Distributional and Behavioural Effects of the Bofinger-Walwei In-Work Benefit Concept – Empirical Evidence from a Microsimulation Study

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Abstract

In this paper we analyse important effects of introducing the Bofinger-Walwei in-work benefit concept for low-income households in Germany. We employ two microsimulation models for estimating labour supply as well as distributional and fiscal effects of the reform proposal. The microsimulation models are based on different datasets, the Socio-Economic Panel 2005 and the German Income and Expenditure Survey 2003, respectively. We provide "morning after effects", i. e. distributional and fiscal effects without considering behavioural adjustments, as well as long-run effects, which take into account the labour supply response following the introduction of the reform. We predict the labour supply responses by estimating a discrete choice model for different household types and find a moderate increase in labour supply (94,000 in full-time equivalents) as well as overall low negative participation effects. The distributional analysis reveals substantial deadweight losses, since about 90% of the in-work benefit accrues to households who are not eligible to social assistance (SGB II) in the status quo.

1 Introduction

Financial incentives to increase employment have been in place for a long time in the US and they are on the rise in other European countries. These policies to 'make work pay' pursue two objectives. Firstly, they attempt to increase the incentives to take up low-paid work and hence increase employment.[1] Secondly, these policies try to lower poverty by increasing the income of low-income households. The design and implementation of in-work-benefit programmes usually differs across countries, but the assessment of all these policies has to consider explicitly the existing tax and benefit system in a country. Not surprisingly in-work benefits have been subject to evaluation studies for a long time. Evidence from other countries shows that in-work benefits can have a positive effect on labour supply and income, which depend crucially on the design of the programme and the framework conditions (Blundell, 2000; Pearson and Scarpetta, 2000; Brewer et al., 2006).

In Germany the situation is somewhat different. While there was a process of restructuring the welfare state in most european countries in the last decades, the German government has just begun to conduct some basic reforms of its social assistance programmes. In the year 2005 a new social assistance programme was implemented for the long-term unemployed ("Hartz-IV Reform"). The Hartz-IV reform is based on a consensus that the former social assistance generates low incentives to take up a low-paid work for long-term unemployed because of very low earnings disregards. Up to now different variations of financial incentive programmes exist in Germany only on a regional level (Dietz et al., 2006). Since the implementation of the Hartz IV reform, long-term unemployed are subject to the new law (The Second Code of Social Law), which includes higher earnings disregards especially for low earnings.

A growing number of working recipients of social assistance during the last two years[2] induces the present public debate in Germany about the working poor. This puts pressure on the government to react. While distributional objectives are in the center of the debate, economists pointed out to the remaining disincentives of the reformed programme to take up a low-paid job, especially to take up a full-time job (Koch and Walwei, 2006). Economists in Germany worked out several proposals to restructure the low-wage sector in Germany in order to encourage employment of low-skilled workers. The models contain in-work benefits and workfare programmes as well.[3]

[1] In our analysis we focus only on in-work benefit policies on the labour supply side. Other financial incentives on the labour demand side to hire low-skilled workers are possible.

[2] The number of full-time working recipients increased by a number of about 200,000 during the years 2005 and 2006. See Statistik der Bundesagentur für Arbeit (2007) for further information.

[3] See Sinn et al. (2007) for an overview.

The german government considers introducing a welfare programme for the working poor, that follows a proposal of the economists Bofinger and Walwei (Bofinger et al., 2006). The original proposal intends a tax-credit administrated by the finance offices, but the German Ministry of Labour decided to examine a modification in which the in-work benefit is administrated by the benefit offices. Additionally, some of the original proposal's parameters are changed.

This paper analyses the effects of the modified reform proposal on government expenditures, income distribution and labour supply. The outline of the paper is as follows. Section 2 provides an overview of the existing benefit system in Germany and describes the modified reform proposal of Bofinger and Walwei. Then we present the employed microsimulation models (Section 3.1), explain our econometric labour supply model (Section 3.2), and the data used (Section 3.3). The results of our analysis are given in Section 4. First we present a projection of the fiscal effects (Section 4.1) of the reform proposal without considering behavioural adjustments. Labour supply effects are estimated in Section 4.2 and distributional consequences of the proposal are given in Section 4.3. Section 5 concludes.

2 The modified Bofinger-Walwei in-work benefit reform proposal

2.1 Existing policies for low-income households in Germany

The success of in-work benefits crucially depends on the initial conditions of the existing tax and benefit system. Therefore we provide a brief overview of the two existing important financial programmes for the long-term unemployed and individuals with low earnings (social assistance and housing benefits) before we explain the reform proposal in detail. Table 1 summarizes the main features of both programmes.

In the past two means-tested programmes for long-term unemployed existed in Germany: Social assistance (Sozialhilfe) and unemployment assistance (Arbeitslosenhilfe). Through the Hartz-IV reform the German system of social assistance radically changed in 2005. All long-term unemployed persons are now subject to the same programme, the new social assistance for long-term unemployed (SGB II). It is a means-tested programme not only for long-term unemployed but also for needy working recipients with low earnings and their families. Every employable individual with less then the defined minimum income is eligible for social assistance benefits, which guarantee a legally defined minimum income.

Table 1: Important means-tested welfare programmes in Germany

Programme	**Eligibility**	**Number of recipients 2005** (households in 1,000)	**Main Features**
social assistance (SGB II)	employable welfare recipients and their families	3,930	benefits for cost of living and housing subsidy; benefits vary with family size; enhanced earnings disregards; case management; obligation to engage in job search
housing benefit (Wohngeld)	low-income households not receiving social assistance	811	housing subsidy; benefits vary with accommodation costs and household size; enhanced earnings disregards

The minimum income is defined as the families' needs and consists of housing costs and living costs. For households with own income the amount of entitlement is reduced as income rises until the income reaches the minimum income. But to lower the implicit tax rate on earnings, a fraction of social assistance recipients' earned income is disregarded when calculating the amount of entitlement. They can earn €100 before their welfare benefits are reduced. For earnings above €100 the benefit reduction rate amounts to 80% and above €800 to 90%. Earnings above a threshold of €1200 (€1500 for recipients with children) reduce the benefits at a rate of 100%.

Beside the social assistance programme there exists a housing benefit programme. The qualification for housing benefits depends on the relationship between the household income and the housing costs. Eligible households receive a grant to their accommodation costs. The take-up of housing benefits excludes the eligibility for social assistance. Hence, households receiving housing benefits have own income – usually low earnings – typically higher than income of recipients of social assistance.

2.2 The reform proposal

The in-work benefit proposal of Bofinger and Walwei (BWC) is only part of a larger package of suggested services to encourage work in the low-wage sector like practical trainings for employable welfare recipients or training programmes.[4] In our description of their reform proposal we concentrate on the financial incentives which affect the existing tax benefit system. Three core elements of the BWC can be identified:

1. Reduction of the social security contributions for low-income earners through an in-work benefit-programme.
2. A stronger constraint on additional earnings allowances of social assistance recipients (SGB II).
3. Abolishment of the tax and social security privileges for low earnings below €800 (so called Midi-Jobs) and below €400 (so called Mini-Jobs).

While the first core element operates outside the existing welfare system, the second element pursuits a reform of the existing social assistance. Both elements focus on the labour supply side in the low-wage sector.

Element 1 provides the introduction of an in-work benefit programme. It is composed of two elements, a grant to *social security contributions* and a *enhanced child benefit*. The benefits are restricted to people who work a defined minimum of working hours per week. The first element requires childless individuals to work 30 hours per week and individuals with children to work 20 hours per week in order to receive the total grant. People who work less than the minimum working hours but reach at least a working time of 15 hours per week (childless individuals) or 10 hours per week (individuals with children) are eligible for half of the benefit. To be eligible for the total enhanced child benefit a minimum of 30 hours per week is required and for the half of the enhanced child benefit the threshold amounts to 15 hours for all individuals.

The grant to social security contributions amounts to the contributions paid by the working individual (about 20,3% of gross wage). Above a household income limit of €750 for singles and €1300 for couples the benefit is linearly reduced to €0 until the household income peaks a maximum of €1300 (singles) and €2000 for couples. The monthly paid enhanced child benefit amounts to €53 for children younger than 14 years and €122 for children younger than 25 years. Again the benefit is linearly reduced when the household income exceeds a first threshold of €1300 for single parents and €2000 for couples. The upper

[4] See Bofinger et al. (2006) for details of the reform proposal.

income limit, where the benefit amounts to €0, is variable and depends on the number of children in the family. It is the first threshold and additional €400 for every child.

Element 2 wants to reduce the incentives for recipients of the existing system to take up only a job with low working hours and low earnings. Recipients of social assistance can earn €100 before their welfare benefits are reduced. The reform proposal provides the following condition for working recipients: Only the first €30 do not affect the amount of benefits. Higher earnings reduce the benefits at a rate of 85%. For earnings above the limit of €750 for singles and €1300 for couples the reduction rate amounts to 100%.

Table 2 summarises important parameters of the reform proposal.

