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The Rise in Female Employment and the Role of Tax Incentives. An Empirical Analysis of the Swedish Individual Tax Reform of 1971

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An Empirical Analysis of the Swedish Individual Tax Reform of 1971 [a]

by

Håkan Selin[b]

Abstract: Sweden reached the 2007 OECD average level of female labor force participation already in 1974. Before, but not after, 1971 the average tax rate facing the housewife was a function of the income of her husband. By exploiting a rich register based data source I utilize the exogenous variation provided by the individual tax reform to analyze the evolution of female employment in Sweden in the beginning of the 1970's. Simulations suggest that employment among married women would have been 10 percentage points lower in 1975 if the 1969 statutory income tax system still had been in place in 1975.

Key words: Female labor supply, income tax reforms
JEL classification: J21, H24.

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1. Introduction

In 2007 Sweden reported the highest labor force participation rate among females aged 25 to 54 in the OECD – 87.1 %.[1] As a matter of fact, Sweden reached the 2007 OECD average level, which is 70.3 %, already in 1974. Thus, the gender composition of the labor force today in most OECD countries has more in common with the Swedish situation in the 1970's than the present one. To study the Swedish transition from a country with modest to high female labour force participation rates is therefore a venture of substantial policy relevance.

As can be seen from *Figure 1*, the rapid growth in female participation rates in Sweden during the post-war era was primarily driven by a surge in *married* women's participation rates. In the mid 1980's the gap between married and unmarried participation rates had virtually vanished. One purported explanation to this unprecedented growth, alongside factors as technological change in home production and the expansion of the public sector, is the profound reforms in the area of family taxation. These culminated in the individual tax reform of 1971.

As the 1971 reform radically increased net wages for a large number of married women it is often considered to have increased labour force participation of married women. However, it is *a priori* unclear if, or to what extent, the tax reform contributed to this development. As documented by Pencavel (1998a), employment-population ratios for married and unmarried women have converged also in the U.S. since the 1970's in a system with joint family taxation. The impact from the structure of family taxation on Swedish female labour force participation has historically been analysed based on cross sectional evidence (Gustafsson 1992 and Gustafsson and Jacobsson 1985).[2] The widely held belief that the 1971 tax reform increased female labor force participation has, however, still not been tested by the exogenous variation provided by the tax policy reform *itself*.

[1] Labor force statistics for the OECD countries can be found at http://stats.oecd.org/WBOS/index.aspx .
[2] See Jaumotte (2003) for a recent overview of female labor supply in the OECD countries from the point of view of family taxation.

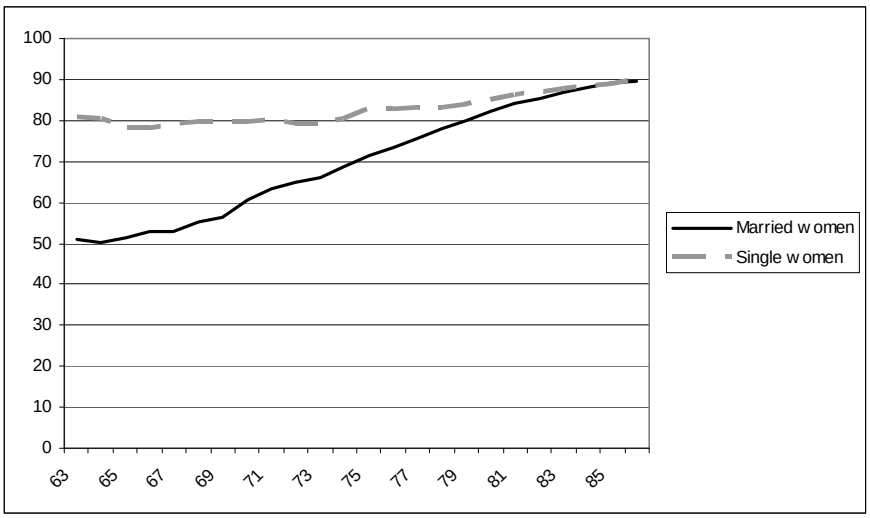

Figure 1. Labor force participation rates (annual averages in percent) of married and single women aged 25 to 54 between 1963 and 1986. Source: Statistics Sweden, Labor Force Surveys.

Undisputedly, the family tax reform provides a quasi-experimental situation: Before 1971 the earnings of each spouse were added together and taxed according to a steeply progressive tax schedule. This meant that the average tax rate facing the housewife was a function of the 'last-dollar' marginal tax rate of her husband. After the reform, the link between the husband's earned income and the wife's average tax rate was in principle abolished. Accordingly, the 1971 reform affected work incentives of different wives differently depending on their husband's pre-reform earnings. Wives married to husbands at the very top of the income distribution faced average tax rate cuts of a magnitude of 40 percentage points whereas women married to lower-income husbands could face small increases.

The purpose of this paper is to assess the impact from the individual tax reform on female employment. The leading idea of the empirical model is to identify the change in the log net wage rate (evaluated at 30 weekly work hours) by the exogenous variation in average tax rates provided by the tax reform. To this end I will use longitudinal individual level data from the LINDA data base from two points in time: 1969, i.e. two years before the reform was launched but the year before it was announced, and 1975, four years after the reform.

Since the data contain tax register information on the spouse I will be able to test whether those who faced large exogenous increases in net wage rates (wives married to high-income men) were more prone to go from non-work to work than women whose first-dollar marginal tax rates did not fall (women married to low-income husbands).

In the estimations I employ a linear probability model that allows for individual level fixed effects. I obtain a preferred estimate of the elasticity of the employment probability with respect to the net-of-tax share of 0.46. This estimate is of expected sign and is also statistically different from zero. I also find a statistically significant non-labour income elasticity of -0.14. The most central component of non-labor income is the net-of-tax earnings of the husband. However, these overall elasticity estimates conceal substantial heterogeneity between women with and without kids. In fact, women with kids both years exhibit a considerably higher net-of-tax share elasticity that is estimated to 1.77.

When the overall estimates are used to simulate the effect of the tax reform it turns out that the 1971 individual tax reform presumably did have a profound impact on married women's employment. The simulations suggest that employment among married women would have been 10 percentage points lower in 1975 if the 1969 statutory income tax system still would have been in place in 1975. Most of the reform effect operates through the effect on net wages.

The paper is organized as follows. The next section provides a background to the paper while section 3 outlines the most important features of the tax system and the Swedish economic environment in 1969 and 1975. Section 4 discusses the empirical model and section 5 deals with data issues and descriptive statistics. The estimation results are presented in section 6. Simulations of the impact of the reform are reported in section 7. Section 8 concludes.

2. Background

During the 1990's it became increasingly popular to estimate labor supply by making use of exogenous policy reforms. To a large extent, this literature centered on various earned income tax credit policies. One common strategy has been to compare labor market outcomes of eligible and non-eligible to income tax credits with data from before and after a policy-reform (Eissa and Liebman 1996) or with data from several time periods (Francesconi and van der Klaauw 2007). A general lesson from this empirical literature, which has been summarized by Eissa and Hoynes (2005) for the U.S., is that the labor supply response of women appears to be concentrated along the extensive rather than the intensive margin.[3] These findings are coherent with results obtained in the traditional labor supply literature (Mroz 1987).

There is also a minor quasi-experimental literature that focuses on the labour supply response of married women to income tax reforms. While adopting a difference-in-difference methodology, Eissa (1995,1996) studies the supply of labor of wives, both along the extensive and intensive margins. The strategy is to compare women married to husbands at the very top of the income distribution with women married to men who are located somewhat lower on the income distribution, groups that are treated differently by the tax reform. Eissa uses two U.S. tax reforms (ERTA81 and TRA86) as exogenous variation and repeated individual cross sections before and after the reforms. [4] Recently, Crossley and Jeon (2007) have directly adopted the methodology of Eissa while studying a Canadian family tax reform of 1988.

[3] Empirical research on Swedish data on labour supply responsiveness to income taxation has traditionally not been conducted in quasi-experimental settings. An exception is Klevmarken (2000), who utilizes the Swedish tax reform act of 1991 to study labor supply along the continuous margin among both males and females on a smaller panel data set (HUS). There are also recent examples (e.g. Hansson (2007) and Blomquist and Selin (2009)) on Swedish papers on the elasticity of taxable income. The responsiveness in taxable income can be viewed as a wider measure of labor supply. To some extent, the empirical strategy of this paper is related to those studies.

