DIW Berlin

German Institute
for Economic Research

Discussion Papers

472

Peter Haan*
Viktor Steiner**

Labor Market Effects of the German Tax Reform 2000

Berlin, February 2005

* DIW Berlin, Public Economics, phaan@diw.de
** DIW Berlin, Public Economics, vsteiner@diw.de and Free University of Berlin

Discussion Papers 472

Peter Haan*
Viktor Steiner**

Labor Market Effects of the German Tax Reform 2000

Berlin, February 2005

* DIW Berlin, Public Economics, phaan@diw.de

** DIW Berlin, Public Economics, vsteiner@diw.de and Free University of Berlin

Acknowledgement: We would like to thank Katharina Wrohlich, Arne Uhlendorff, Achim Rudolph, Michael Feil and Nicole Scheremet for helpful comments on a previous version of this paper and for helpful assistance. The usual disclaimer applies.

IMPRESSUM

DIW Berlin
Deutsches Institut für Wirtschaftsforschung
Königin-Luise-Str. 5
14195 Berlin
Tel. +49 (30) 897 89-0
Fax +49 (30) 897 89-200
www.diw.de

ISSN 1433-0210 (Druck) 1619-4535 (elektronisch)

Labor Market Effects of the German Tax Reform 2000

Peter Haan

Viktor Steiner

Abstract: In the year 2000, the German government passed the most ambitious tax reform in postwar German history aiming at a significant tax relief for households. An important aim of this tax reform was to improve work incentives and, thereby, foster employment. Drawing on data of the German Socio Economic Panel (SOEP), we analyze the work incentive and employment effects of this reform on the basis of a behavioral microsimulation model. We find that the significant reduction of marginal tax rates implied by the tax reform results in a substantial increase in labor supply, a slight reduction of market wages and an increase in employment of about 130 thousand people (full-time equivalents).

Keywords: tax reform, behavioral effects, labor market effects

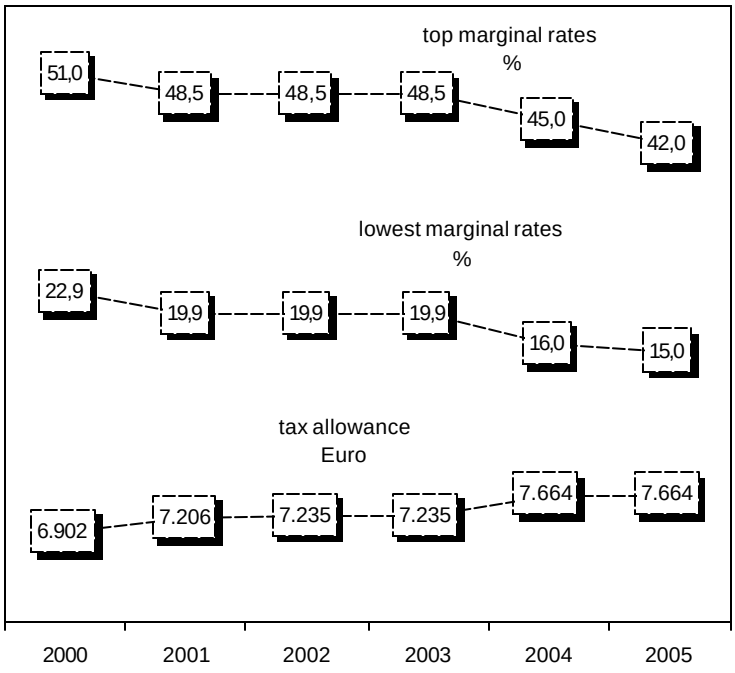
JEL Classification: H24, H31, J22

Correspondence to:
Peter Haan
DIW Berlin
Köngin-Luise-Straße 5
14195 Berlin
e-mail: phaan@diw.de

1 Introduction

In the year 2000, the German government passed the most ambitious tax reform in postwar German history. The reform aims at reducing the burden and distortions of taxation for both companies and private households, thereby fostering employment growth in the sluggish German economy. This paper focuses on the part of the reform related to the personal income tax, which has been implemented in several steps starting in 2001 (see Figure 1).[1] By 2005, the top marginal rate of the personal income tax is to be reduced to 42%, compared to 51% in 2000. In the same period, the lowest marginal tax rate is reduced from 22.9% to 15%, and the basic tax allowance is increased from 6,902 € to 7,664 €.

Figure 1:
Changes in the personal income tax 2000 – 2005



Source: Bundesfinanzministerium (2003).

