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ABSTRACT

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In this paper, we formulate and estimate a structural, static model of household labor supply and multiple welfare program participation. Given the complicated nature of both the income tax schedule and the benefit rules for different welfare programs, we use unique access to a very detailed micro-simulation model to generate accurate budget sets for each work-welfare combination. Moreover, when determining the budget sets, we use extraordinary high-quality data on earnings and other types of incomes, obtained both from employers and from income tax records. The results suggest that labor supply among two-parent families in Sweden is quite inelastic. A policy simulation designed to increase labor supply incentives for low income families generated substantial positive welfare effects, despite only minor increases in labor supply and decreases in welfare participation.

JEL Classification: J2

Keywords: household labor supply, welfare, unobserved heterogeneity

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I. Introduction

There exists an extensive literature in economics on the impact of income taxes and government transfer programs on labor supply behavior, see for instance the survey in Blundell and MaCurdy (1999). Most of the existing work regarding the disincentive effects of transfer programs has focused on the labor supply responses of single women to changes in the Aid to Families with Dependent Children (AFDC) program (Levy (1979), Moffitt (1986)).[1] Recently, this literature was extended to study the impact of the combination of cash benefits and in-kind benefits on single women's labor supply (Moffitt (1992), Keane and Moffitt (1999)) and on *household* labor supply (Hagstrom (1996), Hoynes (1996)).

While the effects of government transfer programs on labor supply behavior in the U.S. is relatively well known, much less is known about such effects in other, less market oriented, countries such as Sweden. Similar to the U.S., Sweden also substantially changed the structure of its public cash assistance programs to low-income families in the 1990s.[2] However, instead of removing national eligibility and payment rules, as was done in the U.S. when AFDC was replaced with TANF in 1996 which gave states much greater discretion in designing their own cash assistance programs, Sweden decided to remove any local variations in eligibility and payment rules.[3] Until 1998, the benefit levels of social assistance – one of the major means-tested cash assistance programs to low-income households in Sweden - were determined in each of the 288 municipalities in Sweden. However, as of January 1, 1998, the regional variations in the benefit levels were replaced by a national, uniform benefit level.[4] Although most social assistance recipients are female-headed households, benefits are available to eligible two-parent households. Despite recent interest about the program's effect on labor supply and welfare use, there exist little empirical evidence of these effects on the behavior of single mothers (recent exemptions are Andren (2003) and Flood et al (2003)) and, as far as we know, no evidence on the behavior of intact families.

[1] In August 1996, AFDC – the primary cash assistance program for low-income families - was replaced with the Temporary Assistance for Needy Families (TANF) block grant.
[2] During the 1990s, Canada, Germany, and Great Britain also modified their welfare system (Blank (2002)).
[3] See Blank (2002) for a review of the major changes in U.S. welfare programs during the 1990s.
[4] However, a number of municipalities adopted the national benefit levels prior to January 1, 1998.

In this paper, we estimate the effects of income taxes and government transfer programs on labor supply behavior among two-parent families in Sweden. We formulate and estimate a structural, static model of household labor supply and multiple welfare program participation (social assistance and housing allowance) in which hours of work for both spouses as well as welfare participation is chosen to maximize household utility subject to a budget constraint. There are at least two problems to consider when formulating and estimating such a model. First, the model must deal appropriately with the complicated nature of both the income tax schedule and the benefit rules for different transfer programs. Both income taxes and means-tested benefits combine to generate highly non-linear and sometimes non-convex budget constraints. Second, since benefit entitlement is determined by *household* income which implies that the labor market decision of one household member can influence the budget constraint for the other member, a traditional labor supply model, such as the one proposed by Hausman (1985) or MaCurdy et al (1990), is computationally infeasible. Instead, the model must have the capacity of dealing with decisions at the household level as opposed to the individual level.

To address the first problem mentioned above, we combine administrative data with detailed information on income and earnings from different sources. These data are obtained both from income-tax registers as well as from employers. It is especially important in a study such as this to have access to high quality data, partly because there tend to be serious under-reporting of welfare participation in traditional survey data, but also because it allows us to obtain very precise budget constraints for different hours of work combinations. Moreover, by using employer provided wages as opposed to self-reported wages, we reduce the potential problems with "division-bias" and measurement errors in wages. To our knowledge, this paper is the first to use high-quality data in a structural household labor supply model. Further, in addition to using high quality data, we use a micro-simulation model – developed and used by Statistics Sweden and the Swedish Ministry of Finance - to generate budget sets for each household and for each hours and welfare participation combination. The simulation model incorporates many details of existing tax and government transfer systems and also provides details on child care costs and other fixed costs of work. Given the complicated nature of both the income tax schedule and the benefit rules for

different transfer programs, it is virtually impossible to obtain accurate budget constraints using simple approximations. Finally, we pool data from 1993 and 1999, in part because they represent times of recession (1993) and economic growth (1999), but also because they provide us with information before and after the reform in the benefit levels for social assistance.

To deal with the second problem mentioned above, we decided to build on a joint labor supply model with discrete hours of work, following van Soest (1995), Hoynes (1996), Keane and Moffitt (1999) and Blundell et al (1999). The discrete approach to labor supply estimation has a number of advantages over continuous methods. Firstly, it is straightforward to deal with non-linear income taxes in a manner that does not impose the Slutsky restriction on the parameters of the model. Secondly, the preference model is fully structural and economic theory is testable. Thirdly, it is feasible to incorporate preference heterogeneity in the model. Finally, it is straightforward to include as many details as possible regarding the budget set. Following Moffitt (1983) and Hoynes (1996), we extend the basic discrete labor supply model by adding terms for the possibility of stigma effects associated with participation in different welfare programs. Moreover, in order to reduce the potential problem associated with mapping a continuum of hours into a finite set of classes, we add the possibility of classification error as in MaCurdy et al (1990) and Hoynes (1996). Finally, we allow for preference heterogeneity using a semi-parametric approach building on Heckman and Singer (1984).

The results suggest that labor supply among two-parent families in Sweden is quite inelastic. For instance, a 10 percent wage increase for husbands is associated with an average increase in hours of work of 0.5 percent. For women, the corresponding labor supply response is an increase by one percent. While a small wage elasticity for men is not uncommon in the literature, our result for women is generally lower than most of the existing results. Regarding the effects on participation in social assistance and in the housing allowance program, we find that increases in the maximum benefit levels are associated with moderate increases in participation rates. Specifically, an increase in the maximum benefit level for social assistance (housing allowance) with 25 percent yields an increase in the participation rate of 4.2 percent (3.1 percent).

In addition to presenting wage elasticities, we performed a simple simulation experiment where we changed both the income tax structure and the benefit rules for social assistance and housing allowance. In Sweden, as well as in many other countries, there is a concern about the high implicit marginal tax rates of an increase in working hours for low-income earners. These effects are due to a combination of a relatively high income tax rate on low earnings combined with a 100 percent implicit tax on welfare benefits. The results from the policy simulation indicate that a significant reduction in income taxes for low-income earners along with a 25 percent reduction in the maximum benefit levels in both social assistance and housing allowance generate substantial welfare effects. Using equivalent variation (EV) as our measure of the welfare effect associated with the tax and welfare change, we find that there are welfare gains for everyone in the sample from the tax and transfer change. However, there are dramatic differences in EV depending on the level of pre-reform household income. The estimated average EV for the poorest 10 percent is SEK 11,345 per year compared to SEK 57,195 per year for the richest 10 percent.

The remainder of this paper is organized as follows. Section II provides a description of social assistance and housing allowance in Sweden. In Section III, the main features of the Swedish income tax system is presented. Section IV presents the economic model and the empirical specification while Section V describes the data used in the analysis. In Section VI we present the results, while Section VII concludes the paper.

II. Social Assistance and Housing Allowance in Sweden

The Swedish welfare system is well known internationally for the high degree of income security that it provides for its residents. Recently, this generous system has been the target of a number of reforms, mainly due to the recession that hit Sweden in the early 1990's.

As an ultimate safety net people in Sweden are covered by social assistance (SA). In order to be eligible for SA, all other welfare programs, such as unemployment compensation, housing allowance, child allowance and various pensions, must be exhausted first. The benefit levels vary across family types and are intended to cover

expenses essential for a "decent" living. To be eligible for SA benefits, a family must have a net income below a maximum benefit level.[5] The benefit levels were, until 1998, determined in each of the 288 municipalities in Sweden and serve as guidelines for the social worker who decides the actual size of the benefits. However, as of January 1998, the regional variations in the benefit levels were replaced by a national, uniform benefit level. SA benefits depend on family composition and they are reduced at a 100 percent reduction rate as the family's net income rises. Figure 1 illustrates how the benefit levels change with net income for a typical two-parent household with two children. The figure also shows benefit levels in 1993 and in 1999. As the benefit levels varied across regions in 1993, Figure 1 shows the average of all regions for that year. For most municipalities, SA generosity has been reduced between 1993 and 1999, and the difference between the average SA benefit level in 1993 and the corresponding level in 1999 is around 20 percent.

