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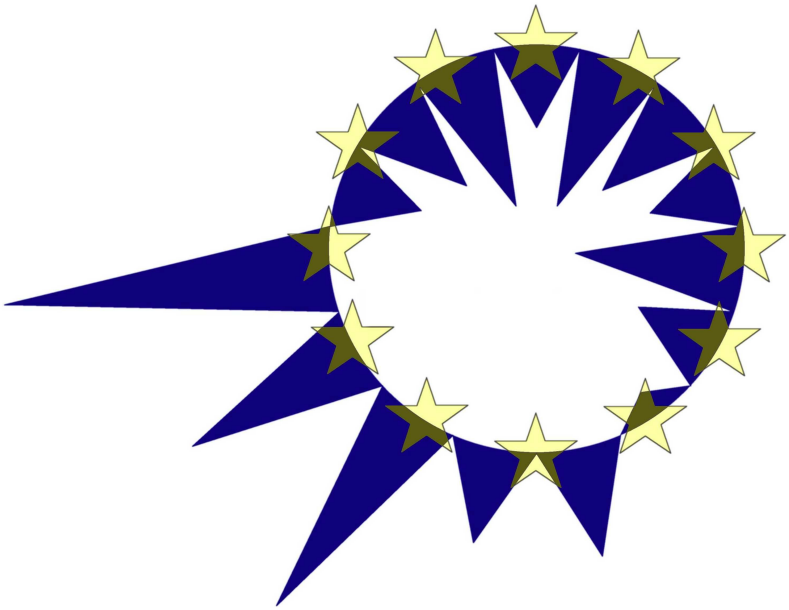

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WELFARE REFORM IN EUROPEAN COUNTRIES: A MICRO-SIMULATION ANALYSIS

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Welfare Reform in European Countries: A Micro-Simulation Analysis*

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Abstract

This paper estimates the welfare and distributional impact of two types of welfare reform in 14 member countries of the European Union. The reforms are revenue neutral and financed by an overall and uniform increase in marginal tax rates on earnings. The first reform distributes the additional tax revenue uniformly to everybody (traditional welfare) while the second reform distributes tax proceeds uniformly to workers only (in-work benefit). We build a simple model of labor supply encompassing responses to taxes and transfers along both the intensive and extensive margin. We then use EUROMOD to describe current welfare and tax systems in all European Union countries (except Sweden) and use calibrated labor supply elasticities along the intensive and extensive margins to analyze the effects of the two welfare reforms. We quantify the equity-efficiency trade-off for a range of elasticity parameters. In most countries, because of the large existing welfare programs with high phase-out rates, the uniform redistribution policy is, in general, undesirable unless the redistributive tastes of the government are extreme. The in-work benefit reform, on the other hand, is desirable in a very wide set of cases. We discuss the practical policy implications for European welfare policy.

1 Introduction

Transfers and redistribution towards low income individuals have grown significantly in Western Europe since World War II. Today, as shown in Table 1, most European countries devote a sizeable amount of public spending to provide low-income support through various programs such as unemployment insurance for those temporarily out the labor force, disability insurance for the disabled, housing and families subsidies for those with modest incomes or children, and various other income maintenance and welfare programs for those with no or very small incomes. Table 1 displays the fraction of government transfers in disposable incomes at each decile for 14 European countries for those aged 18 to 59.[1] In all countries, such transfers represent a very large fraction of disposable income for the bottom deciles.

The proper amount of redistribution and the design of transfer programs is an important and controversial issue in the political sphere. As is well known among economists, redistribution raises the classical equity-efficiency trade-off. Redistribution from middle and high incomes towards lower incomes is desirable for equity reasons, because society puts a higher value on the marginal consumption of those with low incomes than on the marginal consumption of the well-off. However, redistributive programs tend to reduce incentives to work, thereby creating efficiency costs: to redistribute one additional Euro from high-income earners to low-income earners, the government needs to impose a welfare cost larger than one Euro on those with high incomes. Smaller labor supply responses or greater social taste for redistribution imply that larger transfer programs and higher taxes are desirable.

Following the seminal contribution of Mirrlees (1971) on optimal income taxation, most studies on labor supply and redistribution issues have focused on the classic two-good static labor supply model where individuals supply labor so that their indifference curve between leisure and consumption is tangent to the budget constraint. Most studies on the welfare cost of taxation have adopted this labor supply model, e.g. Browning and Johnson (1984), Ballard (1988), and Dahlby (1998). Within this framework, optimal income tax theory shows that redistribution should take the form of a Negative Income Tax, where a lump-sum transfer given to everybody is quickly phased out as earnings increase. In this type of welfare program,

[1] These computations were made using the EUROMOD micro-simulation model described in Section 3 and include all types of transfers. The numbers reported are the sum total of per-capita social benefits as a percentage of the sum total of per-capita disposable income. Disposable income is current cash market income plus cash social benefits minus taxes and social insurance contributions.

transfers to those out of work are financed by positive tax burdens on middle- and high-income earners. There is a simple trade-off in the design of the program: the size of the transfer program and the level of taxes on middle and high incomes depends positively on the strength of redistributive tastes embodied in the social welfare function and negatively on the size of labor supply responses captured by the elasticity of labor supply with respect to the net-of-tax wage rate. In this context, the political debate on redistribution is a classical left-right debate, with the left arguing that redistribution is desirable while the right argues that labor supply responses are large. We will refer to this debate as the old debate.

However, in this standard model, labor supply depends on the local slope of the budget constraint and responds only along the intensive margin: hours of work change a little bit when the marginal tax rate is changed a little bit. This stands in contrast to the political view blaming welfare programs for keeping individuals or families completely out of the labor force (see e.g. Murray, 1984). Indeed, a central finding in the empirical labor market literature is that the extensive margin of labor supply (whether or not to work at all) is more important than the intensive margin (hours-of-work for those who are working). In particular, extensive labor supply responses tend to be strong at the bottom of the income distribution (Eissa and Liebman, 1996; Meyer and Rosenbaum, 2001). Joblessness has long been seen as an important issue in Europe, where many have blamed high unemployment rates on labor taxes and out-of-work transfers (see, e.g., Daveri and Tabellini, 2000). The discouraging effects of traditional welfare programs on participation have lead politicians to advocate programs that preserve work incentives. Such programs have been developed on a large scale during the 1990s in the United States through the Earned Income Tax Credit (EITC) and in the United Kingdom through the Working Families Tax Credit (WFTC). These programs give no support for those with zero earnings, but provide earnings subsidies for those with low earnings up to a maximum level above which the program is gradually phased out.

The recent theoretical analysis of Saez (2002) shows that the incorporation of extensive labor supply responses in the standard Mirrlees model changes the shape of the optimal tax schedule such that subsidizing the working poor (using negative marginal tax rates at the bottom) becomes desirable. Therefore, the new debate on welfare reform focuses to a lesser extent on the size of welfare programs and to a larger extent on the shape of the transfer programs and the incentives they create in the decision to enter or exit the labor force. The

new debate asks whether it is desirable to increase the incentives to work at the bottom by redistributing from the middle and high income earners to the working poor (instead of to those with no earnings as in the old debate).

This paper proposes to cast light on the welfare reform debates, both the old debate on traditional welfare programs and the new debate on redistribution towards the working poor. We construct a simple and fully explicit model of labor supply encompassing responses along both the intensive and extensive margins and we then apply the model to the analysis of welfare reform for 14 European Union countries using the EUROMOD micro simulation model that has recently become available.

The EUROMOD model is a tax and benefits calculator based on homogeneous micro-data on income, earnings, labor force participation, as well as many demographic variables, gathered for 14 of the 15 member countries of the European Union (Sweden is the only EU country not yet included in the EUROMOD). For any set of household characteristics and country, EUROMOD is able to calculate the amount of benefits the household is entitled to and the taxes it should pay. EUROMOD has been constructed to incorporate all the relevant tax and transfer programs in place in all 14 countries for the year 1998, and is therefore a unique tool to get a complete picture of the incentives to work generated by those programs as well as the analysis of welfare reform. An introduction to EUROMOD and a descriptive analysis of taxes and transfers in the EU countries has been provided by Sutherland (2001), Immerwoll (2002), and Immervoll and O'Donoghue (2002).

Using the EUROMOD model, we will first provide a brief description of the incentives to work generated by taxes and transfers along the extensive and intensive margins at each decile of the earnings distribution for all 14 European countries in the analysis. Second and most important, we will evaluate the equity-efficiency tradeoff for two simple reforms corresponding to the old and new debates on welfare reform described above. We calibrate the elasticities of labor supply along the intensive and extensive margins using estimates from the empirical literature, and a careful sensitivity analysis will be provided. Like Browning and Johnson (1984) and others, we measure the equity-efficiency trade-off by the ratio of the dollar value of the welfare loss for those who lose from the reform to the dollar value of the welfare gain for those who gain. In other words, we calculate the amount of dollars it would cost the rich to transfer an additional dollar to the poor (or the working poor).

The first reform we analyze corresponds to the old debate. This reform provides a uniform lump-sum grant to everybody financed by a uniform increase in the marginal tax rate on earnings for all groups in the population. This reform amounts to the standard NIT-type program: it provides more support for those with little or no earnings, but at the same time it weakens the incentives to supply labor along both the intensive and extensive margins. The second reform corresponds to the new debate. It consists in introducing an EITC-type program, where the net transfer to those out of work is kept unchanged. A lump-sum grant provided to all those who are working will be financed by a uniform increase in the marginal tax rate on earnings. This reform will induce those who are out of work to enter the labor force (as the rewards for working increase at the bottom of the income distribution), but will reduce incentives to work along the intensive margin.

For most European countries, expanding the generosity of traditional welfare programs creates large efficiency costs: redistributing one additional Euro to low incomes by increasing welfare benefits requires a reduction in the welfare of higher incomes by 2 to 3 Euros on average (depending on the particular country and the assumed labor supply elasticities). This is due to the fact that most European countries already impose quite large tax rates on the participation margin at the bottom of the earnings distribution. By contrast, improving the incentives to work at the bottom is very cost effective as it will improve incentives to work along the extensive margin. As a result, the welfare cost of redistributing an additional Euro to the working poor might be very low (perhaps around 1 Euro, implying no additional deadweight burden).

Our results stand in significant contrast to previous studies on applied tax/welfare reform in Europe such as Bourguignon and Spadaro (2002a,b) or in the United States such as Browning (1995) because we incorporate the extensive margin of labor supply response in the analysis. The study of Browning (1995), for example, finds that the large EITC program in the United States is an inefficient way to redistribute income in a classic labor supply model incorporating only intensive margin responses. Interestingly, the recent study by Liebman (2002) incorporates fixed costs of work in the Browning model (which amounts to introducing an extensive margin of labor supply response), and finds that the EITC is a quite efficient redistributive program in that context. Our results are fully consistent with Liebman's findings. In contrast to Liebman, we introduce directly and explicitly extensive elasticities which makes

our model more transparent and easier to calibrate using the empirical labor supply elasticity studies. This paper should perhaps be considered as a first step in the systematic analysis of tax and benefit reforms in the European Union. We provide a framework which can easily be extended to consider more complex reform proposals as well as updated to incorporate future findings from the empirical labor supply research.

The paper is organized as follows. Section 2 lays out the model of labor supply responses and the theoretical analysis of tax reforms. Section 3 describes the EUROMOD model, the tax/transfer systems in the 14 European countries we analyze, and applies the theoretical framework to the practical analysis of welfare reform in each country. Finally, Section 4 offers some concluding comments, and discusses avenues for future research.

2 Theoretical Analysis

2.1 Labor Supply Responses

In this section, we propose a simple model to capture labor supply responses at both the intensive and the extensive margins. In order to capture extensive labor supply responses in a realistic way, it is necessary to introduce non-convexities in either the budget set or the preferences. In the standard convex model of individual behavior, marginal changes in prices and endowments give rise to marginal changes in behavior. However, empirical labor market studies have demonstrated that participation responses are poorly captured within such a framework (e.g., Blundell and MaCurdy, 1999). Indeed, the empirical evidence indicates that people choose either to stay out of the labor market or to work at least some minimum number of hours. Hence, we do not observe infinitesimal working hours for those who enter the labor market following a marginal increase in the net gain of work, but rather that they enter the labor force at, say, twenty or forty hours.

In a well-known paper, Cogan (1981) explained these discrete changes in labor supply behavior by the presence of fixed costs of working and showed empirically that such costs are important for the labor supply behavior of married women. In Cogan's analysis, the fixed costs of working may be monetary costs (say child care expenses), or they may take the form of a loss of time (e.g., commuting time). Below we adopt a simplified framework where these two types of fixed costs may be captured in a single parameter q. Within our framework, q

may also be interpreted as a distaste for participation/non-participation, or it may reflect the presence of stigma associated with being out of work. The size of q will be allowed to vary across individuals.

In addition to heterogeneous fixed costs of working, the model also incorporates heterogeneity in abilities and preferences. In particular, we assume that the population may be divided into J distinct groups with N_j individuals in group j. Across groups, individuals differ with respect to productivity and preferences. Within each group, individuals are characterized by identical productivities and preferences, but they differ with respect to their fixed cost of working. By assuming a continuum of fixed costs, the model will generate a smooth participation response at the aggregate level of the group, such that we may capture the sensitivity of entry-exit behavior by setting elasticity parameters for each group.

An individual in group j has an exogenous productivity w_j and earns before-tax income $y_j = w_j l$ when supplying labor l. The individual faces a non-linear income tax schedule $T(y_j, z)$, where z is an abstract shift parameter which will be used when analyzing tax reforms. The tax function constitutes a net payment to the public sector, embodying both taxes and transfers, and therefore $-T(0, z)$ defines the welfare benefit for those not working.

The assumption of identical within-group productivities and preferences implies that any individual who enters the labor market will do so at the same hours of work and earnings as all the other workers in his own group. While the participation decision is heterogeneous within the group (from heterogeneous fixed costs), the hours of work and income conditional on participation are not. Therefore without loss of generality, we may restrict ourselves to piece-wise linear tax schedules, letting each group face a given marginal tax rate and virtual income. Thus, we assume that any individual in group j faces the marginal tax rate τ_j and has virtual income I_j. The same type of discrete formulation has been used by Dahlby (1998) to study the marginal cost of public funds in the standard convex labor supply model. Moreover, in the context of optimal tax analysis, Saez (2001) has shown that the optimal tax formulas depend essentially on average labor supply elasticities at each income level, implying that there is little loss in assuming a discrete set of ability groups, with uniform hours of work and earnings within each group.

In our static model, income net of taxes and transfers $y - T(y, z)$ is equal to consumption and is denoted by c. The utility function for an individual in group j with fixed costs of

working q, takes the following simple form:

$$u_j(c, l, q) = c - v_j(l) - q \cdot 1(l > 0), \tag{1}$$

where $v_j(.)$ is a convex and increasing function normalized so that $v_j(0) = 0$, and $1(.)$ denotes the indicator function. In other words, the fixed cost of working q is incurred whenever the individual decides to start working ($l > 0$). The above utility specification rules out income effects on labor supply which is broadly consistent with empirical studies (e.g., Pencavel, 1986) and simplifies considerably the theoretical analysis (Diamond, 1998, and Saez, 2001). Moreover, even if one was to adopt the view that income effects on labor supply are empirically large, leaving them out of the analysis is unlikely to be a severe problem in our context because we will consider only balanced budget reforms. In a balanced budget context, income effects are quantitatively important for efficiency effects only insofar as they are large *and* substantially heterogeneous across different income groups.

The individual chooses l to maximize:

$$u_j(w_j l - T(w_j l, z), l, q) = w_j l - T(w_j l, z) - v_j(l) - q \cdot 1(l > 0). \tag{2}$$

In the case of participation, i.e. $l > 0$, the optimum labor supply choice for an individual in group j is characterized by

$$W_j = (1 - \tau_j) w_j = v_j'(l_j), \tag{3}$$

where l_j denotes hours of work for a participating worker in group j, τ_j is the marginal tax rate for group j, and W_j denotes the net-of-tax wage rate. The optimal hours of work depend only on the marginal net-of-tax wage rate W_j, not on virtual income. As discussed above, this implies that the intensive labor supply margin displays no income effects and therefore the compensated and uncompensated elasticities of labor supply are identical and fully characterize the intensive labor supply responses. Let us denote by ε_j the intensive labor supply elasticity for an individual in group j. By definition, we have

$$\varepsilon_j = \frac{W_j}{l_j} \frac{\partial l_j}{\partial W_j}. \tag{4}$$

For the individual to enter the labor market in the first place, the utility from participation must be greater than or equal to the utility from non-participation. This participation

constraint gives rise to an upper-bound on the fixed cost of working, denoted by q_j for individuals in group j. If we denote by $c_j = w_j l_j - T(w_j l_j, z)$ consumption when working and by $c_0 = -T(0, z)$ consumption when not working, the upper-bound on the fixed cost may be written as

$$q_j = c_j - c_0 - v_j(l_j). \tag{5}$$

Thus, individuals with a fixed cost below the threshold-value q_j decide to work l_j hours, while those with a fixed cost above the threshold q_j choose to stay outside the labor force ($l = 0$).

