Household chores, taxes, and the labor-supply elasticities of women and men

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Abstract

We study how the division of household chores and individual preferences contribute to gender differences in labor supply elasticities and examine the implications for optimal taxation. In a model of labor supply in dual-earner households, we show that elasticities and optimal income tax rates depend jointly on gender and the within-household allocation of chores. Using PSID data, we find that chore division substantially affects labor supply elasticities, whereas gender per se plays a smaller role. We then evaluate how well simple, feasible tax rules can approximate the optimal within-household tax structure. Gender-based taxation captures a sizable share of the potential efficiency gains, but gender-neutral rules with realistic levels of progressivity perform better.

Keywords: Elasticity of labor supply, taxation, household chores, gender-based taxation

JEL classification: J42, J16, J62, J71

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1 Introduction

Women are often found to supply market labor more wage-elastically than men (e.g., Keane 2011). Alesina, Ichino, and Karabarbounis (2011) examines the implications of this empirical observation for optimal taxation and argues in favor of lower marginal tax rates for women—a concept referred to as "gender-based taxation." They also provide a theoretical explanation for the observed gender differences in labor supply elasticities, pointing to the unequal allocation of household chores. The argument relies on the substitutability of housework and market work in individuals' preferences, with both the slope and the curvature of the disutility of market work being higher when an individual works extensively in the household. As women take on a disproportionate share of housework, their market labor supply becomes more elastic, even if their underlying preferences are identical to those of men. In this sense, gender differences in market labor supply elasticities can arise endogenously through intra-household specialization. These differences may be further reinforced by gender-specific preferences, which can generate additional elasticity gaps even under symmetric task allocations.

From the perspective of optimal taxation, it is essential to distinguish between the two sources of gender differences in labor supply elasticities. Endogenous differences resulting from the division of household chores imply that tax policy should account for individuals' roles within the household, with gender functioning merely as a proxy. However, such proxies can lead to misclassification. For example, men who are heavily involved in housework would still face higher marginal tax rates. Other observables, such as relative income, may serve as more accurate proxies for intra-household specialization. By contrast, if exogenous preference heterogeneity is the main driver, gender itself becomes a relevant determinant of optimal taxation rather than a stand-in for roles that are difficult to observe by the tax authority.

To examine how household specialization and preference heterogeneity shape labor supply elasticities and optimal taxation, we develop a model of joint decision-making in dual-earner households that covers both paid market labor and unpaid housework. The model captures gender differences in labor supply elasticities resulting from the intra-household allocation of chores, as emphasized by Alesina, Ichino, and Karabarbounis (2011).[1] We use the model to derive estimation equations for labor-supply elasticities and conditions for intra-household tax efficiency.

In our empirical analysis, we use data from the Panel Study of Income Dynamics (PSID) to estimate the labor-supply conditions implied by our model. These estimates serve both to test the model's predictions and to inform the subsequent optimal-taxation analysis. We find that women exhibit a significantly more elastic market labor supply. In contrast, total labor supply, the sum of paid market work and unpaid housework, responds less to wage changes and displays much smaller gender differences. This pattern provides clear support for the housework mechanism proposed by Alesina, Ichino, and Karabarbounis (2011), while also pointing to a role for gender-based preference heterogeneity beyond the division of household chores.

Finally, we combine the theoretical and empirical results to quantitatively assess how well implementable tax rules can approximate optimal marginal tax rates within households. Both our model and Alesina, Ichino, and Karabarbounis (2011) show that optimal tax rates depend on the division of household chores, with lower rates being optimal for household members who spend more time on housework. Yet, because housework hours are difficult for the government to observe and verify, directly conditioning taxes on them is impractical. We quantify how good a proxy gender can be and compare gender-based taxation to rules based on alternative observables that are also correlated with chore division, such as household

[1] In contrast to their framework, however, our model also incorporates gender-specific preferences. This extension enables us to disentangle endogenous specialization from exogenous preference heterogeneity as sources of gendered labor supply responses and optimal taxation. As a second extension to the model, we introduce concave utility from consumption—a feature supported by empirical evidence on labor supply behavior (Altonji 1986; Domeij and Flodén 2006; Bredemeier, Gravert, and Juessen 2019; Bredemeier, Gravert, and Juessen 2023). This extension enables a quantitative analysis of optimal tax rates based on a best-practice estimation of labor supply elasticities.

members' relative incomes or characteristics ("tags") such as body height. To this end, we use the estimated labor-supply elasticities together with observed market and housework hours to compute the optimal relative marginal tax rates implied by our model. We then regress these rates on feasible tax determinants to assess how well simple rules based on the latter can approximate the former. Note that any such rule, by construction, departs from joint taxation, under which household members' marginal rates are always identical.

