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Women's and men's responses to in-work benefits: the influence of children

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Abstract

This study examines how the Swedish earned income tax credit (EITC) introduced in 2007 affected the labor supply of men and women living in two-adult households and the extent to which children in the household affected the outcome. Because the EITC is non-targeted in Sweden, it is difficult to form a meaningful comparison group for a regular ex-post quasi-experimental evaluation of the reform. Therefore, a structural discrete choice labor supply model for two-adult households is formulated and used in an ex ante analysis. In a first step, estimates from the structural labor supply model are used to determine the wage elasticities of the labor supply of men and women separately, both with and without children in the household. Our results correspond to those previously reported in the academic literature: somewhat larger wage elasticities are found for women than for men, while similar labor supply responses are found for men and women when there are no children in the household. In a second step, the labor supply model is used to simulate the labor supply responses to the EITC. Our results indicate that the largest response is on the extensive margin, with an increase in the labor force participation of both men and women. While the labor supply effect on the intensive margin is smaller, it is positive for both men and women working part-time. However, the presence of children affects work hours differently for men and women working part-time or not at all. For men, the percentage change in the work hours was much higher for those living in a household without children, whereas for women, the changes are almost the same for the two types of households.

JEL codes: J21; H24

Keywords: Structural discrete labor supply model, EITC, Younger children, Two-adult households

1 Introduction

A notable trend within OECD countries has been the increasing popularity of "Making Work Pay" policies in the form of an earned income tax credit (EITC) and in-work benefits in general, which are often targeted toward low-income earners and/or families with children (Sørensen, 2010). For example, the EITC introduced in the United States in 1975 aimed to offset the adverse distributional and incentive effects of federal income and payroll taxes on low-income workers. Similarly, the Working Tax Credit (WTC) introduced in the United Kingdom in 2003 is a payment from the state to employed people with low incomes.[1]

In Sweden, the EITC policy was first introduced in 2007 and thereafter expanded annually until 2011. The design and the institutional settings of the EITC in Sweden

deviate to some extent from the tax credits used in other countries. It is a *non-targeted* policy that was designed to provide incentives for working-age individuals outside the labor force to work at least part-time and for part-time workers to increase their hours of work, especially among low-income earners. Compared with international counterparts (e.g., in the US and the UK), the tax burden in Sweden is higher, and the EITC rules are less complex and less difficult to grasp. Furthermore, the Swedish EITC does not include a phase-out bracket in which marginal tax rates are increased.[2] These three aspects suggest that the Swedish EITC may have a greater impact on the labor supply. However, in Sweden, before the introduction of the EITC, labor force participation was already high from an international standpoint, the wage structure was rather compressed, and wage flexibility was relatively low, which pushes in the opposite direction and suggests that the effects of EITC might be smaller. The overall effect of the EITC reform in Sweden is therefore an empirical question that has not been fully settled.

Because the tax credit is non-targeted in Sweden, it is not clear how to form a suitable control group for an analysis based on observational data. In an attempt to evaluate the reform, Edmark et al. (2012) exploited the fact that different people with a given earned income have tax reductions (EITC) that differ in size depending on the municipality in which they live.[3] Because it is more likely to find larger effects on the extensive margin, Edmark et al. (2012) focused their analysis on the employment effects on a group of individuals aged 20–64. The effects were estimated for the entire sample and for married and single individuals separately. From their most preferred specification, they received a significant estimate of a 3.3 percentage point change in employment for the entire group. Their estimates for the different subgroups revealed a somewhat mixed picture, with some negative and some positive estimates. Singles had larger responses then married individuals, and women were more responsive then men. However, their estimated placebo effects were similar in size to the estimated reform effects. Edmark et al. (2012) therefore concluded that the limited variation in the size of the tax deduction among individuals in combination with complex employment trends both before and after the EITC reform(s) presented a major challenge to evaluating the employment effects of the Swedish EITC. Therefore, their overall assessment was that their results could not be credibly interpreted as effects of the EITC.[4] To date, no successful ex-post evaluation of the EITC reform using microdata has been carried out, and therefore, only results from ex ante analyses are available (e.g., Ericson et al., 2009).

In Sweden, as in many other countries, there is an ongoing debate on how to increase the hours of work in the economy. A special focus has been directed towards women because they work fewer hours and have a lower labor force participation rate than men. Because the labor supply of men and women are rather similar at the beginning of their careers, that is, until between ages 30 and 35, family nesting and children seem to affect men and women differently in terms of their labor supply behavior. Many women reduce their labor supply when their children are of preschool age, despite the fact that municipalities are obligated to provide childcare for children aged 1–12 years. This reality tends to be a problem because many women continue to work part-time when their children become older. In particular, with respect to part-time work, there appears to be a state dependence that is initiated for women when children arrive in the household. This behavior is not observed for men.

The objective of this paper is therefore to examine how the EITC affects the individual commitment to work among men and women who live together in a two-adult household and, in particular, the extent to which children in the household affect men's and women's labor supply. Because the Swedish EITC policy is *non-targeted*, it is difficult to evaluate its effects ex post; therefore, we formulate and estimate a structural discrete choice labor supply model ex ante using representative samples of Swedish two-adult households with and without children in 2007, the year when the EITC policy was first introduced.

In a first step, we evaluate our structural model by determining wage elasticities for men and women using the estimated preferences to simulate the response from a one-percent increase in gross hourly wages on worked hours and labor market non-participation. Our results are in line with wage elasticities reported in other studies using Swedish data, which indicates that the wage elasticities differ between men and women in two-adult households. Women increased their labor supply by 0.07 percent regardless of whether they had children, whereas men with and without children in the household increased their labor supply by approximately 0.04 percent and 0.06 percent, respectively.

In a second step, the estimated labor supply preferences are used to simulate the EITC effects on labor supply and disposable income of men and women separately, with and without children in the household. Our simulation of the EITC effect shows a somewhat different picture than that of the wage elasticities, which comes as no surprise because the percentage change in disposable income from the EITC is larger for those with lower wages who work fewer hours. The results show that the effect on the extensive margin dominates the intensive margin for both men and women. Furthermore, the presence of children in the household creates a difference between men and women for those that work part-time or not at all: for households without children, the response is about the same among men and women; however, for households with children, the response of men is about the same as that of men in households without children, while the response of women is about half the response of women in households without children. This finding indicates that children in the household have a clear inhibitory effect on women's labor supply, which makes women with children less responsive to economic incentives, but not on men's labor supply.

The remainder of the paper proceeds as follows. Section 2 provides a short review of the results from the academic literature. In section 3, the empirical model used in the analysis is described. The data are presented in section 4, followed by a discussion of the empirical results in section 5. The paper ends with a concluding section.

