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 reforms in each of the 15 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 extra taxes uniformly to everybody (traditional welfare) while the second reform distributes tax proceeds (uniformly) to workers only (earnings credit). We build a simple model of labor supply encompassing responses to taxes and transfers along the intensive and extensive margin. We then use the EUROMOD to describe current welfare and tax systems in all 15 European countries and use calibrated labor supply elasticities along the intensive and extensive margins to analyze the effects of the two welfare reforms. We precisely quantify the equality-efficiency tradeoff for a range of elasticity parameters. In most countries, because of the large existing welfare programs with high phasing-out rates, the uniform redistribution policy is, in general, undesirable unless the redistributive tastes of the government are extreme. Redistribution to workers, however, 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 on Table 1, most European countries devote a sizeable amount of public spending to provide support for low incomes 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 is given to everybody quickly phased-out as earnings increase. In this type of welfare program,

[1] Those computations were made using the EUROMOD described in Section 3 and include all types of transfers. The numbers reported are the sum of 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 as an important issue 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 15 European 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 the 15 member countries of the European Union. 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 15 European 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, 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 15 European countries. 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 additionel 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 extra-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) because we incorporate the extensive margin of labor supply response in the analysis.

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 all 15 European countries, and applies the theoretical framework to the practical analysis of welfare reform in each country. Finally, Section 4 offers some concluding comments, and discussed 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 prefererences 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 heteregeneous 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 model has been used by Dahlby (1998) to analyze the marginal cost of public funds. 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 ($l > 0$). This utility function displays no income effects on the labor supply decision which is consistent with empirical studies (see e.g., Pencavel, 1986) and simplifies considerably the theoretical analysis (Diamond, 1998, and Saez, 2001). We come back to this assumption later on. 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 as depicted on Figure 1, and W_j denotes the net-of-tax wage rate. The optimal working hours depends 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. Let us 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. All individuals with q below q_j defined as,

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

decide to enter the labor market. 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 defined as the difference in utility when working (and supplying optimal labor l_j) and when not working (and collecting welfare 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.

Following Saez (2002), we define the extensive elasticity η_j for group j as the percentage change in workers in group j when the the difference in consumption when working $c_j =$

$w_j l_j - T(w_j l_j, z)$ and not working $c_0 = -T(0, z)$ changes by one percent. 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.

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 worthwile 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 we will in fact consider these disaggregated effects in an appendix [TO BE COMPLETED], the paper will focus mostly on a simple aggregate measure against which to evaluate the reform.

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

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

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 where there are no behavioral responses to taxes and transfers, redistributive taxation does not imply lower efficiency, 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 (the losers - those financing the welfare reform increase - loose more than the gainers - the beneficiaries of the welfare reform increase - gain), whereas if Ψ is less than one there is no conflict between the two (the gainers gain more than the losers loose from the reform).

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 the 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 the optimal hours of work does not affect utility as individual choose l to maximize utility. 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

[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 application of the envelope theorem.

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.

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 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. In experiments with increased redistribition towards the working poor, the last term in the denominator is equal to zero.

Since we are considering redistributive policies, the tax reform is revenue neutral. It is important to notice 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

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

with the first component reflecting 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 response (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

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

Now, 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 equality-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 $d\tau$ and returns the collected revenue in a lump sum fashion 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:

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

where TR is a lump sum transfer. Inserting these expressions in eq. (13) and setting dR/dz equal to zero, we obtain

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

where $a_j \equiv (T_j - T_0) / (w_j l_j)$ denotes the tax rate on labor market entry, and 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: a fraction D_d of the tax revenue collections (assuming no behavioral responses) vanishes due to the behavioral responses to taxation, thereby reducing the amount of money which may be returned as a lump sum transfer. However, in the special case of no labor supply responses along either the intensive or the extensive margins ($\varepsilon_j = \eta_j = 0 \; \forall j$), 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 ($\tau_j = a_j = 0 \; \forall j$), 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 (2002) in the context of the marginal cost of public funds.

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

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

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]

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

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.

2.4 Redistribution to the Working Poor

We now wish to 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 intepreted 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:

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

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

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

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 are positive on net. Consequently, a redistribution towards the working poor does not have to reduce 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 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 case where there is no labor supply response along the extensive margin (i.e., $\eta = 0$), the two tax reforms we have considered produce exactly the same behavioral responses (as the marginal tax rate is increased by τ in each case). It is illuminating the compare our efficiency and trade-off measures D and Ψ in that case.