Our results show that, overall, feasible tax rules can approximate the optimal intra-household marginal rates quite well. Gender-based taxation can realize between 40 and 50% of the efficiency gains associated with the optimal rates. Achieving these gains would require men's marginal tax rates to exceed women's by 25 to 35 percentage points. However, gender-based taxation is outperformed by income-based rules that tax married spouses individually rather than jointly, thereby creating an intra-household link between spouses' relative incomes and their relative marginal tax rates. At levels of tax progressivity observed in the current U.S. tax system, abolishing joint filing could bring about over 50% of the potential efficiency gains, more than what gender-based taxation would achieve. To most closely approximate optimal within-couple tax schedules, a more progressive system would be needed, where marginal tax rates rise with income at an elasticity of about 0.4, compared to 0.3 in the current system. Such a system would realize up to 60% of the potential efficiency gains. Tagging based on BMI and height can also yield some efficiency gains but is dominated by both gender-based and progressive separate taxation. In summary, the largest efficiency gains come from eliminating joint taxation, with conditioning tax rates on gender and higher progressivity providing additional benefits.

The remainder of this paper is organized as follows. Section 2 discusses related literature. Section 3 presents the theoretical model and derives the estimation framework as well as optimal relative tax rates within households. Section 4 presents the empirical analysis and quantifies the accuracy of different implementable tax rules in mimicking optimal within-household tax rates. Section 5 concludes.

2 Related literature

The literature on using gender as a determinant of income tax rates can be divided into two strands. The first, initiated by Alesina, Ichino, and Karabarbounis (2011), proposes gender-based taxation as a means of improving intra-household efficiency. Rather than focusing on redistribution across households, this strand examines how a given tax burden can be raised more efficiently within a household by reallocating it between its members. Our paper contributes to this line of research.

Within this strand, two arguments have been advanced that counteract the Alesina, Ichino, and Karabarbounis (2011) channel. Hundsdoerfer and Matthaei (2020) highlight the disadvantages of gender-based taxation arising from perceived unfairness and its potentially adverse effects on labor supply. Meier and Rainer (2015) document another opposing force: uninternalized externalities in non-cooperative couples. When one spouse increases labor earnings, the other benefits, creating a rationale for Pigouvian subsidies. This externality is stronger for the primary earner, implying that this spouse should face lower taxes, or receive greater subsidies, thereby counteracting the elasticity-based argument for lower tax rates on secondary earners. We complement these critiques by showing that, despite facing similar limitations, implementable income-based tax rules outperform gender-based taxation in terms of efficiency.

The second strand of the literature on gender-based taxation uses gender as a determinant in redistributive tax policy. Because gender is correlated with income, taxing men and women at different rates can serve to redistribute income from high- to low-earning individuals. Moreover, gender is not easily changed, making tax avoidance or evasion unlikely. Quantitative assessments of such redistributive gender-based taxation include Cremer, Gahvari, and Lozachmeur (2010) for the U.S., who find gains for low-wage workers; Berg (2023) for Norway; and Bastani (2013) for Sweden. By abstracting from between-household redistribution, our paper is complementary to this strand of research.

Closely related to the intra-household efficiency of gender-based taxation is the literature on joint versus separate taxation. Boskin and Sheshinski (1983) show that equal marginal tax rates under joint taxation are generally inefficient. Including home production, Piggott and Whalley (1996) highlight a downside of separate taxation: it distorts spouses' specialization between market work and home production. In response, Apps and Rees (1999) and Gottfried and Richter (1999) demonstrate that Boskin's argument outweighs this concern, with optimal tax systems treating spouses separately in deterministic settings. Kleven and Kreiner (2007) and Kleven, Kreiner, and Saez (2009) further formalize this result, showing that individualized taxation dominates joint taxation under fairly general conditions, particularly because joint taxation introduces labor-supply distortions for secondary earners.