In this paper, we analyze the impact of the changes in income taxation on work incentive of households and the resulting labor supply and employment. Our analysis employs a behavioral tax-benefit microsimulation, which embeds a microeconometrically estimated household

[1] We only consider the reduction in the marginal tax function. Reforms such as increased in child benefits of the reduction in the saving tax allowance were announced and implemented before the tax reform 2000. For a more general discussion of the tax reform and its implementation see Haan and Steiner (2004).

labor supply model. This allows us to simulate the work incentive and labor supply effects of the tax reform 2000, which will only be fully implemented by the year 2005, from an ex ante perspective. We estimate labor supply elasticities both in terms of labor force participation and in terms of working hours on the basis of a household labor supply model. The employment effects of the reform are derived within the framework of a partial equilibrium model of the labor market assuming flexible market wages using empirically estimated labor demand elasticities. We also control for bracket creeping, which measures the real increase of household's tax payment due to a purely inflation related increase of the taxable income. As we have demonstrated in previous work (Haan and Steiner 2004), this effect reduces cash gains of the tax reform, and thus work incentives, significantly.

We find that the tax reform has a substantial impact on the labor supply decision of households. The estimations indicate that labor market participation (extensive margin) is increasing by about 240,000 full time equivalents. The total hours effects amounts to over 14 million hours per week, which is an increase of about 1.2 % of weekly working time. Our results indicate that about 50 % of the labor supply results in additional employment. The total employment effects amount to 130,000 full time equivalent or about 8 million additional hours of work, while market wages are slightly reduced by the tax reform.

2 Methodology

One important aim of the German tax reform 2000 was to improve work incentives, thereby raising effective labor supply and increasing employment. We will analyze the work incentive and labor supply effects on the basis of our behavioral tax-benefit microsimulation model STSM, which allows us to perform an ex ante evaluation of the reform spanning the period 2000 – 2005. However, the employment effect of the reform will only equal the labor supply effect under the assumption of perfectly elastic demand for labor. Depending on the size of the labor supply effect, this may not be a very realistic assumption. There exist several approaches in the literature to analyze the effect of an increase in labor supply on market wages and employment. Boeters, Feil and Gürtzgen (2004) study labor supply, wage effects and employment on basis of a general equilibrium model. This approach has the appealing advantage that labor supply and labor demand is integrated within the same model. However, the drawback of the general approach is that the model is based on stylized households by aggregation rather then real micro data. We try to account the labor market effects on the basis of a

partial equilibrium model of the labor market under the assumption of flexible wages. For this analysis we draw on the estimated labor supply elasticities derived from a structural household labor supply model and on empirical labor demand elasticities differentiated by skill group and gender, which have been derived by Buslei and Steiner (1999, chapter 4).[2]

Data and Sample Design

The tax-benefit microsimulation model for Germany employed in our analysis is based on micro data of the German Socio Economic Panel (SOEP). The SOEP is a representative sample of private households living in Germany with detailed information on household incomes, hours worked and household structure.[3] The dataset includes detailed information about the socio-economic situation of over 11,000 households that represent 38.7 million households living in Germany.[4] We draw on data of the 2002 wave, which, for the first time, contains a disproportionately large sample of high-income households.[5] This so-called *high-income sample* consists of over 1,200 households with monthly net incomes of at least 3,834 €. Given that the highest decile of taxable income contributes roughly 40% to the overall collected amount of personal income tax (see Haan and Steiner 2004, table 8), the inclusion of this group in the analysis is of greatest importance. The overrepresentation of this group in our sample is accounted for by adjusting estimation results by appropriate weighting factors available in the SOEP. A detailed description of the structure of the high-income sample and the weighting factors is provided by Schupp et al. (2003).

Tax Benefit Simulation Model

In theory, the German income tax is based on the principle of comprehensive income taxation. That is, the sum of a household's incomes from all sources is taxed at a single rate after several deductions have been applied to arrive at the tax base. In practice, there are various exceptions to this rule, however, especially regarding the taxation of capital income and pensions.

[2] An alternative approach would be to use estimates of the "wage curve" to derive the effect of an increase in employment (or a reduction of the unemployment rate) on the market wage. However, most estimated wage curves do not differentiate elasticities by skill group or gender, as required for our analysis (see e.g. Baltagi and Blien 1999).

[3] A description of the SOEP can be downloaded from www.diw.de/soep; see also Haisken-DeNew and Frick (2001).

[4] For more information about the weighting, see Haisken-DeNew and Frick (2001).

[5] Although we use data from the year 2002, simulations are undertaken for the year 2001. The reason is that most income variables we use are retrospective variables that refer to the year 2001.

Another distinguishing feature of the German tax system is the principle of joint taxation of households, whereby 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.

Our tax-benefit simulation model includes all relevant components of the German tax and transfer system.[6] For the majority of households the most important income component is earnings from dependent employment. For employed people, information on gross monthly earnings in the month before the interview is collected in the SOEP. This information together with the information on weekly hours worked is used to calculate gross hourly wages. Hypothetical yearly earnings for each of the hours categories defined below are calculated by multiplying gross hourly earnings by the respective average number of working hours in each category used in our household labor supply model. For employed persons, it is assumed that the individual gross hourly wage in their actual hours category would be the same in each hours category. For persons not employed in the month preceding the interview, gross hourly wages are estimated by applying a two-stage estimation procedure with a Heckman sample selection correction.[7] Due to item non-response wages are also missing for a non-negligible share of employed persons, for whom hourly wages are also imputed on the basis of these wage equations.

