Household Labor Supply Effects of Low-Wage Subsidies in Germany*

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Summary

This research evaluates the impact of various subvention schemes proposed to foster low-wage employment on household labor supply in the German labor market. Using data from the German Socio-Economic Panel, we estimate a discrete choice model of household labor supply. On the basis of the estimated labor supply parameters of husbands and wives, we simulate participation and hours effects of different policies uplifting low labor earnings on the individual and household level, respectively. In all cases the labor supply effect is very moderate. Subsidies to individuals promote part-time employment, in particular of second earners, while subsidies based on small household income might drive the better qualified partner out of the labor market so that the total number of labor market participants even declines.

1. Introduction

In Germany, unemployment has been increasing since the 1970s. This development has particularly affected the unskilled. At present, almost 40 percent of the unemployed are without formal qualification, which is far more than the share of the low-qualified in the population. While skill-biased technological change seems to be reducing demand for low-skilled labor worldwide, wages in Germany are too rigid downward at the bottom end, to absorb the adverse employment impact of this process on the low-skilled (Steiner/Mohr, 2000). One explanation for lack of flexibility in the low-wage sector of the German labor market comes from provision of subsistence payments to the

* The figures presented in this paper reflect the current state of an ongoing research project. A substantially extended and improved version will be available from the authors soon.

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unemployed, generous by an international standard, in conjunction with high marginal transfer reduction rates on small labor earnings. To give an example, the weekly net income of a fill-time working single without children who receives a gross wage of 7 Euros per hour, exceeds her claim on welfare benefits by only about 60 Euros. This comparison does not even consider any costs of working.

In order to overcome the labor supply disincentives of the German welfare state, reformers either could choose to cut effective benefits received in unemployment, or to increase households' in-work income. Decision makers mostly seem to prefer the latter. Several concepts to lower marginal transfer reduction rates or giving subsidies to low-wage earners have been proposed, and sometimes implemented on an experimental basis. Recently, policies to reduce payroll contributions to social insurance at the lower income range have become popular.

In this paper, we seek to evaluate the impact of different concepts to support low-qualified job seekers through subsidizing social insurance contributions, namely of what might be labeled the *Mainzer*, *Stoiber* and *NRW* models. The latter two, proposed by conservatives and social democrats, respectively, employ subsidy schemes based on individual earnings. In contrast, subsidies in the Mainzer model derive from the joint income of husbands and wives. To adequately capture the labor market effects of such an incentive scheme, we employ a model of joint household decision making, which is estimated on the basis of data taken from the German Socio Economic Panel.

The remainder of the paper is organized as follows. The next section explains our structural discrete choice model of household labor supply, and discusses the data and estimation results. In section 3, the labor market effects of the different subsidy concepts are simulated on the basis of the estimated parameters. Section 4 concludes.

2. Model, Data, and Estimation Results

To explain individual labor supply, we use a static neoclassical structural model, which analyzes preferences in a household context. Spouses in two adults families are assumed to jointly maximize household utility, which depends on husband's and wife's leisure, and on household net income. Maximization is subject to a budget constraint including labor and non-labor income, and determined by the tax and benefits rules (e.g., Hausmann/Ruud, 1984). Following van Soest (1995), we limit the choice of the household to a discrete set of alternatives. The main advantage of the discrete choice approach is that it facilitates estimation. The particular shape of the family budget set (non-convexities etc.) does not affect numerical tractability.

To be specific, we assume that households with characteristics X jointly maximize the family direct utility function $U(Y, H-h^m, H-h^f; X)$, where H represents individual total time endowment (set to 80 hours per week, for the empirical analysis), h^m and h^f male and female working time, and Y net household income. Net income is a function of the two spouses' hourly wage rates, w^m and w^f, working hours, and net taxes, i.e., taxes paid net of transfers received by the household, T:

$$Y = w^m h^m + w^f h^f - T(w^m h^m + w^f h^f; X) .$$

To discretize the choice set of the family, we assume that each individual can choose among only six alternatives of weekly working hours: $h^i \in \{0,10,20,30,40,50\}$, i = m, f. This yields a total of 36 choice opportunities for the two adults household. We need to round working hours observed in the data, in order to fit the elements in the restricted choice set.