Households who are eligible for SA may also be eligible for housing allowance (HA), which is determined by nation-wide benefit rules. The allowance is targeted at families with children. In 1993, households without children could qualify for HA, but a reform introduced in 1997 essentially eliminated that possibility.[6] Eligibility for HA benefits depends on household income, cost for housing, and the size of the household. In Figure 2, we show how HA change with changes in family income for a household with two children. In 1993, the amount of HA a family receives is constant for incomes below SEK 90,000. For higher incomes, the benefits are reduced at a rate of 20 percent. In 1993, about 50-70 percent of the housing cost is covered by HA for a family with an income below SEK 90,000. As shown in Figure 2, HA benefits are less generous in 1999 compared to 1993. The structure of the HA system is the same, and the reduction rate is also similar. However, the income level after which benefits are being reduced is substantially lower, SEK 60,000 in 1999 compared SEK 90,000 in 1993.

[5] For example, in 1999, the maximum benefit level for a four-person household varied between SEK 7,480 and SEK 9,160 per month depending on the age of the children. The benefits are meant to cover expenses for so called necessary consumption, such as food, basic clothing, leisure, health, newspapers, telephone and fees for TV.

[6] However, single persons less than 29 years old without children could still qualify for the allowance.

III. Income Taxes in Sweden

The Swedish income tax system is composed of two parts, a municipal tax rate and a national tax rate. The national government determines the tax base for both national and local income taxes, but each municipality has the authority to set its own rate. In general, the same rules regarding exemptions and deductions apply, and individuals file only one return for both local and national taxes. Each resident with income above a certain threshold (SEK 11,008 in 1993 and SEK 8,736 in 1999) must file an income tax return. Further, the individual is the unit of taxation and income taxes are independent of household composition.

While local taxes are proportional, the national income tax is progressive. There is a large variation in local taxes across municipalities. In 1993, the average tax rate was 30.95% with a minimum of 25.89% and a maximum of 33.80%. For 1999, the corresponding figures are 31.51%, 26.25% and 34.64%, respectively. A major tax reform in 1991 significantly reduced the national income tax rate and removed most of the tax brackets. In 1993, the national tax rate is essentially zero for incomes up to a threshold level of SEK 190,600 and 20% on incomes above that level.[7] In 1999, the national income tax schedule had three income brackets: A zero tax rate for incomes up to SEK 219,300, a tax rate of 20% on incomes between SEK 219,300 and SEK 360,000 and a tax rate of 25% on incomes above SEK 360,000.

Despite the fact that most income earners are only paying local income taxes, which are proportional, there is variation in the marginal tax rates paid by these tax payers. Table 1 shows how the general deductions vary with taxable income evaluated at a municipal tax rate of 30%. In 1993, the marginal tax rate on incomes between SEK 11,000 and SEK 64,000 equals the municipal tax rate. However, between SEK 64,100 and SEK 99,500, the deductions from taxable income increase with income and the marginal tax rate is lower. In the example in Table 1, the marginal tax rate is 22.5% in this income bracket. On incomes between SEK 104,600 and SEK 193,000, the deductions are reduced as income increase and the marginal tax rate is higher than the municipal tax rate. The same pattern regarding the marginal income taxes is observed in 1999. Figures A1 and A2 illustrate how both the marginal and average tax rate vary

[7] The national tax was SEK 100 for incomes up to the threshold level.

with taxable income. The reason for this peculiar shape of the marginal tax profile is political. During the 1991 tax reform, the national income tax rate was reduced significantly for high-income workers while low-income workers were less affected by the reform. To compensate the latter group and to reduce the after-tax income inequality generated by the reform, additional deductions were allowed on incomes between certain levels.

IV. Economic Model and Empirical Specification

As mentioned above, the traditional way to model labor supply assumes that the decision variable, hours of work, is continuous. However, in this framework restrictive assumptions must be made in order to guarantee statistical coherency (see for instance the discussion in MaCurdy et al (1990)). Moreover, an underlying assumption in traditional labor supply models is that the individual (or household) budget set is convex. Hence, to estimate such a model, a number of important simplifications of the income tax and transfer system must be made.

In this paper, we model labor supply as a discrete choice instead, following previous work by van Soest (1995), Hoynes (1996), Keane and Moffitt (1999) and Blundell et al (1999). As opposed to the "continuous" labor supply model, the discrete choice model allow us to include as many details as possible regarding the budget set and it extends naturally into a household model, where husbands and wives jointly determine their labor supply. Specifically, we assume that each household can choose among the alternatives in the choice set of income-leisure combinations $(NI_j, LHUS_j, LWIFE_{j'})$, where $j=1,\ldots,J$ and $j'=1,\ldots,J$. Further, $LHUS_j=TE-h_{hus,j}$ and $LWIFE_{j'}=TE-h_{wife,j'}$ where TE denotes time endowment and is set to 4,000 hours per year.[8] Thus, the choice set for a household contains J^2 different hours of work combinations. In the empirical part of the paper, we set $J=7$.[9]

We assume that family utility depends not only on income and leisure, but also on participation in welfare programs. The two welfare programs considered in this paper are social assistance and housing allowance. These, along with child allowance, are the main public cash assistance programs for two-parent families in Sweden. We do

[8] TE can also be regarded as a parameter that can be estimated together with all other parameters.

not model participation in child allowance as this, as opposed to the other two programs, is paid automatically to parents and is independent of household income.

It is assumed that the utility function is increasing in income and leisure and decreasing in welfare participation (SA and/or HA). The disutility from participation in a welfare program is assumed to primarily reflect the non-monetary costs associated with participation in such programs, such as fixed costs or "stigma", and is included to account for nonparticipation among eligible families.[10]

Following van Soest (1995), we use a translog specification of the direct utility function and for any specific household we have:

(1)

$$\begin{aligned} U\left(NI_{j,j'}, LHUS_j, LWIFE_{j'}\right) = {} & \beta_{NI}\log\left(NI_{j,j'}\right) + \beta_{hus}\log\left(LHUS_j\right) + \beta_{wife}\log\left(LWIFE_{j'}\right) + \\ & \beta_{NIsq}\left(\log(NI_{j,j'})\right)^2 + \beta_{hussq}\left(\log\left(LHUS_j\right)\right)^2 + \beta_{wifesq}\left(\log\left(LWIFE_{j'}\right)\right)^2 + \\ & 2\beta_{NIhus}\log(NI_{j,j'})\log\left(LHUS_j\right) + 2\beta_{NIwife}\log(NI_{j,j'})\log\left(LWIFE_{j'}\right) + \\ & 2\beta_{huswife}\log\left(LHUS_j\right)\log\left(LWIFE_{j'}\right) \\ & -\phi_{SA}d_{SA} - \phi_{HA}d_{HA} \end{aligned}$$

where $j=1,\ldots,J$ and $j'=1,\ldots,J$ and where it is assumed that the disutility from welfare participation (ϕ_{SA}) and from receiving housing allowance (ϕ_{HA}) is separable from the utility of leisure and disposable income (e.g. Moffitt (1983) and Hoynes (1996)).

The household chooses *LHUS, LWIFE,* d_{SA}, d_{HA} and consumption (or net income) by maximizing family utility subject to the following budget constraint:

(2)

$$\begin{aligned} NI_{j,j'} = {} & NI_{j,hus} + NI_{j',wife} + B_{SA}(NI_{j,hus}, NI_{j',wife})d_{SA} + \\ & B_{HA}(NI_{j,hus}, NI_{j',wife})d_{HA} - CC(NI_{j,hus}, NI_{j',wife}) \end{aligned}$$

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[9] We set $h_{i,1}=0$, $h_{i,2}=500$, $h_{i,3}=1000$, $h_{i,4}=1500$, $h_{i,5}=2000$, $h_{i,6}=2500$, and $h_{i,7}=3000$ for *i=hus,wife.*

[10] What may appear as "stigma" or disutility from welfare participation may also result from the inability of the econometrician to measure true welfare eligibility. Moreover, imperfect information regarding benefit eligibility on behalf of the household is also included in this non-monetary cost.

where $NI_{j,hus}$ and $NI_{j',wife}$ are the income net of taxes for husbands and wives at hours combinations j and j', respectively. $B_{SA}(.,.)$ is the amount of household specific social assistance benefits, $B_{HA}(.,.)$ is the amount of household specific housing allowance and $CC(.,.)$ represents child-care costs. $B_{SA}(.,.)$, $B_{HA}(.,.)$, and $CC(.,.)$ all depend on family net income. Further, $CC(.,.)$, as well $B_{SA}(.,.)$ prior to January 1998, are determined at local (municipal) levels. The individual components to household net income are given as:

$$NI_{j,i} = W_i h_{j,i} + Y_i - t(I_{j,i}) \qquad i = hus,\ wife \tag{3}$$

where W_i equals the before-tax hourly wage rate, $h_{j,i}$ is annual hours of work, Y_i denotes annual non-taxable, non-labor income, and $t(I_{j,i})$ is a function that determines income taxes. The tax function is evaluated at $I_{j,i}$ (taxable income) which is defined as $I_{j,i} = W_i h_{j,i} + Y_i^T - D_{j,i}$, where Y_i^T is taxable non-labor income and D_i represents deductions.[11]

The addition of the disutility of welfare participation implies that a family faces $4*J^2$ work-welfare possibilities (neither SA nor HA, SA but not HA, HA but not SA, and finally both SA and HA). Some welfare states may be infeasible if the household income from work is sufficiently high to render them ineligible for SA and/or HA. Solving the optimization problem requires evaluating the utility function in (1) for each possible combination of husband's hours, wife's hours and welfare program participation and choosing the state that yields the highest utility.

