Taxes, childcare and gender identity norms*

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Abstract

We investigate the role of gender norms in shaping parental childcare following changes in the relative take-home pay of mothers and fathers. Exploiting variation from Swedish tax reforms, we estimate the elasticity of substitution in parental childcare for native and immigrant couples from a variety of countries characterized by varying gender norms. Couples originating from countries with relatively conservative norms are more likely to reallocate childcare to mothers following a reduction in the father's tax rate and less likely to reallocate childcare to fathers following a reduction in the mother's tax rate, thereby reinforcing a traditional allocation of childcare across parents.

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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, 2020). 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 choices, earnings, and family structure, among other outcomes.[1]

Individuals may bear economic consequences to behave in line with their adopted schemas. For example, in a couple that values the male breadwinner model, the wife may underinvest in her career, to the detriment of household income. A natural test of the importance of gender norms consists in observing changes in behavior following a change in the market penalty for adopting those norms. For example, narrowing wage gaps incentivizes couples 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 a couple's norms regarding gender roles in the market and the household.

Our paper aims to reproduce this setting in order to investigate behavioral prescriptions regarding the gender allocation of childcare. To this purpose, we combine variation in after-tax wages generated by the introduction of the Earned Income Tax Credit (EITC) in Sweden during 2007-2009 with administrative information on parental childcare time. The EITC progressively reduced the marginal tax rate by about five percentage points on low- and mid-

[1] See, among others, Fernandez et al. (2004), Fortin (2005, 2015), Bertrand et al. (2015, 2020), Bursztyn et al. (2017, 2020).

level earnings. Thanks to individual-based taxation, this resulted in independent changes in the tax rates of spouses, according to their respective earnings. Based on these changes, we identify the effect of economic incentives on the spousal division of childcare.

Information on childcare is obtained from administrative sources in the form of Temporary Parental Leave (TPL), available to either spouse to care for a sick child during working hours, and is only partly compensated by the social security system.[2] Our analysis of data from the Swedish Level of Living Survey reveals that fathers' share of TPL is positively and significantly correlated with fathers' share of overall household work.

Our empirical specification is derived from a household model in which spouses jointly choose their time investments in market work and childcare. Labor supplied to the market earns an after-tax wage determined by the EITC, while spouses' childcare inputs deliver a household public good. We argue that a couple's preferences on how spouses should contribute to the household public good stem from the gender norms it chooses to adhere to.[3] Specifically – and abstracting from technological constraints, on which we comment below – the substitutability of spousal inputs in childcare 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 household disposable income increases with the substitutability between spousal inputs in childcare, which would allow couples to more elastically reallocate their time in line with changed economic incentives. High substitutability indicates that a couple is

[2]TPL is distinct from Standard Parental Leave (SPL), which is used to care for babies and toddlers irrespective of sickness, typically before a child's third birthday. The impacts of SPL on household labor supply in Sweden have been studied, among others, by Avdic and Karimi (2018) and Ginja et al. (2020).

[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. (2020) builds on the difference between these two.

willing to respond to economic incentives, attaching low importance to specific combinations of spousal inputs' in childcare. Low substitutability indicates instead that a couple has strong preferences regarding inputs' combinations, to the detriment of disposable income.

While the elasticity of substitution provides a measure of the *strength* of adopted norms, it is typically silent about the *type* of norms adopted. For example, a couple with egalitarian norms may firmly believe in an equal split of parental childcare, while a couple with gendered norms may believe as firmly that mothers should provide the bulk of childcare. While the two couples clearly adhere to very different norms, the respective elasticities of substitution in parental childcare inputs may be equally low.

To shed light on the type of norms adopted in our sample of parents, we leverage variation in tax treatment and behavior in two ways. First, we estimate distinct elasticity parameters by exploiting variation from husband's and wife's treatment in turn. A reduction in the husband's tax rate would induce time reallocation towards traditional gender roles, by encouraging him to work more in the market and less in the household, and vice versa for his wife. Conversely, a reduction in the wife's tax rate would induce labor reallocation away from traditional gender roles. By comparing responses to a fall in husbands' and wives' tax rates, one can shed light on the importance of "traditional" and "untraditional" norms.

Second, we look into elasticity variation across groups that possibly differ in their attitudes toward gender roles. Building on the epidemiological approach of Fernandez (2007), showing evidence that immigrants' behavior in the host country reflects at least in part their cultural heritage, we investigate heterogeneous responses to tax changes according to norms prevailing in the country of birth of individuals in our sample. As of 2010, about 15% of Swedish residents were foreign-born. The largest immigrant groups are from the Middle

East, followed by Eastern and Central Europe, other Nordic countries, and Eastern Africa, providing large variation in norms regarding gender roles.

We find that non-Nordic immigrant couples react more strongly to a reduction in the husband's tax rate, while Nordic couples react similarly to husband's or wife's treatment. We additionally exploit variation across all origin countries represented in our sample by allowing the estimated elasticities to vary continuously with widely-used proxies for gender norms. These include information from gender-related questions in international surveys of attitudes and country-level indicators of gender discrimination. We find that couples originating from countries with relatively conservative norms are more likely to reallocate childcare across spouses following a reduction in the husband's tax rate, and less likely to reallocate childcare following a reduction in the wife's tax rate. As a result, couples with a more conservative background tend 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 division of labor. These differences tend to wane with the length of exposure of immigrants couples to host-country norms.

The interpretation of our findings hinges on the assumption that the elasticity of substitution between childcare inputs reflects spouses' preferences or beliefs about appropriate gender roles in the household. To rule out alternative channels based on technological substitutability of childcare inputs, or organizational constraints in spouses' respective workplaces, we follow a number of steps. First, we emphasize that technological substitutability is unlikely to drive the systematic differences in elasticities that we observe across population groups. Second, we select couples whose youngest child is 4 or older, as mothers may have a biological comparative advantage in the care of younger children. Third, we control for

parents' specialization in childcare at birth, which may induce comparative advantages in the longer term, and for the workplace composition of mothers and fathers, which would be predictive of a family-friendly work environment and could affect parental contributions to childcare regardless of gender norms. Finally, we show that our results are robust to controls for spouses' detailed education tracks, which proxy for their occupations and aspirations.

By combining variation from tax reforms and the time allocation of spouses to detect evidence of binding gender norms, this paper contributes to two strands of literature. First, it is related to a recent 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 model, and Bursztyn et al. (2017) find that single women may avoid career-enhancing actions whenever these signal traits that are possibly penalized in the marriage market. In our paper, we relate the concept of gender norms to the substitutability of gender inputs in childcare and design an empirical strategy to identify this parameter on administrative data. Also, we emphasize variation in identity norms across population groups, which would be closely associated with children's outcomes.

Second, this paper contributes to a broad body of work on the relationship between taxation, labor supply, and home production. In the macro literature, Ngai and Pissarides (2007) highlight this relationship as a driver of structural transformation and employment growth, and Bick and Fuchs-Schündeln (2018) relate the labor supply of married couples to variation in tax regimes. The micro literature on labor supply has provided extensive evidence on the tax elasticity of earnings (see, among others, Gruber and Saez, 2002). Closely related to our work, Gelber (2014) estimates the response of spouses' earned income to tax changes in Sweden. Our work complements Gelber (2014)'s approach with a focus on

childcare, which offers a direct perspective on gender 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 theoretically studied in Alesina et al. (2011).[4]

The paper is organized as follows. Section 2 lays out a model of parental childcare 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 empirical framework and discusses identification. Section 5 provides baseline results, Section 6 investigates heterogeneous effects, and Section 7 concludes.

2 A model of home production and gender norms

2.1 The couple's optimization problem

We consider a static, unitary model of household choices. Households enjoy a home-produced good H and a market-produced good C and allocate spouses' time between market work and home production.[5] The household good is represented by childcare and provided by a combination of parental inputs according to the following CES specification:

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

where $j = m, f$ denotes parents' gender and $0 \leq H_j \leq 1$ is the share of time devoted by parent j to childcare. The parameters s and $1-s$ capture parents' relative efficiency

[4]This paper also adds to a small body of work on the household division of parental leave in Sweden and beyond. Boye (2015) finds that fathers' TPL take-up in Sweden is negatively correlated to their contribution to household income and Ekberg et al. (2013) estimate that TPL use does not respond to changes in SPL entitlement induced by fathers' quotas. Jørgensen and Søgaard (2022) study how the design of parental leave benefit systems shapes the division of SPL in Denmark.

[5]The unitary model provides an acceptable approximation to household choices whenever intra-household decision power is unaffected by the shocks considered (see Chiappori and Mazzocco, 2017). This is the case for the tax shocks implied by the 2007 EITC (see Section 3.2).

in childcare and β represents the elasticity of substitution between their time inputs. We interpret β as representing couples' preferences about the combination of parental time in childcare and we do not explicitly model technological substitutability.[6]

In the labor market, one unit of time of spouse j produces P_j, which determines the wage rate. Earnings Y_j decrease with the share of time devoted to childcare:

$$Y_j = P_j(1 - H_j), \quad j = m, f. \tag{2}$$

Couples choose the optimal time allocation of spouses and market consumption that maximize joint utility:

$$\max_{H_m, H_f, C} U(H, C) \quad \text{s. to } C \leq [Y_m - T(Y_m)] + [Y_f - T(Y_f)], \tag{3}$$

where H is defined in (1), Y_j is given by (2), and $T(Y_j)$ represents the tax schedule. Assuming separability between C and H in $U(.)$, the solution to (3) requires first-order conditions:

$$\frac{\partial U}{\partial H} s H_m^{-\frac{1}{\beta}} H^{\frac{1}{\beta}} = \lambda P_m(1 - \tau_m) \tag{4}$$

$$\frac{\partial U}{\partial H}(1 - s) H_f^{-\frac{1}{\beta}} H^{\frac{1}{\beta}} = \lambda P_f(1 - \tau_f) \tag{5}$$

where $\tau_j = T'(Y_j)$ is the marginal tax rate and λ is the Lagrange multiplier. Conditions (4) and (5) imply that, other things equal, each spouse's contribution to childcare decreases with own labor productivity in the market and net-of-tax income share (NTS), $1 - \tau_j$. The compensated elasticity of childcare time with respect to the NTS – obtained at constant utility – represents the substitution effect of a change in the tax rate, and is given by

[6]Empirically, we can only identify one substitution parameter, hence our modeling of couple preferences implicitly assumes that technological substitutability is not binding (e.g., because parental inputs are highly substitutable in providing care for 4-11 year old children).