We estimate this model making two assumptions. First, we assume that the observed combination of the male and female partner's working hours is actually the utility maximizing one, conditional on the particular budget set of the household. Second, we add i.i.d. type I extreme value distributed random disturbances ε to the utilities associated with all choice opportunities. This leads to

the familiar conditional logit model of qualitative choice behavior (McFadden, 1974). This model, is easily estimated by maximum likelihood, if one ignores that some hourly wage rates are estimated rather than observed. For the empirical analysis, we use a translog specification of the direct utility function:

$$U = x'Ax + b'x + \varepsilon$$

where $x = (Y, H\text{-}h^m, H\text{-}h^f)'$, A is a symmetric 3x3 matrix of parameters, and b a parameter vector $b = (b_1, b_2, b_3)$. The translog specification implies that all possible interactions of male and female working hours, and family net income, are included in the estimation, as well as all elements of x squared. Finally, to introduce observed heterogeneity among the households, we specify several parameters of the direct utility function as dependent on family characteristics, e.g., $b_2 = \beta_2'X$, with the intention to select the best among a large number of possible empirical specifications.

The data used in this analysis is taken from the 2000 wave of the German Socio-Economic Panel. We select two adult households where both partners are older than age 18 and younger than age 60. After excluding households where at least one of the partners is retired, self-employed, civil servant, in education or in military (national) service, or on parental leave, we are left with a total of 3702 couples, around 13 percent of which are unmarried but cohabiting. In 9.0 percent of the households, neither partner does have a job, in 9.9 percent of the cases only the female partner is employed, and in 30.3 percent of the households only the male partner works. Working time of the employed is determined on the basis of regular working hours and includes regular paid overtime.

To derive household net income, we first predict potential hourly wages for the non-employed by a conventional selectivity corrected wage regression (Heckman, 1979). Gross wage rates are assumed to be independent of hours worked. In a second step, in order to obtain household net income for the feasible combinations of male and female partners' working time, a detailed but of course

simplified model of the German tax and transfer system is applied. Specifically our fiscal model incorporates income taxation (including solidarity surcharge), payroll contributions to social insurance, social welfare benefits, housing benefits, and child care benefits. The setting reflects the tax and transfer rules valid in year 2000.

(Table 1 about here)

Table 1 displays the estimation results for our discrete choice model of household labor supply. The estimated parameters are hard to interpret directly, but note that they exhibit the expected signs. The coefficients of non-interacted male and female leisure, as well as of household net income, are positive and significant, whereas the coefficients of the respective variables squared are significantly negative. This indicates that the estimated direct utility function is well behaved in the sense that it increases at a declining rate in all its three arguments. Note also that female partners, especially those with children, value leisure more highly than male partners, which is consistent with the fact that in Germany women supply less labor, both in terms of participation rates and hours worked conditional on participation. Parameters of the interactions between male and female leisure are generally insignificant, suggesting that partners do not attempt at coordinating spare time.

While the results of our basic model I appear satisfactory, a simulation of the labor supply decisions implied by the estimated parameters reveals that the model is hardly consistent with the data. Part-time is markedly overpredicted at the expense of fulltime employment, perhaps a result of part-time jobs lacking (Tummers/Woittiez, 1991). Thus, in model II, we adopt the strategy proposed by van Soest (1995) who corrects this problem by adding dummies for part-time choice opportunities to the direct utility function. The estimated parameters of these dummies are all negative and highly significant. The parameters are less negative for women though, since they find part-time employment more easily than men. Holding male working hours fixed, Figure 1 draws some indifference

curves that illustrate the effect of this admittedly somewhat ad hoc approach. Dashed lines refer to model I, solid lines to model II. Inclusion of part-time dummies generates a hump in the medium range of working hours, which implies that optimal labor supply (given a budget constraint) is more frequent in the fulltime range. The extended model fits the data quite well. A simulation using the utility parameters of model II predicts an average working time of 31.82 (18.53) hours per week for male (female) partners, compared to 32.06 (18.49) hours in the sample.