2 Earlier literature

The previous academic literature suggests that there are large variations in the labor supply, or working hours, across countries and over time. For example, at the beginning of 2000, Americans worked approximately as much as they did in 1970, whereas Europeans worked almost 50 percent less (Alesina et al., 2006). These differences may be explained by European labor market regulations, which do not appear to have increased employment but instead increased the returns to leisure as more people took longer vacations. These differences may also be explained by the generous social insurance systems in Europe, which, for example, in Sweden, cover absences from work due

to sickness or parental leave, and/or other economic incentives (connected to the tax and transfer systems) that make labor market work less attractive (binding). Therefore, to implement relevant actions to increase work incentives, we must better understand individuals' preferences for work, how they differ among groups, and how tax and benefit reforms actually affect households, their income distribution, and their employment behavior (Altman, 2001). Bargain et al. (2012) attempt to fill this gap by presenting the first large-scale international comparison of labor supply elasticities for 17 European countries and the US by gender and marital status separately. Measurement differences were determined using a harmonized empirical approach (a discrete choice model that accounts for the actual country-specific tax benefit policies that affect household budgets) and comparable data sources (25 representative micro-datasets covering 18 countries and two years of data for 7 countries). The datasets cover a relatively short time period (1998–2005), which facilitates cross-country comparisons. Three results important for welfare analysis are consistent across all countries: 1) the extensive (participation) margin dominates the intensive (hours) margin; 2) except for singles, income elasticities are extremely small; and 3) the results for the cross-wage elasticities of couples are consistent with complementarity in spouses' leisure in the US versus substitution in spouses' household production in Europe.

The wage elasticity estimated using Swedish data from the 1990s and 2000s (Table 8 in the Appendix) varies according to household type, ranging from 0.05 for married/cohabiting men and foreign-born single women to approximately 0.10 for married/cohabiting women and single men and to 0.77 for single mothers. However, Blomquist and Hansson-Brusewitz (1990) suggested that the estimation of the labor market participation response to changes is sensitive to the use of restrictive functional forms and the practice of evaluating female and male wage rate elasticities at different points along the labor supply functions.[5]

Another aspect relevant to our analysis is that most earlier findings suggest that EITC policies have been particularly successful in increasing the labor supply along the extensive margin (i.e., the choice to participate in the labor force) without analyzing or reporting results regarding the intensive margin (number of hours worked). When Saez (2002) modeled labor supply responses along both the intensive and extensive margins, he reported that the optimal transfer program is a classical negative income tax program with substantial guaranteed income support and a large phasing-out tax rate when behavioral responses are concentrated along the intensive margin. When behavioral responses are concentrated along the extensive margin, the optimal transfer program is similar to the EITC, with negative marginal tax rates at low income levels and a small guaranteed income. When the labor supply is flexible only at the extensive margin, an egalitarian society will want to subsidize work at the lower end of the wage distribution by allowing the effective marginal labor income tax rate to be negative for the lowest-paid workers. When in-work benefits are mean tested against household income, perverse incentives to work may exist for individuals in couples in which one spouse already worked. Eissa and Hoynes (2004) documented a perverse negative income effect on the wives of low-income working men in the US, and Blundell et al. (2000) reported strong evidence of negative employment effects in the UK among working wives in low-income families in which both adults work.

Previous studies have reported that the wage elasticity is positive and higher for married women than for married men (see Meghir and Phillips, 2010). In magnitude, wage elasticities are usually smaller for married people than for singles. The same can be said regarding the elasticities related to participation decisions.

Nevertheless, previous studies on differences between men and women in the labor supply responses to EITC for households with and without children are scarce, thus highlighting the relevance of our results.

3 Empirical framework

Our empirical framework is based on Keane and Moffitt's (1998) structural model of multiple welfare program participation and the labor supply, which was used to study the labor supply of single mothers and how it was affected by different types of welfare programs received simultaneously in the US. A similar model was also used to analyze the labor supply of single mothers in Sweden, with a focus on the simultaneous use of paid (municipal) childcare and welfare benefits (Andrén, 2003).

3.1 A labor supply model for a two-adult household

The structural labor supply model in this study consists of a utility function that captures the household's preferences for work and consumption and a budget constraint that represents the household's disposable income. The size of the household's disposable income depends on the choices the adults in the household make in terms of hours of work, given the wage rates of the spouses. A convenient way to model two-adult household preferences is to use a quadratic direct utility function, which, in principle, consists of the sum of two individual utility functions. In its most basic form, the household's utility function has three arguments: hours of work for men (H_m), hours of work for women (H_w), and household disposable income (Y). It is expressed as follows:

$$U(H_m, H_w, Y) = \beta_m H_m + \beta_w H_w + \beta_y Y + +\alpha_m H_m^2 + \alpha_w H_w^2 + \alpha_{my} H_m Y + \alpha_{wy} H_w Y + \alpha_{wm} H_w H_m \tag{1a}$$

The quadratic direct utility function is simple and convenient to use and yet flexible enough to allow for backward-bending labor supply behaviors.[6] The model is discrete because the hours of work for men and women take a finite number of discrete alternatives from which individuals can choose.[7] In this study, seven discrete work hour alternatives per adult household member are used: $H \in \{0, 12, 27, 35, 38, 41, 50\}$.[8]

Some individuals in the sample have unobserved wages (i.e., the individual's labor supply is zero). This constitutes a problem because the estimation method used requires numerical values for all individuals. This situation is often handled by replacing the unobserved wages with predictions based on observable wages (controlling for sample selection).[9] Replacing missing wages with predicted wages has the effect of introducing two distinct distributions of wages depending on whether individuals are observed to be working or not. Ignoring this issue makes the statistical specification of the likelihood function misspecified, as illustrated by MaCurdy et al. (1990). An alternative would be to replace both observed and unobserved wages with predicted wages (e.g., Meghir and Phillips,

2010). This process makes the statistical specification correct, but it causes the budget set to be misspecified for all individuals because it is based on predicted rather than observed wages.

A more interesting approach suggested by van Soest (1995) is to estimate the wage equations simultaneously with the utility function and integrate out the unobserved wages of those who do not work. This method is efficient, leads to a correct stochastic specification for all individuals and allows for the existence of a potential wage penalty due to part-time work. The latter issue is relevant because a significant share of women work part-time.[10]

Another relevant modeling aspect is related to the fact that not all households that are eligible for social assistance are observed as recipients in the data. This means that some households choose not to apply for social assistance, even though the household is entitled to economic support. As a result, some households violate the assumption of utility-maximizing behavior because the utility of a household is assumed to increase with the disposable income. In the economic literature, this behavior is explained by stigma effects associated with the use of social assistance (Moffitt, 1983). To avoid this behavioral inconsistency, a flat component (ϕP_{SA}) is augmented additively to the utility function as follows:

$$U = U(H_m, H_w, Y) + \phi P_{SA}, \tag{1b}$$

where ϕ represents the "stigma" parameter, which is a measure of the stigma effect in terms of (dis)utility associated with social assistance (SA), and P_{SA} represents a binary indicator that shows whether the household is an SA recipient or not. If social assistance is associated with a stigma effect, this coefficient is expected to be negative and significantly different from zero. However, there are several reasons why individuals do not receive social assistance when they are eligible, which means that the estimated stigma parameter should be interpreted with caution.[11]

Another important aspect related to the labor supply is the fixed costs of work. Fixed costs of work refer to transportation costs, childcare costs, and/or any other costs initiated when leaving the state of non-work. It can also refer to costs in terms of utility. This assumption might be questionable, but in Sweden, there is a relatively low variation of these costs across households. Since 2002, a fee schedule cap has kept the costs of childcare relatively low for households.[12] The maximum amount paid by any household was SEK 2,280 (345 USD) per household per month in 2002 (Mörk et al., 2013). We follow van Soest (1995) and control for these costs in terms of utility. Controlling for the fixed costs of work in this way also tends to increase the precision of the labor supply predictions produced by the model compared to the basic model that does not control for fixed costs of work. Using this approach, the utility function is augmented by adding adjustment terms for men and women separately:

$$U = U(H_m, H_w, Y) + \phi P_{SA} + \sum_{g=m,w} \sum_{i=1}^{r} \gamma_{ig} \delta_{ig}, \tag{1c}$$

where δ_{ig} represents an indicator variable for the labor supply alternative i and gender g (i. e., $g \in \{m, w\}$) and γ_{ig} is the corresponding parameter that represents the utility loading associated with a specific labor supply alternative i for the man (m) or the woman (w) in the household. The number of parameters (r) does not need to coincide

with the number of discrete labor supply alternatives per individual in the model and usually takes a lower value. If the effect is associated with a disutility of work, the estimated parameters take negative values and are measured in relative terms to the non-work alternative.