More recent work has shifted toward quantitative assessments. Guner, Kaygusuz, and Ventura (2012) find that moving from joint to separate taxation in the U.S. substantially raises women's labor supply and welfare. Holter, Krüger, and Stepancuk (2023) identify significant welfare gains from a shift to separate taxation, which induces stronger accumulation of labor-market experience by married women. Overall, this literature highlights the importance of differentiating marginal tax rates within households, a conclusion that aligns well with our findings.

Our analysis connects to the normative public finance tradition that derives conditions for optimal taxation from micro-founded models and combines them with empirical information, including elasticity estimates, to normatively assess real-world tax systems and to construct optimal tax rules. This approach is exemplified by the seminal contribution of Saez (2001). We share this structure of analysis by combining model-based optimality conditions with empirical inputs to evaluate tax systems against efficiency benchmarks. Our paper, however, differs in two key respects. First, whereas much of the literature builds on Mirrleesian models with asymmetric information and incentive constraints, our framework follows the Ramsey tradition of optimal tax theory. Second, rather than focusing on inter-household efficiency and redistribution, we concentrate on the efficiency of tax design within households.

Our paper is further related to the literature on estimating labor-supply elasticities, which we draw on to empirically disentangle the two determinants of gender differences in these elasticities and to provide inputs for our optimal-tax analysis. Keane (2011) and Elminejad et al. (2023) provide a survey and a meta-analysis, respectively, of this literature. One focal point is the discrepancy between labor-supply elasticity estimates from micro and macro data, see Keane and Rogerson (2015) for a review. Numerous studies have aimed to reconcile this discrepancy by identifying and correcting for downward biases in microeconometric estimates, including Blomquist (1985, 1988), Alogoskoufis (1987), Heckman (1993), Rupert, Rogerson, and Wright (2000), Domeij and Flodén (2006), Faberman (2015), Bredemeier, Gravert, and Juessen (2019), and Bredemeier, Gravert, and Juessen (2023). The estimation strategy we employ incorporates these insights and applies the corresponding adjustments.

3 Model

In this section, we present the theoretical model, derive the labor-supply conditions for empirical estimation, and characterize the model's predictions for optimal relative tax rates between spouses.

3.1 Model set-up

The model is populated by households, each consisting of a husband and a wife. Household j, with members indexed by i, maximizes the sum of its members' weighted expected lifetime utility

$$U_j = \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t v_{j,t} = \mathrm{E}_0 \sum_{t=0}^{\infty} \beta^t \sum_i \mu_{ij,t} u_{ij,t}, \tag{1}$$

where E is the expectations operator, with per-period utility

$$u_{ij,t} = v_{g(i),c}(\{c_{k,j,t}\}_{k=1}^{K}) + v_{g(i),d}\left(d_{j,t}\right) - \psi_{g(i)} \cdot \frac{(n_{ij,t}^{\text{total}})^{1+1/\eta_{g(i)}}}{1+1/\eta_{g(i)}}$$

where $g(i) = m, f$ denotes the gender of individual i, $c_{k,j,t}$ is household j's consumption of variety k of market-produced goods and services, the function $v_{g(i),c}$ is increasing and concave in all arguments, d refers to household consumption of home-produced goods and services, $v_d' > 0$, $v_d'' \leq 0$, and ψ_g and η_g are potentially gender-specific preference parameters. The weight $\mu_{ij,t}$ represents individual i's bargaining power in period t and may depend on contemporaneous state variables such as wages and wealth.

Importantly, $n_{ij,t}^{\text{total}}$ measures the *total* working time of household member i and is defined as the sum of hours spent on *market* work, $n_{ij,t}^{\text{market}}$, and *housework*, $n_{ij,t}^{\text{home}}$:

$$n_{ij,t}^{\text{total}} = n_{ij,t}^{\text{market}} + n_{ij,t}^{\text{home}}. \tag{2}$$

These preferences nest the original specification in Alesina, Ichino, and Karabarbounis (2011), where both v_c and v_d are assumed to be linear. For empirical applications, it is crucial to account for variation in marginal utility (Altonji 1986, Domeij and Flodén 2006, Bredemeier, Gravert, and Juessen 2019, Bredemeier, Gravert, and Juessen 2023).

