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Economic incentives, home production and gender identity norms[a]

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Abstract

We infer the role of gender identity norms from the reallocation of childcare across parents, following changes in their relative wages. By exploiting variation from a Swedish tax reform, we estimate the elasticity of substitution in parental childcare for the whole population and for demographic groups potentially adhering to differently binding norms. We find that immigrant, married and male breadwinner couples, as well as couples with a male first-born, react more strongly to tax changes that induce a more traditional allocation of spouses' time, while the respective counterpart couples react more strongly to tax changes that induce a more egalitarian division of labor.

JEL-Code: D13, H24, J22

Keywords: Home production, taxes, gender identity, gender gaps.

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1 Introduction

The role played by gender identity norms has attracted increasing attention in the study of gender gaps (Bertrand, 2010). By prescribing appropriate behavior for men and women and inducing utility costs for deviating from underlying norms (Akerlof and Kranton, 2000), gender identity shapes payoffs from several economic actions and potentially feeds into gender gaps in occupational choice, time use and earnings, among other outcomes. As such norms typically evolve very slowly, their persistence correlates well with the slowing convergence in gender gaps since the 1990s in the US and other high-income countries, and several studies have detected significant relationships between gender stereotypes and women's aspirations and marital outcomes, with consequences for their labor force participation and earnings.[1]

By the very definition of identity norms, individuals are willing to bear a cost to behave in line with their adopted norms. For example, in a couple that values the male breadwinner model, the wife may underinvest in her career, to the detriment of household income. However, the simple observation of the household and labor market investments of spouses may not be fully informative of their adopted norms, as they typically result from a combination of norms and economic incentives, most notably wage differentials. A natural test of the importance of gender norms would require to observe changes in individual behavior after a change in the market penalty for adopting those norms. For example, a narrowing of the gender wage gap gives couples the incentive to reallocate some of the wife's working time from the household to the market and, conversely, some of the husband's working time from the market to the household. The intensity of such reallocation, which is directly related to the substitutability of spousal inputs in domestic work, is inversely related to the strength of couple's norms regarding gender roles in the market and the household.

Our paper aims at reproducing this ideal setting to investigate behavioral prescriptions regarding the gender allocation of home production in general, and of childcare in particular. To this purpose, we exploit variation in after-tax wages generated by the introduction of the Earned Income Tax Credit (EITC) in Sweden in 2007, and administrative information on parental childcare time available in registry data. The Swedish EITC reduced the marginal

[1] See, among others, Fernandez et al. (2004), Fortin (2005, 2015), Bertrand et al. (2015, 2016), Bursztyn et al. (2017, 2018) and Folke and Rickne (2019).

tax rate by about 3.2 percentage points (with slight local variation) for low-mid level earnings, from a baseline of about 34%. Thanks to an individual-based tax system, the change in the tax schedule produced by the EITC generates independent changes in the marginal tax rates of spouses, depending on their respective earnings. Based on these changes, we identify the effect of economic incentives on the spousal division of home production.

Information on home production is obtained from administrative sources in the form of Temporary Parental Leave (TPL), available to either spouse in order to care for a sick child during working hours.[2] Parents of children aged between eight months and twelve years are entitled to up to 120 days of TPL per year, which is only partly compensated by the social security system, and is recorded in administrative data for social security purposes. According to the Swedish Level of Living Survey, fathers' share of TPL is positively and significantly correlated with fathers' share of overall household work, which motivates our use of TPL as a proxy for home production.

Our empirical specification is derived from a household model in which spouses jointly choose their time investments in market work and home production. Labor supplied to the market earns an after-tax wage determined by the EITC, while spouses' domestic inputs deliver a household public good (childcare). We argue that a couple's preferences on how spouses should contribute to the household public good stem from its gender norms.[3] Specifically – and abstracting from technological constraints, to which we come back below – the substitutability of spousal inputs in home production is the key parameter that captures the strength of norms. Following a change in their respective tax rates, spouses reallocate home (and market) work according to their household optimization problem. For a given tax change, the gain in disposable household income increases with the substitutability between spousal inputs in home production, which would allow couples to more elastically reallocate their time in line with changed economic incentives. High substitutability indicates that a couple is willing to respond to economic incentives, attaching low importance to specific combinations of spousal inputs' in home production. Low substitutability indicates instead

[2] TPL is distinct from Standard Parental Leave (SPL), which is used by parents to look after a baby or young child, irrespective of sickness status, and is typically taken up within two years since a child's birth.

[3] Our setting is agnostic about the source of norms, which may reflect intrinsic beliefs and/or social reputation issues. The field experiment by Bursztyn et al. (2018) builds on the difference between these two.

that a couple has strong preferences regarding inputs' combinations, to the detriment of disposable income.

We estimate that, in our sample of Swedish parents with children aged 3-11, the elasticity of substitution in home production inputs is about 0.8. This value is substantially lower than existing estimates of the elasticity of substitution between gender inputs in the labor market, with most values ranging between 2 and 5.[4] However, there is no obvious reason to expect that, in the absence of binding norms, the elasticity of substitution in home production should be similar to the corresponding estimate for market production, and the use of different methodologies makes it difficult to compare the household and the market.

In the absence of a clear benchmark, our discussion of gender norms will mostly hinge on the observed variation in the elasticity of substitution across the population of Swedish households. First, we look into variation in the elasticity across groups of the population that potentially differ in their attitudes towards gender roles. We consider demographic groups defined by country of origin, spousal shares of household earnings, marital status, and gender of their children. Previous work has often highlighted some of these dimensions as strongly correlated to gender identity norms (Fernandez, 2007; Bertrand et al., 2015; Warner and Steel, 1999; among others).

Second, we estimate distinct elasticity parameters by exploiting variation from husband's and wife's treatment in turn. The intuition for this distinction is the following. An increase in the husband's after-tax wage, generated by a fall in his tax rate, would induce some labor reallocation towards traditional gender roles, by encouraging him to work more in the market and less in the household, and vice versa for the wife. On the contrary, an increase in the wife's after-tax wage, generated by a fall in her tax rate, would induce labor reallocation away from traditional gender roles. By comparing responses to a fall in husbands' and wives' tax rates across population groups, one can shed light on the importance of "traditional" and "untraditional" gender norms.

We find that non-Nordic couples, male-breadwinner couples, married (as opposed to cohabitating) couples, and couples with a first-born son tend to react more strongly to a reduction in the husband's tax rate, while the respective counterpart couples tend to react

[4] See Hamermesh (1993), Weinberg (2000), Acemoglu et al. (2004) and Johnson and Keane (2013).

more strongly to a reduction in the wife's tax rate. Note that, for each of the population splits considered, the wife takes more TPL days than the husband at baseline. Our results thus imply that couples in the first set are more likely to exacerbate gender disparities in childcare time when incentives push in that direction, while they are not as responsive to incentives that would induce a more equal gender division of labor. The opposite is observed for counterpart couples, who appear to be characterized by less traditional gender norms.

The interpretation of our findings hinges on the assumption that the elasticity of substitution between home production inputs reflects spouses' preferences or beliefs about appropriate gender roles in the household. To rule out alternative channels based on technological substitutability of home production inputs, or constraints to input substitution originating in spouses' respective workplaces, we follow a number of steps. First, we note that technological substitutability is unlikely to drive systematic differences in elasticities that we observe across population groups. Second, we select couples whose youngest child is 3 or older, as mothers may have a biological comparative advantage in the care of younger children, and we control in our regressions for parents' specialization in childcare at birth, which may induce comparative advantages later in a child's life. Third, we show that our elasticity estimates are invariant with respect to children's age in the range 3-11, over which parental comparative advantages (if any) are expected to decline. Finally, we show that our results are robust to the inclusion of controls for spouses' occupations and workplace characteristics predictive of a family-friendly work environment, and do not systematically vary with such measure of family friendliness.

By combining variation from tax reforms and the time allocation of spouses to detect evidence of binding gender norms, this paper makes a contribution to two strands of literature. First, it is related to a recent and growing literature on the role of gender identity norms in the marriage market. Bertrand et al. (2015) have estimated the marriage penalty of deviating from the male breadwinner/female housekeeper model, while Bursztyn et al. (2017) find that single women may avoid career-enhancing actions whenever these signal traits possibly penalized in the marriage market. In our paper, we relate the concept of gender norms to the substitutability of gender inputs in home production, and design an empirical strategy that allows us to identify this parameter on administrative data. Also, we emphasize variation in identity norms across couples, which we relate to a few demographic characteristics, rather than across genders. With assortative matching in the marriage market, an important dimension of gender norms may be the variation in decisions and behavior across couples – with direct consequences on children's outcomes – rather than between men and women.

Second, this paper contributes to a broad literature on the relationship between taxation and home production. A strand in the macroeconomic literature has highlighted this relationship as an important factor driving structural transformation and employment growth (see, among others, Rogerson, 2007 and Ngai and Pissarides, 2007), based on time-series and/or cross-country variation in the tax wedge, coupled with self-reported time use data. The recent literature on labor supply has instead estimated the impact of taxes on earnings, by exploiting variation from tax reforms and information on taxable earnings from administrative sources (see for example Gruber and Saez, 2002). Closely related to our work, Gelber (2014) estimates the response of spouses' earned income to tax changes in Sweden. Our methodology is similar to Gruber and Saez (2002) and Gelber (2014), and complements their work with a focus on home production, which offers a direct perspective on gender identity norms. To our knowledge, this analysis provides the first causal estimates of the impact of taxation on the household division of home production, an effect which has been theoretically studied by Alesina et al. (2011).

The paper is organized as follows. Section 2 lays out a model of home production and links the elasticity of substitution between spousal inputs to gender norms. Section 3 describes the Swedish institutional background and the data sources. Section 4 builds our econometric framework and discusses identification. Section 5 provides estimation results on both the whole sample and distinct demographic groups. Section 6 discusses alternative channels for our findings and Section 7 concludes.

2 A model of home production and gender norms

2.1 The couple's optimization problem

Households enjoy a home-produced good H and a market-produced good C and allocate spouses' time between market work and home production. The household good H is produced with a combination of spousal inputs according to the following CES specification:

$$H = \left[sH_m^{\frac{\beta-1}{\beta}} + (1-s)H_f^{\frac{\beta-1}{\beta}} \right]^{\frac{\beta}{\beta-1}}, \tag{1}$$

where $j = m, f$ denotes spouses' gender and $0 \leq H_j \leq 1$ is the share of time devoted by spouse j to home production. s and $1-s$ are parameters related to the relative efficiency of spouses in home production and β represents the elasticity of substitution between spousal inputs. We interpret β as representing couples' *preferences* about the combination of spousal time in home production and we do not explicitly model technological substitutability between spousal inputs for two reasons. First, empirically we can only identify one substitution parameter, hence our interpretation based on preferences implicitly assumes that technological substitutability would not be binding (for example because, from a technological point of view, spousal inputs would be perfect substitutes in the care for 3-11 year olds, in which no biological comparative advantages are involved). Second, the empirical evidence that will be discussed in Sections 5.2 and 6.1 speaks against a technology-based interpretation of our estimated elasticity of substitution.

In the labor market, the productivity of one unit of time of spouse j is P_j. With perfectly competitive labor markets, wages for each spouse are equal to P_j and the associate earnings Y_j decrease with the share of time devoted to home production:

$$Y_j = P_j(1 - H_j). \tag{2}$$

Each spouse faces a tax schedule $T(Y_j)$, which may be progressive.

Couples choose the optimal time allocation of spouses in order to maximize joint utility. Their optimization problem is given by:

$$\max_{H_m, H_f, C} U(H, C) \tag{3}$$

$$\text{s. to.} \quad C \leq [Y_m - T(Y_m)] + [Y_f - T(Y_f)] \tag{4}$$

where H is given by (1) and Y_j is given by (2), with first-order conditions:

$$\begin{aligned} \frac{\partial U}{\partial H} s H_m^{-\frac{1}{\beta}} H^{\frac{1}{\beta}} &= \lambda P_m(1-\tau_m) & (5) \\ \frac{\partial U}{\partial H}(1-s) H_f^{-\frac{1}{\beta}} H^{\frac{1}{\beta}} &= \lambda P_f(1-\tau_f) & (6) \\ \frac{\partial U}{\partial C} &= \lambda, & (7) \end{aligned}$$

where $\tau_j = T'(Y_j)$ denotes the marginal tax rate and λ is the Lagrangean multiplier. Expressions (5) and (6) represent the compensated demands for home production inputs, as a function of utility H. At given H, home production for each spouse decreases with own labor productivity in the market and net-of-tax income share (NTS), $1-\tau_j$. The elasticity of demand for home production inputs with respect to their respective NTS represents the substitution effect of a change in the tax rate, and is given by $\partial \ln H_j / \partial \ln(1-\tau_j) = -\beta$. Combining (5) and (6) implies that the marginal rate of substitution between spousal inputs in home production equals the ratio of their opportunity costs

$$\frac{s}{1-s}\left(\frac{H_m}{H_f}\right)^{-\frac{1}{\beta}} = \frac{(1-\tau_m)P_m}{(1-\tau_f)P_f}. \tag{8}$$

Taking logs on both sides of (8), we obtain

$$h_m - h_f = \alpha + \beta(\sigma_f - \sigma_m) + \beta(p_f - p_m), \tag{9}$$

where lower case letters are used to denote logs, $\alpha = \beta \ln\left(\frac{s}{1-s}\right)$ and $\sigma_j = \ln(1-\tau_j)$. This expression shows that the relationship between the spousal gap in home production and the NTS gap hinges on the elasticity of substitution β. As the female-male gap in (log) NTS, $\sigma_f - \sigma_m$, increases with the male-female tax gap, $\tau_m - \tau_f$:

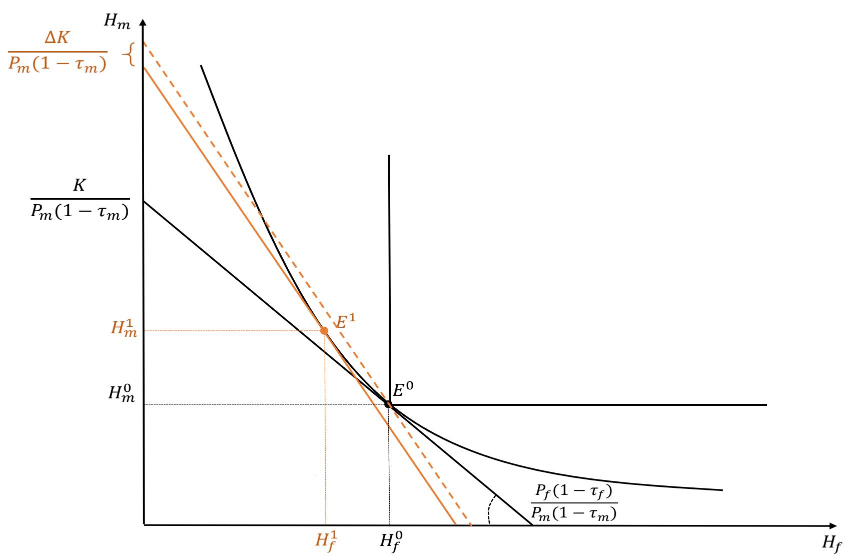
$$\text{sgn}(\beta) = \text{sgn}\left[\frac{\partial(h_m - h_f)}{\partial(\sigma_f - \sigma_m)}\right] = \text{sgn}\left[\frac{\partial(h_m - h_f)}{\partial(\tau_m - \tau_f)}\right].$$

The optimal time allocation can be represented graphically at the tangency between an indifference curve whose shape is given by equation (1), for $H = \bar{H}$, and a budget constraint representing the opportunity cost of producing $\bar{H}$, whose slope is given by the gender ratio in net wages:[5]

$$K = (1 - \tau_m)P_m H_m + (1 - \tau_f)P_f H_f. \quad (10)$$

This equilibrium is represented by point E^0 in Figure 1, where the wife supplies H_f^0 to home production, the husband supplies H_m^0, and the cost of home production K can be read on the intercept of the budget constraint on the vertical axis.