In order to empirically implement the model, we need to specify the nature of heterogeneity in household preferences and the stochastic disturbances. Heterogeneity in preferences for leisure, and welfare is introduced as

$$\beta_i = \sum_{k=1}^{K_x} \beta_{i,k} x_{i,k} + \theta_i \qquad i = hus,\ wife \tag{4a}$$

[11] In addition to the general deductions (see Section III) that everyone is entitled to and which depend on income, deductions can also be made for other reasons such as: business expenses, retirement insurance and payment of periodical support.

(4b) $$\beta_{hussq} = \sum_{k=1}^{K_x} \beta_{hussq,k} x_{i,k} + \theta_{hussq}$$

(4c) $$\beta_{wifesq} = \sum_{k=1}^{K_x} \beta_{wifesq,k} x_{i,k} + \theta_{wifesq}$$

(4d) $$\phi_p = \sum_{k=1}^{K_z} \beta_{p,k} z_k + \theta_p \qquad p = SA,\ HA$$

where the elements of the vectors *x* and *z* are observed individual and family characteristics, such as age and education of both spouses, and the number and ages of children. K_x and K_z denote the dimensions of the vectors *x* and *z*, respectively, while the θ's represent unobserved variables that affect preferences for leisure and welfare.

It is reasonable to assume that an important source for population heterogeneity in terms of preferences for leisure and welfare is unobserved. In order to account for this, we formulate a finite mixture model, which allows for unobserved heterogeneity in a flexible way without imposing a parametric structure. This way of representing unobserved heterogeneity is similar to what Heckman and Singer (1984) suggested for duration data models. We assume that there exist *M* different sets of θ, $\{\theta_{hus}, \theta_{hussq}, \theta_{wife}, \theta_{wifesq}, \theta_{SA}, \theta_{HA}\}$, that determine a family's preferences, each observed with probability π_m (where $\pi_m > 0$ and $\Sigma\pi_m = 1$, *m=1,…,M*). This specification allows for arbitrary correlations between the husband's and wife's work effort as well as between each spouse's work effort and preference for welfare participation.

To make the model estimable, additional random disturbances are added to the utilities of all choice opportunities:

(5) $$U_{j,j',r} = U(NI_{j,j'}, LHUS_j, LWIFE_{j'}) + \varepsilon_{j,j',r}$$

where *j (= 1,…,J)* represents the husband's choice of labor supply, *j' (= 1,…,J)* represents the wife's choice of labor supply, and *r (=1,…,4)* represents the household's welfare participation state, and $U_{j,j',r}$ denotes the household utility of choice *(j,j',r)*. We assume that $\varepsilon_{j,j',r}$ follows a type I extreme value distribution with cumulative density $\Pr(\varepsilon_{j,j',r} < \varepsilon) = \exp(-\exp(-\varepsilon))$. The error term $\varepsilon_{j,j',r}$ can be interpreted

as an unobserved alternative specific utility component or as an error in a household's assessment of the utility associated with choosing the work-welfare combination *(j,j',r)* (optimization error). Thus, it has a different interpretation compared to the θ´s introduced above which represents unobserved preferences for leisure and welfare. Given the distributional assumption of the error term in the utility function, the contribution to the likelihood function for a given household is

$$l = \sum_{m=1}^{M} \pi_m \left\{ \sum_{r=1}^{4} \sum_{j=1}^{J} \sum_{j'=1}^{J} (p \mid \Theta)_{j,j',r} \right\} \delta_{j,j',r}$$

(6) *where*

$$(p \mid \Theta)_{j,j',r} = \frac{\exp(U_{j,j',r} \mid \Theta)}{\sum_{s=1}^{4} \sum_{t=1}^{J} \sum_{w=1}^{J} \exp(U_{t,w,s} \mid \Theta)}$$

where $\Theta = \{\theta_{hus}, \theta_{hussq}, \theta_{wife}, \theta_{wifesq}, \theta_{SA}, \theta_{HA}\}$ and $\delta_{j,j',r}$ is an indicator for the observed state for each household. This expression simply denotes the probability that the utility in state *(j,j',r)* is the highest amongst all possible work-welfare combinations, conditional on unobserved preferences.

The discrete state labor supply model requires a rule for mapping a continuum of hours of work into a finite number of classes. There is no obvious way of transforming continuous hours into discrete categories and the results may be sensitive to the rule used to assign the discrete states.[12] In this paper, we try to limit the possibility of aggregation error in hours of work by using a multiplicative classification error specification, following MaCurdy et al (1990) and Hoynes (1996).[13] Let H_{hus} and H_{wife} denote reported hours and h_{hus} and h_{wife} optimal (discrete) hours. The multiplicative classification error specification is given as

[12] This may be especially true for women as the distribution of hours of work for this group show a considerably higher variance than the corresponding distribution for men.

[13] van Soest (1995), Hoynes (1996) and Gong and van Soest (2002) all find that their main results are insensitive regarding the number of classes. Moreover, Flood and Islam (2003) provide a detailed analysis of the sensitivity regarding the mapping of continuous hours into a finite number of discrete classes. Their findings suggest that there are only minor changes in the estimated parameters if more than 7 classes are used.

(7) $H_i = h_i \exp(\eta_i)$ with $\eta_i \sim N\left(-\frac{1}{2}\sigma_i^2, \sigma_i^2\right)$ for *i=hus, wife*

This design for the classification error implies that zero hours are observed with certainty, but when optimal hours are positive, they differ from reported hours by a factor of proportionality. As discussed in Hoynes (1996), this is not a measurement error in the traditional sense. Instead, this error measures the difference between reported hours and the discrete representation of annual hours (that is, H_i - $h_{j,i}$ for the husband*)*. Thus, it can be regarded as a "within group" error and it essentially serves as a weighting variable, giving more weight to groups where this "within group" error is small.

The assumptions presented in (7) above implies that the density functions for the "within group" errors are

(8) $$g_{j,i} = \begin{cases} 1 \ \textit{if} \ H_i = 0 \ \textit{or} \ h_{j,i} = 0 \\ \textit{else} \\ \frac{1}{\sigma_i}\phi\left(\frac{\left[\log(H_i) - \log(h_{j,i})\right] + \frac{1}{2}\sigma_i^2}{\sigma_i}\right) \end{cases} \quad \text{for } i = \textit{hus, wife}$$

In presence of unobserved heterogeneity and "within group" errors, the contribution to the likelihood function for a given household is represented by

(9) $$l = \sum_{m=1}^{M} \pi_m \left\{ \sum_{r=1}^{4} \sum_{j=1}^{J} \sum_{j'=1}^{J} (p \mid \Theta)_{j,j',r} \, g_{j,hus} \, g_{j',wife} \right\} \delta_{j,j',r}$$

where $g_{j,i}$ are as defined in equation (8) above.

V. Data

A. Description of the Data and Sampling Procedures

The data used in this paper is taken from the Swedish *Income Distribution Survey (HINK)*. This is an annual survey conducted by Statistics Sweden and it contains information on labor market activities, demographic characteristics and incomes for a random sample of Swedish individuals. Information is also collected for their

household members. The survey was initiated in 1975, the second survey took place in 1978 and since 1980, Statistics Sweden has conducted annual surveys. Each survey is cross-sectional representative of the population and in this paper we pool data from the 1993 and 1999 surveys. The reason for choosing these two surveys is that they represent times of recession (1993) and economic growth (1999). Another reason is that this provides us with data from before and after the changes in the social assistance benefit rules.

Information on individuals and households are obtained from three sources: various government registers, a phone interview and income tax returns. Data on incomes, wages, transfers, taxes, wealth and educational attainments are collected from different government registers whereas information on capital gains or losses is obtained from income tax returns. During the phone interviews, respondents are asked about individual and family characteristics, such as marital status, age and number of children, labor supply, child care expenses and cost of living. We have supplemented the information in the surveys with data from the Swedish municipalities who provided information on social assistance benefit levels. As mentioned above, in 1993, the levels depended on the municipality in which the household resides, as well as on the family composition, such as marital status, age and number of children. In 1999, the benefit levels depended only on family composition and not on geographical location.

