few discrepancies encountered are not relevant to the present analysis, given that we are more interested in

		France	Germany	Finland
Working Tax Credit				
net cost	billion euros/year	5,74	6,22	0,49
real cost including behav. resp.	billion euros/year	**7,90**	**7,17**	**0,52**
nb of recipient (hh)	% of population	10,1%	9,0%	10,6%
nb after response	idem	11,2%	9,5%	10,7%
net average amount per hh	(euros/ month)	207	151	165
net average amount after response	idem	256	165	172
Low-wage subsidy				
net cost	billion euros/year	8,30	7,52	0,52
real cost including behav. resp.	billion euros/year	**7,92**	**7,25**	**0,52**
nb of recipient hh	% of population	22,8%	16,3%	21,9%
nb after response	idem	23,2%	16,5%	22,0%
average amount per hh	(euros/ month)	132	101	84
net average amount after response	idem	124	96	83

Source: authors' computations using EUROMOD.

Figure 25: Cost of the reforms (behavioral responses included)

the relative movements in and out of poverty under both reforms, than in the absolute level of headcount ratios.

Figure 26 shows that both the WTC and the LWS achieve significant poverty reduction in France as the poverty rate declines from 7.03% to 6.38% with the WTC and to 6.48% with the LWS, at the 50% poverty line. As expected, the WTC succeeds slightly better than the wage subsidy. In Germany, the reduction is not as large, however, and the effects of both reforms are not significantly different. In Finland, the reduction is even smaller than in Germany, except if the 60% poverty line is considered (i.e the reforms redistribute relatively more to the 'richest' of the poor households in Finland); it turns out that the LWS performs better. In all countries, poverty reduction decreases, in percentage, as we consider lower poverty lines. Indeed, the 40% line captures the poorest households which are composed to a higher proportion of inactive households, that is, households that do not benefit from the reforms. The WTC has no effect whatsoever in Finland when the 40% line is considered.

A central question to our study is *whether increased labor participation* is itself responsible for important moves across the poverty line. Positive labor supply responses of single women (in the case of the WTC) and married women (with the LWS) indeed enhance poverty reduction to some extent. Yet, they do not dramatically change the picture in France or Finland. Things are markedly different in Germany. It turns out that in this country, the number of households taken out of poverty by the WTC is almost doubled (resp. tripled) by positive labor supply responses when the 50% (resp. 40%) poverty line is considered. This result can be explained by the combination of two facts: poor households are most often single mothers and the increase in single women's participation is particularly high when the WTC is introduced in the German system (see Figure 23).[39]

[39] The proportion of single adult adultst amongst the poor population is around 70% in France and Germany when the 50% poverty line is considered (and respectively 75% and 67% with the 40% line).

	baseline	WTC		WTC + response		LWS		LWS + response	
France									
median equivalized income (EUR/month)	1 222	1 225		1 220		1 254		1 259	
poverty rate - *line at 60% of the median*	14,00%	12,29%		12,26%		12,78%		12,69%	
variation in the number of poor hh		-393 110	-12,2%	-400 185	-12,4%	-279 016	-8,7%	-301 044	-9,3%
poverty rate - *line at 50% of the median*	7,03%	6,38%		6,35%		6,48%		6,45%	
variation in the number of poor hh		-150 121	-9,3%	-156 105	-9,7%	-127 528	-7,9%	-134 508	-8,3%
poverty rate - *line at 40% of the median*	2,22%	2,07%		2,07%		2,05%		2,05%	
variation in the number of poor hh		-33 506	-6,6%	-33 506	-6,6%	-37 437	-7,3%	-37 437	-7,3%
Germany									
median equivalized income (EUR/month)	1 246	1 249		1 247		1 260		1 262	
poverty rate - *line at 60% of the median*	11,18%	10,69%		10,55%		10,86%		10,81%	
variation in the number of poor hh		-183 836	-4,3%	-238 490	-5,6%	-119 245	-2,8%	-139 119	-3,3%
poverty rate - *line at 50% of the median*	5,65%	5,51%		5,41%		5,52%		5,50%	
variation in the number of poor hh		-54 654	-2,5%	-94 402	-4,4%	-49 685	-2,3%	-59 622	-2,8%
poverty rate - *line at 40% of the median*	2,10%	2,07%		2,02%		2,08%		2,07%	
variation in the number of poor hh		-9 937	-1,2%	-29 811	-3,7%	-4 969	-0,6%	-9 937	-1,2%
Finland									
median equivalized income (EUR/month)	1 090	1 124		1 124		1 105		1 106	
poverty rate - *line at 60% of the median*	11,97%	11,59%		11,54%		11,44%		11,39%	
variation in the number of poor hh		-8 966	-3,2%	-10 286	-3,6%	-12 670	-4,5%	-13 787	-4,9%
poverty rate - *line at 50% of the median*	3,75%	3,72%		3,71%		3,67%		3,66%	
variation in the number of poor hh		-583	-0,7%	-826	-0,9%	-1 882	-2,1%	-2 118	-2,4%
poverty rate - *line at 40% of the median*	0,76%	0,76%		0,76%		0,75%		0,75%	
variation in the number of poor hh		0		0		-445	-2,5%	-445	-2,5%

Note: poverty line kept fixed at the baseline value

Figure 26: Distributive effets of the reforms

	France	Germany	Finland
Working Tax Credit			
Nb of households out of poverty due to the reform	150 121	54 654	583
in % of total population	0,65%	0,14%	0,02%
Nb of households out of poverty due to behav. resp.	5 984	39 748	242
in % of total population	0,03%	0,10%	0,01%
Nb of households back to work	-160 937	-51 284	-687
in % of total population	-0,70%	-0,13%	-0,03%
Cost per household out of poverty (EUR/year)	52 638	131 230	888 575
Low-wage subsidy			
Nb of households out of poverty due to the reform	127 528	49 685	1 882
in % of total population	0,55%	0,13%	0,08%
Nb of households out of poverty due to behav. resp.	6 980	9 937	235
in % of total population	0,03%	0,03%	0,01%
Nb of households back to work	125 569	80 477	3 119
in % of total population	0,55%	0,21%	0,13%
Cost per household out of poverty (EUR/year)	62 143	145 902	276 239
Cost per household back to work (EUR/year)	63 112	90 077	166 690

Note: poverty line at 50% of the median

Figure 27: Cost effiency in achieving social inclusion or poverty reduction

5.2.4 Cost efficiency

Finally, we study the cost efficiency of the reform to achieve either incentive or distributive objectives. For this purpose, we simply compute the cost per woman taking up work (when the net employment effect is positive) and the cost per household taken out of poverty. Results are presented in Figure 27.

