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A switch from joint to individual taxation is welfare improving*

André Decoster[†] and Peter Haan[‡]

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Abstract

In this paper we empirically derive the welfare effects of a shift from joint taxation with full income splitting to a revenue neutral system of individual taxation in Germany. For the empirical welfare evaluation we estimate the preference heterogeneity in the population and use normative welfare concepts proposed in Fleurbaey (2006) to solve the difficulties of comparison between, and aggregation of heterogeneous individuals and households. We show that, irrespective of the individual welfare measure we use, individual taxation would on average increase individual welfare. Moreover, as far as the aggregation is concerned, we show that any social planner, ranging from a utilitarian to a Rawlsian one, would come to the same conclusion: a policy change which replaces joint taxation with full splitting by individual taxation, would be welfare improving.

Keywords: Taxation of couples, welfare measures; labour supply; preference heterogeneity

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1 Introduction

For couple households, joint taxation with full income splitting (i.e. in equal parts) as implemented in several countries such as France or Germany imposes much higher marginal tax rates for the secondary earner - in general the wife - than individual taxation, see e.g. Apps and Rees (1999). It is not surprising therefore, that numerous empirical studies provide evidence of strong disincentive effects for the labor supply behavior for secondary earners under joint taxation. This disincentive effect is not compensated by the positive incentives for the first earner, in general the husband, see, among others, LaLumia (2008) for the US and Steiner and Wrohlich (2004) for Germany. This empirical finding is the central reason why in theoretical models of optimal taxation joint taxation of couple households is in general not the optimal tax schedule. In contrast, given the higher elasticities of the wife, Alesina et al. (2007), and Boskin and Sheshinski (1983) show that gender based taxation with lower marginal tax rates for the secondary earner would be optimal, since more efficient in terms of labor supply.

There is a large body of literature on joint taxation based on either empirical models of labor supply or on theoretical models of optimal taxation. Therefore, it is all the more surprising how little is known about the empirical welfare effects of a policy move from joint to individual taxation both at the individual and at the aggregate level. The reason is that most papers limit their analysis to aggregate labour supply changes or, when accounting for heterogeneity, present changes in labour supply and/or changes in disposable income for deciles of the gross wage distribution.¹ However, leisure being an argument in the individual utility function, it is clear that the variable of interest at the individual (or household) level, should be the change in welfare as measured by household preferences. It is true that individual welfare metrics such as equivalent or compensating variations, are wellknown and have been used widely for this purpose, see e.g. Creedy and Kalb (2005) or Eissa et al. (2008). Since one of the major aims of this paper is to provide empirical evidence of the impact on individual welfare of a switch to individual taxation, we could have followed this track.

Yet, the interpretation and comparison of these classical welfare measures becomes problematic within the framework used to model the impact of the policy shift on labour supply behaviour with heterogenous individuals. Indeed, it has now become standard to analyze research questions concerning changes in the tax and transfer system by means of static structural models of labor supply. We follow this line in this paper. In particular, we derive the potential labor supply effects of replacing joint taxation by individual taxation on the basis of estimates of a functional form of a preference representation function. But one of the major advantages of these models, to wit the central place allotted to heterogeneity in preferences, plays out as a major obstacle when trying to perform distributional, or more general, normative analyses. Indeed, normative analysis in a

¹Beblo et al. (2007) look at the welfare effect of introducing individual taxation, however they only consider within-household changes and their method does not allow for any comparison between households or aggregation of individual welfare effects into social welfare.

framework of heterogeneous preferences is wellknown to pose difficult - and not seldomly neglected - problems of comparability of individual welfare. A criterion derived from a simple aggregation of equivalent or compensating variations has been shown to be neither a sufficient, nor a necessary condition to identify potential Pareto improvements, let alone social improvements according to a well defined social welfare function (see Boadway and Bruce (1984), Chapter 9 or Auerbach (1985)). In this paper we therefore follow Decoster and Haan (2010) and use welfare measures derived by Fleurbaey and co-authors (see e.g. Fleurbaey (2006) for an overview). The distinguishing feature of the underlying normative framework is that the welfare measures fully respect preference heterogeneity, whereas aggregation of the classical money metrics only makes sense in a context of identical preferences or when using the so-called reference household as introduced by King (1983).