The estimation sample includes families that satisfy the following selection criteria: (i) family contains a married or cohabitant couple with at least one child less than 18 in the household, (ii) family has no taxable wealth, (iii) the household's non-labor income is less than the social assistance benefit level, and (iv) both parents must be less than 56 years old. In addition to these selections, we also excluded families where one or both parents were either full-time students, retired or self-employed. The reason for these sample selections is that it retains families who, apart from their labor income, are eligible for both social assistance and housing allowance.

B. Variable Definitions

As mentioned above, income information in *HINK* is obtained from administrative records with precise information on earnings and non-labor income. The wage data

come from the Official Statistics on Wages produced by Statistics Sweden, which are based on employers' reports of individual wages.[14] These data have the advantage over the usual self-reported wage data of being free from recall error. The wage data cover all employed persons in the public sector and parts of the private sector. For the private sector, Statistics Sweden took a random sample of firms and collected wages for workers in the selected firms. To account for missing wages among nonworkers, log wage equations for the husband and wife are estimated accounting for potential sample selection bias. In order to be consistent regarding the stochastic specification, the wage equation estimates are used to predict wages for both workers and nonworkers.[15]

Non-labor income includes income from capital gains, child allowance and child support payments. Unemployment benefits and other transfers that depend on labor supply are excluded from our measure of non-labor income. We allow the general deductions that depend on labor supply, as shown in Table 1, to vary with hours of work. Other income-dependent deductions, such as contributions to retirement savings plans, have been excluded.

To generate net income for different combinations of hours of work, we use a micro simulation model (FASIT).[16] The micro simulation model contains very precise information on income tax rules as well as on eligibility rules for a number of welfare programs, such as social assistance and housing allowance. In addition, FASIT also enables us to calculate the child-care costs for every combination of hours of work. Access to a simulation model such as FASIT is essential in order to calculate accurate (net) incomes for a given household, conditional on labor supply, as the income tax system and the benefit levels for different welfare programs are complicated functions of earnings and non-labor income.

[14] The employers reported monthly earnings information. The earnings figures are expressed in full-time equivalents and give the amount the individual would have earned had he or she worked full time. To obtain full time equivalent hourly wage rates, the monthly earnings are divided by 165.
[15] Using predicted wages for both workers and nonworkers implies that the budget set is not perfectly observed. An alternative is to use observed wages for workers and predicted wages for nonworkers. However, this may produce bias in the estimates as this could introduce spurious differences in wage distributions across the two groups.
[16] FASIT is used and developed by Statistics Sweden and the Swedish Ministry of Finance. A similar microsimulation model exists for the U.K. (TAXBEN).

Information on labor supply is obtained during the phone interview. Respondents are asked about hours of work, for each month, including overtime. This definition is consistent with the earnings information provided by the employer. Regarding welfare participation, there is register information on the number of months a household received social assistance (as well as the amount received) in *HINK*.[17] However, we are not able to determine which month(s) a household received the benefits. This implies that we are not able to use monthly data in the analysis. Instead we have to aggregate all information to an annual basis.[18] Thus, a household was defined as a social assistance recipient if it received some assistance for at least one month during the year. Most of the social assistance households received benefits for a short period. Of all the social assistance recipients, about 50 percent received it for three months or less and about 20 percent for more than seven months. There is also register information on the amount of housing allowance each household received in a given year. We created binary variables (d_{SA} and d_{HA}) indicating participation status in social assistance and housing allowance, respectively.

The variables that are included in the x and z vectors (which determine observed heterogeneity in distaste for work and welfare) are: age, education of the husband and the wife, where education is measured by two dummy variables describing the highest grade completed (high school and college/university), number of children, a dummy variable for youngest child less than 3 years old, a dummy variable for youngest child aged 3 to 6, a dummy variable indicating the immigrant status of the household (a household is defined to be an immigrant household if the husband and/or the wife was born abroad), a dummy variable that equals one if the household resides in any of the three largest cities in Sweden (Stockholm, Goteborg, Malmo) and finally a time dummy variable which equals one for 1999.

[17] Having access to register data on welfare participation is a great advantage compared to interview data as there is no under-reporting of welfare participation in register data.

[18] Using annual data implies that we are not measuring social assistance eligibility correctly since current, and not annual, income determines assistance receipt. In the data, we find that 2.9 percent of the households received social assistance even if they were not entitled to the benefits according to the benefit rules. We also find that 1.1 percent of the families were entitled to assistance but did not receive any benefits.

C. Descriptive Statistics

Table 2 shows descriptive statistics for the sample used in this study by welfare participation status. All wage and benefit variables are measured in 1999 SEK using the consumer price index to adjust the 1993 values. Of the total 3,297 families, 25 (0.76%) received social assistance only, 300 (9,1%) received housing allowance only, while 134 (4.06%) received both social assistance and housing allowance. Households receiving any of the welfare programs considered in this paper are younger, less educated and work less than those not receiving social assistance or housing allowance. The hourly wage rate is also lower among welfare recipients. Moreover, families receiving welfare have more children and are to a greater extent defined as immigrant households. The average amount of assistance or allowance received, among participants, is SEK 14,712 per year for social assistance and SEK 10,176 per year for housing allowance. For families that receive both social assistance and housing allowance, the average amounts are SEK 52,820 per year for social assistance and SEK 21,600 per year for housing allowance.

VI. Results

A. Structural Estimates

The estimated parameters of the structural model associated with observable characteristics are presented in Table 3. Before discussing the implications of these estimates, it is worthwhile noting that the utility function – evaluated at these estimates and at observed hours of work and disposable income - fulfills the conditions for quasi-concavity for virtually all households (the condition was rejected for only 22 households out of 3,297). Since there is a fair amount of variation in both hours of work and disposable income, this suggests that the utility function is concave over a large region. Given that the estimated utility function satisfies the theoretical requirements, we can use it for predictions and simulations.

The first two columns in Table 3 present results that refer to the disutility associated with social assistance participation (column one) and with receiving housing allowance (column two). In both cases, a positive sign of a coefficient implies that the disutility of participation in a particular welfare program is increasing in that variable since both ϕ_{SA} and ϕ_{HA} enters negatively in the utility function. The estimates suggest

that the disutility of both welfare programs increase with age (at a decreasing rate) and education, decrease with number of children and is lower among immigrant households.

Because of the non-linear nature of the model with respect to labor supply, the magnitudes of the coefficient estimates provide little information about the size of the effects of the observable characteristics. Therefore, instead of discussing the coefficient estimates that are reported in columns three to six in Table 3, we present the percentage changes in hours of work associated with changes in observed characteristics for a representative (using the modes of observable characteristics) husband and wife, respectively. The results are shown in Table 4. For husbands, the effects of number of children, education and region of living (rural versus urban area) on labor supply are small (the percentage changes range from 0.01 to 0.04 in absolute terms). The largest labor supply responses are associated with changes in: immigrant status, where the estimates imply less hours worked for men in immigrant households; time, the estimates suggest that hours of work is less in 1999 compared to 1993; and finally for age, where hours worked increase with age. For wives, the effects of all observable variables are larger in absolute terms, and hours of work is negatively associated with number of children and immigrant status, and positively associated with education, region of living, time, and age. Overall, the signs and the magnitudes of these effects on labor supply are as expected.

The estimates of the distribution of the unobserved heterogeneity components are shown in Table 5. Since the unobserved heterogeneity enters both in β_{hus} and β_{hussq} (as well as in β_{wife} and β_{wifesq}) it is not obvious which types have strong preferences for leisure and which types do not. To illustrate the variation in hours of work and in welfare participation due to unobserved heterogeneity, we obtained type specific predictions of hours of work and participation in SA and HA. That is, we first assumed that every household in the sample has the unobserved preference structure of type 1 families and predicted outcomes based on this. This was repeated for all six types and the results, along with type specific rankings are shown in Table 6. The entries in this table show that in households of type 1, which comprise about 50 percent of the sample, both husbands and wives have strong preferences for work

(predicted hours of work ranks second for both husbands and wives). This household type also receives a strong disutility from participation in either SA or HA, indicated by the low predicted participation rates in each program for this family type. The second household type shows families where the husband has weak preferences for work while the wife has strong preferences for work, while the opposite holds for type 3 families. In type 4 and type 6 families, both spouses have weak preferences for work while in type 5 households only the wife has weak preferences for work. The household type that appears most likely to participate in SA and/or HA is type 4 (ranked first in both SA and HA), followed by type 5 and type 2.

