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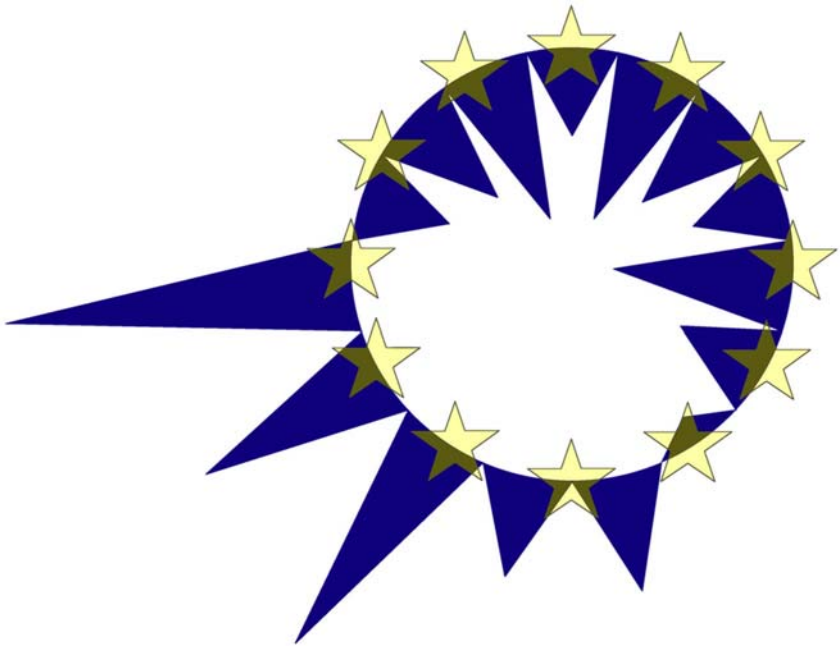

EUROMOD Working Paper No. EM4/04

IN-WORK POLICIES IN EUROPE: KILLING TWO BIRDS WITH ONE STONE?

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October 2004

In-Work Policies in Europe: killing two birds with one stone?[1]

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Abstract: Earning an income is probably the best way to avoid poverty and social exclusion, hence the recent trend of promoting employment through in-work transfers 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. Relying on EUROMOD, a EU-15 integrated tax-benefit microsimulation software, we simulate two types of in-work benefits. The first one is means-tested on family income, in the fashion of the British *Working Family Tax Credit*, while the second is a purely individualized low wage subsidy. Both reforms are built on the same cost basis (after behavioral responses) 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 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.

[1]**Acknowledgements** : We are grateful to Tim Callan for in-depth comments of the first draft. We also thank Tony Atkinson, Denis Beninger, François Bourguignon, Marc Gurgand, Seija and Pekka Ilmakunnas, Herwig Immervoll, Thomas Picketty, Cathal O'Donoghue, Holly Sutherland, Heikki Vittamäki and Sile O'Dorchai for useful comments and advices. All errors or omissions remain ours. This paper was written as part of the MICRESA (Micro Analysis of the European Social Agenda) project, financed by the Improving Human Potential programme of the European Commission (SERD-2001-00099). 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. We are indebted to our present and former colleagues who have contributed to the construction of EUROMOD, and in particular to invaluble work of Herwig Immervoll, Christine Lietz and Cathal O'Donoghue.

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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 many OECD countries has been to promote self-sufficiency as the best way to escaping both poverty and social exclusion. At the institutional level, 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 pioneering measures introduced 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. In particular, 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 secondary-earners, most often women. Individualized schemes seem to combine more unambiguous incentive effects with less efficient targeting. Whether redistributive and efficiency objectives can be reconciled in a single policy measure is still an open question.

When comparing the effects of a reform on several countries, it is important to review the initial conditions which determine to which extent the policy can achieve its objectives. These include the institutional framework - in particular the existing tax-benefit system and the presence of a minimum wage -, the distribution of wage rates and incomes in the country as well as the size and distribution of the labor supply elasticities. Although 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 so within multi-country comparative framework.[4] Pearson (2002) and Pearson and Scarpetta (2000) state that if tax rates are already high, the phasing-out of MWP payments may raise EMTRs to unacceptably high levels. We argue that not only income taxation but all means-tested instruments must be systematically considered. To do so, we analyze how the distribution of EMTRs is affected by the simulated reforms in each country. The structure of wages/earnings may also determine the viability of MWP policies; for instance, a narrow distribution of incomes may imply either a large cost of the reform or very small amounts of transfer per household, and hence a small impact on work incentives; the number of households in the phase-out range (where EMTRs increase) may also be large in that case.[5] The present paper contributes significantly on these accounts and provides useful guidelines for the design of MWP policies, by addressing these issues in a comprehensive way and by comparing the effects of two reforms in three European countries

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

[5] Note that the level of EMTRs is not the only aspect we focus on. In fact, we follow the bulk of the recent literature on labor supply so that our estimation strategy captures participation decisions above all.

- Finland, France and Germany - all experiencing inactivity traps. Using the integrated microsimulation of European tax-benefit systems (EUROMOD), we simulate a purely individualized in-work transfer and an extended version of the WFTC. To analyze the potential effects on incentives and redistribution, we combine the microsimulation with structural models of female labor supply. The reform scenarios are tailored to reach the same budgetary cost - after potential 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 *poverty reduction* and *social inclusion*. 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 number of transitions into work 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 given each country's social policy agenda.

In our view, this paper contributes to the literature on cross-country tax analyses in two ways.

Firstly, national and international studies related to tax-benefit systems rely too often on case-studies with hypothetical households. Instead, large-scale conclusions require the use of microsimulation models in order to assess precisely the overall incentive and redistributive impacts of alternative policies. Yet, few studies conduct such comprehensive evaluation in an international perspective.[6] To our knowledge, there are even fewer cross-country studies which combine microsimulation and labor supply models. Spadaro (2004) extends the work of Bourguignon and al. (1997) by introducing behavioral responses into the simulations under several assumptions about the size of labor supply elasticities.[7] Other studies rely on more traditional econometric estimations, like Callan, Dex, Smith and Vlasblom (1999) and Aarberge, Colombino and Strøm (2000).[8] While the number of national studies using behavioral microsimulation increases dramatically, 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 datasets we relied upon have been rendered homogenous and the labor supply estimations conducted with similar specifications. In addition, the integrated microsimulation program accounts for the whole complexity of the European tax benefit systems. Such a consistent framework offers a unique chance to perform cross-country analysis in a robust and truly comparative way.

Secondly, the success of an in-work policy depends crucially on the design of the reform in relation with the initial conditions. These include the institutional framework - in particular the existing tax-benefit system -, the distribution of wage rates and incomes in the country as well as the size and distribution of the labor supply elasticities. Even though the importance of these conditions has been stressed in previous studies, they have not been sufficiently exploited in large-scale analyses and even less so within multi-country comparative framework.[9] The present paper attempts to contribute significantly on this

[6] The pioneering work of Atkinson, Bourguignon and Chiappori (1988) evaluates the redistributive potential of French and British tax-benefit systems by simulating the 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.

[7] Immervoll et al. (2003) follow a similar path and include the possibility to distinguish between elasticities of working hours and elasticities of participation.

[8] Callan et al. 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). Aarberge et al. simulate a common flat rate simplification of the tax system in Norway, Sweden and Italy.

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

account and provides useful guidelines for the design of MWP policies.

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, and analyses crucial initial conditions like the wage and working hours distribution. Section 4 summarizes the strategy to estimate labor supply and compares the estimated elasticities with the related findings in the literature for each country. Section 5 analyses the potential effects of the reform on labour supply incentives and income 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 potential 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. 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 inactivity traps in Finland, France and Germany

In the three countries we examine, minimum income schemes share a common structure which generates potential disincentive to work. Income assistance transfers are computed as a basic minimum income reduced by total household resources among which labor income. In terms of effective marginal tax rates (EMTRs hereafter), households on welfare are then characterized by an implicit 100% taxation of their earnings. In addition, housing benefits are sharply phased out as earnings increase[10]. Yet, Finland, France and Germany present some differences with respect to relative generosity of social assistance. German minimum income 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 varied from 1.3% of GDP in Germany to 0.6% in Finland. Notice however that in France housing benefits contribute significantly to social assistance.

A simple way to illustrate how institutions may discourage work is to draw household budget curves. Figures 2, 3 and 4 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.[11] Budget curves used in this paper represent original income (gross earnings) on the horizontal axis and disposable income on the vertical axis. It is assumed that the first half of the horizontal axis corresponds to a linear increase in weekly hours of work from 0 to 40 while the second half corresponds to a linear increase in the hourly wage from 6 to 12 EUR. The graphs display the decomposition of disposable income into the main instruments, namely income tax, social security contributions, total family/child benefits, minimum income and housing benefit.

The curves show some interesting features of the concerned countries with respect to the size of child

[10] In France however, levels of benefit are relatively higher and withdrawn at a smaller rate than in Finland and Germany.
[11] This corresponds in fact to the French minimum wage (there are no wage floors in the two other countries).