In relative terms, the real (post-response) cost of both reforms corresponds to 0.54% of GDP in France, 0.33% in Germany and 0.40% in Finland. In Finland, the labor supply responses and distributive effects of both reforms are much smaller than in France and Germany, which leads to extremely high efficiency costs, independently of whether social inclusion or poverty reduction are considered.

Efficiency costs are very high in the two other countries as well and markedly higher in Germany. It would cost 63, 000 EUR in France and 90, 000 EUR in Germany to bring a woman back to work through the LWS reform and respectively 53, 000 and 131, 000 EUR to take a woman out of poverty by means of the WTC. Note that the cost to bring a single woman back to work using the WTC reform would be 180, 000 EUR in Germany and considerably higher in France. If poverty reduction is the central policy objective, then the WTC is preferable. However, the cost per household out of poverty is only slightly larger with the LWS which also provides net positive effects on employment.

According to Pearson (2002), the cost per net job created has stood between 30, 000 and 100, 000$ in the past MWP experiences in the UK and the US. Our results for the LWS are very similar. Both reforms suggested here are relatively expensive (as is the WFTC in the UK) but fortunately, the cost is not the only criterion by which these policies must be judged. Still, the question of funding these reforms - highly problematic in the present European budgetary context - remains.

6 Concluding remarks

In this paper, we present an extended analysis of 'making work pay' policies in Finland, France and Germany, three countries which suffer from particularly large potential inactivity traps due to generous

social assistance. This study is one of the very first cross-country analysis of tax-benefit reforms conducted in a comprehensive way. Firstly, female labor supply estimations are carried out using datasets that are rendered homogeneous across countries. Secondly, estimates are used in combination with a European integrated microsimulation model to simulate potential behavioral responses to tax-benefit reforms. Thirdly, differences in 'framework conditions' across countries are emphasized throughout the analysis, notably the differences in income and wage distributions and the way tax-benefit reforms interact with national systems in force. These issues appear to be crucial to explain the differences in the effects of each reform. They are important issues to be dealt with when designing tax-benefit reforms aimed at reshaping work incentives at national level.

More specifically, we introduce two types of employment-conditional payments in the three countries under consideration. The first instrument is a working tax credit in the fashion of the British WFTC and the second is a simple wage subsidy. These two reforms illustrate the typical opposition between family-based instruments and individual transfers, which characterizes recent trends in 'making work pay' policies in OECD countries. In particular, the former type of instrument is conditioned on household income and is known to yield disincentive effects for women whose partner is employed. Indeed, we find that the tax credit potentially decreases female participation in the three countries we examine. The negative effect on married women is especially strong in France - a result explained by the more elastic labor supply in this country - while it is partly offset by a positive effect on the labor supply of single women in Germany and Finland. The individual wage subsidy is built on the same cost basis as the tax credit, once behavioral responses are accounted for. In this case, married women are clearly encouraged to take up a job, especially in France. The total positive effect on employment remains small however.

As a result, neither poverty reduction nor social inclusion seem achievable through 'making work pay' policies in Finland, the main culprit being very low labor supply elasticities. Policy intervention aimed at enhancing employment should attempt to levy on the demand-side by reducing the cost of low-productive work for employers. However, such a policy should only be recomended if demand-side elasticities are large enough; Böckerman and Jäntti (2004) confirm the importance of demand-side aspects. As a matter of fact, the Finnish authorities are currently considering possible reductions in employer social security contributions.

For Germany and France, final comments on the design of in-work transfers and on the treatment of the family dimension depend on policy objectives. We have defined the *social inclusion* objective as the number of households encouraged to reenter the labor market. In this respect, the wage subsidy performs unambiguously better. Yet, it is noticeable that a large proportion of poor households (around 70% in France and Germany) are single mothers. Interestingly enough, a considerable number of poor single adult households are induced to work by the working tax credit in Germany. As a result, the family-based reform cannot be rejected if indeed social inclusion means encouraging employment of the poorest, even at the price of creating disincentives for second-earners in couples. Moreover, should the rising trend in lone motherhood continue in the near future and approach the British figures the balance between positively and negatively affected households could shift drammatically, justifying the use of "targeted" measures. Should we also consider potential positive externalities from taking up a job, as described by Phelps (2000), the family-based reform would have clear advantages as it would result into a net increase in the percentage of households with at least one earner, which arguably is more important than increasing the employment rate per se.

Both the family-based tax credit and the individual wage subsidy achieve significant poverty reduction in France, less so in Germany. Surprisingly, the tax credit performs only slightly better than the wage

subsidy in targeting poor households in France and both reforms perform equally in Germany. To echoe the previous argument in terms of social inclusion, note that increased participation of single female adults induced by the tax credit contributes substantially to poverty reduction in Germany. Once accounting for behavioral responses, the tax credit performs much better than the wage subsidy on this account. Naturally, the poverty criterion is merely one among several distributional aspects and it is worth noting that the working tax credit achieves an important transfer to the first-half of the income distribution in all three countries.

Ultimately, the choice of one policy scheme rather than an other depends on social preferences, which are unfortunately unknown. Following Spadaro (2004), we could draw conclusions for a broad range of values measuring social aversion towards inequality and find out the range over which one reform is socially preferred to the other. This type of analysis implies additional assumptions and in particular interpersonal utility comparisons; this extension is kept for future research. More pragmatically, we have simplified the analysis by focusing on work incentives, social inclusion (of all or of sub-groups at risk) and poverty reduction, that is, on practical policy concerns which ground new debates on the reform of European welfare systems.

References

[1] Atkinson A.B, Bourguignon F., Chiappori P.A., (1988): "What Do We Learn About Tax Reforms from International Comparisons? France and Britain", *European Economic Review*, 32.

[2] Bargain, O. (2004a): "On modelling household labor supply with taxation", mimeo DELTA.

[3] Bargain, O. (2004b): "Aides au retour à l'emploi et activité des femmes en couple", *Revue de l'OFCE*, 88, 59-88.

[4] Bargain, O. and I. Terraz (2001): "EUROMOD country report for France", *EUROMOD working paper*.

[5] Bargain, O. and I. Terraz (2003): "Evaluation et mise en perspective des effets incitatifs et redistributifs de la Prime pour l'Emploi.", forthcoming in *Economie et Prévision*.