Figure 1: The impact of a cut in τ_f on couples' time allocation under weak and strong norms



Notes: The figure illustrates the optimal time allocation of two couples, characterized, respectively, by $\beta > 0$ (smooth indifference curve) and $\beta \to 0$ (right-angle indifference curve). Their initial time allocation is identical, and is represented by point E^0. Following a cut in τ_f, the time allocation of the $\beta > 0$ couple moves to position E^1, while the time allocation of the $\beta \to 0$ couple remains unchanged.

2.2 Gender norms and the elasticity of substitution

Let's now compare two couples, characterized by different values of β and an equal value of the parameter s. The first couple has $\beta > 0$ and its preferences can be described by the smooth indifference curve in Figure 1. The second couple has instead Leontieff preferences, with $\beta \to 0$, represented by the right-angle indifference curve. In this example we assume that the two couples have an identical time allocation at baseline, represented by point E^0.

[5] To ease graphical exposition we represent a case of proportional taxation, leading to a linear budget constraint.

Consider a tax reform that reduces the female marginal tax rate, τ_f, and thus increases the gender tax gap, $\tau_m - \tau_f$. The budget constraint becomes steeper and, to achieve the initial level of utility, the time allocation for the first household moves to point E^1, with a reduction in H_f and an increase in H_m. The cost of enjoying a given level of utility has now increased, as illustrated by the higher intercept of the budget line, because the opportunity cost of one home production input has increased. The optimal time allocation for the second couple is instead unaffected by the tax change, as spouses are unwilling to alter the proportion of spousal inputs due to $\beta \to 0$. This couple faces a higher opportunity cost of home production than the first household, who is willing to make some input substitution in response to a relative wage change. This higher cost represented by the ΔK term on the vertical axis.

In our set-up, the differential reaction of the two households to tax changes reflects their different gender identity norms. We argue that the second couple, by not responding to economic incentives, adheres to stricter norms regarding the combination of spousal inputs, and is willing to bear a higher opportunity cost of home production, according to its preferred combination of spousal inputs. In doing this, the second couple leaves some disposable income "on the table", which is instead pocketed by the first couple thanks to its willingness to adjust time allocation in response to economic incentives.

To give a rough sense of magnitudes, one can attempt to evaluate the loss of disposable income, ΔK, following a tax change, for alternative values of β. If one calibrates K to the opportunity cost of TPL, the magnitudes involved are tiny, because couples take on average 8.6 days of TPL per year, which correspond to $8.6/(2 \times 251) = 1.71\%$ of their combined working days.[6] But conclusions differ if this framework is applied to the allocation of overall home production time, which amounts to 4 and 4.9 daily hours for fathers and mothers, respectively (SCB, 2012). Using full-time equivalent earnings from the Swedish Wage Structure Statistics, the online Appendix A provides a back-of-envelope calculation of ΔK for a hypothetical couple with Leontieff preferences. Following a cut in the wife's marginal tax rate in line with the EITC, this couple would bear a 13% higher opportunity cost of home production than a couple with $\beta = 1$, and a 21% higher opportunity cost than a couple with $\beta = 2$, where such opportunity cost evaluated at 2006 wages was about 1,223

[6] Year 2006 had 251 working days in Sweden according to https://antal.arbetsdag.se/

Swedish Kronas (SEK) per day (corresponding to approx 130 USD).

Note that our approach to evaluate the strength of gender norms never hinges on the observed time allocation of couples at baseline, but only on the response of such allocation to changes in economic incentives. By estimating the elasticity of substitution separately for various demographic groups, we aim to shed light on couples' characteristics that are more conducive to stringent gender norms.

In the example of Figure 1, the couples considered have symmetric reactions (or lack thereof) to either an increase or a decrease in the tax gap, and this follows directly from the assumed production function (1). But it may be realistic to allow for asymmetric adjustment in the time allocation of spouses, depending on whether the husband or the wife experiences a fall in their tax rate. Asymmetric reactions may themselves stem from gender norms. To see this, note that a cut in the wife's tax rate would induce her to work more in the market and less in the household, going against the traditional allocation of labor, while a cut in the husband's tax rate would induce opposite changes and thus reinforce the traditional allocation of labor. The relative strength of these two tax responses may tell about gender norms in so far as it measures a couple's willingness to go along or against the traditional allocation of labor.

An extreme example is a case in which a couple responds with an elasticity of substitution $\beta > 0$ to a cut in (say) the husband's tax rate, and with a zero elasticity to a cut in the wife's tax rate. This example can be easily introduced in our framework by setting a limit to the husband's contribution in home production, i.e.

$$H = \left[(1-s)H_f^{\frac{\beta-1}{\beta}} + s[\min(H_m, H_m^0)]^{\frac{\beta-1}{\beta}}\right]^{\frac{\beta}{\beta-1}}, \tag{11}$$

where H_m^0 represents the husband's home production time at baseline. Equation (11) implies that any increase in H_m above H_m^0 would be wasted and hence the couple is not going to substitute male to female home production whenever τ_f falls. In this case the couple's indifference curve would coincide with the smooth indifference curve in Figure 1 to the south of E^0 (for $H_m \leq H_m^0$), but would be vertical to the north of E^0 (for $H_m > H_m^0$). Thus the couple would still react to cuts in τ_m, but would not react to cuts in τ_f. Viceversa, a couple that would not increase H_f above a baseline of H_f^0 would react to cuts in τ_f, but not to cuts in τ_m. Whenever we allow for asymmetric adjustment to cuts in τ_m and τ_f we define

$$\beta^+ = \left.\frac{\partial(h_m - h_f)}{\partial(\sigma_f - \sigma_m)}\right|_{d\tau_f<0} \quad \text{and} \quad \beta^- = \left.\frac{\partial(h_m - h_f)}{\partial(\sigma_f - \sigma_m)}\right|_{d\tau_m<0}.$$

A couple conforms to a traditional gender identity norm if $\beta^+ < \beta^-$; while it conforms to an untraditional gender identity norm if $\beta^+ > \beta^-$.

A potential confounding factor in the interpretation of asymmetric adjustment to cuts in τ_m and τ_f is related to differences in the constraints that spouses face in their respective workplaces: depending on professional roles, one spouse may face higher career costs than the other following work absences. Differences in constraints could induce a kink in the budget constraint in correspondence of the initial allocation E^0 in Figure 1. For example, if the husband experiences a wage cut whenever he spends more than H_m^0 time in the household, the budget line would be flatter to the north of H_m^0, and again the couple would still react to a cut in τ_m, but not to cuts to τ_f. While similar to the previous case, the asymmetric adjustment of the couple's time allocation in this case would be driven by workplace constraints rather than gendered norms. In our empirical analysis we will cater for differences in professional constraints by controlling for workplace characteristics and the occupation of individuals. We will come back to this point in detail in Section 6.

To summarize, our empirical set-up will allow for differences in the elasticity parameters both across and within types of couples. For any two couple types denoted by $\pi = \mathcal{T},\mathcal{U}$ we can identify β_π^+ and β_π^-. Based on within-type comparisons, $\beta_\pi^- > \beta_\pi^+$ would indicate that type-π couples respond more strongly to tax changes that reinforce a traditional allocation of labor, and viceversa for $\beta_\pi^- < \beta_\pi^+$. Based on cross-type differences, $\beta_\mathcal{T}^- > \beta_\mathcal{U}^-$ would indicate that type-$\mathcal{T}$ couples follow traditional norms more closely than type-$\mathcal{U}$ couples, while $\beta_\mathcal{U}^+ > \beta_\mathcal{T}^+$ would indicate that type-$\mathcal{U}$ couples follow untraditional norms more closely than type-$\mathcal{T}$ couples. Finally, the double difference $(\beta_\mathcal{T}^+ - \beta_\mathcal{T}^-) < (\beta_\mathcal{U}^+ - \beta_\mathcal{U}^-)$ indicates that type-$\mathcal{T}$ couples behave overall more traditionally than type-$\mathcal{U}$ couples.

2.3 From the model to the data

Equation (9) summarizes the key model result that we bring to the data, allowing us to identify β from the response of the male-female gap in (log) home production to changes in the female-male gap in (log) NTS. The steps leading to (9) are based on compensated demands for home inputs (5) and (6), whose elasticity of substitution β measures (the negative of) the substitution effect of a change in the tax rate. Changes in actual (uncompensated) demand, which we measure in the data, also feature income effects of tax changes. The change in the gap in uncompensated home production demands is then given by

$$\Delta(h_m - h_f) = \beta\Delta(\sigma_f - \sigma_m) + \gamma_m\Delta\theta_m - \gamma_f\Delta\theta_f + \beta\Delta(p_f - p_m), \qquad (12)$$

where $\Delta\theta_j$ approximates the income effect of a tax change for spouse j and γ_j is the associated parameter. Following Gelber (2014), we measure income effects using each spouse's virtual income, which represents the intersection of the individual's extended budget segment with the y-axis, in a space that has earnings on the horizontal axis and disposable income on the vertical axis. This is the appropriate measure of income effects in the presence of progressive taxation, leading to a nonlinear budget set (Burtless and Hausman, 1978). Changes in virtual income encompass changes in marginal tax rates, changes in (net) benefits and changes in (net) capital income – all of which are taken into account in the construction of $\Delta\theta_j$.

The change in the equilibrium time allocation (12) leads naturally to the following empirical specification for the estimation of the elasticity of substitution β:

$$\Delta(h_{imt} - h_{ift}) = \beta\Delta(\sigma_{ift} - \sigma_{imt}) + \gamma_m\Delta\theta_{imt} - \gamma_f\Delta\theta_{ift} + \gamma X_{it} + (u_{imt} - u_{ift}), \qquad (13)$$

in which i denotes couples, t denotes time, X_{it} are observable determinants of the change in the gender gap in market productivity $\Delta(p_{ift} - p_{imt})$, and $(u_{imt} - u_{ift})$ captures time varying, unobservable components of the same change. To avoid dropping observations for which $H_{imt} = 0$ or $H_{ift} = 0$ we compute the dependent variable in (13) as $\Delta(\ln(H_{imt} + 1) - \ln(H_{ift} + 1))$.[7]

We will discuss the empirical challenges that arise from estimating (13) after describing

[7] Our results are generally robust to other choices, such as adding 0.1 or 0.5 before taking logs.

the data and discussing details of the EITC reform, which will shape our empirical strategy.

3 The Swedish institutional setting and data

Sweden represents a valuable testing ground for our approach to the study of gender identity for several reasons. First, the 2007 EITC provides exogenous variation in the NTS of spouses and thus in the cost of following gendered norms. Second, Swedish register data contain longitudinal information on how parents share the time required to care for sick children during their regular working hours, under the TPL program. Although this is only one component of the entire set of home duties that spouses typically share, it is a good proxy for the gender division of household work, it is measured precisely on data normally unavailable for other countries, and can be linked to earnings and taxes. Third, while Sweden has one of the highest female employment rates and among OECD countries, as well as relatively strong attitudes in favor of gender equality (Olivetti and Petrongolo, 2017), previous work has found evidence of glass ceiling effects (Breen and Garcia-Penalosa, 2002; Albrecht et al., 2003, 2015), large motherhood penalties (Angelov et al., 2016; Kleven et al., 2019), and higher divorce rates for women who enter politics (Folke and Rickne, 2019). These pieces of evidence may suggest important heterogeneities in the type and strength of gender norms across different population groups. The rest of this section describes the data sources and population under investigation, the 2007 EITC reform and the TPL scheme.

3.1 Data and sample

We use data drawn from several administrative registers compiled by Statistics Sweden, spanning the years 2004-2007. Our primary dataset is the LOUISE register, which covers the resident population of Sweden aged 16-75 and contains information on demographics (age, gender and household composition), educational qualifications and a large set of income-related variables. Specifically, it provides information on gross annual labor earnings, including zeros, as well as all government transfers (TPL benefits, SPL benefits, sickness insurance, unemployment insurance, etc.) and capital income (interest payments, capital gains on stocks, property sales, etc.). Based on this information, we construct measures of labor and non-labor income.