(Figure 1 about here)

Figure 1 furthermore illustrates how household characteristics might affect the labor supply decision. Compared to an average household without children, the system of indifference curves characterizing a woman who lives in the mean family with children, as shown in the right panel, is markedly steeper. Therefore, for a given budget opportunity set, her optimal working hours would lean further to the left, as expected.

For a first assessment of what effects on labor supply government might achieve by means of subsidizing in-work income, we present some earnings elasticities. The simulations suppose a ten percent increase in the gross wage rate of each spouse, and in net household income, respectively. For the simulations, we first calculate, for each household, the probabilities to select a particular opportunity from the discrete choice set, implied by the estimated coefficients of our model. We then compute participation rates as the sample mean of predicted probabilities characterized by positive working hours, whereas average hours are derived as the sample mean of predicted probabilities for every opportunity with positive working hours, times the hours value of the opportunity.

(Table 2 about here)

Table 2 shows that for each spouse, the own wage elasticitiy regarding participation and hours worked is positive. It is larger for wives than for husbands. Male and female leisure come out as

substitutes, since cross-labor wage elasticities are negative. Wives withdraw from the labor market (or reduce working hours) more frequently if the wage of their husband increases, compared to the opposite case. Finally, a higher net household income does not significantly affect male labor supply, but, surprisingly, female working hours increase somewhat (less so does participation). In any case, the labor supply response to what are substantial changes in earnings is extremely small. Thus, one would not expect that wage subsidies could raise labor supply of the unemployed substantially.

3. Policy Simulations

In this section, we discuss the simulation results for different policies aimed at overcoming the labor supply disincentives of social subsistence payments to the unemployed, by improving in-work income of the less qualified through wage subsidies. The simulations proceed in the same fashion as the previous computation of wage and income elasticities: for each household, probabilities of selecting a specific hours combination as optimal are derived for each of the 36 choice opportunities, conditional on the budget set that becomes available to the household after policy reform. Participation rates are derived as the mean of predicted choice probabilities for opportunities with positive hours values. Average hours are the sample mean of predicted probabilities for each choice opportunity weighted by its hours value.

Although there are several concepts for government intervention to create a low-wage sector available, we limit this analysis to three proposals that have ranked high on the political agenda in Germany recently. More specifically, our first focus is on a proposal to gradually phase in payroll contributions to social insurance at the lower income range that is heralded by the conservative party (henceforth addressed as *Stoiber model*, named after their leader). The plan is to exempt monthly earnings of less than 400 Euro from contributions to social insurance, which lifts the current income bound by 75 Euro. Furthermore, in a phase-in region, contribution rates are planned to increase line-

arly, until the standard contribution rate (20.45 percent, for the employee) is reached at gross earnings of 800 Euro per month. The second policy to be analyzed, suggested by some social democrats (henceforth called the *NRW model*, short for the state where the concept was invented), is actually very similar, but more generous: the zone of contribution-free income is extended to 510 Euro, while the phase-in region, again characterized by linearly growing contribution rates, reaches up to monthly gross earnings of 1280 Euro.

The third policy model, the so-called *Mainzer model*, only just put into practice nationwide, is conceptually different from the previous two, because its subsidy scheme is based on household labor income rather than individual earnings. This means that the lower and upper bound of the phase-in region valid for singles are doubled for two adult households, no matter how labor income is distributed between partners. Contributions to social insurance start at monthly earnings of 650 Euro. The full contribution rate, approached linearly, is hit at 1590 Euro. As a result, the policy covers a wider range of gross hourly wages, especially if the household adapts the one breadwinner model. Besides, the Mainzer model is also seen as a means of family friendly policy– households with children are entitled to an additional monthly benefit of up to 75 Euro per child. Its exact amount again depends on family labor income.