Table 2: Parameters of the BWC-reform proposal

social assistance	
lower earnings disregards	15% of earnings between €1 and €750 for singles and €1300 for couples, at least €30
in-work benefit programme	
basic credit	*Minimum hours requirement:* 15 h/week (half of the benefit) (10 hours for single parents), 30h/week (total benefit) (20 hours for single parents); *earnings supplement* amounts to paid social security contributions, phase out at €750 for singles and €1300 for couples; *income threshold:* €1300 for singles and €2000 for couples
enhanced child benefit	*Minimum hours requirement:* 15 h/week (half of the benefit), 30h/week (total benefit); *earnings supplement:* €53 (children $<$ 14 years), €122 (children $<$ 25 years); *income threshold:* €1300 + €400 * number of children (single parents), €2000 + €400 * number of children (couples)
social security contributions	40,6% of earnings above €1; status quo: 23% of earnings below €400, contribution rate increases to 40,6 % for earnings between €401 and €800

Obviously the first two elements aim to encourage welfare recipients to take up a low paid (full-time)job. The third element of the reform proposal not only aims at the supply side but also at the labour demand side.

To understand the intention of the BWC it is not only essential to know the legal parameters of the reform proposal, but also to understand the objectives and background

of their concept. One objective of the reform is to lower marginal tax rates for currently working recipients of social assistance by introducing in-work benefits and hence increase employment. On the other side the reform proposal wants to avoid the incentives of the existing social assistance programme to take up only a job with a low weekly working hours. Another objective is to create a new programme for the currently working recipients of social assistance outside the existing welfare programmes in order to improve the case management for unemployed recipients of social assistance by reducing caseloads. In the next step we look at the budget constraints and marginal tax rates induced by the reform proposal.

Figure 1: Budget constraints for a couple with one child, existing welfare system (sq) and reform proposal (BWC)

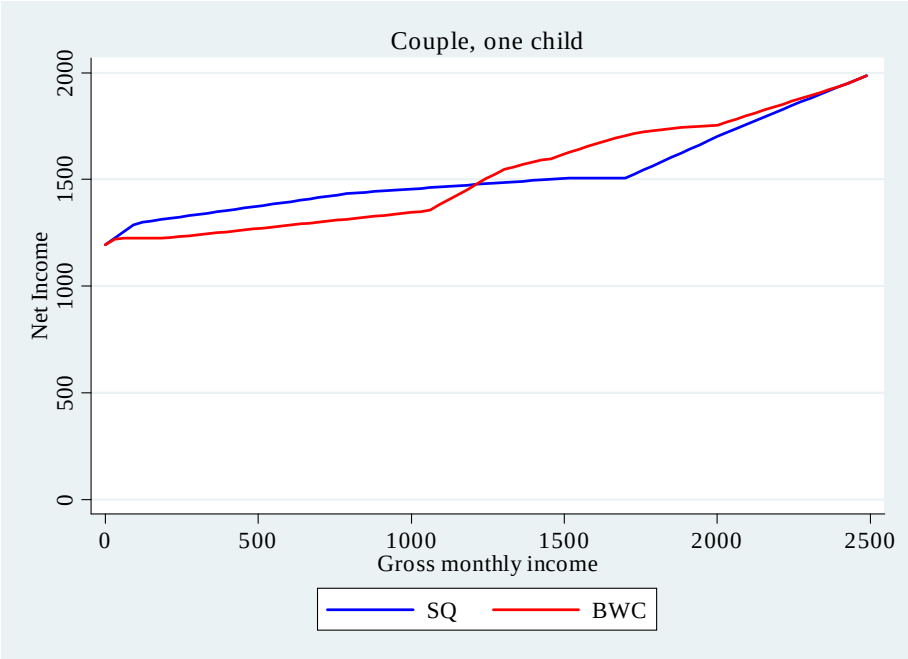


Figure 1 shows an example of budget constraints which a couple with one child faces currently and after introducing the BWC. The lines are drawn under the assumptions of a one-earner couple and an hourly gross wage of €7,00. The gross income consists only of wage income.

The lower earnings disregards induce continuous income losses for low earnings. Beyond the level of about €1210 the couple is better off after the BWC reform. The break-even corresponds with a working time of about 40 hours per week. Although the minimum working conditions of both in-work benefits are fulfilled earlier, the difference in disposable

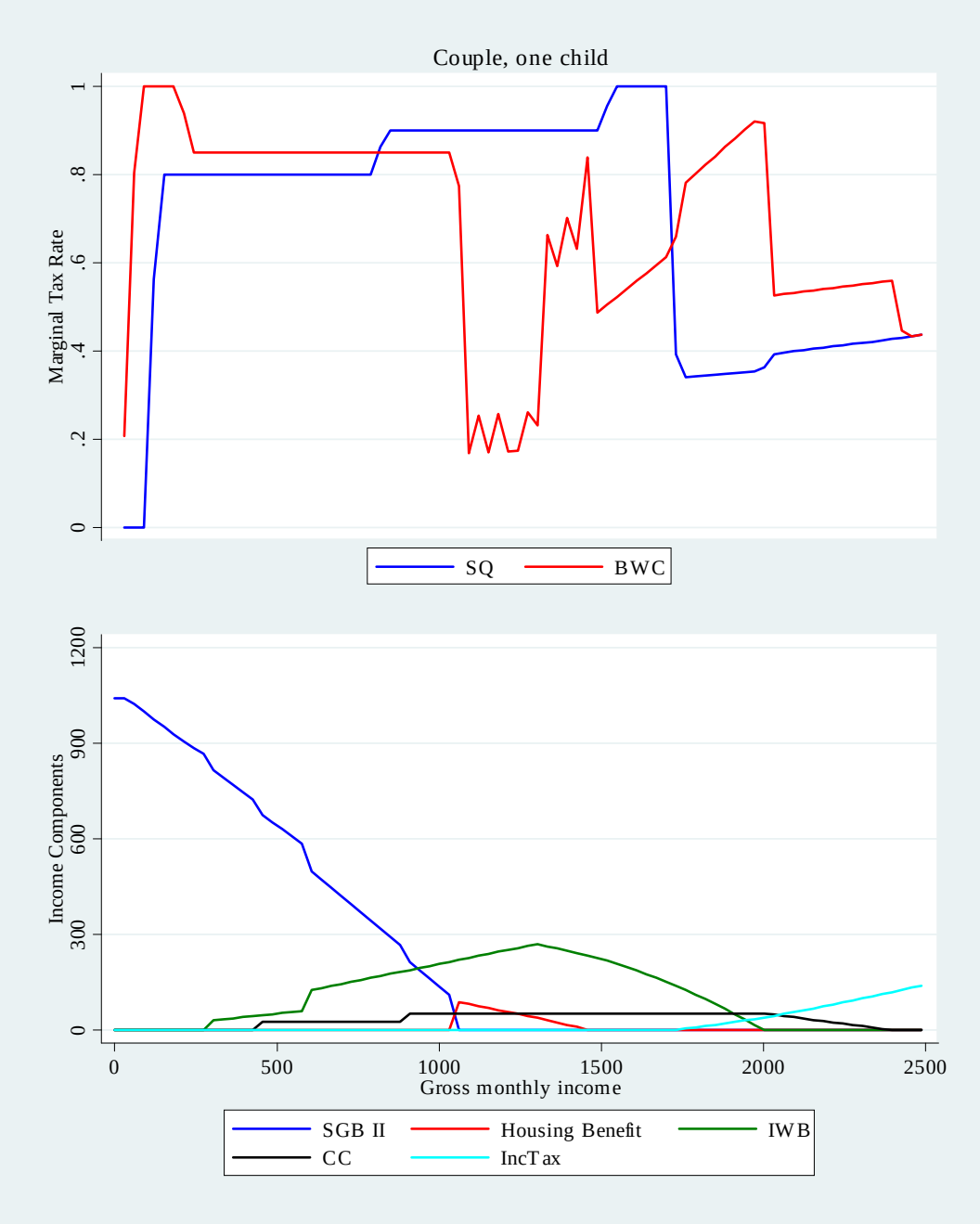
income is still negative because the income effect is dominated by the lower earnings disregards in the reform scenario and our household receives additional social assistance until a gross wage of about €1100.

The income gains are highest (€200 per month) at a gross wage of €1700 which corresponds with a level of 58 hours of work per week. The difference in disposable income beyond €1210 results because of the new in-work benefits, the enhanced child benefit and social security contribution subsidy. Lower earnings disregards in the social assistance programme can be neglected because the household does not receive social assistance at this gross wage income. Beyond €2000 the benefits phase out to €0 at about €2400. The comparison of the budget constraints shows the intention of the reform concept to encourage welfare recipients to take up jobs with higher working hours.

The upper part of Figure 2 presents the corresponding marginal tax rates for our example household. After the implementation of the reform proposal, the marginal tax rates are higher for low earnings, especially for earnings under €100. At the break-even point of €1210 where the household exits the social assistance programme, the marginal tax rate decreases to social security contribution rate. The household obtains the break-even point earlier because he receives additional income from the two in-work benefits. The components of income our household receives are drawn in the second part of figure 2. It shows, that the household is eligible for the in-work benefits although he receives social assistance between a gross income of about €300 and €1100. The intention of the BWC, that welfare recipients and their families exit the social assistance by receiving housing benefits and in-work benefits holds only true for a gross income of €1100 in our example, which equals a working time of 36 hours per week. As to be expected the marginal tax rate increases when the housing benefit phases out and also when the two in-work benefits phase out at higher incomes, leading to higher marginal tax rates than in the status quo for incomes above €1800.

Our example shows that BWC lowers marginal tax rates substantially for full-time working hours as intended. But the results also show that a couple with one child exits the social assistance only with a high working time. The empirical question is whether the decrease in marginal tax rates is high enough to encourage welfare recipients to take up full-time jobs and thus leave social assistance. The highest amount of benefits is paid when the household is not eligible for social assistance, which gives raise to windfall beneficiaries. Calculations for other types of households show similar results. For couples the success of the proposal depends crucially on the labour supply behaviour of both partners. Finally the figure of the marginal tax rates and the income components illustrates the complexity of the reform proposal.