Households act subject to a budget constraint

$$\sum_{k=1}^{K} p_{k,t} c_{k,j,t} + a_{j,t+1} \leq \sum_i w_{ij,t}^{\text{net}} n_{ij,t}^{\text{market}} + (1 + r_t)\, a_{j,t}, \tag{3}$$

where a is a risk-free asset, r its interest rate, and w^{net} are net (after-tax) wage rates, a home production function

$$d_{j,t} = f\left(\{n_{ij,t}^{\text{home}}\}_i\right), \tag{4}$$

which is increasing and concave in all household members' housework hours, and a borrowing constraint

$$a_{j,t+1} \geq a_t^{\min}, \tag{5}$$

where $a_{\min} \leq 0$ denotes (the negative of) a potentially age-dependent cap on borrowing. Wage rates are exogenous and evolve stochastically according to a proces described by the probability density function $\omega(\{w_{ij,t+1}^{\text{net}}\}_i | \{w_{ij,t}^{\text{net}}\}_i)$.

Discussion of modeling choices. Before turning to the analysis of the model, three modeling choices merit discussion. First, we do not impose specific functional forms on either the utility derived from home-produced goods, v, or the home production function f. This allows us to remain agnostic about gender-specific productivity or the substitutability between home and market goods. Importantly, our results rely solely on the time allocation between market work and housework—an empirically observable outcome—rather than on the underlying reasons for this allocation. Consequently, the subsequent results on Frisch elasticities and optimal tax rates are robust to gender differences in home production efficiency or preferences.

Second, we follow Alesina, Ichino, and Karabarbounis (2011) in assuming that market work and housework are perfect substitutes in disutility and aggregate additively into total labor, n^{total}. While this simplification is common in the literature, it warrants some discussion. The mechanism linking Frisch elasticities to the intra-household division of labor relies on the marginal disutility of market work increasing with the amount of housework performed. Intuitively, the marginal hour of market work entails more disutility when a person is already undertaking substantial household chores. Given this property, our qualitative results do not depend on the specific functional form governing the substitutability between market work and housework. However, in regressions where total labor appears on the left-hand side, we take the perfect-substitutability assumption more seriously when interpreting results quantitatively.

Third, the model assumes linear taxation of individual labor income. This simplifies the model exposition, and since behavior depends only on marginal tax rates, the assumption does not restrict generality. Indeed, the implied marginal tax rates can be interpreted as local approximations of a nonlinear tax schedule. In Section 4.3, we consider tax schedules in which relative marginal tax rates vary with income and relative earnings, making this interpretation particularly relevant.

3.2 Behavior

First-order conditions. With $\lambda_{j,t}$, $\lambda^d_{j,t}$, and $\xi_{j,t}$ denoting the Lagrange multipliers on the budget, housework, and borrowing constraints, (3), (4), and (5), the first-order conditions to the household problem are

$$\partial v_{j,t}/\partial c_{k,j,t} = \lambda_{j,t} p_{k,t}, \tag{6}$$

$$\partial v_{j,t}/\partial d_{j,t} = \lambda^d_{j,t}, \tag{7}$$

$$-\partial v_{j,t}/\partial n^{\text{market}}_{ij,t} = \lambda_{j,t} w^{\text{net}}_{ij,t} \ \forall\ i, \tag{8}$$

$$-\partial v_{j,t}/\partial n^{\text{home}}_{ij,t} = \lambda^d_{j,t} \partial f/\partial n^{\text{home}}_{ij,t} \ \forall\ i, \tag{9}$$

and

$$\lambda_{j,t} - \xi_{j,t} = \beta E_t \left[\lambda_{j,t+1} \left(1 + r_{t+1}\right) + \sum_i \frac{\partial \mu_{ij,t+1}}{\partial a_{j,t+1}} u_{ij,t} \right].$$

The final Euler equation includes, in addition to the standard terms, the multiplier on the borrowing constraint (5) as well as the potential response of future bargaining weights to the state variable of accumulated wealth.