Letting the fixed cost q be distributed according to the distribution function $F_j(q)$ with density $f_j(q)$, the fraction of individuals in group j who choose to participate in the labor market is given by $\int_0^{q_j} f_j(q)\,dq = F_j(q_j)$. At the aggregate level of group j, participation depends on q_j which reflects the difference in utility between working (supplying l_j hours) and not working (collecting benefits c_0) . Like the intensive margin, the extensive labor supply margin does not display income effects because increasing by the same amount taxes (or transfers) on those working and on those unemployed does not change the decision to start working.

Like Saez (2002), we define the extensive elasticity η_j for group j as the percentage change in the number of workers in group j following a one-percent change in the difference in consumption between working and not working, $c_j - c_0$. Formally, we have

$$\eta_j = \frac{c_j - c_0}{F_j} \frac{\partial F_j}{\partial (c_j - c_0)} = \frac{(c_j - c_0) f_j(q_j)}{F_j(q_j)}. \tag{6}$$

We denote by $a_j = [T(w_j l_j) - T(0)]/(w_j l_j)$ the tax rate on labor force participation. This tax rate represents the fraction of earnings $w_j l_j$ that the individual in group j gets to keep when he decides to enter the labor force and work l_j hours. From now on, we call a_j the *participation tax rate* (as opposed to the marginal tax rate τ_j).

The aggregate labor supply of group j is thus equal to

$$L_j = N_j F_j(q_j) l_j. \tag{7}$$

Hence, the total elasticity of labor supply with changes in the tax schedule can be decomposed into the intensive elasticity (affecting the amount of work l_j for those working) and the extensive elasticity (affecting the number of individuals $F_j(q_j)$ who decide to work).

2.2 The Equity-Efficiency Trade-Off

The goal of this subsection is to study the effects of an arbitrary small tax reform on utilities and tax revenue, and to derive a measure for the marginal trade-off between equity and efficiency. The effects will be expressed in terms of behavioral elasticities as well as various parameters of the current tax/transfer system. We then study in more detail two specific types of tax reform, namely a redistribution through an increase in the demogrant and a redistribution towards the working poor. Finally, we apply this theoretical analysis to 14 European countries using EUROMOD simulations in Section 3.

Redistributive policies providing income support for the poor or the working poor come at the cost of reduced incomes and welfare among the high-income earners. In this paper, we will always consider welfare and tax reforms that are revenue neutral for the government budget. We will also consider infinitesimal reforms around the current tax and transfer system in order to keep the analysis as simple as possible. Let us consider a general small and revenue neutral tax reform dz. This reform creates losers and gainers. Given our utility specification with no income effects, the marginal utility of money is one for all individuals and welfare gains and losses can be simply aggregated across individuals. We denote by $dG \geq 0$ the aggregate welfare gains of those who gain from the reform and by $dL \leq 0$ the aggregate welfare change of those who loose from the reform. Note that in the case of a Pareto improving reform there are no losers and $dL = 0$.[2]

Due to behavioral responses to taxes and transfers, the decline in welfare for the rich may potentially be much higher than the welfare gain for the poor (i.e., $dG + dL < 0$), reflecting the distortionary effects of redistributive tax policy. A critical question then becomes how to evaluate the desirability of reforms involving such interpersonal utility trade-offs. The standard approach has been to specify a social welfare function involving certain welfare weights across individuals, say a utilitarian welfare function (with equal weights) or a more egalitarian welfare function (with decreasing weights across the income distribution). Any given redistributive policy is then beneficial if it raises the value of the specified social welfare function. However, the interpersonal comparisons implied by the adopted welfare function are clearly subjective, and this limits the applicability of such an analysis as an input into the policy making process.

[2]In contrast, if the reform is Pareto worsening, there are no gainers and $dG = 0$.

Ideally, we want a measure which does not rely on a priori assumptions about interpersonal utility trade-offs. In a world of only two types of individuals, such an ideal measure would be the welfare loss of those who lose relative to the welfare gain of those who gain. This measure would represent a critical value against which the policy maker may compare his/her subjective welfare weights to evaluate whether the reform is worthwhile or not. However, the two-type model does not adequately capture the observed heterogeneity. In our application there will be many groups of losers and gainers, which complicates matters. Faced with this problem, we might simply report the welfare effect for each group of individuals, not attempting to aggregate the group-wise effects into a single aggregate welfare measure. Although it is easy to consider in our model these disaggregated effects, the paper will focus mostly on a simple aggregate measure against which to evaluate the reform. It is important to note, however, that while our reforms are based on individual earnings, welfare is best measured by family income (for example, a non-working wife with a high income husband is better off than a single unemployed woman). Therefore, we will examine in some detail the distribution of gainers and losers when individuals are ranked by family income as opposed to individual income.

Following Browning and Johnson (1984), we divide the population into those who gain from the reform and those who lose from the reform. This partitioning of people will be endogenous both to the reform and to the behavioral responses created by the reform. Within each of the two groups we assume a utilitarian welfare function. We then define the interpersonal utility trade-off Ψ in the following way

$$\Psi = -\frac{dL}{dG}. \tag{8}$$

If the reform in question constitutes an increase in redistribution, Ψ gives the welfare cost to the rich from the transfer of one additional dollar of welfare to the poor (or the working poor). Conversely, if we are thinking about rolling back welfare programs, Ψ is the cost to the poor per dollar transferred to the rich. This interpersonal trade-off may be interpreted as a critical value for the relative social welfare weight between the two groups, i.e., the relative weight on those who gain such that the reform breaks even in terms of social welfare. The trade-off measure used here was originally proposed by Browning and Johnson (1984), and subsequently used by Ballard (1988) and Triest (1994).

The magnitude of Ψ reflects the degree to which there exists a trade-off between equity

and efficiency. In the case with no behavioral responses to taxes and transfers, redistributive taxation does not imply lower efficiency, and there is no change in aggregate utilitarian welfare from the reform. Thus, the welfare gain of those who gain (the denominator) exactly equals the welfare loss of those who lose (the numerator), implying that Ψ is equal to one. Alternatively, a Ψ-value larger than one implies a trade-off between equity and efficiency (those who lose from the reform loose more than the gainers gain), whereas if Ψ is less than one there is no conflict between the two.

To derive Ψ for a general tax reform, we start by examining the impact on individual utilities from a marginal change in the reform parameter z. From eqs (2) and (3), we obtain

$$\frac{du_j(q)}{dz} = \begin{cases} -\partial T_j/\partial z & q \leq q_j \\ -\partial T_0/\partial z & q > q_j \end{cases}, \tag{9}$$

where we have introduced $T_j \equiv T(w_j l_j, z)$ and $T_0 \equiv T(0, z)$ to simplify notation. The effect on individual utility is given simply by the direct change in the tax liability since, by the envelope theorem, tax-induced changes in hours of work does not affect utility as labor supply is initially at its optimal level. The marginal utility of income is equal to one for every individual, due to the quasi-linear specification, and therefore the above utility change is measured in monetary units.[3] While eq. (9) is relevant for all those individuals who are either employed or unemployed before *and* after the reform, the welfare effect for those who choose to enter or exit the labor market following the reform is given by the difference in utilities between the two states. Since we are considering small reforms, and because the marginal worker is indifferent between participation and non-participation from equation (5), the welfare effect for these individuals is not larger than for the rest of the population. Accordingly, as the group of movers is infinitesimally small for the reforms we consider, we do not have to include these individuals in our Ψ-measure. This point shows that who decides to enter the labor force following the small tax reform is actually irrelevant for the welfare analysis. What matters is who gains and who looses absent any behavioral response. Behavioral responses matter only for their aggregate effect on tax revenue. We will come back to this important point later on.

Since the reform experiments which we consider do not take money away from those who are unemployed, i.e. $\partial T_0/\partial z \leq 0$, we may include these individuals among the gainers in the

[3]The result that the welfare effect in monetary units equals the change of tax liability does not hinge on the quasi-linear specification. This is a general result for marginal reforms following from the envelope theorem.

denominator of the Ψ-measure. Moreover, by defining G as the set of ability groups for which employed people gain from the reform, we may use eq. (9) to write Ψ in the following way

$$\Psi = -\frac{\sum_{j \notin G} \frac{\partial T_j}{\partial z} E_j}{\sum_{j \in G} \frac{\partial T_j}{\partial z} E_j + \frac{\partial T_0}{\partial z} (N - E)}, \tag{10}$$

where $E_j \equiv F_j(q_j) N_j$ denotes the number of employed people in group j, $E = \sum_j E_j$ is the aggregate employment, and $N = \sum_j N_j$ is the total population.

Since we are considering redistributive policies, the tax reform is revenue neutral. It is central to note that this does not imply that the partial tax changes in the above expression sum to zero. Aggregating partial tax changes capture only the *mechanical* effect on government revenue, i.e., the effect in the absence of behavioral responses. Aggregate government revenue is given by

$$R = \sum_{j=1}^{J} \left[T(w_j l_j, z) F_j(q_j) N_j + T(0, z) (1 - F_j(q_j)) N_j \right], \tag{11}$$

where the first component reflects tax revenue from employed people, while the second component is the (negative) revenue from those who are out of work. A small change in the reform parameter z affects revenue in the following way

$$\frac{dR}{dz} = \sum_{j=1}^{J} \left[\frac{\partial T_j}{\partial z} F_j N_j + \frac{\partial T_0}{\partial z} (1 - F_j) N_j + \tau_j w_j \frac{dl_j}{dz} F_j N_j + (T_j - T_0) \frac{dF_j}{dz} N_j \right]. \tag{12}$$

The revenue effect may be decomposed into mechanical changes (terms one and two) and behavioral changes along both margins of labor supply (terms three and four). Along the intensive margin, the reform induces employed people to adjust their hours of work in response to a changed marginal net-of-tax wage W_j. At the same time, some individuals will be induced to enter or exit the labor market as the reform affects the net-of-tax income gain from entry $c_j - c_0$.

Using eqs (3)-(6), the above expression may be rewritten to

$$\begin{aligned} \frac{dR}{dz} \quad = \quad & \sum_{j=1}^{J} \left[\frac{\partial T_j}{\partial z} E_j + \frac{\partial T_0}{\partial z} (N_j - E_j) \right. \\ & \left. - \frac{\tau_j}{1 - \tau_j} \frac{\partial \tau_j}{\partial z} \varepsilon_j w_j l_j E_j - \frac{a_j}{1 - a_j} \frac{\partial (T_j - T_0)}{\partial z} \eta_j E_j \right]. \end{aligned} \tag{13}$$

For any given reform satisfying $dR/dz = 0$, we may calculate the equity-efficiency trade-off Ψ from equation (10). The first two terms in equation (13) are the mechanical effect (which

we denote by dM) of the tax reform. As we discussed above, because of the envelope theorem, those mechanical effects are exactly equal to minus the aggregate welfare effect dW on the population. Let us denote by dB the third and fourth terms in equation (13); dB is the effect on tax revenue due to behavioral responses to the tax reform. Hence, equation (13) and revenue neutrality imply that $dW = dG + dL = dB$: the aggregate change in welfare (adding the gains of gainers and the losses of losers) following the reform is exactly equal to the change in tax revenue due to the behavioral responses to the reform. Thus $-dB$ can be seen as the extra deadweight burden generated by the reform. Our equity-efficiency measure $\Psi = -dL/dG$ is larger than one if and only if $dB < 0$, i.e., the tax reform generates deadweight burden. For a given level of deadweight burden $-dB$, the larger the absolute value of gains and losses, the larger the amount of redistribution the reform achieves, and hence the smaller is Ψ.

In the following, we will concentrate on two simple tax reforms for which closed form expressions for Ψ may be obtained. These two types of policies are chosen so as to illuminate some of the most important trade-offs which policy makers are facing in connection with welfare reform.

2.3 Redistribution Through a Demogrant Policy

In this section, we analyze a welfare reform which redistributes income from high-wage earners in the labor market to individuals earning low wages and to those who are not employed. In particular, the reform under consideration takes the form of a demogrant policy which raises the tax rate on all units of labor income by τ and returns the collected revenue as a lump sum TR to all individuals in the economy. This redistributive reform corresponds to an expansion of the traditional welfare programs financed by a general increase in tax rates.

The tax/transfer schedule is changed in the following manner:

$$\frac{\partial \tau_j}{\partial z} = \tau, \quad \frac{\partial T_j}{\partial z} = \tau w_j l_j - TR, \quad \frac{\partial T_0}{\partial z} = -TR, \tag{14}$$

Inserting these expressions in eq. (13) and setting dR/dz equal to zero, we obtain

$$TR \cdot N = [1 - D_d] \cdot \tau \sum_{j=1}^{J} w_j l_j E_j, \quad D_d \equiv \sum_{j=1}^{J} \left(\frac{\tau_j}{1-\tau_j} \varepsilon_j + \frac{a_j}{1-a_j} \eta_j \right) s_j \geq 0, \tag{15}$$

where $s_j \equiv w_j l_j E_j / \left(\sum_{j=1}^{J} w_j l_j E_j \right)$ is group j's share of aggregate labor income. This expression shows that the aggregate lump sum transfer $TR \cdot N$ is equal to the direct increase in tax revenue from the imposition of τ multiplied by a factor $1 - D_d$ reflecting the behavioral responses to the reform. Thus, a fraction D_d of the mechanical tax revenue collections vanishes due to the behavioral responses to taxation, thereby reducing the amount of money which may be returned as a lump sum transfer. The fraction D_d is an increasing function of the size of the labor supply responses measured by the elasticities ε_j and η_j, and of the size of the tax rates of the current tax system measured by τ_j and a_j. Thus, in the special case of no labor supply responses along either the intensive or the extensive margins ($\varepsilon_j = \eta_j = 0$ for all j), there will be no behavioral revenue loss and therefore D_d equals zero. Likewise, if the initial tax system is a non-distortionary lump sum tax ($\tau_j = a_j = 0$ for all j), we get $D_d = 0$.

Finally, from eq. (15), we note that the revenue (and hence efficiency) effects created by the two margins of labor supply response are related to different tax wedges. While the intensive margin is related to the marginal tax rate τ_j, the extensive margin is related to the tax rate on labor market entry a_j, which is an average tax rate including any transfers that are lost or reduced upon labor market entry. This difference between tax/transfer wedges will be important for the empirical application, a point emphasized by Kleven and Kreiner (2003) in the context of the marginal cost of public funds.

Now, using eqs (14) and (15), we may rewrite (10) as

$$\Psi_d = 1 + \frac{D_d}{p_g(1 - D_d) - s_g} \geq 1, \tag{16}$$

where $p_g \equiv \left[\sum_{j \in G} E_j + (N - E) \right] / N$ denotes the population share for those who are gaining from the reform, while $s_g \equiv \sum_{j \in G} s_j$ is the cumulative wage share for those who are gaining.[4] If we are considering a tax reform creating no efficiency loss ($D_d = 0$), the interpersonal trade-off is exactly one, i.e., an additional dollar transferred to the poor imposes a one-dollar cost on the rich. However, if the redistributive reform generates an efficiency loss ($D_d > 0$), and this is generally the case, it will cost more than one dollar of welfare for the rich to transfer one dollar to the poor.

[4]The denominator in eq. (16) captures the welfare gain of those who gain from the reform. Hence, the denominator is always positive.

2.4 Redistribution to the Working Poor

In this subsection, we compare the demogrant policy considered above with a reform which redistributes income to low-wage earners in the labor market, while keeping constant the income of those who are out of work. As before, the reform raises the tax rate on all units of labor income by τ, but now the collected revenue is returned only to those who are working positive hours. Conditional on labor force participation, the transfer is lump sum. This type of reform may be interpreted as the introduction of an Earned Income Tax Credit (EITC) financed by higher taxes on high-wage earners.