Figure 2: Marginal tax rates and components of income for a couple with one child, existing welfare system (SGB II) and reform proposal (BWC)



3 Data and simulation approach

3.1 The microsimulation models

The two models employed in this paper are static microsimulation models. Their purpose is to empirically analyse the effects of taxes, social security contributions and transfers on available income of private households in Germany. Both models can be used to compute static or "morning after" effects of a given reform proposal, i. e. distributional and fiscal effects without considering behavioural adjustments. The main advantage of using two microsimulation models is the possibility to crosscheck the simulation results. Model I additionally includes a discrete labour supply model in the tradition of Van Soest (1995) which allows us to simulate the long-run effects of a reform proposal after taking into account the labour supply response following the introduction of the reform.

Even when assuming constant employment behaviour, it is difficult to estimate a reform's effect on net household incomes and income distribution because of the complexity of the German tax and transfer system and the interaction of its components. Since our models contain a relatively detailed representation (compared to, e. g., macroeconometric models) of the German tax and transfer system, they are able to compute net incomes for each household of the simulation sample. In order to achieve this, the models use information on gross income from their respective data sources. Net incomes, taxes and transfers can be projected grossed up to the total German population by applying appropriate weight factors supplied with the Socio-Economic Panel (SOEP) and the Income and Expenditure Survey (IES). Our microsimulation models are not designed to determine the entire tax burden of a household, since this would additionally require to compute indirect taxes. On the one hand, especially the SOEP does not provide enough information on household expenditures, on the other hand the cost of programming the entirety of tax laws is prohibitive. Therefore, the scope of Model I is limited to elucidating the relation between labour supply behaviour and changes in the tax and transfer system, while Model II is restricted to computing "morning after" fiscal and distributional effects – but with a much larger simulation sample than Model I.

The basic approach for estimating the effects of a reform proposal on fiscal costs, the personal income distribution, and labour supply consists in comparing an initial situation (status quo, baseline scenario, or benchmark) prior to the implementation of the reform with the situation after introducing the reform (counterfactual or alternative scenario).

Hence the impact of the reform is estimated by computing the difference between the baseline scenario and the counterfactual.[5]

In a first step, fiscal (section 4.1) and distributional effects (section 4.3) of the reform proposal are estimated statically, without considering behavioural adjustments. This approach is based on the fiction that households can be observed again immediately after introducing the reform, quasi on the "morning after". By contrast, labour supply effects (section 4.2) are simulated under the assumption that households had enough time to familiarise themselves with the new rules and were thus able to come to an optimal labour supply decision.

Obviously, the reform scenario is a counterfactual situation. Therefore, it cannot be observed and has to be predicted. On the other hand, the baseline situation is observable in principle. In practice, however, a considerable temporal gap between the collection and the availability of the data is commonly found. This is also the case for the datasets used in this paper, since they had both been collected before the SGB II was enacted in January 2005. Additionally, we are using the legal status in 2007 as the baseline scenario. In order to achieve an accurate representation of the baseline scenario, it is necessary that the observed behaviour and the institutional arrangements coincide. Our datasets meet this requirement only approximately, since a number of institutional changes took place between 2003 and 2007, most importantly – at least for our purpose – the introduction of the SGB II.

For our purpose – an ex ante simulation – this implies that the observed incomes and labour supply (in 2003 and 2004, respectively) are not the result of utility maximising behaviour conditional on the state of law in 2007. At best, they represent optimal allocations at the time of the data collection. The econometric estimation of a discrete labour supply model implicitly assumes that a household chooses an optimal allocation of (net) income and leisure. The tax and transfer part of Model I provides the households' budget restrictions conditional on the scenarios respective state of law. Therefore, in order to obtain unbiased estimation results for the labour supply behaviour in 2004, the historical institutions and regulation must be modelled in the tax and transfer part of Model I.

Against this background we decided to apply the following approach: The labour supply effects of the BWC, defined as the predicted deviation from the status quo labour supply in 2007, are derived from the comparison of two predicted states. Both labour supply under the current institutional arrangements and counterfactual labour supply are simulated

[5]For a detailed documentation of the microsimulation approach see Redmond, Sutherland, and Wilson (1998). Jacobebbinghaus (2004) discusses the usage of tax-transfer-microsimulation for evaluating the Hartz-Laws.

using the empirical labour supply model. We use a different approach to assess the fiscal and distributional effects. They are determined by applying the current tax and transfer rules to the SOEP wave 2005 and the IES 2003, respectively. This approach ignores behavioural adjustments which took place in the course of changes in the tax and transfer laws between 2005 and 2007. The advantage of this approach is the better comparability of the results based on the IES and the SOEP. Obviously, the fiscal and distributional effects of BWC depend on the degree in which the change in labour supply affects wages and finally results in a higher (or lower) employment, which again have an influence on fiscal and distributional effects. Since our modelling framework only covers the supply side of the labour market, the computed fiscal and distributional effects should be interpreted as short run results. The determination of the "true" (long run) employment, fiscal and distributional effects would require a modelling framework which links our microsimulation models with a macroeconomic model, which also incorporates goods and financial markets.

3.2 The labour supply model

Changes in the tax and transfer system can induce behavioural adjustments of households, especially in the form of a changed employment behaviour. In order to evaluate these behavioural adjustments, the estimation of a labour supply model is required.

3.2.1 Discrete choice approach

In the context of microsimulation models, two general approaches are discussed in the literature: Continuous and discrete hours labour supply models (Creedy and Kalb, 2006). The discrete hours model became the standard method in most applied work for a number of reasons. Firstly, it is more realistic than the continuous approach, since there is only a finite number of part-time or full-time working options to choose from. Van Soest et al. (1990) and Tummers and Woittiez (1991) showed that a discrete specification of labour supply can improve the representation of actual labour supply compared with a continuous specification. Secondly, the discrete specification greatly simplifies the computation of the households' budget restrictions, since the complexity of most tax and transfer system results in kinks and jumps as well as convex and non-convex ranges. Thus, it is typically cumbersome to evaluate the budget constraints for continuous working hours. Thirdly, the discrete hours approach makes it computationally feasible to estimate a joint labour supply decision for couples, as suggested in Van Soest (1995). Finally, the informational loss of using the discrete hours approach is small, since the empirical distribution of labour supply

exhibits a strong concentration on a small number of work hours categories. Therefore, we also choose the discrete hours approach in this paper.

The discrete hours approach assumes that an individual who faces a fixed gross wage rate maximises utility by selecting the number of hours worked, h, subject to the constraint that only a discrete number J of hours levels, h_i, $i = 1, \ldots, J$ is available. Utility is increasing in its arguments, leisure and net income, and is bounded by the household's budget and time constraints. The utility associated with each hours level is denoted U_i and is assumed to be the sum of measured utility $V_i \equiv V(h_i|X, \beta)$ and an error term υ_i,

$$U_i = V(h_i|X, \beta) + \upsilon_i, \tag{1}$$

where X denotes the set of measured household characteristics (e. g. age, health, number and age of children) and β is a set of unknown parameters. The error terms υ_i stem from the existence of unobserved preference characteristics, optimisation errors or simply measurement errors in the variables X. An observation on h is associated with a draw from each of the J random variables υ_i from their respective distribution. Thus, the framework implies a probability distribution over available hours levels conditional on the properties of υ_i. From the assumption of utility maximisation it follows that the hours level h_i giving the highest utility is chosen. The probability for h_i being the best choice is given by

$$\begin{aligned} p_i &= prob\left(U_i \geq U_j\right) \ \forall j = 1, \ldots, J \\ &= prob(\upsilon_j \leq \upsilon_i + V_i - V_j \ \forall j = 1, \ldots, J. \end{aligned} \tag{2}$$

This is the conditional probability for choosing h_i given υ_i. Integrating over all υ_i gives the overall probability

$$p_i = \int_{-\infty}^{+\infty} \left[\prod_{j \neq i} F\left(\upsilon_i + U_i - U_j\right) \right] f\left(\upsilon_i\right) d\upsilon_i, \tag{3}$$

where $F(\cdot)$ and $f(\cdot)$ are the distribution and density function of υ, respectively, assuming that the distribution of υ_i is the same for all i. The standard approach is to assume the (type I) extreme-value distribution, $f(\upsilon) = \exp\left(-\upsilon - e^{-\upsilon}\right)$, which leads to the choice probabilities of the multinomial logit model (MNL),

$$p_i = \frac{e^{U_i}}{\sum_{j=1}^{J} e^{U_j}}. \tag{4}$$

Now, given N individuals[6] indexed by $n = 1, \ldots, N$, the joint distribution for a certain combination of hours categories – assuming independent choices – is given by

$$p\left(h_{i_1}, \ldots, h_{i_N}\right) = p_{i_1} p_{i_2} \cdots p_{i_N} = \prod_{n=1}^{N} \frac{e^{U_{i_n,n}}}{\sum_{j=1}^{J} e^{U_{j,n}}}. \tag{5}$$

Further assuming that individual utility depends on identical parameters β for each individual, (5) can be interpreted as a (log)likelihood function,

$$\ln L\left(\beta|X\right) = \sum_{n=1}^{N} \left[U\left(X_n|\beta\right)_{i_n,n} - \log\left(\sum_{j=1}^{J} e^{U(X_n|\beta)_{j,n}} \right) \right]. \tag{6}$$