[4] The Eissa (1995,1996) papers have been discussed from various angles by Blundell et al (1998), Blundell and MaCurdy (1999), Heckman (1996) and Liebman and Saez (2006). One concern that has been raised is that the assumption of constant group composition, which is needed for consistency of the difference-in-difference estimator, is likely to be violated when grouping is made based on the income of the husband before and after a large tax reform. Since tax reforms tend to affect both spouses it cannot be ruled out that the composition of income groups is altered in a non-random way due to a reform.

LaLumia (2008) instead sheds light on a move from separate to joint taxation in the U.S in 1948. Equipped with census data from 1940 and 1950, LaLumia exploits the institutional feature that some states applied joint taxation even before 1948. This allows her to perform difference-in-difference estimations, comparing labor supply outcomes of individuals in states with joint taxation both in 1940 and 1950 with individual outcomes in states that converted to joint taxation.

In contrast to the above mentioned works this paper will not pursue an identification strategy that relies on group heterogeneity. There are at least two very good reasons for this. First, if grouping is based on the income of the primary earner, it is impossible to separate the net wage effect from a non-labour income effect. Second, as pointed at by Blundell and MaCurdy (1999), the 'treatment' that individuals typically obtain from income tax reforms is rarely dichotomous in nature. Conversely, different taxpayers are usually treated differently by an income tax reform, even within a certain tax bracket owing to the complexity of the income tax system. Apart from the federal tax bracket of the husband, the change in tax incentives more often than not depend on other parameters as the number of children, local tax rates and various deductions. In the Swedish case, these other sources of variation are important. Hence, in this paper I will employ an estimation strategy that exploits individual heterogeneity in tax rates and non-labor income as the identifying source of variation.

3. Tax system and economic environment

Federal income taxation was first established in 1902 in Sweden. The tax schedule was progressive in nature, rested on joint taxation of all sources of income, and the same schedule applied to married couples as well as to singles. In 1952, two separate federal schedules, one for couples and one for singles, were introduced.[5] The construction of these two schedules implied that, up to a certain limit, the total federal tax paid by two spouses equalled the tax

[5] Single households with children were taxed according to the tax schedule for couples.

paid by two singles, where each single earns half of total family earnings. Hence, to some extent the system was a split system of the type that is currently in use in Germany.

Optional separate taxation came into place in 1966, a law change that was motivated by concerns about married women's labour force participation. This meant that filers could apply for being taxed according to the schedule for singles given that this minimised the total tax payments of the family. Around 5 percent of the population utilized this option, which only involved the federal tax payment and the pension insurance fee, not the local tax rates.[6] As displayed in *Figure 2*, the option implied that the pre-reform marginal tax rate fell at the point where it is was more beneficial for the family to choose separate taxation. The location of this point was of course a function of the husband's income.

Local tax rates were proportional and decided at the level of the parishes, municipalities and counties. Before the 1971 reform, local taxes paid the previous year was deductible against the assessed income at the federal level. Furthermore, prior to 1971 the marginal effects arising from the local and federal tax schedules could be mitigated by a deduction for work ('förvärvsavdrag'). This could be claimed by all women with positive earnings. For married women without children the deduction was just a minor lump sum deduction. However, for married women with children below 16 in the household, the deduction was phased in as 25 percent of her earnings up to SEK 78,800, an earnings range where many married women were located in 1969.[7] This lowered her effective marginal tax rate in this range. The essential ingredients of the 1971 reform were:

- The two separate tax schedules for couples and singles were replaced by a federal tax schedule common to all individuals regardless of marital status. For couples, labour incomes became taxed separately, whereas unearned income and wealth still were jointly taxed.

[6] The pension insurance fee was levied on the federal taxable income progressively and was essentially a sort of 'federal' income tax.
[7] Henceforth, all nominal values are expressed in the price level of 2006.

- The deduction for local taxes was abolished. Since local taxes prior to the reform were deducted against a progressive schedule this move substantially increased tax progressivity.

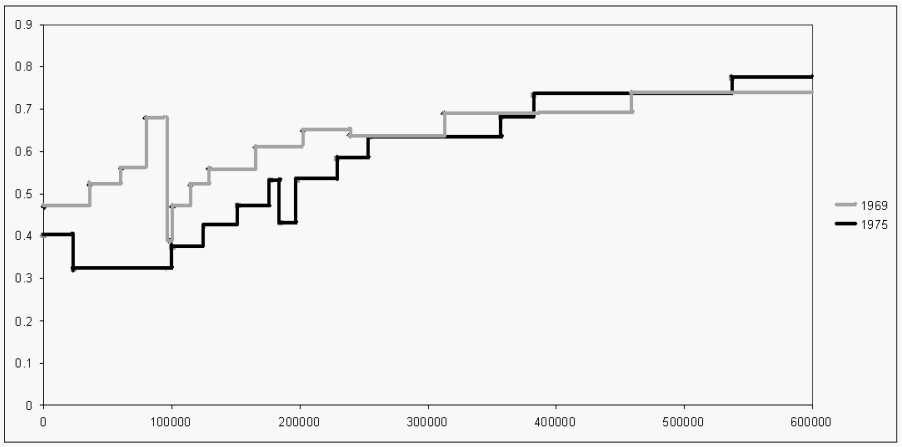

Figure 2. Marginal tax rates generated by the statutory income tax system for different levels of assessed income in 1969 and 1975 in the interval SEK 0-SEK 600,000 for a wife with a husband with mean income, one child and mean local tax rate. Assessed income expressed in 2006 prices. See appendix A for a detailed description of the income tax system.

- In order to compensate one-earner couples a spousal tax reduction was established after the reform. The tax of the primary earner was reduced by SEK 8,500 if the secondary earner had zero earnings. If the secondary earner earned no more than SEK 21,150 the tax reduction was 40 percent of the difference between SEK 21,150 and the income of the secondary earner.
- The deduction for work was retained, even though it became gender neutral: from now on it applied to the secondary earner of the household. It did, however, decrease in nominal terms. Accordingly, due to inflation the importance of the deduction declined even more in real terms.

From inspection of the federal tax schedules in 1969 and 1975 (see appendix A) one might get the impression that tax rates went down in Sweden between 1969 and 1975. This is, however, a false picture since others taxes rose and the deduction for local taxes was repealed. The average local income tax rate increased from 20.24 percent in 1969 to 25.23 percent in 1975.

An important trend was also that a new emphasis was put on indirect taxation. The average pay-roll tax in the sample, levied on gross wages, rose from 9.4 percent to 24.0 percent in 1975. An important source of finance of the individual tax reform in 1971 was also an increase in the value added tax (VAT). The VAT rate rose from 11.11 percent in 1969 to 17.65 percent in 1975.

The business cycle situation for the years 1969 and 1975 can be described as normal. The unemployment rate – the share of unemployed persons from all persons in the labour force -- for married women aged 25 to 54 was low both years – 1.6 percent in 1969 and 1.2 percent in 1975. The labour force participation rate and employment-population ratio were quite close during this time period. Sweden exhibited extraordinary high GDP growth rates during the 1950's and 1960's, whereas a trend wise decrease can be discerned from 1970 and onwards. In 1969 the GDP growth rate was 5.5 percent; the corresponding figure for 1975 was 2.6. In 1971, the same year as the individual tax reform, Sweden experienced a serious downturn, but the economy had recovered in 1975.

4. Methodological issues

4.1 The model framework

Throughout the analysis I make the standard assumption that the wife maximizes her utility while taking the husband's earnings as given and as fully disposable for consumption and that the budget constraint binds. Let f denote 'female' and m 'male' ($j = f, m$). The labor supply function of the wife can then be written as

$$H_f^* = g\left\{\hat{w}_f, \hat{w}_m H_m + S\right\} \qquad (1)$$

where H_j is hours of work, $\hat{w}_j$ is the net hourly wage rate and *S* is family unearned income. While the exogeneity assumption with respect to the husband's work hours might not be valid

for all families it is certainly a more realistic description of family decision making in Sweden in the 1970's than present.

