Distributional and Behavioural Effects of the German Labour Market Reform*

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We estimate the effects of the reform of German Unemployment Insurance that replaced the wage-related Unemployment Assistance with an income maintenance programme and stronger means testing. We model the tax-benefit system and use the Socio-Economic Panel. We estimate a discrete labour supply model and simulate the behavioural and distributional effects using the pseudo distribution method. Poverty and inequality decline overall, since households with children and low incomes gain, while those who used to earn high wages and received high unemployment transfers lose most. The behavioural responses mitigate the redistributive impact of the reform.

* This paper was released for publication in January 2009.
** This paper originated as part of the project "Developing an IAB Microsimulation Model". We are grateful to all participants in the joint project for their comments and support from all participants in the joint project. In particular, we would like to thank Juergen Wiemers for his support. Furthermore we are grateful to the participants of the 1st General Conference of the International Microsimulation Association and the 19th Annual Conference of the European Association of Labour Economists for their comments. The usual disclaimer applies.

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1 Introduction

The German labour market reform – which became known as Hartz IV, after the head of the "Commission for modern services on the labour market", Peter Hartz – came into effect on 1st January 2005. The main feature of this reform is the replacement of the earnings-related Unemployment Assistance (UA) with an income maintenance system, called "Unemployment Benefit II", which is unrelated to previous earnings. Unemployment Assistance used to be paid to unemployed people after their eligibility for Unemployment Benefit (UB) had expired. UB (or UB I as it has been called since the reform) was not changed by the reform. It still provides a replacement rate of 60 percent for people without dependent children and 67 percent for others. The replacement rate of UA used to be 57 percent for people with dependent children and 53 percent for all others. UA was paid under the condition of a relatively weak means test. The new benefit, UB II, is basically a redefined Social Assistance (or welfare) programme. Thus, it is not related to previous wages and it uses a much stricter means test than the old UA. The former welfare programme was also restructured and divided into two branches: (1) Social Assistance for people who are temporarily unable to work and (2) "Unemployment Benefit II" for people who are regarded as labour market participants, which means individuals with the capacity to work at least 3 hours a day. People with permanent disabilities and the retired are covered by a third branch of Social Assistance. The new UB II is, in effect, a minimum income programme for all households in which at least one person is considered to be a labour force participant (i.e. working or able to work).

The aim of our study is to evaluate the impact of this reform on the income distribution and on household labour supply. We are interested in the distributional effects for the total population and for several important subgroups such as former recipients of UA or welfare and new recipients of transfers. Since the reform may induce considerable changes in household behaviour, namely labour supply, we also wish to capture these effects using our microeconometric model. As a by-product of our analysis, we can characterise changes in labour supply for recipients and non-recipients. These changes in labour supply will in turn change the distributional consequences of the reform. The redistributive effects may be mitigated or exacerbated by the labour supply reactions (provided that changes in labour supply translate into changes in employment).

There have been several previous studies on the distributional effect of the Hartz IV Reform. Schulte (2004) found that about 59 percent of the former recipients of UA lost income after the reform. Blos/Rudolph (2005), who used the 2003 Income and Expenditure Survey, estimated that as many as two-thirds of former UA recipients are worse off. Becker/Hauser (2006), who used the 2003 waves of the Income and Expenditure Survey and the GSOEP, arrive at similar conclusions. All three studies have in common that they only consider former recipients of UA and thus only one subgroup that is affected by the reform. They did not consider two other important groups: (i) former recipients of Social Assistance (SA) who switch to UB II and (ii) new recipients who become eligible under the new rules. Thus, their distributional analysis remains incomplete. As Blos (2006) showed, based on the Income and Expenditure Survey, the number of new transfer recipients reached about 730,000 households or 1.5 percent of all German households. Moreover, none of the former studies estimated the second-round effects that are induced by changes in labour supply. Thus, they may have missed important shifts in the income distribution caused by the potential labour supply effects. Steiner/Jacobebbinghaus (2003) evaluated a similar integration of UA and SA at the level of SA, but combined with a cut in SA for people who choose not to work and a lowering of the SA withdrawal rates. They found that this would lead to labour force participation for 390,000 individuals. Therefore, given the recent literature on the actual reform proposal, the contribution of our paper is twofold. First, we extend the analysis to cover the entire population, yielding a complete description of the income distribution. We can then break down the results into several subgroups. Second, we apply a behavioural microsimulation model with an integrated household labour supply model in order to gauge the second-round labour supply effects.

Behavioural microsimulation models have been used in many studies of tax-benefit reforms in different countries. Blundell et al. (2000) gave an excellent application for the introduction of the Working Families Tax Credit (WFTC) for the UK. For Spain, Labeaga/Oliver/Spadaro (2005) evaluated the likely effects of some changes to the tax-scheme. Other examples are Hoynes (1996), Keane/Moffitt (1998) for the US, van Soest/Das (2001) for the Netherlands and Aaberge et al. (2000) for Italy, Sweden and Norway. Gerfin/Leu (2003) determined the impact of in-work benefits on poverty and household labour supply in Switzerland. Beblo/Beninger/Laisney (2004) evaluated the effects of replacing the German marital tax splitting by the French family tax splitting. In the context of a distributional analysis, Creedy et al. (2003) applied a behavioural micro-

simulation model to simulate distributional and labour supply effects in a discrete hours approach. Creedy et al. (2004) proposed the pseudo random distribution method as a superior method to use in distributional analysis. In our distributional analysis, we follow this approach and use the pseudo random distribution method. We extend the ZEW behavioural microsimulation model. Our empirical analysis is based on the 2004 and 2005 waves of the German Socio-Economic Panel (GSOEP), where we use the 2005 wave additionally for a retrospective complement to the data.