$\partial \ln H_j / \partial \ln(1-\tau_j) = -\beta$. Combining (4) and (5) and taking logs yields:

$$h_m - h_f = \alpha + \beta(\sigma_f - \sigma_m) + \beta(p_f - p_m), \tag{6}$$

where lower case letters denote logs, $\alpha \equiv \beta \ln\left(\frac{s}{1-s}\right)$ and $\sigma_j \equiv \ln(1-\tau_j)$, implying that the relationship between the spousal gap in childcare and the NTS gap hinges on the elasticity of substitution β.[7]

The optimal time allocation can be represented graphically at the tangency between an indifference curve, given by equation (1) with $H = \bar{H}$, and a budget constraint representing the opportunity cost of achieving $\bar{H}$, with slope equal to the gender ratio in post-tax wages: $K = (1-\tau_m)P_m H_m + (1-\tau_f)P_f H_f$.[8] Equilibrium is represented by point E^0 in Figure 1, where the wife supplies H_f^0 to childcare, 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.

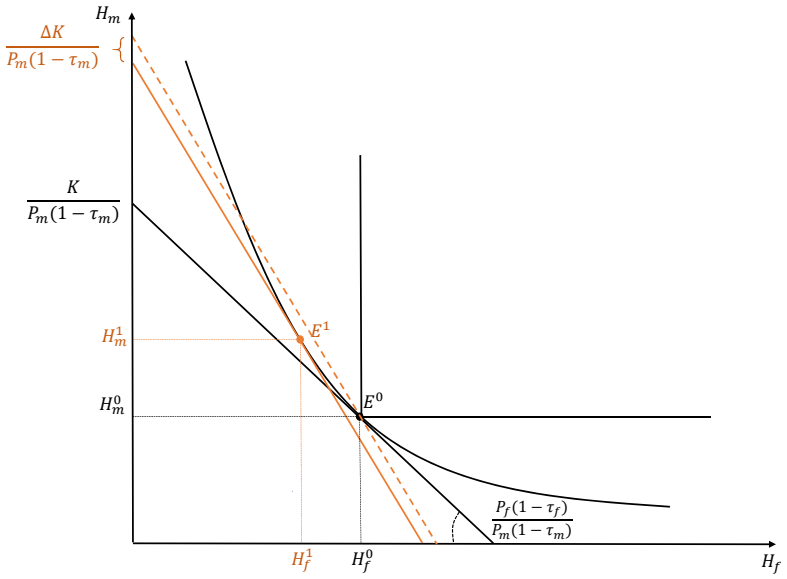
2.2 Gender norms and the elasticity of substitution

Let's compare two couples with the same time allocation E^0, but different values of β. The first couple has $\beta > 0$, and its preferences are represented by the smooth indifference curve in Figure 1; the second couple has Leontief preferences, with $\beta \to 0$, represented by the right-angle indifference curve. Consider a reduction in the wife's tax rate, τ_f, i.e. an increase in the tax gap, $\tau_m - \tau_f$. The budget constraint becomes steeper and, to achieve the initial level of utility, the time allocation for the $\beta > 0$ couple moves to E^1, with lower H_f and

[7] Note that, while the FOCs (4)-(5) require additive separability in $U(H, C)$, expression (6) for their ratio – which forms the basis of our empirical test – does not. Hence the β concept would remain valid in a more general model that does impose separability.

[8] For simplicity, we represent a case of proportional taxation, leading to a linear budget constrain.

Figure 1: The impact of a cut in τ_f on the time allocation of couples



Notes: The figure illustrates the optimal time allocation of two couples, characterized by $\beta > 0$ (smooth indifference curve) and $\beta \to 0$ (right-angle indifference curve), respectively.

higher H_m. The cost of achieving a given level of utility has now increased, as illustrated by the higher intercept of the budget line, because the opportunity cost of one of the childcare inputs has increased. The optimal time allocation for the $\beta \to 0$ couple is instead unaffected by the tax change, as parents are unwilling to alter the combination of childcare inputs. The latter couple faces a higher opportunity cost of childcare (ΔK) than the former, who is willing to make some input substitution in response to a relative wage change.

One may evaluate the loss of disposable income, ΔK, following a tax change, for alternative values of β. If K is calibrated to the opportunity cost of TPL, the magnitudes involved are tiny, because couples take on average only 7.3 days of TPL per year, which corresponds to 1.5% of their combined working days. 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 (Statistics Sweden, 2012). Using full-time equivalent

earnings, Online Appendix A provides a back-of-envelope calculation of ΔK for a hypothetical couple with Leontief preferences. Following a cut in the wife's tax rate in line with the EITC, this couple would bear a 24% higher opportunity cost of home production than a couple with $\beta = 1$, and a 34% higher opportunity cost than a couple with $\beta = 2$, where such opportunity cost evaluated at 2006 wages is about 1,223 Kronas (SEK) per day.[9]

In the example of Figure 1, couples have symmetric reactions (or lack thereof) to a change in the tax gap. In this case a low value of β reflects cultural tightness, but is silent about the underlying cultural model. To shed light on the type of adopted norms, we next allow for asymmetric adjustments in parental childcare, depending on whether the husband or the wife experiences a fall in their tax rate. 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. Conversely, 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 would be indicative of the cultural model a couple adheres to.

Consider the extreme case in which a couple's time allocation only responds to cuts in (say) the husband's tax rate and is invariant to cuts in the wife's tax rate. This case can be modeled by setting a cap to the husband's contribution to childcare, i.e.

$$H = \left[(1-s) H_f^{\frac{\beta-1}{\beta}} + s[\min(H_m, H_m^0)]^{\frac{\beta-1}{\beta}} \right]^{\frac{\beta}{\beta-1}}, \tag{7}$$

where H_m^0 represents the husband's childcare time at baseline. Equation (7) implies that any excess in H_m above H_m^0 would be wasted, hence the couple is not willing to substitute male to female childcare whenever τ_f falls. In this case the couple's indifference curve would coincide

[9] As of March 2024, the exchange rate is 0.1 USD per 1 SEK. Thus this corresponds to about 120 USD.

with the smooth indifference curve in Figure 1 to the south-east of E^0 (for $H_m \leq H_m^0$), but would be vertical to the north-west (for $H_m > H_m^0$). This couple would still react to cuts in τ_m, but not to cuts in τ_f. Vice versa, a couple that sets a cap H_f^0 to female childcare time would react to cuts in τ_f, but not to cuts in τ_m.

To allow for asymmetric adjustment to cuts in τ_m and τ_f we define

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

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

2.3 From the model to the data

Equation (6) summarizes the key model result that we bring to the data, identifying β from the response of the male-female gap in (log) childcare time to changes in the female-male gap in (log) NTS. In our empirical specification in first differences, we additionally control for income effects of tax changes, alongside other observable characteristics:

$$\Delta(h_{imt} - h_{ift}) = \beta\Delta(\sigma_{ift} - \sigma_{imt}) + \gamma_m\Delta\theta_{imt} - \gamma_f\Delta\theta_{ift} + \gamma X_{it} + (u_{imt} - u_{ift}), \qquad (8)$$

where i denotes couples, t denotes years, $\Delta\theta_{imt}$ and $\Delta\theta_{ift}$ represent income effects of tax changes for each spouse,[10] 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 unobservable components.

[10]The steps leading to (6) are based on Hicksian demands for childcare inputs (4) and (5). Changes in actual demand also reflect income effects of tax changes, which we measure using each spouse's virtual income, given by the intercept of the extended budget segment in a space that has earnings on the horizontal axis and disposable income on the vertical axis. Changes in virtual income include changes in marginal tax rates, (net) benefits and (net) capital income. See Gruber and Saez (2002) for the derivation of an expression similar to (8) for the response of earnings to changes in tax rates.

To cater for observations with $H_{imt}, H_{ift} = 0$, we use the transformed dependent variable $\Delta[\ln(H_{imt}+1) - \ln(H_{ift}+1)]$, which is close to the model's functional form.[11]

The corresponding specification for the case of asymmetric adjustments is given by

$$\begin{aligned}\Delta(h_{imt} - h_{ift}) &= \beta^{+}\Delta(\sigma_{ift} - \sigma_{imt})|_{\Delta\sigma_{ift}>0} + \beta^{-}\Delta(\sigma_{ift} - \sigma_{imt})|_{\Delta\sigma_{imt}>0} \\ &+ \gamma_m\Delta\theta_{imt} - \gamma_f\Delta\theta_{ift} + \gamma X_{it} + (u_{imt} - u_{ift}). \end{aligned} \tag{9}$$

3 The Swedish institutional setting and data

Sweden provides a valuable context for studying the consequences of gender norms for the parental division of childcare. First, the EITC drives exogenous variation in the NTS of spouses and in the cost of following gendered norms. Second, registry data contain longitudinal information on how parents share the care for sick children during their regular working hours, under the TPL program. Although this is only one component of childcare, it is a meaningful proxy for the gender division of household work, measured for the universe of couples, and can be linked to earnings and taxes. Third, while Sweden has one of the highest female employment rates among OECD countries (Olivetti and Petrongolo, 2017), previous work has found evidence of glass ceiling effects (Albrecht et al., 2003), large motherhood penalties (Angelov et al., 2016; Kleven et al., 2019), and higher divorce rates for women who enter politics (Folke and Rickne, 2020).

[11] In the Online Appendix B, we report results based on an inverse hyperbolic sine transformation and on a level-log specification that adapts the Chen and Roth (2023) approach to our setting. Reassuringly, all these specifications produce remarkably similar results.

3.1 Data and sample

We use data from several registers compiled by Statistics Sweden, spanning the years 2003–2009. Our primary register is LOUISE, which covers the resident population aged 16–75 and contains information on demographics, schooling, earnings, government transfers (including TPL and SPL benefits), and capital income. We match records from LOUISE to the multi-generational register, linking parents and children, and social insurance data containing start and end dates of TPL spells.