4.2 Empirical model

Following a large body of works on female labor force participation (e.g. Eissa and Hoynes 2004) I will assume that the work decision is a function of the average tax rate at a *fixed hours choice*. The following semi-log participation equation serves as a point of departure[8]:

$$P_{it} = a_0 + a_1 \ln\left[(1-\tau_{it}^{A})w_{it}\right] + a_2 R_{it} + a_3 X_{it} + \gamma_t + \pi_i + e_{it} \qquad (2)$$

where P_{it} is the probability to be in the labour force for individual *i* at year *t*. τ_{it}^{A} is the average tax rate at the fixed hours choice, w_{it} the gross wage rate, R_{it} is non-labor income, X_{it} is a vector of sociodemographic characteristics, γ_t is a time fixed effect, π_i is an individual level fixed effect and e_{it}, finally, is the idiosyncratic error term. The linear probability model has been chosen so that individual fixed effects can be accommodated in the regression framework. Indeed, consistent estimation of the relevant marginal effects would not have been feasible in a non-linear model such as logit or probit due to the incidental parameter problem.[9]

A well-known methodological problem when estimating the discrete labour supply margin is that market wages are unobservable for non-participants.[10] In what follows, I will address this problem by assuming that the log hourly wage rate is given by a linear function

[8] Semi-log labor supply equations have been used extensively in empirical work. See Heim (2007) for a recent example.

[9] Nothing indicates that the use of the linear probability model (LPM) *per se* is critical for the results. The marginal effects obtained by the LPM model are very similar to those obtained by logit and probit in a specification where data are pooled without fixed effects. However, it will become apparent in section 6 that the results will differ across specifications with and without fixed effects.

[10] Unfortunately, in the register data that I use there is no information on hourly wage rates for those working either.

of a vector of individual characteristics, Z_{it} (including age, region and educational status), time fixed effects, κ_t, individual level fixed effects, ϕ_i, and an error term, u_{it}, such that

$$\ln w_{it} = b_0 + b_1 Z_{it} + \kappa_t + \phi_i + u_{it} \quad (3)$$

Combining (2) and (3) yields

$$P_{it} = \beta_0 + \beta_1 \ln(1-\tau_{it}^A) + \beta_2 R_{it} + \beta_3 X_{it} + \beta_4 Z_{it} + \nu_t + \theta_i + \varepsilon_{it} \quad (4)$$

where $\beta_0 = a_0 + a_1 b_0$, $\beta_1 = a_1$, $\beta_2 = a_2$, $\beta_3 = a_3$, $\beta_4 = a_1 b_1$, $\nu_t = \gamma_t + a_1 \kappa_t$, $\theta_i = \pi_i + a_1 \phi_i$ and $\varepsilon_{it} = e_{it} + a_1 u_{it}$. Note that the leading idea of the empirical model is to identify variation in net hourly wage rates by the exogenous variation in average net-of-tax shares provided by the 1971 income tax reform. The empirical strategy is in the spirit of a difference-in-difference model: I compare pre-reform and post-reform employment outcomes for those who faced relatively large and relatively small increases in the log of the net-of-tax share, $\ln(1-\tau_{it}^A)$, while controlling for a common time trend and a set of observable characteristics.

The key exclusion restriction when estimating (4) is that $b_2 = b_3 = 0$ in the equation $\ln w_{it} = b_0 + b_1 Z_{it} + b_2 \ln(1-\tau_{it}^A) + b_3 R_{it} + \phi_i + u_{it}$. This, for instance, rules out any general equilibrium effects from the tax reform on wages, which would introduce a correlation between the key regressors and ε_{it}. The foremost advantage of the approach chosen here, as opposed to imputing wage rates, is that the imputation method typically relies on more controversial exclusion restrictions. To be able to identify the hourly wage rate in the main equation, it is often assumed that the education variables determine labour supply only trough the hourly wage rate.

An important feature of (4), which typically has been absent in related studies conducted on repeated cross sections (Eissa (1995,1996), Crossley and Jeon (2007) and LaLumia (2008)), is the individual level fixed effect θ_i. Remember that the pre-reform level of average tax rates is a function of the income of the husband. How spousal characteristics

relate to each other has been analysed both theoretically and empirically in a substantial literature on marriage and assortative mating.[11] In my sample it is visible that women married to high-income and low-income men are highly heterogeneous with respect to *observable* characteristics like educational attainment. It would therefore be a very strong assumption to posit that women married to low-income and high-income men would not differ in relevant unobserved characteristics (e.g. tastes for work) as well.

4.3 Key independent variables

To arrive at appropriate exogenous measures of net-of-tax shares I make use of available information on the wage and hours distributions for the relevant time period. Since median work hours for Swedish married women belonging to the labor force was 30 hours a week both before and after the reform I set the fixed hours choice to 30 hours a week, which corresponds to 1,560 yearly work hours.[12] Alternative fixed hours choices will be considered in a sensitivity analysis. Gross hourly wage rates have been imputed based on variables on age, region and education. Since there is no data on wages in LINDA covering the relevant time period I have consulted an auxiliary data source – the Swedish Level of Living Survey.[13]

The average net-of-tax share, $(1-\tau_{it}^{A})$, is defined in the following way:

$$(1-\tau_{it}^{A}) = \frac{1-\left\{T(w_{it}^{imp}h_{30};Q_{it})/w_{it}^{imp}h_{30}\right\}}{(1+m_t)(1+p_t)} \qquad (5)$$

[11] See e.g. Pencavel (1998b).

[12] Information on work hours and hourly wage rates has been taken from the 1968 and 1974 waves of the Swedish Level of Living Survey. The distributions of work hours for married women for 1968 and 1974 are reported in Appendix B.

[13] I assume that $\ln w_{it} = \alpha_0 + \alpha_1 B_{it} + v_{it}$, where B_{it} comprises variables for educational status, age and dummies for each county that are present both in the LINDA data set and in the Swedish Level of Living Survey. To account for time heterogeneity in the returns to education and regional demand conditions I estimate the two years separately. The wage variable is then inflated to the wage level for the relevant year by a wage index. To account for unobserved differences between non-worker and workers I have also estimated two-step Heckman selection models, but the selection term turned out to be of minor importance both years and was excluded from the imputation procedure. Following Eissa and Hoynes (2004) I identified the selection term with the variables for the number of kids in the household.

where $T(\cdot)$ is the income tax function, Q is the husband's earnings, w^{imp} is the imputed gross wage rate, h_{30} is the amount of yearly work hours that correspond to 30 weekly work hours, m is the level of the value added tax (VAT) and p is the average pay-roll tax. The gross wage rate is net of pay-roll taxes. The essence of the family tax reform was that the pre-reform tax function had the form $T^{pre-reform} = \zeta\left(w^{imp}h_{30} + Q\right)$ whereas the post-reform counterpart had the structure $T^{post-reform} = \zeta_f\left(w^{imp}h_{30}\right) + \zeta_m(Q)$.

The second key regressor, non-labor income, *R*, is defined as

$$R_{it} = \frac{Q_{it} - T(0; Q_{it}) + TRANSFERS_{it}}{1 + m_t} \qquad (6)$$

Thus, the main component of non-labour income is the earnings of the husband minus the tax payments given that the wife works zero hours. *TRANSFERS* include child allowances and housing allowances. These were both non-taxable transfers.[14] It should be emphasized that I have excluded both positive and negative capital income from Q. The reason is that the main bulk of both positive and negative unearned income relates to investments in owner-occupied housing. To a substantial degree, housing investment decisions and work decisions are determined simultaneously. Therefore, capital income is exluded from *Q*. This endogeneity problem was also noted by Gustafsson and Jacobsson (1985) who excluded deductions from their non-labor income measure.[15]

[14] These transfers have been computed based on the socio-demographic characteristics in the censuses. See Appendix A for a description.

[15] When positive and negative capital income is added to Q considerably higher non-labor income elasticities are obtained in the main specification. However, it is impossible to give these elasticity estimates a causal interpretation since the variation in non-labor income is then driven by endogenous investments in housing. If one instead exploits the non-labor income measure defined by (6) as an instrument for the endogenous non-labor income regressor one obtains IV regression results that are close to the estimates from the OLS regressions reported below in *Table 1*.

4.4 Control variables

Needless to say, the labor supply decision is of course affected by the number of children in the household. Therefore, I include the number of pre-school children (0-6 years of age) and the number of school children (7-15 years of age) in the household.[16]

One factor that undeniably had consequences for the costs of working was the rapid expansion of publicly provided and heavily subsidized day care facilities in Sweden, an expansion that was carried out at the level of municipalities. From April 1 1971 to April 1 1976 the share of pre-school children that was enrolled in subsidized day care increased from 10 percent to almost 20 percent. But the variation in levels and in changes between municipalities was large. Under the assumption that each individual woman is atomistic and does not affect the total provision of day care in the municipality I will include a regressor for the local day care density in the regressions to account for this variation.[17] This variable measures the share of the number of pre-school children in the municipality that was enrolled in subsidized day care. Since day care also played a role as a crucial employer for women this variable surely also picks up a demand effect. Therefore, I also interact this share with the number of pre-school children.