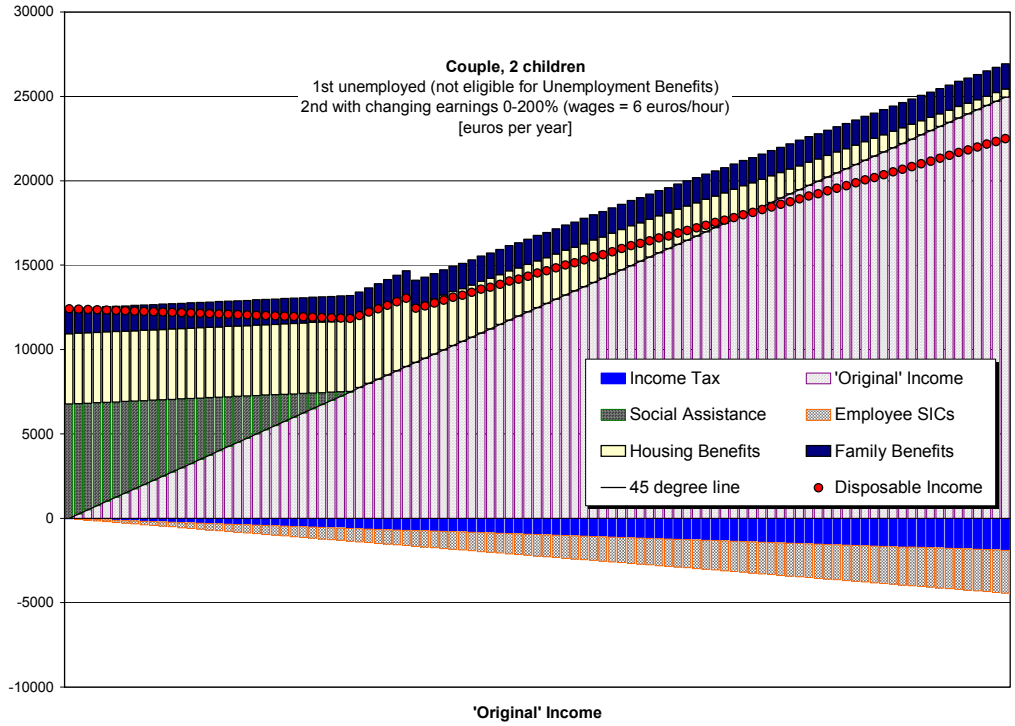

Figure 2: Budget constraint for a one-earner couple with children (France)

benefits or the relative importance of social security contributions (SSC hereafter) and income taxation.[12] 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.[13] The safety net is comparable in France and Finland but France relies also on the aforementioned generous housing benefits. This relatively larger contribution of housing benefit is important; indeed, as it is phased out at a much lower rate than the minimum income, the flat segment in France is shorter compared to Finland.

More generous minimum income in Germany makes this segment longer than in Finland. However, things are slightly more complex in this country. Indeed, small amounts of labor income (70 EUR per month) are entirely disregarded for social assistance assessment, which correspond to the small portion of the curve displaying a 45 degree slope; additional earnings are partially disregarded (30%) up to a maximum of 140 EUR of disregard, which corresponds to the second positively slopped portion of the curve. Beyond, the 100% withdrawal rate of social assistance makes the budget curve flat. In addition, as long as weekly gross earnings are below 300 EUR and working time below 15 hours per week, there is no liability to SSC. This rule does not affect the budget curve - the discontinuity in SSC at 15 hours does not impact on the curve - simply because social assistance withdrawal automatically offsets all reductions in tax and contribution rates (as income assessment is computed on net income).

[12] 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.

[13] 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.

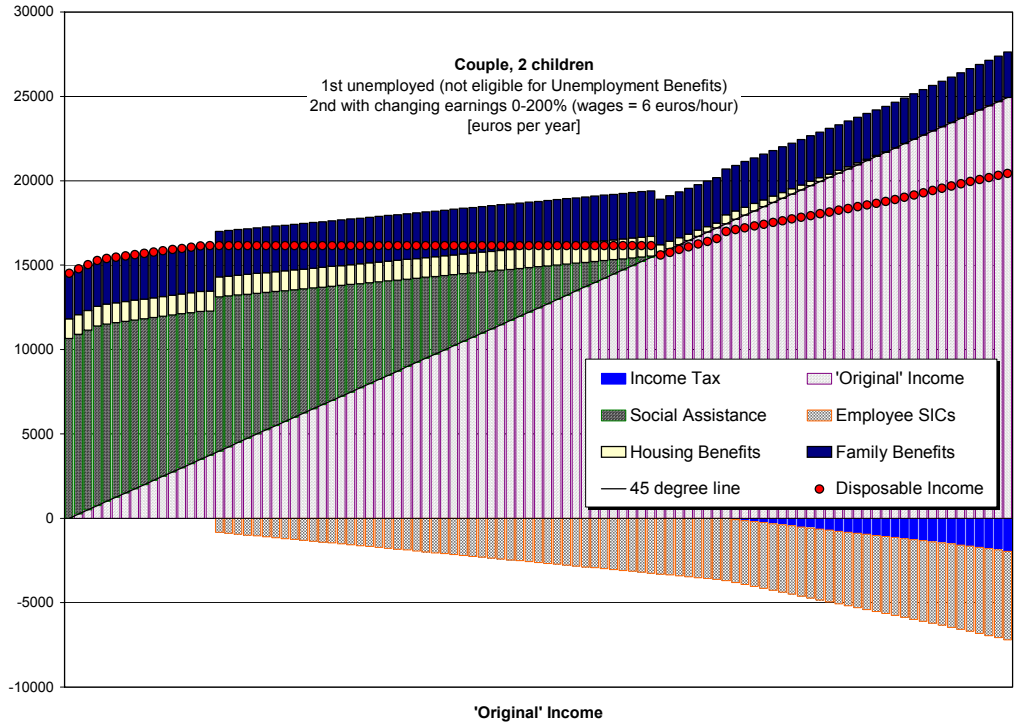

Figure 3: Budget constraint for a one-earner couple with children (Germany)

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 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.[14]

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 in 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 dC. The formula is simply:

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

We opted for a uniform gross income increment $dy = 1500$ EUR per year. Such increment corresponds to increased working hours until a maximum of 40 hours/week and to an increase in the wage rate thereafter[15].

[14] 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, except maybe for some of the self-employed.

[15] Note also that the step of 1500 EUR 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. It actually represents around 5 additional hours per week for a worker paid at 6 EUR/hour (the French wage floor). Note also that the microsimulation accounts for the specific increase in hours worked for each of those already in work. This is important insofar as one of the reforms simulated in this paper shall depend on work duration.

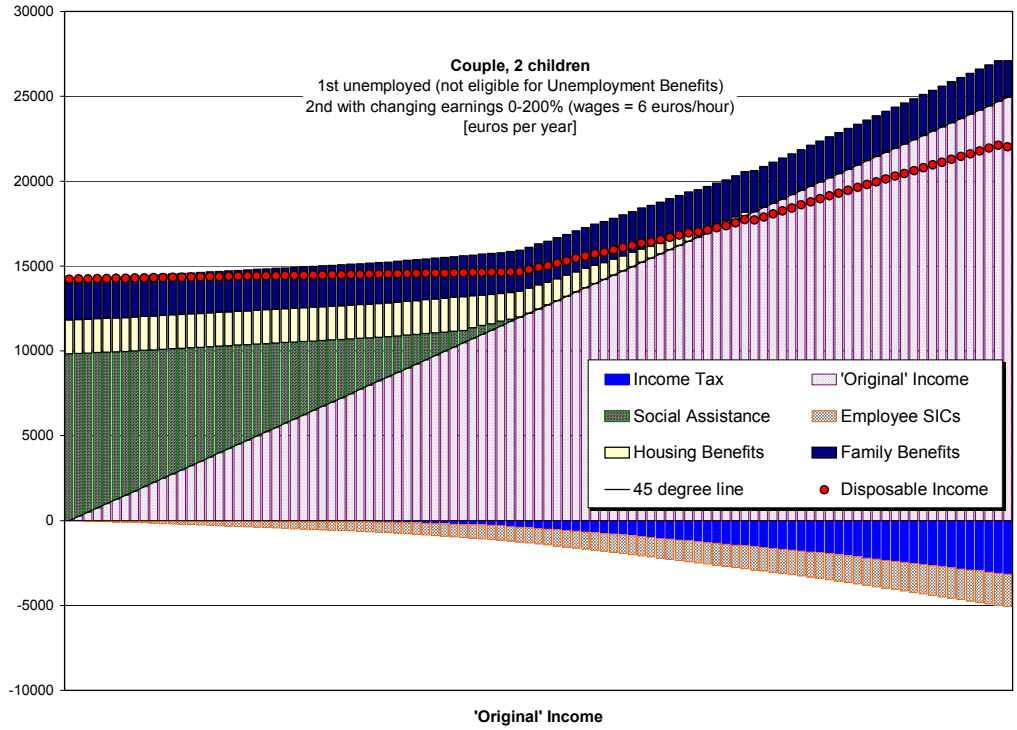

Figure 4: Budget constraint for a one-earner couple with children (Finland)

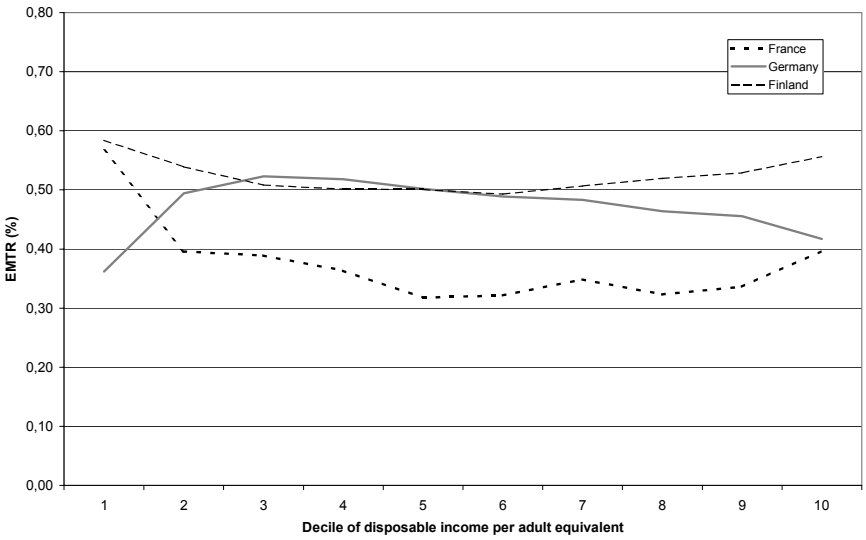

Figure 5: Distribution of average EMTRs for active and potentially active households.