The tax/transfer schedule is changed in the following manner:

$$\frac{\partial \tau_j}{\partial z_j} = \tau, \quad \frac{\partial T_j}{\partial z} = \tau w_j l_j - TR, \quad \frac{\partial T_0}{\partial z} = 0. \tag{17}$$

Inserting these expressions in eq. (13) and setting dR/dz equal to zero, we obtain

$$TR \cdot E = [1 - D_w] \cdot \tau \sum_{j=1}^{J} w_j l_j E_j, \quad 1 - D_w \equiv \frac{1 - D_d}{1 - \sum_{j=1}^{J} \frac{a_j}{1-a_j} \eta_j e_j} \lesseqgtr 1, \tag{18}$$

where $e_j \equiv E_j/E$ is the employment share in group j. As with the analogous eq. (15) for the demogrant policy, the above expression shows that the aggregate lump sum transfer, now $TR \cdot E$, is given by the direct revenue increase multiplied by a parameter $1 - D_w$ capturing behavioral responses to the reform. The essential difference to the previous equation lies in the denominator of the $(1 - D)$-parameter, which reflects the positive participation response arising because the transfer is given only to employed people. Since this denominator is always less than one, the value of D_w may be less than zero, implying that the behavioral feed-back effects on revenue may be positive on net. Consequently, a redistribution towards the working poor may increase overall efficiency.

Inserting eqs (17) and (18) into (10), we get

$$\Psi_w = 1 + \frac{D_w}{e_g(1 - D_w) - s_g}, \tag{19}$$

where $e_g \equiv \sum_{j \in G} e_j$ is the share of employed people gaining from the reform.[5] In this expression, we have $\Psi_w \gtreqless 1$ iff $D_w \gtreqless 0$. It is now possible that the welfare cost to high-wage

[5] As with the demogrant policy, the denominator in eq. (19) is always positive, since it captures the welfare gain of those who gain from the reform.

earners from the transfer of one dollar of welfare to low-wage earners is less than the dollar transferred. In this case there would be no conflict between equity and efficiency.

In the special case of no labor supply responses along the extensive margin ($\eta = 0$), the two types of tax reform which we have considered create identical behavioral responses (as the marginal tax rate is increased by τ in each case). It is illuminating to compare our efficiency and trade-off measures D and Ψ in this special case.

Eqs (15) and (18) show immediately that $D_d = D_w$, implying that the share of the projected mechanical increase in tax revenue which is lost through behavioral responses is the same for the two reforms. In other words, the additional deadweight burden, and hence the difference between gains dG and losses $-dL$, is the same for the two reforms. While the difference between gains and losses is identical, the absolute magnitudes tend to be higher in the case of a demogrant policy. In the demogrant policy, the unemployed obtain transfers without paying any taxes, whereas in the working poor policy everybody getting transfers also pays taxes. For this reason, the aggregate gain of the gainers dG and the aggregate loss of the losers $-dL$ will be higher for the demogrant policy. From the definition of the equity-efficiency trade-off in eq. (8), the larger magnitudes of both numerator and denominator (where the numerator is the larger number) implies that $\Psi_d > \Psi_w$, i.e., the demogrant policy involves a more favorable trade-off than the in-work benefit reform. This result shows that, with no difference in the behavioral responses created by the reforms, the demogrant policy is "better" than the in-work benefits policy in the sense that it achieves more redistribution per dollar of deadweight burden.[6]

This difference in the trade-off for the two policies is part of a more general point. In general, the magnitude of Ψ depends on the earnings distribution among the people affected by the reform. Consider the working poor policy, for example. Since tax payments depend on earnings, if the distribution of earnings is initially relatively equal (workers are almost identical), the net mechanical tax change (equal to the welfare effect) will necessarily be almost the same for each individual (i.e., gains and losses are close to zero). In other words, with an equal earnings distribution, we get little redistribution, and for a given efficiency loss D, the trade-off measure Ψ becomes high. As the earnings distribution widens, gains and

[6]This is the main reason why papers analyzing models with only intensive labor supply responses such as Bourguignon and Spadaro (2000a,b) or Browning (1995) have found that traditional welfare is preferable to earned income tax credit schemes.

losses become bigger (more money is redistributed), and Ψ becomes lower. This implies that, for given labor supply elasticities, in-work benefits will be more desirable in countries with large disparities in earnings.

3 Welfare Reform in Europe

3.1 Taxes and Transfers in European Countries

EUROMOD, Sample, and Tax Definitions

In the empirical part of this paper we make use of EUROMOD, an EU-wide micro-simulation model. EUROMOD is built around 14 separate but partly harmonized household datasets. Thanks to detailed algorithms representing existing tax and benefit legislation, the model is able to compute a range of tax and benefit amounts for each observation unit in a sample that is representative of the population as a whole. The integrated nature of the model permits common definitions of income concepts, units of analysis, etc., to be used across countries and therefore presents an ideal instrument for comparative policy analysis. Currently, the main policy instruments EUROMOD can simulate are income taxes, social insurance contributions (or payroll taxes) paid by employees, benefit recipients, and employers as well as universal and means-tested social benefits. Income components that are not simulated and are required as an input into the calculation of taxes and benefits (or the computation of total household incomes) are taken directly from the data. These include earnings, capital income and insurance benefits which depend on contribution histories not observed in the data.[7]

An essential use of EUROMOD is the analysis of policy reforms and their effects on household income. However, the focus in the present paper is a different one. We need to compute net taxes, marginal effective tax rates as well as participation tax rates for existing policy configurations. We first compute employees' net taxes (income tax plus total social insurance contributions minus all social benefits) in the original situation and present them by gross earnings decile, gender and family type. In a second step, net taxes are recomputed after altering each employee's earnings to find marginal effective tax rates and participation tax rates (we come back to this below). Since EUROMOD takes into account interactions between different policy instruments (such as the taxation of benefits) and household members

[7]For more information on EUROMOD, underlying data and model assumptions see Sutherland (2001).

we are able to capture all relevant effects on total household income of an earnings change for a particular household member (see Immervoll, 2002 and Immervoll and O'Donoghue, 2002). The tax and benefit rules we consider are those that were in place in 1998.[8]

In order to construct ten earnings decile groups, we define our sample as those aged 18 to 59 and who have been working full year and have positive annual earnings. We also exclude those who are currently receiving pension, early retirement, or disability benefits. In all our tax and benefits simulations, we exclude pension benefits. Deciles are based on pre-tax earnings (including any social security contributions paid by employers). For our simulations, we estimate the number of individuals not working using Labour Force Survey employment participation rates.

The marginal tax rate is computed by increasing actual earnings y_j of the individual by 3% and measuring the changes in all taxes and benefits, i.e., $\tau_j = [T(1.03 \cdot y_j) - T(y_j)]/(0.03 \cdot y_j)$. In order to compute the participation tax rate, we first compute the difference between current household taxes and benefits and household taxes and benefits when the earnings of the individual are set to zero: $T(y_j) - T(0)$. We then divide this difference by earnings y_j to obtain the participation tax rate $a_j = [T(y_j) - T(0)]/y_j$. Marginal tax rates and participation tax rates by decile for each country are displayed on Figures 1-4.

The theoretical analysis was based on a discrete formulation dividing the population into J distinct subgroups. In the empirical application, we have to define these subgroups. Here it is important to choose a level of disaggregation which adequately captures the observed heterogeneity in the sample. Because tax rates, wage income and (potentially) labor supply elasticities are strongly heterogeneous *and* correlated across individuals, one could make substantial errors by aggregating too much. Our simulations will be based on a disaggregation into 10 earnings deciles where each decile is divided into 10 subgroups depending on gender and family type.[9] We run simulations where elasticities are allowed to vary across deciles but are assumed constant across demographic groups within deciles, and we run simulations where elasticities are heterogeneous across both deciles and demographic groups. In the case of constant elasticities across demographic groups, we have compared our results from the disag-

[8]Since 1998, there have been a number of tax and transfer reforms in some of the countries we analyze.

[9]Those ten groups are singles (with no kids), lone parents, married males (no kids and working spouse), married males (no kids and non-working spouse), married males (kids and working spouse), married males (kids and non working spouse), married females (no kids and working spouse), married females (no kids and non-working spouse), married females (kids and working spouse), married females (kids and non working spouse).

gregated simulation runs (10 deciles × 10 subgroups) to the results from simulation runs where demographic subgroups are aggregated. The results turn out to be virtually identical, which indicates that there is no reason to disaggregate further than we do because of heterogeneity in tax rates and wage income.[10]

Typology of Taxes and Benefits

Tables A1 and A2 summarize the main features of taxes and benefits (respectively) affecting the marginal and participation tax rates of workers in European countries.

All European countries impose three main types of taxes: income taxes, social security contributions (or payroll taxes), and consumption taxes. Income taxes are levied upon annual incomes (most of the time both employment and non-employment income with various deductions), in general with a progressive tax rate structure, and exemption levels. As a result, no income taxes are paid on very low incomes and marginal income tax rates for high income households can be substantial.[11] Social security contributions (SSC) are levied on employment and sometimes replacement incomes and in general are designed to finance pensions, health, and unemployment benefits. They are often shared between employer and the employee and mostly have a simple flat rate structure with zero payments below a threshold and the contribution base capped above an upper limit. Frequently, thresholds give rise to discontinuities in the budget set since, once exceeded, the entire income is subject to contributions. Overall SSC rates can be substantial, especially in countries with large public pension and health insurance systems (and often exceed income tax rates).[12] Finally, all European countries impose substantial consumption taxes in the form of Value Added Taxes (VAT) as well as excise taxes on specific goods (notably cars, gasoline, alcohol, and tobacco). Our tax computations incorporate both types of consumption taxes. The consumption tax rate is computed using data from OECD National Accounts and Revenue Statistics and are reported in Table A3, column

[10]It should also be noted that we prefer to carry out simulations disaggregated to the level of decile × demographic group rather than completely disaggregated to the individual level due to outliers in the sample. Because of discontinuities in the budget sets created by some programs, marginal tax rates may be equal or larger than one for some individuals, in which case our formulas would be ill defined, and some ad-hoc truncation would be required.

[11]For example in France in 1998, only half of households are liable to the income tax and the top marginal income tax rate reaches 54%.

[12]For example, in France for an employee with median earnings, the combined employee-employer SSC marginal tax rate is over 30%.

(3).[13] The rates center around 20 percent for most countries, while they are much higher in Finland and Denmark.

All European governments provide a number of benefits and transfers providing financial support to individuals and families with certain characteristics such as low income, unemployment, old-age or the presence of children. Benefits depending on income or employment status can have large effects on budget sets. Low-income groups often face very high marginal effective tax rates as a result of the tapering of means-tested benefits. We also see frequent discontinuities caused by work status conditions attached to out-of-work and in-work benefits or the non-gradual phase-out of benefit payments.[14] We describe the main features of the relevant benefits in Table A2.

We can distinguish five main types of benefits. First, most countries operate *social assistance* benefits targeted towards those with no or very little income, and tapered away at high rates. For example, in France, the RMI (Revenu Minimum d'Insertion, or Minimum Income) provides about 400 Euros per month for a single person with no income and is phased out at a rate of 100% (above a small earnings disregard). These minimum income benefits may be almost universal as long as the household meets income conditions (in France the only requirement is to be above 25), or can be targeted towards specific groups. Minimum income benefits are often more generous for certain groups such as single parent families, individuals with disabilities or older individuals (minimum pensions).

Second, a number of benefits are conditional on meeting a number of characteristics and may not be targeted only to low incomes, although many of them are phased-out with earnings. For example, many European countries provide housing benefits for families with low incomes. Family benefits are targeted to households with children or newly born children. In most cases, family benefits are not means-tested.

Third, a number of European countries provide in-work benefits that are targeted to those who are currently working or are moving into work. The first European countries to introduce

[13] The calculation of consumption tax rates is based on the methodology of Mendoza *et al.* (1994). See the notes to Table A3 for further details. To account for the effect of consumption taxes on the purchasing power of labor income, we use the tax rates in Table A3 to adjust the marginal tax rate (τ_j) and the participation tax rate (a_j). The consumption-adjusted tax rates are given by the formula (TR+CTR)/(1+CTR), where TR is the tax rate exclusive of consumption taxes and CTR is the consumption tax ratio.

[14] For example, in Luxembourg and Belgium (in 1998) housing benefits for single parent families are not withdrawn smoothly but drop to zero at a specified income threshold.

such a program were the United Kingdom and Ireland in the early 1990s. In 1998, the year on which our study is based, the Family Credit in the U.K. provided a substantial benefit to all families with children if one parent works at least 16 hours a week and earnings are below a given modest level.[15]. Since 1998, a number of other European countries have introduced in-work benefits. France has introduced such a program as of 2001 ("Prime Pour l'Emploi" or premium for employment). Belgium is phasing-in an Earned Income Tax Credit program from 2002 to 2004. The Netherlands have introduced an Employment Tax Credit (since 2001). Germany has introduced in 2002 the "Mainzer Modell" program which is scheduled to be phased out starting in 2004. Finland is operating an Earned Income Tax Allowance. In all cases, the new in-work benefits programs in Europe are still small relative to the in-work benefit programs in the United Kingdom, Ireland, or the United States (see Gradus and Julsing, 2001). As of 1998, the year on which our simulations are based, only the United Kingdom and Ireland had introduced significant in-work benefit programs (the Italian family benefit is dependent on current or previous employment but is not normally considered an in-work benefit). Therefore and except for those countries, our results can be interpreted as the welfare analysis of introducing modest in-work benefits programs in a situation where such programs did not yet exist.

Fourth, all countries operate unemployment insurance benefits which are either temporary (they expire after some maximum duration) or are conditional on participating in some type of active labor market program. By definition, unemployment insurance benefits are meant to replace lost earnings due to job loss until the person finds work again. In our simulations, computing income measures with and without work requires a special treatment of unemployment benefits as their duration is limited and not all non-working individuals are currently receiving them. Therefore, including fully unemployment benefits in the non-working situation would overstate the value of benefits when out of work. Furthermore, unemployment benefits, by definition, can only be obtained when one has lost his job. As a result, unemployment benefits, by narrowing the difference in disposable income when working and when not working, increase substantially the participation tax rate but have no effect on the marginal tax rate of those in work. As a result, in the presence of positive labor supply participation

[15]The United States introduced the Earned Income Tax Credit in the 1970s and this small program was substantially expanded in the 1980s and especially the 1990s and has become the largest cash transfer programs for low income families. The U.S. experience has lead many other countries to adopt similar programs.

elasticities, unemployment benefits certainly contribute to making in-work benefits more desirable than the demogrant policy. We adopt the following conservative approach for including unemployment benefits. For each country as of 1998, we compute the number of unemployed adults entitled to unemployment benefits using OECD Labour Force Survey statistics on the unemployed by duration of unemployment and using the duration limits on unemployment benefits in each country. We then compute the ratio of those unemployment beneficiaries to the total number of non-working adults aged 18 to 59 in the economy (using again OECD statistics on the labor force). We then compute marginal and participation tax rates as the weighted average of the rates estimated including fully unemployment benefits and excluding fully unemployment benefits. The weight on the scenario with unemployment benefits being the ratio of unemployment beneficiaries to those non-working, and the weight on the scenario with no unemployment benefits is one minus this ratio. The resulting ratios are reported for each of the 14 countries in column (2) of Table A3 in Appendix. In principle, the ideal weight to use would be the fraction getting unemployment benefits when leaving employment because of the reform, and the fraction who were getting unemployment benefits among those starting employment because of the reform. Those propensities of getting/loosing unemployment benefits for the *marginal* worker/non worker are not observed in the data and we therefore rely on the propensity of getting benefits for the *average* person not working. Because those entitled to unemployment benefits are in principle looking for work, they are perhaps closer to employment than the average non-working person, suggesting that our measure of unemployment benefits is probably too conservative. In order to assess the sensitivity of our results to the inclusion of unemployment benefits, we will also provide results in the case where we exclude completely unemployment benefits (this situation is most favorable to the demogrant policy relative to the in-work benefits policy and is obviously too conservative).

Finally, all European countries provide public pension benefits. Those benefits are ignored in the present simulations because we focus on the population aged 18 to 59, and we exclude from our sample all individuals currently receiving pension benefits.[16]

Marginal Tax Rates and Participation Tax Rates in Europe

[16]Gruber and Wise (1999) examine a large number of OECD countries and show that the design of retirement benefits systems has a strong impact on the retirement decision.