We match records from the LOUISE register to the multi-generational register, linking parents and children and providing the month and year of all births, and to the TPL register, compiled by the Swedish Social Insurance Agency, containing start and end dates of TPL spells. Our analysis focuses on couples with dependent children, in which both parents participate in the labor market and are eligible for TPL. To this purpose we restrict our sample to individuals who:

- Live in a couple (married or cohabiting) and have labor earnings above 39,700 SEK in 2006.[8] This restriction ensures that both spouses have sufficient labor market attachment to be potentially affected by TPL entitlement. Non-working individuals would not be eligible, while individual working very few hours may not need to rely on TPL to care for a sick child.
- Have their youngest child born between 1996 and 2003, i.e. aged 3-10 in 2006. Parents of younger children may still use SPL for childcare purposes, plus the substitutability between parental inputs in the care of younger children may conflate both biological gender differences and preferences. Once a child turns 12, parents are no longer eligible for TPL.

We work with a sample of 172,117 couples who fulfill these criteria. Summary statistics on this sample are presented in Table 1. In the representative couple, the husband is 40 years old and the wife is 38 years old, with annual labor earnings of 366,000 and 236,000 SEK respectively. On average, couples jointly take-up 8.6 days of TPL per year, of which 2.9 are taken by the husband and 5.7 are taken by the wife. In 18% of couples, neither spouse takes TPL; in 5% of couples spouses take identical (positive) levels of TPL; in 57% of couples the wife takes more TPL than the husband; and in 21% of couples the husband takes more TPL than the wife.

[8]For simplicity, in what follows we use the terms "spouse", "husband" or "wife" for all cohabiting individuals, irrespective of their marital status. The earnings limit that we impose corresponds to the 2006 Basic Amount, which is set (and annually revised) by the Government to benchmark welfare benefits. As of March 2019, the USD to SEK exchange rate is 9.4 and the EUR to SEK exchange rate is 10.6.

Table 1: Summary Statistics

		Mean	SD	Min	Max
Males:	Age	40.4	5.4	21	70
	Education (%)	0.40	0.49	0	1
	Labor earnings	366	246	40	29,495
	Capital income	10	1,042	-3,348	400,010
	Benefit payments	11	104	0	294
	Marginal tax rate (%)	45.4	9.5	23.1	59.2
	Days of TPL	2.9	5.0	0	180
Females:	Age	38.2	4.8	19	58
	Education (%)	0.48	0.50	0	1
	Labor earnings	236	123	40	3,955
	Capital income	-9	108	-488	18,236
	Benefit payments	17	28	0	315
	Marginal tax rate (%)	37.9	7.5	23.1	58.7
	Days of TPL	5.7	7.4	0	259
Couples:	Nr. of children aged 3–10 in 2006	1.6	0.6	1	6
	Age of youngest child in 2006	6.3	2.3	3	10
	Male-female gap in taxes (%)	7.4	10.9	-31.6	31.7
	Combined days of TPL	8.6	10.1	0	290
	Male-female gap in TPL	-2.8	7.7	-257	172
Share couples with:	$\text{TPL}_m + \text{TPL}_f = 0$	0.18			
	$\text{TPL}_m = \text{TPL}_f > 0$	0.05			
	$\text{TPL}_m < \text{TPL}_f$	0.57			
	$\text{TPL}_m > \text{TPL}_f$	0.21			
Observations		172,117			

Notes: The table summarizes couples' characteristics as of 2006. All monetary values are expressed in thousand SEK. "Education" takes value 1 if an individual has two years or more of post-secondary education, 0 otherwise. "Benefit payments" include SPL payments, TPL payments, sickness benefits, care allowance, training allowance, unemployment benefits, and rehabilitation compensation.

3.2 The 2007 Earned Income Tax Credit reform

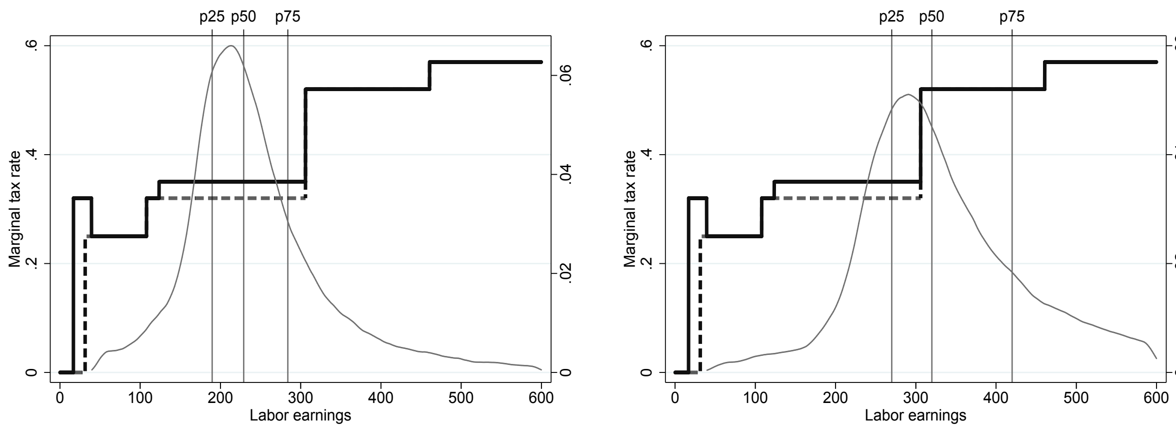
The EITC was introduced in the Swedish tax system in January 2007[9] by the centre-right Government coalition, Alliansen, to incentivize labor participation of low- and middle-income earners. The EITC was first highlighted in the Alliansen's election manifesto in August 2006 (Riksrevisionen, 2009), and its design was outlined in October 2006 within the 2007 budget bill, once Alliansen won the election.

There are two layers of taxation in Sweden, at the municipal and national levels. Both municipal and national taxes are levied on individual taxable earnings, given by gross earnings minus a basic deduction. The EITC introduced additional deductions for low- and middle-income earners that were solely a function of earnings and, unlike in the US and the UK, were unrelated to marital status or the presence of qualifying children in the household. An individual's tax liability is automatically reduced by the tax credit, if eligible, thus take-up is universal. After being emphasized as one of the Alliansen's flagship policies, the incidence of the EITC was salient to employees from their first 2007 pay slip.

Municipal tax rates are proportional, on average 31.6% in 2006 (ranging from 28.89%-34.24%). The national tax rate is progressive and is phased in at 20% for earnings above 306,000 SEK, rising to 25% for earnings above 460,600 SEK. The solid line in both panels of Figure 2 plots marginal tax rates in 2006 for a representative municipality with a local tax rate of 31.6%. Earnings below 306,000 SEK are only subject to municipal taxes but, due to a complex system of deductions, the tax schedule between 0 and 306,000 SEK has the irregular shape represented by the solid line in Figure 2. Beyond 306,000 SEK, the combination of municipal and national taxes yields a 51.6% marginal tax rate up to 460,600 SEK, and 56.6% thereafter.

[9]The EITC was later modified and reinforced in 2008, 2009 and 2010. We end our sample period in 2007 to focus on clean variation from a single tax change.

Figure 2: Marginal tax rates before and after the EITC and distributions of spouse earnings



Females Males

Notes: In both panels the marginal tax rate is displayed on the y-axis and labor earnings are displayed on the x-axis (in thousand SEK). The solid line represents the tax schedule in 2006. The dashed line shows changes to the tax schedule introduced in 2007 by the EITC reform. All marginal taxes are calculated based on a 31.6% municipal tax rate. The left and right panels superimpose the distribution of female and male earnings, respectively, to the tax schedule. Vertical lines indicate the 25th, 50th and 75th percentiles in the earnings distributions, respectively.

The EITC introduced additional deductions that lowered the marginal tax rate in two intervals of the earnings distribution, as represented by the dashed line in Figure 2.[10] For low earnings between 17,000-32,000 SEK, the marginal tax rate was cut to 0. For intermediate earnings between 123,500-306,000 SEK, the marginal tax rate was decreased by 3.2 percentage points on average (ranging from 2.9-3.4 points across municipalities). In the representative municipality, the marginal tax rate was cut by 3.16 points from 34.76% (obtained from the combination of municipal tax rates and deductions) to 31.6%. Given our sample selection criteria, we are not exploiting variation from large tax changes for very low earners, but only from small tax changes for middle earners. The left panel in Figure 2 superimposes the distribution of female labor earnings to the tax schedule, showing that the treatment range considered is centered around median female earnings. For men (right panel), most of the treated incomes lie below the median.

To have a sense of changes in the unit cost of TPL, consider an individual with earnings in the treated range 123,500-306,000 SEK, receiving a tax credit of 3.16 percentage points.

[10]The Online Appendix B gives further detail on the incidence of the EITC along the distribution of taxable earnings and shows how marginal tax rates are computed before and after its introduction. See also Edmark et al. (2016) and DalBo et al. (2019) for descriptions of the EITC.

Before the EITC, she would give up 13% of her daily income for taking one day of TPL. After EITC, she would give up 16.2% of her daily income.[11] This 24.2% increase in the opportunity cost of TPL may induce the household to reallocate TPL from the treated spouse to the untreated one. On the other hand, given that the average couple takes 8.6 days of TPL a year, the change in the opportunity cost of TPL represents a negligible component of household earnings, leaving several dimensions of household finances largely unaffected (wealth, consumption smoothing, spousal bargaining power, etc.), and we would not need to model these dimensions explicitly in our analysis.

Given individual taxation, Swedish couples may have experienced an increase, decrease or no change at all in their tax gaps, depending on spouses' baseline earnings. To illustrate the incidence of treatment, we compute changes in simulated tax rates, given by the tax change an individual would experience at constant earnings, which is unaffected by endogenous labor supply responses to the EITC (see Gruber and Saez, 2002, and Gelber, 2014). Simulated tax changes are computed by applying the 2007 tax schedule to 2006 earnings,

$$\Delta\tilde{\tau}_{ij07} = \tilde{\tau}_{ij07} - \tau_{ij06} = T'_{ij07}(Y_{ij06}) - T'_{ij06}(Y_{ij06}) \tag{14}$$

and can be used to construct simulated changes in the net-of-tax shares (NTS) $\Delta\tilde{\sigma}_{ij07} = \ln(1 - \tilde{\tau}_{ij07}) - \ln(1 - \tau_{ij06})$.

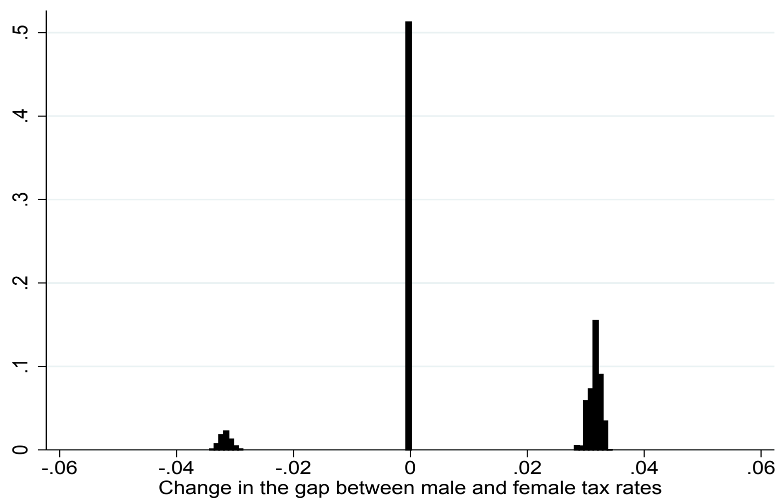
Figure 3 shows the distribution of changes in simulated tax gaps. 51% of couples, represented by the central spike in the distribution, experience no change in their tax gap $\tau_{im07} - \tau_{if07}$, either because neither spouse is affected by the EITC (see e.g. spouses 1 and 4 in Figure 4), or both spouses are affected in the same way (e.g. spouses 2 and 3). These couples represent our control group. The remaining 49% of couples are treated. Among these, some experience an increase in the tax gap of 3.2 percentage points on average, following a corresponding reduction in the female tax rate, leading to a 4.7% change in the gap in log NTS. Wives in these couples have earnings in the treated region (say Y_2 or Y_3 in Figure 4), and husbands have earnings below or above this region (Y_1 or Y_4, respectively). These couples represent 42% of our sample, as shown by the mass on the right-hand side of the

[11] A person with daily earnings equal to y would give up $(1-0.3476)y - 0.8(1-0.3476)y = 0.1305y$ without the EITC, where 0.8 represents the (uncapped) TPL replacement rate, and $(1 - 0.3476 + 0.0316)y - 0.8(1 - 0.316)y = 0.1621y$ with the EITC.

distribution in Figure 3. Finally, 7% of couples (represented by the mass on the left-hand side of the distribution) experience a symmetric reduction in the tax gap, following a reduction in the male tax rate. Husbands in these couples have earnings in the treated region in Figure 4, and wives have earnings below or above.

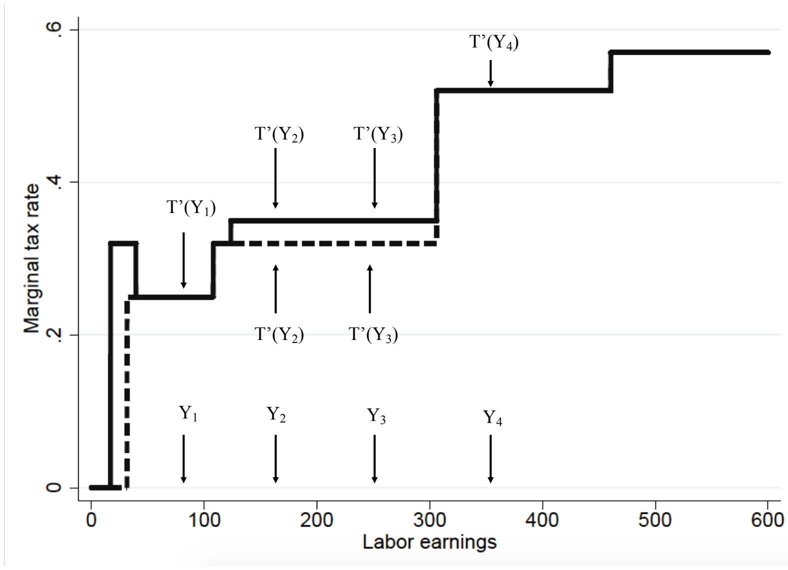
Variation in tax treatment and TPL use across couples will be exploited in Section 4 to identify the elasticity of substitution between spousal inputs in home production.