Gross income of households is calculated by adding all income components of the household members. Taxable income is derived by deducting certain expenses from gross household income. The income tax is computed by applying the income tax function to taxable income of each person in the household or of the spouses' joint income, depending on marital status. Income tax and employee's social security contribution rates are deducted from gross income, and social transfers are added to derive net household income. Social transfers include child benefits, child-rearing benefits, education benefits for students, unemployment compensation, housing benefits and social assistance. The base year for the following analysis is the year 2000 as this is the last year before the tax reform.[8] Drawing on these data, we simulate tax payments and net household incomes on the basis of the tax legislation in 2000. This informa-

[6] A detailed description of the tax-benefit simulation model may be obtained by the authors upon request.

7 In order to increase the variance of the predicted wages, we adjust the predicted wages by adding the normalized error term distribution of the regression of the observed wages. Estimation results for the wage equations are available from the authors upon request.

tion serves as the basis for the analysis. Furthermore, we simulate counterfactual incomes and tax payments, which differ solely due to the changes in the tax function. The difference in the net household income between the counterfactuals and the base simulation measures the tax relief that is related to the different steps of the tax reform.

Household Labor Supply Model

To simulate the labor supply effects induced by the tax reform, we employ a discrete choice labor supply model. The main advantage of the discrete choice approach compared to continuous specifications derives from the possibility to model nonlinearities in budget constraints (see e.g. van Soest 1995 and Duncan and MacCrae 1999). We model the labor supply decision of couple households under the assumption that both spouses jointly maximize a utility function in the arguments leisure of both spouses and net household income. It is assumed that the labor supply decisions of the household's head and spouse can be separated from the labor supply decision of all other household members. The labor supply decision of single persons can be derived as a special case of the couple's labor supply decision.

Following van Soest (1995), we specify a household utility function depending on the leisure time of the household members and net household income. We assume that the household's utility index for a particular hours category k can be modeled by the following quadratic utility function:

$$(1) \qquad U_k(x_k) = x_k' A x_k + b' x_k + e_k$$

where $x = (y, lm, lf)'$. The components of x is net household income (y), leisure of the husband (l_m) and leisure of the wife (l_f). [9] These components enter the utility function in linear, quadratic and cross terms. The matrix A, with elements a_{ij}, $i,j = (1,2,3)$, contains the coefficient of the quadratic and the cross terms, the vector b_j, $j = (1,2,3)$, the coefficients of the linear terms. e_k is a stochastic error term accounting for unobserved factors that affect household utility. Given the assumption of joint maximization of household utility, the household

[8] In order to include the high-income sample we employ the data of the 2002 wave of the SOEP and adjust it to prices of the year 2000.

[9] Specifying income and leisure in logarithms, as suggested by van Soest (1999), does not effect the estimation results.

will choose hours category k if, in probability terms, the associated utility index, U_k, exceeds the utility index in any other possible alternative l, i.e.:

$$(2) \qquad P(U_k > U_l) = P[(x_k' A x_k + b' x_k) - (x_l' A x_l + b' x_l) > e_l - e_k].$$

Assuming that e_k is distributed identically across all hours categories according to an extreme-value distribution, the difference of the utility index between any two hours categories follows a logistic distribution.[10] Under this distributional assumption the probability of choosing alternative k relative to alternative l can be described by a conditional logit model introduced by McFadden (1973):

$$(3) \qquad P(U_k > U_l) = \frac{\exp(x_k' A x_k + b' x_k)}{\sum_m \exp(x_m' A x_m + b' x_m)}, \forall l \neq k,$$

where the summation sign is defined over all possible alternatives, i.e. hours categories. We control for observed heterogeneity in household preferences by including as control variables age and health status of both spouses, number and age of children in the household, region of residence (east or west Germany), and nationality. Because variables with no variation across alternatives drop out of the estimation in the conditional logit model, the household-specific variables are interacted with the leisure terms in the utility function (1).

The specification of the econometric model is based on the assumption that each household compares the expected utility obtained from net income and the two spouses' (or, in the case of singles, the person's) leisure associated with the choice of a particular hours category. The definition of the hours categories is motivated by both, economic considerations and the actual distribution of hours in the sample. Because of the small number of men working part-time, only three categories could be specified for them, namely non-employment (unemployment and non-participation in the labor force), 1-40 hours and more than 40 hours (overtime). For women we specify five hours categories: non-employment, two part-time categories, full time and overtime (for a more detailed discussion see Steiner and Wrohlich 2004).