I also include two dummy variables for education that are time-invariant. Their effect on labour supply might, however, be non-constant through time owing to changes in the wage structure and other factors. Thus, I let the educational dummies interact with the time dummy for 1975. On the same grounds, I also interact a set of county dummies with the time dummy.

[16] Since the census information for the pre-reform year is from 1970, not from 1969, there is some measurement error in the variables for the number of children.
[17] The time points of measurement were April 1 1971 and April 1 1976.

5. Data and descriptive statistics

5.1 The data source

The primary data source for this work is LINDA (Longitudinal INdividual DAta), which is a representative sample of about 3.35 percent of the Swedish population (Edin and Fredriksson 2000). LINDA builds on information from various administrative registers. This paper primarily utilises LINDA data from two kinds of registers: tax registers and the population and housing censuses ('Folk och bostadsräkningarna'). I will use census data from 1970 and 1975 merged with tax register data from 1969 and 1975. Of outmost importance is that the data also contains tax register information about the spouse of the sampled individual.[18] The employment variable, i.e. the dependent variable in the regressions, is defined from declared earnings and equals one if the wife had positive earnings and is zero otherwise. [19] Thus, the dependent variable can be viewed as a measure of whether the female was legally employed at some point in time during the tax year.

Even though the census information on demographic variables relates to 1970 I nonetheless choose to use 1969 as the pre-reform point of measurement. [20] The reason to this choice is two-folded. First, for some unclear reason data for a large number of spouses, who were married to women who did not file their income tax return, are missing in 1970. Still, data of this kind is available for surrounding years. Second, the reform was announced in the

[18] Even though non-married cohabiting couples with common children were treated as married couples for tax purposes I will only include married women in the study. This has been necessary since partners to cohabiting sampled individuals have not been included in the source data set.

[19] Since unearned income not exceeding SEK 1000 in 1969 and SEK 2000 in 1975 was classified as earned income I have required earnings to exceed these limits. The key elasticity estimates in this paper only change slightly if one instead requires earnings to be positive without any restrictions. Moreover, there are other caveats associated with data from administrative registers. In 1974 unemployment benefits and sickness benefits became taxable. Fortunately, from 1974 and onwards LINDA includes information from the register of income statements about the level of these benefits. Thus, in order to obtain a constant earnings measure I have subtracted these social benefits from the 1975 earnings measure.

[20] While data from tax registers are available annually from 1968 and onwards, the censuses were only conducted every fifth year. The latter were based on questionnaires that all Swedish residents were required by law to fill in and return to the authorities. As a consequence, the response rates were extremely high. See SCB (1974, 1979, brief English summaries are included) for detailed descriptions of the censuses.

spring of 1970 (Elvander 1972). In fact, monthly averages of married women's employment from the official Labor force surveys in 1970 show that employment increased much more rapidly during the autumn than during the spring. Thus, data from 1970 could potentially entail anticipatory responses to the 1971 reform that would bias the results.[21]

It is standard in the labor supply literature to limit the population of interest to prime-aged individuals. Here I adopt this convention and accordingly only include married women aged 25 to 54. Since the estimation technique requires that individual observations appear twice, both 1969 and 1975, the sample for 1969 consists of individuals aged 25 to 48. I exclude women who received farm income or income from self-employment or who were married to a spouse who earned income from any of these sources. This is because special tax rules applied to these groups. I also deleted around 450 observations that lacked data on education level. In addition, I restrict the sample to those wives whose husbands had positive earnings and positive federal taxable income in both years.[22] The enumerated requirements are fulfilled by 20,478 women.

Finally, wives married to husbands with a taxable income in the lowest bracket will be left out from the estimation sample. The motivation is that a non-negligible fraction of these households reside there for transitory reasons. In the presence of considerable mean reversion in husband's income, the tax incentive of the wife is also highly transitory in nature. The problem is amplified by the fact that social benefits were taxable in 1975 but non-taxable in 1969. This implies that the spousal income of those at the bottom of the taxable earnings distribution is measured with error.[23] After this exclusion, 18,069 married women remains.

[21] Unfortunately, the data problems for 1970 described above prohibit any assessment of whether or not there was a discontinuity in the change in employment status in 1971 among the "treated" wives.

[22] The budget constraints for households where no one of the spouses works are not possible to observe. Many of these households are not obliged to file tax returns and could potentially rely on various sorts of assistance that are not visible in my data.

[23] To get an idea of the magnitude of this measurement problem I subtracted social benefits (unemployment and sickness benefits) from taxable earnings in 1975 and created deciles based on this adjusted taxable earnings measure, which is comparable with the statutory one in 1969. I then viewed the fraction of social benefits to the adjusted taxable earnings measure in 1975 by deciles. The summary statistics were striking: the ratio of mean

5.2 A look at the data

Figure 3 plots the wife's average tax rate against the earned income of the husband in 1969 and 1975. It is easy to see that the average tax rate is an increasing function of the husbands' earnings in 1969, whereas the two variables do not exhibit any correlation in 1975. One may also discern that there are to two clusters of observations in 1969: One group faces average tax rates that are less increasing in the earned income of the husband. This group consists of women with kids. As described in section 3, these were entitled to a more generous deduction for work than women without kids. There is also a substantial cross sectional variation in tax rates that originates from differences in local tax rates in both years.

Figure 4 visualizes average employment status by decile for the two years. Deciles are defined based on the taxable income of the husband in 1969. We can infer that there was a dramatic increase in married women's employment in the higher deciles, especially in the 10^{th} decile. Obviously, there was also a marked increase in the 1^{st} decile. It cannot be excluded

social benefits to mean adjusted earnings was 0.36 in the first decile, 0.06 in the second decile and 0.005 in the top decile. Hence, as these benefits were available but not taxable in 1969 it is very likely that non-labor income in the first tax bracket is measured with considerable error.

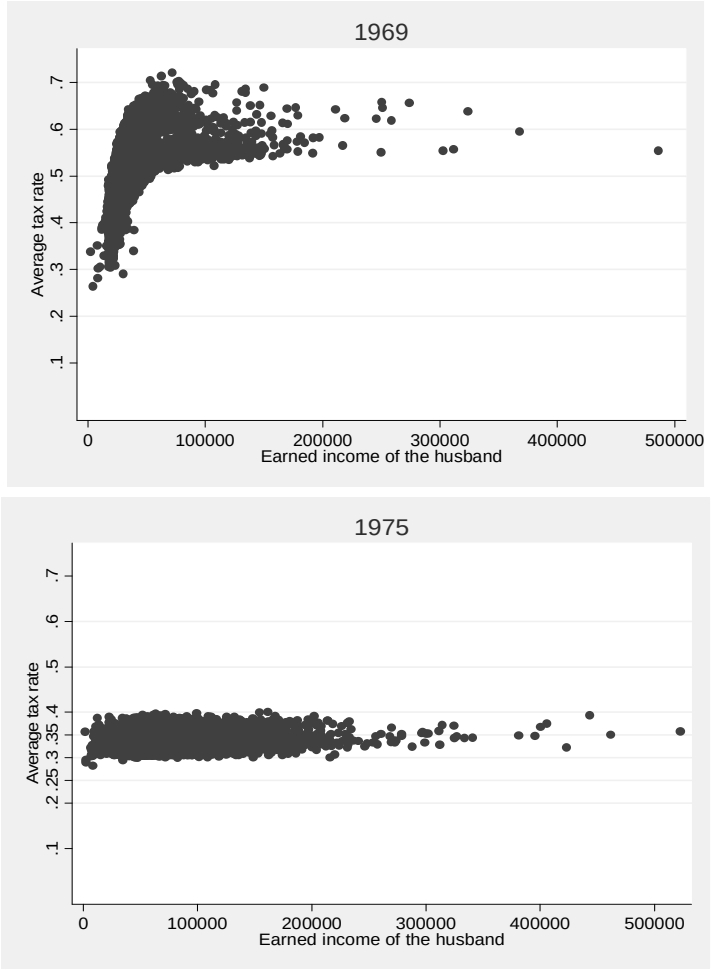

Figure 3. Average tax rates, generated by the statutory income tax system, at 30 weekly work hours against earned income of the husband. Earned income is in SEK and in the price level of 2006.

that the low level of female employment in the 1st decile in 1969 is related to the demand side of the economy. Despite the fact that overall unemployment rate was low (1.6 percent) for married females aged 25-54 in 1969 it was somewhat higher (2.2 percent) in the age category 25-34. Owing to the typical life-cycle earnings profile younger families tend to be placed in the lowermost deciles.