In line with the previous studies for Germany we find that a shift from joint taxation with full income splitting to a revenue neutral system of individual taxation would substantially increase the labor supply of married women and increase the disposable net household income. Moreover we can extend these findings and show that two different welfare measures which start with very different normative foundations suggest that individual taxation would on average increase individual welfare. Finally we show that *any* social planner who expresses social welfare by means of a social preference ordering defined over these individual welfare metrics, would come to the same conclusion: a policy change which replaces joint taxation with full splitting by individual taxation, would be welfare improving for both individual welfare metrics.

The paper proceeds as follows. In the next section, we translate the tax systems of joint and individual taxation into the budget constraints, faced by couple households. Section 3 briefly summarizes the microdata and the microsimulation model used to estimate the labour supply model. The estimated model is presented in section 4, together with the simulated labour supply effects of the switch from joint to individual taxation. Section 5 discusses the individual welfare effects of this reform, and also answers the question whether social welfare, defined as some weighted aggregate of individual welfare, is higher under individual than under joint taxation. Section 6 concludes.

2 Joint taxation with full splitting versus individual taxation of couples

In this section we compare joint taxation with full splitting and individual taxation in terms of the stylized household budget constraint and the working incentives for both spouses. We also provide a brief overview of the current system of joint taxation with full income splitting in Germany and describe the effects of a hypothetical reform of replacing joint taxation with individual taxation.

2.1 Budget constraint

We use a stylized and simplified setting to discuss the effect of joint and individual taxation on the budget constraint of a household. We assume that labor earnings are the only source of income and that households do neither save nor borrow. Furthermore we abstract from any governmental transfers and social security contributions.

When married couples are taxed jointly with full income splitting, the budget constraint for a household h can be written as:

$$C_{joint}^h = \omega_f^h l_f^h + \omega_m^h l_m^h - 2T\left(\frac{\omega_f^h l_f^h + \omega_m^h l_m^h}{2}\right), \quad (1)$$

where ω_m^h and ω_f^h are the gross wages of husband and wife respectively, and l_m^h and l_f^h are the hours of work of each spouse. $T(\cdot)$ denotes the progressive income tax schedule. It is applied on half the joint taxable income, and the resulting tax liability is then multiplied again by a factor 2.

Under individual taxation the same household h would face the following budget constraint:

$$C_{individual}^h = \omega_f^h l_f^h + \omega_m^h l_m^h - T(\omega_f^h l_f^h) - T(\omega_m^h l_m^h). \quad (2)$$

The household net income is now determined by gross labor income of the two spouses minus the sum of the individual tax payments, which are themselves determined independently from each other. In terms of disposable income, a household can only gain from joint taxation with full income splitting when the tax schedule is progressive.² This gain, the splitting advantage, depends on the inequality between the partners' earnings and the level of overall household taxable income. But maybe more importantly, under individual taxation marginal tax rates of one spouse only depend on this spouses' individual labor income. In contrast, under joint taxation the labor income of the partner matters for the marginal tax rate of the other spouse. In a setting, where we define the first earner to be the partner with the higher labor income and the secondary earner the one with lower labor income, the first earner will always benefit from joint taxation, while the secondary earner faces higher marginal tax rates under joint taxation. Also these effects increase with the difference between the partner's income.

2.2 Income taxation of couples in Germany

In theory, the German income tax is based on the principle of comprehensive income taxation. That is, the sum of a household's income from all sources is taxed at a single rate after several deductions have been applied. The tax schedule is piecewise linear and progressive. Married couples are taxed jointly. As described above, the income tax of a married couple is calculated by applying the tax function to half of the sum of the spouses' incomes; this amount is then doubled to determine the tax amount of the couple.

²Not surprisingly, therefore, one measure of progressivity of a tax schedule is based on the gain from splitting, see Lambert (2001)

Steiner and Wrohlich (2004) provide a detailed discussion and analysis of the German system of joint taxation with full splitting. For different household types they calculate the splitting advantage, that is the tax reduction of joint taxation with full splitting relative to individual taxation.

The introduction of individual taxation without changing the tax schedule would significantly increase government's tax revenues, since it would absorb the splitting advantages of the current system. At the same time, disposable net income of households would decrease. Each household would suffer a loss equal to the splitting advantage it enjoys under the current system of joint taxation. In the following section we will empirically identify those households who benefit most of the system of joint taxation, by analyzing the effect of the transition to individual taxation for household types that vary by demographic characteristics.