Frisch elasticities and labor-supply regressions. The first-order condition for market labor supply $n^{\text{market}}_{ij,t}$, (8), is the starting point for deriving Frisch elasticities and labor-supply conditions that can be estimated in linear regressions. Due to perfect substitutability, marginal utility from market work does only depend on total work. Applying the functional form of labor disutility to the first-order condition for market labor supply $n^{\text{market}}_{ij,t}$, (8), yields $\mu_{ij,t} \psi_{g(i)} \cdot (n^{\text{total}}_{ij,t})^{1/\eta_i} = \lambda_{j,t} w^{\text{net}}_{ij,t}$, which in logs reads

$$\log n^{\text{total}}_{ij,t} = \eta_{g(i)} \log w^{\text{net}}_{ij,t} + \eta_{g(i)} \log \lambda_{j,t} - \eta_{g(i)} \log \mu_{ij,t} - \eta_{g(i)} \log \psi_{g(i)}. \tag{10}$$

This condition shows that the *Frisch elasticity of total work* n^{total}_i is simply given by the preference parameter $\eta_{g(i)}$.

To derive the elasticity of *market labor supply*, we take logs of the definition (2) and determine the differential $\partial \log n_{ij,t}^{\text{total}}/\partial \log w_{ij,t} = 1/n_{ij,t}^{\text{total}} \cdot (\partial \log n_{ij,t}^{\text{market}}/\log w_{ij,t} \cdot n_{ij,t}^{\text{market}} + \partial \log n_{ij,t}^{\text{home}}/\partial \log w_{ij,t} \cdot n_{ij,t}^{\text{home}})$. Solving for $\partial \log n_{ij,t}^{\text{market}}/\log w_{ij,t}$ gives the Frisch elasticity of market work n_i^{market} as

$$e_{ij,t}^{\text{Frisch}} = \frac{\partial \log n_{ij,t}^{\text{market}}}{\partial \log w_{ij,t}^{\text{net}}}|_{\lambda,\mu} = \frac{\eta_{g(i)}}{s_{ij,t}^{\text{market}}} - \frac{1-s_{ij,t}^{\text{market}}}{s_{ij,t}^{\text{market}}} \cdot \frac{\partial \log n_{ij,t}^{\text{home}}}{\partial \log w_{ij,t}^{\text{net}}}|_{\lambda,\mu} \approx \frac{\eta_{g(i)}}{s_{ij,t}^{\text{market}}}, \tag{11}$$

where $s_{ij,t}^{\text{market}} = n_{ij,t}^{\text{market}}/n_{ij,t}^{\text{total}}$ is the share of total hours devoted to market work and the last step uses that the term $(1-s_{ij,t}^{\text{market}})/s_{ij,t}^{\text{market}} \cdot \partial \log n_{ij,t}^{\text{home}}/\partial \log w_{ij,t}|_{\lambda,\mu}$ is quantitatively negligible, as shown by Bredemeier, Gravert, and Juessen (2023).

There are two main reasons for gender differences in the Frisch elasticity of market work. First, differences in the allocation of total working time between market work and housework can create such differences. On average, women tend to exhibit higher Frisch elasticities of market work because the average value of $s_{ij,t}^{\text{market}}$ is lower for women. Second, gender differences may stem from heterogeneity in the preference parameter η_g between men and women.

To derive a linear condition for log market work to be used in estimation, we approximate the definition (2) as $\log n_{ij,t}^{\text{total}} \approx s_{g(i)}^{\text{market}} \cdot \log n_{ij,t}^{\text{market}} + (1-s_{g(i)}^{\text{market}}) \cdot \log n_{ij,t}^{\text{home}}$, where $n_{g(i)}^{\text{total}}$, $n_{g(i)}^{\text{market}}$, and $n_{g(i)}^{\text{home}}$ describe the gender-specific points of approximation. Using the approximation in (10) gives

$$\log n_{ij,t}^{\text{market}} = \frac{\eta_{g(i)}}{s_{g(i)}^{\text{market}}} \left(\log w_{ij,t}^{\text{net}} + \log \lambda_t - \log \mu_{ij,t} - \log \psi_{g(i)}\right) - \frac{1-s_{g(i)}^{\text{market}}}{s_{g(i)}^{\text{market}}} \log h_{ij,t}. \tag{12}$$