[6] Bertola, G. (2000): "Policy choices and interactions with existing instruments", *OECD Economic Studies*, 31, 185-196.

[7] Buchel F., Mertens A. and Orsini K. (2003): "Is Mothers' Employment an Effective Means to Fight Family Poverty? Evidence From Seven European Countries", *Luxembourg Income Study Working Paper Series*, 363.

[8] Blundell, R.W. and F. Laisney (1988): "A labour supply model for married women in France: taxation, hours constraints and job seekers", *Annales d'Economie et de Statistiques*, 11, 41-71.

[9] Blundell, R.W. and T. MaCurdy (2000): "Labor Supply: A Review of Alternative Approaches", in Ashenfelter and Card (eds), *Handbook of Labor Economics* , Elsevier North-Holland.

[10] Blundell, R.W., A. Duncan, J. McCrae and C. Meghir (2000): "The Labour Market Impact of the Working Families' Tax Credit", *Fiscal Studies*, 21, 1, 75-103.

[11] Blundell, R., V. Lechene et M. Myck (2002): "Does the representation of family decision processes matter? Collective decisions and fiscal reforms in the UK", *mimeo*, IFS, London.

[12] Böckerman, P. and M. Jäntti (2004): "Is variation in hours of work driven by supply or demand? Evidence from Finnish manufacturing industries", *Labor Institute for Economic Research discussion paper*, 196, Helsinki.

[13] Boeters, S., N. Gürtzgen and R. Schnabel (2003): "Reforming social welfare in Germany - an applied general equilibrium analysis", *ZEW working paper*.

[14] Bonin, H., W.Kempe and H.Schneider (2002): "Household labor supply effects of low-wage subsidies in Germany", *IZA Discussion Paper*, 637.

[15] Bourguignon F. (1997), *Fiscalité et redistribution*, Conseil d'Analyse Economique report, La Documentation Française.

[16] Bourguignon F. and P.-A. Chiappori (1998): "Fiscalité et redistribution, plans pour une réforme", *Revue Française d'Economie*, 13, 3-64

[17] Bourguignon, F. and T. Magnac (1990): "Labour supply and taxation in France", *Journal of Human Resources*, 25, 358-389.

[18] Bourguignon F, O'Donoghue C., Sastre J., Spadaro A., Utili F.(1997): "Eur3: A Prototype European Tax-Benefits Model", *DAE Working Paper,* 9723, Microsimulation Unit, Cambridge University.

[19] Callan, T,. S. Dex, N. Smith and J.D. Vlasblom (1999): "Taxation of Spouses: a Cross-Country Study of the Effects on Married Women's Labour Supply", Centre for Labour Market and Social Research, Danmark - Papers, 99-02

[20] Callan, T. and A. Van Soest (1996): "Family labor supply and taxes in Ireland", *mimeo* Tilburg University.

[21] Carrez, G. (2002): "Examen de la première partie du projet de Loi de Finances (Tome III)", *Rapport à l'Assemblée Nationale*.

[22] Choné, P., D. Le Blanc and I. Robert-Bobée (2003): "Female labor supply and child care in France", *CREST working paper*.

[23] De Lathouwer L.(1996): "A Case Study of Unemployment Scheme for Belgium and The Netherlands", in Microsimulation and Public Policy, Harding editor, North Holland, Amsterdam.

[24] Dilnot, A. and J. McCrae (1999/2000): "The family credit system and the working families tax credit in the United Kingdom", *IFS briefing note*, 3, and *OECD Economic Studies*, 31.

[25] Duncan, A. and C. Giles (1996): "Labor supply incentives and recent family credit reforms", *Economic Journal*, 106, 142-56.

[26] Duncan, A. and C. Giles (1998): "The labor market impact of the working family tax credit", *International Institute for Public Finance*, Cordoba Conference.

[27] Duncan, A. (2003): "'Making work pay' policies and employment incentives", *CESifo Summer Institute*, Venice.

[28] Eissa and Hoynes (1998): "The Earned Income Tax Credit and the labor supply of married couples", NBER working paper, 6856.

[29] Euwals, R. and A. Van Soest (1999): "Desired and actual labor supply of unmarried men and women in the Netherlands", *Labor Economics*, 6, 95-118.

[30] Godino R., R. Castel, M. Jalmain and T. Picketty (1999): "Pour la création d'une allocation compensatrice de revenu", *Note de la Fondation Saint Simon*, 104, 7-20.

[31] Grabka, M. (2001): "EUROMOD country report for Germany", *EUROMOD working paper.*

[32] Gradus, R. and J. Julsing (2000): "Comparing different european income tax policies making work pay", *memo* OCFED.

[33] Gregg, P., P. Johnson and H. Reed (1999), *Entering work and the British tax and benefit system*, IFS Monograph, London.

[34] Haan, P. (2004): "Discrete choice labor supply: conditional logit vs. random coefficient models", *DIW discussion paper,* 394, Berlin.

[35] Haan, P. and Steiner V. (2004): "Distributional and fiscal effects of the German tax reform 2000 - a behavioral microsimulation analysis", *DIW discussion paper,* 419, Berlin.

[36] Heckman, J. (1979): "Sample selection bias as a specification error", *Econometrica*, 47, 151-161.

[37] Heckman, J. (1993): "What has been learned bout labor supply in the past twenty years?", *American Economic Review*, 83, 2, 116-121.

[38] Hoynes, H. (1996): "Welfare Transfers in Two-Parent Families: Labor Supply and Welfare Participation Under AFDC-UP", *Econometrica*, 64, 295-332.

[39] Ilmakunnas, S. and S. Pudney (1990): "A model of female labor supply in the presence of hours restrictions", *Journal of Public Economics*, 41, 183-210.

[40] Immervoll, H. (2002): "The distribution of average and marginal effective tax rates in European Union member states", *EUROMOD working paper* EM2/02.

[41] Immervoll, H. and C. O'Donoghue (2001): "Welfare benefits and work incentives: an analysis of the distribution of net replacement rates in Europe using EUROMOD, a multi-country microsimulation model", *EUROMOD working paper* EM4/01.

[42] Immervoll, H., H. J. Kleven, C. T. Kreiner and E. Saez (2003): "Welfare reform in European countries: a microsimulation analysis", *EUROMOD working paper.*

[43] Kuismanen, M. (2000): "Labor supply and income tax changes: a simulation study for Finland", *Bank of Finland discussion papers*, 5/2000.