In order to estimate the parameters β in (6) by maximum likelihood, a concrete functional form for utility is required. The discrete choice approach allows – in contrast to the continuous hours approach – any regular direct utility function. Following Van Soest (1995), we employ the translog specification

$$U\left(z_i\right) = z_i' A z_i + z_i' \gamma + \upsilon, \text{ with } z_i = \left(\ln y_i, \ln l_i, X\right), \tag{7}$$

where the vector of variables z_i contains the logarithms of income y_i and leisure l_i associated with hours category h_i, where $l_i = (l_{i,male}, l_{i,female})$ for couples. The square matrix A and vector γ contain the parameters to be estimated, $\beta = \left(vec\left(A\right), \gamma\right)$. Given that the translog specification is (log)linear in the parameters, utility can also be written as $U\left(x_i\right) = x_i'\beta + \upsilon_i$, where x_i is a vector containing the squared variables and interaction terms implied by (7). For couples, a unitary household model is assumed (one utility function for both partners), where the arguments are combined net income and separate leisure. We neglect the modelling of the distribution of income and possible strategic behaviour between partners in this paper, since the SOEP does not provide the necessary information for this purpose. Utility is required to be quasi-concave in income and leisure, while the sign of the interaction term for leisure in couple households is ambiguous.[7]

3.2.2 Forecasting labour supply effects using the discrete choice approach

We utilise the estimated discrete choice model to forecast labour supply effects of proposed policy changes. Obviously, this approach is only valid if the policy change does not change the labour supply behaviour fundamentally and thus leads to changed parameters of the discrete choice model. Since the BWC only affects low income households and does

[6] The MNL for jointly optimising couples is derived in a similar way. For details, see Van Soest (1995).

[7] A comprehensive representation of discrete choice models is given, e. g., in Train (2003) or Creedy and Kalb (2006)

not change those households' budget restrictions fundamentally, a stable labour supply behaviour can be assumed.

The estimation of labour supply effects starts with the predicted choice probabilites from the estimation of (6-7) for the baseline scenario

$$\widehat{p}_{in}^{0} = \frac{\exp\left(x_{in}^{0\prime}\widehat{\beta}\right)}{\sum_{j=1}^{J}\exp\left(x_{jn}^{0\prime}\widehat{\beta}\right)},\ i = 1,\ldots,J,\ n = 1,\ldots,N, \tag{8}$$

where the superscript 0 indicates variables pertaining to the baseline scenario. A change in one or more of the variables in x leads to new choice probabilities

$$\begin{aligned}\widehat{p}_{in}^{1} &= prob\left(U_{in}^{1} > U_{jn}^{1}\right)\ \forall j = 1,\ldots,J,\ j \neq i \\ &= \frac{\exp\left(x_{in}^{1\prime}\widehat{\beta}\right)}{\sum_{j=1}^{J}\exp\left(x_{jn}^{1\prime}\widehat{\beta}\right)},\end{aligned} \tag{9}$$

where the superscript 1 indicates variables pertaining to the reform scenario. In the literature on microsimulation, a widespread approach for evaluating labour supply effects consists in summing up the appropriately weighted differences in the (unconditional) choice probabilities, $\widehat{p}_{in}^{1} - \widehat{p}_{in}^{0}$, to obtain the changes of persons working in each hours category at the level of the whole population. The approach is computationally inexpensive and gives valid results if the policy change affects a majority of the population. If, on the other hand, the policy change is directed at a specific group, using unconditional choice probabilities can give very imprecise labour supply effects (Jacobebbinghaus, 2006, chap. 5). For such policy changes, Creedy and Kalb (2003) propose a calibration approach to simulate the transition choice probabilities

$$p_{i\rightarrow j}\left(x^{0}, x^{1}\right) = prob\left(U_{i}^{0} > U_{k}^{0},\ k \neq i;\ U_{j}^{1} > U_{r}^{1},\ r \neq j\right), \tag{10}$$

which give the probability that an individual (or a couple) chooses hours category i in the baseline scenario and category j in the alternative scenario. The calibration is achieved by drawing a set of error terms representing the random utility component v and adding them to the deterministic utility component for each hours category. A set of draws is accepted if it results in the observed labour supply being the optimal choice for the individual. This is repeated until a designated number, R, of accepted draws are obtained. These sets of error terms are then used to compute a distribution of labour supply after a reform. Counting the number of draws which result in an individual choosing hours category $i = 1,\ldots,J$ in the alternative scenario and dividing them by R, the transition probabilities in (10) can be approximated. The approximation will be more accurate the higher R is chosen.[8]

[8] See Creedy and Kalb (2006, chap. 5 and Appendix B) for a more detailed description of the calibration method.

A disadvantage of the calibration approach is that it is computationally expensive. For the case of errors υ following an extreme value distribution, Bonin and Schneider (2006) as well as de Palma and Kilani (2007) derive a closed form solution for the transition probabilities in (10):

$$p_{i\to j}\left(x^0, x^1\right) = \begin{cases} \frac{\exp\left(U_i^0\right)}{\Omega_i^0}, & \text{if } i = j, \\ \sum_{r=1}^{j-1}\left(\frac{\exp\left(U_i^0\right)}{\Omega_{r+1}} - \frac{\exp\left(U_i^0\right)}{\Omega_r}\right)\frac{\exp\left(U_j^1\right)}{\sigma_r}, & \text{if } i < j, \\ 0, & \text{if } j > i, \end{cases} \tag{11}$$

where

$$\begin{aligned} \Omega_r &:= s_r + \sigma_r \exp\left(-\delta_r\right), \; r = 1, \ldots, J, \\ \sigma_r &:= \sigma_0 - \textstyle\sum_{k\le r} \exp\left(U_k^1\right), \text{ with } \sigma_0 := \sum_k \exp\left(U_k^1\right), \\ s_r &:= \textstyle\sum_{k_{\le r}} \exp\left(U_k^1\right) \text{ and} \\ \delta_k &:= U_k^1 - U_k^0, \; k = 1, \ldots, J, \end{aligned} \tag{12}$$

and a ranking $\delta_1 \le \cdots \le \delta_J$ is assumed without loss of generality. Unfortunately, closed form solution for the transition probabilities can only be derived for the special case of extreme value distributed errors, which lead to the MNL. More general types of discrete choice models – for example the Random Parameters (or Mixed) Logit model (RPL) (Train, 2003) – still require the calibration approach to simulate transition probabilities. Nonetheless, the possibility to compute exact transition probabilities with relatively low computational costs using (11-12) can be seen as an additional advantage of the MNL compared to other approaches. Additionally, Haan (2005) shows that the RPL and the MNL produce similar results for labour supply effects using SOEP data, even if the independence of irrelevant alternative (IIA) assumption implicitly made in the MNL is violated. Therefore, we also employ the MNL in this paper.

3.2.3 Distributional analysis with discrete choice models

Since the discrete hours approach is probabilistic in nature, it does not identify a particular level of hours worked and thus available income for each individual after a policy change. Therefore, income and poverty measures cannot be based on a single income level for each household. Instead, the probability distribution over the hours categories has to be used to evaluate the distributional effects of a policy change.

Given N individuals in the data set and J possible labour supply choices for each individual, J^N possible combinations of labour supply and thus income distributions exist,

each resulting in a different value for poverty and income measures. Further assuming that individuals choose their labour supply independently, the probability for each income distribution, P_q, $q = 1, \ldots, J^N$, is given by the product of the individual (transition) probabilities, $P_q = p_{i1}p_{j2} \cdots p_{rN}$, where i, j, and r can attain values between 1 and J. An exact value for any inequality or poverty measure could be computed as a weighted measure over all J^N possible income distributions, where the weights are given by P_q. However, this approach is computationally infeasible for the SOEP (as well as for any other reasonably sized data set).[9]

Creedy et al. (2003b,a) examine three computationally less expensive alternative methods for computing distributional effects in a discrete choice framework. The first method consists in randomly drawing a large number of possible income distributions. With a sufficiently large number of draws, the approach can give a good approximation to the true probabilities P_q. However, the computational cost of this Monte Carlo approach is still very high relative to the other two considered methods, the "expected income method" and the "pseudo income distribution method", respectively. The former and probably most obvious method consists in computing the expected income for each individual from her estimated choice probabilities, $\overline{y}_n = \sum_{j=1}^{J} p_{jn}y_{jn}$, $n = 1, \ldots, N$, and then computing distributional effects for the distribution of the N expected incomes $\overline{y}_n$. The latter method treats all possible hours categories for every individual as if they were separate observations, weighted by the individual choice probabilities to produce a pseudo distribution. More specific, a probability of $p'_{jn} = p_{jn}/N$ is assigned to each of the $N \cdot J$ incomes y_{nj}, ensuring that the sum of probabilities $\sum_{i=1}^{N \cdot J} p'_{jn} = \sum_{j=1}^{J} \sum_{n=1}^{N} p_{jn}/N = 1$. While the computational costs for both methods are negligible, Creedy et al. (2003b) show that the expected income method underestimates the income variance, while the pseudo income distribution method overestimates it. For more complex distributional measures than the variance, they perform a Monte Carlo simulation, where the measure computed by obtaining a large number of possible income distributions provides the benchmark. They find that the pseudo income method performs much better than the expected income method and that the results form the pseudo income method do not differ substantially from the 'true value'. Therefore, we employ the pseudo income distribution method in this paper.