We organize our data as a collection of cohorts. In each year $t-1$, we select couples in which both parents are eligible for TPL and participate in the labor force. This defines "cohort $t-1$". We then observe changes in tax treatment and TPL for each spouse between $t-1$ and t. A given couple may feature in multiple cohorts as long as it satisfies selection criteria in the corresponding baseline years. We select individuals who:

- Live in a couple and have labor earnings above the price base amount (*prisbasbelopp*) at $t-1$.[12] This restriction is meant to capture the universe of potential TPL users. Non-working individuals are not eligible, while individual working very few hours may not need to rely on TPL to care for a sick child.
- Have their youngest child turning 4–10 in year $t-1$. Parents of younger children may still use SPL for childcare, plus the substitutability between parental inputs in the care of younger children may conflate preferences and biological gender differences. TPL eligibility ends on a child's 12th birthday, thus the age cap in year $t-1$ ensures that parents are still eligible for TPL in year t.

[12] We use the terms "spouse", "husband" or "wife" for all cohabiting individuals, irrespective of marital status. The price base amount is set annually by the Government to benchmark welfare benefits. Its level was 39,700 SEK in 2006, 40,300 SEK in 2007, and 41,000 SEK in 2008.

Our working sample consists of 468,533 observations that fulfill these criteria. Summary statistics are presented in Table 1. Wives earn on average 35% less than husbands, and about 11% of individuals are foreign-born. 78% of couples use TPL; on average, joint TPL is 7.3 days per year, of which 2.4 are taken by the husband and 4.9 are taken by the wife.

3.2 The Earned Income Tax Credit reforms

The EITC was introduced in the Swedish tax system by the newly-elected center-right Government in January 2007 and later reinforced in 2008, 2009, 2010, 2014, and 2019. We consider changes to the tax schedule during 2007-2009, when our sample ends.

In the Swedish system, local and national taxes are levied on individual taxable earnings, given by gross earnings net of deductions. The EITC introduced additional deductions for low- and middle-income earners as a function of earnings, unrelated to marital status or parenthood. Deductions are automatically applied to the tax liability of eligible individuals, thus take-up is universal. After being emphasized as one of the Government's flagship policies, the incidence of the EITC was salient to employees from their first 2007 pay slip.

Local taxation is proportional, with an average rate of 31.6% in 2006 (28.9%–34.2% across municipalities). National taxation is progressive, phased in at 20% for earnings above 306,000 SEK, rising to 25% for earnings above 460,600 SEK. The solid line in Figure 2 plots marginal tax rates in 2006, encompassing national taxes, local taxes, and deductions.

The 2007 EITC cut the marginal tax rate to 0 for very low earnings between 17,000–32,000 SEK, and from 34.8% to 31.6% for intermediate earnings between 123,500–306,000 SEK, as shown in Figure 2.[13] Based on our selection criteria, we do not exploit variation from

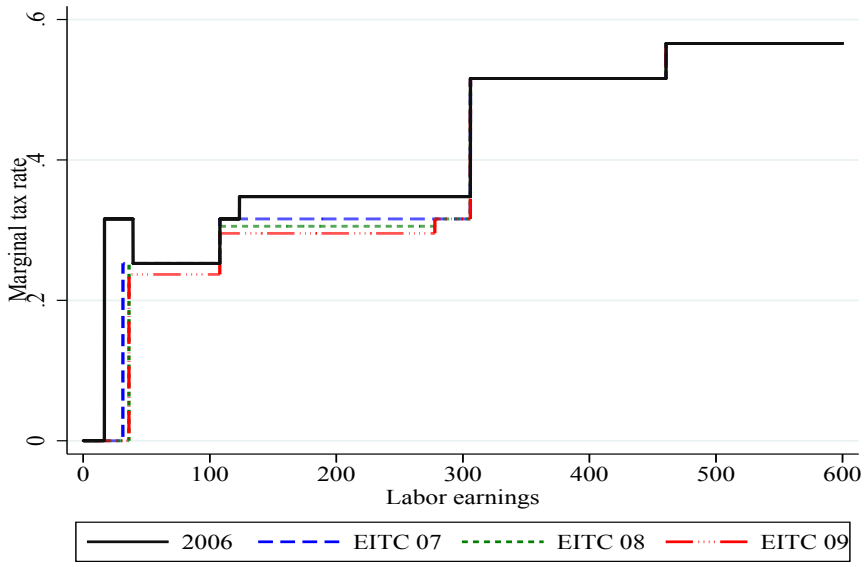
[13]The Online Appendix C gives further detail on the EITC and the calculation of marginal tax rates. See

Table 1: Summary statistics

		Mean	Median	SD
Males:	Age	41.1	41	5.3
	Education (%)	40.6	0	49.1
	Immigrant (%)	11.1	0	31.4
	Labor earnings	386	332	277
	Benefits	9.4	2.5	20.6
	Marginal tax rate (%)	43.8	50.4	10.8
	Days of TPL	2.4	0	4.6
Females:	Age	38.7	39	4.7
	Education (%)	49.0	0	50.0
	Immigrant (%)	11.3	0	31.7
	Labor earnings	249	227	137
	Benefit payments	14.7	4.9	26.7
	Marginal tax rate (%)	35.4	32.2	8.5
	Days of TPL	4.9	3	7.0
Couples:	No. of children aged 4–10	1.5	1	0.6
	Age of youngest child	6.8	7	2.0
	Male-female gap in taxes (%)	8.4	5.0	12.3
	Combined days of TPL	7.3	5	9.5
	Male-female gap in TPL	-2.5	-1	7.1
Share couples with:	$\text{TPL}_m + \text{TPL}_f = 0$		0.22	
	$\text{TPL}_m = \text{TPL}_f > 0$		0.05	
	$\text{TPL}_m < \text{TPL}_f$		0.54	
	$\text{TPL}_m > \text{TPL}_f$		0.20	
Observations	2006 cohort		148,908	
	2007 cohort		157,928	
	2008 cohort		161,697	
	Total		468,533	

Notes: The table summarizes couples' characteristics as of $t-1$ for each cohort, corresponding to the calendar years 2006, 2007, and 2008. 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. The sample includes couples with joint children only.

Figure 2: Changes in the tax schedule, 2006-2009.



Notes: The solid line represents the 2006 tax schedule. The blue, green and red dashed lines represent changes introduced with the 2007, 2008 and 2009 EITCs, respectively. Marginal taxes are calculated based on a 31.6% municipal tax rate and the 2006 price base amount. Labor earnings are expressed in thousand SEK. By selecting couples in which both spouses earn above the price-base amount (between 39,777-41,000 SEK over our sample period), we are not exploiting (large) variation in taxes for very low earners.

large tax changes for very low earners, but only from small tax changes for middle earners. In 2008, additional deductions reduced the marginal tax rate to 30.6% for earnings between 109,600–282,100 SEK, and in 2009 marginal tax rates further fell to 29.5% for earnings in the same range. Below this range, the 2009 EITC further reduced the marginal tax to 23.7% for earnings between 37,300–109,600 SEK.

To have a sense of changes in the cost of TPL, consider an example based on the 2007 EITC. A person with earnings between 123,500–306,000 SEK has her marginal tax rates reduced from 34.8% to 31.6%. This implies that she would give up 13% of her daily income for taking one day of TPL before the EITC, and 16.2% after the EITC.[14] This 25% increase

also Edmark et al. (2016) and DalBo' et al. (2022) for descriptions of the EITC.

[14] A person with daily earnings equal to y would give up $(1-0.348)y-0.8(1-0.348)y = 0.130y$ without the EITC, where 0.8 represents the (uncapped) TPL replacement rate, and $(1-0.348+0.032)y-0.8(1-0.348)y = 0.162y$ with the EITC.

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 7.3 days of TPL a year, the change in its opportunity cost 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.

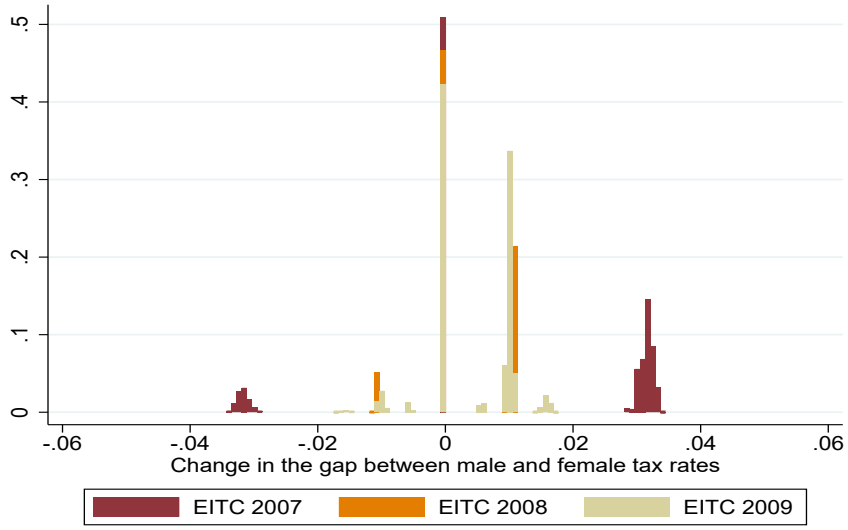
Given individual taxation, couples may face a higher, lower or unchanged tax gap, depending on spouses' baseline earnings. To measure treatment, we compute changes in simulated tax rates ($\tilde{\tau}_{ijt}$), given by the tax change an individual would experience at constant earnings, unaffected by endogenous labor supply responses to the EITC. These are obtained by applying the year t tax schedule to $t-1$ earnings:[15]

$$\Delta\tilde{\tau}_{ijt} = \tilde{\tau}_{ijt} - \tau_{ijt-1} = T'_{ijt}(Y_{ijt-1}) - T'_{ijt-1}(Y_{ijt-1}). \tag{10}$$

Figure 3 shows the distribution of changes in simulated tax gaps. Pooling together 2007–09 tax changes, 46.5% of couples experience no change in their tax gap ($\tau_{imt} - \tau_{ift}$) and represent our control group. The remaining 53.5% of couples are treated. Among these, 85.5% experience an increase in the tax gap of up to 3.4 percentage points (5.3% change in log NTS gap), following a reduction in the female tax rate. The rest experience an equivalent reduction in the tax gap, following a reduction in the male tax rate.

[15] To cater for generalized earnings growth, we project $t-1$ earnings forward using the price-base amount.