[10] The assumption that the error terms following an extreme value distribution is rather restrictive and results in the property of the independence of irrelevant alternatives (IIA). Random coefficient models, in contrast to the conditional logit model used here, allow for unobserved heterogeneity and, therefore, circumvent the restrictive IIA property. Haan (2004), estimating several labor supply models with the same data set we employ, shows that the results (in terms of wage elasticities) from a random coefficient model do not differ significantly from the results obtained from a conditional logit model. Thus, for computational reasons, he suggests to employ the conditional logit model.

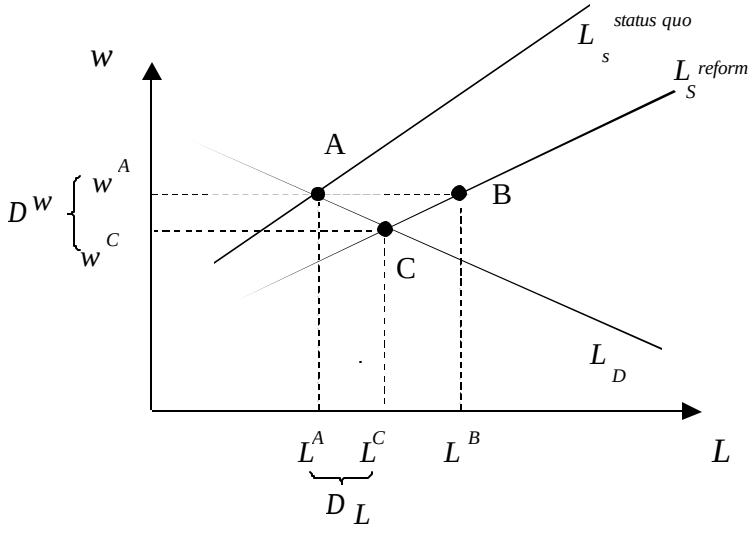
Wage and Employment Effects

The increase in the supply of labor induced by the tax reform will only affect employment in the same size if the market wage stays constant, other things equal. Whether or not this condition seems likely to hold depends on the magnitude of the initial labor supply effect and on general labor market conditions. It may be argued that, given the high level of vacancies in Germany[11], a relatively small increase in the effective supply of labor can be employed without wage reductions. Whether or not this assumption is appropriate in the present situation is an open question and cannot be decided on empirical grounds. As an alternative to this assumption, which implies that firms' demand for labor is at least locally perfectly elastic, we will derive the employment effects of the tax reform under the assumption of flexible market wages and empirically estimated labor demand elasticities differentiated by skill group and gender. Since we are interested in the potential wage effects of a shift in labor supply, the relevant elasticities are those referring to the demand for total hours rather than for the number of workers.

These elasticities have been derived in previous work by Buslei and Steiner (1999). For unskilled men they find an elasticity of -0.67 that differs from the one for skilled men (-0.24). For women, demand elasticities are similar: -0.47 for unskilled and -0.48 for skilled women. It is important to stress that in this analysis we solely focus on the reform of personal income taxation. Thus, the impact of the tax reform on companies is not reflected in the demand elasticities. The following figure explains the adjustment process. Before the reform the labor market equilibrium is in point A with wage w^A and employment L^A. Due to the tax reform the labor supply curve shifts outward (L_s^{reform}). If the wage remains constant at w^A there exists excess supply for labor at point L^B.

[11] There are roughly 300 – 400 thousand vacancies registered at the labor offices even at the trough of the business cycle. The real number of vacancies should be even higher (Franz, 1999).

Figure 2:
Wage and employment effects of the tax reform



Drawing on the empirical demand elasticities referred to above, we can calculate the adjustment of wages by simulation to clear the labor market. In order to increase labor demand to reach labor supply L^B gross hourly wages have to decrease according to the elasticities. Given this wage reduction labor supply becomes less attractive and is dropping such there exists demand exes. In order to equalize the labor market, point C, we have to specify wage w^C. Technically we reach this point by iterating wage adjustment on the basis of the simulation model and labor demand elasticties until labor demand equals labor supply. This iteration is performed separately by gender and qualification groups.

3 Estimation Results

3.1 Impact on Household Net Income

Before turning to the labor supply effects it is insightful to analyze the impact of the tax reform on the net household income because changes in net household income are the driving force of the labor supply adjustment of households. Haan and Steiner (2005) provide a detailed analysis of the financial incentives and the distributional effects of the tax reform on the household level. Their main finding is that the relative income gains increase with taxable income and thus that income inequality is rising. In the following table, the absolute and relative gains that result from the change in the tax function by gender, household type and region

are presented. Note, that the German tax system is defined in nominal rather than in real terms. That implies a nominal increase of the taxable income leads to higher marginal tax rates, although in real terms, the income of the household remains unchanged. This phenomenon is known as bracket creeping in the public finance literature. Haan and Steiner (2004) discuss the effect of bracket creeping and find that considering this effects reduces the gains of the tax reform on average by 240 €. All following results have been derived explicitly accounting for bracket creeping.