[9] We estimate separate MNL models for 600 single males, 778 single females and 1028 couples with only one partner having a flexible labour supply. In each model, the individuals can choose between 7 hours categories. Additionally, we estimate an MNL model for 2604 couples with both partners having a flexible labour supply, and each couple can choose between $7 \cdot 7 = 49$ hours categories. Thus, there are $7^{600+778+1028}49^{2604} = 3.77 \cdot 10^{6434}$ possible income distributions.

3.3 Data

In order to empirically implement a microsimulation model, a dataset is required that contains the relevant characteristics on households and persons. It should further be representative for the German population, up to date, and the number of observations should be sufficient. The Socio-Economic Panel (SOEP) and the Income and Expenditure Survey (IES) meet this requirements in general. Certain restrictions apply to both datasets, for e. g. missing or sparse information about a household's wealth, which is often necessary to determine transfer payments. The number of observations in the IES is substantially higher (about 53,000 households) than in the SOEP (nearly 12.000 houshoulds), but for the problem investigated in this paper, the size of the SOEP is sufficiently large. The SOEP, on the other hand, is typically more up to date than the IES, since the SOEP waves are collected on a yearly basis, while a the IESas a cross-section survey is repeated every five years. On the whole it can be said that both, the SOEP and the IES, are suitable datasets for the implementation of a tax and transfer model. Since the IES does not contain sufficient information on wages and working hours, only the SOEP can be used to estimate a labour supply model.

Net incomes cannot be simulated for all the households in the SOEP and the IES. For example, using Model I for a simulation of hypothetical incomes at alternative working hours, the information is needed, whether a household is eligible for unemployment benefits. This can be deduced from the labour force participation of the previous two years. Additionally, since we use the retrospectively collected data of incomes from the subsequent year, only households which participate in the panel for four consecutive years are selected for the simulation.

Missing values in variables on wages, hours worked, income from renting, etc. are imputed as long as they cannot be deduced satisfactorily from other variables. If an indirect determination of important missing values is not possible, households are excluded from the simulations sample. Finally, households with missing information on the marital status of the head of household or the partner are excluded.

4 Results

4.1 Fiscal effects

This section presents the projected fiscal costs of introducing BWC using both microsimulation models. The costs are derived by comparing costs of the BWC scenario to the costs in the status quo scenario. We present the "morning after" effects of the reform, thus we

do not consider behavioral adjustments. This is necessary to make the results of Model I and Model II comparable, since Model II does not include a labour supply model. Additionally, since labour supply effects of BWC are small (see section 4.2), we do not expect behavioural adjustments to alter the fiscal costs considerably.

Fiscal effects are composed of five partial effects:

- Savings in SGB II costs from the stronger constraint on additional earnings,
- higher housing benefits,
- expenditures for the subsidy to social security contributions,
- expenditures for the enhanced child benefit,
- additional revenues for social security contributions and income tax.

Table 3 presents the projected annual costs and savings for these components as well as the change in the number of households receiving a particular transfer or paying taxes and social security contributions. Note that a negative sign for social security contributions and income taxes implies higher revenue.

Table 3: Effects of the reform proposal on finances and caseloads

	Model I	*Model II*
caseloads	housholds in 1,000	
social assistance (SGB II)	-796	-1,251
housing benefit (Wohngeld)	+451	+498
in-work benefit	+1,696	+1,536
enhanced child benefit	+1,609	+1,484
annual costs	in m €	
in-work benefit	+1,417	+1,005
enhanced child benefit	+1,647	+1,091
housing benefit (Wohngeld)	+445	+522
annual savings/revenues	in m €	
social assistance (SGB II)	-3,399	-4,059
income tax	-1,540	.
social security contributions	-2,395	-2,137
annual total fiscal effect	in m €	
	-3,826	-3,638

With €3.4 billion (Model I) and more than €4 billion (Model II), the savings for the SGB II expenditures are the most important single item in Table 3. This reduction of income is

associated with a decline of 800,000 in Model I (1,200,000 in Model II) households receiving social assistance (SGB II). The larger decline in SGB II households for Model II can be explained by the fact that the IES overestimates the number of households with low SGB II entitlements to a stronger degree than Model I does. For example, based on the IES, 42% of households receiving SGB II transfers have an entitlement of less than €300 (30% for the SOEP), while the true proportion is 12% (Blos et al., 2007). This conversely implies that the number of households having no or very low incomes is underestimated. This is a result of the "middle-class bias" in both the IES and the SOEP. The fact that both models assume a 100% take-up rate of social transfers aggravates the overestimation of households with low SGB II entitlements, but more so in the IES than in the SOEP. A detailed analysis of the BWC elements in Model I shows that nearly 90% of the SGB II savings result from the stronger constraints on additional earnings. An explanation for the small effect of the subsidy to social security contributions and the enhanced child benefit on the reduction of SGB II expenditures is that the largest part of the subsidies (about 90%) accrues to households who are not entitled to SGB II payments in the status quo. This indicates that large deadweight losses of the subsidies are to be expected. The increase in social security contributions and income tax stems mainly from the abolishment of the Mini- and Midi-Jobs and amount to nearly 4 billion in Model I. We cannot report the income tax effect for Model II, since it does not include an income tax element, but additional social security contributions are projected to be of nearly the same size than in Model I.

Additional expenditures of the BWC result from the introduction of the subsidy to social security contributions, the enhanced child benefit and housing benefits. While the increase in housing benefits is projected to be of nearly the same magnitude in Model I and Model II (nearly €0.5 billion), Model I produces €3 billion (€2 billion for Model II) for social security subsidies and enhanced child benefits combined. Again, the the lower expenditures in Model II and Model I are a result of the higher "middle-class bias" in the IES.

Obviously, the total simulated savings of Model I and Model II are not directly comparable, since Model II does not model income taxes. Nonetheless, the models forecast fiscal costs of the same sign and order of magnitude despite being based on different datasets and different implementations of the tax and transfer rules.

4.2 Labour supply effects

4.2.1 Estimation sample

In order to facilitate estimation of labour supply effects using Model I, we differentiate between persons with flexible and inflexible labour supply. If one of the following criteria

is met by a person, he or she is classified as having an inflexible labour supply: a) persons younger than 20 and older than 60 years, b) recipients of a retirement pension or early retirement allowances, c) apprentices (school, university, vocational training, etc.), d) women on maternity leave, persons on military service, e) self-employed persons.

The distinction between flexible and inflexible is necessary, because inflexible persons will not be available for the labour market at all or will exhibit a labour supply behaviour which differs strongly from the behaviour of a typical worker, which means that the behaviour of these persons cannot be captured well by an empirical labour supply model. Therefore, inflexible persons are excluded from the estimation of the labour supply model.

An additional differentiation of household types is necessary, since the empirical distribution of supplied hours varies considerably between household types (see Table 4), indicating a structurally different labour supply behaviour. Furthermore, the distribution of working hours shows distinct peaks at certain hours categories, justifying the use of a discrete choice framework. We estimate separate labour supply models for the following four household types:

1. Couples in which both partner have a flexible labour supply,
2. couples with only one flexible partner,
3. flexible single men,
4. flexible single women.

Table 4: Distribution of weekly hours of work, labour supply sample

	couples2[a]		couples1[a]		singles	
weekly hours of work	male	female	male	female	male	female
[0-5[	8.79%	29.89%	11.39%	30.92%	16.83%	22.11%
[5-12.5[	0.42%	7.82%	1.07%	6.83%	0.83%	4.63%
[12.5-17.5[	0.26%	3.35%	0.71%	4.42%	0.50%	1.41%
[17.5-25[	0.32%	12.01%	0.71%	12.99%	1.67%	7.20%
[25-35[	2.01%	13.13%	1.42%	14.73%	3.83%	12.72%
[35-45[	70.60%	31.56%	65.48%	25.84%	64.33%	47.56%
>=45	17.58%	2.23%	19.22%	4.28%	12.00%	4.37%
aver. hours	37.31h	20.45h	36.58h	20.83h	33.37h	27.14h
N	2604		281	716	600	778

Source: own calculations based on SOEP 2005. [a]Household types: couples2=couples, both partners flexible, couples1=couples, one partner flexible.

Table 5 shows the number of observations in the SOEP for (1) completely flexible households, (2) partially flexible households and (3) inflexible households differentiated by couple

and single households. For simulations without behavioural adjustments, groups 1 to 3 can be employed. With behavioural adjustments, only groups 1 and 2 can be used, because at least one person has to provide a flexible labour supply.

Table 5: Simulation sample for Model I

	group			
	1	2	3	Total
couples	2,604	1,028	1,599	5,231
singles	1,378	-	1,676	3,054
Total	3,982	1,028	3,275	8,285

Source: own calulations based on SOEP 2005

We assume that every flexible person is endowed with 80 hours of available time per week. Since we use a translog utility function, the maximum endowment of time affects the estimation results. Therefore, we tested alternative endowments of time (60, 70, 90, and 100 hours). The choice of 80 hours leads to the highest likelihood for the estimated models. Persons can choose from a discrete set of working hours, $\{0, 10, 15, 20, 30, 40, 50\}$, which implies that completely flexible couples can choose from $7 \cdot 7 = 49$ alternatives. For each alternative, the tax and transfer part of Model I is used to compute the budget restriction. We assume that a person's gross wage does not vary over the alternatives. For people who are not working, we do not observe their gross hourly wage rate. We solve this problem by estimating a wage regression with selection correction as proposed by Heckman (1979).