The two-adult household's joint disposable income is determined using the following formula:

$$Y = Y_m + Y_w + B_{SA}(X_{SA})P_{SA} + B_{HA}(X_{HA})P_{HA} - C_{CC}(X_{CC})P_{CC} \quad (2)$$

$$Y_m = H_m w_m + N_m - (t_m - TC_m) \ \text{(Disposable income of the man)} \quad (3)$$

$$Y_w = H_w w_w + N_w - (t_w - TC_w) \ \text{(Disposable income of the woman)} \quad (4)$$

Equations (3) and (4) represent the contributions specific to each adult to the household's disposable income in addition to the common household components included in eq. (2). The disposable income of men and women is determined by the gross wage (w) rate, the weekly hours of work (H) and the non-labor income (N), which could be both taxable and non-taxable. The gross income is reduced by the income tax (t) corresponding to work and taxable non-labor income, which is reduced by the tax credit (TC), the so-called EITC.

The first household component in eq. 2, $B_{SA}(X_{SA})$, is a function of the potential social assistance and contributes to the household's disposable income if the household is observed as a receiver of social assistance ($P_{SA} = 1$).[13] The second component, $B_{HA}(X_{HA})$, is a function of the potential housing allowance if the household receives a housing allowance ($P_{HA} = 1$).[14] The third component, $C_{CC}(X_{CC})$, represents a function of the potential cost of municipal childcare use if the household has younger children and uses municipal childcare ($P_{CC} = 1$).[15]

Observed heterogeneity among individuals and household members is introduced linearly through parameters $\theta_1 = \{\gamma_m, \gamma_w, \delta_m, \delta_w\}$, which are allowed to vary conditionally on a set of variables (Z, X). In order to estimate the parameters of the model, it is necessary to specify a stochastic structure. This is accomplished by allowing the size of the labor supply parameters for men and women in the utility function to vary in terms of unobservables. The structural labor supply model has four endogenous variables specified in the following way:

$$\beta_m = Z_m \gamma_m + \eta_m \ \text{(Labor supply preferences of men)} \quad (5)$$

$$\beta_w = Z_w \gamma_w + \eta_w \ \text{(Labor supply preferences of women)} \quad (6)$$

$$\ln(w_m) = X_m \delta_m + \varepsilon_m \ \text{(Wage equation for men)} \quad (7)$$

$$\ln(w_w) = X_w \delta_w + \varepsilon_w \text{(Wage equation for women)}, \quad (8)$$

where $\theta_2 = (\eta_m, \eta_w, \varepsilon_m, \varepsilon_w)$ captures the unobserved heterogeneity and is assumed to be distributed jointly normal with mean zero and covariance $\Sigma_{\theta 2}$. This design has the advantage of not imposing the assumption of independence from irrelevant alternatives because it allows for correlation among the unobservables. The model is identified by nonlinearities and discontinuities from tax benefit rules and by the distributional assumption made on the unobservables.

3.2 Estimation of the structural labor supply model

Because hours of work are modeled using a discrete variable, the estimation problem can be formulated as a multiple-choice problem. In two-adult households in which each household member has a choice set of seven discrete work hour alternatives, the choice set for each household consists of 49 different alternatives. Let $j = 1, 2, \ldots, 49$ be the discrete alternatives for each household. The problem is to choose the alternative that generates the highest utility for the household. That is, the household chooses alternative j if and only if

$$U_j \geq U_k \text{ for all } k = 1, 2, \ldots, 49, k \neq j, \tag{9}$$

where U_j represents the utility level calculated using eq. (1c) for alternative j, which is obtained by substituting eqs. (2), (3), and (4) into eq. (1c) evaluated for alternative j.

Each household's contribution to the likelihood function is represented by a probability that corresponds to the observed labor supply alternative. We determine the contributing probabilities that correspond to each alternative $P(U_j \geq U_k)$ for all $k = 1, 2, \ldots, 49$, $k \neq j$, and for each household in the sample by using the Kernel-Smoothed Frequency Simulator proposed by McFadden (1989). This simulator is based on the extreme value distribution function, which is used as a kernel for a standard frequency simulator. [16]

Because two-adult households contribute to the likelihood function, four different states are specified based on how many adults in the household work and, therefore, have observable wages: 1) households in which both the man and the woman work ($d_1 = 1$); 2) households in which the man works and the woman does not work (($d_2 = 1$)); 3) households in which the woman works and the man does not work ($d_3 = 1$); and 4) households in which neither the man nor the woman works $d_4 = 1$. This specification gives rise to the following log-likelihood function:

$$\begin{aligned} \ln(L) = &\sum_{i \in \Theta_1} \sum_{j=1}^{J} d_1 \ln P(j, w_m, w_w | \theta, X, Z) + \sum_{i \in \Theta_2} \sum_{j=1}^{J} d_2 \ln P(j, w_m | \theta, X, Z) \\ &+ \sum_{i \in \Theta_3} \sum_{j=1}^{J} d_3 \ln P(j, w_w | \theta, X, Z) + \sum_{i \in \Theta_4} \sum_{j=1}^{J} d_4 \ln P(j | \theta, X, Z) \end{aligned} \tag{10}$$

where i is an index over households and j is an index over the labor supply alternatives for the household.

3.3 Simulation of the labor supply elasticity for men and women

The estimated parameters from the quadratic direct utility function are used to compute the impact of the change in an individual's disposable income on the labor supply. Using these parameters, we determine the expected value of hours worked per week and the labor supply elasticity of wages for men and women using the following formulas:

$$E[H|Y, X] = \sum_{k=1}^{7} P(H_k|Y, X) H_k \text{ (Average hours)} \tag{11}$$

$$\varepsilon = \frac{E[H|Y_1, X] - E[H|Y_0, X]}{E[H|Y_0, X]} \times \frac{1}{0.01} \text{(Labor supply elasticity)} \tag{12}$$

The average hours of work are determined using the standard formula for the expected value of a discrete random variable. The labor supply elasticity is simulated

using the structural labor supply model by determining how the probabilities of the various work hour alternatives change when the hourly wage rate is changed by one percent. Hence, to find the labor supply response to a change in the tax system, the expected value is determined with and without the EITC, which corresponds to two different disposable incomes (Y_0 and Y_1).

4 Data and institutional settings

In Sweden, the EITC policy introduced in 2007 is a non-targeted tax credit that depends on the taxpayer's labor income, which includes earned income but not taxable transfers. Earned income refers to wage income from work, and taxable transfers refer to indirect employment-related incomes, such as sickness and parental leave benefits, unemployment benefits, and pension income. All labor income is taxed by a proportional local municipal tax. In addition, there is a two-level state tax on labor income above certain income levels, which makes the tax system progressive. In Sweden, married couples are taxed individually and are not subject to joint taxation.

The EITC was gradually expanded between 2007 and 2010 (see Table 9 in the Appendix).[17] The size of the tax credit increases with earned income up to a certain level. Therefore, for taxpayers in these income ranges, the EITC reduces the average tax rate on labor income for all and the marginal income tax for middle-income earners and below.