Figure 3: The distribution of simulated changes in marginal tax rates



Notes: The histogram represents the distribution of changes in the simulated male-female tax gap.

Figure 4: Examples of control and treated spouses



Notes: The marginal tax rate is displayed on the y-axis and labor earnings are displayed on the x-axis (in thousand SEK). The solid line represents the tax schedule in 2006. The dashed line shows changes to the tax schedule introduced in 2007 by the EITC reform. All marginal taxes are calculated based on a 31.6% municipal tax rate. The figure indicates earnings and tax rates for four representative individuals of whom: individuals 1 and 4 experience no tax change, while individuals 2 and 3 experience identical cuts in marginal tax rates.

3.3 The Temporary Parental Leave insurance

The Swedish institutional setting allows us to extract a measure of home production from register data, which can be linked to earnings and tax rates. This is given by TPL, which either parent can use to care for a sick child aged between 8 months and 12 years during their regular working hours. While representing only a portion of overall home production, TPL take-up is directly linked to parenthood and work-life balance considerations, which are one key driver of the gender earnings gap (Kleven et al., 2018, 2019). By linking administrative information on TPL spells to survey based information on time use from the 2000 Level of Living Survey (LNU), Eriksson and Nermo (2010) show that fathers' share of TPL is positively correlated to their share of total home production. We replicate this result on a sample of 2000 and 2010 LNU respondents, selected using the same criteria of our main sample, i.e. dual earner couples with children aged 3 or above, and find that fathers' TPL days are positively and significantly correlated to their share of overall home production, having controlled for total spouses' home production time and their human capital levels.[12]

TPL provides parents with an 80% compensation rate for foregone earnings up to a cap, which in 2007 was applied to monthly incomes of 24,800 SEK and above. Parents are jointly eligible for a maximum of 120 days per child per year, though they are not allowed to take TPL at the same time, with minor exceptions in cases of major illnesses and/or hospitalization.[13] To receive TPL benefits, a parent needs to register a child as sick on the first day of the sickness spell, by phone or online, and from the eighth day a doctor's certificate is required. While the contemporaneous cost of TPL to employees is arguably small, it represents the only component of home production that is clearly visible to employers, and may signal patterns of spousal specialization in home production and shape employers' beliefs about productivity and job attachment.

The use of TPL in Sweden is widespread. In 2016, 458,260 mothers and 353,289 fathers used TPL, respectively, for a total of over 6.3 million days. TPL is more equally shared between parents than SPL, with about 60% of TPL taken by mothers, against three quarters of SPL. In our sample, men and women take on average 2.9 and 5.7 TPL days per year, respectively, and 82% of couples have positive TPL (see Table 1). While TPL represents only a small reduction to individuals' labor supply, its take-up is at an employee's discretion and is less likely to be constrained by optimization frictions that typically interfere with working hours adjustment (see, among others, Chetty, 2012). Importantly, there seems to be little or no competition to TPL use from the market childcare sector in Sweden. As of 2016, only 1.4% of private expenditure for household services was accounted for by childcare services (with cleaning and gardening jointly accounting for 94.7%).[14] This amounts to about 103 million SEK of private expenditure on childcare, against 146 billion SEK of Government expenditure.

[12] Our estimated coefficients imply that a ten-percentage point rise in fathers' share of total home production is associated with one additional half-day of father's TPL.

[13] TPL can be taken for a full day or 75%, 50%, 25% or 12.5% of a day. If parents are unable to provide care, for instance because they are sick themselves, TPL eligibility can be transferred to a third person.

[14] Figures based on tax deductions of individuals purchasing household services on the market.

4 The econometric framework

We bring specification (13) to the data described above. Note that the error term in (13), $u_{imt} - u_{ift}$, is likely to be correlated with the the substitution effect $\Delta(\sigma_{ift} - \sigma_{imt})$ and income effects $\Delta\theta_{ijt}$, as it absorbs the change in the productivity gap $\Delta(p_{ift} - p_{imt})$. Under progressive taxation, $\Delta(p_{ift} - p_{imt})$ is negatively correlated to $\Delta(\sigma_{ift} - \sigma_{imt})$, as higher productivity feeds into higher incomes and marginal tax rates. For the same reasons, $\Delta(p_{ift} - p_{imt})$ is negatively correlated to $\Delta\theta_{ift}$ and positively correlated to $\Delta\theta_{imt}$. More generally, the marginal tax rate faced by an individual is endogenous to his or her labor supply choices, which may in turn be affected by the tax reform.

The 2007 EITC reform generated exogenous changes in spouses' marginal tax rates that can in principle be used to obtain valid instruments for changes in NTS and income effects, i.e. uncorrelated to individuals' labor supply decisions. Conditional on base-year earnings and pre-treatment characteristics of spouses, the change in the simulated NTS gap, $\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})$, provides a potential instrument for the change in the actual NTS gap $\Delta(\sigma_{ift} - \sigma_{imt})$ in equation (13). Similarly, simulated income effects $\Delta\tilde{\theta}_{ij07} = \tilde{\theta}_{ij07} - \theta_{ij06} = \ln[Y_{ij06} - T_{ij07}(Y_{ij06})] - \ln[Y_{ij06} - T_{ij06}(Y_{ij06})]$ could be used as instruments for actual income effects $\Delta\theta_{ij07}$. This strategy, however, opens up two challenges, discussed below.

4.1 Monotonicity

The first issue in using simulated tax changes from the EITC as instruments for actual tax changes in our setting is the violation of the assumption of monotonicity for some earnings ranges. Indeed we find that individuals whose 2006 earnings are just below the 306,000 SEK threshold highlighted in Figure 2 on average experience some earnings growth between any two consecutive years, which pushes them above such threshold. Some of these individuals, who would be eligible for a *cut* in their marginal tax rate of about 3.2 percentage points via the EITC, experience ex-post an *increase* in their actual tax rate of about 17 points. Vice versa for earnings just above the same earnings threshold.

This source of non-monotonicity in our instrument is illustrated in Figure C–1 of the Online Appendix, which plots actual and simulated marginal tax changes by 20,000 SEK bins of the earnings distribution. Panel A refers to men and Panel B refers to women. Grey dots indicate simulated tax changes, and white and black dots indicate actual tax changes during 2005-06 and 2006-07, respectively.[15] For both men and women, in a few bins below the 306,000 SEK threshold, individuals would have experienced a reduction in their tax rate had their income remained at the 2006 level (grey dots), but experienced instead an increase in their actual tax rate due to their increased earnings (black dots). Vice versa, just above the same threshold, the change in the simulated tax rate is null but the actual change is negative. Note that analogous discrepancies between actual and simulated tax changes can be observed in the vicinity of each taxation threshold, and they are not specific to the reform year but also present in 2005-06 (as shown by the white dots). As one would expect, the vertical distance between the 2006-07 and 2005-06 lines is positive where the simulated tax falls, and tends to zero in the other relevant intervals of the earnings support.

Given the violation of the monotonicity assumption in some ranges of the earnings distribution, we identify the impacts of interest from the following intention-to-treat specification, in which we regress the change in the TPL gap on (functions of) simulated tax changes:

$$\Delta(h_{im07} - h_{if07}) = \beta\Delta(\tilde{\sigma}_{if07} - \tilde{\sigma}_{im07}) + \gamma_m\Delta\tilde{\theta}_{im07} - \gamma_f\Delta\tilde{\theta}_{if07} + \gamma X_{it} + (\tilde{u}_{im07} - \tilde{u}_{if07}). \quad (15)$$

4.2 Controlling for the counterfactual evolution of the TPL gap

Estimation of (15) identifies the causal effects of interest if, conditional on an appropriate set of controls, the assignment of couples to alternative tax regimes can be considered as good as random, i.e. one should compare couples that are treated differently but are characterized by a similar evolution of the TPL gap in the absence of a tax reform. While the inclusion of rich controls for base-year earnings may adequately proxy for the counterfactual evolution of the TPL gap, such controls may impair identification in our context, as tax variables on the right-hand side are themselves deterministic functions of earnings (see also Gruber and Saez, 2002 and Gelber, 2014 for a similar discussion). In the absence of earnings' controls, the error term in (15) embodies the counterfactual change in the TPL gap, $\Delta(h_{im07} -$

[15] 2005-06 changes are obtained on a sample that selected on same criteria as those used for our main 2006-07 sample.

h_{if07}|no reform), and the resulting bias in the β estimate depends on its correlation with the regressor $\Delta(\tilde{\sigma}_{if07} - \tilde{\sigma}_{im07})$.

To illustrate possible patterns of correlation, consider first couples in which the husband earns more. Given the incidence of the EITC and the earning distributions of husbands and wives shown in Figure 2, wives in these couples are more likely to be treated than husbands (given the relatively large mass of middle earners in the female distribution and of high-earners in the male distribution), thus $\Delta(\tilde{\sigma}_{if07} - \tilde{\sigma}_{im07}) > 0$. These wives take up the bulk of TPL at baseline, $h_{im06} - h_{if06} < 0$, but – other things equal – such differential tends to shrink over time because (i) total TPL declines with average children's age and (ii) this decline mostly bites on the TPL share of the main TPL provider, implying $\Delta(h_{im07} - h_{if07}|\text{no reform}) > 0$.[16] For a symmetric argument, in female breadwinner couples, the husband is both more likely to be treated and to reduce his TPL contribution when children age, thus $\Delta(\tilde{\sigma}_{if07} - \tilde{\sigma}_{im07}) < 0$ and $\Delta(h_{im07} - h_{if07}|\text{no reform}) < 0$. The positive correlation between $\Delta(\tilde{\sigma}_{if07} - \tilde{\sigma}_{im07})$ and $\Delta(h_{im07} - h_{if07}|\text{no reform})$ would lead to an upward bias in our estimate for β. These are likely scenarios, but other scenarios are of course possible. For example, there are couples in which the husband is both the main earner and the treated spouse, thus $\Delta(\tilde{\sigma}_{if07} - \tilde{\sigma}_{im07}) < 0$, and – as the wife is the secondary earner and primary provider of TPL – over time $\Delta(h_{im07} - h_{if07}|\text{no reform}) > 0$. The resulting negative correlation between the tax treatment and the counterfactual change in the TPL gap would lead to a downward bias in the β estimate.

More in general, if the counterfactual change in the TPL gap is systematically correlated to the baseline earnings gap, which in turn determines spousal treatment, one cannot recover an unbiased estimate for β without controlling for the counterfactual change in the TPL gap. To this purpose, we follow two alternative approaches.

The first approach, which we adapt from Gelber (2014), consists in estimating $\Delta(h_{im07} - h_{if07}|\text{no reform})$ from a parametric relationship between TPL and earnings over the period 2005-06, during which no tax change occurred. We select a 2005 cohort sample based on the

[16]Table C–1 in the Online Appendix shows evidence on these patterns using a sample of couples observed during 2005-06 (when no tax change occurred). Panel A shows that both combined TPL and the TPL gap decline with the age of the youngest child. Panel B shows that the overall decline in TPL is stronger for women than for men as well as for the secondary earner and for the main TPL provider in a couple.

same inclusion criteria defined for our main 2006 cohort sample. This includes individuals living in couple in 2005, whose youngest child is aged 3-10. We then estimate the following specification for the TPL change of each spouse in the 2005 cohort:

$$\Delta(h_{ij06}) = g(y_{if05})\xi_y^{jf} + g(y_{im05})\xi_y^{jm} + g(z_{if05})\xi_z^{jf} + g(z_{im05})\xi_y^{jm} + X_{if05}\xi_x^{jf} + X_{im05}\xi_x^{jm} + v_{06},$$

where y_{ij05} denotes 2005 log real earnings, z_{ij05} denotes log real taxable income (labor earnings plus benefits minus deductions), $g(.)$ denotes a ten-piece spline (with knots at the deciles), and X_{ij05} are observable characteristics.[17] The estimated coefficients $\hat{\xi}_y^{jf}$, $\hat{\xi}_y^{jm}$, $\hat{\xi}_z^{jf}$, $\hat{\xi}_z^{jm}$, $\hat{\xi}_x^{jf}$ and $\hat{\xi}_x^{jm}$ calibrate the evolution of TPL in the absence of tax changes and are used to predict TPL changes for each spouse in the 2006 cohort:

$$\begin{aligned}\Delta_G(h_{ij07}|\text{no reform}) &= g(y_{if06})\hat{\xi}_y^{jf} + g(y_{im06})\hat{\xi}_y^{jm} + g(z_{if06})\hat{\xi}_z^{jf} + g(z_{im06})\hat{\xi}_z^{jm} \\ &+ X_{if06}\hat{\xi}_x^{jf} + X_{im06}\hat{\xi}_x^{jm}, \end{aligned} \tag{16}$$

where the G subscript denotes the Gelber (2014) procedure.

The second approach builds on a non-parametric prediction of $\Delta(h_{im07} - h_{if07}|\text{no reform})$, obtained by matching couples across the 2005 and 2006 cohorts according to their position in the earnings distribution. For each spouse j in couple i in the 2006 cohort, we select the S_{ij} set of spouses in the 2005 cohort whose earnings fall in the same bin (of size 1/25) of the distribution, and live in the same municipality. The predicted changes in TPL for the 2006 cohort in the absence of tax reforms is then given by

$$\Delta_M(h_{ij07}|\text{no reform}) = \mathbb{E}\{\Delta(h_{ij06}|ij \in S_{ij}\}, \tag{17}$$

where the subscript M stands for the matching procedure.