[44] Laine, V. (2002): "Evaluating tax and benefit reforms in 1996-2001", *VATT discussion paper*, 280.

[45] Laisney, F. (2002, ed.), Final Report on the EU Project *"Welfare analysis of fiscal and social security reforms in Europe: Does the representation of family decision processes matter?"* Contract No: VS/2000/0776, Written for the European Commission, DG Employment and Social Affairs.

[46] Laroque, G. and B. Salanié (2000): "Une décomposition du non-emploi en France", *Economie et Statistique*, 328, 3-20.

[47] Laroque, G. and B. Salanié (2002), *Institutions et emploi, le marché du travail des femmes en France,* Economica.

[48] MaCurdy, T. (1992): "Work Disincentives Effects of Taxes: A Reexamination of some evidence", *American Economic Review, Papers and Proceedings*, 82, 243-249.

[49] Mantovani, D. and Sutherland H. (2001): "Social Indicators and other Income Statistics using the Euromod Baseline: a Comparison with Eurostat and National Statistics", *EUROMOD working paper* EM1/03.

[50] Martin, J. and D.Grubb (2001): "What works and for whom: a review of OECD countries' experience of active labour market policies", OECD, Paris.

[51] McFadden, D. (1973): "Conditional logit analysis of qualitative choice behavior", in P. Zarembka, ed., *Frontiers in Econometrics*, Academic Press, NY.

[52] McFadden, D. and K. Train (2000): "Mixed MNL Models for Discrete Response", *Journal of Applied Econometrics*, 15, 447-470.

[53] Meyer, B.D. and Rosenbaum (2001): "Welfare, the Earned Income Tax Credit and the labor supply of single mothers", *Quaterly Journal of Economics*, 116, 1063-1114.

[54] Moffitt, R. (1984): "Estimation of a joint wage-hours labor supply model", *Journal of Labor Economics*, 2, 550-556.

[55] Pearson, M. (2002): "International experience of 'making work pay' policies', *Working Paper OECD.*

[56] Pearson, M. and S.Scarpetta (2000): "An overview: what do you know about policies to make work pay?", *OECD Economic Studies*, 31, 11-24

[57] Pencavel, J.H. (1986): "Labor supply of men: a survey", in O. Ashenfelter and R. Layard (eds), *Handbook of Labor Economics*, vol.1, Amsterdam, North-Holland.

[58] Phelps, E. (2000): "The importance of inclusion and the power of job subsidies to increase it", *OECD Economic Studies*, 31, 85-114.

[59] Pisani-Ferry, J. (2000), *Plein emploi*, Conseil d'Analyse Economique report, La Documentation Française.

[60] Saez, E. (2002): "Optimal income transfer programs: intensive versus extensive labor supply responses", *Quaterly Journal of Economics*, 117(3), 1039-1073.

[61] Service Publique Fédérale Finances (2003), Service d'Etudes et de Documentation, *Memento Fiscal*, 15.

[62] Spadaro, A. (2004): "Microsimulation and normative policy evaluation: an application to some EU tax-benefit systems", *Journal of Public Economic Theory,* forthcoming.

[63] Steiner, V. and K. Whrolich (2003): "Household taxation, income splitting and labor supply incentives - a microsimulation study for Germany", CESifo Venice Summer Institute 2003.

[64] Sutherland, H. (2001): "Final report EUROMOD: an integrated European tax-benefit model", *EUROMOD working paper* EM9/01.

[65] Tummers, M. and I.Woittiez (1991): "A simultaneous wage and labor supply model with hours restriction", *Journal of Human Resources*, 26, 393-423.

[66] Van Soest, A. (1995): "Structural Models of Family Labor Supply: a Discrete Choice Approach", *Journal of human Resources,* 30, 63-88.

[67] Van Soest, A. and M. Das (2000): "Family labor supply and proposed tax reforms in the Netherlands", *De Economist*, forthcoming.

[68] Van Soest, A., I.Woittiez and A.Kapteyn (1990): "Labour supply, income taxes and hours restrictions in the Netherlands", *Journal of Human Resources*, 25, 517-558.

[69] Viitamäki, H. (2001): "EUROMOD country report for Finland", *EUROMOD working paper.*

Appendices

Data and sample selection

Finnish data are provided by the Income Distribution Survey, which contains a combination of register data and information gathered through interviews by Statistics Finland. The dataset refers to 1998 and contains detailed socio-economic information for 25,010 individuals living in 9,345 households. German data come from the German Socio-Economic Panel (GSOEP) initiated by the German Institute for Economic Research (DIW) in 1984. Unlike Finland, the data are collected yearly through interviews only. The 1998 dataset contains information on 18,772 individuals living in 7,677 households. The data used for France are taken from the French Household Budget Survey 1994 and monetary variables have been grossed up to 1998, assuming demography constant. No structural change has occured in the tax-benefit system between 1994 and 1998 so that there is no inconsistency between the simulated system (1998) and observed behaviors (see Bargain and Terraz, 2003). The sample contains information on 28,973 individuals living in 11,220 households. All three datasets have been reweighted to be representative of the whole population and rendered homogeneous in the framework of the EUROMOD project, including similar variables definitions (see Sutherland, 2001).

For each country, we select a sample of married and cohabiting couples and a sample of single women. In each case, we keep only households where adults are aged between 25 and 64 and available for the labor market. For this purpose, households where adults are disabled, student or retired are excluded. So are households of self-employed or farmers (and civil servants, for France). The labor supply behavior of these two categories (and civil servants in the case of France, whose job is guaranteed for life) may indeed be rather different from salary workers and would require a different modeling strategy alltogether. Moreover, independent workers are subject to income tax rules which are substantially different from the ones applied to salary income and which require additional information not available here. Households where adults are unemployed are taken out of the selection. This corresponds to a pure supply-side strategy in which we focus on non-rationed workers.[40]

[40] Withdrawing unemployed individuals enables to discard job seekers but also leads to exclude discouraged workers. Reliable information to identify job seekers would be necessary for a more comprehensive approach.