The introduction of the Swedish EITC may be one explanation for the relatively high levels of labor force participation (Fig. 1) and employment (Fig. 2) in Sweden during the 2008–2012 global recession.

In this study, a representative random sample of two-adult households living in Sweden during 2007 is used. The data were provided by Statistics Sweden (SCB) and contain information from the Household's finances (HEK) database, supplemented by individual information from other population registers.[18] HEK is an annual sample survey of approximately 10,000 households and was designed to

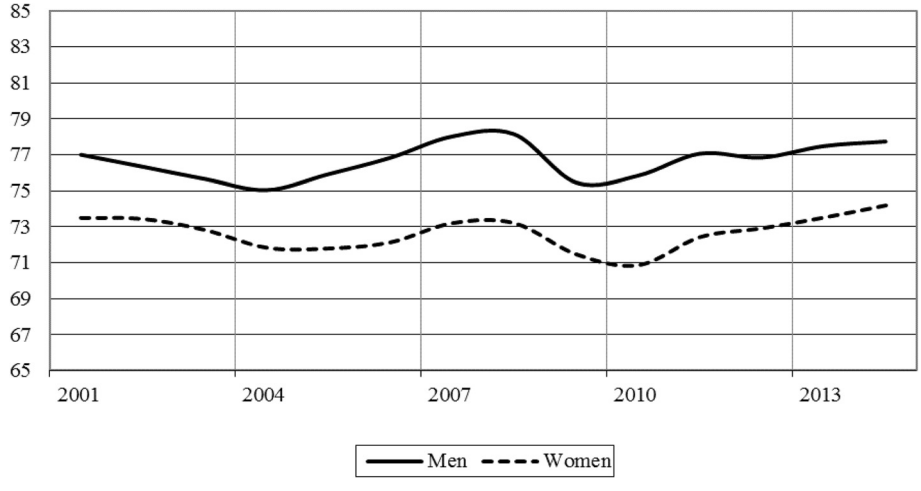

Fig. 1 Labor force participation of 16–64 year olds (percent) by gender; 2001–2014. Source: Own computation based on Statistics Sweden's Labour Force Surveys (LFS)

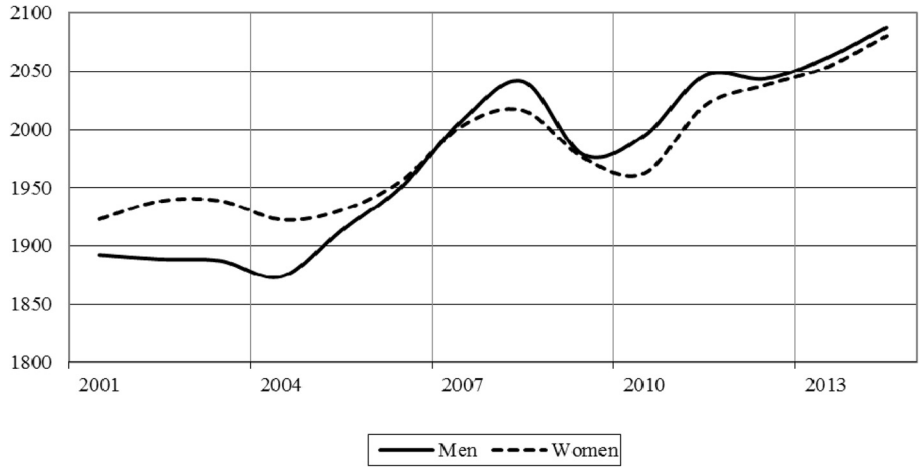

Fig. 2 Employed persons aged 16–64 (in thousands) by gender; 2001–2014. Source: Own computations based on Statistics Sweden's Labour Force Surveys (LFS). Note: Only permanent and temporary employment; self-employed and family workers are excluded

identify the income structure and disposable income distribution among different households and to describe living and housing costs for households.

Given the large difference in the labor supply of women across different types of households, we chose to focus our analysis on two-adult households. However, given that the taxpaying unit in Sweden is the individual and not the household, we analyze men and women separately. Selection is limited to individuals aged 18–64 years who are not early retired, self-employed, or studying (full- or part-time) and who live in a two-adult household.[19]

In the next step, we excluded all households with children younger than one year because all local governments in Sweden are obliged by law to provide, within 3–4 months of the parents' request, highly subsidized, high-quality childcare for children aged 1–12 whose parents either work or are full-time students. All parents who apply for public childcare receive it (more or less if they apply in time). In 2004, 90% of all children in the 3–6 age group attended childcare. The enrollment rate is also high for very young children (aged 1–2). One explanation for these high enrollment rates is that daycare centers offer services during regular work hours. Enrolled children spend on average 32 h per week at daycare. Although children with mothers who work full-time remain in daycare for longer hours than do those with mothers working half-time (34 vs. 21 h per week in 2005), very few children, even those with both parents working full-time, attend daycare more than 40 h per week (Mörk et al., 2013).

In the last step, due to computational reasons, we randomly selected 50 percent of the two-adult households, which resulted in the final sample of 1,875 two-adult households (1,051 households with children and 824 households without children). Descriptive statistics of the individual and household variables used in the analysis are presented in Table 1.

Two key variables of our analysis are the number of hours worked per week (H) and the hourly wage rate. The number of hours worked per week is a construction based on the degree of employment, which is calculated as a percentage of full-time working

Table 1 Descriptive statistics by gender and type of household, 2007

Variables	Women without children	Women with children	Men without children	Men with children
Individual characteristics				
Age (in years)	47.1	38.0	49.1	40.5
Educational level (%)				
Normal school	11.7	10.2	13.1	12.4
High school	42.7	47.0	46.8	51.5
University	45.6	42.8	40.1	36.1
Worked hour per week (*H*) (%)				
$H > 34$	65.7	46.2	80.7	82.5
$0 < H < 34$	25.9	38.8	12.0	12.6
$H = 0$	8.4	15.0	7.3	4.9
Hourly wage (SEK),[a] by *H*				
$H > 34$	156	155	197	188
$0 < H < 34$	146	135	155	148
$H = 0$		-	-	-
Household characteristics				
Children 1–5 years (%)	-	49.2	-	49.2
Children 6–11 years (%)	-	44.9	-	44.9
Children 12–18 years (%)	-	43.6	-	43.6
Received housing allowance (%)	1.0	2.4	1.0	2.4
Received welfare allowance (%)	0.4	4.9	0.4	4.9
Swedish born (both)	79.6	71.9	79.6	71.9
Swedish born (one of them)	11.2	14.9	11.2	14.9
Foreign-born	9.2	13.2	9.2	13.2
Number of observations	824	1051	824	1051

Note: [a]At exchange rates prevailing in 2007, the year before the first step of the Swedish EITC policy, 1 USD corresponds on average to 6.8 SEK (Swedish Krona); and 1 EUR to 9.3 SEK

hours, where the numbers of hours worked each month are added over the year and divided by the standard of 2,080 h per year. An individual who has been unemployed or on parental leave for the whole year has an employment degree of zero and is therefore categorized as a non-participant in the labor force (i.e., his or her hours of work per week is zero). For individuals who have been unemployed for less than a year but who reported during the interview that they worked full-time, their hours of work were adjusted to less than full-time.