Equations (15) and (18) show immediately that $D_d = D_w$, implying that the share of the projected mechanical increase in tax revenue that is lost through behavioral responses is the same for the two reforms. In other words, the extra deadweight burden (i.e., the difference between losses $-dL$ and gains dG from the reform) is the same in both cases. However, the absolute magnitude of the gains and losses are larger in the case of the demogrant policy than in the case of the in-work benefits. In the demogrant policy, the unemployed obtain transfers without paying any taxes, whereas in the working poor policy everybody getting transfers also pays taxes. This implies that the aggregate gain of the gainers and the aggregate loss of the losers tend to be lower in the working poor policy. Indeed, equations (16) and (19) show, that in the case $\eta = 0$, we always have $\Psi_w > \Psi_d$, i.e., the demogrant policy produces a more favorable efficiency-equality trade-off than the in-work benefits. This result shows, therefore, that, consistently with our intuition, absent any differences in behavioral responses, the demogrant policy is more "efficient" than the in-work benefits policy because it achieves a greater level of redistribution.

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

[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.

D, the trade-off measure Ψ becomes high. As the earnings distribution widens, gains and losses become bigger (more money is redistributed), and Ψ becomes lower.

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 microsimulation 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 analyzes. 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.[6]

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 we are able to capture all relevant effects on total household income of an earnings change for

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

a particular household member (see Immervoll, 2002 and Immervoll and O'Donoghue, 2002). All taxes and benefits are defined as of year 1998.[7]

In order to construct our 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. The deciles are based on pre-tax earnings. For our simulations, we estimate the number of individuals not working using OECD employment participation rates.

The marginal tax rate is computed by increasing actual earnings z of the individual by 3% and measuring the changes in all taxes and benefits $T'(z) = T(1.03 \cdot z) - T(z)/(.03 \cdot z)$. 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: $T(z) - T(0)$. We then divide this difference by earnings z to obtain the participation tax rate $T^P = [T(z) - T(0)]/z$. Marginal tax rates and participation tax rates by decile for each country are displayed on Figures 1-4 (and are reproduced in the appendix table).

• Typology of Taxes and Benefits

All European countries impose a number of taxes, primarily to raise revenue. There are three main types of taxes: income taxes, 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, low or very low income households do not pay income taxes, and marginal income tax rates for high income households can be substantial.[8] Income taxes can be raised at the National, Regional, and Municipal level.[9] Payroll taxes are taxes levied on employment income and in general are designed to finance pensions and health benefits. Payroll taxes are often shared between the employer and the employee and have a simple flat rate structure, often payroll taxes are capped above a given earnings level. The payroll tax rate can

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

[8]For example in France, only half of households are liable to the income tax and the top marginal income tax rate reaches 52%.

[9]All countries also impose income taxes on the profits of corporations.

be substantial, especially in countries with large public pension and health insurance systems. Finally, all European countries also impose large consumption taxes which take the form of Value Added Taxes (VAT). VAT rates are in general fairly uniform across commodities and are around 20% in most countries.[10] Our tax computations include a flat consumption tax for each country. Those tax rates are computed using aggregate statistics by the OECD on personal consumption and consumption taxes and are reported on Table A1, column (3).

All European governments provide a number of benefits and transfers which can have large effects on incentives to work. Most benefits provide a given amount conditional on meeting some requirements such as an earnings test, or family or demographic situation (e.g., child benefits). Some programs offer benefits independent of earnings, the main example being children or family allowances. For other programs, the level of benefits is a function of earnings and other income in the household. Such programs are targeted toward low incomes or the middle class and therefore benefits are phased-out as earnings increase, creating potentially large effects on participation and marginal tax rates. Some benefits may be lost completely when income reaches a certain threshold, creating a discontinuity in the budget set. For example, in 1998, housing benefits in Luxembourg or Belgium single parent families are not phased out but drop to zero once income exceeds a certain threshold.

There are five main types of benefits. First, many countries have *minimum income* benefits targeted to those with no or very little income, and taxed away at high rates. The goal of these programs is to insure that beneficiaries have a minimum disposable income. 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 the phasing out rate is 100% (above a small earnings disregard). These minimum income benefits may be almost universal as long as the household meets the earnings test (that is the case in France where the only requirement is to be above 25), or can be targeted to specific groups (for example, single parents benefits in [SAY WHICH COUNTRY] by definition are restricted to families with a single parent). Minimum income benefits are often more generous for certain groups such as single parent families, individuals with disabilities (disability benefits) or older individuals (minimum pensions).

Second, a number of benefits are conditional on meeting a number of characteristics and

[10]Some goods, most notably gasoline and cigarettes, can bear much higher surtaxes.

may not be targeted only to low incomes, although many of them are phased-out with earnings. For example, most countries provide benefits targeted to families with children or newly born children. Housing and education subsidies also fall into that category.

Third, a number of European countries provide in-work benefits that are targeted to those who are currently working. The first European countries to introduce such a program were the United Kingdom (in 19xx) and Ireland (in 19xx). 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 kids if one parent works at least 16 hours a week and earnings are below a given modest level.[11]. 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 has 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 has introduced an Earned Income Tax Allowance. In all cases, the new in-work benefits programs in Europe are still very 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 such an in-work benefit programs. Therefore and except for the United Kingdom and Ireland, our results can be interpreted as the welfare analysis of introducing those modest in-work benefits programs in a situation where such programs did not exist yet.