The remainder of this paper is organized as follows. In the following section, we present a description of the German labour market reform. In Section 3 we briefly describe the dataset, the microsimulation and the household labour supply model.[1] In Section 4 we illustrate how we apply our behavioural microsimulation model to conduct an analysis of changes in the income distribution and changes in poverty. The results are presented in Section 5. Section 6 concludes.

2 The German Labour Market Reform of 2005

2.1 The old system before 2005

The old Unemployment Assistance (UA) was a federal transfer financed by general taxes and administered by the Federal Employment Agency. It was only available for people who had been eligible for Unemployment Benefit, after their eligibility for UB expired. Other unemployed people or needy households could only apply for Social Assistance. Unemployment Benefit (UB) was only paid for a limited period, depending on the recipient's age and the duration of prior employment. Unemployment Benefit was not affected by the reform. However, it is now called "UB I" in order to distinguish it from the new "UB II". The replacement rates of UB are 67 percent for people with dependent children (irrespective of the number of children) and 60 percent for all others. In the UA, the replacement rates were lower at 57 and 53 percent respectively. Housing allowances were usually paid in addition to the unemployment transfers, depending on household composition, income and rent. If the household income fell short of a minimum income (depending on household composition and rent) additional Social Assistance was paid. Thus, a household with an unemployed person could collect transfers from three different sources: UA/UB, housing allowance, and Social Assistance. At the end of the year 2004, before the reform of unemployment assistance was enacted, 4.13 million people between the age of 15 and 65 were receiving Unemployment Assistance and/or Social Assistance. Since Social Assistance was a residual transfer, there were 210,000 people who were receiving both UA and Social Assistance, in cases in which UA did not suffice to reach the minimum income level. However, the majority of households with UA recipients made a living above the minimum income level, since UA was not usually the only source of income.

Recipients of UA were subject to a relatively strict earnings test, a less strict income test and an even weaker wealth test. They could earn up to a maximum of 20 percent of their Unemployment Assistance transfer, or a minimum of 165 Euros. The number of working hours was limited to 15 hours per week under UA, and the whole UA payment was withdrawn as soon as this threshold was reached. There were also special allowances for the recipient's non-earned income and for the partner's income. The wealth test was relatively weak compared to the situation after the reform. Recipients of UA were also covered by health and long-term care insurance. Moreover, pension contributions were made on behalf of the recipient. Several social transfers, such as child benefits and housing allowances were not counted in the means test. Almost 60 percent of UA recipients received between 300 and 600 Euros per month (Statistik der Bundesagentur für Arbeit 2005). About 30 percent of the recipients received 600 to 900 Euros.

Social Assistance (SA) provided a minimum income that was available to all households below a certain minimum income – regardless of the labour force status of the household members. The assistance depended on the number and income of people in the household who shared their financial resources ("Bedarfsgemeinschaft"). There were also allowances for earned income up to 50 percent of the standard benefit. After reaching this limit, earned income was deducted at a rate of 100 percent. The allowances for non-earned income were less generous than this. In the case of SA they were also less generous than in the case of UA. Furthermore there were irregular one-off payments in the old SA (e.g. for new furniture, clothes etc.), which are estimated to have been on average around 18 percent of the basic rate. This is relevant for the distributional analysis, as neglecting the one-off payments would

[1] Cf. Creedy/Kalb (2005) for a complementary description of the modelling specification.

lead to an overestimation of positive income gains for people who received the old SA.

2.2 Unemployment benefit II

Unemployment Benefit II (UB II) was introduced with the Social Code II. It replaces UA and also SA for people deemed to be labour force participants. It constitutes a "new" basic benefit for the working and the non-working poor. Simultaneously with the Social Code II the Social Code XII was introduced, which regulates the new Social Assistance XII that covers the basic needs for individuals or households of working age who are not eligible for UB II and are not retired. In order to qualify for UB II the only requirement besides the income test is that at least one person in the household is able to work a minimum of three hours a day and is between 15 and 65 years old. The household ("Bedarfsgemeinschaft") comprises parents and their children, married or unmarried partners. The minimum income under UB II is slightly higher than it was under the old Social Assistance. This higher amount stems from the fact that transfer money for specific needs like new clothes or new household appliances was substituted by a flat-rate payment. The basic UB II rate is 345 Euros. 80 percent of the basic rate is paid for the partner and each adult child in the household. For example, for a couple without children the minimum income level (net of rent payments) is 621 Euros per month. There are supplementary payments for extraordinary situations (e. g. for sole parents, for people with disabilities, for the special dietary requirements of sick people etc.). A lower monthly rate is considered for children. In general, the rent for "adequate housing" is added. In October 2005 the legislation on allowances for earned income was modified, as the former law was considered unconstitutional. The new regulation provided a basic allowance of 100 Euros which is not deducted from UB II. Gross incomes from 101 to 800 Euros are deducted from UB II at a rate of 80 percent and incomes from 801 to 1,200 Euros at a rate of 90 percent (for families with at least one child the threshold was raised to 1,500 Euros). Higher incomes are deducted at 100 percent. The allowance for non-earned income is 200 Euros multiplied by age (minimum 4,100 Euros – maximum 13,000 Euros) and 4,100 Euros for each child in the household. For people who were born before 1948 the rate is 500 Euros with a maximum of 33,800 Euros.