Figure 3: The distribution of simulated changes in marginal tax rate gaps



Notes: The histogram represents the distribution of changes in the simulated male-female tax gap ($\tau_m - \tau_f$) induced by the 2007, 2008 and 2009 EITCs.

3.3 Temporary parental leave

TPL can be used by either parent to care for a sick child aged between 8 months and 12 years. While representing only a portion of overall home production, TPL take-up is directly linked to parenthood, which is one key driver of gender gaps in earnings. By linking administrative data on TPL to information on time use from the 2000 and 2010 Swedish Level of Living Survey (SLLS),[16] we establish that fathers' share of TPL is positively correlated to their household work. Estimates shown in Table 2 capture the correlation between fathers' TPL days and their share of household chores, conditional on age, education, and the combined hours spent on chores by mothers and father. The interpretation of the estimate in column 1 is that a 10-percentage point rise in a husband's share of overall home production is associated

[16]The SLLS is a survey conducted every ten years on a 1/1000 random sample of the Swedish resident population aged 15-75, with a panel component.

with him taking an additional 0.57 days of TPL. Correlations are positive for each item of home production in isolation (columns 2-5) or when all items are jointly included (column 6), although the coefficient on food shopping and preparation is not significantly different from zero. Given the small SLLS sample size and its long-spaced waves, we cannot use it for our main analysis on the impact of taxes on home production, but the correlations shown in Table 2 suggest that TPL provides a meaningful proxy for spousal inputs into unpaid work.

Table 2: Home production and TPL

	(1)	(2)	(3)	(4)	(5)	(6)
All chores	5.654**					
	(2.362)					
Clothes care		4.315***				4.250**
		(1.544)				(1.664)
Cleaning			3.954***			2.459*
			(1.435)			(1.411)
Repairs				2.228**		3.114**
				(1.262)		(1.406)
Food					1.003	-0.491
					(1.573)	(1.850)
N	291	315	316	272	318	263

Notes: The dependent variable is the number of TPL days taken by the husband in a year. Estimates reported are coefficients on the husband's share of hours spent on any house chore (column 1), care of clothes (column 2), cleaning (column 3), repairs (column 4), grocery shopping and food preparation (column 5), and each single chore (column 6). Regressions also control for the combined weekly hours spent by husbands and wives on each chore, fixed effects for age, years of schooling, and year 2010. Significance: * = 0.1; ** = 0.05; *** = 0.01. Source: Swedish Level of Living Survey (SLLS), 2000 and 2010. Sample: married or cohabiting, dual-earner couples with children aged 4-11.

TPL is compensated at 80% of foregone earnings up to a cap, rising from 302,000 SEK in 2007 to 321,000 SEK in 2009. 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. To receive TPL benefits, a parent needs to register a child as sick on the first day of the sickness spell, and from the

eighth day, a doctor's certificate is required.[17]

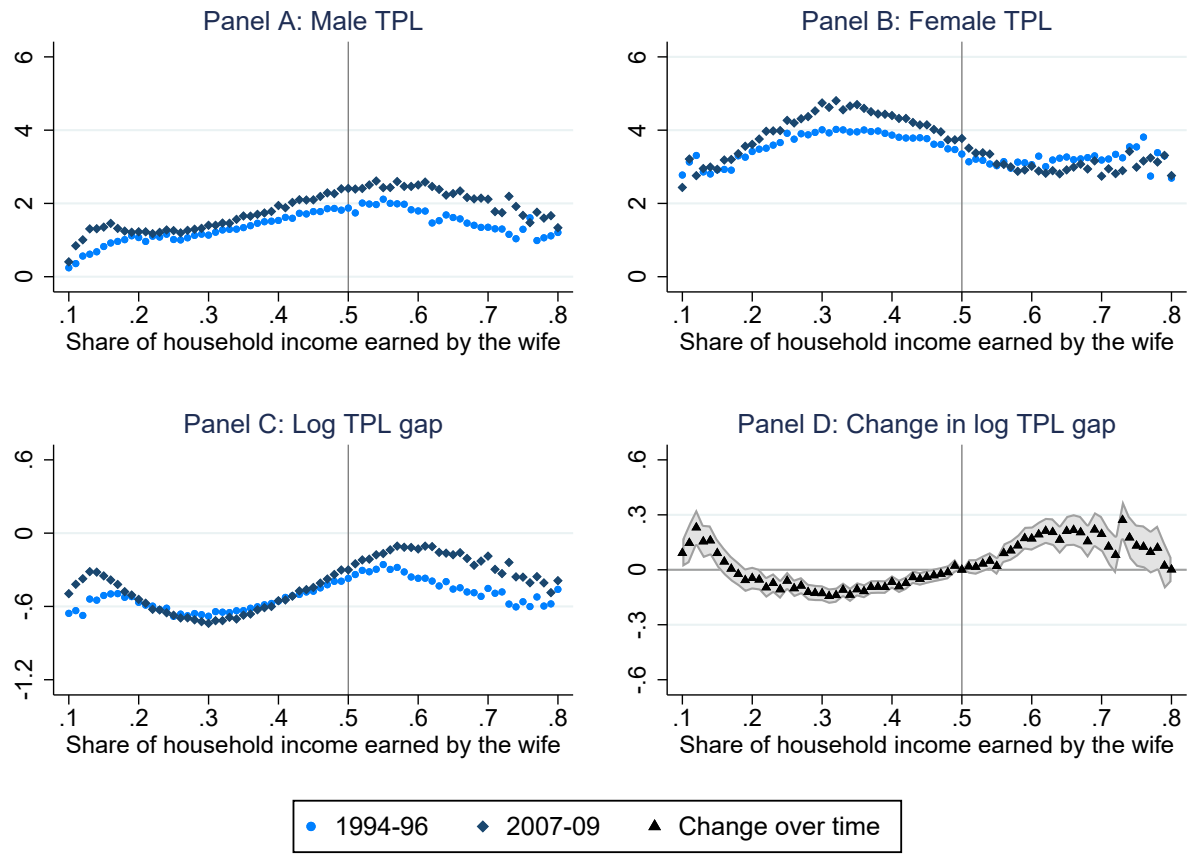
The use of TPL is widespread. In our sample, 78% of couples have positive TPL, and there seems to be little competition to TPL use from the market childcare sector. In 2016, only 1.4% of private expenditure for household services was accounted for by childcare services.[18] This amounts to about 103 million SEK of private expenditure on childcare, against 146 billion SEK of Government expenditure. As for other components of labor supply, TPL use may be constrained by optimization frictions that interfere with working hours adjustment (Chetty, 2012). In particular, TPL days have a lower bound of zero and an upper bound at the number of child sick days. These limits can become binding whenever individuals face large tax changes. In other words, the modest tax changes embedded in the 2007 EITC are relatively less likely to drive choices toward corner solutions than large tax reforms.

While our analysis focuses on the years surrounding the 2007-09 reforms, the TPL scheme has been in place for decades, and changes in take-up may be suggestive of the evolution of the relative importance of economic incentives and norms. Figure 4 plots husbands' and wives' TPL days against the share of household income earned by the wife for two time periods: our main sample period 2007-09, and an earlier period 1994-96, when TPL days were first recorded in the LOUISE register. The distribution is capped below 0.1 and above 0.8 to reduce noise, as in less than 1% of households the wife earns less than 10% or more than 80% of joint family income. Panel A shows that husbands' TPL is overall positively

[17]The 2006 audit experiment of Engström et al. (2007) suggests evidence of an "excess" TPL use, with 22.1% of take-up being unrelated to the care of sick children. As a response, the Social Insurance Agency randomly audited 40% of TPL cases from August 2006–August 2008 and, from July 2008, schools/daycare certificates were required to confirm child absences. Despite tighter monitoring since 2006, some of TPL take-up may not strictly reflect childcare time, but there is no reason to expect that excess use varies systematically with EITC treatment in a way that is not captured by the set of controls used in our regressions.

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

Figure 4: TPL use in 1994-96 and 2007-09



Notes: The figure plots TPL use in days (Panels A and B) and the log TPL gap (Panel C) against the share of household income earned by the wife in 1994-96 and 2007-09. Panel D plots the change in the log TPL gap over time, where the shaded area represents 95% confidence intervals.

correlated to their wives' income shares, and it has increased over time, especially in female-breadwinner households. Over time, male TPL has therefore become more responsive to economic incentives. Symmetrically, the rise in wives' TPL in panel B has been concentrated in male-breadwinner households.[19] This implies a decrease over time in the (log) TPL gap in male-breadwinner households and an increase in female-breadwinner households (Panels C and D). The more salient role of economic incentives over time is suggestive of evolving

[19]The positive correlation between wives' TPL and their income share below 30% possibly reflects a higher incidence of part-time work among low-earning women, who may not need to use TPL when their children are sick.

norms on the gendered division of childcare.

4 The empirical specification

We bring specifications (8) and (9) to the data described above. Note that the error term, $u_{imt} - u_{ift}$, is likely to be correlated with the tax treatment embodied in substitution and income effects whenever the marginal tax rate faced by an individual is endogenous to their labor supply choices. We therefore exploit the exogenous change in marginal tax rates generated by the EITC to build simulated log NTS gap, $\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})$ and simulated income effects $\Delta\tilde{\theta}_{ijt} = \tilde{\theta}_{ijt} - \theta_{ijt-1} = \ln[Y_{ijt-1} - T_{ijt}(Y_{ijt-1})] - \ln[Y_{ijt-1} - T_{ijt-1}(Y_{ijt-1})]$, and estimate the following intention-to-treat specification:

$$\Delta(h_{imt} - h_{ift}) = \beta\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt}) + \gamma_m\Delta\tilde{\theta}_{imt} - \gamma_f\Delta\tilde{\theta}_{ift} + \gamma X_{it} + (\tilde{u}_{imt} - \tilde{u}_{ift}). \tag{11}$$

Estimation of (11) identifies the causal effects of interest if, conditional on observables, treatment and control couples would experience a similar evolution of the TPL gap in the absence of tax changes. While the inclusion of earning controls could proxy for the counterfactual evolution of the TPL gap, such controls would absorb the identifying variation, as tax variables are themselves deterministic functions of earnings. In general, the error term embodies the counterfactual change in the TPL gap, $\Delta(h_{imt} - h_{ift}|\text{no reform})$, and the resulting bias in the β estimate depends on its correlation with the tax regressor $\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})$.