Fourth, all countries have some form of unemployment insurance benefits for those who loose their jobs. Those benefits are temporary (they expire after some maximum duration) or are conditional on participating in some type of active labour market program). By definition, unemployment insurance benefits are meant to replace lost earnings due to job loss until the person finds work again. Unemployment benefits require a special treatment as their duration is limited and not all non-working individuals are currently getting those benefits. 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,

[11]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.

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. As a result, in the presence of positive labor supply participation 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 the OECD 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. Those ratios are reported for each of the 14 countries in column (2) of Table A1 in Appendix. In principle, the ideal weight to use would be the fraction getting unemployment benefits when one leaves employment because of the reform, and the fraction who were getting unemployment benefits among those who join 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 (the situation which advantages most 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 other sample all individuals currently receiving pension benefits.

• **Marginal Tax Rates and Participation Tax Rates in Europe**

Comparing Tax Levels across Countries

Figure 1-4 display tremendous heterogeneity across countries in the levels of marginal and average tax rates. As is well known, southern European countries, most notably Greece and Spain and to a lesser extent Italy and Portugal, have much lower tax rates than Nordic countries such as Denmark and Finland. Atlantic countries, Ireland and the United Kingdom have relatively low tax rates as well. Continental countries, especially Belgium, France, and Germany, have relatively high tax rates (although lower than Nordic countries) while Austria, the Netherlands, and Luxembourg have tax rates intermediate between the other continental countries and the Atlantic countries.

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 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 large minimum income programs. In contrast, countries such as Greece, Luxembourg, Spain, and the United Kingdom have relatively lower tax rates at the bottom because they have either no or modest minimum income programs in place or propose in-work benefits which counter-balance the effects of social assistance.

Comparing Marginal Tax Rates and Participation Tax Rates

The participation tax rate is the average of marginal tax rates from 0 to current earnings z. For a given decile, the participation tax rate T^P will be lower than the marginal tax rate T' if the marginal tax rates were relatively lower in lower deciles (if, for example, marginal tax rates are increasing with earnings). In contrast, T^P will be higher than T' if marginal tax rates were higher in lower deciles (for example, if a welfare benefit has been phased-out at very high rates below the decile).

For most countries, participation tax rates tend to be larger than marginal tax rates. This is due mainly to the fact that unemployment benefits increase participation tax rates but have

no effect on the marginal tax rate of current workers as those benefits are not available for those currently working in general.

• **Income Distribution**

Figures 1-4 also display the average earnings in each decile (relative to the median earnings in our sample). As is well known, there is substantial heterogeneity in the distribution of earnings across countries. If the distribution is wide with a substantial number of individuals having very low earnings (as in Ireland or the United Kingdom) then it is easier to target benefits to the working poor by introducing an in-work benefit that is phased-out before reaching the middle-class. In contrast, in countries with a narrow distribution (such as Finland, or France because of the existence of a large minimum wage), phasing-out in-work benefits will require to introduce higher marginal tax rates for a large fraction of the population (the lower-end of the middle class). Therefore, in the case where intensive labor supply elasticities are not negligible, transfer programs to the poor will tend to be more costly in countries with narrow income distributions than in countries with wider income distributions at the bottom.[12]

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,

[12]This logic is well known in the optimal income tax model of Mirrlees (1971). The optimal marginal tax rate at any income level is inversely proportional to the density of incomes at this particular income level (see e.g., Piketty, 1997 and Diamond, 1998).

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 US, UK, 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 UK 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.

Since the empirical literature focuses on various demographic subgroups, it is not easy to calibrate elasticities across income deciles. Yet, 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. The participation elasticities in the middle part of the distribution is likely to be substantially lower, while there is almost no responsiveness of labor force participation at the top of the distribution. As shown in Table A2, 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. Finally, 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.

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.

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 described in Section 3.1, and calibrating labor supply behavior as shown 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). A negative value implies positive deadweight burden. 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.

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 of work imposes a welfare cost on high-wage earners of 1.8 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 14, while for Finland the trade-off is between 6.75, implying that any additional redistribution in those countries would be extremely costly even for the moderate elasticities we are using. In between these polar 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, 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, Portugal, 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 tend to create large welfare losses.[13]

[13]In Scenario 1 the trade-off for Finland is higher for the working poor policy than for the demogrant policy.

Panel B of Table II reports the results in the case where there is no 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 demogrant policy produces a more favorable equity-efficiency tradeoff 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 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. Now, 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.[14] 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 results to the average participation elasticity in the economy. In the first experiment, the average level equals 0.1 (Panel A), while in the second experiment it equals 0.3 (Panel C). As one would expect, the overall level of the

This may seem surprising because the working poor policy has the lowest efficiency loss. To understand this, notice that unemployed people obtain transfers without paying any taxes in the demogrant policy. In the working poor policy everybody who obtain transfers are also paying taxes. By implication, the aggregate gain of the gainers and the aggregate loss of the losers are both lower in the working poor policy. This implies, ceteris paribus, that the aggregate gain relative to the aggregate loss becomes higher for the working poor policy (as long as the trade-off is above one). This composition effect becomes particular strong for a country like Finland where the distribution of pre-tax income is very equal.