4.2.2 Elasticities of labour supply, participation and working hours effects

Tables 11 and 12 in Appendix A show the estimation results for the conditional logit labour supply models. Table 11 shows the results for the household types 2, 3, and 4, having one flexible person, while Table 12 gives results for completely flexible couples. As the tables show, we interact the category specific variables, income and leisure, with category invariant variables, like age, education level, nationality and region. For females we also include interactions with dummies for children of certain age groups to reflect higher opportunity costs of working if children are present. Fixed costs of working are incorporated by including dummies for employment.

We check the required theoretical property of quasi-concave utility by computing the first and second derivatives of the translog utility function (Van Soest, 1995). The empirical utility function is in line with theory as the derivatives indicate increasing utility in income

and leisure. Additionally, the derivatives imply a decreasing marginal rate of substitution. Since the utility function includes squared terms and interactions of variables, it is hard to interpret the signs of the coefficients. Therefore, the quantitative implications of empirical labour supply models are best described by deriving participation and hours elasticities with respect to a given percentage change in the gross wage rate. We choose an increase of 10% instead of 1% to reduce the impact of discontinuity points in the budget restriction. Table 6 gives elasticities for all household types. The results are in line with those found in previous literature (Steiner and Jacobebbinghaus, 2003; Haan and Steiner, 2004; Jacobebbinghaus, 2006). Own elasticities of women are higher (in most cases) than those of men. For couples with two flexible partners also cross elasticities are derived. An increase of 10% in the male partners gross wage rate results in a 0.22 percentage points lower participation probability and 0.25% less supplied working hours for the female partner, indicating that women substitute their partners higher income with leisure, possibly reflecting that women are more likely to take care of children. On the other hand, the male partner increases his participation rate and working hours – albeit slightly – if the woman's income is increased. Participation elasticities for single households and partially flexible households are similar for women and man. This may be the result of men being the traditional bread winners, so that he is trying to stabilize his share of household income if his partner is increasing her labour supply. The hours elasticity for single men is small (0.85%) compared to the hours elasticity of single women, which is more than three times higher (2.78%). This higher hours flexibility of women can already be seen in the empirical hours distribution (Table 4), where for all household types about 95% of men either work full-time or not at all, while up to 39% of women (for household type 2) choose part-time work.

Table 7 presents the results for the grossed up participation and hours effects for the four household types. As discussed in section 3.2.2, the effects are based on the exact transition probabilities, which are generally more appropriate than the unconditional choice probabilities. The last row of the table gives the total change in labour supply for all household types measured in 1000 full-time equivalents, where it is assumed that full-time work corresponds to 40 hours per week. The last column sums up the changes in each hours category over all household types, and the lower right entry gives the total change in 1000 full-time equivalents. The most important result is that BWC leads to nearly 95,000 additional full-time equivalents in labour supply. Thus, BWC achieves one of its intended goals, although the increase in labour supply is rather moderate compared to the increase projected for other in-work benefit proposals. For example, the proposal of the Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (2006) is forecasted to generate nearly 400,000 additional full-time equivalents while reducing fiscal costs even further than BWC. Total participation effects of BWC are simulated to be neg-

Table 6: Labour supply elasticities[a]

	participation effect (change in percentage points)		hours effect (change in percent)	
	male	female	male	female
couples, two flexible partners				
gross income male partner +10%	1.591377	-.2252136	1.78447	-.2531535
gross income female partner +10%	.1997464	1.747245	-.0023176	4.268964
couples, one flexible partners				
gross income male partner +10%	1.622182	-	2.269102	-
gross income female partner +10%	-	1.643984	-	2.131344
singles				
gross income +10%	1.806629	2.156935	.8500502	2.778585

Source: Estimation is based on Model I and SOEP 2005. [a]Estimation of elasticities uses exact transition probabilities.

ative with nearly 32.000 persons less in the labour market. The reduction mainly stems from women in households with two flexible partners, where more than 60.000 women are forecasted to leave the labour market. At the same time, about 20,000 of their male partners enter the labour market, while other partners shift their labour supply in the direction of full-time employment, thus generating about 34.000 additional full-time equivalents. Obviously, for flexible couples an intra-household reallocation of leisure takes place after introducing BWC. Participation effects for other household types are negligible. Single women and women in partially flexible couple households, on the other hand, display a qualitatively similar behaviour as men in fully flexible couple households: a shift from part-time to full-time employment. The labour supply behaviour of single men remains nearly unchanged after introducing BWC.

In order to provide a more detailed analysis of the BWC labour supply effects, we decompose the proposal into its elements and forecast labour supply effects for each reform step (see Tables 13 - 15 in Appendix B), where we gradually add an element to the previous elements. Table 13 shows the effect of abolishing the so called Mini- and Midi-Jobs, Table 14 shows the additional effect of a stronger constraint on additional earnings, and Table 15 gives the additional impact of providing a grant to social security contributions for low income workers. Table 7 gives the total labour supply effect of BWC by also incorporating the enhanced child benefit.

As can be seen in Table 13, especially women react to the abolishment of the Mini- and Midi-Jobs, which is to be expected, since mostly women choose these jobs. As the table

Table 7: Estimated labour supply effects of the Bofinger-Walwei-Concept[a]

		couples2[b]		couples1[b]		singles		
		male	female	male	female	male	female	**Sum**
Particip. effect[c]		**20,779**	**-61,238**	**12,262**	**3,859**	**-2,014**	**-5,596**	**-31,948**
Changes in hours categories (in 1000 persons)	10 h	-12,186	-57,685	-3,448	-13,756	-2,330	-24,012	**-113,416**
	15 h	-4,737	-11,856	-442	-2,561	-1,857	-16,541	**-37,994**
	20 h	-233	-11,700	455	5,099	-1,583	-8,425	**-16,387**
	30 h	-117	5,872	3,706	3,186	135	11,219	**24,001**
	40 h	42,018	14,032	8,390	10,730	3,531	29,345	**108,046**
	50 h	-3,965	99	3,601	1,160	90	2,818	**3,803**
Hours effect[d]		**33,811**	**-1,711**	**15,036**	**13,680**	**2,370**	**31,066**	**94,252**

Source: Estimation is based on Model I and SOEP 2005. [a]Estimation of supply effects uses exact transition probabilities. [b]Household types: couples2=couples, both partners flexible, couples1=couples, one partner flexible. [c]Number of persons (in 1000) entering (positive sign) or leaving the labour market. [d]Working hours effect of reform measured in 1000 full-time employed persons.

shows, the reaction can work in both directions: Some women – especially in flexible couple households – stop working, while other women choose to work full-time, resulting in a slight increase in supplied hours.

The BWC's positive effect on supplied working hours is almost exclusively the result of the introduction of a stronger constraint on additional earnings, as can be seen in Table 14. While this reform element results in even more women in flexible couple households leaving the labour market, their partners overcompensate the associated loss of income with a strong increase in participation (35,000 persons) and supplied hours (54,000 full-time equivalents). Also, single women and members of partially flexible households increase their supplied working hours substantially. Especially couples with children, who can have additional earnings of up to €620 (€310 for each partner) in the status quo, would incur strong losses in income, since BWC only allows €195 additional earnings for the household. This obviously generates a strong incentive especially for the male partner to increase his labour supply, not least because his gross wage is typically higher than the wage of his partner.

From Tables 14 and 15 the isolated labour supply effect of introducing the subsidy to social security contributions can be deduced. This reform element does not have the intended effect: While partially flexible couples and single men hardly react at all, only single women choose the 30 hours category more often (about 9,000 women). On the other hand, men in flexible couple households reduce their supplied working hours by about 17,000 full-time equivalents. A possible explanation for this behaviour could be that often men in couple

households are entitled to the subsidy, but the household does not receive SGB II transfers. For these households, the subsidy is a windfall profit, so that men can reduce their labour supply in the BWC scenario without lowering the status quo household income.

The last element of BWC, the enhanced child benefit, provides incentives similar to the social security subsidies: For households working part-time in the status quo scenario, the attractiveness of working full-time is increased. On the other hand, persons who already work full-time in the status quo, the enhanced child benefit produces a pure income effect. Thus, the effect of the enhanced child benefit depends on the distribution of working hours in the status quo. As can be seen from the comparison of Tables 7 and 15, the intended effect of a higher labour supply only shows for single woman, who more often choose full-time hours categories than in the status quo, resulting in approximately 16,000 additional full-time equivalents. For other household types, the effect of the enhanced child benefit is negligible.

4.3 Distributional effects

In this section we look at the distributional consequences of the BWC. The main distributional objective of the proposal is to redistribute income to individuals with low earnings in low-income-households. As Blank et al. (1999) point out, the labour supply and distributional effects of financial incentives depend on two critical factors: The relative size of the affected groups and the magnitude of the behavioral changes among each group. In their theoretical analysis they distinguish between four groups:

A Non-working recipients,

B working recipients,

C non-recipients who are currently earning less then the new break even,

D non-recipients who are currently earning a little more then the break even and will opt in the new welfare programme.