Together with UB II an additional supplementary child allowance (Kinderzuschlag) was introduced for "marginal" families who would become eligible for UB II without the additional child allowance. To keep these "marginal" families out of UB II, the supplementary child allowance is paid in combination with housing benefits.

3 Microsimulation and estimation

In a static microsimulation the so-called "morning after" or "first-round" effect is estimated. It is assumed that the household will not change its behaviour and it is therefore only possible to observe the crude effect of a reform. In our study we also take into account behavioural reactions or the so-called "second-round" labour effects. We thus specify a model that allows behavioural reactions. The idea is that the household is allowed to decide how many hours to work and also to change this decision. Using this information it is possible not only to calculate the distributional and labour supply effects separately, but also to calculate the distributional effects with respect to the labour supply effects. In our study we use the behavioural ZEW microsimulation model (STSM) with an integrated household labour supply model. Our model has been used in earlier studies such as Arntz et al. (2003), Beninger/Laisney/Beblo (2007), Beblo/Beninger/Laisney (2004) and Steiner/Jacobebbinghaus (2003).

3.1 Data and simulation sample

The ZEW microsimulation model is based on the micro data of the 2004 and 2005 waves of the German Socio-Economic Panel (GSOEP).[2] The GSOEP consists of almost 12,000 households and is a representative sample of private households, with information for example on gross household income, hours of work and household characteristics.[3] The simulation year of our study is 2004. As almost 80 percent of the households are usually surveyed in the first months of a year, we use the retrospective information from 2005 (e. g. gross income per month, months worked) instead of the actual values in 2004.

In our analysis we divide people into "flexible" and "inflexible" with regard to adjusting their labour

[2] A description of the German Socio-Economic Panel is given by Haisken DeNew/Frick (2005).

[3] We lack information about the gross hourly wage rate of people who are not working. To solve this problem we apply a wage regression with selection correction as proposed by Heckman (1976).

Table 1
Weighted (unweighted) simulation sample after the selection process

Group	1	2	3	N
Couples	8.71 m (2603)	3.56 m (949)	5.53 m (1352)	17.8 m (4904)
Singles	8.21 m (1378)	–	10.08 m (1602)	18.29 m (980)
Households	16.92 m (3981)	3.56 m (949)	15.61 m (2954)	36.09 m (7884)

Source: own calculations based on GSOEP 2004.

supply. Starting from the individual level a "flexible" person is in the prime working age of 20 to 65, is not participating in vocational training or doing military or alternative civilian service. Moreover, the individual should not be self-employed, on maternity leave, or retired. We continue our analysis on a selected simulation sample switching to household level and distinguishing the following groups: in the first group we select couples where both partners are flexible in our sense, and flexible single households. In the second group we select couple households with only one flexible partner while the other partner is inflexible. The third group includes inflexible couples and singles. There remains a fourth group of people with missing information that are eliminated during the simulation process. To correct for selectivity due to item non-response of these dropouts we apply a correction of the household sample weights.[4] For simulating income effects without labour supply adjustments we can use groups one to three, while for the behavioural model only groups one and two can be considered, because at least one person within the household should be flexible in order to adjust labour supply. Table 1 above illustrates the structure of the simulation sample.

3.2 Structural model of household labour supply

In a standard theoretical framework a linear budget curve is derived from a continuum of hours. The indifference curve then displays the preferences of the household regarding hours of work and consumption. The optimal hours of work and optimal consumption are derived in the osculation point of the two curves. By introducing a tax and benefit system, in particular the German tax and benefit system, the budget curve becomes nonlinear because of the complexity of the system (e. g. there are kink points which produce complications in a continuous framework that are cumbersome to solve).[5]

Instead of regarding labour supply as continuous, we apply a discrete choice approach as suggested by van Soest (1995). This approach is favourable in that only a discrete number of hour points need to be considered from which the household can choose labour supply. As such, this framework copes with nonlinear budget curves circumventing the kink problem or allowing for non-convex budget sets. Furthermore, the empirical hours distribution of the households shows several peaks around particular hours categories suggesting that people might be bound by or restricted to a set of hours under existing labour contracts, thus supporting the discrete choice approach (see Table 2).

Referring to the hours distribution, we construct our hours set for women and men separately. For women we choose the weekly hours categories {0, 10, 20, 30, 40, and 50}. Category 0 describes the decision not to work as a voluntary decision[6], while 10, 20 and 30 define part-time work, 40 describes full-time employment and 50 defines overtime. For men we use only a reduced set of hours categories because we rarely observe part-time work {0, 20, 40, 50} (see Table 2). For each hours category and the 24 (4×6) hours category combinations of couples with two flexible partners we compute the respective outcomes such as taxes, transfers and disposable income by applying our microsimulation model. We assume that the individual hourly gross wage rate remains constant across the hours categories and that overtime is fully paid. Furthermore, we assume a 100 % take-up rate. This results from the facts that on the one hand we want to isolate the distributional and labour supply effects of the reform and that on the other hand there is no information on take-up and the impact of income changes on the take-up rate.

For our analysis, we use a structural model of household labour supply to transfer the outcomes into behavioural responses of the households. In this struc-

[4] Cf. Appendix 4 in Jacobebbinghaus/Steiner (2003).
[5] For a discussion about the kink problem see Moffitt (1990) and for nonlinear budget sets see Hausman (1985).
[6] Bargain et al. (forthcoming) allow for involuntary unemployment in their evaluation of the Mini-Job reform.