(Table 3 about here)

Table 3 summarizes the simulated impact of the three different policies on average hours worked, and on male and female participation rates. On the whole, the labor market impact of the subsidies is small. This is expected considering the rather small wage and income elasticities obtained from the estimated model parameters. The startling result is that general subsidization of low monthly incomes reduces aggregate labor supply. The more generous of the two individual subsidy models lowers the employment volume of men, compared to the baseline simulation, by 0.3 percent.

The Mainzer model, in the variant including the extra payment for children, brings average male working hours down by almost 1.3 percent. At the same time, the volume of female labor supply stays basically unchanged. This reveals that the subsidy does not only create an incentive for low qualified agents to expand their labor supply, but at the same time also an incentive for better qualified agents to reduce work to part-time. The associated earnings loss is partly compensated by the subsidy, while additional utility is drawn from more leisure. It turns out that for men, in the aggregate, this effect dominates the calculated impact of the subsidy, but it is also important for women.

In all scenarios the number of no earner households declines. This response is strongest for the NRW model, which reduces the number of no earner households by 3.5 percent. Since women receive lower wages in general, they benefit from the subsidy more frequently than men– all policies raise the share of households in which the female partner is employed. Still the policies impact on the allocation of work within the household differently. This is best seen comparing the Stoiber and the Mainzer models, either of which raises the share of households with employed females close to 61.3 percent (up from 60.9 percent in the baseline simulation). However, while the former attracts female (second) earners so that the number of two earner households increases at the expense of the male breadwinner model, the latter puts women into fulltime work so that the two earners type of household becomes less frequent. This is to the benefit of the rather unusual female breadwinner model, which gains by 10.2 percent. The explanation is that the Mainzer model, unlike the Stoiber and the NRW models, reaches well into the fulltime range, provided that the partners decide to specialize on market and home production, respectively. Then the drift from male to female labor, as explained, is due to the gender wage rate differential.

(Table 4 about here)

The previous observation matters for the aggregate participation effects of the different subsidy concepts, on display in Table 4. To provide more illustrative figures, we blow up the sample using the household weights provided with the data. The gender wage rate effect is obviously present for all policies. It makes the small participation success of the individual subsidy strategies even smaller. In net terms, the Stoiber model does not reach more than 26.000 agents, a negligible quantity relative to the 4.4 million non-employed covered by our sample. Also the more generous (and much more costly) NRW model, with a gain in participation of 64.900 agents, is hardly a success. The Mainzer model is even destructive– net participation falls by a number of 29.000 or 43.300, depending on payment of extra child benefits, due to the strong negative participation effect on males associated with the policy.

4. Conclusions

In our simulations, misspecification is still a problem, for example, due to the neglect of the fixed costs of working, ignorance of the stochastic nature of the auxiliary wage rate predictions, and lack of sufficient variables on household wealth. Moreover, our simulation technique, based on predicted choice probabilities, is perhaps inadequate, as conceptually the discrete choice model would require applying a maximum probability approach. This alternative is much harder to compute, however, since one has to respect the probabilistic nature of the individual optimal choice (Duncan/Weeks, 1998).

Nevertheless, we draw some tentative policy conclusions. Overall, policies aimed at improving in-work income at the bottom end, in order to reduce the labor supply disincentives emanating from the German welfare system, do not appear to be very effective. The reason for this is that the empirical wage elasticity of labor supply, as measured in this analysis, is very small. Therefore, subsidy policies that have a substantial labor market impact are probably too costly to finance.