[14]This may be seen more formally by noting from eq. (18) that $\Omega_d/\Omega_w = 1 - \sum_{j=1}^{J} \frac{a_j}{1-a_j}\eta_j e_j$. 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.

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.[15] Although the empirical evidence shows that extensive responses tend to be larger than intensive responses, in Panel A, elasticities are identical 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.

Finally, 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 quantitative 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 tradeoff than the working benefits policy.

4 Discussion

This paper has proposed an analysis of welfare reform in European countries using a simple and 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)

[15]For Denmark, the working poor policy creates Laffer curve effects in the high-elasticity case (indicated by 'Laffer' in the table). When participation tax rates are reduced at the bottom deciles the positive feedback effect on government revenue from increased participation is larger than the initial tax reduction. Hence, a balanced budget requires that taxes are reduced even further, leading to a new feedback effect, and so on. This type of Laffer curve effect is inconsistent with the entire simulation method, which relies on linearization around the initial equilibrium.

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 with 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.[16]

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 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

[16]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.

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.

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 do not allow employers to pay 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 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.[17]

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

[17]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) leads 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.

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 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) shows 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.

Moreover, labor force participation 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. 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 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	-0.37	2.97	-0.09	1.57	-0.16	1.58	-0.16	2.17	-0.28	2.24	-0.02	1.12
Belgium	-0.56	4.66	-0.15	2.06	-0.24	1.87	-0.24	3.43	-0.45	3.27	0.03	0.86
Denmark	-0.72	14.32	0.18	0.39	-0.23	2.28	-0.23	4.48	-0.68	12.15	2.37	0.00
Finland	-0.61	6.75	-0.20	4.45	-0.24	2.12	-0.24	6.35	-0.56	5.68	-0.06	1.48
France	-0.49	4.24	0.10	0.65	-0.14	1.51	-0.14	2.21	-0.44	3.63	0.31	0.29
Germany	-0.48	4.12	-0.13	1.93	-0.19	1.71	-0.19	2.66	-0.36	2.81	-0.02	1.13
Greece	-0.21	1.66	-0.06	1.30	-0.10	1.26	-0.10	1.59	-0.16	1.49	-0.03	1.16
Ireland	-0.36	2.53	0.06	0.80	-0.14	1.42	-0.14	1.82	-0.29	2.09	0.23	0.43
Italy	-0.32	2.06	-0.12	1.96	-0.16	1.42	-0.16	2.60	-0.28	1.85	-0.07	1.48
Luxembourg	-0.25	1.94	-0.06	1.30	-0.12	1.38	-0.12	1.70	-0.20	1.68	-0.03	1.14
Netherlands	-0.35	2.78	-0.07	1.39	-0.15	1.56	-0.15	2.09	-0.27	2.20	0.02	0.91
Portugal	-0.28	2.29	0.00	1.01	-0.13	1.44	-0.13	1.68	-0.24	2.01	0.07	0.79
Spain	-0.19	1.53	0.00	0.99	-0.07	1.16	-0.07	1.34	-0.15	1.38	0.04	0.85
United Kingdom	-0.21	1.79	-0.03	1.13	-0.09	1.29	-0.09	1.47	-0.15	1.54	0.01	0.96

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.
Note: 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.
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 4, η=0.2 in deciles 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. η=0.1 (average) and ε = 0.1				B. η=0.3 (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	1.88	-0.10	1.63	-0.41	3.34	0.04	0.83
Belgium	-0.35	2.46	-0.15	2.06	-0.63	6.11	0.29	0.29
Denmark	-0.46	4.96	0.00	1.03	-0.94	83.48	Laffer	Laffer
Finland	-0.40	3.45	-0.18	3.76	-0.75	12.38	0.12	0.51
France	-0.29	2.31	-0.01	1.04	-0.63	6.72	1.24	0.02
Germany	-0.27	2.18	-0.12	1.88	-0.54	4.96	0.08	0.68
Greece	-0.13	1.37	-0.07	1.37	-0.23	1.75	-0.01	1.02
Ireland	-0.22	1.72	-0.01	1.02	-0.42	2.98	0.50	0.19
Italy	-0.22	1.62	-0.12	2.01	-0.37	2.30	-0.04	1.25
Luxembourg	-0.16	1.52	-0.08	1.41	-0.27	2.06	0.01	0.96
Netherlands	-0.21	1.85	-0.08	1.47	-0.39	3.18	0.09	0.66
Portugal	-0.19	1.70	-0.05	1.20	-0.33	2.61	0.17	0.58
Spain	-0.11	1.26	-0.02	1.09	-0.21	1.62	0.09	0.71
United Kingdom	-0.12	1.41	-0.05	1.21	-0.22	1.88	0.05	0.82