Figures 1-4 report the marginal and participation tax rates in the 14 European countries we study. Countries are divided into two groups of seven countries. The first group is continental and Northern Europe (Austria, Belgium, Denmark, Finland, France, Germany, and the Netherlands). As shown on Figures 1 and 3, tax rates for this group are high. The second group is composed of all the other countries with lower tax rates: Southern Europe (Greece, Italy, Portugal, and Spain), anglo-saxon European countries (Ireland, the United Kingdom), and Luxembourg.[17]

In a number of countries, the structure of tax rates across deciles is strikingly flat. For example, in the Netherlands the participation tax rate is between 40 and 50% for all deciles. Belgium, Finland, Germany, Italy, and Portugal have also relatively flat rate structures. This suggests that, to the extent that decile groups are homogeneous, the tax/transfer system of those countries is relatively close to a pure Negative Income Tax system combining a demogrant and a constant marginal tax rate on earnings.

In some countries such as Denmark, participation tax rates are largest at the bottom because of the existence of relatively generous minimum income benefits which increase the part of in-work earnings that are effectively "taxed away" upon entering employment. Also, unemployment benefits are subject to a floor meaning that replacement rates can in some cases be very high. In contrast, countries such as Greece, Luxembourg, Spain, and the United Kingdom have relatively lower tax rates at the bottom because minimum income programs do not exist or are modest relative to in-work earnings, because tax burdens on employment incomes are small and/or because the operate in-work benefits which counter-balance the loss of social assistance or unemployment benefits.

Income Distribution

Figures 5-6 displays the P90/P10 and P80/P20 ratios by countries for those with positive earnings. As is well known, Nordic countries have the lowest level of earnings inequality while Anglo-saxon countries have the highest. As we discussed above, larger earnings disparities will make our reforms, and especially the in-work benefit, more desirable as it spreads gains and losses more widely in the population.

[17]Luxembourg is of course part of continental Europe. However, as other smaller and very wealthy European countries or principalities such as Lichtenstein or Switzerland, tax rates are significantly lower in Luxembourg than in other larger continental European countries.

3.2 Empirical Literature and Calibration

A central finding in the empirical labor market literature, recently surveyed by Blundell and MaCurdy (1999), is that labor supply tends to be quite unresponsive along the intensive margin. While it has long been recognized that the hours-of-work elasticity for prime-age males is close to zero, more recent research has demonstrated that this is also the case for females. The old findings of high elasticities for women (especially married women) were based on censored specifications including non-participating individuals, thereby including the extensive response in the estimated elasticity. Once labor supply is estimated conditional on labor force participation, it turns out that the female hours-of-work elasticity is close to that of males (Mroz, 1987; Triest, 1990).

Hence, a strong degree of labor supply responsiveness would have to come from the margin of entry and exit in the labor market. Indeed, there is an emerging consensus that extensive labor supply responses may be much stronger than intensive responses (e.g., Heckman, 1993). In particular, participation elasticities seem to be very high for certain subgroups of the population, typically people in the lower end of the earnings distribution. Let us briefly review some of the evidence, emphasizing studies based on tax policy experiments which are our concern here.

One source of evidence comes from a series of Negative Income Tax (NIT) experiments carried out in the United States from the late 1960's. The empirical results from these experiments have been surveyed by Robins (1985). The results indicate that participation elasticities are often above 0.5 and sometimes close to 1 for married women (secondary earners), single mothers, low-educated individuals, and the young. On the other hand, the participation decision of prime-age males was estimated to be fairly unresponsive to changes in incentives.

More recently, some countries have experimented with various 'in-work' benefit reforms for low income workers. Blundell (2001) describes the reforms and provides a survey of results from the experiences in the United States, the United Kingdom, and Canada. For the United States, Eissa and Liebman (1996) and Meyer and Rosenbaum (2001) document that the 1986 expansion of the EITC has had large effects on the labor force participation of single mothers. This was especially the case for single mothers with low education, where the Eissa-Liebman study implies an elasticity around 0.6.

Like the EITC, the recently implemented Working Families Tax Credit (WFTC) in the United Kingdom was designed to induce lone mothers from welfare into work. The study by Blundell *et al.* (2000) indicate that the reform was quite effective in achieving this goal. They find that the participation rate of single women with children increased by 2.2 percentage points (5 per cent). Another interesting source of evidence is provided by the Canadian Self Sufficiency Programme (SSP), which was structured very much like the EITC and WFTC. The advantage of the Canadian program lies in the fact that it is a randomized experiment rather than an actual policy reform, thereby providing an ideal setup to estimate labor supply behavior. A study by Card and Robins (1998) suggests that this experiment created a very large increase in labor market attachment. In fact, the treatment group almost doubled their participation rate over the control group.

The finding that tax incentives may have quite substantial effects on labor force participation is consistent with another stream of empirical literature estimating the effect of out-of-work benefits on unemployment. Krueger and Meyer (2002) survey the evidence from a number of OECD countries. They conclude that benefits raise the incidence and the duration of unemployment, and that the elasticity of lost work time with respect to benefits tend to be around one. Since the risk of unemployment is largest among low-skilled workers, this evidence also indicates that strong participation responses tend to be concentrated at the bottom of the wage distribution.

Although the literature on labor supply in anglo-saxon countries is extensive, there are many fewer studies on labor supply responses for continental European countries. An important objection to our method is that elasticities might be substantially smaller in the more rigid labor markets of continental Europe than in Anglo-saxon countries. Several recent studies suggest that this is not the case. A number of structural studies of married women labor supply are surveyed in Blundell and MaCurdy (1999, pp. 1649-1951). Those studies find in general substantial elasticities (between 0.5 and 1) for most countries (Germany, Netherlands, France, Italy, and Sweden) although they do not decompose the elasticity into participation versus hours of work on the job. Blundell (1995) surveys studies of labor market participation responses in OECD countries and suggests that elasticities for married women are substantial and similar across countries with values close to 1 (pp. 58-61).

Similarly, Van Soest (1995) and Van Soest *et al.* (2002) obtain substantial elasticities for

females in the range 0.5 to 1 in a structural model for Netherlands. Most of those elasticities are due to substantial participation effects. Similarly, Aaberge *et al.* (1999) propose a structural estimation for Italy and find substantial participation elasticities for women (and much lower elasticities of hours of work conditional on working). Piketty (1998) analyzes the introduction in France in 1994 of an allowance for non-working wives with three or more children and finds convincing evidence of large participation effects, with elasticities in the range 0.6 to 1 for women with young children.

Thus, the evidence from structural estimation as well as direct policy change analysis suggests large participation elasticities for women across all European regions (Continental, Nordic and Southern Europe) with magnitudes similar to those obtained in the large literature on Anglo-Saxon countries. Thus, it is perhaps a reasonable first step to assume homogeneous elasticities of labor supply as we do in this analysis.

Since the empirical literature focuses on various demographic subgroups, it is not easy to calibrate elasticities across income deciles. Yet, from available evidence, it seems reasonable to conclude that participation elasticities are large, perhaps above 0.5, for the groups in the lower part of the income distribution. Participation elasticities in the middle part of the distribution are likely to be substantially lower, while there is almost no responsiveness of labor force participation at the top of the distribution (see, e.g., Blundell, 1995). As shown in Table A4, we run policy simulations under different scenarios for the participation elasticities. In the benchmark case (column 1), the average participation elasticity for the whole economy is equal to 0.2 but decreasing across deciles. Those elasticity estimates are perhaps conservative estimates of the size of the participation elasticities obtained in empirical studies. We will of course investigate the case where the participation elasticity is zero for all deciles (column 2). In column (3), we propose a profile of participation elasticities equal to 0.2 on average (as in column 1) but more heavily concentrated at the bottom. As shown in columns (4) and (5), we will also investigate the sensitivity of the results to lowering or increasing the average level of participation elasticities to 0.1 and 0.3, respectively.

Finally, because the empirical literature shows that female labor supply tend to be more elastic than primary earners' labor supply, we will also present simulations where the participation elasticity is heterogeneous within deciles. As displayed in columns (6) and (7), we consider the case where participation elasticities are concentrated among married women and

lone parents only (with a zero participation elasticity for married men and singles with no children).

For the hours-of-work elasticity, we will assume that it is constant across income deciles (like, e.g., Diamond, 1998, and Saez, 2001). We will take an elasticity equal to 0.1 to be our baseline case, but will also consider values equal to 0 and 0.2.[18]

3.3 Quantifying the Equity-Efficiency Trade-Off

In this section, we simulate the impact of a demogrant welfare reform and a working poor welfare reform in EU countries. In order to do so, we combine the theory laid out in Section 2 with the EUROMOD tax and benefit calculations presented in Section 3.1, and setting labor supply elasticities as described in Section 3.2. Our evaluation of the two types of welfare reform focuses on economic efficiency and, most importantly, on the trade-off between efficiency and equality. The pure efficiency effect is measured in proportion of collected revenue and is found by calculating $-D$ from expressions (15) and (18). The number reflects the fraction of mechanical tax revenue that is lost due to behavioral responses. A negative value corresponds to an efficiency loss. The trade-off between efficiency and equality is derived from formulas (16) and (19). Recall from Section 2 that our measure of the trade-off gives the welfare cost to the rich from transferring one additional Euro to the poor.

We consider as our baseline case an hours-of-work elasticity equal to 0.1 and a participation elasticity for the aggregate economy equal to 0.2 in Panel A of Table II (see Table A4 for the distribution of the participation elasticities across deciles).

Panel A shows that the efficiency implications of welfare reform depend crucially on who is targeted by the reform, the poor or the working poor. Redistributing income to the poor by increasing the demogrant leads to efficiency losses in all countries, implying a trade-off between efficiency and equality above one. Although there is substantial variation across countries, the equity-efficiency trade-offs tend to be very unfavorable. The smallest trade-offs are found primarily in Southern Europe and Anglo-Saxon countries where taxes and benefits are relatively low. In the UK, for example, giving 1 Euro to low-wage earners and those out

[18] A large literature for the United States has shown that very high income earners might be much more responsive to tax rates than middle or middle high income earners (see Saez, 2004 for a recent summary). However, this phenomenon is concentrated at the very top (top 1%) and thus, for our purpose, this high-income elasticity should only increase slightly the overall intensive elasticity of the top deciles income earners.

of work imposes a welfare cost on high-wage earners of 1.9 Euros. At the other extreme, we find the two Nordic countries, Denmark and Finland, where the generosity of existing welfare programs give rise to large efficiency losses. In the case of Denmark, the trade-off is around 24, while for Finland the trade-off is slightly over 6, implying that any additional redistribution in those countries would be extremely costly even for the moderate elasticities we are using. In between these extreme cases, we have a middle group of continental European countries like Belgium, Germany, France, and the Netherlands. In these countries, the welfare cost to the rich from transferring 1 Euro to the poor centers around 3 Euros.

A completely different picture emerges once we turn to the working poor policy. For all countries the loss of economic efficiency is now substantially lower. In fact, for Denmark, Ireland, France, Portugal, and Spain the policy may create an aggregate welfare gain, implying a trade-off which is lower than 1. For many other countries the working poor policy creates only small efficiency losses such that the trade-off is quite close to one. This applies to countries such as Austria, Greece, Luxembourg, Netherlands, and the United Kingdom. In these countries there is no big trade-off between efficiency and equality when we consider redistribution from the rich to the working poor. Only in the case of Finland does the working poor policy involve an unfavorable equity-efficiency trade-off. The in-work benefit reform does not work well in Finland mainly because of the extreme equality of the earnings distribution in this country (see Figures 5 and 6). With a strongly compressed earnings distribution, most workers gain or loose very small amounts. Hence the reform generates almost no redistribution per dollar of deadweight burden, thereby creating a very poor equity-efficiency trade-off, cf. the discussion in Section 2.4.[19,20]

Panel B of Table II reports the results in the special case of a zero participation elasticity. This is the situation that most previous studies on tax reforms have considered because this is the situation which arises in the standard static labor supply model with no fixed costs of work. Panel B shows that, in that case and in stark contrast to Panel A, the demogrant and the working poor policies produce exactly the same efficiency losses $-D$ but that the

[19] In the extreme case of a perfectly equal earnings distribution, the in-work benefit reform would create deadweight burden with no gainers, hence creating an infinite trade-off parameter.

[20] One might wonder why the working poor policy works so well in Denmark where the earnings distribution is almost as equal as the Finnish one. This is simply because participation tax rates are much higher in Denmark, especially in the bottom deciles where participation elasticities are high. In the simulations, this effect strongly dominates the effect of a compressed earnings distribution.

demogrant policy produces a more favorable equity-efficiency trade-off as it spreads and gains and losses more widely among groups, a point we discussed earlier. Those results show that it can be quite misleading to use the standard labor supply model to study welfare reform for low income earners if indeed participation elasticities are significant.

To get a better grasp on the difference between the demogrant or working poor policies, notice from Figures 1-4 that countries with relatively high participation tax rates in the bottom deciles, such as Denmark, Ireland, or France, tend to gain more by choosing a working poor policy rather than a demogrant policy. The working poor policy creates, ceteris paribus, higher incentives for participation in the labor force. Moreover, participation rises mainly at the bottom deciles where participation elasticities are large. If participation tax rates are very large at the bottom deciles, the increase in labor participation creates a large increase in government revenue and hence in economic efficiency. This may be seen more formally by noting from eq. (18) that

$$(1 - D_d)/(1 - D_w) = 1 - \sum_{j=1}^{J} \frac{a_j}{1 - a_j} \eta_j e_j.$$

The participation elasticities (η_j) are large at the bottom of the wage distribution while the employment shares (e_j), by definition, are equal to 0.1 for all deciles. Hence, the working poor policy has a relatively large effect on economic efficiency compared to the demogrant policy if participation tax rates (a_j) are high at the bottom deciles. The same type of mechanism is at work when we increase the concentration of participation responses in the bottom of the earnings distribution. As we go from Panel A to Panel C in Table II, the working poor policy becomes more attractive for all countries, and the effect is largest for those countries imposing relatively high participation taxes at low wage levels.

In Table III we explore the sensitivity of the results to the average participation elasticity in the economy. In Panel A the average elasticity equals 0.1, whereas in Panel B the average elasticity equals 0.3. As one would expect, the overall level of the responsiveness of labor force participation is very important for the effects of the two policies. A larger elasticity makes the demogrant policy worse, while it makes the working poor policy better. In the high-elasticity scenario (Panel B), the working poor policy creates an efficiency gain in most

countries, implying a trade-off below 1.[21] Although the empirical evidence shows that extensive responses tend to be larger than intensive responses, we consider the case (in Panel A) of identical elasticities along the two margins. This scenario constitutes a conservative case for the working poor policy. It is therefore remarkable that the policy looks more favorable than the demogrant policy for a fair number of countries.

The sensitivity of the results with respect to the hours-of-work elasticity is analyzed in Table IV. The analysis indicates that the simulated effects on economic efficiency and equity-efficiency trade-off seem quite sensitive to the size of the hours-of-work elasticity. However, unlike the level of the participation elasticity, the hours-of-work elasticity has the same qualitative impact on the demogrant policy and the working poor policy. Hence, the relative effects of the two policies are less influenced by the size of the hours-of-work elasticity.

In Table V, we report results in the same scenarios as in Table II but in the case where we exclude completely unemployment benefits. We note that the gap between the demogrant and the working poor policies narrows a little bit but the qualitative implications remain the same. As long as there are moderate participation elasticities, the current tax and benefits systems, even ignoring unemployment insurance, imply that the demogrant policy generates more deadweight burden and creates a less favorable equity-efficiency trade-off than the working benefits policy.

Finally, in Table VI, we consider the case where participation elasticities are heterogeneous within deciles among different demographic groups. We assume that participation elasticities are concentrated among married women and lone parents and zero otherwise (married men and singles with no kids). In both Panels A and B of Table VI, the average intensive and extensive elasticities are 0.1 and 0.2, respectively (as in our benchmark case in Table II). In Panel B, the participation elasticities are more concentrated in the bottom deciles. Thus, the results presented in Panels A and B of Table VI ought to be compared with Panels A and C of Table II. Introducing heterogeneity in the elasticities has only modest consequences on our efficiency and trade-off measures. The numbers for the working poor policy are very similar while the demogrant policy looks in general slightly better with heterogeneous elasticities. However, in all countries, the working poor policy continues to appear more favorable (and

[21] For Denmark, the demogrant policy generates a Pareto loss (No Gainers) while the working poor policy generates a Pareto improvement (no Losers). In those cases, the efficiency and efficiency-equity parameters are ill defined.

often much more favorable) than the demogrant policy suggesting that our results are indeed very robust to introducing heterogeneity in the elasticities across demographic groups.