Figure 5 shows the distribution of mean EMTRs by decile. Deciles of equivalent income are computed on the basis of the whole population, but EMTRs are averaged over active and potentially active households only (i.e. household head must be between 25 and 60 year old, neither disabled, nor in full time education or retired).[16]

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 progressiveness of the income tax schedule while they are due to the means-testing of social assistance at the bottom; in particular, the high EMTR level in the first decile characterizes the inactivity trap. In France, the overall level of taxation is lower so that EMTRs are lower than in Finland, except in the first decile (which is hardly concerned by income taxes). The Finnish curve is fairly smooth while the anomalies in the French curve are mainly due to thresholds in means-tested transfers to families and to income tax rebate.

In Germany, the aforementioned disregard of labor income for social assistance assessment is very small but sufficient to explain lower EMTRs for the first decile which contains most of the inactive households.[17] In Germany and Finland, high EMTRs in lower deciles 2 to 4 are due to the means-testing of generous transfers observed on budget curves above. This is not the case in France where housing benefits present lower withdrawal rates and assure a relatively larger part of the transfers compared to the other countries. This feature, together with a lower level of income taxation, mainly explain the difference with Finland and Germany.

Finally, it is important to recall that the EMTRs computed in this paper account for social security contributions (SSC) in addition to direct taxes and transfers.[18] This explains the lower general level of EMTR curves compared to Bourguignon (1997, p.42) and turns out to be important in the German case.[19] In effect, the German curve computed by Bourguignon drops after the 5th decile and then starts to rise slightly again. Here, the decrease after the 5th decile is not as pronounced since SSC are accounted for. Higher deciles progressively benefit from the presence of a ceiling on of SSC (around $3,000$ EUR of monthly gross earnings) which explains the decrease in EMTRs in that range. Note that for the reason mentioned in the budget curve analysis, the exemption of low earnings from SSC plays only a marginal role in lowering EMTRs in the first decile, at least for inactive people.[20]

Figure 6 presents the distribution of EMTRs in different brackets and compares our findings with those

[16] 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 it was composed only by inactive household.

[17] This point depends crucially on the EMTR definition. In our computations, the 1500 EUR yearly increment implies that inactive households of the first decile are assumed to switch from 0 to 125 EUR per month of earnings, only 35 EUR of which will be considered in the income assessment due to the disregard. In that case, the benefit withdrawal rate is around 30%. Additional disregards for workers with children may bring the withdrawal rate down. This effects naturally explain the relatively lower EMTR in the first decile in Germany. A 'truly marginal' increment would imply full disregard hence 0 EMTRs for inactive households, which would make cross-country comparisons inconsistent and gives credit to the EMTR definition retained here.

[18] The choice to treat these contributions as taxes is highly debatable but can be justified to some extent. We do not go into details here and refer to Bourguignon (1997) for a more in-depth discussion.

[19] In addition, some instruments have changed since the reference year in Bourguignon (1997), which explain that the EMTR has decreased for the first decile. In particular, the additional disregard for social assistance has been brought up from 15% to 30% of income higher than 70 EUR.

[20] The exemption mainly serves lowering EMTRs for secondary earners in couples. This could partly explain the differences in EMTRs between men and women. According to our calculation, the proportion of men facing low EMTRs (below 10%) is about 3% whereas it is almost 16% for women.

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 6: Distribution of EMTRs

of Immervoll (2002). Although different definitions to compute EMTRs are used, results are close enough to derive similar conclusions.[21] 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 5). Overall, withdrawal of means-tested transfers - minimum income and housing benefits (with a restriction for France) - is the main cause for high implicit taxation. This feature is common to the three countries we examine while they present wide heterogeneity on other accounts (level of income taxation, initial conditions, etc.). This heterogeneity is exploited in what follows. In all three countries, the inactivity trap phenomena has led national advisors to promote job-enhancing policies.[22]

2.2 'Making work pay' policies

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 the UK, Belgium and the three countries under consideration.

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 80s and 90s (Austria, Belgium, France, the Netherlands and to some extent in the UK through a progressive contribution scheme). Other

[21] Note that the definition of EMTR when computed numerically is arbitrary and may condition the results to some extent. As seen before, the shape of EMTRs 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.

[22] Previous results on the detrimental role of social assistance on incentives are confirmed by Immervoll (2002) for several other European countries.

countries have targeted employment subsidies to employers of youngsters, long-term unemployed and welfare recipients. An in depth discussion 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 occurred 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 the 'working poor'. Such instruments are often seen as more desirable and more politically acceptable than an increase in social assistance given the minor effect on work disincentives and the targeting on the 'deserving poor'; they also seen as 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.[23]

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 on the supply side. 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, more precisely, the choice of the unit retained to assess income. Two broad groups of possible schemes are usually encountered, although hybrid measures also exist.

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, in the fashion of the EITC and the WFTC, is known to be well-targeted to poor working families. However, while the reform unequivocally encourages the participation of single individuals, it is often the case that it discourages second-earners in couples, bringing about a gender bias against the participation of women (see Eissa and Hoynes, 1998, and Blundell et al., 2000, among others). Moreover, the generosity of the reform implies a high taper rate in the phase-out portion of the measure and, hence, large increases in EMTRs and potential disincentives at the intensive margin.

On the other hand, some countries like Belgium have experienced purely individualized measures, conditioned on individual earnings only. Given a similar budgetary cost, this type of measure clearly implies smaller benefits and larger numbers of recipients. Indeed, low-paid individuals in well-off families may well receive some transfers. This policy is considered to have greater incentive effects than the family-based alternative as (i) it has no discouraging effects on second-earners in a couple and (ii) the less generous amounts imply smaller increases in EMTRs in the phase-out region.

To account for the family dimension or to alternatively retain the individual as the unit of interest could have a serious impact on the way reforms contribute to the policy objectives. Targeting low-

[23] Note however that setting a high minimum wage while subsidising employer costs could be identical in effect to 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. Let us recall that there is no wage floor in Finland and Germany.

income families rather than low-wage workers is likely to achieve more redistribution but to have more ambiguous incentive effects. 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 individuals - and mostly lone parents - constitute the largest group of poor households;[24] generous amounts of transfer from a WFTC-type scheme may then have both redistributive and incentive effects on such vulnerable groups. 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 has served as a benchmark to our study as well as to policy makers throughout Europe. In complement to this family-based policy, we also review the Belgian case which represents an interesting example of purely 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).[25] It is a transfer to households with children 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% 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 number of children, but is paid at the same rate for couples and individuals; a 20% 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 rolls together 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, hence extended to all types of households. 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.[26]

[24] 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).

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

[26] These figures represent basic amounts, without premium for working more than 30 hours. Premium for children depends

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 7: Labor supply responses to the WFTC in the UK

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.[27] 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 7, 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 - has been 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 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 individualized. 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

on the age of the children in the FC scheme and the figure given here assumes the lowest premium rate (25.3%).

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

separate taxation (income from self-employment is also disregarded when the latter is complementary activity). Eligibility is conditional on having a yearly gross income between 3,850 and 16,680 EUR and on working at least 13 hours, so that the measure targets workers with an income around the minimum wage and clearly distinguishes between low productivity and low effort. (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, but it is likely to increase substantially in the future[28].

2.2.4 Recent policy changes 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 British 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 (2000), 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), which is a hybrid measure targeted both on individual earnings and on household income.

To be eligible, at least one member of the household must be employed. Jointly assessed taxable income must be lower than 11,972 EUR per year (2003 figures) for a single plus additional increments per dependent child.[29] Each worker in the household opens the right to a tax credit, provided that his or her individual taxable income falls between 3,265 EUR and 23,207 EUR per year (note that the lower bound is similar to the Belgian one). 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. 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) and potential effects on employment are analyzed in Bargain (2004b).

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 significantly lowered. A description and complete analysis of the reforms can be found in Haan and Steiner (2004).

[28] Orsini (2004) describes and analyses the 2001 Belgian tax reform and finds mitigate labor supply effects related to the individualized tax credit component.

[29] 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.

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 fall to 15% (from 22.9% in 2000) while the top rate should be cut to 42% (from 51% in 2000) in order to reach international standards. The personal income tax allowance will be increased from 6,902 up to 7,664 EUR in 2005, but will continue not to be 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 political agenda and have been reviewed by Bonin, Kempe and Schneider (2002). Interestingly enough, with respect to the previous discussion, two of these proposals employ individual subsidy schemes 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 last policy proposal (the so-called Mainzer model), entitlement to the reduction depends on a joint assessment of household labor income and the lower and upper bounds of the phase-out region are respectively 650 and 1590 EUR for singles (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 moderate wage elasticities and conclude that these subsidy policies could not be 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 occurred mainly in the 1996-2002 period, following the recommendations of a working group whose proposals are analyzed by Laine (2002). The important policy measure for our concerns is the introduction of an *earned income allowance* in municipal taxation of employment income in 1997. In order to reach very low earners, the deduction concerns income taxation for municipalities rather than state income tax as the latter targets relatively higher ranges of income. The maximum allowance was 925 EUR in 1998 and it has increased progressively up to 3,550 EUR in 2004.