Based on either counterfactual (16) or (17), we construct $\Delta_k(h_{im07} - h_{if07}|\text{no reform})$, $k = G, M$, which we use to residualize the dependent variable in (15) and estimate:

$$\hat{\Delta}_k(h_{im07} - h_{if07}) = \beta\Delta(\tilde{\sigma}_{if07} - \tilde{\sigma}_{im07}) + \gamma_m\Delta\tilde{\theta}_{im07} - \gamma_f\Delta\tilde{\theta}_{if07} + \gamma X_{it} + \epsilon_{i07}, \tag{18}$$

[17] These are: age fixed-effects for each spouse, education fixed-effects for each spouse (7 categories), industry fixed effects for each spouse (58 categories), municipality fixed-effects (289), the number of children aged 3-11 (5 dummy variables), benefit payments for each spouse, total days of SPL taken by the couple for spells before 2006, the share of days of SPL taken by the father, and dummies for marital status, spouses born outside Nordic countries, gender of first child and gender of the main earner in 2006.

where $\hat{\Delta}_k(h_{im07} - h_{if07}) \equiv \Delta(h_{im07} - h_{if07}) - \Delta_k(h_{im07} - h_{if07}|\text{no reform})$.

Whether one uses the Gelber (2014) or matching approaches to construct counterfactuals, the procedure described amounts to a triple difference identification strategy, in which differences across control and treated couples before and after the EITC introduction are benchmarked against the corresponding differences in a period without tax changes. Identification of the effects of interests requires that a parallel trends assumption is satisfied. That is, in the absence of tax reforms, the evolution of the change in the TPL gap should differ at most by a constant between treated and control couples. This assumption holds if $\beta_p = \gamma_{pj} = 0$ in the following placebo regression:

$$\hat{\Delta}_k(h_{im06} - h_{if06}) = \beta_p \Delta_k(\tilde{\sigma}_{if06} - \tilde{\sigma}_{im06}) + \gamma_{pm}\Delta\tilde{\theta}_{im06} + \gamma_{fm}\Delta\tilde{\theta}_{if06} + \gamma X_{it} + \epsilon_{i06}, \qquad (19)$$

where the dependent variable is obtained on the 2005 cohort sample, following the same steps described above to construct $\hat{\Delta}_k(h_{im07} - h_{if07})$.

4.3 Asymmetric responses

Specification (18) allows us to exploit changes in the tax gap to identify β, which is inversely related to the strength of norms. We next allow for asymmetric responses in a couple's TPL gap to an increase and decrease in the tax gap, generated by a reduction in the wife's and husband's tax rates, respectively. We argued in Section 2.2 that a couple's reaction to the wife's tax cut is indicative of the strength of its untraditional gender norms, while its reaction to the husband's tax cut is indicative of the strength of its traditional gender norms. To identify these mechanisms we estimate the following variant of equation (18):

$$\begin{aligned} \hat{\Delta}_k(h_{m07} - h_{f07}) &= \beta^+ \Delta(\tilde{\sigma}_{f07} - \tilde{\sigma}_{m07})|_{\Delta(\tilde{\tau}_{m07} - \tilde{\tau}_{f07}) > 0} + \beta^- \Delta(\tilde{\sigma}_{f07} - \tilde{\sigma}_{m07})|_{\Delta(\tilde{\tau}_{m07} - \tilde{\tau}_{f07}) < 0} \\ &+ \gamma_m \Delta\tilde{\theta}_{im07} - \gamma_f \Delta\tilde{\theta}_{if07} + \gamma X_{it} + u_{07}, \qquad (20) \end{aligned}$$

by imposing a spline in $\Delta(\tilde{\sigma}_{f07} - \tilde{\sigma}_{m07})$, with a knot at 0. Equation (20) is fitted on the whole sample as well as on various sub-samples, described in the next section.

5 Results

5.1 Whole sample

Table 2 presents estimates for the whole sample of couples. Each column in Panels A and B is obtained from a separate regression. Panel A estimates specification (18) with symmetric adjustment to changes in either husbands' or wives' tax rates. The vector of couples' characteristics X_{it} includes all variables listed in footnote 17. In column 1 of Panel A, the dependent variable is the raw change in the (log) TPL gap, i.e. unadjusted for the evolution of the counterfactual TPL gap absent tax reforms, and the resulting β estimate is about 1.4 and highly significant. This corresponds to the double-difference estimate of specification (15), in which we exploit differences over time across treated and control couples. Column 2 introduces an extra layer of differences, as in specification (18), by residualizing the change in the TPL gap with respect to its counterfactual evolution, based on the Gelber (2014) method, and the β estimate falls to about 0.8. A similar estimate is obtained in column 3, in which the dependent variable is residualized using the matching method. As one may have expected from the discussion Section 4.2, the double-difference estimate for β in column 1 is upward biased with respect to estimates in columns 2 and 3 that control for the counterfactual evolution of the TPL gap.

Columns 4-6 report results from the corresponding placebo regressions, estimated over the period 2005-06. We detect a significant placebo estimate in column (4) on the double-difference specification (15), implying that couples whose earnings lie in the treated ranges – but receive no treatment – display systematically different TPL behavior from other couples in the absence of tax reforms,[18] and, only when these differences are catered for with the Gelber (2014) or matching adjustments of specification (18) in columns (5) and (6) respectively, is the placebo estimate very close to zero and statistically insignificant.

[18]A similar point is made by Edmark et al. (2016), who find positive and significant estimates of changes in average tax rates on the extensive margin of labor supply in their 2004-06 placebo sample.

Table 2: Baseline estimates on the whole sample and the placebo sample

	Raw 2006–07 (1)	Gelber (2014) 2006–07 (2)	Matching 2006–07 (3)	Raw 2005–06 (4)	Gelber (2014) 2005–06 (5)	Matching 2005–06 (6)
Panel A						
β	1.437***	0.821***	0.739***	0.806***	-0.068	0.070
	(0.107)	(0.107)	(0.110)	(0.108)	(0.108)	(0.111)
γ_f	-0.001	0.000	0.000	-0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
γ_m	-0.000	0.000	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Panel B						
β^+ $(\tau_f \downarrow)$	1.252***	0.762***	0.704***	0.688***	-0.061	0.059
	(0.124)	(0.124)	(0.128)	(0.127)	(0.127)	(0.130)
β^- $(\tau_m \downarrow)$	2.032***	1.009***	0.850***	1.178***	-0.090	0.105
	(0.251)	(0.250)	(0.257)	(0.253)	(0.252)	(0.260)
Row difference	-0.780***	-0.247	-0.147	-0.491	0.030	-0.046
	(0.291)	(0.290)	(0.298)	(0.294)	(0.294)	(0.303)
Mean $(H_{m06} - H_{f06})$	-2.845	-2.845	-2.845	-2.749	-2.749	-2.749
N	172,117	172,117	172,117	164,555	164,555	164,555

Notes: Panel A estimates specification (18). The dependent variable in column 1 is the raw change in the log TPL gap over 2006-2007; in column 2 it is the residualized change in the log TPL gap based on the Gelber (2014) method; in column 3 it is the residualized change in the log TPL gap based on the matching method. Columns 4 to 6 report corresponding placebo specifications over the period 2005-2006, based on specification (19). Panel B estimates specification (20) with the same dependent variables and samples as in Panel A. All regressions also control for age fixed-effects for each spouse, education fixed-effects for each spouse (7 categories), industry fixed effects for each spouse (58 categories), municipality fixed-effects (289), the number of children aged 3-11 (5 dummy variables), benefit payments for each spouse, total days of SPL taken by the couple for spells before 2006, the share of days of SPL taken by the father, and dummies for marital status, spouses born outside Nordic countries, gender of first child, and gender of main earner in 2006. Regressions in Panel B also control for changes in virtual income for each spouse. The sample is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Panel B in Table 2 allows for asymmetric responses to changes in tax gaps generated by wives' and husbands' tax cuts, which identify β^+ and β^-, respectively, as in equation (20). In column 1, based on the double-difference specification, the response of couples' TPL gap to a decrease in the female tax rate is significantly smaller than its response to a decrease in the male tax rate, but this difference is much reduced and not-significantly different from zero once the dependent variable is benchmarked, in columns 2 and 3, against the counterfactual evolution of the TPL gap. We detect again significant placebo effects when the dependent variable is not residualized in column 4, and these vanish with either the Gelber (2014) or matching adjustments in columns 5 and 6. To summarize, the estimates presented in Table 2 suggest an elasticity of substitution of about 0.8, with no significant variation across husbands' and wives' treatment or residualization methods.

Comparable elasticities to those reported in Table 2 may be obtained from Blundell et al. (2018), who estimate the wage elasticity of childcare time within a fully structural model for the time allocation and consumption choices of US households over the life cycle. Based on results reported in their Table 6, we compute the equivalent of our β^+ estimate as $\partial(h_m - h_f)/\partial w_f = 0.501$ and the equivalent of our β^- estimate as $-\partial(h_m - h_f)/\partial w_m = 0.328$, where w_m and w_f denote log spousal wages. While different model structures and identification strategies require some caution in making comparisons, this evidence would suggest higher substitutability in childcare among Swedish than US parents. Some of this difference is likely explained by the flexible use of TPL in the Swedish context, which is subject to minimal optimization frictions in the consequent labor supply adjustment.

The literature also contains a number of estimates for the elasticity of substitution between male and female inputs in the labor market. Hamermesh (1993) reviews various studies and suggests values of such elasticity of 2 for the U.K. and 2.3 for Australia. For the U.S., Weinberg (2000) and Acemoglu et al. (2004) obtain estimates around 2.4 and 3, respectively, and Johnson and Keane (2013) obtain a higher estimate just above 5.[19] Despite variation across them, all these studies detect an elasticity of substitution significantly above 1. These

[19] A common approach in this literature consists in regressing the log gender wage gap in the aggregate economy (or partitions within it) on the gender gap in log labor supply, having imposed a trend increase on the relative demand for female labor. Acemoglu et al. (2004) use individual wages and instrument relative female labor supply in 1940s US with male mobilization rates.

and our estimate are obtained on different methodologies and contexts, but – with these qualifications in mind – the comparison between them hints that the "direct" substitutability of spousal inputs in home production is lower than their "potential" substitutability in the labor market at large.

The evidence discussed in this section aggregates behavior over different groups in the Swedish resident population, possibly concealing heterogenous patterns of adherence to gender identity norms. We explore these patterns in the next section, where we only report results based on the Gelber (2014) triple-difference approach, as the matching adjustment procedure delivers similar estimates (available from the authors).

5.2 Heterogeneous effects

We consider heterogeneity in spousal responses to tax incentives along a number of dimensions that are possibly correlated to gender identity norms, namely country of origin, household income shares, marital status, and gender of children. Clearly, couples who differ in these dimensions are likely to differ in several other dimensions (most notably earnings and the counterfactual evolution of the TPL gap in the absence of tax changes) that are related to the outcomes of interest. These differences are captured by our rich set of controls X_{it} and by residualizing the dependent variable with respect to the predicted counterfactual TPL gap, as described in Section 4.2.

5.2.1 Country of origin

We first relate TPL adjustments to the country of origin of couples, comparing Nordic and immigrant couples from any non-Nordic country. The epidemiological approach of Fernandez (2007) and Fernandez and Fogli (2009) has shown evidence that the family formation and work decisions of immigrants in the host country are shaped at least in part by cultural norms prevailing in the country of origin and, according to a variety of indicators, norms prevalent in Nordic countries are on average more conducive to gender equality than norms prevalent in the rest of the world.

Table 3 gives a sense of cultural, economic and legal differences in gender-related matters between Nordic countries (Sweden, Norway, Finland, Denmark and Iceland) and the rest of the world. We consider a number of indicators. The Global Gender Gap Index (GGGI) captures gender gaps in economic participation and opportunity, educational attainment, health and survival, and political empowerment, ranging between 0 (least unequal environment) and 100 (most unequal). The Social Institution and Gender Index (SIGI) is an indicator of discriminatory social institutions, which aggregates subscores relating to women's discrimination in the family, restricted physical integrity, restricted access to productive and financial resources, and restricted civil liberties. It also ranges between 0 (least discriminatory environment) to 100 (most discriminatory). The WVS index is given by the percentage of respondents in the World Value Survey agreeing with the statement "when job are scarce, men should have more right to a job than a woman". The EU index measures the difference in the percentage of women and men doing some positive amount of home production every day, according to the EU survey of gender equality.

Columns 1 and 2 in the Table give averages of such indexes in Nordic countries and the rest of the world, respectively. While these indicators are quite heterogeneous in the way they are constructed, the aspects of gender inequality they reflect, and the purpose for which they are originally obtained, Nordic countries stand out in providing a much more favorable ground to gender parity according to all four indicators. Columns 4 and 5 show variation in the corresponding indexes across couples in our sample. Nordic couples, representing 93.6% of our sample, are defined as those in which at least one spouse is native of a Nordic country, and whenever spouses are native of different countries we assign their couple the average index value across spouses.

Table 3: International differences in indexes of gender inequalities

	Country level			Couple level		
	Non-Nordic	Nordic	Difference	Non-Nordic	Nordic	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
<u>Index</u>						
GGGI	81.5	68.9	12.5	81.2	66.3	14.9
	[24]	[4]		[11,009]	[161,102]	
SIGI	14.5	1.3	14.3	19.3	1.7	17.6
	[24]	[4]		[11,009]	[161,102]	
WVS	29.4	2.0	27.4	36.6	2.7	33.9
	[19]	[1]		[7,165]	[153,072]	
EU	45.0	24.4	20.6	49.2	18.2	31.1
	[13]	[3]		[3,717]	[154,387]	

Notes: The table reports average values of gender inequality indexes for Nordic and Non-Nordic countries (Nordic includes Sweden, Norway, Finland, Denmark and Iceland). Columns 1-3 refer to country-level averages, columns 4-6 refer to couple-level averages (the number of observations on which each average is computed is reported in square brackets). Nordic couples are defined as those in which at least one spouse is native of a Nordic country. Whenever spouses are native of different countries we assign to their couple the average index value across spouses. GGGI captures gender gaps in economic participation and opportunity, educational attainment, health and survival, and political empowerment, ranging between 0 (least unequal environment) and 100 (most unequal). SIGI is an indicator of discriminatory social institutions, which aggregates subscores relating to women's discrimination in the family, restricted physical integrity, restricted access to productive and financial resources, and restricted civil liberties. It also ranges between 0 (least discriminatory environment) to 100 (most discriminatory). The WVS index is given by the percentage of respondents in the World Value Survey agreeing with the statement "when job are scarce, men should have more right to a job than a woman". The EU index measures the difference in the percentage of women and men doing some positive amount of home production every day, according to the EU survey of gender equality. GGGI, SIGI and EU refer to 2016, WVS refers to the 2010-2014 wave of the Survey. All mean differences are statistically significant at the 1% level or higher.