3 Data, microsimulation and descriptive evidence

Our empirical analysis is based on the German Socio Economic Panel Study (SOEP) which is a representative household survey for Germany with detailed information about the socio-economic situation of households (Wagner et al. 2007). Moreover the data includes information about the employment behavior of all household members. For this analysis we make use of data collected in 2005 which yields the information for the tax year 2004. We restrict the sample to married households with a wife aged between 20 and 60, who is not self-employed, retired or in full-time education. Finally, we include only households with full-time working men. This gives us a sample of 2076 households. This sample restriction is motivated by the behavioural analysis in which we only focus on the labor supply of women and assume that the behavior of the husband is fixed. In fact we assume that the female partner of the household optimally decides about her labor supply behavior and maximizes household utility conditional on her partner's behavior.³

The SOEP is used as the input dataset for the Microsimulation model STSM (Steiner et al. 2008) which describes in detail the German tax and transfer system. Given observed gross earnings of households it is possible to determine the tax liabilities of the current tax system with joint taxation and the resulting net household income for all observed households. Moreover it is possible to derive the tax payments and the net income assuming hypothetical scenarios of taxation, e.g. individual taxation.

Table 1 presents disposable net household income for different subgroups under joint and individual taxation and the resulting income differences between the two systems. In this descriptive table we do not consider any behavioural reaction of the households. As mentioned above introducing individual taxation would substantially increase tax revenues of the government and hence the potential supply of public goods. Since we wanted to keep public good consumption outside the individual welfare analysis, a more sensible

³At first glance, this often applied simplification might seem restrictive. However, empirical evidence suggests that cross elasticities between household partners are either not significant or of little importance (Steiner and Wrohlich, 2004), which justifies this assumption.

Table 1: Changes in net income: Joint versus Individual taxation

	Income in Euro Joint taxation	Income in Euro Individual taxation	Change in income
<i>Quintiles of gross earnings of the husband</i>			
I	2356	2479	123
II	2731	2796	65
III	3014	3039	25
IV	3497	3477	-20
V	4928	4734	-194
<i>Quintiles of inequality of earnings between spouses</i>			
I	3495	3680	185
II	3440	3593	153
III	3516	3542	25
IV	3533	3299	-234
V	2538	2408	-130
<i>West versus East Germany</i>			
West Germany	3389	3361	-28
East Germany	2967	3080	113

Source: Own calculations based on SOEP and STSM. All income information is per month. Inequality of earnings between spouses is calculated as the share of the husband's earning in total household earnings.

comparison of the two tax systems is obtained by imposing revenue neutrality. We do this by redistributing the additional tax revenue from individual taxation as a lump sum benefit on a household basis to all married households.

We compare the income differences by the level of earnings of the full time working husband, by the inequality of earnings between the two spouses, and by region. The inequality of earnings between the two spouses is defined as the ratio of the husband's earnings over total household earnings. Hence, a ratio of 1 implies maximal inequality within the household.

The distributional analysis in Table 1 reveals that a revenue neutral form of introducing individual taxation affects different household types differently. Consistent with the splitting gain to be increasing with earnings, we find that households with lower earnings of the husband would benefit from the transition to individual taxation, whereas particularly those in the highest quintile would lose in terms of disposable income. Also according to expectations, the second panel in the table shows a loss for households with high earnings inequality between the spouses, and a gain for households with the least unequal intra family distribution of earnings. The latter households did not benefit from

the splitting advantage under joint taxation and now benefit from the lump sum transfer. The households with more unequal earnings between spouses, on the other hand, lose a splitting advantage which exceeded the lump sum transfer they now receive. As well documented in the literature (Steiner and Wrohlich, 2004), household in West Germany would lose from the introduction of individual taxation whereas those in the east would benefit. This is explained both by lower household incomes of east Germans and higher equality of earnings. For the other demographic groups differences are smaller.

4 The labor supply model

We estimate the labor supply effects of introducing individual taxation by means of a static structural discrete choice model of labor supply, similar to Aaberge et al. (1995) or van Soest (1995). The model is structural, because it starts from a specification of a utility function of the household which depends on household consumption and female leisure time. Since we assume that the labor supply of the husband is fixed, his leisure time does not affect utility. The model is a discrete choice model because it reduces the choices of the individual (in this case the number of hours worked) to a finite number of discrete alternatives. The main advantage of this discrete specification over the continuous framework is the possibility to account for the non-linearities in the budget set and to cope with the endogeneity of net-household income in a relative straightforward way.