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.
Note: 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.
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.
Laffer denotes a Laffer effect: the welfare reform self-finances itself and nobody looses from the reform.
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. η=0.2 (on average) and ε = 0				B. η=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	-0.21	1.84	0.13	0.56	-0.53	4.91	-0.32	5.17
Belgium	-0.32	2.26	0.33	0.26	-0.80	13.73	-0.62	34.10
Denmark	-0.49	5.65	1.14	0.00	-0.95	94.72	-0.78	No Gainers
Finland	-0.37	3.18	0.29	0.23	-0.85	21.44	-0.69	No Gainers
France	-0.35	2.71	0.40	0.21	-0.64	6.83	-0.21	3.57
Germany	-0.29	2.33	0.19	0.42	-0.67	8.38	-0.45	11.39
Greece	-0.11	1.31	0.06	0.77	-0.30	2.12	-0.17	2.36
Ireland	-0.22	1.73	0.29	0.36	-0.50	3.84	-0.18	2.15
Italy	-0.16	1.41	0.09	0.63	-0.48	3.12	-0.33	8.30
Luxembourg	-0.13	1.39	0.09	0.71	-0.37	2.76	-0.22	2.70
Netherlands	-0.20	1.77	0.15	0.52	-0.50	4.57	-0.29	4.13
Portugal	-0.15	1.54	0.18	0.57	-0.41	3.45	-0.19	2.16
Spain	-0.12	1.31	0.09	0.71	-0.26	1.79	-0.08	1.42
United Kingdom	-0.12	1.38	0.08	0.72	-0.30	2.37	-0.14	1.84

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.
Note: 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.
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=0.05 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 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	-0.35	2.80	-0.10	1.62	-0.16	1.58	-0.16	2.17	-0.27	2.17	-0.04	1.19
Belgium	-0.50	3.88	-0.19	2.53	-0.24	1.87	-0.24	3.44	-0.41	2.91	-0.07	1.39
Denmark	-0.65	10.57	0.01	0.97	-0.23	2.28	-0.23	4.50	-0.61	9.21	0.67	0.07
Finland	-0.52	5.02	-0.22	5.66	-0.24	2.13	-0.24	6.50	-0.47	4.31	-0.15	2.83
France	-0.40	3.14	-0.01	1.03	-0.15	1.52	-0.15	2.21	-0.37	2.86	0.11	0.62
Germany	-0.46	3.89	-0.13	2.00	-0.19	1.71	-0.19	2.66	-0.35	2.73	-0.04	1.22
Greece	-0.20	1.62	-0.06	1.33	-0.10	1.26	-0.10	1.59	-0.16	1.46	-0.04	1.21
Ireland	-0.35	2.48	0.04	0.86	-0.14	1.42	-0.14	1.82	-0.28	2.05	0.19	0.50
Italy	-0.32	2.03	-0.12	1.98	-0.16	1.42	-0.16	2.60	-0.27	1.84	-0.07	1.51
Luxembourg	-0.24	1.91	-0.07	1.32	-0.12	1.38	-0.12	1.70	-0.19	1.66	-0.04	1.17
Netherlands	-0.33	2.62	-0.08	1.49	-0.15	1.56	-0.15	2.09	-0.26	2.12	-0.01	1.03
Portugal	-0.28	2.24	-0.02	1.07	-0.13	1.45	-0.13	1.68	-0.23	1.96	0.04	0.88
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	-0.21	1.78	-0.04	1.15	-0.09	1.29	-0.09	1.47	-0.15	1.53	0.00	1.00

Source: Authors' own simulations based on EUROMOD tax and benefit calculations.
Note: 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.
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 4, η=0.2 in deciles 4, η=0 in deciles 5 to 10.
The tax and benefits computations exclude completely Unemployment Benefits.

Table A1. 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%

Note: 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) reports the average tax rate on consumption goods (VAT and all Sales taxes).
Source: Columns (1) and (2): OECD Labour Force Statistics
Columns (3): OECD National Accounts (2003), Volume II, 1990-2001

Table A2: Scenarios for the Participation Elasticity

Decile	Tables II and V, Panel A and Table IV	Tables II and V, Panel B	Tables II and V, Panel C	Table III, Panel A	Table III, Panel B
1	0.4	0	0.8	0.4	0.8
2	0.4	0	0.6	0.3	0.8
3	0.3	0	0.4	0.2	0.5
4	0.3	0	0.2	0.1	0.5
5	0.2	0	0	0	0.2
6	0.2	0	0	0	0.2
7	0.1	0	0	0	0
8	0.1	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	0
Average	0.2	0	0.2	0.1	0.3

Notes: This table reports the participation elasticity assumptions by decile used in Tables II, III, IV, and V. The average is the unweighted population average.