We provide elasticity estimates by couples' country of origin in Table 4. Estimates reported in column 1 refer to couples in which both spouses were born in non-Nordic countries, while those in column 2 refer to couples in which at least one spouse was born in a Nordic country. These estimates are obtained in a single regression, including an interaction between the tax variables and a dummy for Nordic origin. Estimates reported in Panel A show that the elasticity of substitution for Nordic couples is slightly higher than for non-Nordic couples, but this difference is not statistically significant (column 3). Panel B fits different slopes for wives' and husbands' tax cuts and shows that Nordic couples respond more strongly than non-Nordic couples to a cut in wives' marginal tax rates (β^{+}), while the differential is reversed following cuts in husbands' marginal tax rates (β^{-}). However, differences across the two samples are imprecisely estimated.

Differences become much sharper when one selects into the immigrants' subsample non-Nordic nationals who migrated to Sweden as adults, aged 18 or older. This is shown in columns 4-6 of Table 4. While the β^{+} and β^{-} estimates are very close to one other for Nordics (and non-Nordic nationals who migrated to Sweden as children), they are markedly different for non-Nordic nationals who migrated to Sweden as adults. For this subsample, the elasticity of substitution following wives' tax cuts is very small (0.353) and not statistically significant, while the elasticity following husbands' tax cuts (2.626) is highly significant, and three times higher than the corresponding estimates for Nordic couples (0.875). The comparison between results in columns 1-3 and columns 4-6 suggests that time spent in the host country may be a significant determinant of gender norms for immigrants. This is in line with the "impressionable years" hypothesis, discussed by Giuliano and Spilinbergo (2014), according to whom "culture and norms crystallize during a period of great mental plasticity in early adulthood and remain largely unaltered thereafter".

Table 4: Elasticity of substitution by country of origin

	Birthplace of spouses:			Residence at age 18:		
	Non-Nordic	Nordic	Difference	Non-Nordic	Nordic	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
β	0.628	0.834***	-0.207	1.170***	0.802***	0.368
	(0.416)	(0.109)	(0.427)	(0.472)	(0.109)	(0.482)
Panel B						
β^{+} $(\tau_f \downarrow)$	0.236	0.791***	-0.556	0.353	0.778***	-0.426
	(0.565)	(0.123)	(0.576)	(0.645)	(0.126)	(0.655)
β^{-} $(\tau_m \downarrow)$	1.327	0.977***	0.350	2.626***	0.875***	1.751*
	(0.811)	(0.262)	(0.851)	(0.911)	(0.259)	(0.946)
Row difference	-1.091	-0.186	-0.905	-2.274*	-0.097	-2.177*
	(1.079)	(0.302)	(1.121)	(1.219)	(0.299)	(1.256)
Mean $(H_{m06} - H_{f06})$	-2.529	-2.867	0.338	-2.273	-2.874	0.602
N	11,013	161,104		8,328	163,789	

Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy for both spouses being born in a non-Nordic country. Column 3 reports differences between coefficients in columns 1 and 2. Coefficients in columns 4 and 5 are estimated in a single regression, including an interaction between the tax variables and a dummy for both spouses migrating to Sweden from a non-Nordic country after age 18. Column 6 reports differences between coefficients in columns 4 and 5. Row 4 reports differences between β^{+} and β^{-} estimates for each type of couple in columns 1, 2, 4 and 5, and the corresponding double differences in columns 3 and 6. Row 5 reports the mean male-female TPL gap in 2006 for each type of couple in columns 1, 2, 4 and 5, and the corresponding differences in columns 3 and 6. All regressions also control for variables listed in the notes to Table 2, and a dummy for both spouses migrating to Sweden from a non-Nordic country after age 18 (columns 4 and 5). The sample is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Note that the mean 2006 TPL gap (reported in the bottom row) is negative for both subsamples, with wives taking on average 2.3 and 2.8 more TPL days than husbands in non-Nordic and Nordic couples, respectively. Therefore, starting from fairly similar baselines, Nordic couples are relatively more prone to close their TPL gap, and move towards a more equal division of labor, than non-Nordic couples. Indeed the β^+ and β^- estimates for non-Nordic couples are significantly different from each other (column 4, row 4): by reacting more strongly to husbands' than wives' tax cuts, non-Nordic couples tend to widen their TPL gap and reinforce a traditional division of labor. The double difference across types of couples and tax cuts is reported in column 3, row 4, and is negative, large and significant.

5.2.2 Household income shares

We look next at differences between male and female breadwinner couples, according to spousal shares of labor earnings. Bertrand et al. (2015) suggest that male breadwinner norms in the US induce couples – actual or prospective – to avoid a situation in which the wife earns more than her husband. Thus a woman who is likely to outearn her potential marriage partners is less likely to marry, and marriages in which the wife earns more are more likely to end in divorce than marriages in which the husband earns more. As a corollary, couples that stay together despite breaking the male breadwinner norms can be expected to behave less traditionally than male-breadwinner couples.

Estimates reported in Panel A of Table 5 show that couples in which the wife earns more (representing about 19% of the sample) have an overall elasticity of substitution β that is about half the corresponding elasticity in couples in which the husband earns more. Allowing for asymmetric responses in Panel B, shows that male breadwinner couples have a much higher propensity to react to male tax cuts ($\beta^- = 2.267$) than to female tax cuts ($\beta^+ = 0.691$), and this difference is significant at the 1% level. The β^- estimate for male-breadwinner couples is also much higher (and significantly so) than the corresponding estimate for female-breadwinner couples ($\beta^- = 0.183$). While female breadwinner couples react more strongly to wives' tax cuts than husbands' tax cut, this difference is not statistically significant (and we possibly lack power in pinning down this difference, which is identified on 19% of observations in our sample). The double difference across types of couples and tax cuts is negative, large and highly significant. This implies that male breadwinner couples are significantly more prone than female breadwinner couples to move towards a more traditional allocation of labor.

5.2.3 Marital status

Columns 4 and 5 in Table 5 show separate results for married and non-married couples. About 30% of couples in our sample are not married, among whom young and/or first-time parents are over-represented. Estimates in Panel A show that unmarried couples have an overall elasticity of substitution in home-production twice as large as that of married couples, and this difference is significant at the 1% level. Allowing for asymmetric responses in Panel B shows that this difference is entirely driven by the higher response of unmarried couples to a fall in the female tax rate (β^{+}), while β^{-} estimates are very close in the two subsamples. Starting from similar baselines in their TPL gaps (row 4), non-married couples are more prone to move towards a more equal division of labor by responding more strongly to wives' tax cuts.

Table 5: Elasticity of substitution by income shares of parents and marital status

	Higher earner:			Marital status:		
	Husband	Wife	Difference	Married	Unmarried	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
β	0.903***	0.457*	0.446	0.654***	1.203***	-0.550***
	(0.118)	(0.254)	(0.280)	(0.123)	(0.178)	(0.204)
Panel B						
β^{+} $(\tau_f \downarrow)$	0.691***	1.078**	-0.387	0.533***	1.276***	-0.743***
	(0.128)	(0.538)	(0.554)	(0.145)	(0.215)	(0.250)
β^{-} $(\tau_m \downarrow)$	2.267***	0.183	2.084***	1.023***	0.987**	0.036
	(0.418)	(0.313)	(0.524)	(0.294)	(0.443)	(0.521)
Row difference	-1.575***	0.895	-2.470***	-0.490	0.288	-0.780
	(0.454)	(0.657)	(0.799)	(0.344)	(0.527)	(0.626)
Mean $(H_{m06} - H_{f06})$	-3.287	-0.945	-2.343	-2.757	-3.048	0.291
N	139,638	32,479		119,813	52,304	

Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy for the gender of the higher earner in the couple. Column 3 reports differences between coefficients in columns 1 and 2. Coefficients in columns 4 and 5 are estimated in a single regression, including an interaction between the tax variables and a dummy for marital status. Column 6 reports differences between coefficients in columns 4 and 5. Row 4 reports differences between β^{+} and β^{-} estimates for each type of couple in columns 1, 2, 4 and 5, and the corresponding double differences in columns 3 and 6. Row 5 reports the mean male-female TPL gap in 2006 for each type of couple in columns 1, 2, 4 and 5, and the corresponding differences in columns 3 and 6. All regressions also control for variables listed in the notes to Table 2. The sample is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

5.2.4 Gender of children

We investigate the role of the gender of children in the TPL division, borrowing from the "female socialization" hypothesis of Warner (1991) and Warner and Steel (1999), who find that having daughters makes mothers and fathers more sensitive to gender equity issues and more likely to support equal-treatment interventions. In the political economy literature, there is evidence that having daughters makes congressmen more likely to vote liberally on women's issues (Washington, 2008), and steers the average voter's support towards left and centre-left parties (Oswald and Powdthavee, 2010). In the labor supply literature, Lundberg and Rose (2002) find that men's working hours and wages respond more to births of sons than births of daughters. In the corporate context, Cronqvist and Yu (2017) show that CEOs who have daughters tend to engage in practices that improve several dimensions of corporate social responsibility. We extend these ideas to the household and investigate whether the presence of daughters affects the substitutability of parents' time in home production.

Columns 1-3 of Table 6 distinguish couples according to the gender of their first born. While TPL days may indistinguishably cover first-born's or any other child's sickness (something on which we have no information), the gender of the first-born provides an interesting source of between-couple variation in behavior, as it is both related to the overall gender composition of children and randomly assigned. Thus we ask whether a random shock to otherwise identical couples induces different choices about the provision of child care.

The overall elasticity of substitution for couples with a first-born girl is about 50% higher than for couples with a first-born boy, and this difference is significant at the 10% level. Moreover, couples with a first-born girl respond much more strongly to a female tax cut than couples with a first-born boy. Respective β^+ estimates are 1.094 and 0.449, and their difference is significant at the 1% level. Differences in the β^+ estimates across the two subsamples are indeed driving the difference between the β estimates reported in Panel A. Estimates in row 3 show evidence of reversed β^- estimates: couples with a first-born boy react more strongly than couples with a first-born girl to husband's tax cuts, although this difference is not significant at conventional levels. Finally, the double difference in elasticities is negative, large and significant.

Columns 4-6 in Table 6 distinguish between all-girl and all-boy households, having dropped mixed households from the sample. Most estimates are close to those reported in columns 1-3, and all-girls households respond significantly more strongly than all-boys households to wives' tax cuts, but we lack power to identify with precision other effects of interest on this smaller sample. We also obtain a very similar picture on the whole sample, allowing the elasticity of substitution to vary continuously with the share of girls in the household. This share significantly raises the overall elasticity of substitution by increasing the β^{+} estimate, without a discernible impact on the β^{-} estimate (estimates available from authors).

Table 6: Elasticity of substitution by gender of children

	Gender of first-born:			Gender of all children:		
	Boy	Girl	Difference	Boys	Girls	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A						
β	0.658***	0.992***	-0.334*	0.478***	1.026***	-0.547**
	(0.139)	(0.143)	(0.185)	(0.198)	(0.205)	(0.264)
Panel B						
β^{+} $(\tau_f \downarrow)$	0.449***	1.094***	-0.646***	0.279	1.055***	-0.777***
	(0.166)	(0.171)	(0.228)	(0.239)	(0.247)	(0.329)
β^{-} $(\tau_m \downarrow)$	1.305***	0.697**	0.608	1.074**	0.957*	0.118
	(0.341)	(0.349)	(0.477)	(0.468)	(0.492)	(0.661)
Row difference	-0.857**	0.397	-1.254**	-0.796	0.099	-0.895
	(0.402)	(0.413)	(0.572)	(0.558)	(0.586)	(0.803)
Mean $(H_{m06} - H_{f06})$	-2.831	-2.860	0.030	-2.739	-2.821	0.082
N	88,495	83,622		44,154	40,442	

Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy for the gender of the first-born. Column 3 reports differences between coefficients in columns 1 and 2. Coefficients in columns 4 and 5 are estimated in a single regression, including an interaction between the tax variables and a dummy for the gender of all children in the household. Column 6 reports differences between coefficients in columns 4 and 5. Row 4 reports differences between β^{+} and β^{-} estimates for each type of couple in columns 1, 2, 4 and 5, and the corresponding double differences in columns 3 and 6. Row 5 reports the mean male-female TPL gap in 2006 for each type of couple in columns 1, 2, 4 and 5, and the corresponding differences in columns 3 and 6. All regressions also control for variables listed in the notes to Table 2 and a dummy for the gender of all children in the household (columns 4 and 5). The sample is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

6 Alternative mechanisms

6.1 Technological substitutability

One mechanism that naturally comes to mind as an alternative driver of parents' childcare inputs is the existence of gender comparative advantages – innate or acquired – in the childcare production function. We take on board concerns about a "technological" interpretation of our findings in a few steps.

First, we note that it is unlikely that technological substitutability would systematically differ between subgroups in the population. If technology matters it should play the same role independent of the immigrant status of spouses, their income shares, marital status and gender of children. Second, we select couples whose youngest child is three or older, as mothers may have a comparative advantage in the upbringing of younger children. Third, as mothers' comparative advantage at birth may lead them to specialize in childcare and become less substitutable in the care for older children, we have introduced controls for parents' specialization at birth, as proxied by the shares of SPL taken by the mother for all children in the household (as well as the amount of SPL jointly taken by parents). All the results discussed above control for these SPL variables, but estimates of the elasticity of substitution were virtually unaffected by their exclusion across the board of specifications.