Table 1:
Impact on net household income by gender, household type, and region

		with adjustment for bracket creeping			
		net income 2000	net income 2005	Δ (in €)	Δ (%)
West Germany	couple	35,495	36,639	1,145	3.22
	male single	19,774	20,612	838	4.24
	female single	16,159	16,471	312	1.93
	all	27,132	27,981	850	3.13
East Germany	couple	29,138	29,827	689	2.36
	male single	13,525	13,816	291	2.15
	female single	14,014	14,159	145	1.04
	all	22,044	22,507	463	2.10
all couples/all singles		26,183	26,961	778	2.97

Source: SOEP, wave S (2002), own calculations.

On average, the tax reform has a positive effect on the yearly net household income by about 778 €. That results in a relative increase of the net income by 2.97 %. The absolute gain in west Germany is nearly twice as large as in the gain in the eastern part of Germany; the relative difference is about one percentage point. That is related to the still higher average income in west Germany. For the same reason, the gains for single men are higher then for single women. That is in particular true for the western part of Germany, as the female labor market participation as well as the number of working hours is relatively low in comparison to east Germany. Another important reason for the difference by gender is the still existing gender wage gap.

3.2 Labor Supply Effects

For the estimation of the labor supply model we restrict our sample to household members who are not pensioners and not in any sort of schooling, training or university. Also self-employed people are excluded since this groups might differ in their labor supply behavior.[12] We run separate estimations for couple households, single men and single women. For technical reasons, we further divide couple households in three groups, those where both spouses are assumed to be flexible regarding their labor supply behavior (i.e. both spouses are neither pensioners, nor students, nor in maternity leave, nor self-employed), those where only the husband is assumed to be flexible and those where only the wife is assumed to be flexible. In total we estimate labor supply responses for 7,809 households.

On average, estimated elasticities of working hours with respect to a 1% change in the real wage derived from our labor supply model described in section 3 above are about 0.3 for women and 0.2 for men (see appendix).[13] These estimates are in the range of typical cross-section estimates from studies for other OECD countries (see e.g. Fuchs, Krueger and Poterba 1998, Blundell and MaCurdy 1999). Although these average elasticities are not very large, the effect of the tax reform on labor supply may be substantial given the relative large reductions in marginal tax rates and its effect on net household incomes documented above.

The quantitative implications of the tax reform can best be described by deriving hours and participation elasticities with respect to changes in the tax function. Although a closed-form expression of elasticities is not available for the utility function estimated in our specification of the household labor supply model, elasticities can be calculated from the simulated changes in estimated hours and participation rates induced by changes in the tax function. The expected number of hours worked as well as the labor force participation rates are calculated for each sample observation both on the basis of the tax function in 2000 and using the changed tax functions. The difference of these numbers provides the estimated effects of the tax reform in terms of elasticities of both participation rates and working hours.

[12] It is certainly problematic to exclude self-employed when estimating the impact of the tax reform on labor supply. This group might be seen as the most flexible with respect to labor supply. However the used data provide not sufficient information about the self-employed. Including behavioural effects of this group remains for future work.

[13] Estimation results for the household utility model are available form the authors upon request. For further methodological discussion related to the estimation of these elasticities, see Haan (2004).

These elasticities combine the effects of both the change in net *real* household incomes of a particular group resulting from the tax reform (Table 1) and the size of the labor supply response of a particular household type to a given percentage change of net household income.

Table 2:
Cumulated labor supply elasticities by gender, household type, and region

	couples, both spouses flexible		couples, only one spouse flexible		singles	
	women	men	women	men	women	men
	change in the participation rate (in percentage points)					
all couples/all singles	0.96 (0.84-1.08)	0.74 (0.66-0.83)	0.64 (0.35-1.03)	0.64 (0.41-0.89)	0.46 (0.31-0.62)	0.90 (0.62-1.19)
West Germany	1.01 (0.87-1.16)	0.71 (0.62-0.81)	0.69 (0.35-1.03)	0.61 (0.36-0.86)	0.49 (0.33-0.66)	0.81 (0.49-1.12)
East Germany	0.78 (0.60-0.96)	0.86 (0.65-1.06)	0.44 (0.25-0.63)	0.76 (0.44-1.07)	0.36 (0.22-0.50)	1.20 (0.85-1.55)
	change in total hours worked (in percent)					
all couples/all singles	2.58 (2.24-2.92)	1.20 (1.06-1.34)	1.82 (0.98-2.66)	1.05 (0.61-1.49)	1.23 (0.81-1.65)	1.49 (1.04-1.96)
West Germany	2.73 (2.33-3.14)	1.16 (1.00-1.31)	1.99 (1.03-2.95)	0.99 (0.54-1.45)	1.29 (0.84-1.74)	1.34 (0.89-1.80)
East Germany	2.05 (1.57-2.54)	1.4 (1.02-1.86)	1.06 (0.60-1.53)	1.19 (0.65-1.73)	1.02 (0.62-1.41)	1.96 (1.26-2.65)

Note: Numbers in parentheses refer to 95-percent bootstrap confidence intervals (500 repetitions).
Source: SOEP, wave S (2002), own calculations.