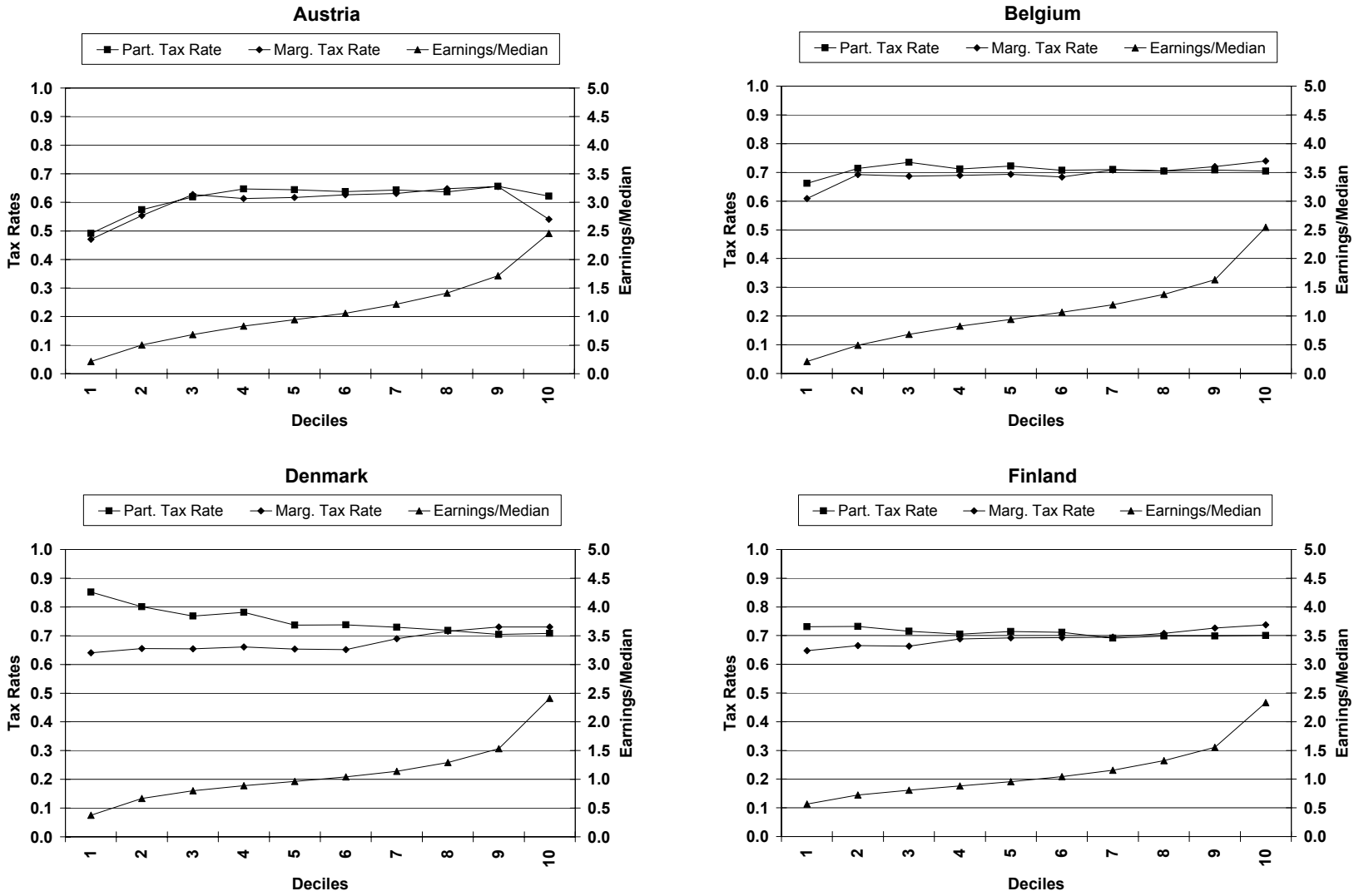

Figure 1: Participation Tax Rate, Marginal Tax Rate and Earnings to Median

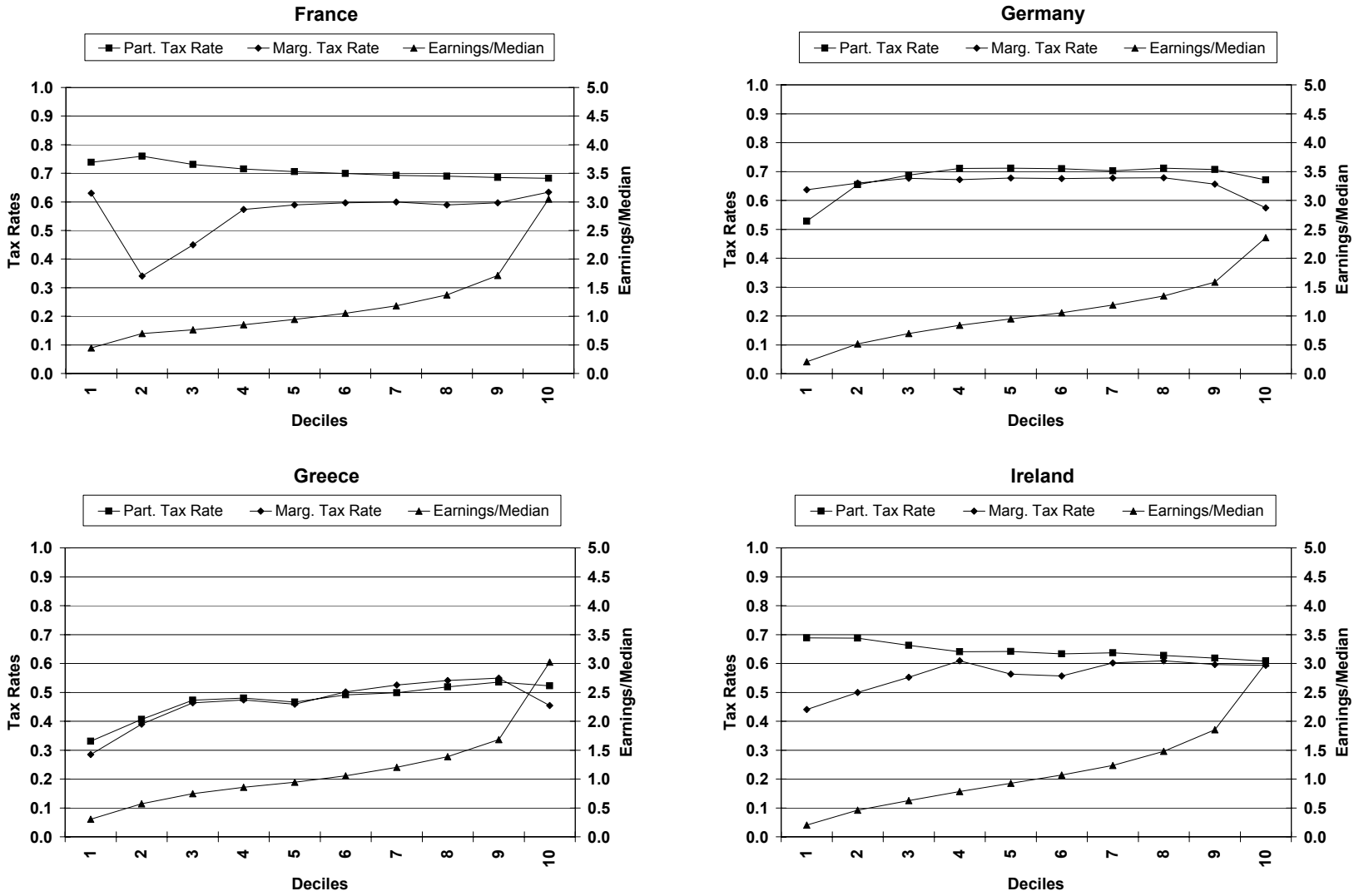