	France		Germany		Finland	
	Women	Men	Women	Men	Women	Men
Participation*	70,5%	99,1%	63,2%	95,7%	73,6%	90,1%
Working time (hours/week) / participants	35,7	42,0	33,3	38,2	37,0	40,0
Working time (hours/week) / all	26,0	41,9	21,6	36,7	35,5	39,8
Gross wage rate (euros/hour) / participants	10,5	12,8	12,2	15,8	11,8	15,5
Gross wage rate (euros/hour) / all**	9,9	12,8	11,8	15,8	11,4	15,3
Average age	38,2	40,4	38,4	40,9	40,2	41,8
Primary education	30,7%	17,9%	14,6%	11,1%	16,1%	18,6%
Vocational training	37,9%	46,0%	48,7%	44,8%	35,2%	37,8%
High school diploma	14,8%	17,9%	23,2%	25,9%	27,5%	18,1%
University studies	16,7%	18,2%	8,5%	14,9%	21,2%	25,4%
Average number of children	1,47		1,11		1,19	
Presence of child 0-2	17,1%		11,9%		15,9%	
Presence of child 3-5	20,2%		15,7%		18,6%	
Presence of child 6-11	33,8%		29,4%		29,4%	
Nb of selected households	2 095		1 265		1 632	
Corresponding population	3 898 106		4 020 163		329 343	
% of total population	16,9%		10,5%		14,0%	

** non-participation according to our discretization (i.e working less than 15 hours per week or than 6 months per year)*

*** these include predicted wages*

Figure 28: Descriptive statistics for couples

Employees not reporting important pieces of information (e.g worked hours) are excluded from each sample. To further increase data homogeneity, extreme households are withdrawn from the sample, notably the ones receiving important levels of non-labor income, the ones with more than 3 children or whose children earn substantial earnings (more than half the cumulated earnings of the parents). Households with more than two decision-makers in the case of couples (i.e other adults than the basic couple) are also withdrawn from the sample.

Descriptive statistics of the selected samples are presented in figures 28 and 29 for couples and singles respectively. Wage rates are not provided directly and must be computed as earnings divided by the number of work hours. Wage rates for non-working women are predicted using the usual Heckman (1979) two-stage estimation technique.[41]

The distribution of working hours for the selected samples is represented in Figures 30 and 31. The pattern of hours appears fairly rigid in all countries. This is a usual feature in continental Europe, mostly driven by demand-side and institutional constraints. The discrete approach retained here seems well adapted to this framework.[42]

Structural model of labor supply and tax-benefit simulation

Model and specification

Labor supply modeling in this paper relies on a discrete choice multinomial/conditional logit model and on a traditional specification in terms of consumption-leisure preferences. If household i is offered to

[41] Because the labor supply models are nonlinear, it is necessary to take the wage rate prediction errors explicitely into account for a consistent estimation of the models, for instance by integrating the disturbance term of the wage equation in the likelihood. Practically, this is done by approximating the integral by a simulated mean. However, for a tractable number of draws (20), this correction did not significantly change our results.

[42] The distribution of male hours - available upon request - is much more concentrated still and justifies the choice to treat male labor supply as fixed.

	France	Germany	Finland
Participation*	96,8%	79,3%	80,1%
Working time (hours/week) / participants	37,4	36,0	37,7
Working time (hours/week) / all	36,6	28,7	36,7
Gross wage rate (euros/hour) / participants	11,2	12,4	12,5
Gross wage rate (euros/hour) / all**	11,1	12,8	11,8
Average age	40,6	38,5	42,5
Primary education	22,3%	21,0%	17,6%
Vocational training	32,7%	44,6%	36,1%
High school diploma	15,1%	22,5%	26,2%
University studies	30,0%	11,9%	20,2%
Average number of children	0,64	0,59	0,54
Presence of child 0-2	2,3%	4,9%	1,9%
Presence of child 3-5	4,8%	6,2%	5,3%
Presence of child 6-11	14,5%	19,2%	12,0%
Nb of selected households	664	453	416
Corresponding population	1 458 464	2 579 207	171 100
% of total population	6,3%	6,8%	7,3%

** non-participation according to our discretization (i.e working less than 15 hours per week or than 6 months per year)*

*** these include predicted wages*

Figure 29: Descriptive statistics for single women

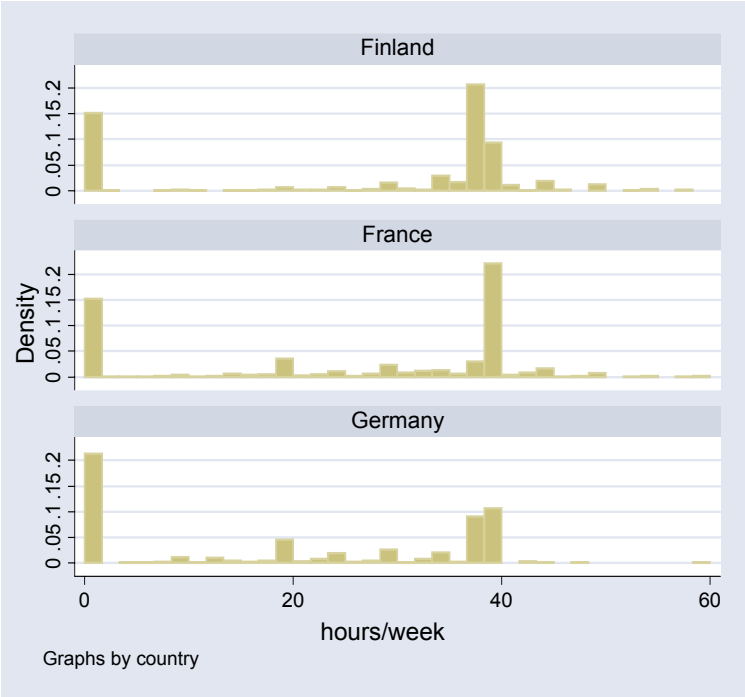

Figure 30: Distribution of working time (females in couples)