To illustrate possible patterns of correlation, let's consider first couples in which the husband earns more. Given that the EITC predominantly applies to low-mid earnings, wives in these couples are more likely to be treated than husbands, i.e., $\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt}) > 0$. These

wives take up the bulk of TPL at baseline, $h_{imt-1} - h_{ift-1} < 0$, but (other things equal) such differential tends to shrink over time because (i) total TPL declines with children's age and (ii) this decline mostly bites on the TPL share of the main provider, implying $\Delta(h_{imt} - h_{ift}|\text{no reform}) > 0$.[20] 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 get older, thus $\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt}) < 0$ and $\Delta(h_{imt} - h_{ift}|\text{no reform}) < 0$. The positive correlation between $\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})$ and $\Delta(h_{imt} - h_{ift}|\text{no reform})$ would yield an upward bias in the β estimate. This is only a likely scenario, and other scenarios are possible. 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 accounting for it.

To factor in the counterfactual evolution of the TPL gap, we follow two alternative approaches. The first, which we adapt from Gelber (2014), consists in estimating $\Delta(h_{imt} - h_{ift}|\text{no reform})$ from a parametric relationship between TPL and income for the 2005 cohort:

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

where y_{ij05} denotes 2005 log income (earnings plus benefits), $g(.)$ denotes a ten-piece spline with knots at deciles, and X_{ij05} are observable characteristics. The estimated coefficients $\hat{\xi}_y^{jf}$ and $\hat{\xi}_y^{jm}$ calibrate the evolution of TPL in the absence of tax changes in different parts of

[20] Table E1 in the Online Appendix shows evidence of these patterns before 2007 (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, secondary earners, and primary TPL takers.

the income distribution and are used to predict TPL changes for each spouse in later years:

$$\Delta_G(h_{ijt}|\text{no reform}) \quad = \quad g(y_{ift})\hat{\xi}_y^{jf} + g(y_{imt})\hat{\xi}_y^{jm}, \tag{12}$$

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

The second approach builds on a non-parametric prediction of $\Delta(h_{imt} - h_{ift}|\text{no reform})$, based on matching individuals in the reform period to a sample of similar individuals in the pre-reform period. For the 2006-08 cohorts (the reform period) and the 2005 cohort (the pre-reform period), we consider the distributions of male and female earnings in our study population and divide them into twenty-five 4% bins. We then assume that the counterfactual evolution of TPL for each spouse j in couple i in the 2006-08 cohorts is given by the mean TPL change during 2005-06 among the set S of individuals in the 2005 cohort who belong to the same gender, municipality and earnings' bin:

$$\Delta_M(h_{ijt}|\text{no reform}) = \mathbb{E}\{\Delta(h_{ij06}|S)\}, \tag{13}$$

where the subscript M stands for the matching procedure.

We residualize our dependent variable by either counterfactual (12) or (13) and estimate:

$$\hat{\Delta}_k(h_{imt} - h_{ift}) = \beta\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt}) + \gamma_m\Delta\tilde{\theta}_{imt} - \gamma_f\Delta\tilde{\theta}_{ift} + \gamma X_{it} + \epsilon_{it}, \tag{14}$$

where $\hat{\Delta}_k(h_{imt} - h_{ift}) \equiv \Delta(h_{imt} - h_{ift}) - \Delta_k(h_{imt} - h_{ift}|\text{no reform})$, $k = G, M$.

This is a triple difference identification strategy, in which differences across control and treated couples before and after the EITC are benchmarked against the corresponding differences in a period without tax changes. Identification of the effects of interests hinges on a parallel trend assumption that, in the absence of tax changes, the evolution of the change

in the TPL gap should differ at most by a constant between treated and control couples.

We consider asymmetric responses in a couple's TPL gap to an increase or decrease in the tax gap based on the following variant of equation (14), which imposes a spline in $\Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})$ with a knot at 0:

$$\begin{aligned} \hat{\Delta}_k(h_{imt} - h_{ift}) &= \beta^+ \Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})|_{\Delta\tilde{\sigma}_{ift}>0} + \beta^- \Delta(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})|_{\Delta\tilde{\sigma}_{imt}>0} \\ &+ \gamma_m \Delta\tilde{\theta}_{imt} - \gamma_f \Delta\tilde{\theta}_{ift} + \gamma X_{it} + \epsilon_{it}. \end{aligned} \tag{15}$$

The vector of couple characteristics X_{it} includes individual and household demographics, together with education and industry effects for each spouse.[21] We additionally control for several factors potentially shaping a couple's division of childcare, over and above the significance of gender norms. First, as mothers' comparative advantage at birth may lead them to specialize in childcare and become less substitutable in the care for older children, we control for the mother's share of SPL (as well as total household SPL), as a proxy of parental specialization at birth. Second, parents' workplace constraints potentially affect the substitutability between their respective involvement in childcare. The law leaves discretion to employees on the use of TPL, but individuals may have career concerns over disruption or reputational consequences of their work absences. As proxies of family-friendly workplace culture, we use share of female employees with young children in each spouse's workplace and the interaction between the two. The robustness analysis additionally considers controls for occupations, college majors and high-school tracks. Third, while the private sector provides

[21] The inclusion of industry effects in the first-difference specification effectively controls for industry-specific trends in TPL use. We also estimate more flexible specifications that include industry-by-cohort fixed-effects, which would absorb industry-specific shocks associated to the onset of the Great Recession. As the results are virtually identical to those that only include industry-specific dummies, we do not report them here.

scant alternatives to TPL, we consider the use of informal child care. Based on the Swedish multi-generational register we build a proxy for the most common type of informal childcare, provided by grandparents who live within commuting distance, and control for the number of grandparents living in the same municipality.

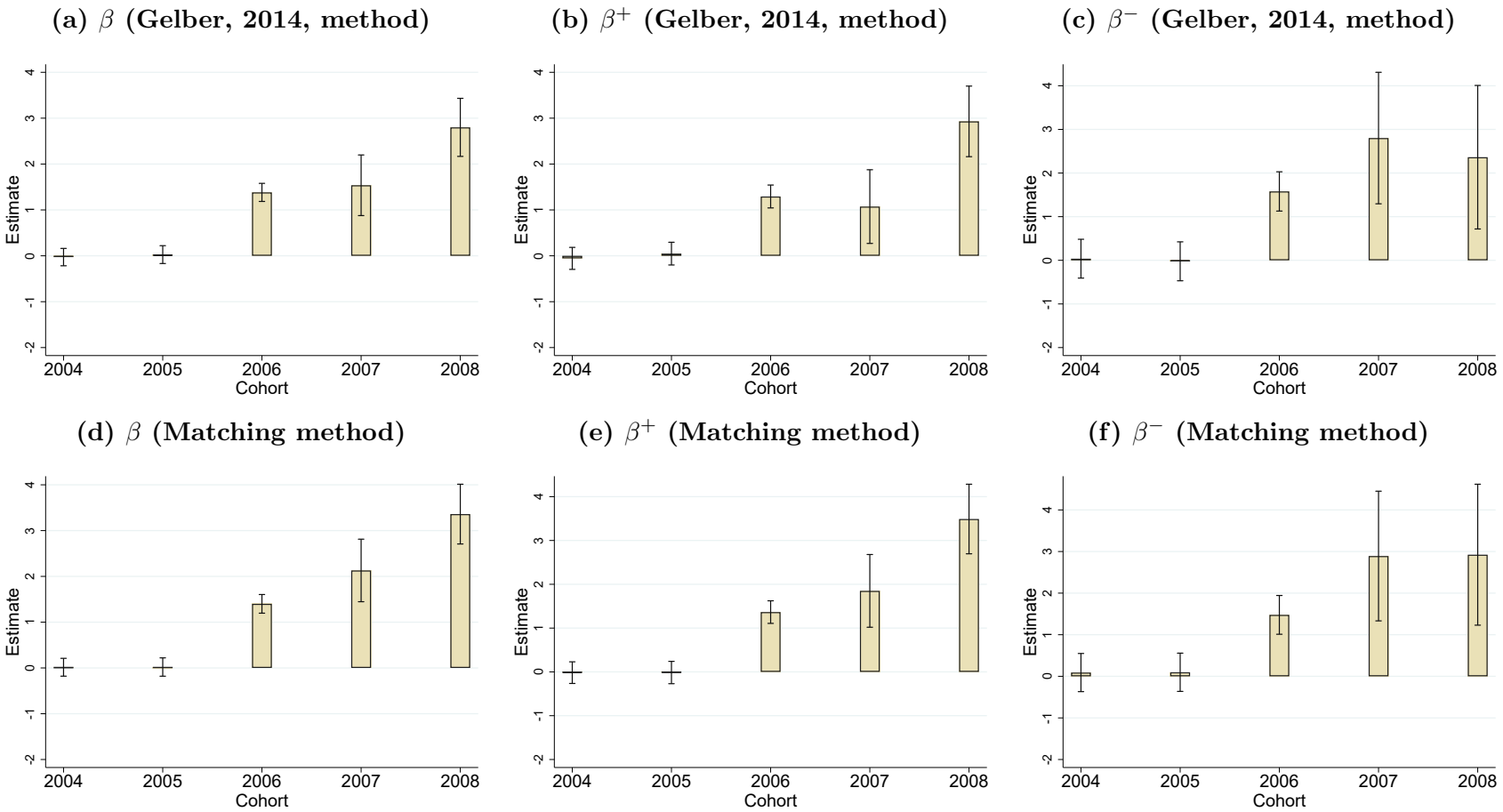
5 Baseline results

We first show separate estimates for each reform year, as well as for the pre-reform period, which serves for falsification. Figure 5 displays estimates of the overall elasticity (β) and of the asymmetric responses (β^+ and β^-) for each cohort. The β estimates for the 2006, 2007, and 2008 cohorts (our working sample) are based on specification (14), and the β^+ and β^- estimates are based on specification (15). Changes in TPL gaps between $t-1$ and t have been residualized based on corresponding changes in the 2005 cohort. Estimates for the 2004 and 2005 cohorts (our falsification period) are obtained after residualizing changes in TPL gaps based on corresponding changes in the 2003 cohort.[22]

With either residualization method, all pre-treatment estimates for β, β^+ and β^- are fairly precise zeros, while post-treatment estimates are positive and highly significant. Estimates of β during the reform years range from 1.38 for the 2006 cohort to 2.80 for the 2008 cohort in panel (a) and from 1.40 to 3.36 in panel (d). The rise in the estimated elasticities over time is also visible for the asymmetric responses in panels (b)-(c) and (e)-(f). There is no obvious interpretation for the observed rise. One possible explanation is that the impact of the tax treatment is heterogeneous across the earnings distribution – as tax changes during

[22]For the 2004 and 2005 cohorts we impose the 2007 hypothetical treatment range. Imposing the 2008 or 2009 treatment ranges yields equivalent placebo estimates, both qualitatively and quantitatively.