It is also illuminating to examine wives with and without kids separately. To this end I have created two subsamples. First, I have extracted those wives who had kids in the household both years. Second, I have constructed a subsample of those wives who did not have kids in the household any of the two years. From *Figure 5* we acknowledge that there was much more action going on in the sample with kids, where the mean level of employment

status rose from 0.54 in 1969 to 0.76 in 1975. The corresponding statistics for the sample without kids are 0.80 and 0.82 respectively.

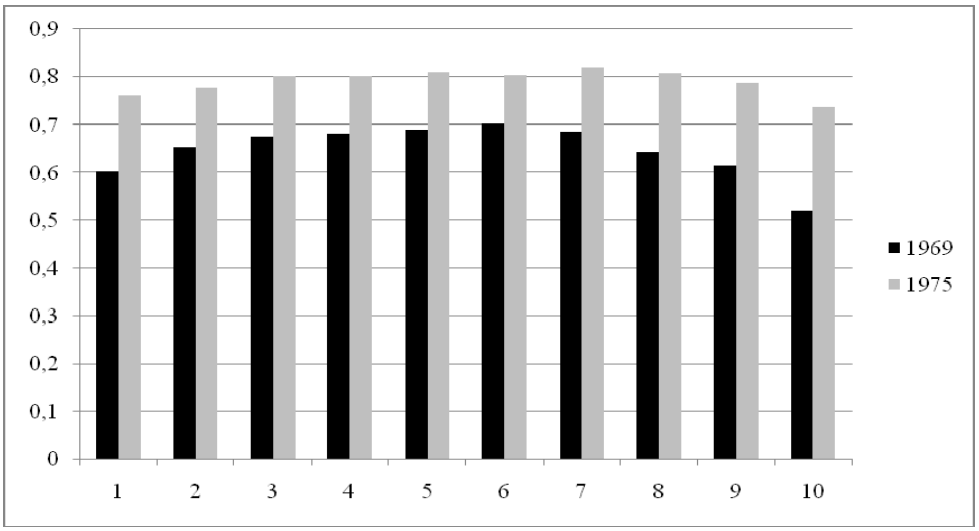

Figure 4. Average female employment status by decile, where deciles are based on taxable income of the husband in 1969.

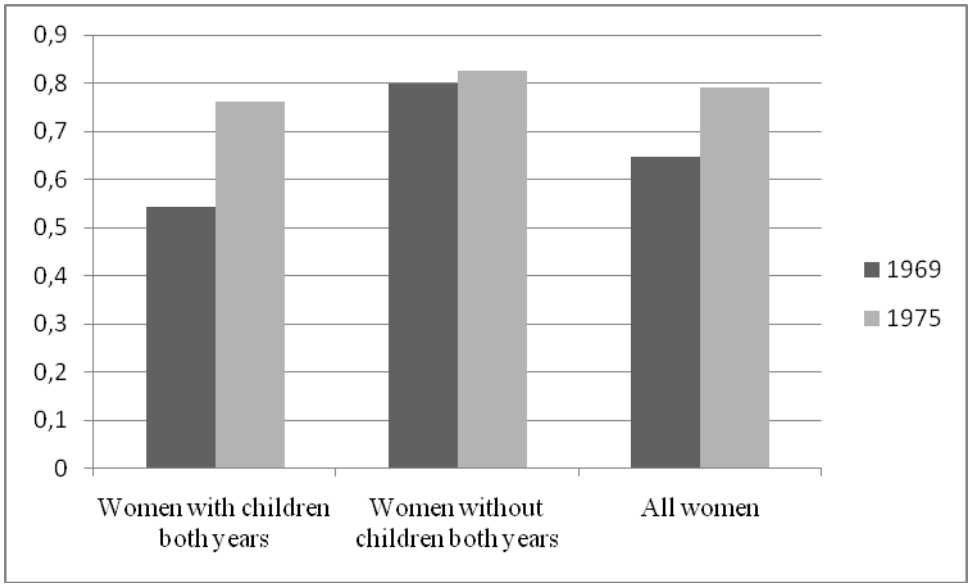

Figure 5. Average female employment status in 1969 and 1975 for different categories in the sample.

The evolution of non-labour income between the two years is of course also a central part of the story. From *Figure 6* it is visible that non-labor income decreased dramatically in the upper deciles between the two years. To obtain a view on to what extent the changes in the income tax system mechanically is responsible for this trend I recomputed then non-labor income variable for 1975 while assuming that the husband's earned income in 1975 was taxed

according to the 1969 income tax laws.[24] As can be seen from *Figure 6*, when holding the 1969 income tax system fixed between the two years the relatively slower non-labor income growth in the upper deciles is less dramatic. Still, the growth is relatively faster at the bottom part of the income distribution. This phenomenon can be ascribed to a general compression of the wage structure, which earlier has been documented elsewhere by, for instance, Edin and Holmlund (1995). The sharp increase in income tax payments in upper deciles is mainly due to the abolishment of the deduction for local taxes paid the previous year.

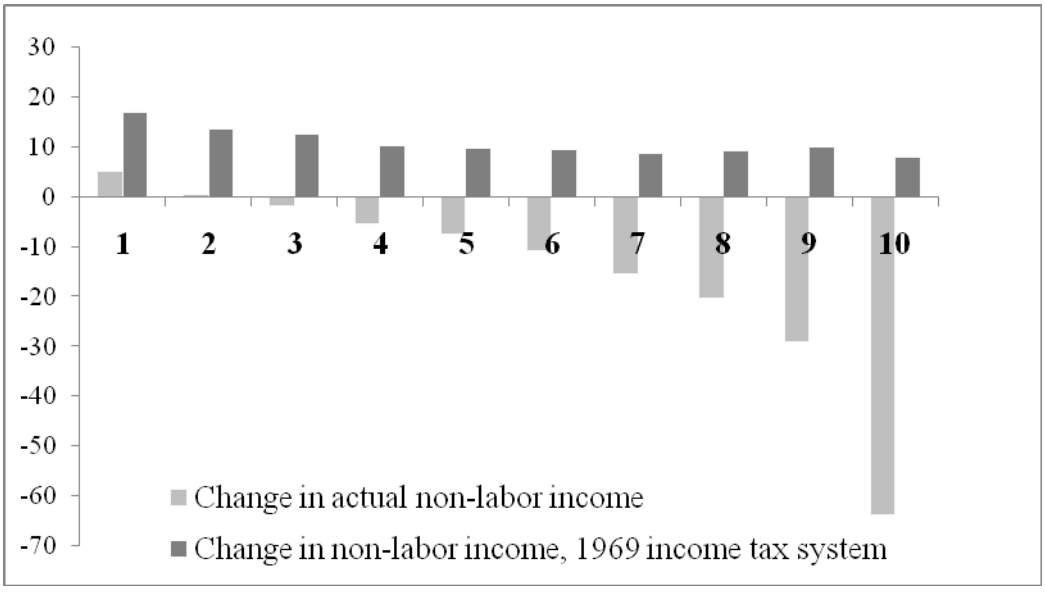

Figure 6. The change in non-labor income between 1969 and 1975. The definition of non-labor income follows from equation (6) and the unit of measurement is thousands of SEK in the price level of 2006.

6. Regression results

6.1 Baseline results

The baseline specification follows from equation (4) and the baseline results are reported in the first column of *Table 1*. When evaluated at the sample mean, the elasticity of the

[24] The procedure here is identical to the one employed in the simulations presented in section 7. I have deflated the husband's earnings for 1975 according to a wage index and then taxed this deflated income measure according the 1969 tax laws. Thereafter, I have inflated spousal net-of-tax earnings with the same wage index. (Since there is no general index for wages in these years I have used the wage index for 'Average hourly earnings of adult workers in various branches of mining and manufacturing etc.: Women'. See Statistical yearbook 1972: table 258 and Statistical yearbook 1978: table 280.) Also, I have assumed that the husband takes the deduction for local taxes paid the previous year in 1969 as given.

participation probability with respect the net-of-tax share is estimated to be 0.46. [25] Even though comparisons with traditional labor supply estimates must be done with great care, the "net-wage" elasticity is of expected sign and in the range of previously estimated female wage elasticities on Swedish data.[26] Moreover, the net-of-tax share elasticity is by far significantly different from zero at a level of 1 percent and precisely estimated. It is also interesting that a non-negligible non-labor income elasticity is detected: the non-labor income elasticity is estimated to be -0.14. This is the sign to be expected – when income in the state of non-work increases the employment probability should decrease. One should notice that also the non-labor income elasticity is estimated to be significantly different from zero at a level of 1 percent.