Table 2
Distribution of weekly hours of work for Group 1

Weekly hours of work	Singles		Couples	
	Male	Female	Male	Female
0–5[	17.0 %	22.9 %	9.9 %	29.7 %
5–15[	0.8 %	4.6 %	0.6 %	10.0 %
15–25[	2.0 %	7.8 %	0.6 %	17.9 %
25–35[	3.8 %	12.6 %	1.9 %	12.6 %
35–45[	64.5 %	47.6 %	69.9 %	27.1 %
≥45	11.8 %	4.5 %	17.2 %	2.7 %
Average hours	33.3 h	26.6 h	37.3 h	20.0 h
Observations	600	778	2603	

Source: own calculations based on GSOEP 2004.

tural model we assume that the decision maker chooses the category with the highest utility compared to the other categories. This is our first identifying assumption. Furthermore, we assume that couples are regarded as one decision maker by jointly maximizing their utility. This model is considered a unitary model of household labour supply.[7]

We estimate household utility by using a translog utility function as proposed by van Soest (1995). For a detailed description of the labour supply model see Arntz et al. (2003) and Steiner (2000).

4 Distributional analysis

Before applying a distributional analysis, it is necessary to distinguish two mechanisms. The distributional effects consist of the direct effects caused by the change in the disposable incomes and the indirect effects that are due to the re-financing of the benefit payment. The latter results from the fact that UB II is financed from taxes and so the aim would also be to target those who will have to bear the redistribution costs. This would demand a general equilibrium model, because several carryover effects would have to be taken into account, which is rather difficult in a partial equilibrium framework. So the question is whether to focus on the disposable income or on the household consumption to measure the direct effects. The GSOEP does not provide information on non-earned income, consumption or accumulated pension entitlements. Thus, we focus our analysis on comparing the disposable household incomes that are calculated with our ZEW microsimulation model. The disposable household incomes are then modified using equivalence scales to take into account differences in the size of the households. The same context is also used by the German government and the European Union (EU). To check for robustness we apply different concepts of equivalence scales, such as the international expert scale, the OECD scale and the modified OECD scale. The concepts we use for measuring income inequality are the Gini coefficient and the measures proposed by Atkinson (1970). In general, a percentile analysis detects the income gainers and losers of a reform while, more specifically, a poverty analysis focuses on the part of the income distribution that is below a minimal standard. The problem is that there is no real consensus about what defines a minimal standard, although there are several definitions of understanding poverty (cf. Sen 1973). We use the measures used by Foster/Greer/Thorbeeke (1984), which also belong to the family of axiomatic poverty measures established by Sen (1976). We use FGT (0), FGT (1) and FGT (2). FGT (0) displays the poverty rate or head count ratio, calculating the share of people below the minimal standard.[8] FGT (1) defines the standardised poverty gap ratio and FGT (2) the squared standardised poverty gap ratio. Because the latter measures the squared gap between the income and the poverty line, higher income gaps receive a higher weight.

The conditional logit estimation produces a probabilistic distribution on the discrete hours categories as

[7] An extension of the household model would be to focus on intra-household sharing of incomes, which has been done by Beninger/Laisney (2002).

[8] In this study we report the results for the poverty line defined as 50 percent below median equivalence income as this poverty

discussed in Section 3. As such, it is not clear how to compare disposable incomes before and after the reform. In this framework the standard formulas for inequality and poverty measures cannot be applied. One method would be to use the expected income which results from the probabilities for each category multiplied by the respective disposable income calculated for this category. Other methods would be the random sampling method or the pseudo distribution method. For the random sampling method a specified number of incomes are drawn from the underlying income distribution and the measures are calculated as averages of the draws. The pseudo distribution method is characterised by the disposable income for each category being treated as a separate observation. This establishes the pseudo distribution with household weights relative to the estimated probability of the category. Creedy et al. (2004) find that the expected income method results in a less accurate approximation of the true inequality measures compared to random sampling methods and the pseudo distribution method. In contrast, the pseudo distribution method leads to outcomes that converge quickly to the true values that had been simulated. According to Creedy et al. (2004) the pseudo distribution method is superior to the random sampling method. Thus, we also apply the pseudo distribution method. This leads to the following structure:

$$yv_{ij}^{0} = f(H_i = j;\, R = 0;\, x_{ij}) \tag{1}$$

$$yv_{ij}^{1} = f(H_i = j;\, R = 1;\, x_{ij}) \tag{2}$$

where the subscript i indicates the household and j the category. So the disposable income yv_{ij}^{R} is a function of the chosen hours category, the scenario where $R = 0$ indicates the status quo and some individual and category-specific characteristics, expressed in x_{ij}. The pseudo distribution method is applied by multiplying the household weights by the estimated probabilities of the respective hours category for the status quo and the reform scenario with $R = 0{,}1$ (see Equation 3).

$$hhweightsp_{ij}^{R} = hhweights_i \cdot p_{ij}^{R}, \quad \text{with} \quad \sum_{j=1}^{m} hhweightsp_{ij}^{R} = hhweights_i \tag{3}$$