4.1 Description of female participation and hours of work in a discrete setting

In the discrete choice model the utility level of household i at a finite number of discrete chosen levels of labour supply is specified. We index the discrete points by means of the subscript $j = 1, \dots, J$. For female labour supply, we define $J = 5$ discrete working alternatives: non-participation, two part time alternatives, full-time work and over-time.⁴

Table 2 shows the overall distribution of the households at the five alternatives. We also show average working hours and average monthly net household income and the shares by region, by education level and by the presence of children younger than 3 years old. The data reveal the relatively low labour market attachment of married women. About 29% of all married women are not working, close to 50% works part time and less than a quarter of all married women work regular hours or more. Since in our sample, husbands work at least 30 hours, the distribution of household income between the 5 discrete states is not very unequal. In addition, this is partly related to the joint taxation with full splitting which leads to high marginal tax rates for the secondary earner.

Table 2 shows interesting differences in the distribution across the employment states by region, education, and family composition. In our sample roughly 20 % of all households live in East Germany, but we only find 13% East Germans amongst the non-working

⁴The median of the empirical distribution in the following intervals define the discrete points: 0, [0 - 15], [16 - 34], [35 - 40], > 40. The estimation results are robust to changes in the approximation of the distribution of working hours.

Table 2: Discrete employment states

Employment	Share in %	Working Hours per week	Net Income per months	East Germans in %	Education in years	Child younger than 3 years
1 not working	29.06	0	2744	13.07	11.68	27.28
2 0 - 15 hrs	18.00	10	3107	6.33	11.49	10.29
3 16 - 34 hrs	29.01	23	3398	18.99	11.91	4.09
4 35 - 40 hrs	18.33	38	3805	38.60	12.34	2.59
5 >40 hrs	5.60	42	3943	48.31	13.35	3.38

Notes: The sample consists of 2076 married households where the husband is working at least 30 hours. The second column gives median working hours for the intervals 0, [0 - 15], [16 - 34], [35 - 40], > 40, and this median is used to define the discrete employment states.

The share of East German households in the population is 20%, 11% of all women are low educated, i.e. 9 years of school or less, and 11.5% of all households have a child younger 3 years.

Source: SOEP, wave 2005 and STSM

women, and even less among part time work. On the other hand the share of East Germans in the subset of households where the wife is working fulltime is close to 40%. For over time work the overrepresentation of East-Germans is even larger. By education we find that women who work more hours tend to have more years of education. The opposite holds for family composition. Close to 30% of non-working women have a child younger than three years, as opposed to only 3% of those working full time or more hours.

To derive net household income according to the tax legislation in Germany in 2004 at each discrete alternative of working hours, we use the microsimulation model STSM, mentioned above. More precisely, for each discrete hours point we calculate gross household earnings as the sum of observed earnings of the husband and the state specific earnings of the wife. Gross earnings of the women are simply the state specific hours multiplied by her expected market wage. For working women we take the observed wage information as their market wage, while for the non-working we impute their expected market wage using an estimated wage equation with selection correction.⁵ The information on gross earnings is the key input for the microsimulation model which describes, in detail, all relevant transfer programmes, social security contributions and income taxation and which delivers the state specific net-household income.

4.2 The Box-Cox utility function

The state specific level of utility of household i , denoted v_{ij} , at the $j = 1, \dots, J$, discrete states, described in the previous subsection, consists of a deterministic and a stochastic part:

$$v_{ij} = u(c_{ij}, (1 - l_{ij}); \mathbf{z}_i) + \epsilon_{ij}, \quad (3)$$

where c_{ij} denotes the state specific net-household income c_{ij} at choice j and l_{ij} is the labor supply of the wife in household i at choice j . Leisure time at each hours point is the

⁵Estimation results for the wage equation can be obtained from the authors upon request.

time endowment $T = 80$ minus working time. In (3) we normalize the time endowment at 1, such that the wife's leisure time is simply $(1 - l_{ij})$.

The deterministic part of the utility function is represented by $u(c_{ij}, (1 - l_{ij}); \mathbf{z}_i)$, and ϵ_{ij} is a stochastic random error term which varies independently between the individuals and the discrete points. Preference heterogeneity is captured by vector \mathbf{z}_i . Note that we will limit the analysis to observed preference heterogeneity (see below) and hence neglect household specific heterogeneity which is unobserved. We assume that all unobservable effects are captured by the stochastic term ϵ_{ij} .