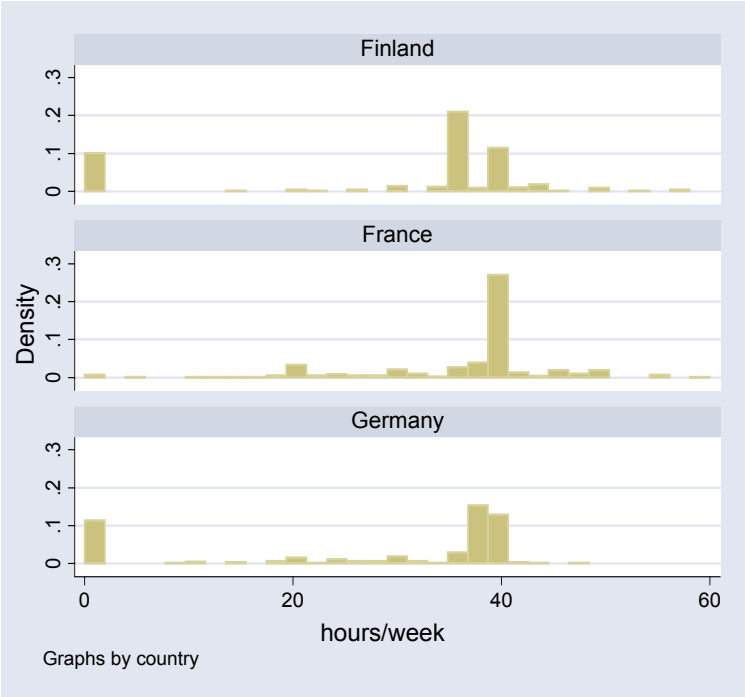

Figure 31: Distribution of working time (single women)

choose one among J work durations for the female adult, it is assumed that the utility the household may derive from alternative j $(= 1, ..J)$ is given by:

$$V_{ij} = U(H_j, C_{ij}, Z_i) + \epsilon_{ij},$$

where $U()$ is a conventional utility function which depends on female work duration (H_j) and consumption (C_{ij}) as well as on a vector Z_i of household characteristics. Recall that for empirical reasons detailed in the text, the labor supply of men is supposed to be constant whereas women are assumed to choose between nonparticipation $(H_1 = 0)$, part-time $(H_2 = 20$ hours/week) and full-time $(H_3 = 39$ hours per week). This discrete approach is particularly appropriate when institutional and demand-side rigidities are strong and imply concentration around a limited number of hours choices (see Van Soest, 1995).

The actual utility derived from alternative j for household i, V_{ij}, also includes an error term ϵ_{ij} that is assumed to be identically and independently distributed across alternatives and households according to a type I-extreme value distribution.[43] Under this distributional assumption, McFadden (1973) proves that the probability that alternative k is chosen by household i is given by:

$$P_{ik} = \Pr(V_{ik} \geq V_{ij}, \forall j = 1, ..J) = \frac{\exp U(H_k, C_{ik}, Z_i)}{\sum_{j=1}^{J} \exp U(H_j, C_{ij}, Z_i)}.$$

[43] The assumption of independence across alternatives results in the property of independence of irrelevant alternatives (IIA). This shortcoming can be avoided by introducing random terms accounting for unobserved heterogeneity across households (see McFadden and Train, 2000). With the random parameter model, however, the computation of bootstrapped confidence intervals becomes computationally non-tractable, as proved by Haan (2004). In addition, the latter shows that the results in terms of wage elasticities from a conditional logit do not differ significantly from the results of a random parameter logit. We obtain the same results for the three models presented here and decide to rely on the conditional logit specification so as to derive confidence intervals of our estimates.

The likelihood of a sample of observed choices can be derived from that expression as a function of the preference parameters of function $U()$. Estimates of these parameters may be obtained by maximum likelihood techniques. As in Blundell et al. (2000), we choose a quadratic functional form so that, for choice $j = 1, ...J$, the deterministic part of the utility is written as follows:

$$U_{ij} = \alpha_{cc} C_{ij}^2 + \alpha_{hh} {H_j}^2 + \alpha_{ch} C_{ij} H_j + \alpha_{cir} C_{ij} + \alpha_{hi} H_j,$$

with heterogeneity:

$$\begin{aligned} \alpha_{cir} &= \alpha_{cr}^0 + \alpha_c' Z_i \\ \alpha_{hi} &= \alpha_h^0 + \alpha_h' Z_i \end{aligned}$$

and vectors $\alpha_c' = (\alpha_c^1, ..., \alpha_c^L)$, $\alpha_h' = (\alpha_h^1, ..., \alpha_h^L)$. Observed heterogeneity in vector Z_i corresponds to socio-demographic characteristics supposed to pick up variation in tastes for work across households.

In order to comply with the usual properties required for well-behaved preferences, some regularity constraints are usually added to the preceding framework. In particular, C-monotonicity and quasi-concavity seem natural minimum requiremenstfor positive and normative analysis of tax reforms. Positive monotonicity is written:

$$2\alpha_{cc} C_{ij} + \alpha_{ch} H_j + \alpha_{cir} > 0.$$

Practically, we impose this constraint in the likelihood maximization. Quasiconcavity is most often relaxed and simply checked *a posteriori* in related studies, thus avoiding the critique of MaCurdy (1992) that elasticities are largely determined *a priori*. It turns out here that C-quasiconcavity is always fulfilled when C-monotonicity is imposed.

Budget constraint and microsimulation

In the present static framework, consumption is equivalent to disposable income:

$$C_{ij} = D(w_i H_j,\, y_i, Z_i).$$

Disposable income is expressed as a function $D()$, the arguments of which are some socio-demographic characteristics of the household as well as gross income. In our setting, endogenous income $w_i H_j$ in alternative j corresponds to labor income of a single or of a wife (in couples), with w_i the wage rate of the person considered. Exogenous income y_i includes non-labor income, such as capital income, and the earnings of the husband (in couples). As a result, $D(\,)$ represents the way the tax-benefit system transforms gross income into disposable income. In general, this function relies on a fairly complex set of tax-benefit rules computed by microsimulation.

In the present paper, disposable income at each discrete hours choice is computed using EUROMOD microsimulation. EUROMOD is a tax and benefit calculator based on homogeneous micro-data on income, earnings, labor force participation as well as socio-demographic variables gathered for the member countries of the European Union. For each country and for the year 1998, this microsimulation model enables us to compute all social contributions, direct taxes and transfers to individuals and households and thus to calculate household disposable income, replacement rates and effective marginal tax rates. An introduction and a descriptive analysis of taxes and redistributive transfers across European countries are provided by Immervoll and O'Donoghue (2001) and Sutherland (2001).