Estimated elasticities are all positive and statistically significant.[14] Elasticities vary between the groups, yet, according to the bootstrapped confidence intervals, the differences are statistically not significant in most cases. As shown in table 2, labor supply elasticities resulting from the tax reform differ little between east and west Germany, which may be related to various factors. First, since household income in west Germany is on average still substantially higher than in the eastern part, west Germans benefit more from the reduction in marginal tax rates. However, this effect is reduced by the indirect effects resulting from the system of income splitting of married couples in Germany. A reduction in marginal tax rates reduces the advantage of income splitting. As Steiner and Wrohlich (2004) show, west German couples

[14] For almost 100% of the sample the first derivatives with respect to income and for 90% of the sample with respect to both leisure terms are positive, i.e. the theoretical restrictions of a well-behaved utility function are fulfilled in the great majority of all cases.

benefit much more from the system of income splitting. Second, as the labor supply elasticities derived from a 1% in wages indicate (see Appendix), labor supply is more elastic in west Germany.

Population-weighted estimates of the effects of the tax reform on supplied labor force participation and on supplied hours of work for Germany as a whole are summarized in Table 3.

Table 3:
Labor supply effects – aggregate numbers in 1000

		number of persons additionally participating after the reform	total hours effect (per week)	hours effect due to additional participation (per week)	conditional hours effect (per week)	number of full time equivalents due to the tax reform
		(1)	(2)	(3)	(4)	(5)
couples	women	125 (102-148)	5,927 (4,911 -6,942)	3,362 (2,744-3,980)	2,565 (2,125-3,004)	87 (71-103)
	men	95 (79-111)	5,110 (4,339-5,880)	3,899 (3,259-4,538)	1,211 (987-1,435)	101 (84-118)
singles	women	24 (16-32)	1,596 (1,077 -2,095)	793 (526 -1,060)	792 (518-1,088)	21 (14-28)
	men	31 (9-54)	1,759 (865-2,654)	1,290 (430 -2,151)	468 (309 -628)	34 (11-56)
total		276 (214-338)	14,382 (11,514-17,251)	9,345 (7,693 -10,998)	5,037 (4,009 -6,065)	243 (199 -286)

Note: Numbers in parentheses refer to 95-percent bootstrap confidence intervals (500 repetitions). The confidence intervals of the sums were computed by calculating a weighted average of the percentage deviation of the bounds of the confidence intervals from the mean.

Source: SOEP, wave S (2002), own calculations.

Although bootstrapped confidence intervals are unfortunately quite large, simulated aggregate labor supply elasticities are significantly positive for all groups shown in Table 3. Hence, the tax reform will unambiguously lead to an increase of labor supply. In total, the point estimate of the participation effect amounts to about 275,000 people, where women and men contribute roughly equally. The additional supply of working hours amounts to approximately 14 million additional hours per week. That translates into an increase of about 1.2 % of the pre reform working hours per week [15]. Since part-time employment is common among women while the majority of men works full-time or even overtime, a larger share of this additional hours effect is accounted for by men.

[15] In the year 2000 total working hours in Germany amount to about 1,100 million per week (own calculation based on the SOEP).

Following the method suggested by McDonald and Moffit (1980), the total hours effect can be decomposed into a conditional hours effect and a participation effect. As the decomposition in Table 2 (columns 3 and 4) shows, the participation effect is much larger than the conditional hours effect. About two thirds of the additional hours are supplied by persons who have not been participating in the labor market before the tax reform. The participation effect predominates for all groups, except for single women. This group differs from the other as participation is high and part time work is common. For the reason given above, the participation effect is relatively large for men.

The last column of Table 3 presents the additional full time equivalents resulting from the participation effect. Dividing the number of hours due to additional participation by 38.5 hours, we calculate that the tax reform results in additional labor supply of 150,000 full time equivalents. The number of full time equivalents exceeds the total participation effect in column (1) for women, whereas for men the reverse holds. These gender differences result from differences in average working hours between men and women already referred to above.

The estimated labor supply effects induced by the tax reform are derived under the assumption that the market wage stays constant and result in employment because of an infinitely elastic demand curve. In the following we relax this strong assumption by considering negatively sloped demand curves for labor.

3.3 Wage and Employment Effects

We derive the effect on the gross hourly wages separately for men and women and differentiated by skill[16] and region. Doing so, we assume that the different groups act on separate labor markets. Table 3 contains the results of the above described iterative adjustment process.