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 amounts - 16 EUR per month in 1998 - are sufficiently small not to interfere with the simulations of more generous MWP schemes we suggested here for the year of reference 1998.

3 Simulation of in-work transfers in three European countries

The reforms simulated hereafter are in line with the two broad groups of policies surveyed in the previous section, that is, household-based vs. individual in-work transfers. 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 premium is universalized in a new instrument (the Child Tax Credit). Instead, we have maintained the child element of the WFTC. 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 for all household types.[30] By definition, the wage subsidy is individual and 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 above 30 hours.

By construction, each reform is meant to emphasize one of the two policy objectives (even if they both attempt to simultaneously 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 an essentially incentive measure; it is not phased-out but simply conditioned on the wage rate.

Another crucial aspect is the interaction with existing policy instruments. The LWS is simply added to the present tax-benefit system. The WTC interacts with several instruments which are fairly different across countries. In this view, 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, a change in the income tax rates. This choice would necessarily imply additional labor supply effects which would make difficult the analysis of the effects specific to the MWP policies under study. Consequently, we simply assume alternative ways to let the reforms be financially neutral. One could in particular think of governmental budget reallocation or of an increase in indirect taxation (essentially a proportional tax on consumption) which would not affect neither labor supply behavior nor vertical distribution. More important than revenue-neutrality, reforms must assure to be comparable one with the other. For this purpose, we calibrate the LWS in such a way that it reaches the same real cost - after behavioral responses - as the WTC policy.

3.1 A family-based working tax credit

3.1.1 Design and simulation hypotheses

The rules of the WTC are based on the description given in section 2 for the 2001 WFTC. 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) net income of the household. According to 2001 WFTC rules, the taper rate t equals 55%; this corresponds roughly to 37% on gross income in the UK but to different percentages across the countries

[30] Optimally, child increments should be set according to the equivalence scales of national social assistance schemes in order to maintain a sufficient financial gap between inactivity and activity, in particular for households with children. For comparability purposes, we have opted for a homogeneous choice across countries, namely the equivalence scale of the 2001 WFTC. The definition of a qualifying child we retain, however, is the same as in the national social assistance scheme of each country.

we examine. The maximum amount of benefit B is 74.6 EUR/week for a childless household.[31] Maximum entitlement does not depend on the number of adults but increases by 49% per dependent child. The threshold θ amounts to 128.3 EUR per week.[32] Other features of the WFTC are taken into account.[33]

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).[34] In the UK, the income assessment for the WFTC is the same as for social assistance (*Income Support*) so that all 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 includes all the family transfers as in the *Revenu Minimum d'Insertion (*minimum income scheme, RMI hereafter) and the *Allocation pour Parents Isolés* (minimum income for lone parents, API hereafter), with the exception of the most generous child benefit (*Allocation Familiale*).[35] In Finland and Germany too, WTC assessment is modelled along the lines of existing social assistance benefits (*Toimeentulotuki* in Finland, *Sozialhilfe* in Germany), child benefits being excluded as well as some specific disregards (the aforementioned disregard on low earned income in Germany).

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.[36] Differently from the UK, we model income from WTC not to enter the assessment for housing benefits as the latter impact in turn on the conditioning of minimum income schemes (either directly, in Finland, or through a lump-sum, in France).

3.1.2 Impact on budget curves

We now look at hypothetical budget constraints to comment on the effects of the reform on the systems in force. These examples are merely illustrative and the analyses should not be generalized to widely to the 'real' population.

In Figure 8, we illustrate the budget constraint of a single individual (here for Germany).[37] 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 thereafter

[31] 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).

[32] 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 £/EUR). Alternatively, we could have chosen relative amounts computed as a function of a national reference such as the average equivalized income. Results would then possibly be sensitive to the reference figure chosen.

[33] 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.

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

[35] Other means-tested transfers for children are accounted for; housing benefit is not included directly but though a lump-sum (see Bargain and Terraz, 2001, for a description).

[36] 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.

[37] 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.

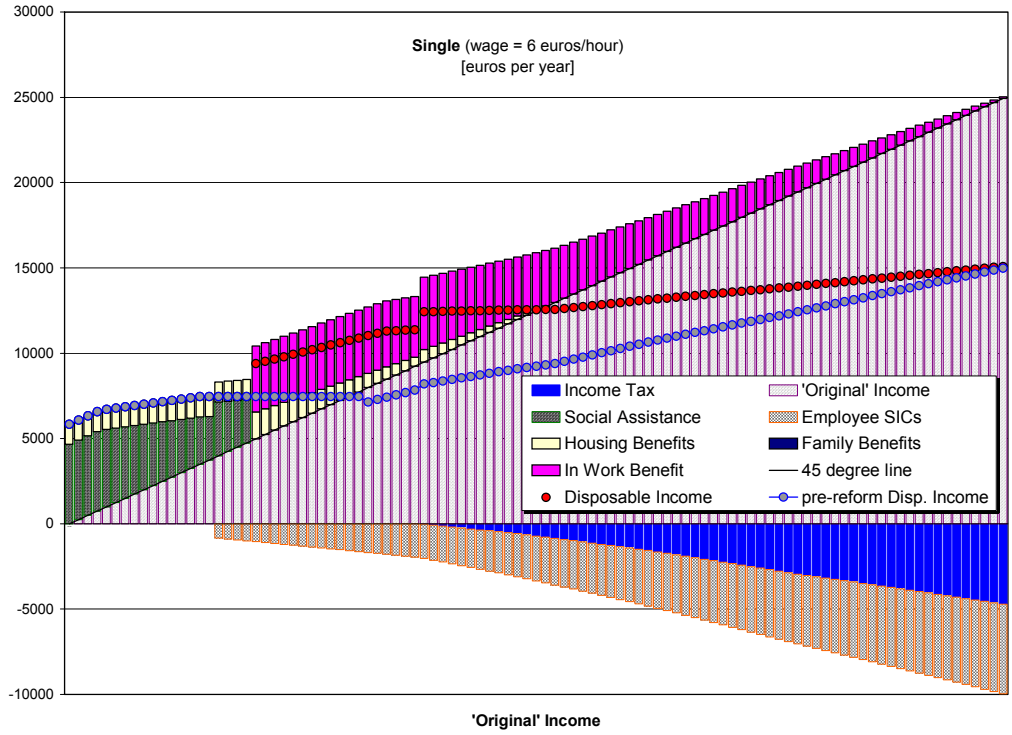

Figure 8: Impact of the reform on the budget curve of a single individual (Germany)

(second half of the X axis). The 16 and 30 hours thresholds are particularly evident, as they correspond to WTC eligibility and full time 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 - for Germany - is depicted in Figure 9. It turns out to be much smaller than the amount of the transfer, as 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 9 shows that the maximum net gains are in a range between $10,000$ and $15,000$ EUR instead of between the $5,000 - 10,000$ EUR as might be supposed by looking at the WTC alone. It also appears that in all countries, the reform recreates a significant financial difference between non-participation and full-time activity, unambiguously enhancing the probability of participation for single individuals or lone parents.

Figure 10 shows the budget constraint of the second-earner in a couple (here for France), conditional on the first-earner working 40 hours a week at minimum wage. Disposable income when secondary earner works zero hours increases due to the WTC received by the first-earner, but the amount of transfer decreases as the second-earner increases his/her working time. The financial incentive to work for secondary earners decreases in comparison to the pre-reform situation. 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.

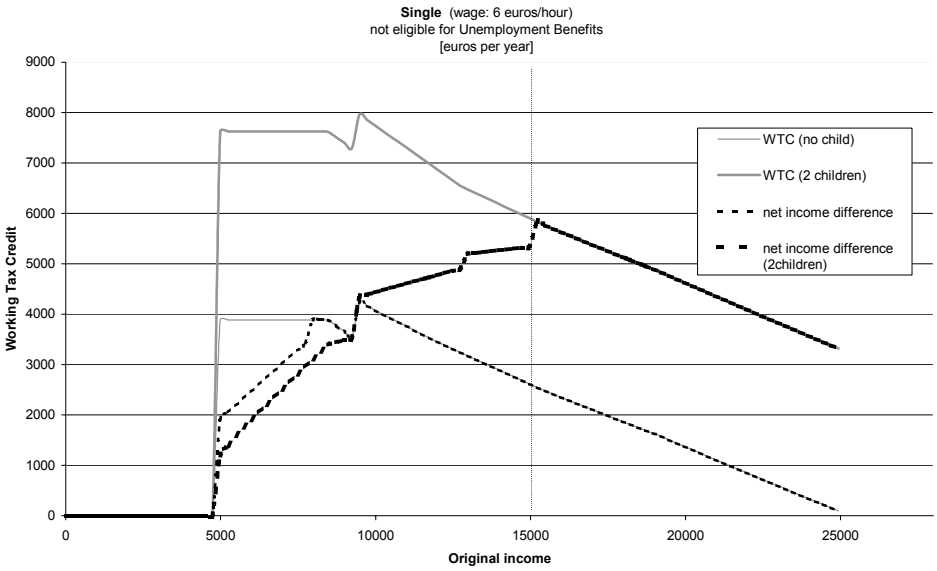

Figure 9: WTC reform for a single individual (Germany)