The HEK database includes information regarding hourly wage rates. However, a monthly earnings rule rather than exception is the case for many state and municipal employees. This signifies that the measure of the hourly earnings in the HEK is based on the observed monthly salary and is adjusted to correspond to a full-time salary and, in some cases, is scaled down to represent an hourly wage.

The descriptive statistics of work hours reported in Table 1 suggest that the labor supply behaviors are different for men and women in the same household. Regardless of whether there are children present in the household, men work full-time to a much higher degree than women do, but the labor supply behaviors of men and women tend

to be more similar when there are no children in the household. However, the difference in the shares of men and women working zero hours is approximately the same when no children are present in the household. All these differences indicate that there will be differences in the response to the tax credit for married men and women.

5 Results

5.1 Estimates of the labor supply model for a two-adult household

The parameter estimates associated with the preferences for the household labor supply (Eqs. 5 and 6) are presented in Table 2 for both men and women. These estimates can be interpreted as approximations of effects on the marginal utility of work,[20] but because the estimates represent effects expressed in terms of utility, their values have no clear interpretation. However, their signs reveal whether the household utility increases or decreases as a result of changes in the hours of work for men and women, respectively.

For households without children, only the intercepts are significant, which turns out to be the case for both men and women. On the other hand, for households with children, several significant effects are found. An interesting result is related to the estimated effect of the number of children aged 1–5 years. An increase in the number of young children in the household reduces the household utility of hours of work for both men and women; in terms of household utility, this effect is twice as large for women as it is for men.

Table 2 Equations for labor supply preferences by gender and type of household

	Married/Cohabitated without children		Married/Cohabitated with children	
Variables	PE	SE	PE	SE
Women				
Constant	14.502*	(1.359)	10.608*	(1.198)
Age/10	-0.106	(0.459)	1.890	(0.996)
Educational level (CG: lower)				
Medium (high school)	1.729	(1.608)	5.277*	(1.868)
Higher (university)	2.780	(1.761)	7.950*	(2.152)
Stockholm's region	0.668	(1.543)	0.504	(1,382)
Swedish born	4.223	(1.681)	6.167*	(1,546)
Number of children, 1–5 years old			–4.377*	(0.986)
Men				
Constant	22.490*	(3.217)	33.933*	(2.333)
Age/10	–0.642	(0.514)	–2.067*	(0.793)
Educational level (CG: lower)				
Medium (high school)	–0.956	(1.705)	3.043*	(1.419)
Higher (university)	0.146	(1.888)	1.869	(1.546)
Stockholm's region	–0.566	(1.476)	0.372	(1.331)
Swedish born	2.738	(1.738)	5.111*	(1.261)
Number of children, 1–5 years old			–2.551*	(0.797)

Note: *stands for statistical significance at the 5 percent level or better

Table 3 presents the parameter estimates of the wage equations for men and women by household type, while Table 4 presents the remaining parameter estimates of the household's utility function (e.g., fixed costs of work, stigma effects related to social assistance and the covariance matrix for the unobservables). In Table 3, almost all parameters are estimated with good precision, and most of them are significant at a 5 percent level. As an example, men with a university degree have, on average, a higher return to their education than women. Interestingly, the highest return to education can be found for men in households with children, while women in the same situation have the lowest return to higher education.

The estimated interaction effect (α_{wm}) between hours of work for men and women, presented in Table 4, suggests how men and women in the household value their hours of work. The interaction effect is positive and significant for households without children and is small and negative but not significant for households with children. Hence, children in the household seem to contribute to behavioral differences in terms of the hours of work of men and women. For households without children, the hours of work for the man and the woman are more complementary than those for households with children. These results have implications for explaining the behavioral patterns that are observed in Sweden for women with regard to how hours of work evolve during their working lives. Both men and women primarily begin their labor market careers part-time. Over time, the share of full-time workers, both men and women, increases. However, the increase in the hours of work is halted for women when they reach an age

Table 3 Wage equation estimates by gender and type of household

	Married/Cohabiting without children		Married/Cohabiting with children	
Variables	PE	SE	PE	SE
Women				
Constant	4.425*	(0.052)	3.157*	(0.109)
Age/10	0.141*	(0.018)	0.690*	(0.058)
Age*age/100	−0.014*	(0.002)	−0.072*	(0.008)
Educational level (CG: lower)				
Medium (high school)	0.032	(0.034)	−0.021	(0.031)
Higher (university)	0.191*	(0.033)	0.136*	(0.032)
Stockholm's region	0.159*	(0.025)	0.134*	(0.022)
Swedish born	0.050*	(0.026)	0.071*	(0.023)
Men				
Constant	4.261*	(0.101)	3.618*	(0.078)
Age/10	0.231*	(0.034)	0.473*	(0.027)
Age*age/100	−0.021*	(0.004)	−0.049*	(0.003)
Educational level (CG: lower)				
Medium (high school)	0.051	(0.059)	0.136*	(0.051)
Higher (university)	0.282*	(0.060)	0.316*	(0.048)
Stockholm's region	0.072	(0.037)	0.181*	(0.031)
Swedish born	0.102*	(0.041)	0.183*	(0.029)

Note: *stands for statistical significance at the 5 percent level or better

Table 4 Estimated utility function by gender and household type

	Household without children				Household with children			
Utility parameters		P.E.	S.E.			P.E.	S.E.	
α_w		−4.681*	1.494			−5.317*	0.131	
α_m		−2.909	8.248			−4.468*	0.598	
α_y		5.359*	1.623			2.395*	0.153	
α_{wy}		−0.775*	0.389			−0.135*	0.059	
α_{my}		−0.875*	0.369			−0.134*	0.033	
α_{wm}		2.272*	0.573			−0.053	0.073	
ϕ (Stigma effect)		−48.66*	4.330			−38.87*	2.356	
	Men		Women		Men		Women	
Fixed cost	P.E.	S.E.	P.E.	S.E.	P.E.	S.E.	P.E.	S.E.
γ_1(FC, $H \in \{12, 27\}$)	−25.957*	2.672	−19.884*	1.416	−17,125*	1.938	−18.742*	1.248
γ_2(FC, $H \in \{35\}$)	−16.424*	1.154	−7.911*	2.582	−3,347*	0.837	−1.531*	0.227
γ_3(FC, $H \in \{38\}$)	−12.823*	3.134	15.883*	2.928	−3,178*	0.227	14.595*	2.582
γ_4(FC, $H \in \{41\}$)	1.424	6.763	3.244	3.009	13,614*	0.490	5.238*	2.653
γ_5(Fc, $H \in \{50\}$)	−23.739*	4.536	−1.920	3.063	−4,901*	0.329	8.027*	2.700
Number of households		1648				2102		
Log-likelihood/n		−3,848				−3,805		
Covariance matrix of unobservables								
	η_m	η_w	ε_m	ε_w	η_m	η_w	ε_m	ε_w
η_m	139.60*	−0.096	0.108*	0.014	114.91*	0.507*	0.103*	−0.001
η_w		134.86*	−0.001	−0.011		189.12*	0.021	0.001
ε_m			0.159*	0.195*			0.145*	0.144*
ε_w				0.079*				0.092*

Note. *Significant at the 5% level. P.E. stands for parameter estimate. S.E. stands for standard error

between 30 and 35, which coincides with the time when many women have their first child. This behavior in terms of the hours of work is not observed for men.