Empirical applications must address the fact that the labor-supply conditions (10) and (12) include two elements that are not directly observable, the marginal utility $\log \lambda_{j,t}$ and the bargaining weight $\log \mu_{ij,t}$. To address these challenges, we follow Bredemeier, Gravert, and Juessen (2023), who show that these variables can be expressed as log-linear functions of the household's total consumption expenditures, $\widetilde{c}_{j,t} = \sum_k p_{k,t} c_{k,j,t}$, and the share spent on a specific consumption category k, $\widetilde{c}_{k,j,t}/\widetilde{c}_{j,t}$, where $\widetilde{c}_{k,j,t} = p_{k,t} c_{k,j,t}$. Using this result, the labor-supply conditions (10) and (12) can be rewritten as the following regression equations:

$$\log n_{ij,t}^{\text{market}} = \kappa_i^m + \delta_t^m + \frac{\eta_{g(i)}}{s_{g(i)}^{\text{market}}} \log w_{ij,t}^{\text{net}} - \frac{1 - s_{g(i)}^{\text{market}}}{s_{g(i)}^{\text{market}}} \log h_{ij,t} + \alpha_{g(i)}^m \log \widetilde{c}_{j,t} + \gamma_{g(i)}^m \log \left(\frac{\widetilde{c}_{k,j,t}}{\widetilde{c}_{j,t}} \right) + \varepsilon_{ij,t}^m \tag{13}$$

and

$$\log n_{ij,t}^{\text{total}} = \kappa_i^{\text{total}} + \delta_t^{\text{total}} + \eta_{g(i)} \log w_{ij,t}^{\text{net}} + \alpha_{g(i)}^{\text{total}} \log \widetilde{c}_{j,t} + \gamma_{g(i)}^{\text{total}} \log \left(\frac{\widetilde{c}_{k,j,t}}{\widetilde{c}_{j,t}} \right) + \varepsilon_{ij,t}^{\text{total}}, \tag{14}$$

where the individual fixed effects κ^m and κ^{total} collect $-\eta_{g(i)} \log \psi_{g(i)}$ and mean approximation and measurement errors, the time fixed effects δ^n and δ^l capture the effects of time variation in goods prices, ε^n and ε^l are residuals reflecting variation in approximation and measurement errors, and the parameters α^n, γ^n, α^l, and γ^l combine the proxy relations discussed above with the slope coefficients from (10) and (12). In our empirical analysis, we estimate (13) and (14) separately for men and women.

Anticipating that s^{market} is, on average, smaller for women than for men, we can formulate the following conjectures implied by the model for the results of such regressions. Unless offset by a strong counteracting difference in the preference parameters, i.e. $\eta_m \gg \eta_f$, we expect, first, that the coefficient on the wage rate in the market-hours regression (13) is larger for women, and, second, that the coefficients on the wage rate in the total-hours regression (14) are more similar between men and women than the corresponding coefficients in the market-hours regression (13). Importantly, the results of the total-hours regression identify the preference parameters η_g, which we use

3.3 Optimal taxation

We now discuss the model's normative implications for income tax rates. Specifically, we show how the government should tax the individual members of a household relative to one another. Our aim is to derive a simple expression that summarizes this implication in terms of objects that can be observed or estimated empirically.

Further, we concentrate on a structural perspective, i.e., how to tax spouses in general, independent of occasionally binding borrowing constraints and potential changes in intra-household bargaining power. Put differently, we concentrate on the intra-temporal substitution between market consumption, home-produced consumption, and leisure, abstracting from intertemporal substitution or bargaining between spouses. The latter abstraction implies constant weights μ and thus stable *household* preferences. Together with homotheticity, we can concentrate on a consumption bundle $c_{j,t}$ that provides one unit of household utility v at minimal cost and has a price index p_t satisfying $p_t c_{j,t} = \sum_{k=1}^{K} p_{k,t} c_{k,j,t}$. We normalize $p_{k,t}$ to one. With these simplifications, we can combine the first-order conditions (6)–(9) to:[2]

$$\frac{\partial U_j}{\partial n_{ij,t}^{\text{market}}} = -\frac{\partial U_j}{\partial c_{j,t}} w_{ij,t}^{\text{net}} \;\forall\; i, \tag{15}$$

$$\frac{\partial U_j}{\partial d_{j,t}} = \frac{\partial U_j}{\partial c_{j,t}} \frac{w_{ij,t}^{\text{net}}}{\partial f / \partial n_{ij,t}^{\text{home}}} \;\forall\; i. \tag{16}$$

We express these relations using upper-tier U as defined in (1), which is convenient for the subsequent tax analysis.

We abstract from redistributive aspects of taxation and take as given the amount of taxes $T_{j,t}$ that the government aims to collect from household j through labor income taxation. We then examine how to raise this amount in the most efficient way.