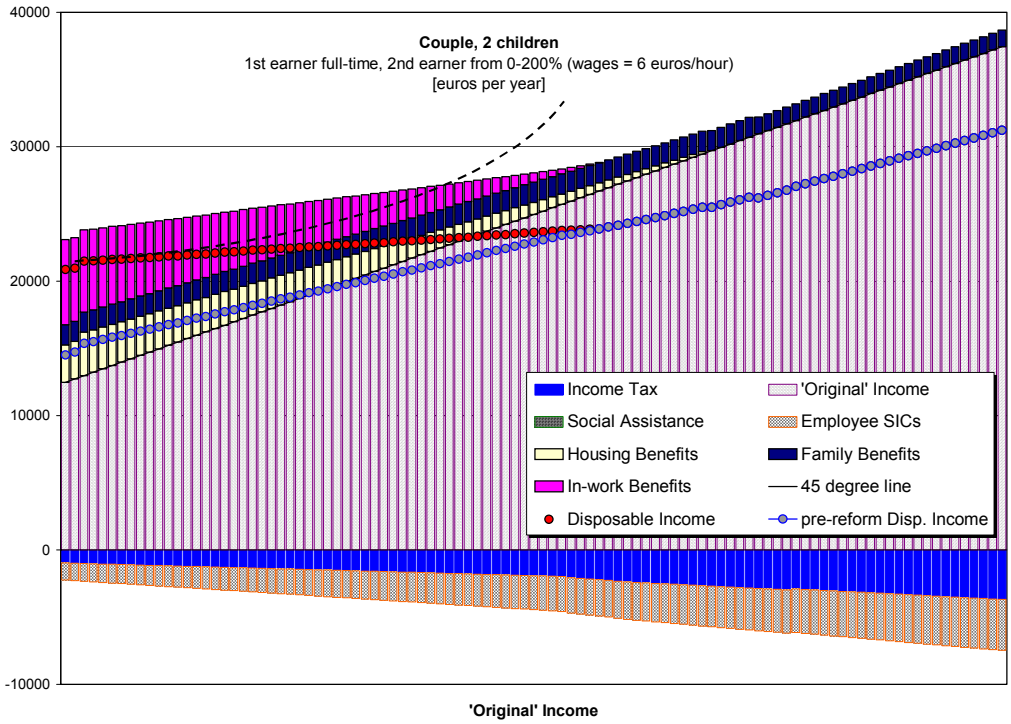

Figure 10: Impact of the reform on the budget curve of a two-earner couple with two children (France)

3.2 An individual wage subsidy

3.2.1 Design and simulation hypotheses

The LWS reform consists of increasing individual labor income $y = wh$ by a percentage A.[38] 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 country-specific wage floor, which does unfortunately not exist in Germany and Finland in 1998. Instead, we opt for the 10% cut-point of the wage distribution of each country, which corresponds to 6.09 EUR per hour for France (close to the 1998 French minimum wage), 6.79 for Finland and 7.42 for Germany. To reduce the number of degrees of freedom, we simply fix homogeneous values across countries ($\alpha = 1$ and $\beta = 1.4$)[39].

The supplement factor A is country-specific and calibrated iteratively 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 $K = \frac{(\beta - w/W)}{\beta - \alpha} \in [0, 1]$.

3.2.2 Impact on budget curves

The impact of the LWS is shown in Figure 11 in the case of a single individual (here for Finland). This way, the amount of wage supplement Awh increases linearly with working time (phasing-in) at a flat rate Aw so that the slope of the budget curve gets steeper. After hitting 40 hours, in the middle of the X-axis, 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.

3.3 Distribution of working hours, earnings and wage rates

We have previously reviewed the different types of framework conditions which are of potential relevance when designing and evaluating MWP policies. The primordial 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 a crucial aspect which has been investigated in the previous budget curve analysis. We focus here on the structural differences across countries which may explain the differences in the direct effects of each reform (cost, targeting, etc.).

Figure 12 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 participation rates 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.

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

[39] The individual tax credit applied in France since 2001 is also phased out between 1 and 1.4 time the minimum hourly wage.

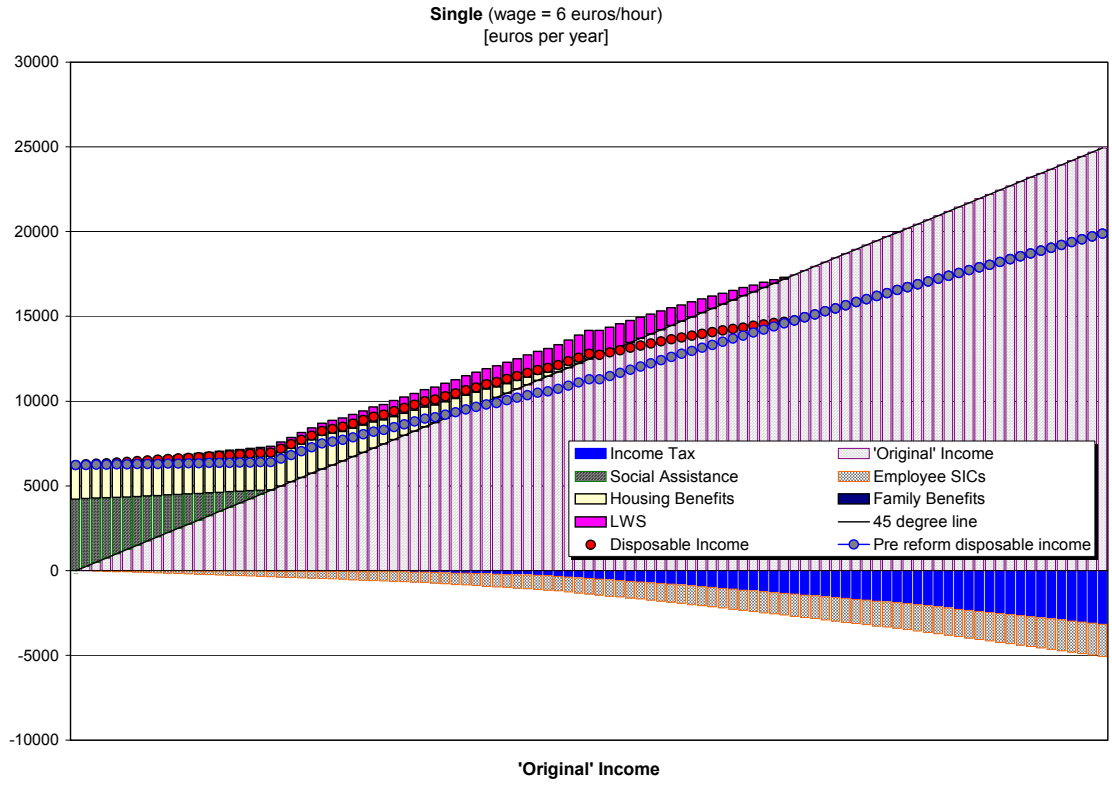

Figure 11: Impact of the reform on the budget curve of a single individual (Finland)

	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 12: Female participation rate across countries

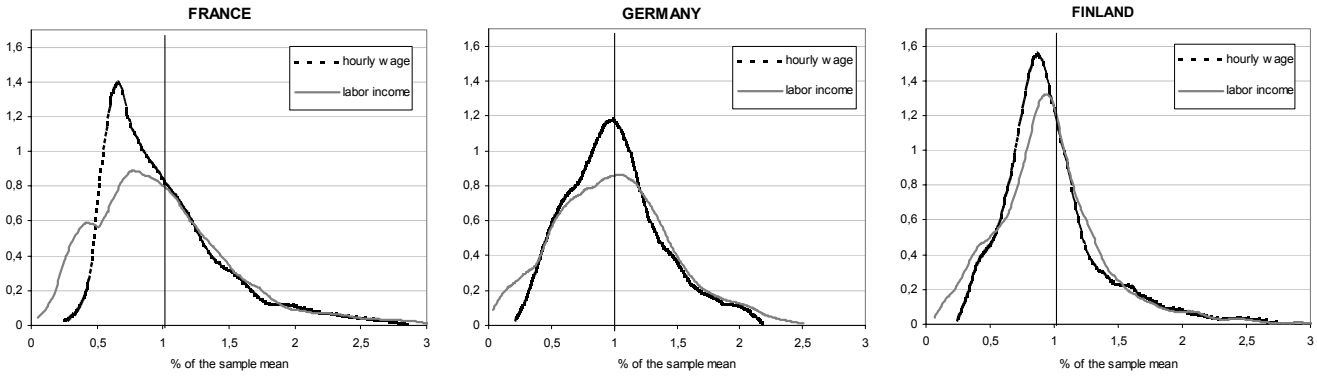

Figure 13: Distribution of hourly wage rate vs labor income for women

The distributions of females' wage rates and labor incomes, represented in Figure 13, are also important to explain the impact of the reforms.[40] The Figure reveals that for female workers, the distribution of *wage rates* in Finland is slightly more concentrated than in France and in France than in Germany. This observation seems in line with the literature on wage inequalities which usually places France between Scandinavian countries and Finland on one side and the UK and Germany on the other. Cross-country differences in the concentration of *incomes* are even larger and in particular, the distribution of income becomes much more unequal in France and Germany. This is explained by overall larger wage-elasticities in these countries, as shall be seen below. Larger wage-elasticities indeed mean that labor supply increases more with wage rates so that the distribution of labor income is more unequal than the distribution of skills (see Stern, 1986).[41]

The distribution of incomes is naturally what matters for the design of the WTC. An important consideration is the *shape* of the distribution and the different across countries on that account. In particular, it is remarkable that a larger density of workers is found in a lower income range in France as 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, whereas a larger density of the population in the phase-out region or above in Finland. This could imply smaller average amounts of WTC in Finland and, to some extent, partially offset the differences in theoretical eligibility (explained above by differences in participation rates).