The specification used for the distribution of unobserved heterogeneity allows for unrestricted correlations between the unobserved preferences for work for the husband (determined by both θ_{hus} and θ_{hussq}), for the wife (determined by θ_{wife} and θ_{wifesq}) as well as for the household's preferences for welfare participation (θ_{SA} and θ_{HA}). The empirical correlation coefficient between the husband's and wife's unobserved preference for work is -0.05. This suggests that, holding observable characteristics constant, higher work effort for the husband is associated with lower work effort for the wife. Regarding the correlation between the unobserved elements of work effort and welfare participation, the results indicate strong negative correlations both for husbands and wives. For husbands, the empirical correlation coefficient between work effort and participation in SA is -0.68 and it is -0.52 between work effort and participation in HA. For wives, the corresponding figures are -0.51 and -0.58, respectively. Negative correlations between work effort and welfare participation was also found by Hoynes (1996) and suggest existence of self-selection into welfare programs.

B. Model Fit

A common problem in many labor supply studies is the poor ability to fit the observed distribution of hours of work. One option to improve the ability of the estimated model to mimic the observed frequencies of hours of work is to try to control for unobserved fixed costs of work (e.g. Kapteyn et al (1990) and van Soest (1995)). Alternatively, we can specify a flexible model with respect to unobserved heterogeneity, which may to some extent represent unobserved fixed costs of work as

well as unobserved preferences for leisure, to improve the model fit. This is the approach taken in this paper and, as can be seen in Table 7, the predicted distribution of hours is quite similar to the observed distribution, both for men and women.

C. Elasticities

The effects of wage changes are assessed using simulations. Specifically, wages were increased by 10 percent for everyone in the sample and the resulting changes in predicted working hours were calculated. The results imply that working hours are quite insensitive to wage changes, especially for males. For instance, a 10 percent wage increase for husbands, holding everything else constant, is associated with an average increase in hours of work equal to 0.5 percent. For women, the corresponding labor supply response is an increase by one percent. A wage inelastic labor supply for men is not uncommon in the literature, regardless of model specification and data source. The entries in Table 8 show estimated uncompensated wage elasticities obtained using structural household labor supply models and they range from -0.04 to 0.15. Thus, our results for husbands are quite similar to those found previously in the literature. For women, the existing literature shows more variation in terms of the labor supply response to wage changes. In Table 9, we summarize the results from a selection of such studies, again focusing on structural household labor supply models. The estimated elasticities range from 0 to 1.03, depending on model specification and data source, and our results for women are generally lower than most of the existing results.

D. Policy Simulations

To illustrate the effects on labor supply of changes in income taxes and in benefit rules for both social assistance and housing allowance, we performed a simple simulation experiment. In Sweden, as well as in many other countries, there is a concern about the high implicit marginal tax rates of an increase in working hours for low-income families. These effects are mainly due to the existence of a relatively high income tax rate on low earnings combined with a high implicit tax on welfare benefits. To investigate the labor supply effects of a reduction of these strong work disincentive effects for low-income families, we used our estimates to predict hours of work during the current tax and transfer system as well as during a modified system. Specifically, we increased the general deductions from SEK 11,000 to SEK 68,800 in

1993 and from SEK 8,500 to SEK 72,800 in 1999, which substantially lowers income taxes for low-income families. We also reduced the benefit levels for both SA and HA with 25 percent as an additional labor supply incentive.

As a result of the suggested tax and benefit changes, working hours increase on average with 1.1 percent for wives and with 0.3 percent for husbands. Further, disposable or net income increase with almost 12 percent and income tax revenues decrease with 28 percent. As expected, the policy change has a dramatic effect on government spending on both social assistance (a reduction with 44%) and housing allowance (a reduction with 28%) but the effects on participation in these programs are limited. Despite the strong reduction in income tax rates and the substantially reduced welfare benefit levels, the average effects on labor supply are quite small. This demonstrates the difficulties associated with financing any reform that implies a large reduction in income taxes.[19] In fact only 0.6 percent of the husbands and 2.0 percent of the wives change their working hours in response to the policy change. This is a natural consequence of the discrete approach to modeling labor supply where the dominating prediction is no change in working hours.

A more detailed presentation of the changes in labor supply, disposable income and income taxes for the whole sample is given in Table 10. This table also shows the welfare effects of the reform. We chose equivalent variation (EV) as our money metrics of a welfare change. EV is measured as the amount of money added or subtracted from the households' disposable income under the initial tax rules in order to make the household indifferent between the initial and the alternative tax system. As such, EV summarizes the household's net welfare change associated with behavioral responses.

The average EV for the whole sample is SEK 36,169. However, there is a substantial variation across households. Table 10 lists EV for different levels of pre-reform disposable income. All EV-values are non-negative, which suggests that there are

[19] Obviously, our simulation ignores many of side-effects of the policy change. For instance, there is a relatively high sales tax in Sweden (varying between 12.5% and 25% depending on the good) and this combined with an expected low savings ratio (our sample consists of households with young children and no wealth) suggests that a large fraction of the increase in net income would eventually be taxed

welfare gains for everyone from the tax and transfer change. However, there are dramatic differences in EV depending on the level of pre-reform household income. The estimated average EV for the poorest 10 percent is SEK 11,345 per year compared to SEK 57,195 per year for the richest 10 percent.

As mentioned above, the average effects of the tax reduction on working hours were relatively small. However, this does not imply that the effects for all income groups are small. Table 10 presents the predicted changes in working hours for different pre-reform income groups. The results suggest a relatively strong increase in both the wife's and the husband's hours of work (8 percent and 3 percent, respectively) among low-income households. However, and as expected, among the richest 10 percent there are virtually no changes in labor supply.

To summarize, a reduction in income taxes and welfare benefits has considerable welfare effects and the difference in these effects between poor and rich households is substantial. The effect on working hours is, however, quite small and the policy change is associated with a sharp decline in income tax revenues.

E. Results from Alternative Specifications

This sub-section examines the robustness of our results to different model assumptions as well as to a different definition of social assistance participation. Regarding alternative model specifications, we consider a naïve model with no unobserved heterogeneity or welfare stigma, a model with no observable characteristics affecting β_{hussq}, β_{wifesq}, ϕ_{SA} and ϕ_{HA}, and finally a model where we include observed and unobserved heterogeneity in β_{NI} instead of in β_{hussq} and β_{wifesq}. To assess the effects of wage changes on labor supply, we again increased wages by 10 percent and the resulting changes in predicted working hours were calculated. For husbands, we find that a 10 percent wage increase is associated with increases in hours of work ranging from 0.1 percent to 0.4 percent, depending on model specification, which should be compared to 0.5 percent obtained in our preferred specification. For women, the corresponding labor supply responses using the

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indirectly through the consumption taxes. Moreover, the reduced expenditures on social assistance and housing allowance, would also help financing the tax and benefit changes.

alternative specifications range from 1.2 percent to 2.5 percent, somewhat higher than the 1 percent reported above.

In another attempt to explore the robustness of our results, we re-estimated the model presented in Section IV using a different definition of social assistance participation. In the above analysis, a household is recorded as social assistance participants if it received social assistance for at least one month during the year. This definition is arguably ad-hoc, and to verify that our results are not driven by our assignment rule for social assistance participation, we re-estimated the model but with the difference that households are recorded as participants in social assistance only if they received payments for at least *four* months during the year. The labor supply effects from wage changes using this new definition on social assistance are similar to the ones reported above, with an increase in husbands and wives hours of work with 0.4 percent and 0.7 percent, respectively. Overall, we find that the results and model implications are quite robust towards both changes in model specification and to alternative variable definitions.

VII. Conclusions

In this paper, we used a sample of Swedish households with detailed and unique information on incomes and benefits and estimated a structural household labor supply model. We formulated a model where labor supply and participation in two welfare programs (social assistance and housing allowance) were jointly determined. Further, the labor supply and welfare participation decisions were treated as a discrete choice problem, and we assumed that these choices follow a simple conditional logit rule. We used a micro simulation model that incorporates many details of existing tax and government transfer system to calculate disposable income for different work-welfare combinations. In addition, we allowed for unobserved individual-specific effects and for the possibility that these effects are correlated across alternatives. Classification errors in hours of work were allowed for by using a multiplicative classification error specification. The estimates from the structural model yielded small wage elasticities, both for husbands and wives. The result for men is similar to what earlier studies have reported, while our result for women is generally lower. We also performed a simple simulation experiment where we changed both the income

tax structure and the benefit rules for social assistance and housing allowance. The results from the policy simulation indicate that reducing income taxes significantly for low-income families along with a substantial reduction of maximum welfare benefit levels generate substantial welfare effects. Using equivalent variation (EV) as our measure of the welfare effect associated with the tax and welfare change, we find that there are welfare gains for everyone from the tax and transfer change. However, there are dramatic differences in EV depending on the level of pre-reform household income. The estimated average EV for the poorest 10 percent is SEK 11,345 per year compared to SEK 57,195 per year for the richest 10 percent.