In column (2) and (3) the fixed-effects model is compared to the corresponding random-effects model (column 2) and pooled OLS-model (column 3). In the alternative models both key elasticities are estimated to be larger in absolute terms when compared to the fixed-effects case. Note that if the tax reform would have been purely exogenous, i.e. if the variation in the net-of-tax share would have been random and uncorrelated to unobserved individual heterogeneity, pooled estimation, fixed-effects estimation and random-effects estimation would all yield consistent estimates, but the latter the most efficient ones. Here a Hausman test forcefully rejects the joint hypothesis that the coefficient estimates for the log net-of-tax share and non-labour income are equal in column 1 and 2.[27] This clearly indicates that the inclusion of fixed effects in equation (4) is of importance to the regression results.

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[25] When using the notation in equation (4) the net-of-tax share elasticity is given by $\eta_{(1-\tau^A)} = \frac{\beta_1}{\overline{P}}$, where $\overline{P}$ is average employment status in the sample. The non-labor income elasticity is given by $\eta_R = \beta_2 \frac{\overline{R}}{\overline{P}}$, where $\overline{R}$ is the sample mean level of non-labor income.

[26] When evaluating labor supply elasticities at the mean values of the sample of married women Blomquist and Hansson-Brusewitz (1990) obtain hours elasticities ranging from 0.34 to 0.75 in a non-linear Tobit estimation framework.

[27] To account for heteroskedasticity I implemented the procedure suggested by Wooldridge (2002, p. 291), i.e. I performed a regression based Hausman test with a robust Wald statistic.

In line with our prior expectations, the number of pre-school kids in the household strongly reduces the probability to be employed, although at a decreasing rate. The negative effect from kids in school age is, however, considerably smaller. In the main specification (column 1), the coefficient for the control variable for the local day care density is positive, as expected, and significant, whereas the coefficient for the interaction between day care density and the number of pre-school children is insignificant.

As explained above, the interactions between the year dummy for 1975 and the age, education and region variables are included in order to control in a flexible way for time trends related to these variables. The negative coefficient for the interaction between the time dummy for 1975 and the dummy for more than 9 years of schooling makes sense since this period saw a decline in the returns to education (Edin and Holmlund 1995).

6.2 Heterogeneous response

Previous works on female labour supply to taxation in Sweden has typically been conducted on smaller survey data sets. And as far as I know, the Swedish literature has so far been silent on the issue whether there are heterogeneous responses among married women with and without children. *Table 2* reveals that the overall response reported in *Table 1* undeniably masks substantial heterogeneity between wives with and without kids. The selection of the two subsamples was described in section 5. Indeed, women with kids exhibit a noticeably higher net-of-tax share elasticity -- 1.77 which can be compared with 0.36 for women without kids.[28] Interestingly, none of the subsamples responds in a significant way to the changes in non-labor income between the two years.

From *Figure 5* we have already seen that the pre-reform level of employment was considerably lower among women with kids both years. The diverging sizes of the elasticity

[28] These elasticities are evaluated at sample means for each subsample. When elasticities are evaluated at the overall sample mean the elasticity for women with kids is 1.60 and the elasticity for women without kids is 0.41.

estimates for the two groups presumably relates to taste differences between the groups that also might help explain why employment was so low among females with kids in 1969.

6.3 Sensitivity analysis

In this paper I have approximated the relevant budget constraint of the individual with her *average tax rate* at a certain level of predicted earnings. As explained in section 4, in the main specification I arrive at this level of earnings by imputing hourly wage rates and by setting the amount of weekly work hours to 30, which was the median level of weekly work hours both in 1968 and 1974. One might wonder though what happens if one instead uses 40 weekly work hours, the mode value both years (conditional on positive hours). 40 hours also correspond to full-time work. Column 1 of *Table 3* shows that the estimated net-of-tax share elasticity then increases to 0.58 (from 0.47), while the estimate of the non-labor income elasticity only slightly changes. According to the hours distributions reported in Appendix B, a third natural point for evaluating a fixed hours choice is 20 hours a week. As can be seen from column 2 the estimated net-of-tax share elasticity then falls to 0.29. The non-labor income elasticity is estimated to be -0.13. In similarity with Eissa and Hoynes (2004) who analyzed U.S. data with related techniques I also find a difference in "net wage elasticities" depending on whether the point of evaluation is 20 or 40 weekly work hours.[29]

[29] In this case, an explanation to the observed pattern in estimated net-of-tax share elasticities is that the change in log net-of-tax shares between the two years was larger at the top of the income distribution when evaluated at 20 hours. Clearly, this phenomenon relates to the optional separate tax system that was in place in 1969. As can be seen from *Figure 2*, when the earnings of the wife exceeded a certain threshold a separate tax schedule applied. To some degree, this equalized tax payments among wives married to low- and high income husband and thereby reduced variation in pre-reform tax rates at higher levels of the earnings of the wife. (See also Table C.1 of Appendix C).

Table 1. Baseline Regression Results. Linear Probability Model.
Dependent Variable: Employment Status

	Fixed-effects	Random-effects	Pooled OLS
Log average net-of-tax share	0.333	0.482	0.599
	(0.033)***	(0.031)***	(0.035)***
Implied elasticity	*0.463*	*0.671*	*0.833*
	*(0.046)***	*(0.043)***	*(0.049)***
Non-labor income	-0.001	-0.001	-0.001
	(0.000)***	(0.000)***	(0.000)***
Implied elasticity	*-0.143*	*-0.286*	*-0.298*
	*(0.029)***	*(0.020)***	*(0.019)***
# Pre-school children	-0.280	-0.300	-0.308
	(0.017)***	(0.012)***	(0.013)***
# Pre-school children squared	0.040	0.044	0.046
	(0.006)***	(0.005)***	(0.005)***
# School children	-0.055	-0.063	-0.067
	(0.006)***	(0.003)***	(0.003)***
Local day care density	0.001	0.002	0.002
	(0.001)**	(0.000)***	(0.000)***
Local day care density *	0.001	0.001	0.002
# pre-school children	(0.001)	(0.000)***	(0.000)***
Time dummy	0.016	0.013	0.011
* AGE in 1975	(0.008)**	(0.007)*	(0.008)
Time dummy *	-0.025	-0.018	-0.017
(AGE^2)/100	(0.009)***	(0.008)**	(0.011)
Time dummy *	-0.005	-0.015	-0.018
9 years of schooling	(0.008)	(0.008)*	(0.010)*
Time dummy *	-0.031	-0.055	-0.062
More than 9 years of schooling	(0.014)**	(0.014)***	(0.017)***
Time dummy * County Dummies	Yes	Yes	Yes
Time dummy for 1975	Yes	Yes	Yes
# cross sectional obs.	18069	18069	18069

Robust standard errors are in parenthesis. * denotes significance at 10%, ** significance at 5% and *** significance at 1%. Standard errors for elasticities have been obtained by the delta method. Elasticities are evaluated at sample means. The specifications reported in column 2 and 3 also include variables for age, age squared, 9 years of schooling, more than 9 years of schooling and a set of region dummies.

Table 2. Regression Results for a Linear Probability Fixed-Effects Model
Dependent Variable: Employment Status

	Women with children both years	Women without children both years
Log average net-of-tax share	1.152	0.294
	(0.068)***	(0.058)***
Implied elasticity	*1.769*	*0.362*
	*(0.104)***	*(0.071)***
Non-labor income	-0.000	-0.000
	(0.000)	(0.000)
Implied elasticity	*-0.010*	*-0.069*
	(0.045)	*(0.057)*
# cross sectional observations	10321	4197

Robust standard errors are in parenthesis. * denotes significance at 10%, ** significance at 5% and *** significance at 1%. Standard errors for elasticities have been obtained by the delta method. Elasticities are evaluated at the sample means for each subsample. All specifications include the full set of control variables.