In the case of the LWS policy, the differences in wage rate distributions must be considered. In addition to the general 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. The important feature here is the concentration of wage rates in the eligibility zone which is itself tailored in function of the wage distribution: the lower bound upper which the LWS starts to decrease with the wage rate corresponds to the wage reference W (the wage value at the frontier of the first decile) while the eligibility ends at $1.4W$. Wage rates are concentrated in lower ranges in France and Finland; the same feature applies to male wages, although represented here. Higher concentration in Finland implies relatively more eligible individuals, *ceteris paribus*.

[40] Similar graphs for men are not provided as differences in concentrations are less significant, either across countries or between the distribution of wage rates and the distribution of labor incomes.

[41] Naturally, more precise statement would imply to look at the distribution of elasticities in the sample.

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. We simply look at own wage-elasticities to provide an order of magnitude of the potential labor supply responsiveness across countries.

To model labor supply, we rely on the recently developed technique based on a structural unitary model with discrete work hours.[42] 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 working hour are more variable than men's, as female work is often regarded as a second source of earnings.[43] At the same time, male labor supply is known to be very inelastic to moderately sized exogenous changes in the budget constraint,[44] whilst inactivity is mostly explained by demand-side rationing in the countries we consider. Consequently, we simply treat male labor supply as fixed at observed values.[45]

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 (see Figures in the Appendices). Self-employed workers may have more freedom 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.[46] In this respect, our modelling strategy focuses mainly on participation decisions, even though the possible variations in hours are partially captured by the part-time option. The model, and the estimation results are described in the Appendices.

Estimates are used to compute elasticities. Evaluating elasticities at the sample mean is not very informative - in a highly nonlinear model like ours - on the consequence of wage changes in a heterogeneous population. Instead, we compute wage-elasticities 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 changes in average work duration and in the participation rate.[47]

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

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

[44] This has been justified on sociological grounds and proved extensively in labor supply literature (see surveys from Pencavel,1986, or more recently Blundell and MaCurdy, 2000). An option would be to model only participation decisions for men. Yet, in the countries we examine, the number of inactive men remaining after the selection process appears too small to do so.

[45] Even if one does not believe in the 'second-earner' model of the household decision process, it seems reasonable to think that the suggested reforms should not have any negative impact on the participation of men in couple; they should not have any positive impact either as the selected sample contains very few inactive couples; considering the extremely low elasticities of hours, the impact at the intensive margin can also be ignored in a first approximation. The approach is slightly more detrimental if we consider single men as some inactive ones may be encouraged to take up a job with the reforms; however, inactive single men are under-representated in most surveys and disapear almost completely after the selection process described in the Appendices. To capture the impact of in-work policies on this sub-population, specific datasets are required. Gurgand and Margolis (1998) make use of a survey on minimum income recipients in France.

[46] 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 weakness of 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).

[47] Transition frequencies are the means over 200 simulated transitions. Each transition is obtained by calibration of the stochastic part of the utility at each hour choice in order to obtain a perfect match between observed and predicted hours

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 working 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

Elasticities presented in Figures 14 and 15 are in line with recent labor supply literature (see Blundell and MaCurdy, 2000). Being moderately sized, they suggest a relatively modest potential response to tax-benefit reforms. Significant differences across country are not surprising, as we suggest in the following review of literature. Note that the figures presented here are only average values while it may be interesting to compare the distribution. By construction, elasticities of working hours implicitly account for participation effects in the present paper, which may not be the case in all the studies quoted below.

For France, the values we obtain compare well with the order of magnitude of recent findings, even if slightly higher, which may simply be due to different data selection hypotheses. Bargain (2004a), indeed, focuses on married/cohabiting females with working partners only. This way, matching aspects between partners imply a higher participation level for these women hence lower elasticities. Choné et al. (2003) study only couples with at least one child under the age of seven. Participation elasticities lie around 0.3 in both studies when the censorship effect of the minimum wage is not accounted for. Small values convey to the idea that there may not be as much scope for incentive reforms as thought in previous studies of the labor supply of women in France.[48]

for the pre-reform situation. Confidence intervals for each transition cell and summary measure are simulated by drawing 200 times from the estimated asymptotic distribution of the parameter estimates and for each of those parameter draws, applying the calibration method to build transition matrices. The same technique is applied to simulate the labor supply effects of a reform. See Bargain (2004a) for a more detailed description.

[48] In Blundell and Laisney (1988) and Bourguignon and Magnac (1990), elasticities obtained using the Hausman technique appeared 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 to account for participation effects, the wage-elasticity becomes extremely small (0.05) as it captures only the variations in hours for the the average household.

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. Our elasticities are slightly higher probably because we do not account for the joint decision in couples. Indeed, when husbands' labor supply is assumed fixed, Haan and Steiner (2004) find female elasticities of working hours very close to ours (0.39); the results also match very well for single women as they find elasticities of 0.13. As in all related studies on Germany, elasticities are found markedly smaller for East German females.

Smaller wage-elasticities for married women in Finland coincide with a higher proportion of women working full-time in this country. Yet, there are few studies related to 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, finding very moderate effects. Overall, it seems that labor supply responsiveness is extremely small in Finland. Larger elasticities for singles than for married women remain surprising however and require further investigation.

Our approach could fruitfully be compared to the strategy of Spadaro (2004) who acknowledges the lack of consensus in the literature regarding the size of elasticities and simply postulates different levels of labor supply responsiveness to analyze the impact of tax reforms on social welfare. In the present paper, we rely more traditionally on the econometric approach despite the well-known limitations (see the Appendices). This approach enables us to capture discrepancies in labor supply sensitivity across countries which turn out to be prominent in explaining the difference in results for an identical tax reform. Still, an interesting complementary exercise, left for future research, would consists in assuming identical elasticities across countries in order to capture what relates specifically to institutional factors (existing tax-benefit systems, wage/income structures etc.) in explaining cross-country discrepancies in the effects of each reform. Notice however that the bootstrapped confidence intervals provided in Figures 14 and 15 reveal that the bounds are close enough to perform some sensitivity analysis. In the case of married women for instance, upper bound of the confidence interval for Germany (resp. Finland) is fairly close to the lower bound for France (resp. Germany). At the same time, the upper level of response to the WTC reform in Germany does not reach the lower level in France, as shall be seen below.

5 Tax reform analysis

5.1 Tax reform analysis without behavioral responses

The '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 Appendices. In addition, 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'

	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 (no behavioral responses).

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).

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). Just as in the UK, the reform targets the first half of the distribution of equivalent incomes, 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. In effect, the number of recipient households is twice as large as with the WTC; the policy measure attains individuals in all income deciles as low-wage individuals can be found in richer families.

The parameters of the reform have been calibrated so that post-response costs of both reforms are as close as possible. As we shall show below, a net decrease in labor supply in France following the WTC imply a relatively larger post-response cost for this reform, and, hence, for the LWS as well; 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.

		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

Furthermore, it appears that the impact of the LWS depends on structural factors as discussed previously. As shown in Figure 13, 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 18 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 in between 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 couple. Note also that there is no difference between apparent and net costs as the LWS does not interact with the rest of the system.

A measure of the targeting of the two reforms is presented in Figure 19: the WTC reform targets the first half of the distribution of equivalent incomes, just as in the UK. Highest gains, moreover, are concentrated between the second and third income decile, given the higher percentage of inactive households in the first income decile. The LWS reform, on the other hand has a more or less normal profile: highest gains - in absolute terms - are concentrated in the middle of the distribution, also due to the possibility of double eligibility in a same household. In the first and in the second decile, on the other hand, the gains tend to be small, due to low participation or shorter working hours. Finally at the top of the income distribution, higher hourly wages phase out the LWS.

		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

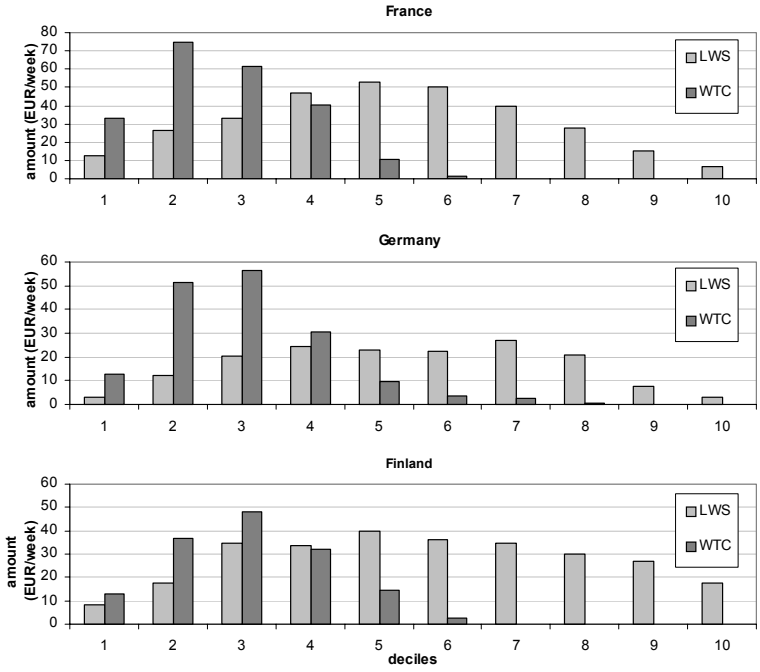

Figure 19: Average amount of transfer per decile (adult equivalent disposable income)

5.1.2 Characterization of potential effects on working hours through EMTRs

The potential impact of both reforms on working hours may 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 $dC^{new} \geq dC$ in the phase-out region. Therefore, the increase in EMTRs for WTC recipients in this region should be equal *at most* to the taper rate on gross income $\frac{dz}{dy}t$.