[16] We define unskilled as people without higher school degree (Haupt- und Realschule) and without any vocational degree.

Table 4:
Wage effects by region, gender and skill

	West		East	
	skilled	unskilled	skilled	unskilled
	changes in %			
women	2.37	1.88	1.91	1.55
men	2.41	1.16	2.95	1.01

In general gross hourly wages have to drop by about 2% in order to equal labor demand and labor supply. For skilled people (about 85 % of the population) the wage adjustment is relatively larger then for the unskilled. That is in particular true for men. That can be explained by demand and supply side factors. First of all the labor supply effects of the tax reform are higher for skilled people as they are more effected by the reduction of marginal tax rates (Haan and Steiner 2004). Furthermore, for skilled men demand elasticities are markedly lower then for unskilled, which implies a far higher wage drop for this group. Differences between men and women are mainly explained by the different demand elasticties. For the skilled the reduction in wages is higher for men, whereas due to the high demand elasticity of unskilled men the wage effect is lower for this group then for unskilled women. Differences between east and west Germany are caused by labor supply effects. As table 2 indicates, labor supply effects for women are higher in the west, thus the supply exes is relatively higher. For men just the opposite holds true. In addition, the skill composition differs. In east Germany there live less unskilled people (13%) then in the west (16 %). Thus, the demand elasticties are slightly higher in the eastern part of Germany.

Given the new equilibrium wage, we can calculate the additional labor supply that results in employment. The employment effects have been derived separately for couples, single women and single men using the above described method. [17]

[17] We only present the employment effects in aggregate numbers, employment elasticities can be obtained from the authors upon request.

Table 5:
Employment effects – aggregate numbers in 1000

		number of persons additionally participating after the reform	total hours effect (per week)	hours effect due to additional participation (per week)	conditional hours effect (per week)	number of full time equivalents due to the tax reform
		(1)	(2)	(3)	(4)	(5)
couples	women	76	3,749	2,039	1,710	53
		(58-94)	(3,012-4,486)	(1,556-2,520)	(1,402-2,019)	(40-65)
	men	48	2,669	1,983	686	52
		(40-57)	(2,262-3,307)	(1,643-2,322)	(552-819)	(43-60)
singles	women	12	906	406	500	11
		(8-16)	(613-1,199)	(263-547)	(333-669)	(6-14)
	men	14	879	574	305	15
		(-3-30)	(240-1,157)	(-550-1,202)	(198-412)	(-1-31)
total		150	8,203	5,000	3,201	130
		(106-194)	(6,346-10,061)	(3,978-6,022)	(2,256-3,879)	(103-156)

Note: (Numbers in parentheses refer to 95-percent bootstrap confidence intervals (500 repetitions) The confidence intervals of the sums were computed by calculating a weighted average of the percentage deviation of the bounds of the confidence intervals from the mean. missing).

Source: SOEP, wave S (2002), own calculations.

According to the confidence intervals differences between men and women as well as between east and west Germany are in most cases not significant. Our estimations indicate that slightly more then half of the labor supply effects induced by the tax reform results in employment. About 150,000 persons enter employment. The sum of additional weekly hours is about 8 million or 0.7 % of the pre reform working hours per week. The larger drop in male wages because of the lower demand elasticity of skilled men becomes evident when comparing the employment effects to the labor supply effects (Table 3). For men, less then half on their labor supply leads to employment, whereas for women the ration is about 60%. The working hours decomposition by McDonald and Moffit (1980) and full time equivalents are presented in the last three columns of the table. Differences by martial status and by gender have a similar structure as in the analysis of the labor supply effect, however at a lower level. Our estimates indicate that the tax reform increases employment by 130,000 full time equivalents.

4 Conclusion

It was the purpose of this study to analyze the impact of the German tax reform 2000 on work incentives of households and the resulting labor market effects. As this reform will not be fully implemented before the year 2005, we employ an ex ante analysis based on a behavioral microsimulation model, which includes a microeconometric labor supply estimation. Wage and employment effects of the reform are derived within the framework of a partial equilibrium model of the labor market assuming flexible market wages using empirically estimated labor demand elasticities.

We find that the tax reform has a substantial impact on the labor supply decision of households. The estimations indicate that labor market participation (extensive margin) is increasing by about 240,000 full time equivalents. The total hours effects amounts to over 14 million hours per week, which is an increase of more than 1,2% of weekly working time. Our results indicate that slightly over 50 % of the labor supply results in additional employment. The total employment effects amount to 130,000 full time equivalent or about 8 million additional hours of work, while market wages are slightly reduced (about 2%) by the tax reform.

We see our results as lower bound estimates. Within our microsimulation framework we do not account for the potential employment effects induced by the substantial increase of disposable net household income (Haan and Steiner 2004). Depending on the additional consumption by household induced by the increased income, labor demand is affected. The size of this effect is an empirical question, which has to be studied in future research.