Similar to Aaberge et al. (2004) we use a Box-Cox functional form to specify the deterministic part of the utility function in (3):

$$u(c_{ij}, (1 - l_{ij}); \mathbf{z}_i) = \beta_c \frac{c_{ij}^{\alpha_c} - 1}{\alpha_c} + \beta_L(\mathbf{z}_i) \frac{(1 - l_{ij})^{\alpha_L} - 1}{\alpha_L}, \quad (4)$$

where preference heterogeneity is introduced by means of taste-shifters in the following form:

$$\beta_L(\mathbf{z}_i) = \beta_{L0} + \beta'_{L1} \mathbf{z}_i, \quad (5)$$

and vector \mathbf{z}_i includes the age of both spouses, educational dummies, the number and age of children and a regional dummy. Preferences are determined by the parameters β_c , β_{L0} , β'_{L1} , α_c and α_L . The β -parameters determine the marginal utility of consumption and leisure, whereas the α -parameters determine the concavity of the utility function.

The estimation procedure is based on the assumption that the error terms ϵ_{ij} are i.i.d. and follow an extreme value distribution. This gives an expression of the probability for each discrete working alternative, which results in the well known conditional logit framework that can be estimated by maximum likelihood. As already announced above, we do not account for unobserved heterogeneity. Haan (2006) has shown that unobserved heterogeneity does not significantly affect the labour supply elasticities when using a similar specification with cross sectional data. Nor do we model potential restrictions on the labour market as in Aaberge et al. (2004) or Bargain et al. (2010). The findings of Bargain et al. (2010) imply that demand side constraints bias elasticities in particular for men and single women, but tend to be less severe for the labour supply decision of married women.

4.3 Estimated preferences for income and leisure

Table 3 presents the estimated parameters of the Box-Cox utility function in (4). Parameters α_c and α_L , both smaller than 1, indicate that the utility function is concave with respect to consumption and leisure time. For consumption, the curvature comes close to a logarithmic functional form (which would be the case if $\alpha_c = 0$) and the concavity is more pronounced for leisure. As expected, households value consumption positively ($\beta_c = 3.47$ being positive) and - on average - women also value leisure time positively ($\beta_{L0} = 0.64$).

However, we find significant preference heterogeneity by observable characteristics.⁶ In line with previous studies we find that the taste for leisure increases with the presence of children, in particular for children younger than 3 years. We find positive effects of the educational dummies, where the reference category is high education. This implies that *ceteris paribus* women with low and medium education have a higher preference for leisure than women with the highest educational degree. Finally, we find important differences between women in East and West Germany. In line with the descriptive statistics of table 2, women in West Germany have a significantly lower inclination to work. This different pattern in female employment behaviour has often been analysed and is mainly explained by the different history and socialisation of the two parts of Germany before the reunification. We already noted that this preference heterogeneity poses difficult - and not seldomly neglected - problems of comparability of individual welfare for the welfare analysis of this tax reform. We take this up in following section.

Table 3: Estimated parameters of Box-Cox utility function

	Coefficient	Standard Error
Preferences for Consumption		
β_c	3.47	0.59
α_c	0.20	0.14
Preferences for Leisure		
β_{L0}	0.64	0.27
β'_{L1} (taste shifter dummies)		
Age of wife	1.79	0.95
Age of husband	-1.02	0.86
Child younger 3	1.75	0.41
Child between 4 and 6	0.95	0.23
East Germany	-0.64	0.15
Low Education	0.40	0.15
Medium Education	0.28	0.10
α_L	-1.82	0.33

Notes: α_c and α_L determine the concavity of the utility function with respect to consumption and leisure. β_c and β_L determine the marginal utility of consumption and leisure.

Source: SOEP; Number of observations: 2076

5 Effects of the tax reform

5.1 Labor supply effects

Based on the estimated structural model we simulate the labor supply responses of women when replacing joint with individual taxation. As mentioned above, we simulate this tax

⁶See Decoster and Haan (2010) for a more detailed discussion of the preference heterogeneity using this empirical specification

reform under the constraint of revenue neutrality by redistributing the additional revenue under individual taxation as a lump sum benefit to all married households. More precisely, to calculate the labor supply responses, we integrate over the stochastic error terms and calculate the expected choice of women before and after the tax reform. We do this twice, once for joint taxation with full splitting, and then for individual taxation including the lump sum transfer. The difference in the female participation rate and the expected working hours between these two scenarios give an indication of the labor supply effects of the reform.