Figure 5: Elasticities by cohort



Notes: The figures plot estimates of β, β^+ and β^- separately for five cohorts of couples. The 2004 and 2005 cohorts belong to the placebo sample, which was not exposed to tax reforms. Simulated tax changes for this sample are calculated using the 2007 EITC earnings thresholds. The 2006, 2007 and 2008 cohorts comprise our working sample. The dependent variable in all estimates is the residualized change in the log TPL gap using the Gelber (2014) or the matching methods described in Section 4. All regressions include the same controls as described in the notes to Table 3 below. Vertical bars represent 95% confidence intervals, with standard errors clustered at the couple level.

2008 affect earnings further down in the distribution relative to 2007 changes. Another interpretation is that individuals gradually become better aware of the EITC, which triggers more widespread responses.

Table 3 shows estimates on the pooled EITC sample in columns 1-3 and for the placebo sample in columns 4-6. To highlight the role of residualization, we show both double-difference estimates (columns 1 and 4) and triple-difference estimates (columns 2-3 and 5-6). In column 1 of Panel A, the dependent variable is the raw change in the (log) TPL gap, and the resulting β estimate is about 2.2 and highly significant. In column 2 the change in the TPL gap is residualized with respect to its counterfactual evolution based on the Gelber (2014) method, and the β estimate falls to about 1.6, which corresponds to the average of the separate estimates reported in panel (a) of Figure 5 for the 2006-2008 cohorts. A similar estimate is obtained in column 3, in which the dependent variable is residualized using the matching method. As expected from the discussion of Section 4, the double-difference estimate for β is upward biased.

Columns 4-6 report results from the corresponding placebo regressions. We detect a significant estimate in column 4 on the double-difference specification, 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,[23] and, only when these differences are catered for in columns 5 and 6, respectively, is the placebo estimate very close to zero and statistically insignificant.

Panel B estimates specification (15) to identify β^+ and β^-. In column 1, the response of the TPL gap to a decrease in the female tax rate is significantly smaller than its response

[23]This was also noted by Edmark et al. (2016) in double-difference estimates of the EITC on employment.

Table 3: Elasticity of substitution in the main and placebo samples

	Main sample 2006, 2007 and 2008 cohorts			**Placebo sample** 2004 and 2005 cohorts		
	Raw (1)	Gelber (2014) (2)	Matching (3)	Raw (4)	Gelber (2014) (5)	Matching (6)
Panel A						
β	2.192***	1.635***	1.708***	0.872***	0.001	0.020
	(0.087)	(0.087)	(0.090)	(0.064)	(0.063)	(0.066)
Panel B						
β^+ $(\tau_f \downarrow)$	1.993***	1.549***	1.696***	0.773***	0.001	-0.011
	(0.110)	(0.110)	(0.114)	(0.081)	(0.081)	(0.084)
β^- $(\tau_m \downarrow)$	2.656***	1.836***	1.738***	1.101***	0.002	0.089
	(0.207)	(0.207)	(0.215)	(0.152)	(0.152)	(0.158)
Row difference	-0.663***	-0.287	-0.042	-0.328	-0.001	-0.100
	(0.256)	(0.256)	(0.265)	(0.189)	(0.189)	(0.196)
N	468,533	468,533	466,420	295,567	295,567	294,869

Notes: The dependent variable in column 1 is the raw change in the log TPL gap between $t-1$ and t (specification (11)); in column 2 it is the residualized change in the log TPL gap based on the Gelber (2014) method and in column 3 it is the residualized change in the log TPL gap based on the matching method (specification (14)). Columns 4-6 report corresponding placebo specifications. Panel B estimates specification (15) with the same dependent variables and samples as in Panel A. All regressions also control for cohort fixed-effects; virtual income, age fixed effects, education fixed-effects (7 categories), dummy for born in Nordic country, and industry fixed effects (10 categories) for each spouse; municipality fixed-effects (289); fixed effects for the number of children aged 4-11; fixed effects for the age of the youngest child; total days of SPL taken by the couple; share of SPL taken by the mother; fixed effects for the number of grandparents living in the same municipality; share of mothers with children aged 0-11 at each spouse's workplace (and their interaction); marital status. Standard errors are clustered at the couple level and reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

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 residualized in columns 2 and 3. We detect again significant placebo effects when the dependent variable is not residualized in column 4, and these vanish with either adjustment method in columns 5 and 6.[24]

In summary, results shown in Table 3 suggest an elasticity of substitution around 1.6, with no significant variation across husbands' and wives' treatment or residualization methods. Importantly, all placebo estimates based on residualized dependent variables are not statistically significant and very close to zero in magnitude.

The estimates above leverage relatively small changes in tax rates (up to a 5.3% change in log NTS gap). In the Online Appendix D, we extend this analysis by exploiting variation from the large tax changes generated by an earlier reform of 1990-91, which drastically reduced the marginal tax rates, especially for mid- and high-earners and implied a change of the tax gap of more than 10 percentage points for 50% of couples in our sample (see Figure D2 in the Online Appendix).

Leaving details to Online Appendix D, evidence from the 1990-91 reform enriches our analysis and qualitatively supports our main findings on the EITC, both in terms of the overall elasticity of substitution in spousal TPL and asymmetric adjustments. Quantitatively, though, the estimated elasticity is considerably smaller than the EITC-based estimate from Table 3. We postulate that this difference may reflect the role of the optimization frictions discussed in Section 3.3 (TPL days cannot be less than 0 and more than children's sick days): specifically, constraints to TPL use, limiting the possibilities of TPL substitution between

[24]Results in Table 3 are obtained after transforming the TPL gap into $\Delta(\ln(H_{imt}+1)-\ln(H_{ift}+1))$, to cater for cases with zero TPL. The Online Appendix B shows that results obtained with alternative methods to measure the percent home production gap are remarkably similar.

spouses, are more likely to be binding in the presence of large tax changes. By restricting the 1989-91 sample to subsets of couples with progressively smaller changes in the tax gap, we estimate a monotonically rising elasticity with the tightness of the selection criteria, reaching about 1.1 in a sub-sample with a similar range of variation in the tax gap as our main 2006-09 sample (see Table D2 in the Online Appendix). This estimate is about one-third smaller than the corresponding 1.6 estimate from Table 3. To some extent, the remaining difference may reflect genuine changes in the substitutability of childcare between spouses, related to the declining role of norms vis-à-vis economic incentives, as also suggested by Figure 4.

6 Heterogeneous effects by country of origin

6.1 Indicators of gender norms

To investigate heterogeneous responses to tax inventives, we build on the epidemiological approach, which identifies the role of culture from variation in behavior across individuals from different countries of origin, whose norms are potentially different, but observed within the same economic and institutional environment (Fernandez, 2011).

We measure cultural differences in gender-related matters between Sweish resident couples from different origin countries using a variety of country-level indicators: some of these are based on direct elicitation of norms, while others summarize institutional or economic aspects that can be associated with variation in gender norms. From the World Value Survey, we use responses to the statement: "When jobs are scarce, a man should have more right to a job than a woman". This is available for the largest set of countries and is widely used as a measure of gender norms (see, e.g., Azmat et al., 2006, Alesina et al., 2013 and

Bertrand et al., 2020). We use an additional statement from the World Value Survey, "When a mother works the children suffer," referring more specifically to spouses' contributions to childcare. We use the share of the population that disagrees with each statement (denoted by WVS1 and WVS2, respectively) as an indicator of liberal gender norms. We also use global indices relating to gender equality, namely the Global Gender Gap Index (GGGI), capturing gender gaps in economic participation and opportunities, educational attainment, health, survival, and political empowerment; and the Social Institution and Gender Index (SIGI), capturing discrimination in social institutions, including women's discrimination in the family, restricted physical integrity, restricted access to productive and financial resources, and restricted civil liberties. Finally, we use two economic outcomes that tend to be associated with gender equality, namely the gender ratio in labor force participation rates (FLFP) and GDP per head. To ease interpretation and discussion, all indicators are defined such that *higher values correspond to higher gender equality.*

There is wide cross-country variation in all indicators considered. For example, the share of respondents who disagree with the statement "When jobs are scarce, a man should have more right to a job than a woman," is 83% in Sweden (at the 95th percentile) and 12% in Iran (5th percentile), with an (unweighted) standard deviation of 21. Pairwise rank correlations between the six indicators range from 0.14 (GDP–FLFP) to 0.75 (SIGI–WVS1).