References

Baltagi, B. and U. Blien (1999): The German Wage Curve: Evidence from the IAB Employment Sample, Economics Letters, 61, 135-142.

Blundell, R. and T. MaCurdy (1999): Labor Supply: A Review of Alternative Approaches, in: *Ashenfelter, O and D. Card* (eds.): Handbook of Labor Economics, Vol. 3A, Elsevier, Chapter 27, S. 1559-1695.

Boeters, Feil and Gürtzgen (2004): Discrete Working Time in an Applied General Equilibrium Model, ZEW Discussion Paper, 04-20, Mannheim.

Bundesfinanzministerium (2003): Tax Reform 2000 – An Overview (http://www.bundesfinanzministerium.de/Anlage22233/Tax-reform-2000-An-overview-Adobe-Acrobat-3.x-4.x.pdf).

Buslei, H. and V. Steiner (1999): Beschäftigungseffekte von Lohnsubventionen im Niedriglohnbereich, Nomos, Baden-Baden.

Duncan, A. and J. MacCrae (1999): Household Labour Supply, Childcare Cost and IN-Work Benefits: Modeling the Impact of the Working Families Tax Credit in the UK , Manuscript, Department of Economics and Related Studies, University of York.

Franz, W. (1999): Arbeitsmarktökonomik, Springer, Berlin.

Fuchs, V.R., A. B. Krueger and J. M Poterba (1999): Economists' views about parameters and policies: survey results in labor and public economics, Journal of Economic Literature, 36, 1387-1435.

Haan, P. (2004): Discrete Choice Labor Supply: Conditional Logit vs. Random Coefficient Models, DIW Discussion Paper, No. 394.

Haan, P. and V. Steiner (2004): Distributional and Fiscal Effects of the German Tax Reform 2000, A Behavioral Microsimulation Model, DIW-Discussion Paper, No. 419.

Haan, P. and V. Steiner (2005): Distributional Effects of the German Tax Reform 2000 - A Behavioral Microsimulation Analysis, Schmollers Jahrbuch, forthcoming.

Haisken De-New, J. and J. Frick (2001): Desktop Compendium to The German Socio- Economic Panel Study (SOEP): DIW Berlin.

McDonald, J. and R. Moffitt (1980): The Use of Tobit Analysis, Review of Economics and Statistics, 62, 318-321.

Schupp, J., T. Gramlich, B. Isengard, R. Pischner, G. Wagner and B. v. Rosenblatt (2003): Repräsentative Analyse der Lebenslagen einkommensstarker Haushalte. Studie des DIW Berlin im Auftrag des Bundesministeriums für Gesundheit und Soziale Sicherung.

Steiner, V. and K. Wrohlich (2004): Household Taxation, Income Splitting and Labor Supply Incentives. A Microsimulation Study for Germany, CESifo Economic Studies, 50, 541-568.

van Soest, A. (1995): Structural Models of Family Labor Supply: A Discrete Choice Approach, Journal of Human Resources, Vol. 30: 63-88.

Appendix: Labor supply effects of a 1% increase in gross wages

	couples. both spouses flexible		couples. only one spouse flexible		singles	
	women	men	women	men	women	men
	change in the participation rate (in percentage points)					
all couples/all singles	0.13 (0.12-0.15)	013 (0.11-0.14)	0.16 (0.12-0.20)	0.14 (0.08-0.19)	0.11 (0.07-0.14)	0. 18 (0.13-0.19)
west Germany	0.14 (0.12-0.16)	0.12 (0.11-0.14)	0.17 (0.12-0.21)	0.12 (0.07-0.17)	0.11 (0.07-0.15)	0.16 (0.11-0.20)
east Germany	0.10 (0.08-0.13)	0.14 (0.10-0.18)	0.13 (0.08-0.18)	0.19 (0.11-0.28)	0.10 (0.06-0.14)	0.26 (0.18-0.34)
	change in total hours worked (in percent)					
all couples/all singles	0.35 (0.31-0.40)	0.20 (0.18-0.23)	0.40 (0.28-0.52)	0.22 (0.12-0.32)	0.25 (0.17-0.34)	0.29 (0.20-0.40)
west Germany	0.38 (0.33-0.44)	0.20 (0.17-0.23)	0.43 (0.30-0.56)	0.18 (0.10-0.27)	0.26 (0.17-0.34)	0.24 (0.17-0.33)
east Germany	0.27 (0.20-0.34)	0.22 (0.16-0.28)	0.28 (0.18-0.38)	0.31 (0.14-0.48)	0.24 (0.15-0.33)	0.42 (0.26-0.59)

Note: Numbers in parentheses refer to 95-percent bootstrap confidence intervals (500 repetitions).

Source: SOEP, wave S (2002), own calculations.