3.4 Majority Support and Distributional Effects

Our results strongly suggest that, for most countries and for realistic labor supply elasticity assumptions, the working poor policy is more desirable than the demogrant policy. This raises two important questions. First, is the working poor policy more likely to be supported by a majority of self-interested voters. Second, what are the redistributive consequences of introducing such a working poor policy?

Columns (1) and (2) of Table VII show the share of gainers for the demogrant and the working poor policy, respectively, in the case of our benchmark case for elasticities (Table II, Panel A).[22] A majority supports the demogrant policy only in Spain and Italy. In most countries, especially in the Nordic countries with generous transfer policies, a large majority would favor rolling back the welfare state (a negative demogrant policy). By contrast, column (2) shows that, for most countries, the working poor policy would be supported by a majority.[23] The reason for those results is again that the in-work benefit creates a low (or no) deadweight burden and therefore generates more gainers than losers.

The working poor policy hence appears to be economically efficient and also politically feasible. The last point we examine is the redistributive consequences of such a policy. The working poor policy benefits workers with low earnings at the expense of higher income earners (non-workers are left unaffected by the policy). However, the policy has been defined at the individual level, independent of total family income. Hence, the working poor policy provides the same benefit to a low income working lone parent and to a low income spouse married to a high income husband. Therefore, it is conceivable that the redistributive consequences of the working poor policy are actually much less attractive when total family income is taken into account. To investigate this point, columns (3) to (7) display the share of individuals benefitting from the working poor policy in each *family* disposable income quintile.[24] Our

[22] In the case of the working poor policy, the non-working population is excluded as it is unaffected by the policy.

[23] Only in Belgium, Finland, and Germany would a majority be opposed to the introduction of a working poor policy.

[24] Hence, in our previous example, the lone parent is likely to be in the first quintile while the spouse of the high income husband is likely to be in the fifth quintile.

results show that, even though some of the gainers are indeed in the top quintile, the fraction of gainers is always highest in the bottom quintiles. In other words, although some wives with wealthy husband will gain from the reform, most of the gainers will be individuals with modest family incomes. Thus, the working poor policy also appears to be redistributing from high income families toward low income families on average. Finally, it is important to note that the redistributive properties of the working poor policy (or any other small tax/transfer change) are independent of the distribution of the behavioral responses. For example, the policy will have the same redistributive properties even if only wives with wealthy husbands are induced to work because of the policy and if lone parents are completely inelastic. What matters in the analysis is the total revenue loss due to all behavioral responses, and the static redistributive properties of the policy.

4 Discussion

This paper has proposed an analysis of welfare reform in European countries using a simple static model of labor supply and the EUROMOD micro-simulation model. Following the findings of the empirical labor supply literature, we have modelled labor supply responses not only along the intensive margin (as has been done by most previous tax reform studies) but also along the extensive margin. Our analysis leads to quite definite and robust results. Because of the presence of significant labor supply responses along the extensive margin, increasing traditional welfare has very different welfare implications than introducing in-work benefits. Because of large existing transfer programs which generate significant tax rates for low-wage earners, increasing redistribution through traditional welfare leads to significant negative labor supply responses along both the intensive and the extensive margin, thereby creating large efficiency costs. As we have shown, the welfare cost for high-wage earners from redistributing one additional Euro to the poor is in the order of magnitude of 2 to 3 Euros. By contrast, in-work benefits generate positive labor supply responses along the extensive margin (and the same negative responses along the intensive margin). As a result, the efficiency cost of redistribution through in-work benefits is much smaller and sometimes very close to zero: in a number of countries, the welfare cost on higher incomes of redistributing one Euro to the working poor is actually very close to one Euro.

It needs to be emphasized, however, that the groups who benefit from redistribution in those two reforms are different. In the traditional welfare case, those who benefit the most are those who have no earnings at all, presumably those who are the most in need of support. In the in-work benefit case, those with no earnings receive no additional support and redistribution benefits only the working poor. As a result, if the government had extreme redistributive tastes and put a much higher welfare weight on those with no incomes than on the working poor (such as in the case of a Rawlsian welfare criterion), it is possible that increasing traditional welfare would be more desirable than introducing in-work benefits.[25]

Our findings are well in line with the recent developments in taxes and benefits in Europe. As we discussed above, since 1998 (the year upon which our analysis is based), a number of the European countries have introduced in-work benefits. In year 2003, seven of the fourteen countries in our sample had implemented in-work benefits programs. Except for Ireland and the United Kingdom, however, those in-work benefits are still of modest size with maximum annual benefits between 300 and 1000 Euros (see Gradus and Julsing, 2001, for the most recent and systematic description of these programs). Therefore, our small reform methodology and results should in principle provide a good approximation of the effect of introducing such programs. As illustrated by Blundell (2002) in the case of the extension of in-work benefits in 1999 in the United Kingdom, such prospective analysis should be supplemented by direct empirical analysis after the reform. The recent introduction of in-work benefits in several European countries offers a promising avenue to test our results empirically. Additional and more precise empirical results would be easy to incorporate into our model to improve the accuracy of our analysis.

Our simple labor supply model abstracts from a number of issues which we would like to discuss briefly. First, and perhaps most importantly, we have assumed that the labor market is perfectly competitive. This might be a poor approximation to European labor markets, where minimum wages tend to be substantial, and where wage rates are often the result of bargaining between unions and employers. Minimum wages forbid employers from paying wages which are below a defined minimum, thereby eliminating jobs with very low productivities and potentially creating involuntary unemployment among the unskilled. Likewise, union bargaining

[25]By contrast, if the government puts lower welfare weights on those with no earnings than on the working poor, the case for in-work benefits would be even stronger. Conservative governments tend to hold the latter view: those not working are seen as lazy, whereas the working poor are seen as deserving.

models, efficiency wage models, and search models imply that a fraction of individuals become involuntary unemployed.

The effects of taxation in imperfect labor markets have been explored in a number of recent papers (see, e.g., the survey by Sørensen, 1997). The introduction of imperfections will not change the most important mechanisms at work in our analysis. Firstly, variation in aggregate employment is still the result of behavioral responses along the intensive and the extensive margins. For example, Sørensen (1999) considers optimal taxation in three different models of involuntary employment (unions, efficiency wages, and search) where both intensive and extensive responses are present. Secondly, in all imperfect labor market models, a reduction of average tax rates leads to higher employment, where the effect is channelled through lower equilibrium wages. Accordingly, a working poor policy would lead to increased job opportunities, while a demogrant policy would reduce the chances of finding a job.[26]

While the most important employment effects would survive the introduction of labor market imperfections, the welfare implications of changed labor force participation would be affected by the presence of involuntary unemployment. Following the introduction of in-work benefits, those who obtain jobs would experience a discrete (as opposed to an infinitesimal) increase in utility because some of them were previously involuntarily unemployed. This reinforces the positive effect of the working poor policy on welfare. Increasing traditional welfare programs, on the other hand, creates higher unemployment. To the extent that people lose their jobs involuntarily, the welfare loss is exacerbated relative to the case of voluntary unemployment. In conclusion, a model with labor market imperfections generating involuntary unemployment would most likely increase the attractiveness of redistributing to the working poor and reduce the attractiveness of increasing traditional welfare programs, thereby reinforcing the main conclusion of this paper.

Second, there might be issues related to the presence of segmented labor markets. A well-known hypothesis is that labor markets tend to have a dual structure, being segmented into

[26]In one respect the imperfect labor market models do involve different comparative statics than the competitive model. This difference relates to the effect of changes in the marginal tax rate. A higher marginal tax rate (for a given value of the average tax rate) may lead to a lower equilibrium wage rate which, ceteris paribus, imply higher employment. At the same time, higher marginal tax rates give rise to lower working hours for those who are working as in the standard competitive model. However, the important point to note is that these effects would apply to both the demogrant and the working poor policies, since both types of reforms increase the marginal tax rate. The main difference between the reforms lies in their implications for the average effective tax rates at the bottom of the earnings distribution.

a perfectly competitive sector offering low-paying, low-productivity jobs and an imperfectly competitive sector offering high-paying, high-productivity jobs. Indeed, labor economists have gathered considerable evidence in favor of the dual labor market hypothesis (see, e.g., the survey by Saint-Paul, 1996, pp. 62-68). In the dual labor market model, there is a distortion in the allocation of employment in favor of the perfectly competitive sector offering low-paying jobs. As pointed out by Bulow and Summers (1986), this implies that the government ought to use industrial policy to shift resources away from the low-productivity sector. In the context of tax reform, Kleven and Sørensen (2003) show that such sectoral distortions tend to make policies aimed at the working poor less attractive, because they promote bad jobs at the expense of good jobs. A policy which succeeds in increasing aggregate employment by promoting low-paying jobs may, in theory, reduce welfare as it creates a deterioration in the sectoral mix of employment.

Labor force participation may also generate externalities. Positive externalities of working would make the introduction of in-work benefits even more attractive relative to traditional welfare, while negative externalities would make in-work benefits less attractive. Some of these externalities take the form of fiscal externalities, where higher employment rates affect the demand for certain commodities that are initially taxed or subsidized by the government. For example, higher employment may generate more demand for child care, which would then create positive or negative externalities depending on whether this commodity carries a positive or negative tax rate (in the Nordic countries, for example, child care is heavily subsidized). Externalities could also come in the form of social externalities. Positive social externalities would be reduced crime (as working individuals have less need and time to resort to criminal activities), newly employed parents being better role models for their children (which could increase the incentives of children to do well at school, etc.). Negative externalities are also a possibility if working reduces the time that parents can devote to their children and therefore worsen the quality of parental education.

Finally, a large body of work in behavioral economics has shown that individuals are not always able to make the best decisions for themselves, especially when those decisions involve inter-temporal trade-offs. In the case of labor supply, it is conceivable that some individuals may not perceive the full future benefits of starting to work, or procrastinate in the decision to leave welfare and start working. Such models with inconsistent time preferences generate

so-called internalities (Herrnstein *et al.*, 1993) that are conceptually close to externalities: an individual may not internalize fully the utility of future selves and hence decide to work too little today. As a result, in-work benefits may be desirable to induce people to work more and help correcting such internalities.

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Table I: Total social benefits over disposable income by deciles in 1998

Decile Group	Austria	Belgium	Denmark	Finland	France	Germany	Greece	Ireland	Italy	Luxem-bourg	Nether-lands	Portugal	Spain	United Kingdom
1	42,3%	69,3%	65,4%	74,0%	49,2%	72,6%	29,0%	94,5%	38,0%	41,2%	67,6%	55,0%	48,2%	83,2%
2	31,6%	53,3%	62,8%	64,3%	38,7%	45,7%	27,4%	74,2%	37,9%	33,4%	49,2%	28,8%	35,3%	67,9%
3	27,5%	31,5%	69,5%	55,7%	29,2%	28,4%	24,2%	63,3%	23,6%	29,5%	33,2%	26,0%	29,1%	52,7%
4	27,6%	32,1%	41,1%	43,2%	23,0%	23,8%	15,4%	42,6%	25,6%	25,8%	19,7%	19,2%	28,5%	31,6%
5	22,3%	26,2%	27,1%	39,5%	20,2%	17,9%	12,2%	24,3%	20,9%	23,9%	19,4%	15,9%	21,1%	22,6%
6	17,0%	23,9%	25,6%	34,7%	18,2%	15,1%	12,4%	16,3%	20,6%	23,4%	12,6%	11,8%	15,6%	12,5%
7	19,5%	21,9%	17,1%	29,2%	14,9%	11,0%	18,5%	10,9%	20,6%	16,1%	9,6%	10,8%	15,1%	8,1%
8	17,3%	15,0%	13,3%	25,0%	10,8%	9,4%	8,4%	8,5%	20,0%	13,6%	6,1%	14,2%	14,6%	6,4%
9	14,9%	12,0%	10,3%	20,5%	10,5%	7,0%	10,2%	5,1%	16,0%	12,1%	7,0%	8,6%	10,1%	3,3%
10	16,7%	10,2%	4,3%	13,1%	8,1%	4,5%	6,5%	1,9%	12,5%	7,0%	4,2%	8,6%	5,8%	1,6%
Total	20,0%	21,2%	20,9%	30,1%	16,4%	15,1%	11,9%	15,7%	19,0%	17,1%	13,9%	13,1%	15,3%	12,9%

Source: EUROMOD tax and benefit calculations.

Note: Decile groups are for per-capita household disposable income. The "modified OECD" equivalence scale is used for computing per-capita figures (with weights 1 for the first adult, 0.5 for further adults and 0.3 for children aged under 14). Working age is 18-59. The table shows, for working age individuals, the sum total of per-capita social benefits as a percentage of the sum total of per-capita disposable income. Disposable income is current cash market income plus cash social benefits minus taxes minus own social insurance contributions.

Table II: Welfare Effects from Tax Reform under Different Profiles for the Participation Elasticity

	A. η = 0.2 (on average) and ε = 0.1				B. η = 0 and ε = 0.1				C. η = 0.2 (on average) and ε = 0.1 η is concentrated more in the bottom deciles			
	Demogrant Policy		Working Poor Policy		Demogrant Policy		Working Poor Policy		Demogrant Policy		Working Poor Policy	
Country	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off
Austria	-0,38	3,04	-0,08	1,50	-0,16	1,57	-0,16	2,16	-0,28	2,29	-0,01	1,04
Belgium	-0,57	4,83	-0,14	1,93	-0,25	1,87	-0,25	3,45	-0,46	3,41	0,07	0,74
Denmark	-0,81	23,82	2,87	0,00	-0,23	2,28	-0,23	4,50	-0,82	23,98	---- No Losers ----	
Finland	-0,59	6,33	-0,21	4,82	-0,24	2,11	-0,24	6,32	-0,53	5,24	-0,09	1,83
France	-0,51	4,32	0,07	0,76	-0,17	1,61	-0,17	2,39	-0,43	3,32	0,26	0,37
Germany	-0,50	4,38	-0,12	1,89	-0,19	1,72	-0,19	2,67	-0,37	2,91	-0,01	1,08
Greece	-0,21	1,66	-0,05	1,29	-0,10	1,26	-0,10	1,59	-0,16	1,49	-0,03	1,15
Ireland	-0,39	2,73	0,26	0,39	-0,14	1,42	-0,14	1,82	-0,34	2,41	0,93	0,07
Italy	-0,32	2,07	-0,12	1,96	-0,16	1,43	-0,16	2,62	-0,28	1,87	-0,07	1,46
Luxembourg	-0,26	1,98	-0,06	1,29	-0,12	1,38	-0,12	1,71	-0,20	1,70	-0,03	1,12
Netherlands	-0,36	2,88	-0,07	1,37	-0,15	1,56	-0,15	2,10	-0,28	2,26	0,03	0,88
Portugal	-0,29	2,34	0,00	0,99	-0,13	1,44	-0,13	1,68	-0,25	2,05	0,08	0,77
Spain	-0,19	1,52	0,00	0,99	-0,07	1,16	-0,07	1,34	-0,14	1,38	0,04	0,86
United Kingdom	-0,22	1,88	-0,01	1,06	-0,09	1,30	-0,09	1,48	-0,17	1,59	0,04	0,86

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.

Notes:

η denotes the participation elasticity, and ε denotes the hours-of-work elasticity which is assumed constant across deciles.

Efficiency denotes the marginal efficiency cost of the extra-tax used to finance the extra welfare benefits (a negative number is an efficiency loss).

Trade-off denotes the ratio of the welfare loss of losers to the welfare gains of gainers from the reform.

In Panel A, η=0.4 in deciles 1 and 2, η=0.3 in deciles 3 and 4, η=0.2 in deciles 5 and 6, η=0.1 in deciles 7 and 8, η=0 in deciles 9 and 10.

In Panel B, η=0 in all deciles.

In Panel C, η=0.8 in decile 1, η=0.6 in decile 2, η=0.4 in decile 3, η=0.2 in decile 4, η=0 in deciles 5 to 10.

The tax and benefits computations include a fraction of Unemployment Benefits equal to the ratio of beneficiaries to those non-working.