Finally, if technological factors behind spousal substitutability were an important issue in our sample (and they were not adequately controlled for by our proxy of parental specialization at birth), one should expect the elasticity of substitution in childcare to gradually increase with the age of the child, reflecting a decline in the mother's role of primary carer as a child grows. We then test for heterogeneous effects by the age of the couple's youngest child. Table C–2 of the Online Appendix reports separate estimates for couples with preschool kids, aged 3-6, and couples with older kids, aged 7-11. Both the overall β estimates, as well as the β^+ and β^- estimates, are very similar (and never statistically different) across the two types of couples, and we detect no evidence of asymmetric adjustment for either type of couple. Overall these findings speak against interpretations of our estimates based on technological substitutability.

6.2 Workplace constraints

Another factor that would possibly affect the substitutability between parents' childcare time is the presence of respective workplace constraints. While the law leaves complete discretion to employees on the use of TPL, individuals may take into account disruption effects generated by their work absences and potential career consequences. These considerations are likely to vary systematically across occupations, according to the substitutability and divisibility of the tasks involved, and with workplaces' culture of accommodating employees' family commitments.

Information on occupation is available from the Swedish Wage Structure Statistics, which we match to our main dataset. The Wage Structure Statistics covers a sample of workers with positive hours in the survey month (typically September), i.e. all public-sector employees, all employees in private-sector firms with 500+ employees, and a stratified sample (based on industry and firm size) of employees in private-sector firms with less than 500 employees. As a result, in any given year, information on occupation is available for approximately 50% of private-sector workers. In Table C–3 of the Online Appendix we report estimates of the elasticity of substitution that control for 3-digit occupation, for three main population splits based on country of origin, the gender shares of household income, and first-born gender, respectively. All point estimates stay close to the values obtained without occupational controls (see columns 1-3 in Table 4, columns 4-6 in Table 5 and columns 1-3 in Table 6). However, given the reduced sample size, we clearly lack power to identify precisely the elasticity differentials across demographic groups.

While we have no direct information on family-friendly workplace practices, we use as proxies of a workplace culture the gender composition of employees and the share of employees with young children (and thus eligible for TPL). Table C–4 of the Online Appendix reports elasticity estimates that control for these workplace composition indicators for the three main population splits. The added regressors are the share female employees in the wife's and husband's workplace, respectively, and the corresponding shares of employees with children aged 0-11. All results are extremely robust, in terms of both point estimates and their statistical significance, to the inclusion of these workplace controls.

Finally, in Table C–5 of the Online Appendix we look into heterogeneous effects by the presence of female employees with children aged 0-11 in the spouses' workplaces. Columns 1 and 2 look separately at couples in which the share of mothers in the wife's workplace is above and below the median, respectively. Columns 4 and 5 look at the corresponding split in the husband's workplace. The differences in the elasticity estimates across the subsamples considered are small in magnitude and never significantly different from zero (columns 3 and 6). The substitutability in home production inputs seems thus invariant with respect to workplace characteristics possibly related to a family-friendly culture. In summary, in the estimates reported in this section we do not detect evidence of any strong role played by job or workplace characteristics (albeit along a limited number of available dimensions).

6.3 Informal child care

As noted in Section 3.3, the private sector seems to provide scant alternatives to TPL, as shown by the negligible take-up of tax deductions related to households' private expenditure on childcare services. However, this may not rule out the use of informal child care as an alternative to TPL. One possible concern is that, by introducing one extra margin of substitutability – between parents and, for example, grand parents – informal childcare interferes with our estimates of the elasticity of substitution between spouses, and the associated bias depends on the underlying substitutability between maternal, paternal and informal childcare. Another concern is that the use of informal child care may vary systematically with characteristics that we have associated to traditional gender norms. To make a simple example, immigrants are less likely than natives to have extended family networks nearby, and one potential concern might be that different elasticity estimates between Nordic and non-Nordic couples reflect different opportunities of childcare substitution between parents and other family members.

The use of the Swedish Multi-generational Register allows us to build a proxy for the most common type of informal childcare, provided by grandparents who live within commuting distance. We thus link spouses in our main sample to their parents (if present in the data) and test whether the elasticity of substitution in TPL inputs varies with the presence of grandparents in the same municipality. In Table C–6 of the Online Appendix we distinguish between couples who have at least one grandparent living in the same municipality and couples who have no grandparents nearby (either because they live elsewhere in Sweden, or because they do not appear in the data – i.e. they may be dead or living abroad). The main β estimates in Panel A are very close to each other whether or not spouses have grandparents nearby (and also close to the baseline estimates reported in column 2 of Table 2). Similarly, when we allow for asymmetric responses in Panel B, estimates do not significantly differ across the two types of couples.[20]

7 Conclusions

This paper proposes a test of gender identity norms based on the response of husbands' and wives' home production time to changes in their post-tax wages, which alter the cost of abiding to gendered norms in the division of household tasks.

Based on a household optimization problem, we relate gender norms to the elasticity of substitution between spousal inputs in home production, and note that asymmetries in such elasticity following cuts in husbands' and wives' tax rates are informative about specific norms – traditional or untraditional – that a couple abides to. We bring this conceptual framework to the data, combining variation in post-tax wages generated by the Swedish EITC with administrative information on parents' childcare time within the TPL scheme. Our empirical setting allows us to identify the elasticity of substitution between spousal inputs in home production, distinguishing between cases of husbands' and wives' treatment.

We estimate an overall elasticity of substitution of about 0.8, and find evidence of systematic variation in elasticity estimates across subgroups of the population. Immigrant couples, male-breadwinner couples, married couples and couples with a first-born son tend to react more strongly to a reduction in husbands tax rates, while the respective counterpart couples tend to react more strongly to a reduction in wives' tax rates. The interpretation is that couples in the first set are more likely to exacerbate gender disparities in childcare time when tax incentives push in that direction, while they are not as responsive to incentives

[20]We also obtained closely comparable results when restricting to couples with all four grandparents living in the same municipality (results not reported)

that would induce a more egalitarian division of labor. A symmetric behavior is observed for counterpart couples, who appear to be characterized by less traditional gender norms. We thus detect evidence of both traditional and untraditional norms in different subgroups of the Swedish resident population. Our findings should inform the design of policies aimed at incentivizing female participation to the labour market, as the labor supply impact of tax incentives would vary with the type and strength of gender norms in the treated population.

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Online Appendix of the paper

Economic incentives, home production and gender identity norms

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A The cost of norms: A simple numerical illustration.

Using the standard CES properties for the expenditure function, the cost of achieving utility H when preferences are summarized by an elasticity of substitution β is given by

$$K(\beta, H) = \left\{ \sum_j a_j [P_j(1-\tau_j)]^{1-\beta} \right\}^{\frac{1}{1-\beta}} H, \tag{A–1}$$

with $a_m = s^\beta$ and $a_f = (1-s)^\beta$.

Consider a couple with Leontieff preferences ($\beta \to 0$), an initial home production allocation H_j and associated opportunity cost $\sum_j (1-\tau_j) p_j H_j$, $j = m, f$. Following a change in the tax structure, the home production allocation remains unchanged and its opportunity cost rises to

$$\sum_j (1-\tau_j') p_j H_j = K'(0, H) = H \sum_j (1-\tau_j') p_j, \tag{A–2}$$

where τ_j' represents the new tax structure.

If this couple had instead a higher elasticity of substitution $\beta > 0$, the opportunity cost would have risen to $K'(\beta, H) = \{\sum_j a_j [P_j(1-\tau_j')]^{1-\beta}\}^{\frac{1}{1-\beta}} H$. Given (A–2), $H = K'(0,H)/[\sum_j (1-\tau_j')p_j]$. The loss of disposable income associated to Leontieff preferences can thus be expressed as a proportion of total home production expenditure $K'(0, H)$:

$$K'(0,H) - K'(\beta, H) = \left\{ 1 - \frac{\{\sum_j a_j [P_j(1-\tau_j')]^{1-\beta}\}^{\frac{1}{1-\beta}}}{\sum_j (1-\tau_j') p_j} \right\} K'(0, H). \tag{A–3}$$

We evaluate (A–3) based on total home production time of a representative couple with dependent children in 2006. Based on full-time equivalent (FTE) earnings from the Swedish Wage Structure Statistics and 251 working days in 2006, FTE daily wages in 2006 were equal to $P_m = 1480$ and $P_f = 1160$ SEK. Given the EITC, these baseline earnings imply $\tau_m = \tau_m' = 0.516$, $\tau_f = 0.347$ and $\tau_f' = 0.316$. We calibrate s using the first order condition (8), together with the above values of P_m, P_f, τ_m, τ_f and our β estimate for the whole sample (0.8, see Table 2). Home production hours are taken from time use surveys. Specifically, Table B:7a in SCB (2012) reports that men and women with children 0-6 do on average 4.6 and 5.7 hours of home production per day, respectively. Corresponding figures for parents of children 7-17 are 3.3 and 4.1, respectively. Using population weights from registry data, we compute that fathers and mothers do on average 4.0 and 4.9 hours of home production per day, corresponding to 1,460 and 1,788.5 annual hours, respectively. These data imply $s = 0.73$. We feed these figures into equation (A–3) to give the loss of disposable income as a function of β. For example, the Leontieff couple would spend an extra $0.13K'(0,H)$ relative to a couple with $\beta = 1$, and an extra $0.21K'(0,H)$ relative to a couple with $\beta = 2$. $K'(0,H)$ represents the daily opportunity cost of home production, as given by (A–2). Using the information described above gives $K'(0,H) = 1,223$ (in 2006 SEK). Thus the Leontieff couple would forgo about SEK 159 per working day with respect to the $\beta = 1$ couple, and SEK 260 with respect to the $\beta = 2$ couple.

B Swedish marginal tax rates

We compute marginal tax rates by combining information on tax schedules and annual gross earnings (Y). The earnings variable available in the LOUISE register is the same concept on which the Swedish tax authority computes individual tax liabilities.

We proceed as follows. First, we obtain taxable earnings by subtracting the basic deduction from gross earnings. The relationship between the basic deduction (BD) and gross earnings for 2006 and 2007 is summarized in Table B–1. The income thresholds for tax deductions are expressed as a function of a base amount (BA), which is revised every year according to inflation (see notes to Table B–1 for 2006 and 2007 values).

Table B–1: Basic deduction 2006-2007

Gross earnings (Y)	Basic deduction (BD)
$0 \leq Y < 0.99\times$BA	$0.423\times$BA
$0.99\times$BA $\leq Y < 2.72\times$BA	$0.423+0.20\times(Y$-$0.99\times$BA)
$2.72\times$BA $\leq Y < 3.11\times$BA	$0.77\times$BA
$3.11\times$BA $\leq Y < 7.88\times$BA	$0.77\times$BA-$0.10\times(Y$-$3.11\times$BA)
$7.88\times$BA $\leq Y$	$0.293\times$BA

Notes: The table shows how to calculate the basic deduction for the years 2006 and 2007. The base amount (BA) is equal to 39,700 SEK in 2006 and 40,300 SEK in 2007.

In 2007, we also subtract the EITC from gross earnings. The design of the EITC is displayed in Table B–2. Note that the income thresholds for determining the applicable tax credit are also based on the basic amount and the basic deduction introduced above.

Table B–2: Deductions introduced by EITC 2007

Gross earnings (Y)	EITC
$0 \leq Y < 0.79\times$BA	(Y-BD)$\times$MT
$0.79\times$BA $\leq Y < 2.72\times$BA	($0.79\times$BA+$0.2\times(Y$-$0.79\times$BA)-BD)$\times$MT
$2.72\times$BA $\leq Y$	($1.176\times$BA-BD)$\times$MT

Notes: This table presents the design of the 2007 EITC in Sweden and how the credit varies with gross earnings levels. BD is the basic deduction from Table A1 and MT is the municipal tax rate.

We compute taxable earnings before 2007 as gross earnings in each year, minus the tax deductions in Table B–1; and taxable earnings in 2007 as gross earnings in 2007 minus the tax deductions in Tables B–1 and B–2. In a second step, we compute tax payment as a function of taxable earnings. Taxes include municipal and state level taxes. The municipal tax is proportional. In 2006, the corresponding rate was on average 32% across municipalities, ranging between 28.89% and 34.24%. For taxable earnings above a certain threshold (306,000 SEK in 2006), national taxes are levied on top of municipal taxes. The added marginal tax rate is 20% up to the next threshold. (460,600 SEK in 2006), and 25% beyond that.[B–1]

[B–1] The lower and upper thresholds in 2007 are 316,700 SEK and 476,700 SEK, respectively.

C Auxiliary tables and figures

Table C–1: TPL use in the 2005-06 sample

Panel A	Combined TPL in 2005	TPL gap in 2005
By age of youngest child		
Three	13.27	-4.13
Four	10.95	-3.48
Five	9.61	-3.26
Six	7.91	-2.79
Seven	6.77	-2.45
Eight	5.81	-2.12
Nine	5.13	-1.94
Ten	3.97	-1.59
Panel B	Change in TPL 2005-06	
By gender		
(1) Male	-0.33	
(2) Female	-0.62	
Gap (1)-(2)	0.28	
By share of household income		
(1) Main earner	-0.34	
(2) Secondary earner	-0.61	
Gap (1)-(2)	0.27	
By share of TPL		
(1) Main TPL provider	-1.30	
(2) Secondary TPL provider	0.35	
Gap (1)-(2)	-1.65	
N	164,567	

Notes: The 2005-06 sample is selected on the same criteria as the main 2006-07 sample, see Section 3.1 for details. Panel A displays the average of couples' combined TPL days and the corresponding male-female gap by age of youngest child. Panel B displays the average 2005-06 change in TPL by gender, shares of household income and shares of TPL, and the corresponding gaps. Main and secondary earners are defined based on 2005 earnings. Main and secondary TPL providers are defined based on 2005 TPL days (when spouses have identical TPL days, the wife is chosen as the main provider).