In the following, we distinguish the results as a simulation without behavioural reactions and a simulation with behavioural reactions. For the simulation without behavioural reactions we apply the disposable income yv_{if}^{1} of the reform scenario and the modified household weights of the status quo $hhweightsp_{ij}^{0}$ (see Equation 4). In order to analyse the behavioural reactions, we use the disposable income of the reform scenario yv_{if}^{1} and the modified household weights of the reform scenario $hhweightsp_{ij}^{1}$ (see Equation 5). The difference between Equation (5) and Equation (4) yields the pure behavioural effect.

$$yv^{10}_{ij} = yv_{ij}^{1} \cdot hhweightsp_{ij}^{0} \tag{4}$$

$$yv^{11}_{ij} = yv_{ij}^{1} \cdot hhweightsp_{ij}^{1} \tag{5}$$

5 Results

5.1 Results of the household labour supply model

As Table 2 illustrated, we detect differences between singles and couples regarding the distribution of the hours of work and between men and women in single households. We therefore estimate our conditional logit model separately for couples, single women and single men, and for couple households with only one flexible partner. We interact the category-specific variables of income and leisure with category-invariant variables like age, age squared, education level, region and nationality. For females we additionally interact with children aged up to 6, from 7 to 16 and from the age of 17. In addition, we construct dummy variables for full-time employment for both sexes and in the case of women also for part-time employment to cover the fixed costs of working part-time or full-time. The results for couples show that most of the variables are highly significant. We check the theoretical assumption of concavity by analysing the derivations and the minors of the Hessian matrices. The demanded theoretical quality of our model that utility rises with a decreasing marginal rate with increased leisure and with higher income is fulfilled. We continue estimating the labour supply elasticities numerically by raising the gross earned income by one percent (see Table 3).[9]

If the gross income of the male partner is increased by one percent, the woman reduces her participation by 0.02 percentage points and reduces her working hours by 0.05 percent. This result implies

line was proposed by the OECD (see Foerster/d'Ercole 2005) and we do not hold the poverty line constant for the reform scenario.

[9] We present only the labour supply elasticities as the estimation results give little insight into the direction of the included variables.

Table 3
Labour supply elasticities

	Participation effect (in percentage points)		Hours effect (as percentages)	
	Male	**Female**	**Male**	**Female**
Couples				
Income male spouse (+ 1 percent)	0.16	–0.02	0.24	–0.05
Income female spouse (+ 1 percent)	0.02	0.14	0.03	0.37
Singles				
Income (+ 1 percent)	0.17	0.18	0.23	0.38
Couples with one flexible partner				
Income (+ 1 percent)	0.17	0.18	0.20	0.38

Source: own calculations based on GSOEP 2004 and 2005.

Table 4
Participation effects in western and eastern Germany

	Couples, both flexible		Singles		Couples, one flexible	
	Women	**Men**	**Women**	**Men**	**Women**	**Men**
	Number of Persons (as %)					
West Germany no children	15,248 (0.42)	21,290 (0.58)	12,170 (0.44)	26,083 (0.85)	–24,737 (–1.29)	1,458 (0.31)
East Germany no children	1,696 (0.17)	708 (0.07)	1,881 (0.35)	794 (0.11)	–14682 (–3.58)	–326 (–0.19)
West Germany with children	–16,125 (–0.45)	16,631 (0.46)	–32,430 (–3.80)	–628 (–1.47)	–11,005 (–3.56)	–5,437 (3.71)
East Germany with children	–319 (–0.07)	1,958 (0.44)	–4,433 (–2.24)	–22 (–0.18)	–3169 (–2,71)	1,522 (3.4)
Total	500 (–0.01)	40,586 (0.47)	–22,812 (–0.52)	26,226 (0.68)	–53,594 (–1.95)	–2,783 (0.34)

Source: own calculations based on GSOEP 2004 and 2005.

that if the male's income increases the woman substitutes work with leisure. One explanation for this could be the tax-splitting system, which results in higher marginal tax rates for women if the husband works full-time, another possible explanation is that women are more likely to be responsible for child care. The male partner increases his participation by 0.16 percentage points and his working hours by 0.24 percent if his gross income increases by one percent. He also increases his participation and his working time if the gross income of the female partner increases.

One possible explanation for this result is that male partners could perceive themselves as being in competition with their successful partners. For single households the elasticities are quite similar for single men and single women, at 0.17 and 0.18 percentage points respectively, while the hours effects are much higher for single women at 0.38 percent compared to 0.23 percent for men. This is very similar for couples with one inflexible partner while the hour effects are 0.2 for men and 0.38 for women.

In the next step we take into account the labour supply effects that are likely to result from the reform by comparing the participation rate in the status quo with the reform scenario. The results are presented in Table 4.[10]

[10] As labour market conditions differ between eastern and western Germany, the results are also reported separately.

The negative participation effects are mainly dominated by couples with one flexible partner. Among these households, especially women reduce their participation. In general, the negative effects are driven by households which become eligible for UB II in the reform scenario and did not receive any benefits in the status quo. Negative effects are also found for single mothers and women who are part of a couple if there are children in the household. This seems plausible because women are usually responsible for child care. In the opposite direction, positive effects are found for single men and single women and for couples without children. The total effects do not significantly vary from zero.

5.2 Results of the distributional analysis

Having established our estimation model we proceed with the distributional analysis. In a first step we apply our analysis to the whole simulation sample. In a subsequent step we form subgroups for different states. We create subgroups for the people who received UA or SA, including people who received both, and people who received no benefits in the status quo. The analysis of the subgroups for UA and SA include people who become eligible for UB II, people who pass over to the "new" SA and people who lose their entitlement. Furthermore we subsume all the people who are affected by the reform into "Group A".