Another concern that can be raised is that the employment definition used in the analysis is too generous. As explained in section 5.1 I have treated all wives who reported earnings exceeding a small amount as employed. As a consequence, the aggregate employment rate in my sample exceeds the employment-population ratios and labor force participation figures that earlier have been reported in the Labor Force Surveys. As a robustness check, I have therefore constructed an alternative employment measure. Following Edin and Fredriksson (2000) I have treated a wife as employed given that she reports annual earnings exceeding one price base amount. With this new definition, average employment status in the sample falls from 0.65 to 0.48 in 1969 and from 0.79 to 0.71 in 1975. However, as can be inferred from column 3 this redefinition does not bring about any drastic consequences for the elasticity estimates. The estimated net-of-tax share elasticity is now 0.41 instead of 0.47 and the non-labour income elasticity is estimated to be -0.12 instead of -0.14.

Table 3. Sensitivity analysis
Dependent variable: Employment status.

	(1) 40 weekly hours	(2) 20 weekly hours	(3) Alternative employment definition
Log average net-of-tax share	0.418 (0.042)***	0.211 (0.026)***	0.297 (0.036)***
Implied elasticity	*0.581 (0.059)****	*0.293 (0.037)****	*0.413 (0.050)****
Non-labor income	-0.001 (0.000)***	-0.001 (0.000)***	-0.001 (0.000)***
Implied elasticity	*-0.148 (0.029)****	*-0.156 (0.030)****	*-0.119 (0.030)****

Robust standard errors are in parenthesis. * denotes significance at 10%, ** significance at 5% and *** significance at 1%. Standard errors for elasticities have been obtained by the delta method. Elasticities are evaluated at the sample means. The number of cross sectional observations is 18,069. All specifications include the full set of control variables.

7. Simulating the reform effect

To assess the effect of the 1971 individual tax reform I have simulated average employment status in 1975 given that the tax system of 1969 was in place in 1975. I have assumed that the evolution of all other variables – including gross earnings of the husband -- was unaffected by the tax reform. The idea is to compare the simulated level of employment in 1975 with the actual level that year.[30] The difference between the two levels of employment is interpreted as a reform effect, even though this should be done with severe caution given the assumptions involved.

In general, the tax reform influences labour supply through two channels. First, it affects the net wage through the average tax rate. Second, it has an effect on non-labour

[30] It is a well known problem with the linear probability model that it generates predictions outside the feasible range. When plugging in the actual values of the independent variables, my main specification gives 2 predictions outside the feasible range in 1969 and 7 predictions of this kind in 1975. Since the mean value of the fixed effects have been normalized to zero in the estimations, the mean value of the predictions for each year equals the actual mean value of employment status.

income through the net-of-tax earnings of the spouse. To begin with, in simulation 1a reported in *Table 4*, I solely focus on the statutory income tax system (that does not include indirect taxes) and the effect that operates through the net-of-tax share. This exercise suggests that average employment status in the sample would have been 0.71 in 1975 if the 1969 net-of-tax share implied by the 1969 statutory income tax system would have been in place in 1975. The estimate of the average reform effect is 0.08, an estimate that is significantly different from zero at a level of 1 percent.[31] The reform effect is further amplified if one considers the effect that works through non-labor income. Remember from *Figure 5* that tax progressivity increased between the two years, mostly due to the abolishment of the deduction for local taxes, and that the real level of non-labor income went down. The reform effect is now estimated to be 0.1. Apparently, most of the reform effect operates through increased net wages.

[31] This mean difference is defined as $\sum_{i=1}^{N} \frac{\left(P_i^{actual} - P_i^{simulated}\right)}{N}$, where P_i^{actual} is the value of the prediction when evaluated at the actual levels of all the independent variables, whereas $P_i^{simulated}$ is the value of the prediction when evaluated at the simulated levels of the log net-of-share and non-labor income and the actual values of all the other regressors. $N = 18{,}069$.

Table 4. Simulated reform effects

	Predicted (actual) mean level in 1975	Simulated mean level in 1975	Mean difference
1. Keeping the statutory income tax system fixed at the 1969 level			
(a) simulated net-of-tax share only	0.791 (0.002)	0.710 (0.008)	0.081 (0.008)***
(b) simulated net-of-tax share and non-labor income	0.791 (0.002)	0.693 (0.008)	0.098 (0.008)***
2. Keeping the complete tax and transfer system fixed at the 1969 level			
(a) simulated net-of-tax share only	0.791 (0.002)	0.755 (0.004)	0.036 (0.004)***
(b) simulated net-of-tax share and non-labor income	0.791 (0.002)	0.721 (0.007)	0.070 (0.007)***

The simulations are based on the baseline specification reported in column 1 of *Table 1*. Robust standard errors are in parenthesis. Robust standard errors for the predictions have been obtained by the delta method. In the third column * denotes significance at 10%, ** significance at 5% and *** significance at 1%.

I have also performed simulations where I have kept the whole 1969 tax and transfer system constant through 1975. In addition to the statutory income tax, the tax and transfer system also includes pay-roll taxes, VAT, child allowances and housing allowances. Throughout, I have assumed that the burden of pay-roll and VAT taxation is fully borne by the individual. As outlined in section 3, indirect taxes sharply increased between 1969 and 1975. As can be seen from simulation 2a, the positive effect from the introduction of separate taxation was probably to some extent offset by the surge in indirect taxes. Indeed, when keeping the whole tax and transfer system at the 1969 level and only simulating the net-of-tax share, the reform effect is considerably smaller, namely 0.04. On the other hand, the increase in indirect taxes pushes down non-labour income as well. This has a positive impact on female employment. Thus, when both the net-of-tax share and non-labor income are simulated (simulation 2b) the reform effect is estimated to be 0.07.

8. Concluding discussion

In this paper I have utilized the quasi-experimental nature of the 1971 Swedish individual tax reform in combination with a rich panel data source to assess the impact from the reform along the extensive margin. Crucially, the panel structure of the data has allowed me to address issues of unobserved heterogeneity. In a first step I estimated employment elasticities. The overall net-of-tax share elasticity was estimated to be 0.46 and the non-labour income elasticity was -0.14. However, I also found that the net-of-tax share elasticity was considerably higher among women who had kids in both years. For this group I estimated a net-of-tax share elasticity of 1.77. In a second step I exploited the overall estimates to assess the impact of the reform. The results indicated that female employment would have been approximately 10 percentage points lower if the 1969 statutory income tax system, which to a large part rested on joint taxation, would have been in place in 1975. These estimates point at that the reform effect was substantial and that most of it operated through the increase in net wages.

Since long it has been recognized that the structure of the income tax system appears to be an important determinant of married women's labor force participation. In fact, the main motive for the individual tax reform of 1971 was to promote female labour force participation. Numerous papers have set out to explain the impact from the family tax system on female labor supply based on cross sectional data.[32] In contrast to this earlier literature, this paper instead directly exploits a family tax reform in Sweden that occurred in a historical situation when Swedish female labor market participation was close to today's OECD average.

[32] These include Smith et. al. (2003). More structural approaches to the same research question have recently been adopted by Callan et al (2007) and Steiner and Wrohlich (2008).

It has become one of the main political priorities for policy makers world-wide to enhance female labor force participation. Jaumotte (2003) has shown that there is a cross-country correlation between the average tax rate facing the secondary earner in the household and the female participation rate in the OECD. Needless to say, the exact magnitude of the simulation results in this paper should be interpreted with caution. However, the results in this study nonetheless indicate that that the Swedish family tax reform *did* make a difference and that this difference appears to be considerable.

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Appendix A . Tax and benefit calculations.

A.1 Tax calculations

The statutory tax schedules for 1969 and 1975, respectively, are depicted in *Table A.1*. Other features of the income tax system, which all have been taken into account are summarised in *Table A.2*. Even though the register data owe a very high degree of accuracy there are some shortcomings. Also, some simplifying assumptions have been made in the tax calculations. Even though the formal tax rules were gender neutral in 1975, I have assumed that the wife is the secondary earner of the household in 1975. Another simplification in the tax calculations is that the sickness insurance fee for 1969 has been computed for national averages, even though some local variation prevailed.

Table A.1 'Federal' Tax Schedules in 1969 and 1975

1969				1975	
Couples		Singles		All tax payers	
Upper limit	Marginal tax rate	Upper limit	Marginal tax rate	Upper limit	Marginal tax rate
88044	15	44022	15	70230	7
117392	20	58696	20	93640	12
146740	27	73370	27	117050	17
176088	32	110055	32	140460	22
220110	39	146740	36	187280	28
293480	42	183425	41	210690	33
440220	48	220110	45	304330	38
733700	54	293480	44	327740	43
1100550	59	440220	49	468200	48
	65	733700	54	702300	52
		1100550	59		56
			65		

The tax schedules for 1969 include the mandatory pension insurance fee. Segments are expressed in taxable income (2006 prices).