As a way to evaluate the performance of the estimated model, it is useful to check how well the model predicts actual data in terms of the distribution of work hour alternatives. Table 10 in the Appendix shows the observed and fitted values of the different work hour alternatives (in percentages), as well as the mean value of worked hours (observed and predicted) for men and women in households with and without children. The results show a fair fit between the mean values of observed and predicted work hour alternatives. However, the model appears to have difficulties in predicting the distribution of labor supply for some of the discrete alternatives. For example, the model underestimates the work hours for women working 38 and 41 h and overestimates the work hours for men working 41 h.

5.2 Simulated labor supply elasticity

Using the estimates presented in Tables 2, 3 and 4, we calculate the expected value of the hours worked per week and the labor supply elasticity of wages for men and women separately and by the type of household. One should bear in mind that these simulations are made over both intensive and extensive margins. Table 5 presents the

Table 5 Simulated responses (in percent) on labor supply by gender and type of household

	Married/Cohabiting with children	Married/Cohabiting without children
Women		
Wage elasticity	0.07	0.07
Implicit wage elasticity	0.08	0.08
Not in the labor force	−0.26	−0.40
Men		
Wage elasticity	0.04	0.06
Implicit wage elasticity	0.05	0.06
Not in the labor force	−0.37	−0.37

Note: The *wage elasticity* corresponds to the percentage change in mean hours of work when the gross wages over all individuals change by one percent. The *implicit wage elasticity* corresponds to the ratio between the simulated change in the mean hours of work and the percentage change in disposable income as a result of a 10 percent reduction in the municipal tax rate. *Not in the labor force* corresponds to the effect on those that work zero hours

simulated responses on the mean labor supply as a result of a one-percent increase in the hourly wage rate for men and women separately and by household type. The results indicate distinct reactions for men and women: regardless of whether they have children, women's wage elasticity is estimated to 0.07 percent, whereas men's wage elasticity is 0.04 percent with children and 0.06 percent without children. This difference is in line with previous research and is driven partly by the fact that women had lower wages and worked fewer hours than men before the EITC policy was introduced. However, our results for the extensive margin suggest that the response of women is much smaller in households with children. That effect is not found for men, which suggests that having children is an obstacle to women's participation in the labor market. Because no standard errors are available for the simulated responses, comparisons across the groups should be taken with care, as the differences might not be statistically significant. [21]

5.3 Simulated effects of the EITC

Next, the estimated labor supply preferences and disposable income, as predicted by the structural labor supply model, are used to simulate the effects of the first four steps of the EITC policy on both disposable income and the labor supply (both weekly hours of work and changes in labor force participation) by gender for households with children (Table 6) and households without children (Table 7). The effects are the percentage change for each EITC step in relation to a tax system without an EITC.

For all four steps of the EITC reform, there are relatively large differences between the simulated EITC effects on the weekly worked hours of women and men within the same type of household. In households with children, men worked on average approximately nine more hours per week than women. For example, after the fourth step, women worked an average of 28.8 h per week, whereas men worked an average of 37.5 h per week (Table 6). For households with children, the difference was approximately 5 h per week. The fourth step revealed that the average worktime was 31.7 h per week for women and 36.3 h for men (Table 7).

Furthermore, the presence of children affects work hours differently for men and women. For men, the percentage change in the work hours was much higher for those

Table 6 The simulated effects of EITC on worked hours and disposable income of married/cohabiting with children

	Without EITC	Step 1	Step 2	Step 3	Step 4
Women					
Weekly worked hours	28.542	28.684	28.725	28.765	28.805
Work hours (%Δ)		0.498	0.641	0.781	0.921
Disposable income (%Δ)		4.514	5.785	6.991	8.205
Men					
Weekly worked hours	37.359	37.455	37.481	37.507	37.533
Work hours (%Δ)		0.257	0.327	0.396	0.466
Disposable income (%Δ)		4.004	5.113	6.118	7.239

Note: The change in disposable income is based only on information from those who worked in 2007

living in a household without children, whereas for women, the changes are almost the same for the two types of households. However, it is not clear a priori how an individual's transitions between the different labor supply alternatives (our seven discrete points) should appear because the potential behavior differs for part-time and full-time workers and for those who worked more than the usual 40 weekly hours before the introduction of the EITC reform. This idea follows from the mechanism by which the substitution effect and income effect change as the hours of work and wage rates increase over the intensive margin. Typically, the income effect dominates the substitution effect for those with high wages working full-time. Hence, the direction of the net effect is likely to have a different sign for different individuals, leaving the mean net value of the effect on the labor supply an empirical question.

On the extensive margin, the direction of the effect on the labor supply is less uncertain because there is no income effect involved. Lower taxes with an increase in the disposable income therefore increase the effect on the inflow to the labor force. Figure 3 illustrates how men and women respond to the reduced tax induced by the four steps of EITC over the different discrete labor supply alternatives.

For households with children (Fig. 3a), the single largest effect occurs on the extensive margin for both men and women: the share of women outside the labor force decreases by approximately 4 percent, whereas the corresponding reduction for men is approximately 5 percent. Figure 3 also illustrates how men and women respond differently depending on whether there are children in the household. The most striking

Table 7 The simulated effects of EITC on worked hours and disposable income of married/cohabiting without children

	Without EITC	Step 1	Step 2	Step 3	Step 4
Women					
Weekly worked hours	31.382	31.538	31.584	31.629	31.675
Worked hours (%)		0.497	0.644	0.787	0.934
Disposable income (%)		4.602	5.902	7.143	8.384
Men					
Weekly worked hours	36.042	36.177	36.216	36.255	36.294
Worked hours (%)		0.375	0.483	0.591	0.699
Disposable income (%)		3.982	5.082	6.140	7.190

Note: The change in disposable income is based only on information from those who worked in 2007

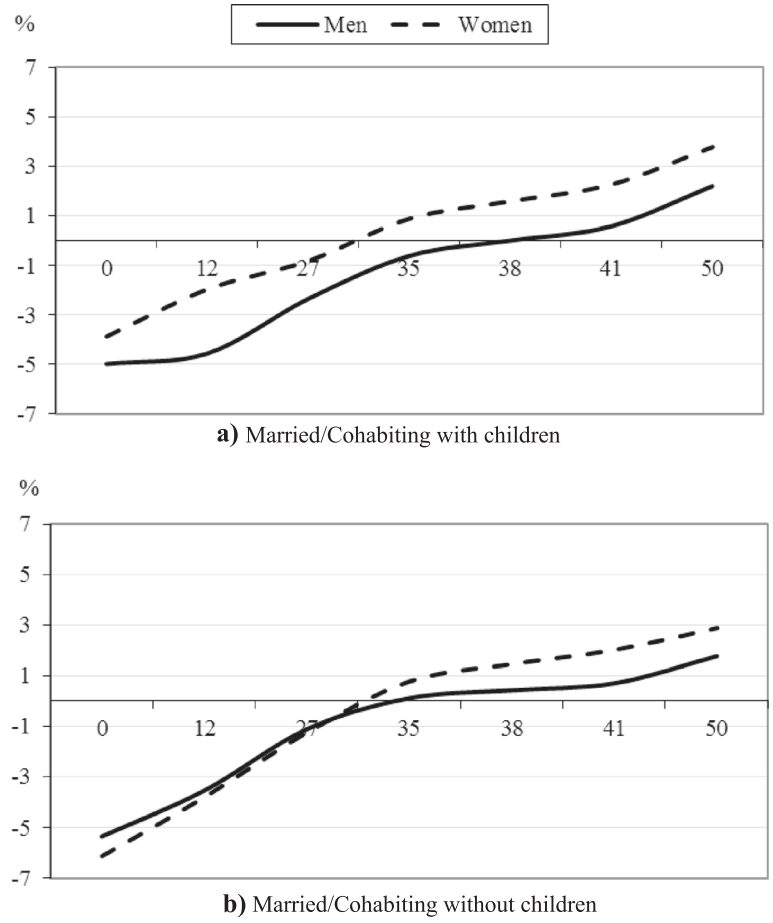

Fig. 3 Percentage change in the work hours between the (2010) fourth step of the EITC reform and the tax system without the EITC by gender for Married/cohabitating with children (**a**) and Married/cohabitating without children (**b**). Note: The horizontal axes show the different weekly work hour alternatives for each individual in the household and the vertical axes show the percentage change that corresponds to each alternative as a result of introducing EITC