Results confirm this analysis. Figure 20 shows that EMTRs increase substantially for deciles 3, 4 and 5, given the relatively sharp phasing-out of the transfer; the rise is effectively 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 EMTRs starts only at the third decile (the second in Finland). This is probably related to the greater importance of (flat rate) social security contributions rather than of progressive income taxation in Germany, so that low earnings are relatively more taxed than in Finland (hence EMTR rise relatively less at the bottom).

Two reasons explain why EMTRs decrease in the two first deciles in Germany. Firstly, the 16 hours threshold for eligibility may induce negative EMTRs in the cases where the increment makes the household eligible for the WTC; this is more often the case in Germany due to a larger proportion of households below the 16 hours threshold. Secondly, the WTC crowds out social assistance for low income household in activity; this way, the implicitly taxation of additional gross earnings switches from 100% (withdrawal rates of minimum income schemes) to $\frac{dz}{dy}t$. Finally, the impact of the reform on the second half of the distribution is quite insignificant, so that EMTRs of deciles 6 to 10 hardly change.

Figure 21 complete this analysis. It shows that the proportion of EMTRs in the range $40 - 60\%$ tend to decrease while 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 rates to decrease in the UK. 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).

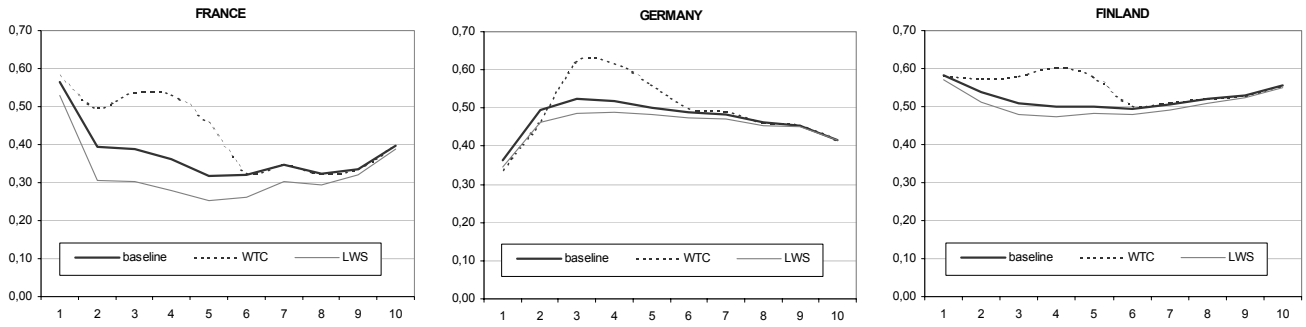

Figure 20: Distribution of EMTRs per decile of disposable income per adult equivalent

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 21: Impact of the reforms on the distribution of EMTRs

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 20, the LWS reform shifts EMTRs downwards along the whole income distribution. The strongest relative reduction occurs between the 2nd and the 4th decile. In a comparative perspective, note that the magnitude of the reduction is larger in France. This comes as no 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 for the interpretation of the results. Indeed, if incremental gross income do not correspond to additional hours of work but instead to a pay rise (due for instance to 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 here, 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 and 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 females in the selected samples (used for labor supply estimations). We simply simulate the relative increase of household disposable income (in %) when females works full or part-time as compared to remaining inactive. The wage rate is computed from the data for females in employment, while it is predicted by means traditional econometric techniques for inactive females. Figures 22 and 23 describe the financial gain to take a job for single and married women respectively.

Larger amounts of transfer through a well targeted WTC naturally lead to a larger increase in financial gains to work for single women. 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 with the WTC; 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, however, 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

% 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 22: Impact of the reforms on financial gain of 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 23: Impact of the reforms on financial gain of work (women in couple)

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 23 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 average gains of working (especially full-time) and reduces the proportion of small gains, especially in France and Germany.

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 described in the Appendices.

5.2.1 Labor supply responses

Labor supply responses to the WTC are presented in Figure 24. The intuition from the analysis of financial gains of 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 22, results turn out to be much larger in Germany and Finland than in France due to the following two reasons. Firstly, the pre-reform participation rate is comparatively much lower in Germany than in France in our selection of singles (79 versus 97%). Secondly, the participation elasticities are substantially larger, especially in Finland (see 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).

Overall, the disincentive effect for married women prevails so that the net effect on employment is negative in all three countries and proportionally 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 24 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 described previously; this shift is especially important in France (6.17% of selected single women) as it is the country where EMTRs increase the most.

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. British studies conclude that the important amount of money spent on the WFTC could only be justified on distributive grounds. It is difficult, though, to compare our results in a straightforward way with the situation in the UK since the WFTC came simply as 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 this scheme in France and Germany.

Labor supply responses to the LWS are presented in Figure 25. 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 half and two-third of what was found for the WTC reform (18,000 women versus 39,000 women with the WTC in Germany, for instance).

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

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 24: Response to the WTC reform

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 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. This result validates the choice made in 2001 by the French government to opt for an individualized policy (see section 2); however, the actual amounts distributed through the *Prime pour l'emploi* are much smaller than the individual subsidy suggested here and should have hardly any effect on employment (see Bargain, 2004b).

5.2.2 Cost of the reforms and targeting

Figure 26 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 $-\Delta T = \sum(\Delta C - \Delta y)$, that is, larger than the simple variation in disposable income when the reform implies net disincentive effects ($\Delta y < 0$). This is exactly what happens with the WTC; as negative responses are larger in France, Figure 26 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 occurs in the case of an incentive reform so that the real cost of the LWS is 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 WTC increases after responses while the average amount of LWS decreases. In both cases, the number of recipients increases, whether responses are positive (the rise in labor supply may open eligibility) or not (the withdrawal of the woman from the labor market

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 25: Response to the LWS reform

may lead the husband to become eligible); we shift from 9 to 9.5% of households eligible to the WTC in Germany and from 22.8 to 23.2% of households eligible to the LWS in France, for instance.[49]

5.2.3 Distributive impacts

We now tackle the distributive objective, namely the reduction of poverty. We assess the number of households taken out of poverty, holding the pre-reform poverty line constant and considering poverty lines defined as 40, 50 and 60% of the median of equivalent disposable income.[50]

Figure 27 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. Surprisingly, the WTC succeeds only slightly better than the wage subsidy. In Germany, the reduction is not as large and the effects of both reforms are not significantly different. In Finland,

[49] 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% (resp. 21%) of the movers due to the LWS (resp. WTC). These figures are respectively 44 and 32% in France and 15 and 12.5% in Finland.

[50] Estimated poverty rates for France are in line with results reported in Mantovani and Sutherland (2001) and derived from 1997 French fiscal data, according to which poverty rates are 2.4%, 6.9% and 12.8% with a poverty line at 40%, 50% and 60% respectively. Finland's poverty rates are however not so close to Mantovani and Sutherland (2001) who this time use figures derived from the 1999 Income Distribution Survey (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: 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 so relevant to the present analysis, given that we are more interested in the relative movements in and out of poverty under both reforms, than in the absolute level of headcount ratios.

		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 26: Cost of the reforms (behavioral responses included)

the reduction is even smaller than in Germany, except if the 60% poverty line is considered, which means that the reforms redistribute relatively more to the 'richest' among the poor households. This last aspect is true to some extent in all the countries so that poverty reduction becomes smaller as we consider lower poverty lines (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).

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 behavioral 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 individuals and the increase in single women's participation is particularly high when the WTC is introduced in the German system (see Figure 24).[51]

5.2.4 Cost efficiency

Finally, we study the cost efficiency of the reforms 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 28.

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, whether social inclusion or poverty reduction are considered.

[51] 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 27: 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 28: Cost effiency in achieving social inclusion or poverty reduction

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 ranged 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. 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.

This study is one of the very first cross-country analyses of tax-benefit reforms conducted in a truly comparative and comprehensive way. Firstly, female labor supply estimations are carried out using

datasets that are rendered homogeneous across countries. Secondly, tax analysis is performed using the integrated microsimulation of European tax-benefit systems EUROMOD. Thirdly, the microsimulation is combined to structural discrete-choice models in order to predict potential behavioral responses to the reforms. Estimations make use of a similar specification across country to compare the determinants of labor supply and predict differences in labor supply responsiveness to exogenous changes on the budget constraints. Fourthly, the individual wage subsidy is calibrated to reach the same cost basis as the tax credit, once behavioral responses are accounted for. Lastly, differences in 'framework conditions' across countries are emphasized throughout the analysis, notably the differences in income and wage rate distributions and the way tax-benefit reforms interact with national systems in force. These issues turn out to be crucial to explain the differences in the effects of each reform across countries. They are important issues to be dealt with when designing tax-benefit reforms aimed at reshaping work incentives at national level.

We find that the overall female employment decreases after the introduction of the working tax credit. The participation of married women decline in all three countries and especially in France, where labor supply is slightly more elastic. This is only partially offset by a positive effect on single women's labor supply in Germany and Finland. With the individual transfer, married women are clearly encouraged to take up a job, especially in France. The total positive effect on female labor supply 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 be recommended only 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 low-wage jobs.

For Germany and France, final comments on the design of in-work transfers and on the treatment of the family dimension depend necessarily on policy objectives. We have defined the *social inclusion* objective as the number of female workers encouraged to enter 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 individuals. Interestingly enough, a substantial number of poor single women are induced to work by the working tax credit in Germany. As a result, this reform cannot be rejected if indeed social inclusion now means encouraging employment of the poorest, even at the price of creating disincentives for second-earners in couples. Such definition of social inclusion also implies positive externalities not accounted for here, as described by Phelps (2000).[52] Moreover, these results justify the need for measures better targeted to sub-groups of the population.