The following results are described with respect to the square root scale. As we assume observable sensitivity according to the equivalence scale that has been chosen (see Atkinson 1998), we also present the results for the modified OECD and OECD scales.

As shown in Table 5 the rounded Gini coefficient remains unchanged for the entire population at 0.27 while a reduction in income inequality can be measured by looking at "Group A". Here the rounded Gini coefficient drops from 0.18 to 0.14 after the labour supply responses. A reduction from 0.20 to 0.16 is also observed for UA recipients and in particular for people without benefits (UA and SA) in the status quo, from 0.22 to 0.12.

The Atkinson measures also confirm a reduction in income inequality for "Group A". The effects are stronger for the Atkinson measures as compared to the Gini coefficient (see Table 6). This result reflects the quality of the Gini coefficient as it is more sensitive to deciles with a higher concentration of people while the Atkinson measures on the other hand are more sensitive to changes in the bottom deciles, also depending on the degree of risk aversion assumed (e = 0.5, 1).[11]

For people receiving UA the Atkinson measure A(1) also shows a reduction in income inequality within this subgroup while for people receiving

[11] For a discussion on the properties of the Gini coefficient see Cowell (1995), Blackorby/Donaldson (1978), Atkinson (1970) and Sen (1973).

Table 5
Inequality analysis before and after labour supply: Gini coefficient

Gini coefficient	Status quo			Unemployment Benefit II					
				Before labour supply			After labour supply		
	Square root	OECD	Modified OECD	Square root	OECD	Modified OECD	Square root	OECD	Modified OECD
Simulation sample	0.27	0.27	0.26	0.27	0.27	0.26	0.27	0.27	0.26
Group A	0.18	0.17	0.17	0.14	0.12	0.13	0.14	0.12	0.12
UA	0.20	0.19	0.19	0.17	0.14	0.15	0.16	0.13	0.14
SA	0.09	0.08	0.08	0.11	0.09	0.09	0.11	0.09	0.09
No benefit	0.22	0.21	0.21	0.12	0.10	0.11	0.12	0.10	0.11

Notes:
Group A: all people who are affected by the labour market reform
UA: recipients of Unemployment Assistance
SA: recipients of Social Assistance
No benefit: people who were not entitled to UA or SA in the status quo but become eligible for UB II.
Source: own calculations based on GSOEP 2004 and 2005.

Table 6
Inequality analysis before and after labour supply: Atkinson measures

	Status quo			Unemployment Benefit II					
				Before labour supply			After labour supply		
	Square root	OECD	Modified OECD	Square root	OECD	Modified OECD	Square root	OECD	Modified OECD
Atkinson (0.5)									
Simulation sample	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06
Group A	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.01	0.02
UA	0.03	0.03	0.03	0.03	0.02	0.02	0.03	0.02	0.02
SA	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
No benefit	0.05	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.01
Atkinson (1)									
Simulation sample	0.12	0.12	0.12	0.12	0.11	0.11	0.12	0.11	0.11
Group A	0.07	0.06	0.06	0.04	0.03	0.03	0.04	0.03	0.03
UA	0.06	0.06	0.06	0.05	0.04	0.05	0.05	0.04	0.04
SA	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.01	0.01
No benefit	0.12	0.11	0.11	0.03	0.02	0.02	0.03	0.02	0.02

Notes:
Group A: all people who are affected by the labour market reform
UA: recipients of Unemployment Assistance
SA: recipients of Social Assistance
No benefit: people who were not entitled to UA or SA in the status quo but become eligible for UB II.
Source: own calculations based on GSOEP 2004 and 2005.

SA, the Atkinson measure A(1) records an increase in income inequality.

In the following poverty analysis the head count ratio (FGT0) of the sample population indicates a slight reduction in the poverty rate which is much stronger within "Group A". Here the share of people below the poverty line decreases by 5 percentage points. The standardised poverty gap ratio (FGT1) and the squared standardised poverty gap ratio (FGT2) also decline substantially within "Group A" (see Table 7). These results suggest that the distance to the poverty line became smaller.

For people in receipt of UA, the poverty rate increases by one percentage point while for recipients of the former SA there is a reduction of two percentage points. The result that for UA income inequality has declined while the poverty rate has increased leads to the conclusion that redistribution from the top to the bottom must have taken place. This becomes clearer by looking at the percentile analysis (see Table 8).

As we can see from the percentile analysis, which measures the monthly gains and losses per capita on average for each decile, we find that the two lowest deciles are the income gainers of the reform in the simulation sample. In contrast, the income losers are detected in the 3rd to 8th deciles. Within Group A, the top two deciles lose the most income per capita while the bottom deciles gain the most income. The magnitude of the income gains of the bottom two deciles diminish until the 8th decile. These results show that the losses found in the higher deciles are mainly driven by former recipients of higher UA. Interestingly, their household income could even reach into the top decile of the income distribution. This suggestion is confirmed when we look at the dramatic income losses of UA recipients in the top decile, which average nearly 300 Euros per capita. When we look at the analysis for SA recipients we find on average income gains with exceptions in the 3rd decile. Looking at the results from the other equivalence scales it becomes clear that there is no continuity in the gains or losses. With the introduction of UB II the average rate paid to SA recipients increased from 296 to 345 Euros in western Germany and from 283 to 331 Euros in eastern Germany. As on the one hand the rates for children aged from 7 to 14 and those aged from 14 to 18 decreased from 65 to 60 percent and 90 to 80 per-