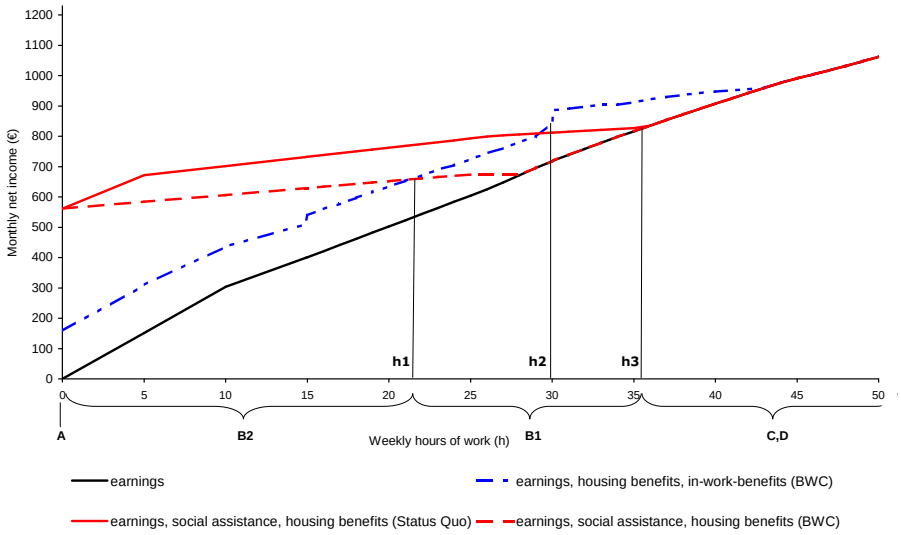
Their basic findings also hold true for our analysis. Because the BWC includes work requirements, we divide the working recipients in two separate groups:

B1 Working recipients who work above the minimum size of working hours per week (full-time or part-time),

B2 working recipients who are working only a little and are not eligible for the new in-work benefits (working time lower than 15 hours a week, respectively 10 hours).

An example of the possible affected groups is given in Figure 3 for a single who earns €7 per hour. It displays the budget constraints of the existing welfare programmes and the social assistance and in-work-benefits after a welfare reform following the BWC.

Figure 3: Budget contraints for a single household, existing welfare system (status quo) and BWC



Our analysis first focuses on the changes of households' net income in the short-run and then on the income changes after employment effects. In the short run we expect a negative income effect on group B2 because of the new lower earnings disregards. For group B1 the effect is not clear. Individuals from group B1 are better off after the reform when they currently work a minimum of h2. For those working less then h2 negative income effects can be expected just as for group B2. A higher disposable income after the reform can be expected for group C. Group C consists of windfall beneficiaries who currently work more then h3 and receive no social assistance. In the short run there are no income effects on group A and D.

Beside these effects there is another element of BWC which has consequences for the disposable income of the households. The abolishment of the tax privileges for so called Mini- and Midi-Jobs has a negative effect on net working income, because of higher social security contributions. This element of the proposal affects households of all income groups since Mini- and Midi-Jobs are often only secondary jobs.

In total the different elements of the BWC sum up to a negative impact on total income. In particular our analysis shows a great impact of the BWC to disregard a lower share of the

earnings of social assistance recipients before reducing their welfare benefits. While some individuals can compensate this effect by the new in-work benefit (individuals working more than h1), recipients who do not reach the necessary minimum working time are confronted with relatively high income losses.

Table 8 shows the changes in average equivalent monthly net income and percentage points of poverty rates for the different groups.

Table 8: Impacts of BWC on income and poverty in the short-run

	Model I	*Model II*
Family Monthly Income, Mean		
Working Welfare Recipients (B1)	-19€	-32€
Working Welfare Recipients (B2)	-68€	-85€
Windfall Beneficiaries (C)	+30€	+33€
Poverty Rate[a], Mean		
Working Welfare Recipients (B1)	+5,4pp	+2,6pp
Working Welfare Recipients (B2)	+21,7pp	+16,1pp
Windfall Beneficiaries (C)	-3,2pp	-4,3pp
Caseloads, in 1,000		
Non working Recipients (A)	2,219	1,609
Working Welfare Recipients (B1)	1,166	627
Working Welfare Recipients (B2)	908	1,956
Windfall Beneficiaries (C)	1,406	1,858

[a] The poverty rate is defined as the fraction of households who have a monthly equivalent net income of € 723 or below. € 723 is equivalent to 60% of the average equivalent income of all households in Germany 2003 (Statistisches Bundesamt, 2005). Changes are given in percentage points.

As expected the reform proposal has a considerable negative effect on the income of households of group B2. The poverty rate increases by 16,1 percentage points (model II) and 21,7 percentage points in model I. The poverty rate of group B1 increases too. In our example of figure 3 the results indicate that more individuals work less then h2 but more than h1. Group C receives a higher disposable income after the BWC-Reform and their poverty rate decreases by 3,2 percentage points (4,2 percentage points, model II). Group C is not the underlying targeting group of BWC because they were previously no welfare recipients, but the results show, that the dead-weight losses are very high.

Next we assess the effects of the reform proposal on total income distribution. Table 9 shows the probability that households belonging to each decile of current income distribution (status quo) have to fall into the deciles of the income distribution after the implementation of the reform (BWC).

Table 9: Transition matrix between deciles of equivalent net income Status Quo and deciles of the income distribution BWC

Deciles BWC	*Deciles Status Quo*									
	1	2	3	4	5	6	7	8	9	10
1	**91,5**	7,8	0,7	0	0	0	0	0	0	0
2	8,4	**83,9**	7,3	0,4	0	0	0	0	0	0
3	0,1	8,1	**85,6**	6,1	0	0	0	0	0	0
4	0	0,1	6,4	**89,4**	3,9	0,3	0	0	0	0
5	0	0	0,1	4,0	**92,6**	3,3	0,1	0	0	0
6	0	0	0	0,1	3,4	**94,4**	2,0	0	0	0
7	0	0	0	0	0	2,1	**96,6**	1,4	0	0
8	0	0	0	0	0	0	1,3	**97,9**	0,8	0
9	0	0	0	0	0	0	0	0,8	**98,9**	0,3
10	0	0	0	0	0	0	0	0	0,3	**99,7**

Source: German Income and Expenditure Survey 2003, Model II

The highest income deciles have the highest probability to remain in the same decile as usually they are only affected by the Mini-/Midi-Job reform. Table 9 further shows a redistributive effect at the lower end of the income distribution in both ways. The highest effects on the mobility between deciles can be observed in households between the second and the fourth decile.

Given the objective to lower poverty among the working poor, the analysis of the short run effects shows ambiguous results. While windfall beneficiaries are better off, a large part of welfare recipients has a lower net income and the poverty rate for this group increases. The income effects in the long-run depend on the behavioural reactions of the individuals. The response of individuals of group A and B2 to the changed work incentives might have an effect on their incomes. Hence we examine the distributional effects in the long-run next. Table 10 shows the changes in average equivalent monthly net income and percentage points of poverty-rates for the different groups after behavioural effects.

Table 10: Impacts of BWC on income and poverty after labour supply effects

	Model I
Family Monthly Income, Mean	
Working Welfare Recipients (B1)	-18€
Working Welfare Recipients (B2)	-52€
Windfall Beneficiaries (C,D)	+52€
Caseloads, in 1,000	
Non-working Recipients (A)	2,228
Working Welfare Recipients (B1)	1,119
Working Welfare Recipients (B2)	864
Windfall Beneficiaries (C,D)	1,480

[a] The poverty rate is defined as the fraction of households who have a monthly equivalent net income of €723 or below. €723 is equivalent to 60% of the average equivalent income of all households in Germany 2003 (Statistisches Bundesamt, 2005).

After labour supply effects the number of non-working recipients (A) increases slightly. The group B2, which faces the highest income losses in the short-run, increases about 31%. On the other hand the amount of caseloads of group B1 decreases by 4% and of group C (D) increases by 5%. Not only the number of windfall beneficiaries increases, but they also can enhance their income gains, while the income losses of group B2 and B1 decrease slightly. The results after behavioural effects confirm our findings of table 8. A high number of working welfare recipients faces high income losses after the reform and poverty rates increase distinctly. Furthermore, a high number of them remains in the social assistance programme, what was not the proposal's intention. On the other hand the number of windfall beneficiaries is also very high.

5 Summary and conclusion

The results show that the Bofinger-Walwei concept for restructuring the low-wage sector in Germany works in the intended direction: Aggregated over all household types full-time employment becomes more attractive, resulting in about 94.000 additional full-time equivalents. As could be expected, this comes at the cost of a number of persons leaving the labour market. One obvious objection against the BWC is that this result could have been

achieved by only imposing the stronger constraint on additional earnings. The subsidy to social security contributions and enhanced child benefit has no effect on total worked hours. For flexible couple households, we even simulate a negative effect on worked hours, since in these households one partner – typically female – can leave the labour market because her partner is entitled to the in-work benefit, thus compensating the female partners loss of income. Moreover, often the male partner is entitled to the benefit without even having to increase his labour supply.

The analysis of fiscal effects indicates that the short-run costs of introducing BWC will be negative. Both employed microsimulation models forecast savings in excess of €3.5 billion. Since labour supply effects are small compared to the size of the labour force, we do not expect general equilibrium effects to substantially alter this result. The analysis of fiscal effects also reveals large deadweight losses of the subsidy to social security contributions and the enhanced child benefit, since 90% of those transfers would accrue to households who do not receive SGB II transfers, even without considering behavioural adjustments. This is arguably the main reason why the in-work benefit components of BWC do not generate additional labour supply.

The analysis of the distributional effects shows considerable income losses for the group of working welfare recipients, which are only slightly reduced after considering behavioural adjustments. The winners of the reform are households, whose income is too high to be eligible to social transfers. For them, the in-work benefit is simply a windfall gain. Thus, compared to the status quo, households in the lowest income deciles lose most, while the medium deciles win, leading to a higher income inequality among the low income households. This result obviously runs contrary to the intentions of the BWC.