Table A.2. Features of the Income Tax System in 1969 and 1975

	1969	1975
Joint taxation of earned income	Optional.	No.
Joint taxation of asset income	Yes, not affected by optional separate taxation.	Yes, asset income was taxed at the primary earner.
Local tax rate	Yes, proportional (average 20.24 %)	Yes, proportional (average 25.23 %)
Interest expenses	Fully deductible against source income (e.g. imputed income from owner occupied housing). Deficits were deductible against earned income.	Fully deductible against source income and deficits in source were deductible against earned income. If deductions exceeded earned income the residual amount could be deducted by the spouse.
Imputed income from owner occupied housing	Yes, obtained from a progressive schedule as a function of the assessed value of the house.	Yes, obtained from a progressive schedule as a function of the assessed value of the house.
Deduction for local taxes paid the previous year	Yes, $\max(SEK16500, local\,taxes\ \ previous\ \ year)$ was deductible against 'federal' taxable income.	No.
Sickness insurance fee	Yes, levied on earned income according to a non-linear schedule. Deductible against 'federal' taxable income.	No, paid by the employer.
Standard deduction	Yes, SEK 16,500 for each spouse both in local and 'federal' taxation. Standard deduction not utilised by one spouse could be transferred to the other spouse.	Yes, 23,100 for each spouse both in local and 'federal' taxation. Not transferable.
Spousal tax reduction	No.	Yes, the spousal tax reduction was $\max(0, SEK9250 - 0.4 * AISE)$ where AISE is assessed income of the secondary earner.
Deduction for work	Yes, SEK 2,200 for women without children in the household. $2200 + \min(0.25 * EIW, 19800)$ where EIW is earned income of the wife.	Yes, $\min(0.2 * EISE, 10280)$ where EISE is earned income of the secondary earner.
Special tax reduction	No.	Yes, amounts to SEK 1,300 if assessed income does not exceed SEK 36,000. Reduction rate 10 % between SEK 36,000 and SEK 38,500. Requirement: assessed income must exceed the amount for the standard deduction.

All monetary values are expressed in 2006 prices. Thus, the 1969 nominal values are multiplied with a factor 7.34 and the 1975 values with 5.14.

A.2. Public transfers.

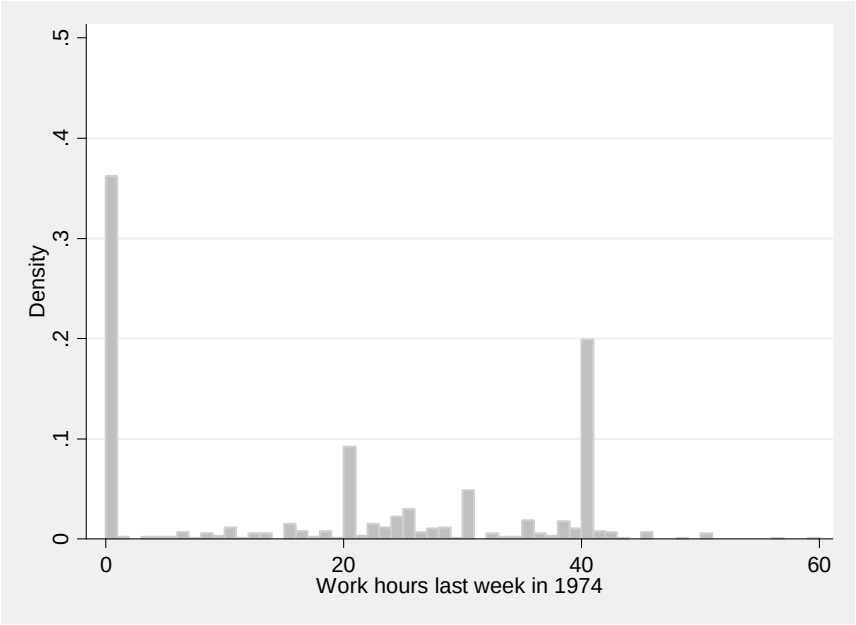
Two public transfers are relevant to the studied population – housing allowances and child allowances. Both years, families were entitled to a housing allowance that was designed to compensate families for their housing costs. The basic structure of the allowance was that a maximum allowance first was computed as a function of the number of children in the family, housing quality (1969 only) and housing costs. Then the maximum allowance was reduced as a function of family income and family wealth two years ago (1967 and 1973). Since register data are available only from 1968 and onwards housing allowances for 1969 have been computed based on income and wealth variables for 1968.

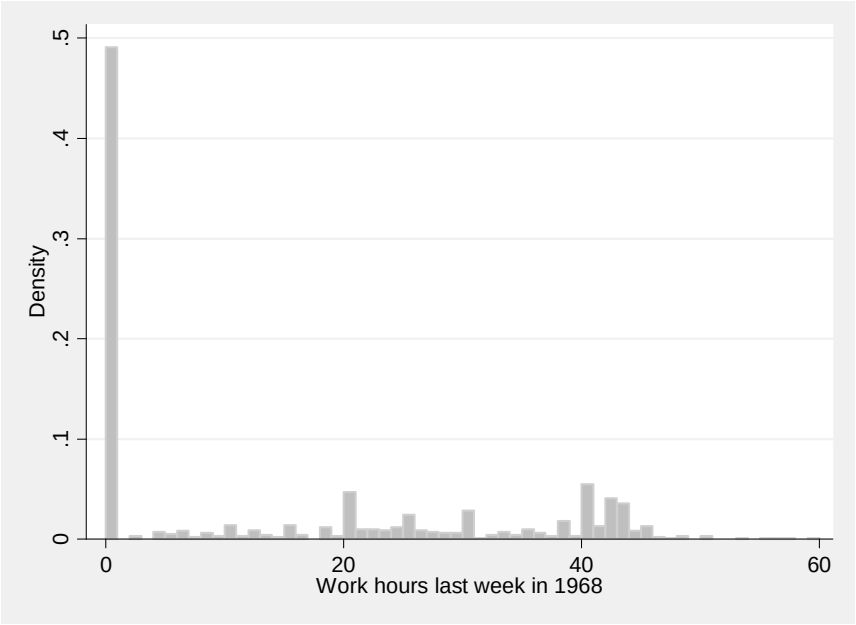
During the period of study, housing allowances had two components, namely 'statskommunala bostadstillägg', which was financed both by the 'federal' and local level and 'statliga bostadstillägg', which was financed exclusively by the 'federal' level. The allowance rate for the former component varied at the local level. Here it is assumed that the allowance equalled the subsidy provided by the 'federal' level. Moreover, in the absence of information on housing costs I have assumed that all households face housing costs above the maximum limit. There were two major legislative changes with respect to housing allowances between 1969 and 1975. First, in 1969, but not in 1975, full allowance required that the dwelling exhibited a set of attributes. Information on housing quality is available in the 1970 censuses. Second, families without children were eligible to housing allowances in 1975 but not in 1969.

The second transfer system, child allowances, was both years designed as a lump sum transfer for each child below 16 years of age in the household. In 1969 the transfer amounted to SEK 6,600 per child and in 1975 to SEK 8,740 per child.

Appendix B. Distribution of work hours last week in 1968 and 1974.

Source: The Swedish Level of Living Survey.





Appendix C.

Table C1. Summary Statistics for the Estimation Sample

	1969	1975
Employment status	0.647	0.791
	(0.478)	(0.407)
Log net-of-tax share (40 hours)	-0.918	-0.835
	(0.102)	(0.034)
Log net-of-tax share (30 hours)	-0.891	-0.782
	(0.124)	(0.024)
Log net-of-tax share (20 hours)	-0.851	-0.747
	(0.161)	(0.013)
Non-labor income	163.393	148.544
	(49.789)	(34.368)
Pre-school children	0.561	0.239
	(0.763)	(0.529)
Shool children	0.799	0.821
	(0.880)	(0.897)
Age	36.739	42.739
	(7.026)	(7.026)
Local day care density (%)	10.365	19.953
	(6.899)	(10.160)
6 years of schooling	0.661	0.661
	(0.473)	(0.473)
9 years of schooling	0.265	0.265
	(0.442)	(0.442)
More than 9 years of schooling	0.074	0.074
	(0.261)	(0.261)
# observations	18069	18069

Standard deviations are in parenthesis. Non-labor income is expressed in thousands of SEK and in the price level of 2006.

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