References

Andren, T., 2003, "The Choice of Paid Childcare, Welfare, and Labor Supply of Single Mothers," Labour Economics 10, 133-147.

Blank, R. M., 2002, "Evaluating Welfare Reform in the United States," Journal of Economic Literature 40, 1105-1166.

Blundell, R., A. Duncan, J. MacCrae, and C. Meghir, 1999, "Household Labour Supply, Childcare Costs and Tax Credits," Presented at the workshop "The Economics of Childcare," held at IZA in November 1999.

Blundell, R. and T. MaCurdy, 1999, "Labor Supply: A Review of Alternative Approaches," in *Handbook of Labor Economics, Vol. 3*, eds. Ashenfelter, O. and D. Card, North-Holland, 1559-1694.

Blundell, R. and I. Walker, 1986, "A Life-Cycle Consistent Empirical Model of Family Labour Supply Using Cross-Section Data," Review of Economic Studies 53, 539-558.

Bonin, H., W. Kempe, and H. Schneider, 2002, Household Labor Supply Effects of Low-Wage Subsidies in Germany," IZA Discussion Paper No. 637, Institute for the Study of Labor (IZA), Bonn, Germany.

Flood, L. and M. Islam, 2003, "Continuous or Discrete Dependent Variable? A Monte Carlo Comparison of Two Approaches," Working Paper, Department of Economics, Göteborg University, Sweden.

Flood, L., E. Pylkkanen, and R. Wahlberg, 2003, "Labor Supply and Welfare Participation of Single Mothers in Sweden," Working Paper, Department of Economics, Göteborg University, Sweden.

Gong, X. and A. van Soest, 2002, "Family Structure and Female Labor Supply in Mexico City, Journal of Human Resources 37, 163-191.

Hagstrom, P. A., 1996, "The Food Stamp Participation and Labor Supply of Married Couples," Journal of Human Resources 31, 383-403.

Hausman, J., 1985, "The Econometrics of Nonlinear Budget Sets," Econometrica 53, 1255-82.

Hausman, J. and P. Ruud, 1984, "Family Labor Supply with Taxes," American Economic Review 74, 242-248.

Heckman, J. and B. L. Singer, 1984, "A method for minimizing the distributional assumptions in econometric models for duration data," Econometrica 52, 271-320.

Hoynes, H. W., 1996, "Welfare Transfers in Two-Parent Families: Labor Supply and Welfare Participation under AFDC-UP," Econometrica 64, 295-332.

Kapteyn, A., P. Kooreman, and A. Van Soest, 1990, "Quantity Rationing and Concavity in a Flexible Household Labor Supply Model," Review of Economics and Statistics 70, 55-62.

Keane, M. and R. Moffitt, 1999, "A Structural Model of Multiple Welfare Program Participation and Labor Supply," International Economic Review 39, 553-589.

MaCurdy, T., D. Green, and H. Paarsch, 1990, "Assessing empirical approaches for analyzing taxes and labor supply," Journal of Human Resources 25, 415-490.

Levy, F., 1979, "The Labor Supply of Female Household Heads, or AFDC Work Incentives Don't Work Too Well," Journal of Human Resources 14, 76-97.

Moffitt, R., 1983, "An Economic Model of Welfare Stigma," American Economic Review 73, 1023-1035.

Moffitt, R., 1986, ”Work Incentives in the AFDC System: An Analysis of the 1981 Reforms,” American Economic Review 76, 219-23.

Moffitt, R., 1992, “Incentive Effects of the U.S. Welfare System: A Review,” Journal of Economic Literature 30, 1-61.

Ransom, M.R., 1987, “An Empirical Model of Discrete and Continuous Choice in Family Labor Supply,” Review of Economics and Statistics 69, 465-72.

van Soest, A., 1995, “Structural Models of Family Labor Supply,” Journal of Human Resources 30, 63-88.

van Soest, A., and M. Das, 2000, ”Family Labor Supply and Proposed Tax Reforms in the Netherlands”, Working Paper, Tilburg University, The Netherlands.

Table 1. Description of the Swedish Income Tax System in 1993 and 1999.

Income Levels	General Deductions	Marginal Tax Rate (%)
1993:		
- 10,900	All Income	0
11,000-64,000	11,000	30
64,100-99,500	11,000+0.25*(Income-64,100)	22.5
99,600-104,500	19,875	30
104,600-193,000	19,875-0.1*(Income-104,600)	33
193,100-201,500	11,000	30
201,600-	11,000	50
1999:		
-8,500	All Income	0
8,600-67,500	8,500	30
67,600-105,500	8,500+0.25*(Income-67,600)	22.5
105,600-110,500	20,200	30
110,600-203,500	20,200-0.1*(Income-110,600)	33
203,600-227,000	8,500	30
227,000-368,500	8,500	50
368,600-	8,500	55

Note: The marginal tax rate is calculated assuming a local (municipal) tax rate of 30%.

Table 2. Sample Statistics by Welfare Status (N = 3,297).

	No Welfare		Only SA		Only HA		SA and HA	
Variables	**Mean**	**Std**	**Mean**	**Std**	**Mean**	**Std**	**Mean**	**Std**
Percent of Observations	86.1%		0.76%		9.10%		4.06%	
Husband:								
Age	39	7	36	7	36	8	36	9
Education (highest attained):								
-Primary school (1=Yes)	0.19	0.39	0.40	0.50	0.34	0.47	0.43	0.50
-High school (1=Yes)	0.64	0.48	0.56	0.51	0.59	0.49	0.49	0.50
-University (1=Yes)	0.18	0.38	0.04	0.20	0.07	0.26	0.09	0.29
Working hours per year	1,992	475	1265	967	1,748	700	735	859
Working (1=Yes)	0.97	0.17	0.80	0.41	0.92	0.27	0.54	0.50
Wage/hour	120	30	109	27	97	24	105	32
Wife:								
Age	37	7	33	7	33	7	32	7
Education (highest attained):								
-Primary school (1=Yes)	0.15	0.36	0.28	0.46	0.32	0.47	0.55	0.50
-High school (1=Yes)	0.69	0.46	0.72	0.46	0.64	0.48	0.42	0.50
-University (1=Yes)	0.16	0.37	0	0	0.04	0.19	0.03	0.17
Working hours per year	1,539	651	1,049	962	1,099	804	503	749
Working (1=Yes)	0.93	0.26	0.68	0.48	0.77	0.42	0.42	0.50
Wage/hour	92	14	85	10	80	10	79	13
Household:								
Number of children	1.81	0.78	2.00	1.00	2.30	0.91	2.28	1.20
Urban region (1=Yes)	0.37	0.48	0.36	0.49	0.29	0.45	0.37	0.48
Year 1999 (1=Yes)	0.45	0.50	0.44	0.51	0.17	0.37	0.43	0.50
Immigrants (1=Yes)	0.13	0.34	0.24	0.44	0.23	0.42	0.63	0.48
Amount of Social Assistance	------	------	14,712	17,037	------	------	52,820	49,432
Amount of Housing Allowance	------	------	------	------	10,176	7,573	21,600	12,182
Total Amount of Welfare	------	------	14,712	17,037	10,176	7,573	74,420	57,456
Number of Observations	2,838		25		300		134	

Note: Obtained from the Swedish Income Distribution Survey (HINK) 1993 and 1999. SA = Social Assistance and HA = Housing Allowance. All amounts are in 1999 SEK.

Table 3. Estimates of a Structural Household Labor Supply Model: Effects of Observed Heterogeneity and of Classification Errors.

Variables	Husbands (β_{hus})	Husbands (β_{hussq})	Wifes (β_{wife})	Wifes (β_{wifesq})	Social Assistance (β_{SA})	Housing Allowance (β_{HA})
Age husband	-1.07 (0.08)	0.25 (0.06)	-	-	-0.04 (0.06)	0.26 (0.02)
Age husband^2 / 100	1.30 (0.13)	-0.27(0.10)	-	-	-0.02 (0.08)	-0.36 (0.03)
Age wife	-	-	-0.84 (0.09)	0.07 (0.07)	0.41 (0.06)	0.16 (0.02)
Age wife^2 / 100	-	-	1.39 (0.17)	-0.44 (0.13)	-0.39 (0.10)	-0.11 (0.03)
High school husband	0.75 (0.52)	-0.85 (0.46)	-	-	0.63 (0.25)	0.52 (0.15)
University husband	2.63 (0.66)	-3.02 (0.65)	-	-	1.10 (0.43)	0.98 (0.26)
High school wife	-	-	3.17 (0.59)	-2.47 (0.44)	0.94 (0.24)	0.63 (0.15)
University wife	-	-	1.04 (0.52)	-1.52 (0.43)	1.89 (0.31)	1.54 (0.32)
No. of Children	-0.90 (0.33)	0.56 (0.27)	0.97 (0.39)	0.20 (0.27)	-0.64 (0.12)	-0.92 (0.08)
Immigrant Household	-3.41 (0.78)	6.05 (0.77)	-4.14 (0.76)	3.68 (0.61)	-2.51 (0.28)	-1.64 (0.15)
Urban Area	-0.27 (0.44)	0.32 (0.37)	0.02 (0.56)	-0.49 (0.42)	0.22 (0.25)	0.29 (0.14)
Year = 1999	0.55 (0.46)	0.05 (0.39)	-1.00 (0.50)	0.29 (0.38)	-0.56 (0.25)	0.94 (0.15)
Classification Error:						
σ_h			0.12 (0.001)			
σ_w			0.24 (0.001)			
Log Likelihood value:			-6,779.29			
Number of Observations:			3,297			

Note: Standard errors appear in parentheses. Data used are from the Swedish Income Distribution Survey (HINK) 1993 and 1999.