Table 4 shows descriptive statistics for these indicators in our sample, obtained by assigning to each couple the value of the indicator corresponding to the spouses' country of origin (or the mean value if spouses were born in different countries). As the variable denoting country of birth in the Swedish registry data is aggregated into 27 groups (described in Table E2 of the Online Appendix), we first compute indicators for each group as the

Table 4: Summary statistics for indicators of gender norms in the working sample

Index	Mean	SD	Min	Max	Obs
WVS1	78.2	13.7	12.3	87.2	468,511
WVS2	74.4	9.1	16.8	91.2	468,511
GGGI	80.1	4.5	55.1	84.5	468,511
SIGI	97.3	6.7	35.9	99.1	468,511
FLFP	85.1	11.1	16.5	89.6	468,511
GDP	54.8	14.1	0.5	96.5	468,511

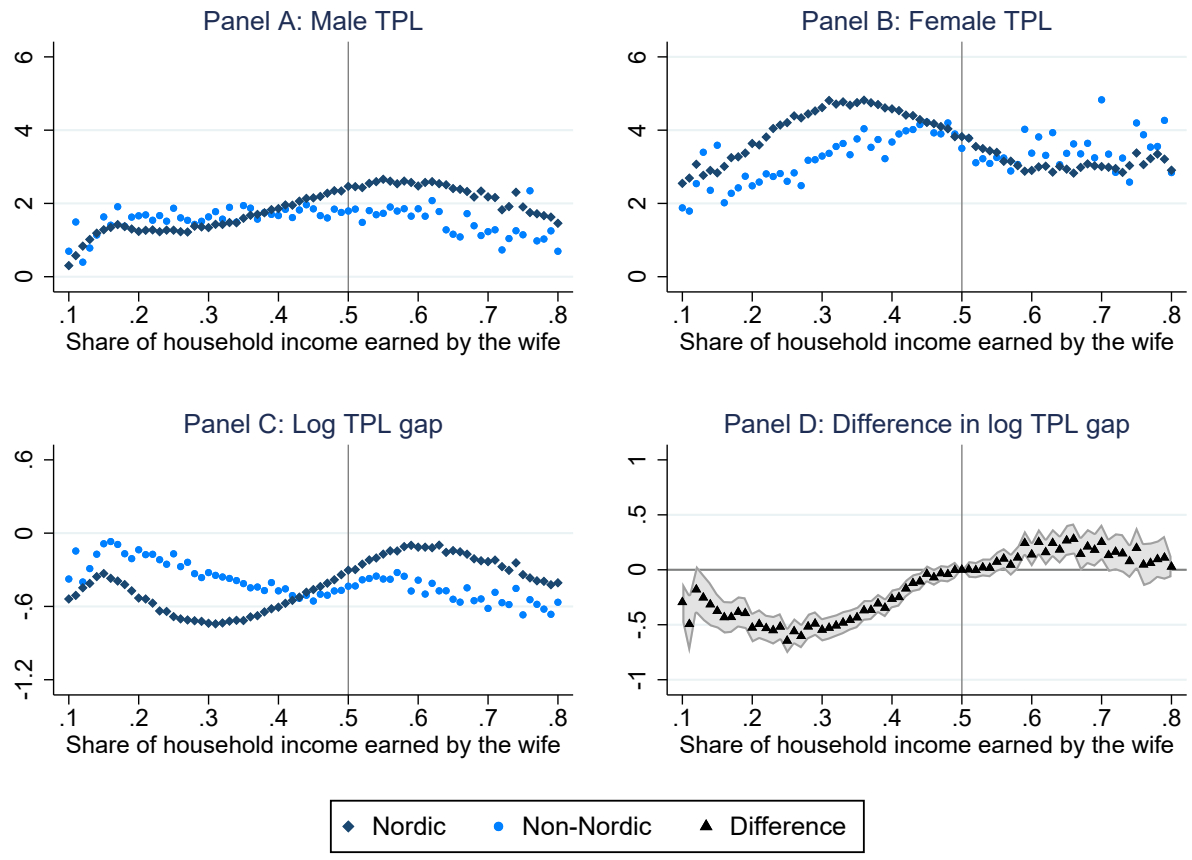
Notes. If spouses are natives of different countries, couples are assigned the mean value of each indicator. All indicators are defined such that *higher values correspond to higher gender equality.* **WVS1**: % of respondents in the WVS (waves 5-7) who do not agree with the statement "When job are scarce, men should have more right to a job than women." **WVS2**: % of respondents in the WVS (waves 6-7) who do not agree with the statement "When a mother works, the children suffer." **GGGI**: equal to 100 minus the Global Gender Gap index, capturing gender gaps in economic participation and opportunities, educational attainment, health, survival, and political empowerment; ranging between 0 "most unequal environment" and 100 "most equal environment" (source: 2016 WEF Global Gender Gap Report; 2018 for Iraq). **SIGI**: equal to 100 minus the Social Institution and Gender Index, capturing discriminatory social institutions, aggregating sub-scores that relate to women's discrimination in the family, restricted physical integrity, restricted access to productive and financial resources, and restricted civil liberties; ranging between 0 "most discriminatory environment" and 100 "least discriminatory environment" (source: OECD, 2014). **FLFP**: ratio of female to male labor force participation rate (x100) (source: World Bank, 2011). **GDP**: GDP per head, in thousands USD (source: World Bank, 2011).

weighted average of the corresponding country-level indicators, using the shares of migrants in 2000 from each country as weights. Variation in the indicators is much reduced in the couple-level data, as in 83% of couples both spouses were born in Sweden, but the results presented below suggest that our empirical setting has enough statistical power to identify the impacts of interest.

One key divide in the variation of indicators is between Nordic countries (Sweden, Norway, Finland, Denmark, Iceland) and the rest of the world, as shown in Figure E1 of the Online Appendix. While indicators differ in the way they are constructed, the aspects of gender inequality they reflect, and the purpose for which they are originally obtained, Nordic countries provide a much more favorable ground for gender parity according to each of them.

Figure 6 plots male and female TPL against the share of family income earned by the

Figure 6: TPL use among Nordic and non-Nordic couples



Notes: The figure plots TPL use in days (Panels A and B) and the log TPL gap (Panel C) against the share of household income earned by the wife for Nordic and non-Nordic couples. Panel D plots the corresponding difference in the log TPL gap, where the shaded area represents 95% confidence intervals.

wife for Nordic and non-Nordic nationals separately. Nordic husbands take relatively more TPL than non-Nordic husbands in female-breadwinner households (Panel A) and, symmetrically, Nordic wives take relatively more TPL than non-Nordic wives in male-breadwinner households (Panel B). This implies that the TPL gap is more strongly correlated to economic incentives for Nordic than non-Nordic households (Panels C), and both the male-TPL deficit in male-breadwinner households and the male-TPL surplus in female-breadwinner households are significant at the 5 percent statistical level (Panel D). The interpretation is that non-Nordic households are relatively less sensitive to economic incentives, possibly

consistent with a heavier role of norms in the gender division of childcare.

These patterns do not control for differences in several relevant characteristics of couples. However, individuals originating from different countries are also likely to differ in important dimensions, including the respective processes of selection into employment and migration (if foreign-born), their earnings, and counterfactual evolutions of TPL in the absence of tax changes – to name a few. In our estimates, the role of unobservables at the couple level is factored in by taking first differences (see equations (14) and (15)). In addition, we residualize the dependent variable with respect to the predicted counterfactual TPL gap and include a rich set of controls described at the end of Section 4.

6.2 Evidence on heterogeneous effects

We first show separate elasticity estimates for couples in which at least one spouse was born in a Nordic country and couples in which both spouses were born elsewhere. These are obtained in regressions that include an interaction between the tax treatments and a dummy for Nordic origin. The estimates are reported in Table 5. Columns 1 and 2 in panel A show similar estimates for the overall elasticity of substitution for Nordic and non-Nordic couples, and the corresponding difference is not statistically significant (column 3).

Panel B fits different slopes for wives' and husbands' tax cuts and shows that the β^+ and β^- estimates are nearly identical for Nordic couples, who seem to react with similar intensities to wives' and husbands' tax cuts. There is instead evidence of a wide gap in the elasticities for non-Nordic couples, whose reaction to wives' treatment is weak and not significantly different from zero, while their reaction to husbands' treatment is very large, statistically significant,

Table 5: Elasticity of substitution by country of origin

	Birthplace of spouses: Nordic (1)	Non-Nordic (2)	Difference (3)
Panel A			
β	1.620***	1.835***	-0.215
	(0.089)	(0.341)	(0.351)
Panel B			
β^+ $(\tau_f \downarrow)$	1.606***	0.630	0.976**
	(0.112)	(0.476)	(0.485)
β^- $(\tau_m \downarrow)$	1.627***	3.562***	-1.935***
	(0.218)	(0.626)	(0.659)
Row difference	-0.022	-2.932***	2.911***
	(0.266)	(0.859)	(0.891)
N	434,547	33,986	

Notes: The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. Panel A estimates are based on specification (14) and Panel B estimates are based on specification (15). 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. 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 columns 3. All regressions also control for variables listed in the notes to Table 3. Standard errors are clustered at the couple level and are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

and more than twice as large as the corresponding elasticity for Nordic couples (3.6 versus 1.6). Horizontal cross-country differences in β^+ and β^- are statistically significant (column 3), while vertical within-group differences between β^+ and β^- are only significant for the non-Nordic couples (column 2). The positive and statistically significant double difference at the bottom of column 3 implies that non-Nordic couples display, overall, a more conservative behavior than Nordic couples, because they respond less intensively to female tax cuts and more intensively to male tax cuts.

Table 6: Varying elasticities with gender norms in the country of origin

Indicator	WVS1 (1)	WVS2 (2)	GGGI (3)	SIGI (4)	FLFP (5)	GDP (6)	PC (7)	IN-SWE (8)
Panel A								
β	1.633***	1.635***	1.634***	1.635***	1.634***	1.635***	1.634***	1.639***
	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)	(0.087)
$\beta \times indicator$	-0.073	-0.098	-0.068	-0.152*	-0.098	-0.078	-0.098	-0.057
	(0.090)	(0.091)	(0.089)	(0.087)	(0.089)	(0.091)	(0.090)	(0.087)
Panel B								
β^+	1.533***	1.537***	1.533***	1.546***	1.537***	1.534***	1.536***	1.548***
	(0.110)	(0.110)	(0.110)	(0.110)	(0.110)	(0.110)	(0.110)	(0.110)
$\beta^+ \times indicator$	0.247**	0.206	0.262**	0.103	0.238*	0.240*	0.231*	0.101
	(0.124)	(0.126)	(0.124)	(0.121)	(0.126)	(0.123)	(0.124)	(0.110)
β^-	1.754***	1.763***	1.757***	1.774***	1.757***	1.754***	1.751***	1.806***
	(0.208)	(0.207)	(0.208)	(0.207)	(0.208)	(0.208)	(0.208)	(0.207)
$\beta^- \times indicator$	-0.542***	-0.533***	-0.539***	-0.517***	-0.554***	-0.568***	-0.569***	-0.386**
	(0.171)	(0.172)	(0.167)	(0.162)	(0.164)	(0.176)	(0.168)	(0.192)
N	468,511	468,511	468,511	468,511	468,511	468,511	468,511	468,509