Table 4 summarizes the results, which, broadly spoken, are in line with the earlier study of Steiner and Wrohlich (2004). The participation rate (extensive margin) of the subpopulation of females living in couples increases across the board with 5.88%. Total labour supply (extensive and intensive margin combined) even goes up by 10.71%. The variation of this substantial positive labour supply effect across the different subgroups in table 4 can be explained by the differences in preferences (table 3) and in the working incentives, i.e. changes in the disposable net household income due to the tax reform (table 1). Labor supply effects both in terms of participation and working hours increase monotonically with the gross earnings of the spouse. Similarly the effects tend to increase with the inequality of earnings between the two spouses. These patterns are very much in line with the incentives effects shown in table 1.

By demographic characteristics the most striking difference is for women in East and West Germany. Whereas west German wives increase their labour supply by 6.79% and the working hours by 12.16%, married women in the eastern part react with 2.32% (participation) and 5.08% substantively less. This is indeed in line with the different changes in the disposable net household income discussed above. In addition preferences are important to explain this difference. As mentioned above, women in West Germany have a significantly lower inclination to work, leading to lower participation rates and lower working hours. This implies *ceteris paribus* they can change their behavior more than the East German women who to a large extent work already before the reform.

5.2 Welfare effects of the tax reform: gainers and losers

In this section of the paper we go beyond the previous literature on the effects of replacing joint taxation with individual taxation in Germany. In fact this literature limited itself to describing the results as in the previous subsection, that is: in terms of effects on labour supply. Yet, for the evaluation of this kind of reform, which triggers a considerable effect on labour supply, one needs a more comprehensive individual welfare measure than simply net household income. Decreased leisure being the counterpart of the increase in participation or working hours, one has to account for this in a genuine welfare analysis of the reform.

In classical applied welfare analysis, individual welfare metrics such as equivalent or compensating variations have been used intensively. But as already noted in the introduction, in a context of individuals with heterogeneous preferences, both the interpretation

Table 4: Labor supply effects

	Change in participation (in %)	Change in working hours (in %)
All households	5.88	10.71
<i>Quintiles of gross earnings of the husband</i>		
I	1.81	4.45
II	5.77	10.09
III	6.03	11.21
IV	7.24	12.69
V	8.56	15.16
<i>Quintiles of inequality of earnings between spouses</i>		
I	3.54	4.13
II	5.78	8.99
III	6.96	12.07
IV	7.06	13.91
V	6.05	14.46
<i>Demographic characteristics</i>		
West Germany	6.79	12.16
East Germany	2.32	5.06
Without children younger 3	5.47	10.36
With children younger 3	8.97	13.37
Low education	5.91	10.55
Medium or high education	5.61	11.99

Source: Own calculations based on SOEP and STSM. All income information is per month. Inequality of earnings of spouses is calculated as the share of the husband's earning over the total household earnings.

of these welfare metrics, and certainly their aggregation quickly faces serious difficulties. Therefore, in this paper we pursue a different empirical strategy which is based on normative welfare concepts proposed in Fleurbaey (2006). In particular we empirically calculate the 'Rent' criterion and the 'Wage' criterion. Under the 'Wage' criterion, we judge two individuals as equally well off when they have the same hypothetical net wage rate, irrespective of the choices they make. In terms of a responsibility-compensation cut, a social planner using this criterion would hold people fully responsible for differences in their tastes for leisure, but would be prepared to compensate people for differences in their productivities. Thus, differences in preferences, leading to different choices, are considered not to be a sufficient reason for redistributing, or for ranking people as worse or better off. When using the 'Rente' criterion, on the other hand, one offers maximal protection for people who have a larger distaste for working. From this perspective, choosing the Rente criterion as the welfare metric implements an underlying normative choice of holding people with a strong aversion to work minimally responsible for these preferences. We refer to Decoster and Haan (2010) for a more extensive discussion of these - and other, related - metrics and for the empirical strategy to calculate these different welfare measures in a structural discrete choice setting. Anyhow, the measures are directly related to the above estimated preferences, since - contrary to the concept of equivalent income as defined in King (1983) - they retain the full preference heterogeneity of the sample in the normative step of the analysis.