Table III: Welfare Effects from Tax Reform under Different Levels for the Participation Elasticity

	$A.\ \eta$ = 0.1 (on average) and ε = 0.1				$B.\ \eta$ = 0.3 (on average) and ε = 0.1			
	Demogrant Policy		Working Poor Policy		Demogrant Policy		Working Poor Policy	
Country	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off
Austria	-0,22	1,90	-0,09	1,57	-0,42	3,47	0,07	0,73
Belgium	-0,35	2,51	-0,14	2,00	-0,65	6,58	0,42	0,19
Denmark	-0,52	6,42	0,21	0,35	---- No Gainers ----		---- No Losers ----	
Finland	-0,38	3,31	-0,19	3,97	-0,72	10,66	0,02	0,87
France	-0,30	2,31	-0,04	1,18	-0,62	6,37	1,13	0,04
Germany	-0,28	2,23	-0,12	1,86	-0,56	5,42	0,11	0,58
Greece	-0,13	1,37	-0,07	1,37	-0,23	1,75	0,00	1,02
Ireland	-0,24	1,84	0,13	0,61	-0,47	3,49	2,57	0,00
Italy	-0,22	1,63	-0,12	2,01	-0,37	2,33	-0,04	1,23
Luxembourg	-0,16	1,53	-0,08	1,40	-0,28	2,11	0,02	0,93
Netherlands	-0,22	1,88	-0,08	1,46	-0,41	3,35	0,11	0,61
Portugal	-0,19	1,72	-0,05	1,18	-0,34	2,69	0,19	0,55
Spain	-0,11	1,26	-0,02	1,09	-0,21	1,61	0,08	0,71
United Kingdom	-0,13	1,44	-0,04	1,15	-0,24	2,00	0,09	0,69

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.

Notes:

η denotes the participation elasticity, and ε denotes the hours-of-work elasticity which is assumed constant across deciles.

Efficiency denotes the marginal efficiency cost of the extra-tax used to finance the extra welfare benefits (a negative number is an efficiency loss).

Trade-off denotes the ratio of the welfare loss of losers to the welfare gains of gainers from the reform.

In Panel A, η=0.4 in decile 1, η=0.3 in decile 2, η=0.2 in decile 4, η=0.1 in deciles 4, η=0 in deciles 5 to 10.

In Panel B, η=0.8 in deciles 1 and 2, η=0.5 in deciles 3 and 4, η=0.2 in deciles 5 and 6, η=0 in deciles 7 to 10.

The tax and benefits computations include a fraction of Unemployment Benefits equal to the ratio of beneficiaries to those non-working.

Table IV: Welfare Effects from Tax Reform under Different Levels for the Hours-of-Work Elasticity

	$A.\ \eta$ = 0.2 (on average) and ε = 0				$B.\ \eta$ = 0.2 (on average) and ε = 0.2			
	Demogrant Policy		Working Poor Policy		Demogrant Policy		Working Poor Policy	
Country	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off
Austria	-0,22	1,89	0,15	0,53	-0,53	5,03	-0,31	5,00
Belgium	-0,32	2,32	0,36	0,23	-0,82	14,78	-0,63	36,55
Denmark	-0,59	8,21	7,65	0,00	---- No Gainers ----		---- No Gainers ----	
Finland	-0,35	3,03	0,25	0,27	-0,83	18,52	---- No Gainers ----	
France	-0,33	2,54	0,44	0,22	-0,68	8,20	-0,31	5,66
Germany	-0,31	2,45	0,21	0,38	-0,69	9,17	-0,46	12,20
Greece	-0,11	1,31	0,06	0,77	-0,30	2,13	-0,17	2,36
Ireland	-0,25	1,86	0,55	0,16	-0,53	4,18	-0,03	1,12
Italy	-0,16	1,42	0,10	0,63	-0,49	3,16	-0,33	8,50
Luxembourg	-0,13	1,41	0,10	0,70	-0,38	2,82	-0,22	2,71
Netherlands	-0,21	1,82	0,16	0,50	-0,51	4,75	-0,29	4,20
Portugal	-0,16	1,57	0,19	0,55	-0,42	3,53	-0,18	2,12
Spain	-0,12	1,30	0,09	0,71	-0,25	1,79	-0,08	1,43
United Kingdom	-0,13	1,44	0,10	0,66	-0,32	2,49	-0,13	1,76

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.

Notes:

η denotes the participation elasticity, and ε denotes the hours-of-work elasticity which is assumed constant across deciles.

Efficiency denotes the marginal efficiency cost of the extra-tax used to finance the extra welfare benefits (a negative number is an efficiency loss).

Trade-off denotes the ratio of the welfare loss of losers to the welfare gains of gainers from the reform.

In both Panels A and B, η=0.4 in deciles 1 and 2, η=0.3 in deciles 3 and 4, η=0.2 in deciles 5 and 6, η=0.1 in deciles 7 and 8, η=0 in deciles 9 and 10.

In Panel A, ε=0 in all deciles and in Panel B, ε=0.2 in all deciles.

The tax and benefits computations include a fraction of Unemployment Benefits equal to the ratio of beneficiaries to those non-working.

Table V: Welfare Effects from Tax Reform excluding Unemployment Benefits

	A. η = 0.2 (on average) and ε = 0.1				B. η = 0 and ε = 0.1				C. η = 0.2 (on average) and ε = 0.1 η is concentrated more in the bottom deciles			
	Demogrant Policy		Working Poor Policy		Demogrant Policy		Working Poor Policy		Demogrant Policy		Working Poor Policy	
Country	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off
Austria	-0,36	2,85	-0,09	1,56	-0,16	1,57	-0,16	2,16	-0,27	2,21	-0,02	1,12
Belgium	-0,52	4,03	-0,18	2,41	-0,25	1,87	-0,25	3,45	-0,42	3,02	-0,05	1,25
Denmark	-0,72	14,63	0,35	0,20	-0,23	2,28	-0,23	4,50	-0,70	13,26	13,80	0,00
Finland	-0,51	4,93	-0,22	5,43	-0,24	2,11	-0,24	6,32	-0,47	4,24	-0,14	2,78
France	-0,41	3,18	-0,05	1,23	-0,17	1,61	-0,17	2,39	-0,35	2,69	0,06	0,78
Germany	-0,48	4,14	-0,13	1,95	-0,19	1,72	-0,19	2,67	-0,36	2,84	-0,03	1,17
Greece	-0,20	1,62	-0,06	1,33	-0,10	1,26	-0,10	1,59	-0,16	1,47	-0,04	1,20
Ireland	-0,38	2,70	0,24	0,41	-0,14	1,42	-0,14	1,82	-0,34	2,38	0,85	0,08
Italy	-0,32	2,05	-0,12	1,98	-0,16	1,43	-0,16	2,62	-0,28	1,85	-0,07	1,49
Luxembourg	-0,25	1,95	-0,07	1,31	-0,12	1,38	-0,12	1,71	-0,20	1,69	-0,03	1,15
Netherlands	-0,34	2,70	-0,08	1,47	-0,15	1,56	-0,15	2,10	-0,27	2,17	0,00	1,01
Portugal	-0,28	2,29	-0,01	1,04	-0,13	1,44	-0,13	1,68	-0,24	2,00	0,05	0,84
Spain	-0,15	1,39	-0,03	1,12	-0,07	1,16	-0,07	1,34	-0,12	1,30	-0,01	1,03
United Kingdom	-0,22	1,87	-0,02	1,08	-0,09	1,30	-0,09	1,48	-0,17	1,58	0,03	0,89

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.

Notes:

η denotes the participation elasticity, and ε denotes the hours-of-work elasticity which is assumed constant across deciles.

Efficiency denotes the marginal efficiency cost of the extra-tax used to finance the extra welfare benefits (a negative number is an efficiency loss).

Trade-off denotes the ratio of the welfare loss of losers to the welfare gains of gainers from the reform.

In Panel A, η=0.4 in deciles 1 and 2, η=0.3 in deciles 3 and 4, η=0.2 in deciles 5 and 6, η=0.1 in deciles 7 and 8, η=0 in deciles 9 and 10.

In Panel B, η=0 in all deciles.

In Panel C, η=0.8 in decile 1, η=0.6 in decile 2, η=0.4 in decile 3, η=0.2 in decile 4, η=0 in deciles 5 to 10.

The tax and benefits computations exclude completely Unemployment Benefits.

Table VI: Welfare Effects from Tax Reform where the Participation Elasticities are Concentrated on Married Women and Lone Parents

	A. η = 0.2 (on average) and ε = 0.1				*B*. η = 0.2 (on average) and ε = 0.1 η is concentrated more in the bottom deciles			
	Demogrant Policy		Working Poor Policy		Demogrant Policy		Working Poor Policy	
Country	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off	Efficiency	Trade-Off
Austria	-0,29	2,30	-0,05	1,26	-0,25	2,07	-0,01	1,03
Belgium	-0,51	3,96	-0,03	1,15	-0,43	3,10	0,08	0,69
Denmark	-0,81	23,75	---- No Losers ----		-0,80	21,13	---- No Losers ----	
Finland	-0,46	4,13	-0,20	4,61	-0,40	3,52	-0,17	3,41
France	-0,39	2,98	-0,03	1,13	-0,31	2,36	0,03	0,89
Germany	-0,42	3,38	-0,07	1,40	-0,33	2,59	-0,02	1,10
Greece	-0,16	1,48	-0,07	1,36	-0,13	1,37	-0,06	1,32
Ireland	-0,27	1,96	0,02	0,91	-0,23	1,76	0,10	0,69
Italy	-0,27	1,80	-0,11	1,85	-0,24	1,70	-0,08	1,55
Luxembourg	-0,20	1,69	-0,06	1,28	-0,18	1,60	-0,04	1,17
Netherlands	-0,28	2,28	0,02	0,93	-0,26	2,13	0,10	0,62
Portugal	-0,25	2,08	-0,01	1,04	-0,21	1,85	0,01	0,96
Spain	-0,14	1,36	-0,01	1,02	-0,12	1,29	0,01	0,95
United Kingdom	-0,18	1,64	0,00	1,02	-0,14	1,49	0,02	0,92

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.

Notes:

η denotes the participation elasticity, and ε denotes the hours-of-work elasticty which is assumed constant across deciles.

Efficiency denotes the marginal efficiency cost of the extra-tax used to finance the extra welfare benefits (a negative number is an efficiency loss).

Trade-off denotes the ratio of the welfare loss of losers to the welfare gains of gainers from the reform.

For lone parents and married women, the participation elasticities are as follows:

In Panel A, η=0.9 in deciles 1 and 2, η=0.6 in deciles 3 and 4, η=0.4 in deciles 5 and 6, η=0.2 in deciles 7 and 8, η=0 in deciles 9 and 10.

In Panel B, η=1.5 in decile 1, η=1.0 in decile 2, η=0.5 in decile 3, η=0.3 in decile 4, η=0 in deciles 5 to 10.

For all other groups (singles and married men), the participation elasticities are zero.

In both Panels A and B ε=0.1 in all deciles.

The tax and benefits computations include a fraction of Unemployment Benefits equal to the ratio of beneficiaries to those non-working.

Table VII: Majority Support and Redistributive Consequences

	Demogrant Policy	Working Poor Policy					
	Share of Population Gaining	Share of Employed Gaining	Share of Gainers Across Family Income Quintiles				
			First	Second	Third	Fourth	Fifth
Country	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Austria	0,37	0,50	0,74	0,66	0,49	0,41	0,19
Belgium	0,39	0,49	0,84	0,63	0,50	0,32	0,16
Denmark	0,19	1,00	1,00	1,00	1,00	1,00	1,00
Finland	0,27	0,40	0,75	0,45	0,35	0,29	0,14
France	0,37	0,70	0,96	0,90	0,80	0,55	0,28
Germany	0,34	0,40	0,74	0,52	0,34	0,25	0,16
Greece	0,48	0,60	0,87	0,61	0,64	0,54	0,34
Ireland	0,46	0,72	0,92	0,82	0,75	0,64	0,44
Italy	0,50	0,50	0,72	0,60	0,57	0,35	0,24
Luxembourg	0,45	0,60	0,96	0,78	0,61	0,47	0,17
Netherlands	0,39	0,50	0,67	0,59	0,55	0,44	0,25
Portugal	0,40	0,70	0,96	0,85	0,82	0,66	0,21
Spain	0,53	0,59	0,90	0,68	0,63	0,52	0,19
United Kingdom	0,47	0,60	0,88	0,76	0,66	0,47	0,23

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.

Notes:

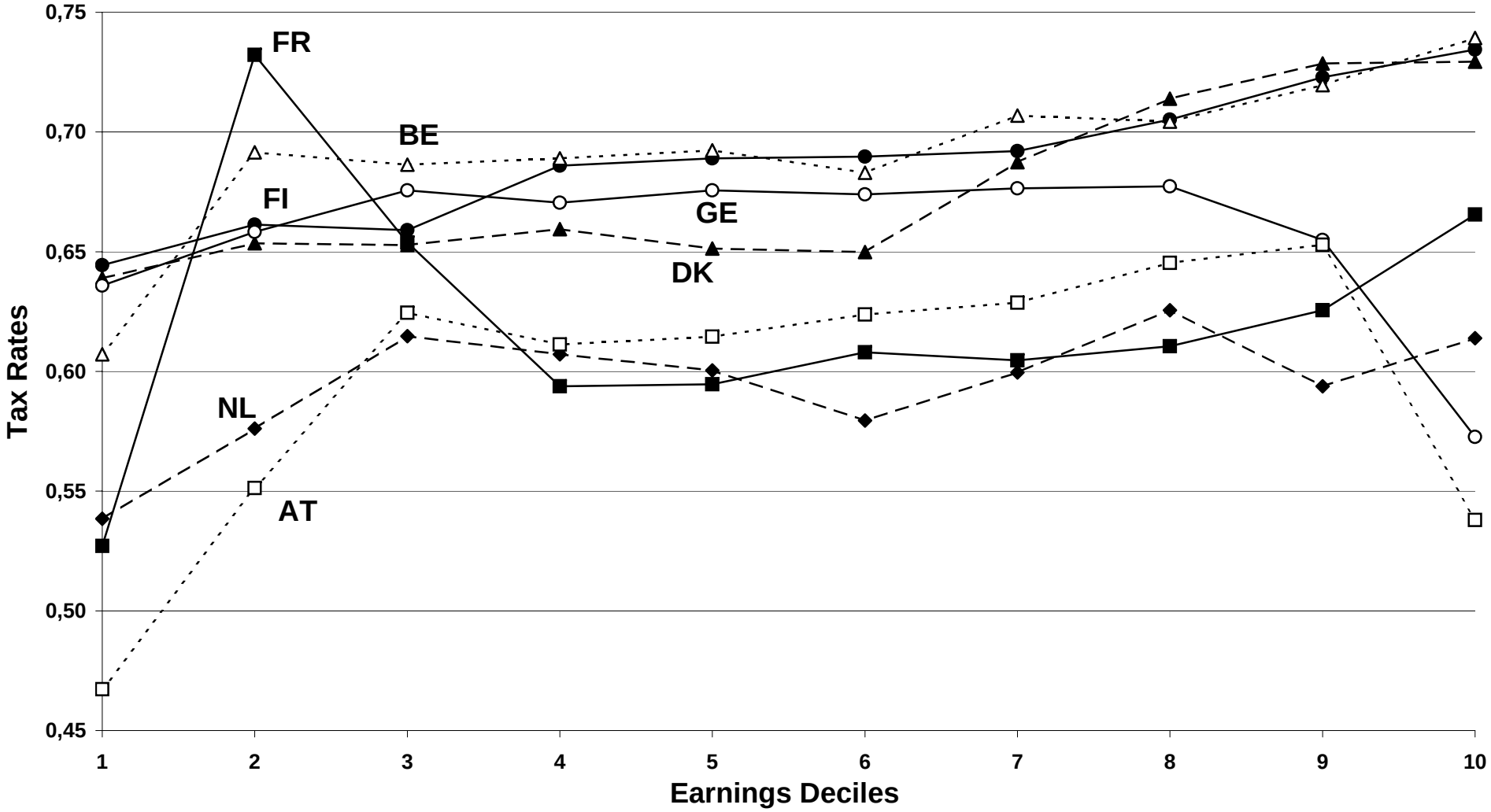
The simulation is based on the benchmark scenario with hours-of-work elasticity ε=0.1 and participation elasticities η=0.4 in deciles 1 and 2, η=0.3 in deciles 3 and 4, η=0. deciles 5 and 6, η=0.1 in deciles 7 and 8, η=0 in deciles 9 and 10.