Table 4. Percentage Changes in Hours of Work Associated with Changes in Observed Characteristics for a Representative Husband and Wife.

Variable	Husband	Wife
Increase the number of children from two to three	0.04	-3.03
Increase husband's education from high-school to university	0.04	-0.02
Increase wife's education from high-school to university	0.01	2.21
Immigrant household as opposed to a native household	-1.49	-4.45
Living in an urban area as opposed to living in rural areas	0.01	1.38
1999 instead of 1993	-0.26	1.48
Increase husband's age from 36 to 37	0.27	0.04
Increase wife's age from 35 to 36	0.01	0.72

Table 5. Estimates of the Distribution of Unobserved Heterogeneity.

Type (m):	Type probabilities (π_m)	Husband's leisure: (θ_{hus})	Wife's leisure: (θ_{wife})	Husband's leisure^2: (θ_{hussq})	Wife's leisure^2: (θ_{wifesq})	Social Assistance: (θ_{SA})	Housing Allowance: (θ_{HA})
1	0.50	47.74 (0.73)	26.17 (0.61)	-35.05 (0.81)	-9.70 (0.59)	-1.78 (0.28)	-5.48 (0.17)
2	0.05	28.24 (1.69)	23.03 (1.17)	-5.97 (0.90)	-11.64 (1.21)	-5.13 (0.27)	-6.70 (0.26)
3	0.26	50.25 (0.83)	20.71 (1.11)	-49.13 (1.74)	-0.88 (0.62)	10.95 (0.01)	-5.41 (0.23)
4	0.09	26.66 (0.86)	18.74 (1.82)	-8.22 (0.76)	0.07 (0.83)	-5.71 (0.33)	-7.93 (0.27)
6	0.05	32.86 (0.74)	59.21 (0.43)	-18.56 (0.67)	-6.49 (1.17)	-5.06 (0.28)	-7.21 (0.25)
7	0.05	49.53 (0.52)	20.77 (1.32)	-22.04 (0.57)	-6.00 (1.15)	10.33 (0.01)	7.99 (0.01)

Note: Standard errors appear in parentheses. Data used are from the Swedish Income Distribution Survey (HINK) 1993 and 1999.

Table 6. Type Specific Predictions of Hours of Work and Welfare Participation.

Type (m):	Type probabilities (π_m)	Predicted Hours of Work for Husband	Predicted Hours of Work for Wife	Predicted Participation in SA for Household	Predicted Participation in HA for Household
1	0.50	2,170 {2}	1,830 {2}	0 {3}	0.03 {4}
2	0.05	700 {6}	1,910 {1}	0.08 {2}	0.12 {3}
3	0.26	2,190 {1}	1,200 {4}	0 {3}	0.03 {4}
4	0.09	1,520 {5}	1,020 {5}	0.13 {1}	0.32 {1}
6	0.05	2,150 {3}	0 {6}	0.08 {2}	0.21 {2}
7	0.05	1,670 {4}	1,800 {3}	0 {3}	0 {6}

Note: Rankings appear in parentheses.

Table 7. Observed and Predicted Hours of Work Frequencies (Percentages).

Hours Category (h_j):	Husband's Observed Distribution	Husband's Predicted Distribution	Wife's Observed Distribution	Wife's Predicted Distribution
$h_1=0$	5.16	6.67	11.13	15.01
$h_2=500$	1.09	0.45	4.76	2.0
$h_3=1000$	2.49	1.88	4.34	3.61
$h_4=1500$	2.94	1.88	15.59	8.58
$h_5=2000$	6.55	5.91	27.57	44.16
$h_6=2500$	77.37	82.04	36.0	26.6
$h_7=3000$	4.40	1.15	0.61	0.03

Note: Observed fractions equal sample fraction. Predicted fractions obtained using the estimates in Tables 3 and 4.

Table 8. Male Labor Supply Elasticities for Married Males using Household Models

Study:	Age Selection	Data Source	Wage Elasticity
Hausman and Ruud (1984)	21-65	1976 PSID	-0.03
Blundell and Walker (1986)	18-59	1980 FES	0.02
Ransom (1987)	30-50	1977 PSID	-0.04
van Soest (1995)	16-65	1987 SEP	0.15
van Soest and Das (2000)	16-64	1995 SEP	0.08
Bonin et al. (2002)	18-60	2000 GSEP	0.00

Note: PSID=US Panel Study of Income Dynamics, FES = UK Family Expenditure Survey, SEP=Dutch Socio-Economic Panel, GSOEP=German Socio-Economic Panel.

Table 9. Labor Supply Elasticities for Married Females using Household Models

Study:	Age Selection	Data Source	Wage Elasticity
Hausman and Ruud (1984)	21-65	1976 PSID	0.76
Blundell and Walker (1986)	18-59	1980 FES	0.03
Ransom (1987)	30-50	1977 PSID	0.70
van Soest (1995)	16-65	1987 SEP	1.03
van Soest and Das (2000)	16-64	1995 SEP	0.71
Bonin et al. (2002)	18-60	2000 GSEP	0.00

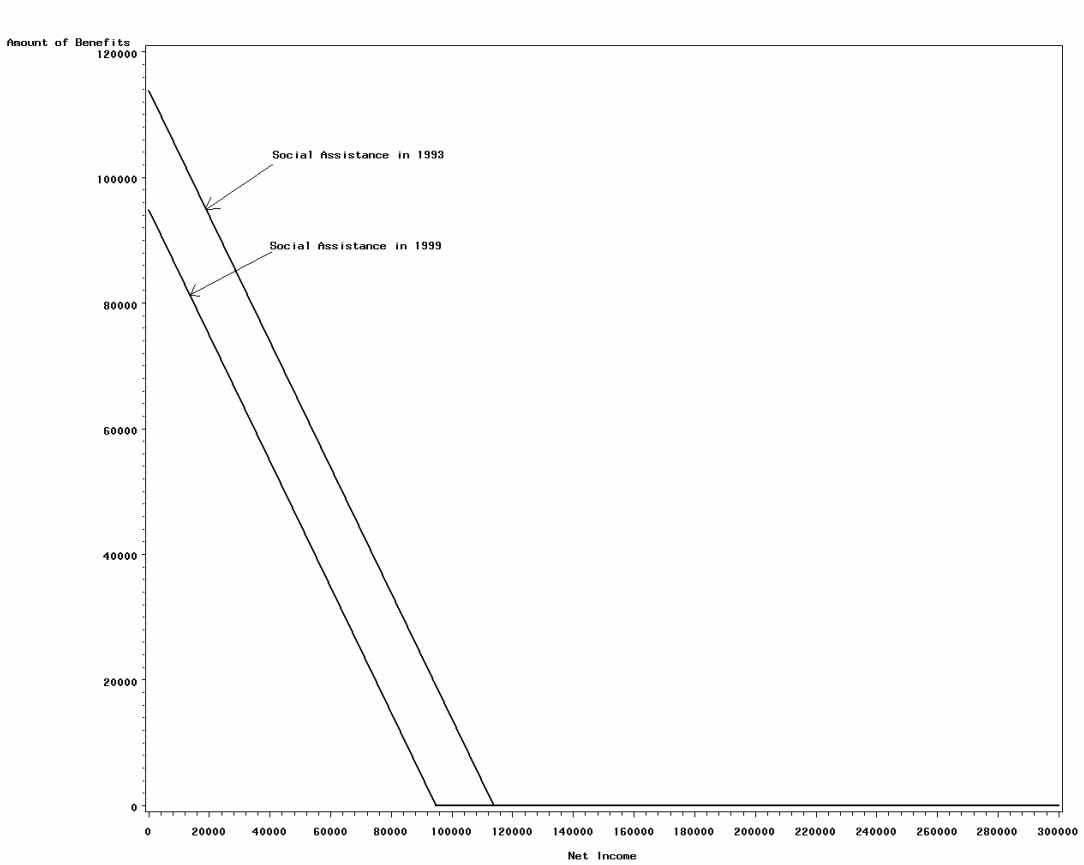
Note: See note for Table 8.