Moreover, subsidies at low labor incomes might have accidental side effects. Since male and female leisure are substitutes, there is a tendency that husbands reduce labor supply, to the benefit of wives whose lower earnings capacity makes it easier for them to get into reach of the wage subsidy. If the subsidized income range becomes wide enough, this might even reduce aggregate participation. The specific policies studied in this research also appear to be fiscally inefficient. Basing the subsidy on low monthly earnings rather than low hourly wages creates strong part-time incentives beyond the target group of the low qualified. Besides, individuals who were employed already before the policy is introduced take up a vast majority of the subsidy, if it is paid to everybody at low income.

In view of the obstacles to cure the consequences of the disincentives for unqualified labor, decision makers might be well advised to engage in reforms that target the causes of the low-wage employment problem in the welfare system instead. It appears that workfare concepts are at the horizon also in Germany.

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Table 1: Estimation results of structural model

	Model I		Model II	
	No part-time correction		Part-time Correction	
	Parameter	t-value	Parameter	t-value
($\log^2 y$)	-0.37**	-1.97	-1.49***	-7.53
($\log y$) x ($\log l_m$)	-0.58***	-3.20	-1.01***	-5.91
($\log y$) x ($\log l_f$)	-0.73***	-4.33	-1.19***	-7.38
($\log y$)	19.49***	3.91	44.75***	9.13
($\log^2 l_m$)	-3.98***	-14.63	-10.88***	-34.00
($\log^2 l_f$)	-1.52***	-5.67	-14.89***	-19.20
($\log l_m$) x ($\log l_f$)	2.23	1.01	1.62	0.76
x Age	-1.05	-0.85	-0.97	-0.83
x Age^2	0.15	0.88	0.14	0.87
x Children younger than 3	-0.37***	-2.93	-0.34***	-2.82
x Children older than 3	-0.22	-0.69	-0.22	-0.83
x East German	0.39*	1.78	0.52**	2.26
x Married	-0.41	-1.49	-0.36	-1.21
($\log l_m$)	108.48***	5.11	171.56***	8.50
x Age	-18.39***	-3.60	-38.05***	-3.58
x Age^2	5.74***	3.76	5.43***	3.76
x Children younger than 3	3.01***	2.84	2.62***	2.62
x Children older than 3	2.09	0.78	2.05	0.90
x East German	-3.30*	-1.86	-4.37**	-2.34
x Married	2.68	1.23	2.21	0.93
x Care	0.13	0.31	0.11	0.27
x Poor Health	1.80***	6.36	1.44***	6.08
($\log l_f$)	135.05***	5.76	255.35***	10.68
x Age	-65.56***	5.34	-66.69***	-5.30
x Age^2	9.44***	4.36	9.57***	5.51
x Children younger than 3	4.23***	4.36	3.88***	4.21
x Children older than 3	5.12**	2.14	4.53***	2.22
x East German	-5.30***	-3.13	-6.28***	-3.50
x Married	4.10**	1.94	4.05*	1.75
x Care	1.94***	3.40	1.60***	3.25
x Poor Health	0.49	1.46	0.46	1.44
Part-Time				
$h_m = 10$			-4.37***	-21.93
$h_m = 20$			-5.30***	-23.46
$h_m = 30$			-3.10***	-41.46
$h_f = 10$			-2.65***	-30.65
$h_f = 20$			-2.48***	-24.19
$h_f = 30$			-2.51***	-25.13
Pseudo-R^2	0.1358		0.3939	

Table 2: Labor supply elasticities

	Male Wage Rate		Female Wage Rate		Household Net Income	
	Hours Worked	Participation	Hours Worked	Participation	Hours Worked	Participation
Male Labor	0.021	0.019	-0.002	-0.002	0.001	0.000
Female Labor	-0.003	-0.003	0.027	0.020	0.015	0.009

Note: Percentage response to 10 percent increase in gross hourly wage rates, or net household income.