difference among the cases can be found for women working part-time (i.e., working fewer than 35 h per week) or not working at all, whereas the responses for men are approximately the same in the two cases. Therefore, these results indicate that children have an inhibitory effect on the labor supply of women, whereas the effect on the labor supply of men attributable to the EITC can be considered independent of whether there are children in the household. These results are interesting because married women with no children in the household already work more hours than women with children, but not to the same extent as men.

Regarding disposable income, our results indicate that the EITC had, on average, a greater effect on women than on men for both types of households. This result was expected because before the EITC reform, women's earned income was significantly lower than that of men due to the fact that on average, women both have lower wages and work fewer hours than men. When the EITC was introduced, women increased their disposable income by approximately 8 percent, whereas men increased their disposable income by approximately 7 percent.

6 Discussion and conclusions

The Swedish EITC was designed to contribute to the well-functioning tax system from the employment point of view by breaking the longstanding Swedish tradition of taxing several types of social transfers together with earned income. Therefore, the Swedish EITC was designed as a non-targeted tax credit that depends on the taxpayer's labor income, which includes earned income but not taxable transfers. The overall purpose of the EITC was to increase the labor force participation and make it more profitable for the individual to work. Because by construction, it increases the net income from work, the EITC is expected to effectively reduce the incentives of receiving incomes from sources other than work, such as unemployment benefits or sick benefits.

From an international point of view, the labor force participation rate in Sweden is high for both men and women. However, it is an observed fact that women have lower wages and work fewer hours than men. Nevertheless, part-time work is widespread among women and is much more common than for men. Importantly, when men and women start their careers on the labor market, part-time work is common for both men and women, and the share of full-time workers increases over time. However, at approximately 30–35 years of age, women's average work hour halt and start to decrease and finally ends up stabilizing on a distinct lower level than that of men. This change has been proven to be correlated to the time when children enlarge the household. These facts suggest that it is policy relevant to analyze the response to economic incentives to work, such as those introduced by EITC for women and men who live in two-adult households separately for households with and without small children.

Of particular importance is choosing the optimal econometric framework to estimate the EITC effects in Sweden, where all employees with income from work receive the tax credit. Consequently, it is not easy to evaluate the EITC effects post factum using conventional non-experimental evaluation methods because there is no natural comparison group that receives no tax credit. Therefore, we formulated and estimated a static structural discrete labor supply model for two-adult households and simulated afterwards how the EITC steps affected both the labor supply and the disposable income of men and women according to the type of household.

Our results suggest that the EITC brought more women into the labor market, which might be interpreted as a successful contribution to the Swedish government's goal of reducing inequalities between men and women in the labor market. Furthermore, our estimates of the EITC policy show that the labor supply effect on the intensive margin is low, yet positive, for both men and women working part-time and that the presence of children in the household induces differences between men and women. For men, the percentage change in the work hours was much higher for those living in a household without children, whereas for women, the changes are almost the same for the two types of households.

The differences between men's and women's responses to economic incentives seem to be driven by how each individual's working hours are valued in relation to one another within a household; i.e., whether the corresponding hours of work for men and women are complements or substitutes in the household. The estimated interaction effect between the hours of work for men and for women in the utility function answers this question. In households without children, men and women tend to work similar

hours, but in households with children, there is a large variation in the hours of work for women, which are not necessarily coordinated with their spouse's hours of work. This may indicate that if the man works full-time, the woman tends to reduce her work hours and presumably dedicates more time to household work and childcare. This finding suggests that with respect to part-time work, the state dependence induced by children in the household can be partly remedied using economic incentives such as the EITC.

The most important finding across all results indicates that women working part-time or not at all are less responsive to economic incentives than men when children are present in the household. Hence, other means to increase their labor supply should be used. These means should be driven by the fact that, by nature or as a result of societal norms, women take greater responsibility for the children than men do.

Endnotes

[1]The WTC replaced the Working Families Tax Credit (WFTC), which operated from April 1999 to March 2003. The WFTC was a transitional system from the earlier benefit for working families, known as the Family Credit (FC), which had been in operation since 1986. In addition to the WTC, people may also be entitled to the Child Tax Credit (CTC) if they have custody of children.

[2]The official motivation for this design was based on the fear of negative marginal effects on the work incentives in the phase-out region of the income distribution. Marginal effects of this sort are particularly harmful when the wage distribution is compressed, as it is in Sweden.

[3]The earned income tax credit in Sweden, by design, is a function of the municipal tax rate. Because each municipality has the right to set their own tax rate, it varies in size across municipalities. A higher municipal tax rate therefore generates a larger tax credit in SEK for an individual with a given earned income. However, the tax reduction for the same individual, measured as a percentage change, is approximately the same in high- and low-tax-rate municipalities.

[4]In 2015, the municipal tax rates varied between 29.2 and 34.7 percent, with an average value of 31.99 percent. In 2007, the average municipal tax rate was 31.55 percent, with a standard deviation that was approximately the same as in 2015. These differences generate rather small variations in tax reduction among individuals. Because a higher municipal tax rate also implies more tax to pay, the variation in the net-of-tax rate among municipalities for an individual with a given earned income is very small, which indicates that their estimates depend on rather weakly identifying variations.

[5]Blomquist and Hansson-Brusewitz (1990) estimated labor supply functions for married men and women in Sweden using data from 1980, considering the complete form of individuals' budget constraints. Using a quadratic supply function, they evaluated the female wage rate elasticity at the mean male sample values and reported a wage rate elasticity of 0.10 for women and approximately 0.12 for men. The linear supply function with random preferences yielded a wage rate elasticity of approximately 0.45 to 0.80 and an income elasticity of approximately–0.04 to–0.06. The quadratic supply function with fixed preferences yielded a wage rate elasticity of 0.37 calculated at the mean sample values for working women and considering only the responses for working females. Evaluating elasticity at the mean sample values for the full sample and taking into account the labor-leisure choice, they obtained an elasticity of 0.58.

[6]This utility function is equivalent to the one with leisure (L_m, L_w) as the argument, such as $U(L_m, L_w, Y)$, but avoids the necessity of explicitly representing the total hours available for work and leisure. Because the direct utility function is quadratic and includes an interaction term between the hours of work for men and women, the marginal utility of hours of work for men and women are functions of the level of hours of work for men and women and the level of disposable household income. The parameter of the interaction term between the hours of work for men and women (α_{wm}) indicates whether the labor supplies of men and women are complements or substitutes in the household.

[7]The choice of the number of worked hours is limited by a given number of discrete alternatives. This approach, introduced by Van Soest (1995), has been frequently used in the context of structural labor supply models because the econometric application is greatly simplified compared to the choice of hours worked on a continuous variable. This is especially true in the presence of highly non-convex budget constraints induced by welfare benefits and complex tax structures. For the discrete approach, it is generally very easy to determine whether the empirical model is economically grounded and meets the requirement of utility-maximizing individuals.