Table 5 displays the average value of the change in the three individual welfare metrics: net income, 'Rent' criterion and 'Wage' criterion, for the whole subpopulation, and for different subgroups. All measures can be interpreted in monetary terms. Of course, their different definition makes a direct comparison difficult: the 'Rent' criterion is calculated as monthly net income assuming that the wife is not working and the 'Wage' criterion as monthly gross earnings of the wife assuming full time work.

Starting with the effect on net disposable income, the difference with the numbers in table 1 is entirely due to the labour supply effect. Although we did impose revenue neutrality for the government, on average net disposable income of the households increased by 105 Euro per month. This is of course due to the increased economic activity. Compared to table 1, all subgroups gain more or lose less, and the ranking of gainers and losers in terms of characteristics is not really affected by the changes in labour supply. Some groups, like West German households, households with children younger than three, or the fourth quintile of both the distributions in the upper two panels of the table, succeed in turning their income loss with unchanged behaviour, into an income gain by working more.

However, the two rightmost columns of table 5 show that it is important to take leisure into account when assessing individual welfare. Take the West German households for example. They do gain in terms of net income by working more. But once the lost leisure time is also valued in the welfare measure (and this on the basis of the individual's own preferences), West German households do lose by the transition to individual taxation. The same reversal from gainers to loser holds for the fourth quintile of the distribution

Table 5: Change in individual welfare measures according to different metrics

	Change in net household income	Change in Rent criterion	Change in Wage criterion
All households	104.54	24.92	7.89
<i>Quintiles of gross earnings of the husband</i>			
I	180.05	138.08	77.83
II	156.03	85.58	47.20
III	132.24	51.17	27.11
IV	102.92	11.16	-0.56
V	-49.53	-162.79	-113.00
<i>Quintiles of inequality of earnings between spouses</i>			
I	201.17	150.57	86.95
II	188.11	107.39	60.78
III	141.23	50.30	25.48
IV	67.92	-24.47	-24.78
V	-76.38	-159.94	-109.48
<i>Demographic characteristics</i>			
West Germany	85.68	-4.73	-6.21
East Germany	178.01	140.38	62.79
Without children younger 3	116.40	35.84	16.59
With children younger 3	13.93	-58.55	-58.69
Low education	107.42	27.78	8.82
Medium or high education	81.47	1.95	0.41

Source: Own calculations based on SOEP and STSM. All income information is per month. Inequality of earnings of spouses is calculated as the share of the husband's earning over the total household earnings. The 'Rent' criterion is calculated as monthly net income assuming that the wife is not working and the 'Wage' criterion as monthly gross earnings of the wife assuming full time work.

according to earnings inequality between the spouses. Since all groups work more, the welfare gain is clearly smaller than the income gain for all groups. Note also that the picture is quite robust with respect to the choice between the two broader welfare metrics.⁷

The second, and from a policy perspective maybe even more important conclusion from table 5 is that, even when taking into account lost leisure time, the overall average welfare gain of a transition to a revenue neutral individual taxation, is still positive. Moreover this finding is independent of the very different normative underpinings of the two welfare measures. As mentioned above under the 'Wage' criterion agents are fully responsible for a larger distaste for working whereas in the 'Rent' criterion one offers maximal protection for these agents. Thus in very different normative settings, introducing revenue neutral individual taxation instead of joint taxation increases the overall average welfare.

Of course, since there exists a large variation in the welfare effects across the different households, the next question which pops up is whether the distributional pattern of gains and losses would be approved by an inequality averse social planner or if the results hold only for the population average. This is the topic of the next and last subsection.

5.3 Effects on social welfare

To answer the question about the distributional effects, one approach could be to calculate some inequality measure like the Gini coefficient, or the Atkinson or the Theil measure for varying degrees of inequality aversion of the social planner. But we can present a stronger result. In table 6 we show the Lorenz ordinates of the ten deciles of the distribution of welfare, as measured by the three different metrics. We do find Lorenz dominance for all three possible choices of the welfare measure: net income, the 'Rent' criterion or the 'Wage' criterion. That means that *any* scale invariant inequality measure which embodies the transfer- or Pigou-Dalton principle would rank the welfare distribution under individual taxation as less unequal than the one under joint taxation. This implies, inequality in welfare definitely decreases by this reform, independently from the individual welfare measure used, and independently from how concerned one is about inequality.