Figure 2: Participation Tax Rate, Marginal Tax Rate and Earnings to Median

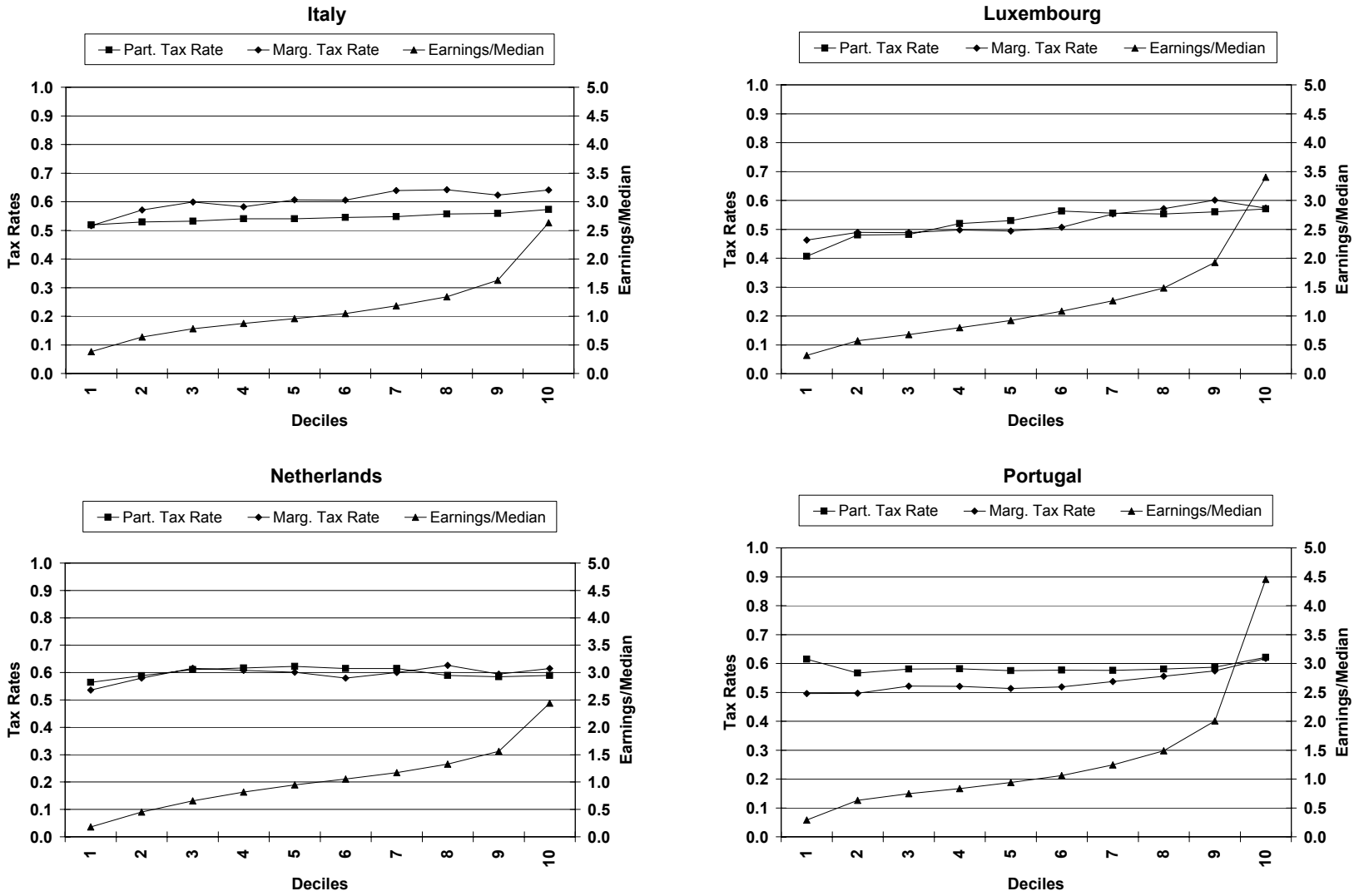

Figure 3: Participation Tax