Table 7
Poverty analysis before and after labour supply

	Status quo			Unemployment Benefit II					
				Before labour supply			After labour supply		
	Square root	OECD	Modified OECD	Square root	OECD	Modified OECD	Square root	OECD	Modified OECD
FGT (0)									
Simulation sample	0.08	0.06	0.07	0.07	0.05	0.07	0.07	0.05	0.07
Group A	0.34	0.31	0.29	0.29	0.20	0.25	0.29	0.20	0.25
UA	0.30	0.29	0.28	0.32	0.22	0.28	0.31	0.22	0.28
SA	0.36	0.24	0.26	0.35	0.16	0.25	0.34	0.16	0.26
No benefit	0.51	0.45	0.47	0.23	0.19	0.19	0.25	0.20	0.20
FGT (1)									
Simulation sample	0.02	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01
Group A	0.07	0.06	0.06	0.05	0.03	0.03	0.04	0.03	0.03
UA	0.05	0.04	0.04	0.05	0.04	0.04	0.05	0.03	0.04
SA	0.04	0.02	0.02	0.04	0.02	0.02	0.04	0.02	0.02
No benefit	0.17	0.15	0.15	0.04	0.02	0.03	0.04	0.03	0.03
FGT (2)									
Simulation sample	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Group A	0.03	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.01
UA	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
SA	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.00
No benefit	0.09	0.08	0.09	0.01	0.01	0.01	0.01	0.01	0.01

Notes:
Group A: all people who are affected by the labour market reform
UA: recipients of Unemployment Assistance
SA: recipients of Social Assistance
No benefit: people who were not entitled to UA or SA in the status quo but become eligible for UB II.
Source: own calculations based on GSOEP 2004 and 2005.

cent respectively, and on the other hand the rates for children below the age of 7 increased from 50 to 60 percent together with an overall stronger deduction of incomes from other members of the household (i.e. parents), it depends very much on the structure of a household whether it becomes a net income gainer or an income loser.

In the percentile analysis for households which received neither UA nor SA in the status quo and become eligible for UB II in the reform scenario we observe the strongest income gains, although we also find income losses in the top decile. Households without UA and SA in the status quo are households which received housing benefit, which lived from the incomes of other household members and/or were not entitled to UA or had too high non-earned income to become eligible for SA. As we assume a 100 % take-up rate of the benefits we assume further that people who become entitled to UB II and receive higher payments compared to housing benefit, choose UB II over housing benefit, although this leads to a lower household income. This assumption is driven by the circumstances that most of the people did not have this information when applying for UB II.

If we consider the number of children in a household, we detect that the gains increase with the number of children, which is consistent for the en-

Table 8

Percentile analysis before and after labour supply effects

(monthly income gains and losses per capita)

	Square root		OECD		Modified OECD	
	before	after	before	after	before	after
Simulation sample						
1st decile	70	91	68	85	66	91
2nd decile	8	15	–5	0	6	12
3rd decile	–10	–3	–15	–10	–10	–10
4th decile	–19	–13	–14	–9	–17	–12
5th decile	–18	–11	–14	–9	–16	–10
6th decile	–13	–8	–7	–4	–11	–6
7th decile	–11	–7	–8	–5	–9	–5
8th decile	–6	–4	–3	–2	–6	–2
9th decile	–1	–1	–2	–1	–1	–2
10th decile	–1	–1	–1	0	–1	0
Group A						
1st decile	238	280	220	248	233	283
2nd decile	101	122	84	99	94	117
3rd decile	44	62	52	63	40	57
4th decile	27	44	37	47	23	45
5th decile	6	23	13	23	3	29
6th decile	27	39	0	12	23	30
7th decile	–4	14	–14	–3	–6	18
8th decile	–1	29	–49	–33	–5	–25
9th decile	–127	–93	–83	–62	–118	–71
10th decile	–314	–261	–278	–240	–283	–261
UA						
1st decile	116	133	124	137	110	150
2nd decile	87	102	69	79	79	93
3rd decile	41	62	31	43	36	49
4th decile	–34	–8	24	37	–37	25
5th decile	–9	14	–17	–5	–14	–4
6th decile	–54	–24	–53	–40	–55	–45
7th decile	–112	–77	–125	–107	–108	–96
8th decile	–205	–176	–151	–137	–192	–149
9th decile	–268	–228	–227	–208	–247	–227
10th decile	–364	–303	–350	–304	–322	–317
SA						
1st decile	24	25	29	31	24	24
2nd decile	3	4	36	38	3	18
3rd decile	–10	–10	33	35	–10	5
4th decile	15	18	26	28	14	22
5th decile	8	10	7	10	6	22
6th decile	13	16	4	5	12	43
7th decile	32	35	5	8	28	25
8th decile	38	42	–3	0	35	21
9th decile	53	59	–7	–3	45	11
10th decile	47	55	27	31	41	40

Table 8 (continued)

No benefit						
1st decile	512	500	446	439	493	487
2nd decile	303	330	279	293	300	322
3rd decile	184	226	145	167	176	256
4th decile	144	165	104	115	136	127
5th decile	105	124	83	93	100	74
6th decile	81	95	69	76	75	95
7th decile	67	81	46	65	62	88
8th decile	27	37	24	34	25	68
9th decile	52	82	8	15	47	21
10th decile	–59	–21	–31	–13	–53	–23

Notes:
Group A: all people who are affected by the labour market reform
UA: recipients of Unemployment Assistance
SA: recipients of Social Assistance
No benefit: people who were not entitled to UA or SA in the status quo but become eligible for UB II.
Source: own calculations based on GSOEP 2004 and 2005.

tire population and for "Group A" (see Table 9). This finding results from the fact that benefit payments for children – these are calculated relative to the basic benefit – have in some cases become more generous due to the higher basic benefit rate. The negative effects are further mitigated by the labour supply responses while the positive effects are intensified consistently.