Table 10. Results from a Tax and Transfer Simulation.

	Whole Sample		Poorest 10 percent		Richest 10 percent	
Variable	**Husbands**	**Wives**	**Husbands**	**Wives**	**Husbands**	**Wives**
Working hours before policy change	2,031	1,518	856	493	2,245	2,031
Working hours after policy change	2,038	1,535	883	531	2,245	2,035
Disposable income before policy change	322,787		132,364		564,448	
Disposable income after policy change	360,388		147,536		621,634	
Income taxes paid before policy change	99,840		34,391		218,169	
Income taxes paid after policy change	71,854		19,318		180,095	
Equivalent variation	36,169		11,345		57,195	

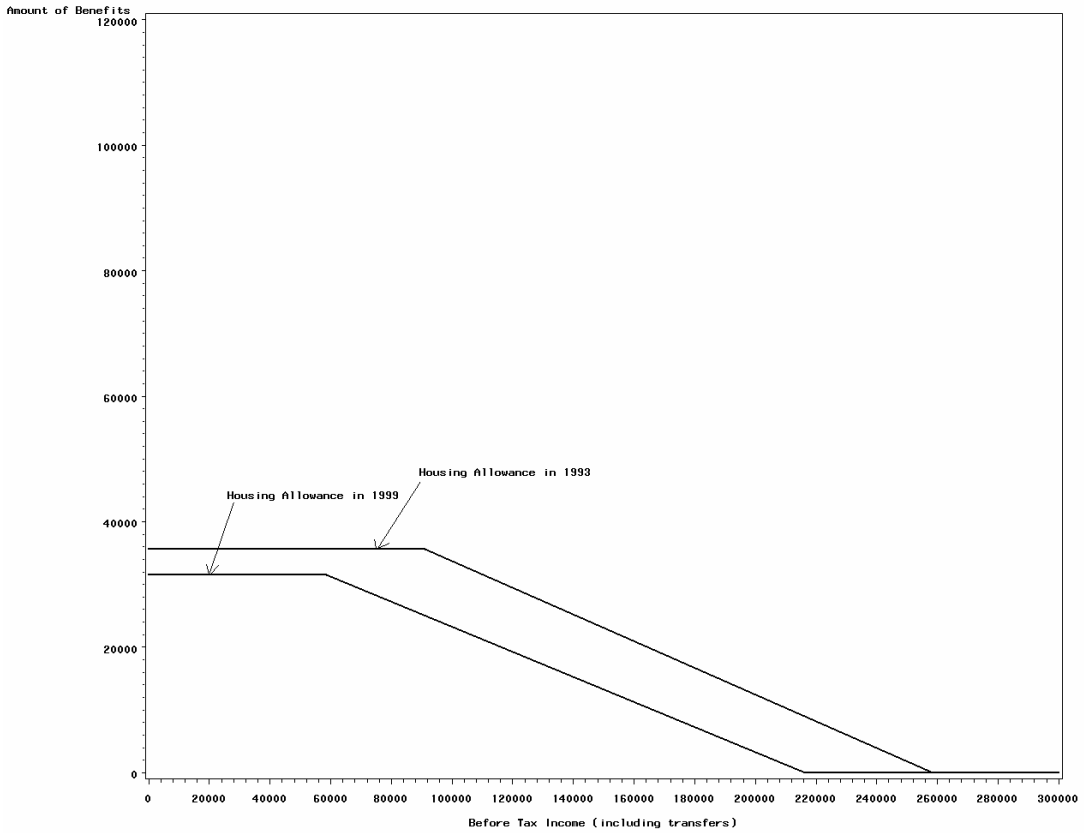
Note: See text for details regarding the policy change. Reported values are averages. The poorest 10 percent are those who belong to the bottom 10 percentiles based on predicted disposable income before the policy change. Similarly, the richest 10 percent are those who belong to the top 10 percentiles based on predicted disposable income before the policy change.

Figure 1. Social Assistance Benefits in Sweden, 1993 and 1999.



Note: The benefits are calculated for a two-parent family with two children, aged 1 and 4, and are expressed in 1999 SEK.

Figure 2. Housing Allowance in Sweden, 1993 and 1999.



Note: Housing allowance is calculated for a two-parent family with two children, aged 1 and 4, using an average housing cost, and is expressed in 1999 SEK.

Figure A1. Income taxes in Sweden 1993.

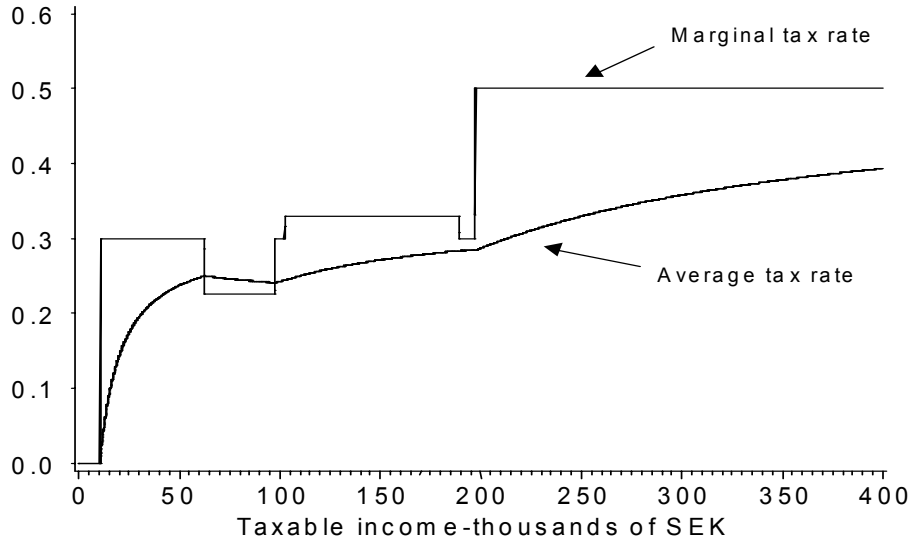
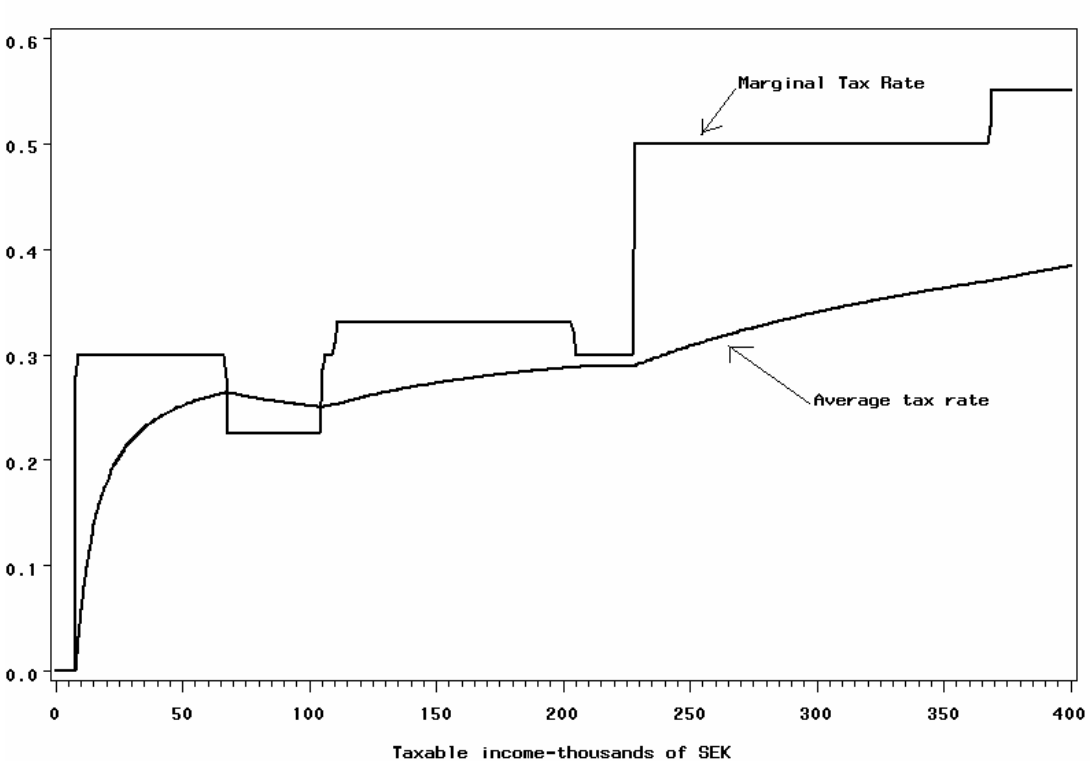


Figure A2. Income taxes in Sweden 1999.



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