Table 3: Simulated aggregate participation effects

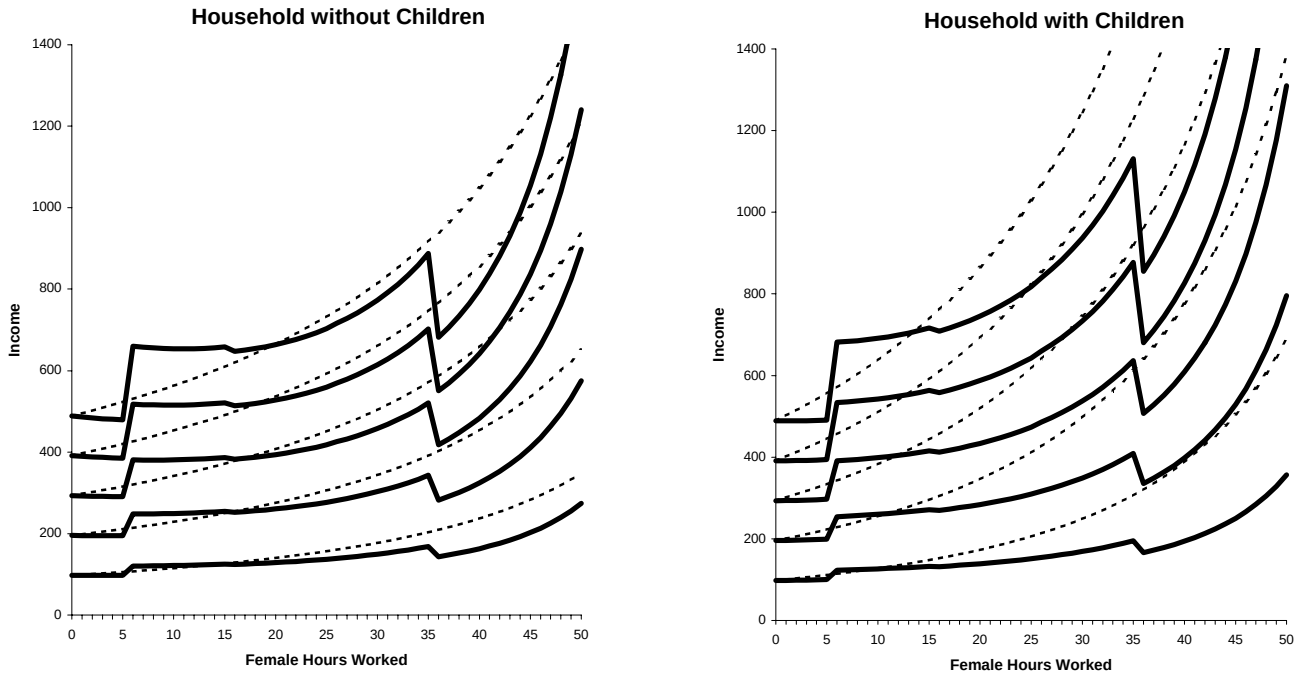
	Males	Females	Net Effect
Stoiber Model	-2.599	28.625	26.026
NRW Model	-10.929	75.756	64.872
Mainzer Model			
- Contribution Subsidy	-63.550	24.513	-29.037
- Contribution Subsidy + Child Support	-62.172	28.969	-43.203

Note: Change in number of participants relative to baseline simulation; weights: GSOEP.

Table 4: Simulation results

	Average Hours		Participation Rates			
	Males	Females	$h_m = 0$ $h_f = 0$	$h_m = 0$ $h_f > 0$	$h_m > 0$ $h_f = 0$	$h_m > 0$ $h_f > 0$
Sample	32.06	18.49	8.97	9.91	30.31	50.81
Baseline Simulation	31.82	18.53	8.48	10.86	30.63	50.03
Stoiber Model	31.79	18.50	8.37	10.99	30.36	50.27
NRW Model	31.72	18.57	8.18	11.26	29.96	50.59
Mainzer Model						
- Contribution Subsidy	31.48	18.52	8.29	11.83	30.52	49.35
- Contribution Subsidy + Child Support	31.42	18.53	8.27	11.97	30.50	49.27

Figure 1: Estimated indifference curves



Note: Average of households with male partner working 40 hours.