Column (1) reports the fraction of the population gaining from the demogrant policy.

Column (2) reports the fraction of the employed population gaining from the working poor policy (those not working are not affected by the policy).

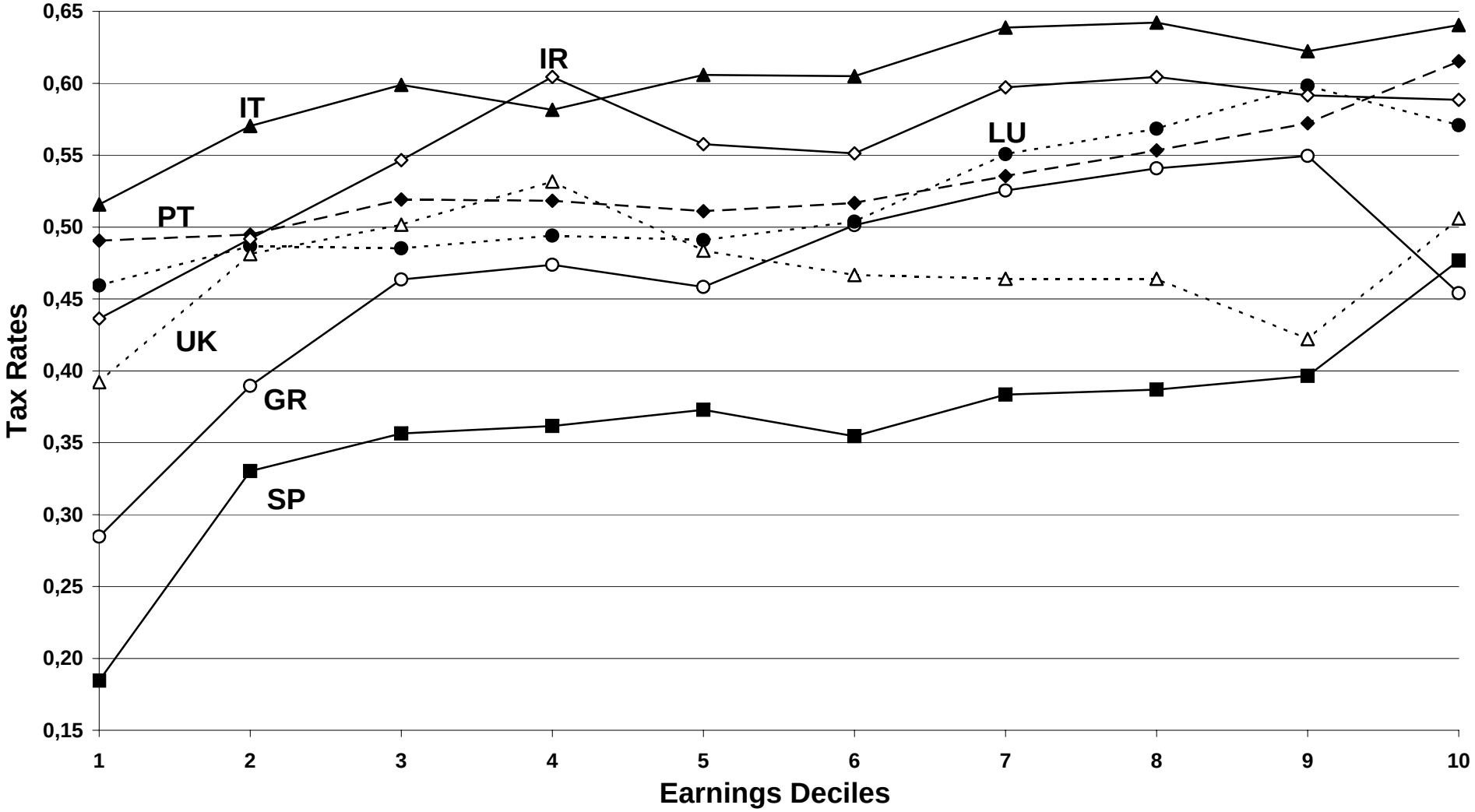
Columns (3) to (7) report the fraction of individuals gaining from the working poor policy in each quintile (defined based on family disposable income).

Figure 1: Effective Marginal Tax Rates for High-Tax Countries



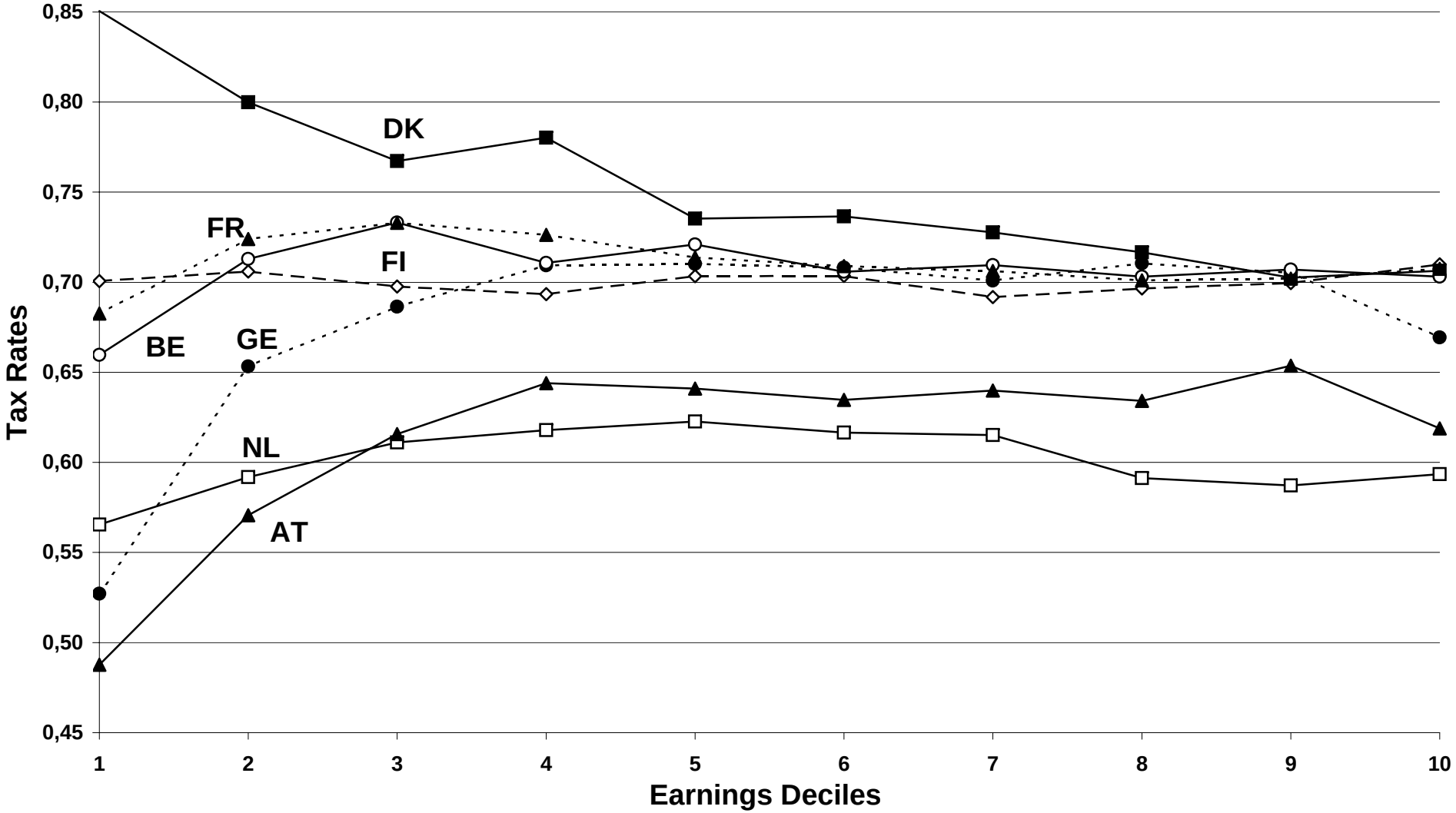
Source: EUROMOD tax and benefit calculations.
Note: The earnings deciles are based on individual earnings of those aged 18 to 59 who have been working the full year. The effective marginal tax rate is computed by increasing earnings of the individual by 3% and measuring the change in all taxes and benefits relative to the increase in earnings.

Figure 2: Effective Marginal Tax Rates for Low-Tax Countries



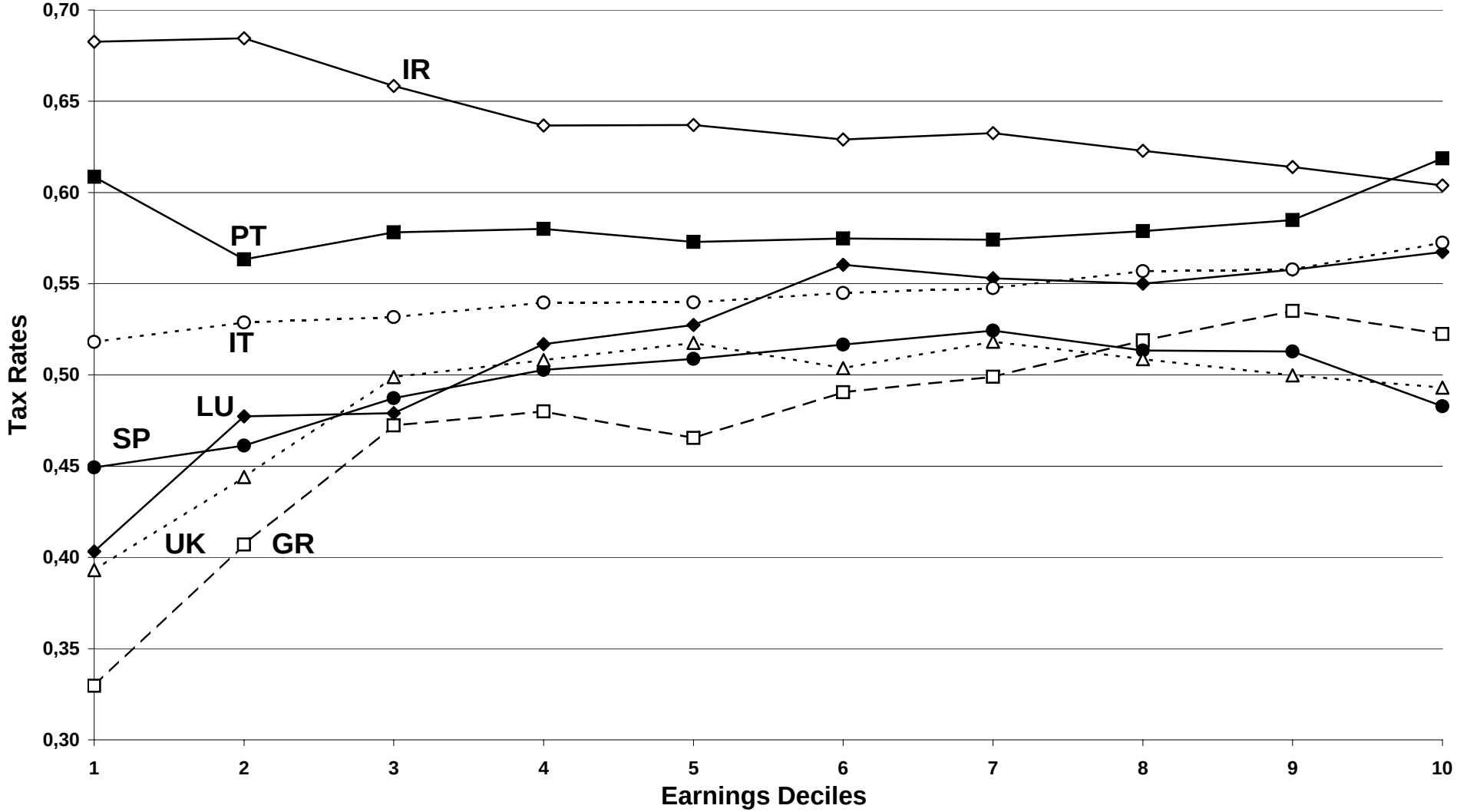
Source: EUROMOD tax and benefit calculations.
Note: The earnings deciles are based on individual earnings of those aged 18 to 59 who have been working the full year. The effective marginal tax rate is computed by increasing earnings of the individual by 3% and measuring the change in all taxes and benefits relative to the increase in earnings.

Figure 3: Participation Tax Rates for High-Tax Countries



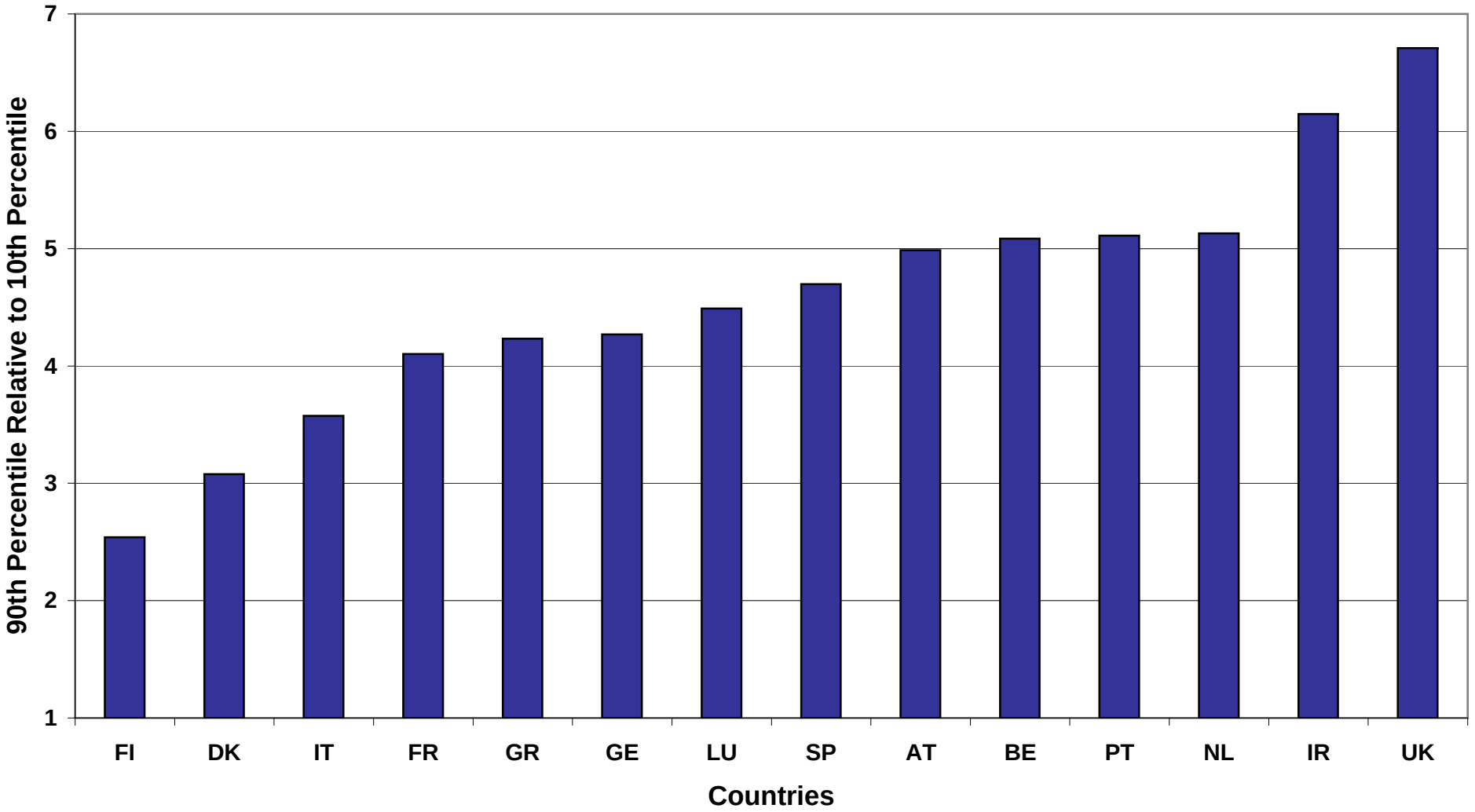
Source: EUROMOD tax and benefit calculations.
Note: The earnings deciles are based on individual earnings of those aged 18 to 59 who have been working the full year. The participation tax rate is computed by setting earnings equal to zero and measuring the change in all taxes and benefits as a share of the actual earnings of the individual.