Variable	France		Germany		Finland	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
income²	-21.9498	4.9144 ***	-2.9260	10.2510	-26.4957	7.4651 ***
female hours²	4.8128	.2949 ***	2.3065	.3673 ***	9.1652	.5443 ***
female hours x income	1.1945	1.2855	-1.0002	2.5060	1.5839	2.0792
income	-41.5824	11.7884 ***	20.9454	17.1296	-23.1057	12.2757 **
x female age/40	38.8598	16.7766 ***	57.4418	34.1371 *	69.7468	24.2224 ***
x (female age/40) ²	*ns*	*ns*	-28.3773	15.2769 *	-29.1119	11.8734 **
x male age/40	.7055	.4249 *	-.8223	.19202 ***	*ns*	*ns*
x # children 0-2	18.5153	4.5939 ***	*ns*	*ns*	*ns*	*ns*
x # children 3-5	9.9980	3.7059 ***	*ns*	*ns*	*ns*	*ns*
x # children 6-11	9.1716	2.5094 ***	*ns*	*ns*	*ns*	*ns*
x **1**(region)@	7.0700	1.3903 ***	-12.8571	5.0395 ***	4.8992	1.1943 ***
female hours	5.8904	1.3858 ***	-2.0258	.6589 ***	-8.8773	.6208 ***
x female age/40	-7.0596	1.8309 ***	*ns*	*ns*	*ns*	*ns*
x male age/40	-.1001	.0459 **	*ns*	*ns* ***	*ns*	*ns*
x # children 0-2	-3.0707	.5071 ***	-3.3672	.3387 ***	-2.2393	.1862 ***
x # children 3-5	-1.910	.4131 ***	-3.0676	.2867 ***	-.1810	.1434
x # children 6-11	-1.6500	.2768 ***	-1.7954	.1541 ***	-.1919	.1044 *
x **1**(region)@	*ns*	*ns*	3.4062	.5510 ***	*ns*	*ns*
x **1**(married)	-.2747	.1865	*ns*	*ns*	.3246	.1533 **
Log-Likelihood	-1691		-967		-1036	
Nb of observations	2095		1265		1632	

Level of significance: *=10%, **=5%, ***=1%

@ : the dummy `region' corresponds to Paris area for France, Helsinki area for Finland and East Germany for Germany.

ns : covariates were excluded from the estimation as they were highly non-significant, hence increasing the variance of the predictions from the estimated model

Figure 32: Estimation results for women in couple

Results of estimations

As we use the same labor supply specification in all three countries, with the same definitions of variables, it is possible to provide a reliable picture of the differences and similarities in labor supply behaviors in France, Germany and Finland. Callan, Dex, Smith and Vlasblom (1999) provide similar cross-country comparisons for Britain, Denmark, Ireland and Germany.

Figure 32 presents the results of the estimations for women in couples. Among estimated taste parameters for income, only the regional dummy and female age are significant in all three countries. On the contrary, estimates for hours are more often significant. As could have been expected, the marginal utility of work decreases with the presence of children. Related coefficients are significant at the 1% significance level except for children above 3 in Finland. Women prefer to work significantly more if located in East Germany (positive coefficient of the regional dummy), which is a usual result. Marginal utility of work decreases with age, suggesting a move towards single-earner couples as the household ages (or a cohort effect). In Finland, it turns out that women significantly prefer to work more when married.

Figure 33 presents the results of the estimations for single women. Among estimated taste parameters for income, only female age is significant in all countries. On the contrary, estimates for hours are more often significant in France and Germany. As expected, the marginal utility of work decreases with the presence of young children. The coefficients for older children (above 3) are not always significant as single women are likely to have fewer (and younger) children that married women. Again, women prefer to work significantly more when living in East Germany and less when they grow older.

Variable	France		Germany		Finland	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
income²	-54.3544	23.8996 ***	-164.9638	41.3225 ***	-70.8054	49.3646
female hours²	.0654	.8786	3.6165	.8382 ***	13.8404	1.8541 ***
female hours x income	17.8010	8.7094 **	8.1466	7.9430 **	1.5776	8.1891
income	-62.1622	39.3672	-43.1169	44.1962	-138.4106	29.3103 ***
x female age/40	119.1399	68.7225 *	186.6772	84.6024 *	296.542	57.3874 ***
x (female age/40) ²	-48.3022	30.5138	-90.5340	37.7626 **	-130.1408	26.7441 ***
x # children	-3.1994	2.7546	-8.0673	3.5386 ***	*ns*	*ns*
x **1**(region)@	8.1489	5.0149 *	*ns*	*ns*	4.2375	3.4476
female hours	3.8634	1.8444 **	-2.1754	1.5461	-13.1094	1.9158 ***
x female age/40	-2.0915	1.4830	-2.4791	1.2203 **	*ns*	*ns*
x (female age/40) ²	*ns*	*ns*	*ns*	*ns*	*ns*	*ns*
x # children 0-2	-1.5024	.6778 **	-5.3494	1.2623 ***	-2.1548	1.1239 **
x # children 3-5	-.8967	.6006	-3.7813	.7819 ***	-.2899	.4100
x # children 6-11	-1.3529	.3853 ***	-1.1990	.3345 ***	*ns*	*ns*
x **1**(region)@	*ns*	*ns*	1.5097	.4983 ***	*ns*	*ns*
Log-Likelihood	-300		-258		-213	
Nb of observations	664		453		416	

Level of significance: *=10%, **=5%, ***=1%

@ : the dummy `region' corresponds to Paris area for France, Helsinki area for Finland and East Germany for Germany.

ns : covariates are excluded from the estimation if they are highly non-significant, hence increasing the variance of the predictions from the estimated model

Figure 33: Estimation results for single women

Note that quasiconcavity in H is not respected as coefficients of H^2 are always positive. This could be due to the fact that hours variables not only represent distaste for work but also account for variable costs of work.[44]

Goodness-of-fit

Goodness-of-fit (in terms of the pseudo-R2 in nonlinear types of models as the one used) and accurate predictions are usually a matter of trade-off. To increase the number of variables in Z_i for a better fit would be detrimental to the precision of the predictions for a reform. The compromise we made - mostly influenced by the necessity to obtain precise predictions - was to take out of the specification all interacting socio-demographic characteristics, the coefficients of which were highly unsignificantly different from zero.