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. To echo the previous argument relative to the social inclusion of the poorest households, note that increased participation of poor single women induced by the tax credit contributes substantially to poverty reduction in Germany; once accounting for this effect, the gap between the performances of the two reforms increases. Naturally, the poverty criterion is only one among several distributional aspects;

[52] Phelps argues that there are potentially important social and economic externalities associated with entering the labor market (he insists on the fact to hold a full-time job): "Bringing marginalized groups, including those who work in the underground economy, into mainstream economic activities may generate beneficial outcomes for society as a whole, for example through the amelioration of problems like crime, social destitution, drug etc."

it must not be forgotten that the working tax credit achieves an important transfer to the first-half of the income distribution, with the exception of the very first decile, in all three countries.[53]

Ultimately, the ranking of policy objectives depends on social preferences, 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 focused on policy criteria often retained by decision-makers and which ground the debates on the reform of European welfare systems.

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[53] If social objectives consisted merely in fighting poverty, an increase in social assistance would unambiguously perform better by targeting the poorest. The moderate size of participation elasticities found in this paper as well as in related studies conveys to the idea that subsequent disincentive effects may not be that large, which weakens the 'inactivity trap' thesis. Then, it remains to find "how Rawlsian" the social planner has to be in order to prefer *welfare* to *workfare* policies. This 'old debate' is examined by Immervoll et al. (2003) but is out of scope here as we focus merely on the design of in-work transfers.

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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 socioeconomic information for $25,010$ individuals living in $9,345$ households. German data come from the German Socioeconomic 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 collected by INSEE; monetary variables have been grossed up to 1998, assuming demography constant. No structural change has occurred 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 weighted 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.

	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 29: Descriptive statistics for couples

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 altogether. 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.[54]

Employees not reporting important pieces of information (e.g. worked hours) are excluded from each sample. To further increase data homogeneity, extreme households are selected out, 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 29 and 30 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.[55]

The distribution of working hours for the selected samples is represented in Figures 31 and 32. A usual feature in continental Europe, mostly driven by demand-side and institutional constraint, is that the pattern of hours appears fairly rigid as it presents concentration around a limited number of hours

[54] 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.

[55] 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.

	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 30: Descriptive statistics for single women

choices in all three countries. In that case, the discrete approach retained here seems particularly well suited (see Van Soest, 1995).[56]

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 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:

$$V_{ij} = U(H_j, C_{ij}, Z_i) + \epsilon_{ij}, \tag{1}$$

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. Women are assumed to choose between nonparticipating $(H_1 = 0)$, part-time $(H_2 = 20$ hours/week) and full-time $(H_3 = 39$ hours per week).

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.[57] Under this distributional assumption, McFadden (1973) proves

[56] The distribution of male hours - available upon request - is much more concentrated, quasi-exclusively around full time.

[57] 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.

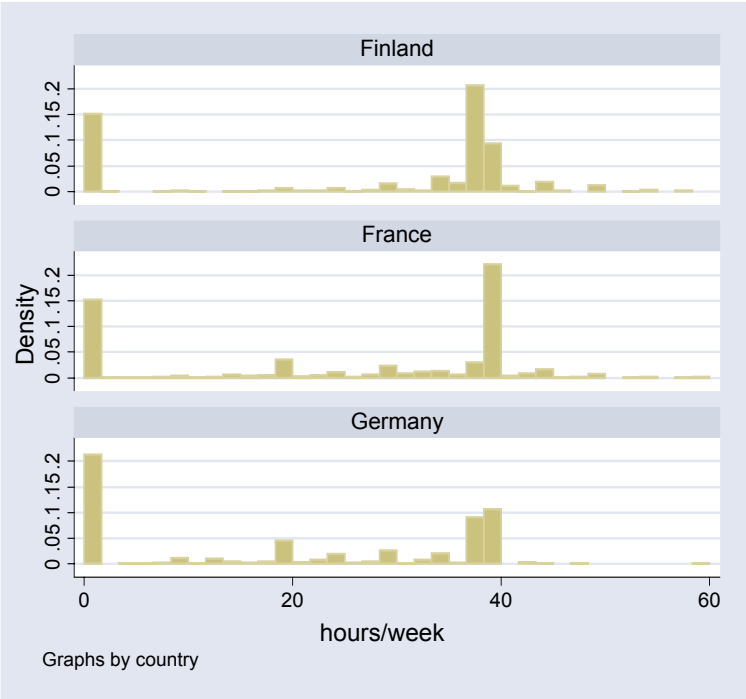

Figure 31: Distribution of working time (females in couples)

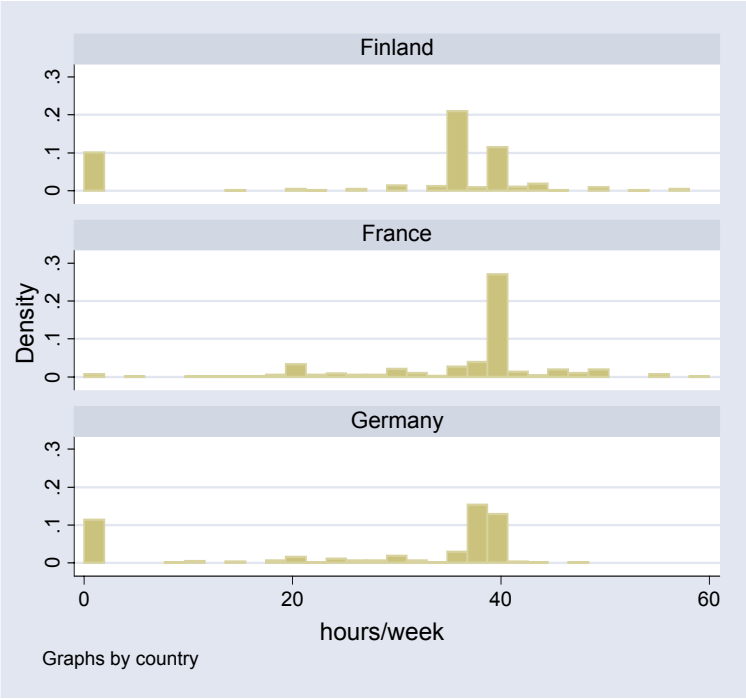

Figure 32: Distribution of working time (single women)

that the probability that alternative k is chosen by household i is given by:

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

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 requirements for 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 incomes. 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 to the model and a descriptive analysis of European systems 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	28.2235	16.9983 *	-32.8948	7.6808 ***	*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	-4.0039	1.8388 **	*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 33: Estimation results for women in couple

Results of estimations

As we use the same labor supply methodology and homogenous datasets 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 33 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, and especially very young children. 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 in France, 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 34 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. The marginal utility of work decreases with the presence of children between 0 and 2 in all three countries; the coefficients for older children are not always significant however, except in Germany where the disutility of work decreases with the age of the children (which may also reflect decreasing childcare costs as the children get older and go to school). Again, women prefer to work significantly more when living in East Germany and less when they grow older (in France and Germany).

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 34: 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.[58] Dynamic aspects or demand-side rationing can also be captured in the estimates and interfere with the purely static and labor supply interpretations.

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 indeed lead to fairly less precise predictions of labor supply elasticities or responses to the reforms. 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 whose coefficient were highly insignificantly different from zero.

The pseudo-R2 or Likelihood Ratio Index of McFadden (1974) 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 the specification search as it summarizes the fit of a given specification in a single value; however, the absolute value is itself not very informative (see Green, 2000) and it cannot be used to rank the quality of estimations across countries.

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

[58] The usual practice consists in adding state-specific dummies (or only part-time dummies, as in Van Soest, 1995) which could represent the variable costs of work (e.g. childcare costs) or the specific disutilities from job search (e.g. when part-time jobs are relatively scarse, in the Dutch case studied by Van Soest, 1995). 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 35: 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 36: Goodness-of-fit for estimations on single women

singles respectively, figures 35 and 36 show that the probabilities predicted for all countries 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).

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 type I-extreme value 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 calibration step. The procedure is repeated 100 times to obtain transitions frequencies for each household. Transition tables result from averaging 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

It is worth noting that the assumption that male labor supply is fixed can bias the estimations for women in couple. Indeed, beyond usual effects in second-earner models, female labor supply may be linked to some extent to the labor supply of husbands by some matching of unobservable characteristics

between spouses. For instance, women with inactive husbands tend to work less than women with working partners, *ceteris paribus* (i.e for the same level of cumulated male and non-labor incomes). This heterogeneity cannot be identified with the few household characteristics available. In particular, it is difficult to know if the matching between spouses is related to preferences, to the productivity of both. This bias is partly reduced here by the fact that the husband's wage rate (or 0 if inactive) is introduced in the estimation used to predict wage rates for female non-workers. A better correction of this bias would require to predict wage rates for all women and not only for inactive ones.

Other 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 study and 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 is unfortunately not provided by the datasets at hand.[59] Secondly, we implicitly assumed that before-tax hourly wage rates do not vary with work hours.[60] 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.[61] In addition, it is assumed that employers will not offset the net gain of the benefit by lowering hourly wages.[62] Fourthly, the model is static and does not account for life cycle aspects which could justify that some households take a job even when financial gains are null.

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 be determinant to the effectiveness of the policies. The administrative arrangement for the payment of the transfers may be important and in particular the frequency of payment.[63] The form chosen for the MWP policies also has a non negligible role. Three forms of employment-conditional transfers are usually used by governments: wage subsidies, in-work benefits or refundable/non-wastable tax credits. In our simulations, the form given to each policy - purely illustrative - 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 chosen a refundable tax credit instead of an in-work benefit.[64] This is also motivated by the fact that in-work benefits conditional on

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

[60] 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.

[61] 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.

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

[63] See comments from Duncan (2000) an Dilnot and McCrae (1999).

[64] 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

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.

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.