Another week point of the BWC is the unnecessary complexity of its specification. There are different threshold values of working hours which have to be attained to be eligible to either the subsidy to social security contributions or the enhanced child benefit, leading to a low transparency of the proposal especially for couples and households with children.

In contrast to other proposals (e. g. Sinn et al., 2002; Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, 2006; Sinn et al., 2007) the BWC only lowers the income of those SGB II receiving households who earn additional income in the status quo. Other proposals induce stronger positive labour supply effects, because they reduce the legally defined minimum income for all recipients and use this reduction to finance lower earnings disregards of additional income, thus effectively lowering the marginal tax burden for SGB II households over a wide range of gross incomes. The BWC instead even increases the marginal tax rates for low incomes. Therefore, the relatively low labour supply effects of BWC are to be expected. On the other hand, the BWC achieves positive labour supply

effects without lowering the legally defined minimum income, which marks the minimum acceptable standard of living guaranteed by the constitution. From a political standpoint, this may be the redeeming quality of the BWC, since it eases the political enforceability of the proposal. Nonetheless, there is an obvious necessity to revise the in-work benefit elements of BWC, since they generate costs, probably unintended distributional effects and no incentives to work – which is the key intent of in-work benefits.

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Appendix A: Estimation results for the conditional logit labour supply models

Table 11: Conditional logit estimations, HH with one flex. person

Household type	(2) Couples (1flex)	(3) Single Male	(4) Single Female
Dep. variable: Hours category chosen			
Monthly net household income (Log)	0.3800	12.8493***	6.0707*
Mon. net household income sqr.	0.3762***	-0.0103	0.2551***
Net hh income * leisure	-0.7539*	-2.8925***	-1.7790**
Leisure	99.9713***	85.4082***	107.7387***
Leisure of male spouse * dummy female (dlzf)	6.1262***		
Leisure squared	-11.8864***	-7.6247***	-12.2312***
Leisure * dummy for employment	0.5153*		
Leisure of female spouse * high education	0.7092		1.6153
Leisure of female spouse * low education	1.7014		2.5487*
Leisure of male spouse * high education	-0.0859	1.8754	
Leisure of male spouse * low education	-0.6132	2.5283	
Leisure * age	-0.6315	-1.1425**	0.0488
Leisure * age squared	0.0050***	0.0013	0.0031*
Leisure squared * age	0.0315	0.1366**	-0.0279
Leisure * dummy East Germany	0.8814	0.4082	-0.1705
dlzf * dummy East Germany	-2.6443***		
Leisure * dummy nationality German	-0.7791	0.6408	1.5720**
Leisure * children 3-6 years	1.5353*		3.8566***
Leisure * children 7-16 years	1.0750***		0.9612***
Leisure * children >17 years	0.4771*		0.4255
Dummy for part-time job	-5.4295***		-3.5696***
Dummy for full-time job	-3.8786***	5.6581***	-1.8280***
Dummy for employment * dummy female	2.4247***		
Dummy for employment * children 3-6 years	-0.2166		
Dummy for employment * children 7-16 years	0.4232**		
Observations	7196	4200	5446
ll	-1505.3466	-672.9639	-1038.0209
ll_0	-2000.3956	-1167.5461	-1513.9181
aic	3060.6932	1371.9278	2110.0418
bic	3232.7252	1454.3847	2222.2867
r2_p	0.2475	0.4236	0.3143

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: estimation is based on simulation and SOEP (2005)

Table 12: Conditional logit estimation, couples, both partners flexible

Household type	(1) Couples
Dep. variable: Hours category chosen	
Monthly net household income (Log)	17.0665***
Mon. net household income sqr.	0.2468***
Leisure of male spouse * leisure of female spouse	-1.9877***
Net hh income * leisure of male spouse	-2.8627***
Net hh income * leisure of female spouse	-1.4363***
Leisure of female spouse	107.1673***
Leisure of female spouse squared	-10.5039***
Leisure of male spouse	47.9893***
Leisure of male spouse squared	-0.7511
Leisure of female spouse * dummy East Germany	-10.0674***
Leisure of female spouse * nationality German	0.2458
Leisure of male spouse * dummy East Germany	-8.3699***
Leisure of male spouse * nationality German	-0.2215
Leis. male sp. * Leis. female sp. * East Ger.	2.1045***
Leis. male spouse * Leis.female spouse * dum. Ger.	-0.1721
Leisure of female spouse * high education	1.5719*
Leisure of female spouse * low education	1.8198*
Leisure of male spouse * high education	2.5422*
Leisure of male spouse * low education	3.2906**
Leisure of male spouse * age	-0.3309***
Leisure of female spouse * age	-0.3092***
Leisure of male spouse * age squared	0.0044***
Leisure of female spouse * age squared	0.0044***
Leisure of female spouse * children 7-16 years	1.2369***
Leisure of female spouse * children >17 years	0.4786***
Leisure of female spouse * children 3-6 years	3.3174***
Dummy for full-time job	6.4375***
Dummy for part-time job	-1.8299***
Dummy for full-time job	-0.3856
Dummy for employment of male AND female spouses	-0.7226***
Observations	127596
ll	-6451.9493
ll_0	-10134.3001
aic	12963.8986
bic	13256.5974
r2_p	0.3634

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Source: estimation is based on simulation and SOEP (2005)

Appendix B: Decomposed labour supply effects

Table 13: Estimated labour supply effects of the Bofinger-Walwei concept, Element 1: Abolishment of the tax and social security privileges for low earnings[a]

		couples2[b]		couples1[b]		singles		
		male	female	male	female	male	female	**Sum**
Particip. effect[c]		**-6.615**	**-29.058**	**-4.709**	**-10.399**	**-109**	**-1.586**	**-52.477**
Changes in hours categories (in 1000 persons)	10 h	576	-44.200	399	-9.899	2	-1.392	**-54.514**
	15 h	971	-3.888	120	-3.090	-2	-1.679	**-7.568**
	20 h	344	2.618	238	-442	-275	-313	**2.171**
	30 h	-485	6.231	-509	455	4	569	**6.265**
	40 h	-6.397	10.059	-2.805	2.301	134	1.173	**4.464**
	50 h	-1.624	121	-2.151	275	27	57	**-3.295**
Hours effect[d]		**-8.474**	**5.143**	**-5.658**	**291**	**34**	**1.165**	**-7.499**

Source: Estimation is based on Model I and SOEP 2005. [a]Estimation of supply effects uses exact transition probabilities. [b]Household types: couples2=couples, both partners flexible, couples1=couples, one partner flexible. [c]Number of persons (in 1000) entering (positive sign) or leaving the labour market. [d]Working hours effect of reform measured in 1000 full-time employed persons.

Table 14: Estimated labour supply effects of the Bofinger-Walwei concept, Element 2: A stronger constraint on additional earnings[a]

		couples2[b]		couples1[b]		singles		
		male	female	male	female	male	female	**Sum**
Particip. effect[c]		**28.710**	**-46.799**	**12.913**	**1.149**	**-5.328**	**-40.352**	**-49.706**
Changes in hours categories (in 1000 persons)	10 h	-8.707	-52.264	-4.508	-14.200	-1.713	-19.293	**-100.686**
	15 h	-7.975	-6.922	-1.696	-5.426	-3.133	-19.448	**-44.601**
	20 h	-2.127	-5.814	-1.876	1.362	-2.856	-23.724	**-35.035**
	30 h	-265	4.585	-511	1.623	-111	-9.270	**-3.949**
	40 h	43.459	11.254	13.758	16.336	3.385	26.131	**114.323**
	50 h	4.325	2.363	7.746	1.456	-899	5.252	**20.243**
Hours effect[d]		**45.426**	**1.674**	**20.992**	**16.503**	**322**	**9.058**	**93.976**

Source: Estimation is based on Model I and SOEP 2005. [a]Estimation of supply effects uses exact transition probabilities. [b]Household types: couples2=couples, both partners flexible, couples1=couples, one partner flexible. [c]Number of persons (in 1000) entering (positive sign) or leaving the labour market. [d]Working hours effect of reform measured in 1000 full-time employed persons.

Table 15: Estimated labour supply effects of the Bofinger-Walwei concept, Element 3: Providing a grant to social security contributions for low income workers.[a]

		couples2[b]		couples1[b]		singles		
		male	female	male	female	male	female	**Sum**
Particip. effect[c]		**12.692**	**-49.357**	**15.891**	**4.231**	**-2.669**	**-27.224**	**-46.436**
Changes in hours categories (in 1000 persons)	10 h	-9.889	-53.947	-4.503	-14.359	-2.324	-21.388	**-106.410**
	15 h	-7.458	-8.838	-1.302	-3.784	-1.887	-17.802	**-41.071**
	20 h	-1.509	-8.960	-902	3.090	-1.611	-14.652	**-24.543**
	30 h	-534	7.932	1.732	3.381	111	-456	**12.167**
	40 h	31.980	13.516	14.618	14.712	2.952	22.918	**100.696**
	50 h	101	939	6.249	1.190	90	4.156	**12.725**
Hours effect[d]		**28.479**	**2.673**	**22.151**	**16.692**	**1.762**	**15.098**	**86.854**

Source: Estimation is based on Model I and SOEP 2005. [a]Estimation of supply effects uses exact transition probabilities. [b]Household types: couples2=couples, both partners flexible, couples1=couples, one partner flexible. [c]Number of persons (in 1000) entering (positive sign) or leaving the labour market. [d]Working hours effect of reform measured in 1000 full-time employed persons.