A usual approach to measure goodness-of-fit in a multinomial setting is to compare for all discrete choices their observed frequency by the average estimated value over all households. For couples and singles respectively, figures 34 and 35 show that the probabilities predicted by all models correctly represent the proportions of the samples. The figures also display the generalized R2 for each choice, that is, the percentage of observed variance explained by the model. Results seem reasonable except for the prediction of part-time work. This is in line with findings from the recent literature (Laroque and Salanié, 2002, for France; Bonin, Kempe and Schneider, 2003, for Germany). We also provide the pseudo-R2 or Likelihood Ratio Index of McFadden (1974) which is a measure (ranging between 0 and 1) of the distance between the maximized value of the log-likelihood and the log-likelihood when all parameters are set to zero. This indicator is helpful for specification as it summarizes the fit in a single figure; however, it

[44] The usual practice consists in adding state-specific dummies (or only part-time dummies, as in Van Soest, 1995) which represent the variable costs of work or the specific disutilities from job search, from a pure-supply side perspective. We tried such specification but it turned out that the new coefficients did not prove significantly different from zero and dramatically increased the standard-error of our predictions.

choice	France			Germany			Finland		
	observed frequencies	average predicted frequencies	generalized R2	observed frequencies	average predicted frequencies	generalized R2	observed frequencies	average predicted frequencies	generalized R2
0	0,296	0,300	18,6%	0,368	0,368	39,0%	0,264	0,284	25,5%
20	0,117	0,114	0,6%	0,166	0,166	2,7%	0,038	0,041	0,1%
39	0,588	0,586	18,2%	0,466	0,466	34,6%	0,698	0,675	23,5%
pseudo-R2		26,5%			30,4%			42,2%	

Figure 34: Goodness-of-fit for estimations on women in couples

choice	France			Germany			Finland		
	observed frequencies	average predicted frequencies	generalized R2	observed frequencies	average predicted frequencies	generalized R2	observed frequencies	average predicted frequencies	generalized R2
0	0,032	0,032	6,7%	0,208	0,208	43,2%	0,200	0,215	16,8%
20	0,117	0,113	2,7%	0,093	0,093	4,1%	0,019	0,012	0,1%
39	0,851	0,855	7,0%	0,700	0,700	37,5%	0,781	0,773	16,2%
pseudo-R2		58,8%			48,2%			53,4%	

Figure 35: Goodness-of-fit for estimations on single women

should not be used to rank estimations across countries.

Simulating transitions

To compute transition frequencies after a shock in the budget constraint (reform, increase in wage rates to compute elasticities, etc), the following strategy was retained. We generate a plausible baseline (or pre-reform situation) by repetitively drawing some series of pseudo-residuals $\widehat{\epsilon}_{ij}$ $(j = 1, ...J)$ from a Weibull distribution for the stochastic part of the utility at each hour choice, until a perfect match between observed and predicted hours is obtained. Post-reform optimal choices are defined as the hours predicted by the deterministic model plus the retained pseudo-residuals $\widehat{\epsilon}_{ij}$ derived from the model calibration. The procedure is repeated 100 times to obtain transitions frequencies for each household. Transition tables result from averageing over the whole population.

As the nonlinearity of the model makes sensitivity analysis fairly complex, we proceed numerically. Confidence intervals for each transition cell and summary measure are simulated by drawing 100 times from the estimated asymptotic distribution of the parameter estimates, and for each of those 100 parameter draws, applying the method described above to build transition matrices.

Limitations of the approach

Some important limitations of this setting are worth mentioning even though common to most related studies in the literature. Firstly, some labor market constraints are not addressed in the present studyand in particular rationing in the choice of hours. Information on actual as well as desired hours of work is necessary to capture these aspects and to disentangle supply and demand sides. The necessary data are unfortunately not provided by the datasets at hand.[45] Secondly, we implicitly assumed that before-tax

[45] Even when desired hours are available, it is difficult to make sure that individuals' answers to the preferred hours question only reflect preferences (and are not themselves affected by some constraints). Desired hours are used in Ilmakunnas and

hourly wage rates do not vary with work hours.[46] Thirdly, prices/wages are assumed not to change with the reforms. Our results can be seen as valid in the middle-term, the short-term implying no behavioral responses (first-round analysis) and the long-run incorporating general equilibrium effects.[47] In addition, it is assumed that employers will not offset the net gain of the benefit by lowering hourly wages.[48]

Other aspects are worth mentioning. We focus here on financial incentives only and ignore the type of institutional arrangements chosen as a framework to implement the reform, even though those may determinane the effectiveness of the policies (see Dilnot and McCrae, 1999). The administrative arrangement for the payment of the transfers may be important and in particular the frequency of payment.[49] It seems also important to mention the form chosen for the MWP policies. Three forms of employment-conditional transfers are usually used by governements: wage subsidies, in-work benefits or refundable/non-wastable tax credits. In our simulation, the form given to each policy has been simply pragmatic. An individual policy in the form of a tax credit - as in the recent Belgian reform - would require individualized income tax schemes which is not the case in France or Germany. To keep the implementation in all three countries as simple as possible, a wage subsidy seemed a natural candidate. As for the family-based reform, we have used the popular British reform as a benchmark, and have hence choisen a refundable tax credit instead of an in-work benefit.[50] This is also motivated by the fact that in-work benefits conditional on claims have posed serious take-up problems. In the recent years, policy makers have rather opted for tax credit administered by fiscal authorities and paid directly through the wage packet in Paid As Your Earn systems. Notice that as in Blundell et al. (2000), we have assumed full take-up of both transfers.

Pudney (1990), Van Soest et al. (1990), Callan and Van Soest (1996), Euwals and Van Soest (1999) and Van Soest and Das (2000).

[46] This hypothesis is relaxed in Moffit (1984), Tummers and Woittiez (1991) and Ilmakunnas and Pudney (1990). The authors find that before-tax wage rates are lower for part-time jobs. In the countries we examine, most wages are determined by collective bargaining within branches or sectors so that discrimination between full-time and part-time workers is less likely to occur.

[47] Using a CGE model for Germany, Boeters et al. (2003) find that general equilibrium effects are rather modest when simulating MWP policies (a cut in social assistance and a reduction in marginal tax rates). Partial equilibrium approximations are justified insofar as only a small number of individuals are affected, which is usually the case with this type of reforms.

[48] To limit this adverse effect, minimum wage legislation has recently been implemented in the UK.

[49] See Duncan (2000) for more detailed comments.

[50] Note that this choice may well have implications as far as intrahousehold aspects are concerned. Indeed, in the beginning the Family Credit was payable to the main carer of the children (most often the wife), but the WFTC was paid as a refundable tax credit included in the pay package of the main earner (most often the husband). If we accept that who controls resources matters for intrafamily distribution, the latter reform should be seen as a 'purse to wallet' transfer to families. This issue is addressed in Blundell, Myck and Lechene (2002) using the methodology developed in Laisney (2002, ed.) to simulate a collective model of labor supply. It is interesting to note that the 2003 reform in the UK precisely split the credit in two, a child tax credit going to the main carer and a working tax credit to the main earner.