Table C–2: Elasticity of substitution by age of youngest child

	3–6 (1)	7–11 (2)	Difference (3)
Panel A:			
β	0.904***	0.722***	0.183
	(0.142)	(0.140)	(0.185)
Panel B:			
β^+ $(\tau_f \downarrow)$	0.831***	0.680***	0.150
	(0.168)	(0.169)	(0.228)
β^- $(\tau_m \downarrow)$	1.137***	0.854***	0.283
	(0.352)	(0.334)	(0.474)
Row difference	-0.307	-0.174	-0.132
	(0.412)	(0.398)	(0.570)
Mean $(H_{m06} - H_{f06})$	-3.451	-2.130	-1.321
N	93,194	78,923	

Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy for the youngest child in the household being aged 3-6. Column 3 reports differences between coefficients in columns 1 and 2. Row 4 reports differences between β^+ and β^- estimates for each type of couple in columns 1 and 2, and the corresponding double differences in column 3. Row 5 reports the mean male-female TPL gap in 2006 for each type of couple in columns 1 and 2, and the corresponding differences in column 3. All regressions also control for variables listed in the notes to Table 2, and a dummy for the youngest child in the household being aged 3-6. The sample used is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Table C–3: Elasticity of substitution by type of couples, controlling for occupation

	Residence at age 18:			Higher earner:			Gender of 1^{st} child:		
	Non-Nordic	Nordic	Diff.	Husband	Wife	Diff.	Boy	Girl	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A									
β	1.156	0.674***	0.483	0.678***	0.820	-0.142	0.393	1.033***	-0.640*
	(0.841)	(0.215)	(0.854)	(0.227)	(0.537)	(0.577)	(0.264)	(0.273)	(0.332)
Panel B									
β^+ $(\tau_f \downarrow)$	0.150	0.523**	-0.373	0.462*	0.451	0.011	0.049	0.999***	-0.950***
	(1.050)	(0.239)	(1.065)	(0.238)	(1.675)	(1.690)	(0.303)	(0.310)	(0.393)
β^- $(\tau_f \downarrow)$	3.757**	1.283***	2.474	3.103***	0.863	2.239*	1.711***	1.208*	0.503
	(1.880)	(0.521)	(1.942)	(1.029)	(0.580)	(1.182)	(0.666)	(0.715)	(0.941)
Row difference	-3.607	-0.760	-2.847	-2.641***	-0.413	-2.228	-1.662**	-0.209	-1.430
	(2.313)	(0.559)	(2.379)	(1.078)	(1.808)	(2.096)	(0.760)	(0.808)	(1.090)
Mean $(H_{m06} - H_{f06})$	-2.360	-2.779	0.419	-3.293	-0.024	-3.269	-2.743	-2.772	0.029
N	2,746	50,719		44,694	8,771		27,613	25,852	

Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy for both spouses migrating to Sweden from a non-Nordic country after age 18. Column 3 reports differences between coefficients in columns 1 and 2. Coefficients in columns 4 and 5 are estimated in a single regression, including an interaction between the tax variables and a dummy for the gender of the higher earner in the household. Column 6 reports differences between coefficients in columns 4 and 5. Coefficients in columns 7 and 8 are estimated in a single regression, including an interaction between the tax variables and a dummy for the gender of the first-born. Column 9 reports differences between coefficients in columns 7 and 8. Row 4 reports differences between β^+ and β^- estimates for each type of couple in columns 1, 2, 4, 5, 7 and 8 and the corresponding double differences in columns 3, 6 and 9. Row 5 reports the average mean male-female TPL gap in 2006 for each type of couple in columns 1, 2, 4, 5, 7 and 8 and the corresponding differences in columns 3, 6 and 9. All regressions also control for variables listed in the notes to Table 2 and 3-digit occupation. The sample used is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Table C–4: Elasticity of substitution by type of couples, controlling for workplace composition

	Residence at age 18:			Higher earner:			Gender of 1^{st} child:		
	Non-Nordic	Nordic	Diff.	Husband	Wife	Diff.	Boy	Girl	Diff.
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A									
β	1.173***	0.811***	0.362	0.916***	0.446*	0.470*	0.666***	1.000***	-0.334*
	(0.472)	(0.109)	(0.482)	(0.118)	(0.255)	(0.281)	(0.139)	(0.143)	(0.185)
Panel B									
β^+ ($\tau_f \downarrow$)	0.356	0.789***	-0.433	0.705***	1.040*	-0.334	0.460***	1.103***	-0.644***
	(0.645)	(0.126)	(0.655)	(0.129)	(0.540)	(0.556)	(0.166)	(0.171)	(0.228)
β^- ($\tau_m \downarrow$)	2.628***	0.877***	1.752*	2.274***	0.185	2.089***	1.304***	0.702**	0.602
	(0.912)	(0.259)	(0.947)	(0.419)	(0.313)	(0.524)	(0.341)	(0.349)	(0.477)
Row difference	-2.273*	-0.088	-2.185*	-1.569***	0.854	-2.423***	-0.844**	0.402	-1.246**
	(1.219)	(0.299)	(1.256)	(0.454)	(0.659)	(0.800)	(0.402)	(0.413)	(0.572)
Mean ($H_{m06} - H_{f06}$)	-2.273	-2.874	0.602	-3.287	-0.945	-2.343	-2.831	-2.860	0.030
N	8,328	163,789		139,638	32,479		88,495	83,622	

Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy for both spouses migrating to Sweden from a non-Nordic country after age 18. Column 3 reports differences between coefficients in columns 1 and 2. Coefficients in columns 4 and 5 are estimated in a single regression, including an interaction between the tax variables and a dummy for the gender of the higher earner in the household. Column 6 reports differences between coefficients in columns 4 and 5. Coefficients in columns 7 and 8 are estimated in a single regression, including an interaction between the tax variables and a dummy for the gender of the first-born. Column 9 reports differences between coefficients in columns 7 and 8. Row 4 reports differences between β^+ and β^- estimates for each type of couple in columns 1, 2, 4, 5, 7 and 8 and the corresponding double differences in columns 3, 6 and 9. Row 5 reports the average mean male-female TPL gap in 2006 for each type of couple in columns 1, 2, 4, 5, 7 and 8 and the corresponding differences in columns 3, 6 and 9. All regressions also control for variables listed in the notes to Table 2, the share female employees in the wife's and husband's workplace, respectively, and the corresponding shares of employees with children aged 0-11. The sample used is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Table C–5: Elasticity of substitution by workplace characteristics

	Wife's workplace			Husband's workplace		
	Share women with 0-11 y.o. kids			Share women with 0-11 y.o. kids		
	Above p50	Below p50	Difference	Above p50	Below p50	Difference
	(1)	(2)	(3)	(4)	(5)	(6)
β	0.847***	0.799***	0.049	0.667***	0.956***	-0.289
	(0.147)	(0.137)	(0.188)	(0.144)	(0.140)	(0.188)
$\beta^+ \quad (\tau_f \downarrow)$	0.897***	0.650***	0.248	0.642***	0.866***	-0.224
	(0.175)	(0.164)	(0.230)	(0.172)	(0.167)	(0.230)
$\beta^- \quad (\tau_f \downarrow)$	0.697*	1.240**	-0.543	0.754**	1.241***	-0.487
	(0.377)	(0.321)	(0.485)	(0.343)	(0.348)	(0.477)
Row difference	0.200	-0.590	0.790	-0.112	-0.375	0.263
	(0.442)	(0.381)	(0.580)	(0.405)	(0.410)	(0.573)
Mean $(H_{m06} - H_{f06})$	-2.852	-2.840	-0.012	-2.691	-2.988	0.297
N	79,045	93,072		82,803	89,314	

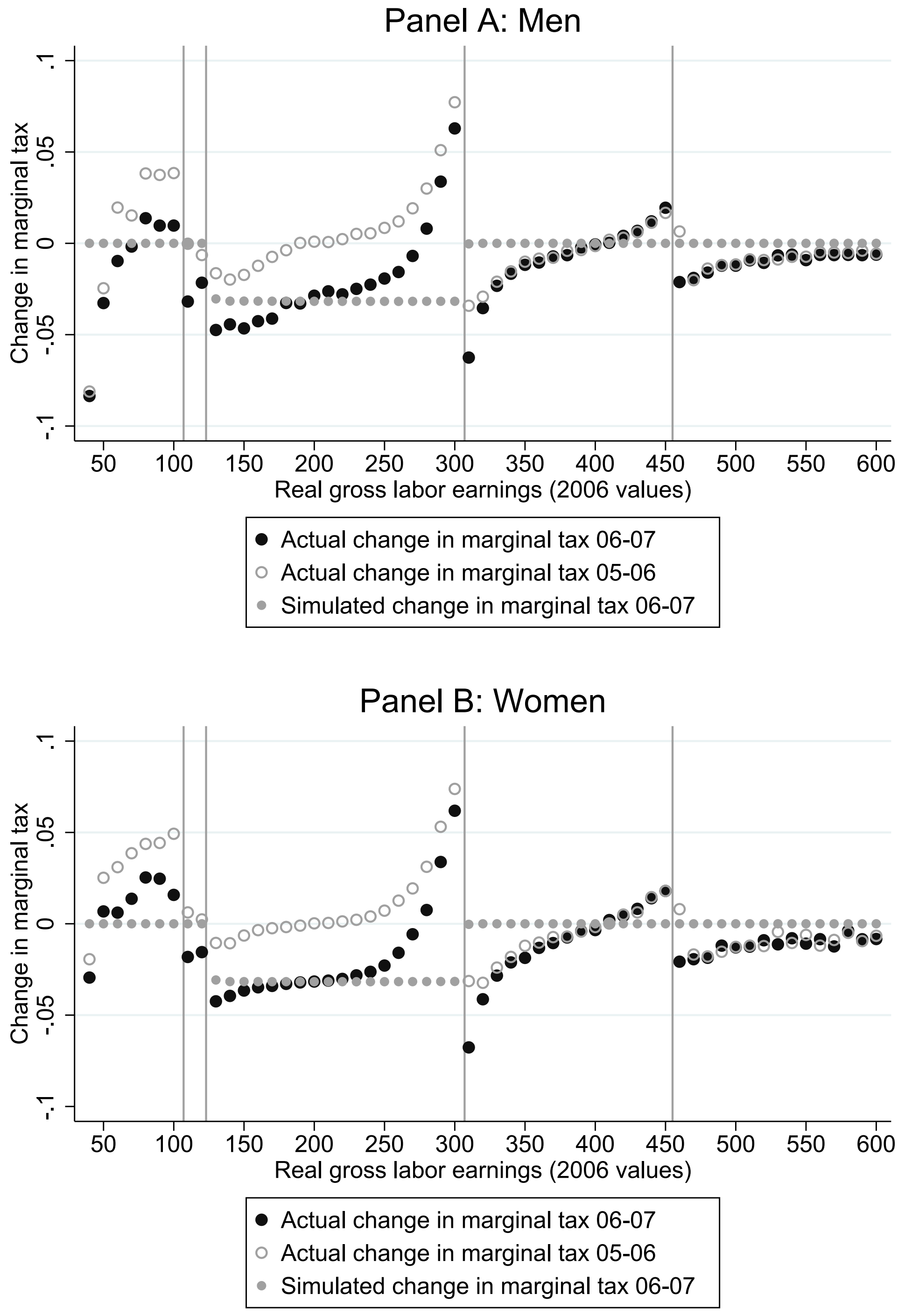
Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy for the wife's workplace having an above-median share of female employees with children aged 0-11. Column 3 reports differences between coefficients in columns 1 and 2. Coefficients in columns 4 and 5 are estimated in a single regression, including an interaction between the tax variables and a dummy for the husband's workplace having an above-median share of female employees with children aged 0-11. Column 6 reports differences between coefficients in columns 4 and 5. Row 4 reports differences between β^+ and β^- estimates for each type of couple in columns 1, 2, 4 and 5, and the corresponding double differences in columns 3 and 6. Row 5 reports the average mean male-female TPL gap in 2006 for each type of couple in columns 1, 2, 4 and 5, and the corresponding differences in columns 3 and 6. All regressions also control for variables listed in the notes to Table 2, and a dummy for the share of female employees with children aged 0-11 in the wife's workplace being above the median (columns 1 and 2), or a dummy for the share of female employees with children aged 0-11 in the husband's workplace being above the median (columns 4 and 5). The sample used is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Table C–6: Elasticity of substitution by geographical vicinity of grandparents

	Number of grandparents in same municipality		
	At least one	None	Difference
	(1)	(2)	(3)
Panel A:			
β	0.836***	0.799***	0.037
	(0.134)	(0.152)	(0.188)
Panel B:			
β^+ $(\tau_f \downarrow)$	0.834***	0.659***	0.174
	(0.158)	(0.183)	(0.232)
β^- $(\tau_m \downarrow)$	0.854***	1.192***	-0.340
	(0.352)	(0.357)	(0.479)
Row difference	-0.019	-0.533	0.514
	(0.392)	(0.427)	(0.576)
Mean $(H_{m06} - H_{f06})$	-3.016	-2.615	-0.401
N	98,945	73,172	

Notes: Panel A estimates are based on specification (18) and Panel B estimates are based on specification (20). The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Coefficients in columns 1 and 2 are estimated in a single regression, including an interaction between the tax variables and a dummy variable for having at least one grandparent living in the same municipality as the couple. Column 3 reports differences between coefficients in columns 1 and 2. Row 4 reports differences between β^+ and β^- estimates for each type of couple in columns 1 and 2, and the corresponding double differences in column 3. Row 5 reports the mean male-female TPL gap in 2006 for each type of couple in columns 1 and 2, and the corresponding differences in column 3. All regressions also control for variables listed in the notes to Table 2, and a dummy variable for having at least one grandparent living in the same municipality. The sample used is described in Table 1. Standard errors are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Figure C–1: Actual and simulated marginal tax changes



Notes: Changes in marginal tax rates are displayed on the y-axis and real labor earnings (in thousand SEK) are displayed on the x-axis.