Figure 4: Participation Tax Rates for Low-Tax Countries



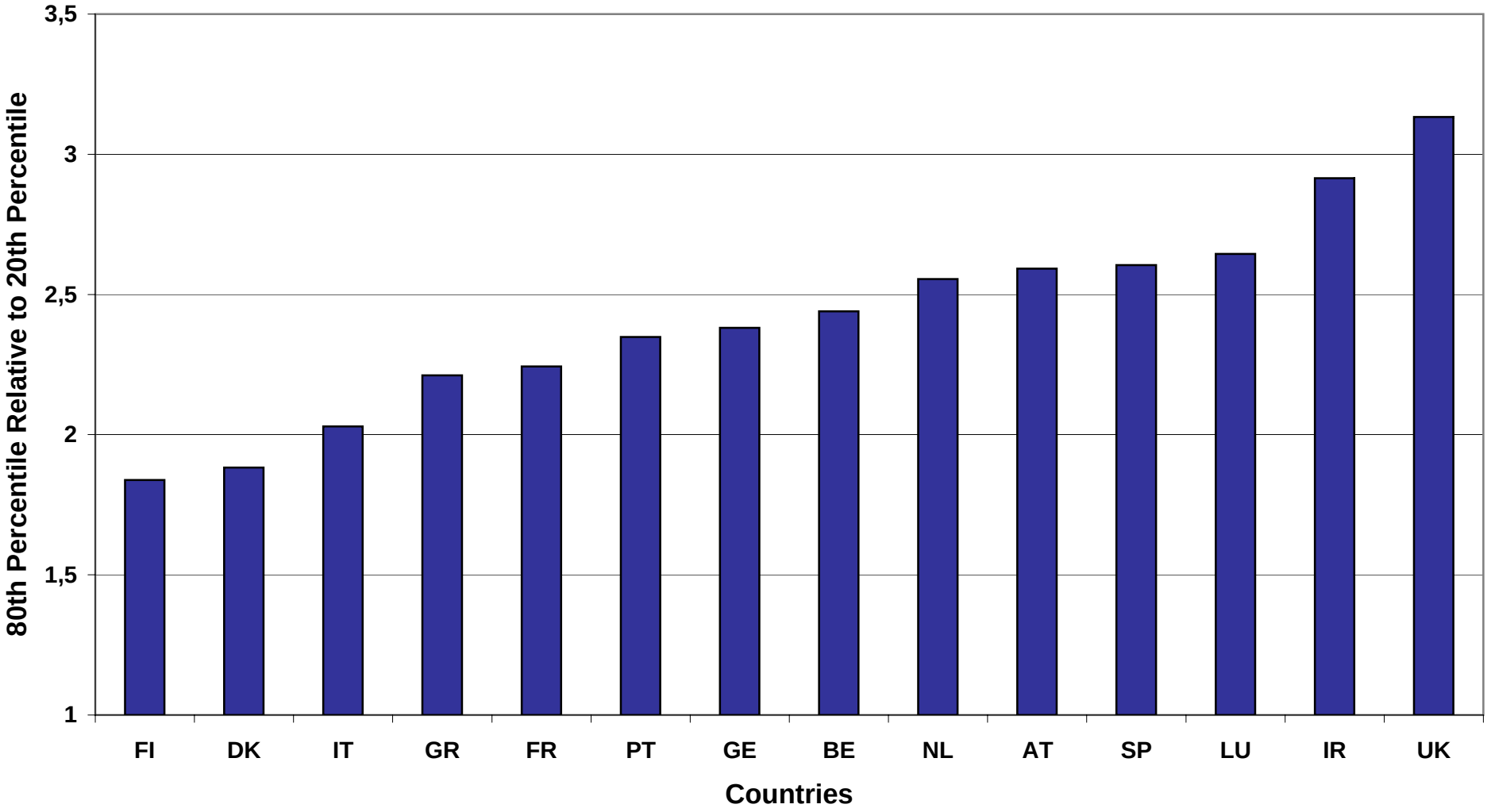
Source: EUROMOD tax and benefit calculations.
Note: The earnings deciles are based on individual earnings of those aged 18 to 59 who have been working the full year. The participation tax rate is computed by setting earnings equal to zero and measuring the change in all taxes and benefits as a share of the actual earnings of the individual.

Figure 5: Earnings Inequality



Source: EUROMOD calculations.
Note: The earnings deciles are based on individual earnings of those aged 18 to 59 who have been working the full year.

Figure 6: Earnings Inequality



Source: EUROMOD calculations.
Note: The earnings deciles are based on individual earnings of those aged 18 to 59 who have been working the full year.

Table A1: Taxes on workers, 1998 (rates shown for a single full-time blue-collar private sector employee with no other income and no non-standard expenses)

	VAT	Income Tax[7]					employee SSC				employer SSC					
	standard rate [%]	lowest/highest tax band limit[1,2]	lowest/highest rate [%]	main tax credit[1]	tax unit	family-related tax provisions	thres-hold[1]	rate [%]	ceiling[1]	tax deductible	thres-hold[1]	rate [%]	ceiling[1]	taxable	features reducing METR	features increasing METR
Austria	20	17/231	21/50 4 rates	5	individual	deduction for single earners; tax credits for lone parents	15	18.8	193	yes	15 -	21.3 4.5	49000 -	no		for a 2nd earner: phase-out of single-earner credit
Belgium	21	24/318	25/55 7 rates	-	individual	parts of taxable income transferrable to spouse; additional tfa for children and lone parents	-	11.9	-	yes	-	45.4	-	no		for a 2nd earner: phase-out of amount transferrable from higher-earning spouse
Denmark	25	12/100	40/59[4] 3 rates	-	individual	unused deductions transferrable to spouse	-	9 + flat amnt	-	yes	-	2.0 + flat amnt	-	no		
Finland	22	35/223	24/56[4] 6 rates	-	individual		- 58	7.6 0.5	-	yes	-	24.5	-	no	earned income tax allowance of 20% of taxable earnings above 11	phase out of earned income tax allowance for earnings > 31; and basic allowance for taxable earnings > 76
France	20.6	30/336	11/54 6 rates	-	family		- - - 136 -	0.9 9.6 2.8[4] 3.6 7.6	- 136 409 545 -	yes yes yes yes partly	- - - 136	19.8 13.4 4.1 5.3	- 136 409 545	no	reductions of marginal employer contributions rates of up to about 60% for wages < 130% min. wage.	
Germany	16	30 133 252	27.3 37.2 55.7[5]	-	family	choice of tfa or child benefit	15	7.7 13.4	156 208	yes	15	7.7 13.4	156 208	no		
Greece	18	56/478	5/45 5 rates	max. 15% of accepted hshld. expendit.	individual	0.9-1.8 non-refundable tax credit per child	-	15.9	200; none for new jobs	yes	-	28.2	200; none for new jobs	no		
Ireland	21	25/80	24/46 2 rates	-	family (individual optional)	-	41 86	4.5 2.3	193 -	no	- 112 -	8.5 12.0 4.0	12 231 231	no	tax reduced to zero for income below 33 (higher limit if children)	tax reduction phased out above the 33 limit.
Italy	20	0/118	19/46 5 rates	up to 6	individual	up to 2 tax credit per dependent family members	- 56	9.0[4] 1	-	yes	-	33.0[4]	-	no		for 2nd earner: tax credit for dependent spouse phased out; main tax credit slowly phased out for incomes > 30
Luxembourg	15	25/250	6/47 17 rates	-	family	deductions for lone parents and care expenditure; 3 tax credit per child	-	13.1	259	yes	-	14.6[4]	259	no	for 2nd earner: 17 additional (joint) deduction if both spouses work	
Netherlands	17.5	20/212	36[8]/60 3 rates	-	individual	additional 1240 tfa for lone parents	54 -	5.3 1.7	156 105	yes no	54 - -	6.4 5.6 7.9[4]	156 105 156	no yes no		
Portugal	17	0/490	5[9]/40 5 rates	3	family	additional 1.5 tax credit per child	-	11	-	no	-	23.8	-	no		
Spain	16	22/492	20/56 8 rates	3	family (individual optional)	up to 2 tax credit per child (plus additional amounts in some regions)	46	30.8	177	yes	46	6.4	177	no	earners if income below 55 are exempt from tax	"spike" in METR once above exemption limit; phase out of main tax credit adds 5 pct. points to METR
United Kindgom	17.5	29/220	20/40 3 rates	-	individual	2 tax credit for married couples; 13 tax deduction for lone parents	23	8.4 to 10	177	no	23[10] 40 56 76	3 5 7 10	-	no		

Notes: tfa = tax free allowance

[1] in % of median gross employment income (not including employer social security contributions)

[2] after adding any standard tax free allowances, deductions or exemptions available to single employees

[3] insurance is voluntary

[4] averages: rates differ between municipalities and/or employers

[5] Including "Solidarity Surplus Tax" for German unification. MTR increases linearly inbetween lower and middle; and middle and top tax band limits.

[6] West Germany

[7] including regional income taxes where applicable

[8] including pension contributions (same tax base as income tax)

[9] effective rate taking into account the allowance of 70% of the tax base for low incomes

[10] ***all*** earnings are subject to the applicable rate once they exceed these threshold levels

Table A2: Social Benefits available to persons of working-age, 1998(rates shown for single benefit recipients)

	Social Assistance				Housing Benefit		Family Benefits		In-work Benefits			Unemployment Benefits[2]			
	max. amount[1]	disregard[1]	withdrawal rate	taxable	max. amount[1]	withdrawal rate	amount[1]	withdrawal rate	amount[1]	work/income conditions	withdrawal rate	floor	rate; amount	ceiling	taxable
Austria	32	-	100%	IT: no SSC: no	-	-	5-7 per child	-	-	-	-	7	55% of net	min(56, 80% of net)	IT: no SSC: no
Belgium	39	9	100%	IT: no SSC: no	-	-	4-13 per child; additional supplements if not working	-	-	-	-	31 (if previous job full-time)	60% of gross	48 (if previous job full-time)	IT: reduced SSC: no
Denmark	34 (+ housing allowance)	up to 9	100%	IT: yes SSC: no	3 (no children); 14 (>3 children)	75%	3-4 per child; higher for one parents; plus day-care subsidy	-	-	-	-	56 (if previous job full-time)	90% of (gross minus SSC)	68	IT: yes SSC: partly
Finland	18 (+reasonable housing cost)	-	100%	IT: no SSC: no	17	80%	5-9 per child; plus 2 per child for lone parents; plus day-care subsidy	-	-	-	-	22	up to 42% of net exceeding 22	-	IT: no SSC: no
France	24; (plus lone parent benefit of 31+10 per child)	-	100%	IT: no SSC: no	ca. 15	ca. 34%	main benefit: 7 to 12 for second & further children; special benefits for young children	main benefit: 100% once income > 174-261	-	-	-	30	57-75% of gross	313	IT: yes SSC: yes
Germany	13[3]	4	75-100%	IT: no SSC: no	ca. 25	ca. 40%	5-9 per child; plus 5-7 child raising benefits for very young children	young child raising benefit: 20-40% once income > 62	-	-	-	-	60% of net	125	IT: no SSC: no
Greece	-	-	-	-	-	-	0.5-1 per child plus additions for large families	reduced in steps for incomes > 65	-	-	-	28	40-70% of gross	min(126, 70% of gross)	IT: reduced SSC: no
Ireland	29 (+housing supplements)	19 for partner's income	100%	IT: no SSC: no	see Social Assistance		3-4 per child	-	60% of difference between family gross earnings and ca. 88 (higher limit for larger families)	couple jointly working at least 20 hours per week	60% (of gross earnings)	-	138 to 305 depending on previous gross earnings	-	IT: reduced SSC: no
Italy	none at the national level				none at the national level		see employment-conditional benefits		ca. 3-17 per family member (also spouses) depending on family type	must work at least 3 days per week; reduced benefits if working less than full-time	reduced in steps for incomes > ca. 73 at rates of ca. 6-10%	-	30% of gross	66	IT: yes SSC: no
Luxembourg	37	7	100%	IT: yes SSC: reduced	6 (must receive Social Assistance)	100%	8-13 per child; plus education allowance for children aged 3-	-	-	-	-	-	80% of gross; reduced by partner's income > 130	130	IT: yes SSC: yes
Netherlands	24	-	100%	yes but amount shown is net of tax	6 (for low rents)	ca. 54%	2-7 per child	-	-	-	-	41 (if previous job full-time)	70% of gross	156	IT: yes SSC: yes
Portugal	20	-	80%	IT: no SSC: no	none at the national level		4 per child	reduced to 3 per child once income > 71	-	-	-	49 (if previous job full-time)	65% of gross	146	IT: no SSC: no
Spain	none at the national level				none at the national level		2 for first child, 0.2 for further children	100% of income > 55	-	-	-	33	0.7 of gross	75	IT: yes SSC: reduced
United Kindgom	18	2-4	100%	IT: no SSC: no	100% of recognised rent; 100% of council tax	65% (housing benefit); 20% (council tax benefit)	3-5 per child	-	18 + up to 13 per child + 4 if working > 30 hours per week; only entitled if >= 1 child	at least one person working >= 16 hours per week	70% of income > 29	18	18	18	IT: yes SSC: no

Notes: tfa = tax free allowance; IT = income tax; SSC = social security contributions

[1] in % of median gross employment income (not including employer social security contributions)

[2] shown for initial phase of unemployment (after any waiting period if applicable) for persons aged 30+

[3] West Germany

Table A3. Aggregate Variables: Participation Rate, UI Recipients, and Consumption Tax

Country	Participation Rate 20-59 years old (1)	UI recipients / non working population (2)	Consumption Tax Rate (3)
Austria	75.1%	9.0%	20.8%
Belgium	67.6%	21.1%	17.7%
Denmark	80.8%	21.4%	36.6%
Finland	73.0%	28.1%	31.3%
France	70.1%	31.4%	20.1%
Germany	73.7%	13.8%	16.1%
Greece	64.3%	9.7%	16.4%
Ireland	67.9%	8.8%	27.7%
Italy	55.9%	7.3%	15.5%
Luxembourg	69.2%	4.3%	24.5%
Netherlands	76.0%	12.7%	19.6%
Portugal	75.1%	14.1%	23.3%
Spain	58.7%	23.1%	14.8%
United Kingdom	76.2%	10.0%	17.5%

Source: Columns (1) and (2): OECD Labour Force Statistics. Columns (3): OECD National Accounts (2003), Volume II, 1990-2001 and OECD Revenue Statistics (2002), 1965-2001

Notes: All figures are from 1998. Column (1) reports the fraction of the population aged 20 to 59 currently working. Column (2) reports the fraction of the non-working population (aged 20 to 59) that is unemployed and entitled to unemployment benefits. Column (3) reflects the authors' own calculations based on the methodology of Mendoza *et al.* (1994). Referring to OECD National Accounts and Revenue Statistics classification, the consumption tax rate is given by the ratio of the sum of general consumption taxes (5110) and excise taxes (5121) to national consumption expenditure which includes consumption by households (Cp), non-profit institutions (CNPIH) and government (G), but excludes government wage outlays (GW). The formula is (5110+5121)/(Cp+CNPIH+G-GW-(5110+5121)).

Table A4: Scenarios for the Participation Elasticity

Decile	Tables II, V Panel A and Table IV, VII	Tables II and V, Panel B and Table VI (males/singles)	Tables II and V, Panel C	Table III, Panel A	Table III, Panel B	Table VI Panel A (married women and lone parents only)	Table VI Panel B
1	0.4	0	0.8	0.4	0.8	0.9	1.5
2	0.4	0	0.6	0.3	0.8	0.9	1.0
3	0.3	0	0.4	0.2	0.5	0.6	0.5
4	0.3	0	0.2	0.1	0.5	0.6	0.3
5	0.2	0	0	0	0.2	0.4	0.0
6	0.2	0	0	0	0.2	0.4	0.0
7	0.1	0	0	0	0	0.2	0.0
8	0.1	0	0	0	0	0.2	0.0
9	0	0	0	0	0	0.0	0.0
10	0	0	0	0	0	0.0	0.0
Average	0.2	0	0.2	0.1	0.3	0.57	0.43

Notes: This table reports the participation elasticity assumptions by decile used in Tables II, III, IV, V and VI. The average is the unweighted population average except in Table VI Panels A and B where employment weights for each decile are used. For Table VI, the participation elasticities are set as displayed in the Table for lone parents and married women and set equal to zero for singles and married men.