Rate, Marginal Tax Rate and Earnings to Median

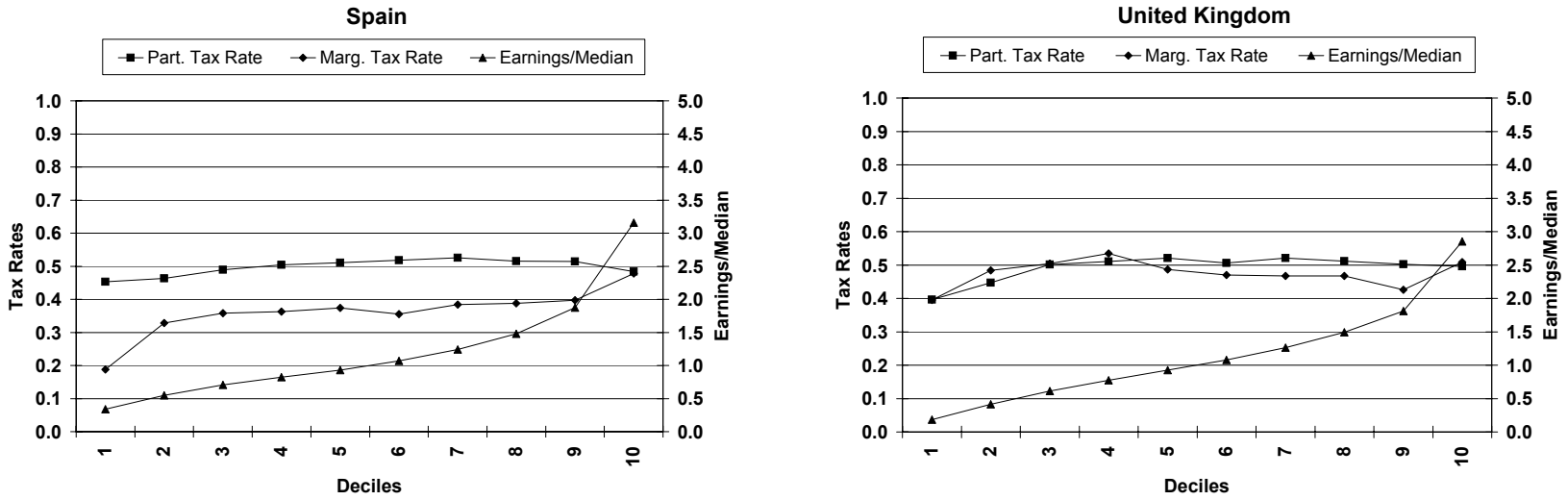

Figure 4: Participation Tax Rate, Marginal Tax Rate and Earnings to Median