Notes: The dependent variable in all regressions is the residualized change in the log TPL gap based on the Gelber (2014) method. The indicators for norms in the headings of the first six columns are: **WVS1**: % of respondents in the WVS (waves 5-7) who do not agree with the statement "When job are scarce, men should have more right to a job than women." **WVS2**: % of respondents in the WVS (waves 6-7) who do not agree with the statement "When a mother works, the children suffer." **GGGI**: equal to 100 minus the Global Gender Gap index, capturing gender gaps in economic participation and opportunities, educational attainment, health, survival, and political empowerment; ranging between 0 "most unequal environment" and 100 "most equal environment" (source: 2016 WEF Global Gender Gap Report; 2018 for Iraq). **SIGI**: equal to 100 minus the Social Institution and Gender Index, capturing discriminatory social institutions, aggregating sub-scores that relate to women's discrimination in the family, restricted physical integrity, restricted access to productive and financial resources, and restricted civil liberties; ranging between 0 "most discriminatory environment" and 100 "least discriminatory environment" (source: OECD, 2014). **FLFP**: ratio of female to male labor force participation rate (x100) (source: World Bank, 2011). **GDP**: GDP per head, in thousands USD (source: World Bank, 2011). **PC** in Column 7 is the first principal component of indicators 1-6 (explaining 90% of the overall variation, with an eigenvalue of 5.38). **IN-SWE**: is the share of a person's life in Sweden (which ranges from zero for immigrants arriving at $t-1$ to 100 for persons born in Sweden). All indicators are standardized with a mean equal to zero corresponding to the average couple and a standard deviation equal to one. Estimates in Panel A are based on an augmented specification of (14), where $(\tilde{\sigma}_{ift} - \tilde{\sigma}_{imt})$ is interacted with each indicator in turn. Estimates in Panel B are based on an augmented specification of (15) where $\Delta(\tilde{\sigma}_{ft} - \tilde{\sigma}_{mt})|_{\Delta\tilde{\sigma}_{ft}>0}$ and $\Delta(\tilde{\sigma}_{ft} - \tilde{\sigma}_{mt})|_{\Delta\tilde{\sigma}_{mt}>0}$ are interacted with each indicator in turn. If spouses are from different countries of origin, we use the average value of each indicator. All regressions also control for the relevant indicator and for variables listed in the notes to Table 3. Standard errors are clustered at the couple level and reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

We next exploit variation across all origin countries represented in our sample by allowing elasticities to vary continuously with proxies for gender norms in each couple's country of origin. All indicators are standardized to have zero mean and unit standard deviation in our sample. Recall that, for each indicator, higher values reflect more egalitarian norms. Columns 1-6 in Table 6 report elasticity estimates that vary with each indicator in turn, by including an interaction between the tax treatment and each indicator, together with its main effects. As indicators are standardized, β estimates represent the elasticity for the average couple and, as expected, the estimates in columns 1-6 coincide almost exactly with the value shown in column 2 of Table 3. The coefficient on the interaction term measures the change in the elasticity associated with a one standard deviation increase in gender equality in the spouses' country of origin. In all specifications, this coefficient is small and statistically insignificant, except in column 4 where it is significant at the 10% level. Small estimates on the interaction terms echo the small and statistically insignificant difference between the coefficients in columns 1 and 2 of panel A in Table 5.

Panel B of Table 6 (similarly as panel B of Table 5) shows instead that norms in the origin country do matter for asymmetric responses to wives' and husbands' treatment. Specifically, β^+ estimates increase and β^- estimates decrease with a more egalitarian environment, across all indicators considered. The interpretation is that more egalitarian norms boost the response of spouses' time allocation to a cut in the wife's tax rate, while they dampen the response to a cut in the husband's tax rate. The size of the estimated interaction coefficients is remarkably stable across specifications. On average, a one standard deviation increase in gender equality in one's country of origin (corresponding for example to the difference between the average German-born couple and the average Swedish-born couple according

to WVS1) raises couples' response to a cut in the wife's tax rate by about 0.25, and lowers their response to a cut in the husband's tax rate by twice as much, about 0.5.

While country-specific indicators capture differences in gender equality and norms pertaining to diverse domains, it is plausible that they are driven by a common, latent determinant at the country level. This is explored in column 7, reporting results from a principal component (PC) analysis. The first PC explains about 90% of the overall variance, with an eigenvalue of 5.38. All estimates in column 7 are very similar to those reported in columns 1-6, strongly supporting the hypothesis that the first PC of these indicators captures the bulk of gender norm variation across couples.

We additionally investigate evidence of immigrants' behavioral assimilation to norms prevailing in the host country, by allowing elasticities to vary continuously with the share of a couples's life in Sweden (which ranges from zero for spouses arriving at $t-1$ to 100 for spouses born in Sweden). We also include country of origin fixed-effects to capture the role of the time spent in Sweden by immigrants from a given country, over and above the changing composition of immigrant inflows over time. The results, reported in column 8, show that immigrants couples' response to wives' tax cuts do not significantly evolve with their exposure to local culture, while their response to husbands' tax cuts become less traditional over time.

The main takeaway point from this heterogeneity analysis is that more progressive norms induce couples to more strongly respond to economic incentives that push towards an egalitarian division of labor, while withstanding incentives that push towards a traditional division of labor. Both effects are statistically significant and quantitatively relevant. We also detect some evidence of immigrants' assimilation to local norms. These effects can be identified

by separately exploiting cases of husbands' and wives' tax treatment, while they would not be detected by the overall β estimate, which conflates variation from incentives pushing in opposite directions.

6.3 Robustness

We next perform some robustness analysis on the heterogeneous effects presented above. The results are presented in Table 7 where, to ease exposition, we only consider – as a single indicator of norms – the standardized PC of the various indicators used in Table 6. We report in column 1 the benchmark specification for reference (coinciding with column 7 of Table 6). In columns 2 and 3, we measure norms based on husbands' and wives' country of origin, respectively (as opposed to using their average as in column 1) and find no evidence that husbands' and wives' norms matter any differently for the time allocation of couples. While the share of mixed-origin couples is small in our sample, and we are likely underpowered in the identification of separate roles of spousal norms, we detect no sign that our results may be disproportionately driven by one spouse's origin as opposed to the other's.

Second, we estimate specifications that control for the occupation and workplace size of each spouse. These may proxy work-related constraints in the take-up of TPL, related, for example, to differential patterns of employee substitutability in the workplace. This is relevant whenever men and women tend to specialize in different occupations and firms, and differentially so by country of origin. Moreover, occupation controls cater to the possibility that women from countries with conservative norms under-invest in their human capital in a way that constrains their labor supply in Sweden.

We obtain information on occupations from the Salary Structure Statistics, which cover the whole public sector, private firms with 500 employees or more, and a stratified sample of smaller firms. We can match only about 30% of our original sample to records in the Salary Structure Statistics. Column 4 controls for 4-digit occupation and firm-size fixed effects for each spouse separately. The results are closely in line with those reported in column 1, both qualitatively and quantitatively. However, given the much-reduced sample size, the coefficients on the interaction terms are less precisely estimated. In column 5, we replace occupation controls with detailed educational categories that are available for the whole sample. These are created by Statistics Sweden and intersect field and level of education, resulting in 97 distinct combinations of college majors and high school tracks. These should should proxy for occupations and professional aspirations. Once again, the results remain very similar to the benchmark in column 1.

Finally, the specification in column 6 uses the matching method to residualize the dependent variable with respect to the counterfactual evolution of TPL and delivers results that are very close to those obtained with the Gelber (2014) method in column 1.

7 Conclusions

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

Table 7: Varying elasticities with gender norms in the country of origin – Robustness

Robustness	Benchmark model (1)	Husband's norms (2)	Wife's norms (3)	Occ + size FE (4)	Educ tracks + size FE (5)	Matching (6)
Panel A						
β	1.634***	1.638***	1.636***	1.762***	1.691***	1.708***
	(0.087)	(0.087)	(0.087)	(0.202)	(0.089)	(0.090)
$\beta\times$ PC	-0.098	-0.075	-0.120	-0.116	-0.096	-0.024
	(0.090)	(0.089)	(0.090)	(0.196)	(0.091)	(0.092)
Panel B						
β^+	1.536***	1.538***	1.542***	1.628***	1.653***	1.680***
	(0.110)	(0.110)	(0.110)	(0.240)	(0.114)	(0.115)
$\beta^+\times$ PC	0.231*	0.238*	0.181	0.269	0.212*	0.252**
	(0.124)	(0.122)	(0.123)	(0.245)	(0.126)	(0.127)
β^-	1.751***	1.763***	1.759***	1.965***	1.670***	1.674***
	(0.208)	(0.208)	(0.208)	(0.525)	(0.211)	(0.216)
$\beta^-\times$ PC	-0.560***	-0.535***	-0.575***	-0.964**	-0.553***	-0.435**
	(0.168)	(0.172)	(0.171)	(0.414)	(0.171)	(0.172)
N	468,511	468,511	468,511	143,988	468,511	466,398

Notes: This table perform some robustness analysis on specification 7 of Table 6. In all columns, the norms indicator variable is the standardized first PC of the indicators described in Table 4. Column 1 reproduces column 7 of Table 6 for reference. Columns 2 and 3 measure norms based on husbands' and wives' origin country, respectively. Column 4 controls for 4-digit occupation of each spouse and workplace size (in bins: 1-9; 10-49; 50-249; 250-500; and 500+ employees), column 5 controls for education tracks (97 combinations of college majors and high school tracks) and workplace size. In column 6 the dependent variable is residualized by the counterfactual evolution of the TPL gap using the matching approach (see Section 4). Standard errors are clustered at the couple level and are reported in brackets. Significance: * = 0.1; ** = 0.05; *** = 0.01.

Based on a household optimization problem, we relate gender norms to the elasticity of substitution between spousal inputs in childcare and argue that asymmetries in such elasticity following cuts in husbands' and wives' tax rates are informative about specific norms – traditional or egalitarian – 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 parental inputs in childcare, distinguishing between cases of husbands' and wives' treatment.

We estimate an overall elasticity of substitution of about 1.6, and find evidence of systematic variation in elasticity across couples with different cultural backgrounds. Specifically, couples originating from countries with relatively conservative norms more intensively reallocate childcare across spouses following a reduction in the husband's tax rate, and less intensively following a reduction in the wife's tax rate. These results imply that couples with a more conservative background 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. Taken to a larger scale, our findings imply that public intervention would face an uphill struggle in tackling gender inequalities whenever individual responses are mediated by conservative norms.

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