[8]These choices are discrete approximations of the observed worked hours (h), with the following associations: $H = 0$ when $h = 0$; $H = 12$ when $1 \le h \le 20$; $H = 27$ when $21 \le h \le 30$; $H = 35$ when $31 \le h \le 37$; $H = 38$ when $38 \le h \le 39$; $H = 41$ when $40 \le h \le 43$; and $H = 50$ when $h \ge 44$. Accordingly, in our model, we use $H_m \in \{0,12,27,38,41,50\}$ and $H_w \in \{0,12,27,38,41,50\}$. The specific alternatives have been chosen to make each work-hour group similar in size.

[9]This is a commonly used method that was first proposed by Hausman (1981). Implicitly, it is assumed that the predictions are made with no errors or that the prediction errors are ignorable.

[10]Löffler et al. (2014) reported in a rather extensive simulation exercise that the correct treatment of wages in a structural labor supply model are crucial and that different approaches affect the estimated labor supply elasticities very differently.

[11]In practice, this situation may, in many cases, be a matter of a lack of knowledge regarding eligibility for social assistance or a way to avoid an extensive investigation that is expected to be very time-consuming for too little financial outcome. In addition, it could also result from measurement errors in the data.

[12]The fee schedule cap has two components. First, the charge per child is determined as a fixed percentage of household income. The rate varies with the age and birth order of the children, such that care for younger children and children with few siblings in childcare costs more. Secondly, per-child fees are capped and are thus constant beyond a monthly income ceiling, which was SEK 38,000 (5,770 USD) in 2002 (Mörk et al. 2013).

[13]B_{SA} is a function of the age of the children, the number of children, housing rent, and the disposable household income.

[14]B_{HA} is a function of the number of children and the disposable household income.

[15]B_{CC} is a function of the age of the children, the number of children, and the gross household income.

[16]To obtain better precision in the simulation of the log-likelihood function, quasi-random numbers (the random Halton sequence) are used instead of the standard pseudo-

random numbers. The simulation noise is thereby reduced by a factor of 10, which indicates that 10 Halton draws have the same precision as 100 pseudo-draws. In this study, 10 Halton draws are used per adult in each household. See Train (2003) for a detailed description of how to generate Halton random draws.

[17]In 2011, the EITC was extended yet another time. This final extension is not considered in this paper.

[18]For more information about the HEK database, see www.scb.se.

[19]In a first step, we select all working-age individuals aged 18–64 years who are not fully or partially studying, are not early retired or are not self-employed. We obtained a sample of approximately 7,300 households. In the second step, we excluded all households of singles (1,901 single men and 1,616 single women).

[20]One should keep in mind that β_m and β_w are only part of the expressions for the marginal household utility of work hours for men and women, respectively, because the household utility function contains squared terms of hours of work for the men and the women in the household.

[21]These simulations are based on the estimated parameters of the model. Because this model is numerically intensive and computaionally hard to estimate, it is difficult to form standard errors for the parameter estimates. Bootstrapping is therefore not an option because reestimating the model many times to form a distribution of estimated parameters would be inconceivable and the analytical standard errors for this model are unknown.

Appendix

Table 8 Uncompensated wage elasticity from Swedish research literature estimated using discrete structural labor supply models (percent)

Study by household type	Wage elasticity	Data (year)	Selection
Married/cohabiting men			
Flood et al. (2004)	0.05[a]	HINK (1993, 1999)	
Sacklén (2009)	0.06[b]	HEK (2004)	
Finansdepartementet (2010)	0.13[c]	HEK (2007)	
Married/cohabiting women			
Flood et al. (2004)	0.10[a]	HINK (1993, 1999)	
Sacklén (2009)	0.10[b]	HEK (2004)	
Finansdepartementet (2010)	0.18[c]	HEK (2007)	
Single women			
Andrén (2003)	0.77[a]	HINK (1997, 1998)	Single mothers
Flood et al. (2007)	0.62[a]	LINDA (1999)	Single mothers
Andersson & Hammarstedt (2008)	0.05[a]	LINDA (2004)	Foreign-born single women
Finansdepartementet (2010)	0.21[c]	HEK (2007)	
Single men			
Finansdepartementet (2010)	0.09[c]	HEK (2007)	

Note: [a]Percentage change in the hours worked divided by the percentage change in gross earnings. [b]Percentage change in the hours worked divided by the percentage change in disposable income, referring to the overall effect of cohabitation and single habitation. [c]Percentage change in the hours worked divided by the percentage change in disposable income, calculated by increasing the municipal tax of 10 percent. These elasticities capture both the extensive and intensive margins

Table 9 Formula for the Swedish EITC, by step

Earned Income (EI)	0 – 0.91 BA	0.91 BA – 2.72 BA	2.72 BA – 7.00 BA	7.00 BA –
Step 1 (2007)	(EI <0.79 BA)	(0.79 BA < EI < 2.72 BA)	(EI > 2.72 BA)	
	(EI – BD) * LITR	(0.79 BA + 0.200 * (EI – 0.79 BA) – BD) * LITR	(1.176 PBB – GA) * LITR	
Step 2 (2008)	(EI – BD) * LITR	(0.91 BA + 0.200 * (EI – 0.91 BA) – BD) * LITR	(1.272 BA + 0.033 * (EI – 2.72 BA) – BD) * LITR	(1.413 BA – BD) * LITR
Step 3 (2009)	(EI – BD) * LITR	(0.91 BA + 0.250 * (EI – 0.91 BA) – BD) * LITR	(1.363 BA + 0.065 * (EI – 2.72 BA) – BD) * LITR	(1.642 BA – BD) * LITR
Step 4 (2010)	(EI – BD) * LITR	(0.91 BA + 0.304 * (EI – 0.91 BA) – BD) * LITR	(1.461 BA + 0.095 * (EI – 2.72 BA) – BD) * LITR	(1.868 BA – BD) * LITR

Note: BA basic amount, *BD* basic deduction, *LITR* local income tax rate. BA = 40 300 SEK in 2007 (39 700 SEK in 2006, 41 000 SEK in 2008)

Table 10 Actual and fitted distributions of labor supply (in percent) and mean value of worked hours (observed and predicted) by gender and type of household

	Married/Cohabiting with children		Married/Cohabiting without children	
	Observed	Predicted	Observed	Predicted
Women				
H = 0	15.0	15.3	8.5	10.8
H = 12	3.6	3.7	3.6	2.7
H = 27	23.7	15.1	12.7	7.5
H = 35	35.6	51.9	34.7	55.3
H = 38	11.5	6.2	24.3	13.2
H = 41	5.9	4.2	10.9	6.6
H = 50	4.7	3.5	5.2	3.9
E[H]	28.4	28.5	32.3	31.4
Men				
H = 0	4.9	5.4	7.3	10.1
H = 12	1.6	2.4	2.1	1.5
H = 27	6.6	3.2	5.9	2.5
H = 35	17.1	11.6	12.7	7.8
H = 38	15.9	11.3	20.0	12.2
H = 41	40.4	57.7	39.1	57.3
H = 50	13.4	8.4	12.9	8.6
E[H]	37.3	37.4	36.4	36

Competing interests
The IZA Journal of Labor Policy is committed to the IZA Guiding Principles of Research Integrity. The authors declare that they have observed these principles.

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