Bringing the results together, we can summarize that we identify most of the losers in the group of people who previously received UA. Here, we identify six deciles as income losers before labour supply response and seven deciles after labour supply response. The finding before labour supply is in agreement with Schulte (2004), Blos/Rudolph (2005) and Becker/Hauser (2006). In contrast to their studies, however, we find reform winners for almost all deciles in the subgroup of people who previously received SA. This can be explained by the less restrictive rates at which income is deducted from benefit payments and the particularly higher rates for children as mentioned above. Furthermore, we observe the strongest reform winners in the group of people who did not receive UA or SA benefits in the status quo but who become eligible for UB II in the reform scenario.

While the results for SA and UA recipients are plausible and in the direction we expected, the result for people not receiving UA or SA – although plausible as well – is also influenced by the structure of our tax-benefit model: the GSOEP contains only insufficient information on non-earned income. We only observe the annual interest incomes together with incomes from dividends, which we use to recalculate the potential capital assets by assuming an interest rate of 3 percent. These calculated assets serve as the basis for the wealth test, which leads to the result that a lot of people become eligible because they were not entitled to UA and had too many private assets by law to receive SA or because they received housing benefits. Within this group nine out of ten deciles gain, so this group of people becomes the strongest income gainers of the reform. We also observe losers as we assume 100 % take-up, so that a household applies for UB II if the payments are higher than housing benefits although the household income decreases.

A main aspect of our analysis was the consideration of behavioural labour supply responses. The results show that, in general, taking into account behavioural reactions mitigates the negative distribution effects of the reform on the one hand and intensifies the positive effects on the other hand. This implies that the households adjust their behaviour in such a way as to improve their income situation.

Table 9

Gains and losses by number of children before and after labour supply

(monthly income gains and losses per capita)

	Square root		OECD		Modified OECD	
	before	after	before	after	before	after
Simulation sample						
No children	-2	3	-2	2	-2	3
1 child	-2	8	-1	7	-1	9
2 children	2	11	2	9	2	11
3 children	17	25	12	17	15	22
more than 3 children	27	31	17	19	22	26
Group A						
No children	-33	19	-31	14	-32	17
1 child	2	49	6	41	6	48
2 children	21	72	18	56	22	70
3 children	63	87	43	59	55	77
more than 3 children	73	86	45	53	61	72
UA						
No children	-141	-79	-126	-75	-135	-78
1 child	-64	-11	-45	-8	-55	-9
2 children	-62	-19	-43	-12	-55	-15
3 children	44	64	29	42	37	54
more than 3 children	44	63	28	38	37	51
SA						
No children	13	16	9	12	11	14
1 child	31	36	25	29	30	34
2 children	5	9	4	7	6	9
3 children	45	47	30	31	39	41
more than 3 children	64	68	38	41	52	55
No benefit						
No children	151	172	130	148	144	163
1 child	109	157	91	130	108	154
2 children	147	211	112	161	142	203
3 children	166	220	122	159	158	206
more than 3 children	142	168	96	113	128	151

Notes:
Group A: all people who are affected by the labour market reform
UA: recipients of Unemployment Assistance
SA: recipients of Social Assistance
No benefit: people who were not entitled to UA or SA in the status quo but become eligible for UB II.
Source: own calculations based on GSOEP 2004 and 2005.

6 Conclusions

Our distributional analysis of the "Hartz IV Reform" is the first attempt to cover the entire population. Furthermore, we are the first to take into account the "second-round" effects by allowing for behavioural adjustments. We used the pseudo distribution method, which is a simple but adequate approach in a probabilistic framework when focusing on issues of income distribution.

The main results of our analysis are as follows. The introduction of UB II has led to a consolidation of the benefit system. The presumption that people who used to receive high UA benefits because they had higher earnings (before unemployment) lose

most is confirmed. We find that six deciles lose income as a consequence of the reform when labour supply effects are considered (and seven deciles lose income when labour supply effects are not considered). Our results correspond with the findings of other studies like Becker/Hauser (2006), Schulte (2004) and Blos/Rudolph (2005) regarding the recipients of the former UA. We identify reform winners in the subgroups of (1) former recipients of social assistance and (2) new recipients. The largest gains accrue to households with many children and to households which were not eligible for any benefits before. These households become eligible because of the less restrictive test of non-earned income compared to the old social assistance. For the whole group of benefit recipients, namely "Group A", we find a reduction in income inequality accompanied by a positive effect on poverty measures. This effect is in line with the theoretical considerations. The new benefit system has a tendency to equalize the transfer payments at a level that is slightly higher than the old social assistance level. These results are also confirmed by the labour supply effects. We find negative participation effects for women with children in couple and single households. In contrast, couples without children, single men and women without children increase their participation. These opposing effects almost cancel each other out and are not significant in either direction. Thus, the net employment effect of the reform is negligible.

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