Combined with the finding from table 5 that average welfare also increases due to the reform, the Lorenz dominance of table 6 translates into what is known as Generalized Lorenz Dominance. The ordinates of the Generalized Lorenz curve are the ordinates of the Lorenzcurve multiplied with the average of the distribution, see Shorrocks (1983) or Lambert (2001) for details. Switching from the analysis of the Lorenzcurve to one based on the generalized Lorenz curve amounts to changing the perspective from inequality to social welfare, where the latter not only takes into account the distribution of the pie, but also the size of the pie. Therefore our generalized Lorenz dominance result is even stronger.

It says that *any* social planner who expresses social welfare by means of a social preference ordering which embodies only two mild properties, Paretianity (more is better than less) and the transfer principle (or inequality aversion), would come to the same

⁷This is in contrast with the results we presented in Decoster and Haan (2010) as far as the welfare ordering in terms of *levels* are concerned.

Table 6: Lorenz ordinates for the distribution of welfare under joint and individual taxation

	Net household income		Rent criterion		Wage criterion	
	Joint tax	Individual tax	Joint tax	Individual tax	Joint tax	Individual tax
1	6.14	6.44	5.99	6.35	4.88	5.25
2	13.31	13.79	13.06	13.61	11.25	11.95
3	21.15	21.77	20.79	21.52	18.69	19.63
4	29.48	30.25	29.06	29.93	26.82	27.96
5	38.41	39.29	37.90	38.89	35.64	36.91
6	47.84	48.84	47.25	48.37	45.14	46.47
7	58.06	59.10	57.38	58.54	55.62	56.95
8	69.29	70.28	68.61	69.73	67.32	68.53
9	82.27	82.98	81.75	82.53	80.99	81.84
10	100	100	100	100	100	100

Source: Own calculations based on SOEP and STSM. All income information is per month.

conclusion: a policy change which replaces joint taxation with full splitting by individual taxation, would be welfare improving. Whether one adheres to a utilitarian social welfare function (which is inequality neutral), to a Rawlsian one (which is extremely inequality averse, and only concerned about the change in welfare at the very bottom of the distribution) or anything in between, one always orders the two social states in the same way: individual taxation is better than joint taxation. Note that this conclusion holds for both the 'Rent' criterion and the 'Wage' criterion.

6 Conclusion

In this paper we provide empirical evidence that a shift from joint taxation with full income splitting to a revenue neutral system of individual taxation in Germany would i) substantially increase the labor supply of married women, ii) increase the disposable net household income, iii) increase the individual welfare and iv) increase social welfare, defined as a function of the individual welfare levels. Our findings in terms of labor supply support previous results for Germany, e.g. Steiner and Wrohlich (2004) which have studied a replacement of joint taxation using the same empirical method which takes into account labour supply effects by means of a discrete choice model. We go beyond this literature and, in addition to labour supply and income effects, we calculate the welfare effects induced by this tax reform. The welfare effects are in particular informative for the political debate because they account for the change in leisure time induced by a tax reform.

For empirical welfare evaluations individual welfare metrics such as equivalent or compensating variations, have often been used and it is well known that in a context of individuals with heterogeneous preferences, both the interpretation of these welfare metrics,

and certainly their aggregation quickly faces serious difficulties. In this paper we solve these difficulties and pursue a different empirical strategy which is based on normative welfare concepts proposed in Fleurbaey (2006). The advantage of these welfare measures is that they try to unveil more explicitly the normative assumptions on which the interpersonal comparability rests.

In particular we empirically calculate the 'Rent' criterion and the 'Wage' criterion which express different assumptions of comparability of welfare levels and how to treat them in redistributive policies. The 'Rent' criterion assumes maximal protection for people who have a larger distaste for working, whereas for the 'Wage' criterion it is assumed that people are fully responsible for differences in their tastes for leisure. Despite these different assumptions the two welfare measures give the same results. This allows us to draw a robust conclusion concerning the welfare effects of introducing individual taxation. Overall we find that individual welfare increases when replacing joint taxation with income splitting by a revenue neutral version of individual taxation. Certainly some households are losers, namely those households who benefit the most from joint taxation, but this effect is outnumbered by the gainers of this reform. The policy conclusion with respect to this tax reform becomes even stronger when focussing on the effects of social welfare. Our results show that irrespective of the welfare criterion and even more importantly of the redistributive tastes of the social planner, a reform towards individual taxation would increase social welfare.

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