When deciding on tax rates for the two members of household j at a given period of time, the government maximizes household utility U_j as defined in (1) subject to

$$\sum_i \tau_{ij,t} w_{ij,t} n_{ij,t}^{\text{market}} = T_{j,t}, \tag{17}$$

where w denotes gross (before-government) wage rates and τ are tax rates to be set optimally.

[2]Combining (6) with (8) and using $\partial v_{j,t}/\partial x = \beta^t \partial U_j/\partial x$ for any choice variable x gives (15). Combining (7) with (9) and using $\partial v_{j,t}/\partial x = \beta^t \partial U_j/\partial x$ as well as $\partial U_j/\partial n_{ij,t}^{\text{market}} = \partial U_j/\partial n_{ij,t}^{\text{home}}$ gives (16).

The first-order condition for $\tau_{ij,t}$ is

$$
\begin{aligned}
&\frac{\partial U_j}{\partial c_{j,t}} \cdot \frac{\partial c_{j,t}}{\partial \tau_{ij,t}} + \frac{\partial U_j}{\partial d_{j,t}} \cdot \frac{\partial d_{j,t}}{\partial \tau_{ij,t}} + \frac{\partial U_j}{\partial n^{\text{home}}_{ij,t}} \cdot \frac{\partial n^{\text{home}}_{ij,t}}{\partial \tau_{ij,t}} + \frac{\partial U_j}{\partial n^{\text{home}}_{-ij,t}} \cdot \frac{\partial n^{\text{home}}_{-ij,t}}{\partial \tau_{ij,t}} \\
&\quad + \frac{\partial U_j}{\partial n^{\text{market}}_{ij,t}} \cdot \frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}} + \frac{\partial U_j}{\partial n^{\text{market}}_{-ij,t}} \cdot \frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}} \\
&\quad + \lambda^G_{j,t} \cdot \left(w_{ij,t} n^{\text{market}}_{ij,t} + \tau_{ij,t} w_{ij,t} \frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}} + \tau_{-ij,t} w_{-ij,t} \frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}} \right) = 0,
\end{aligned}
\tag{18}
$$

where $\lambda^G_{j,t}$ is the Lagrange multiplier on (17) and $-i$ indicates the partner of individual i. This condition simplifies considerably when first-order conditions and constraints of the household problem are substituted. Specifically, using the optimality conditions (15) and (16) as well as the constraints (3) with $a_{j,t+1} = (1+r)a_{j,t}$ holding in a steady state and (4) gives, after collecting terms,

$$
-\frac{\partial U_j}{\partial c_{j,t}} + \lambda^G_{j,t} \cdot \left(1 + \frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}} \frac{\tau_{ij,t}}{n^{\text{market}}_{ij,t}} + \frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}} \frac{\tau_{-ij,t} w_{-ij,t}}{w_{ij,t} n^{\text{market}}_{ij,t}} \right) = 0, \tag{19}
$$

see Appendix A.1 for a detailed derivation.

For sufficiently small values of $\tau_{ij,t}$, we have $\partial x / \partial \tau_{ij,t} \approx -\frac{\partial x}{\partial w_{ij,t}} w_{ij,t}$ for any variable x, because both an absolute increase in τ and a relative decrease in the gross wage rate by the same amount induce the same change in the decision-relevant net wage rate. Defining

$$
\begin{aligned}
e^{\text{own}}_{ij,t} &= \frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{ij,t}} \cdot \frac{w_{ij,t}}{n^{\text{market}}_{ij,t}}, \\
e^{\text{cross}}_{ij,t} &= \frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{-ij,t}} \cdot \frac{w_{ij,t}}{n^{\text{market}}_{-ij,t}},
\end{aligned}
$$

we can simplify (18) to

$$
-\frac{\partial U_j}{\partial c_{j,t}} + \lambda^G_{j,t} \cdot \left(1 + \tau_{ij,t} e^{\text{own}}_{ij,t} + \tau_{-ij,t} e^{\text{cross}}_{-ij,t}\right) = 0, \tag{20}
$$

which needs to hold for both i and $-i$, hence describing a system of two equations in two unknowns, $\tau_{ij,t}$ and $\tau_{-ij,t}$. This system can be solved for the ratio of optimal tax rates within the household,

$$\frac{\tau^*_{ij,t}}{\tau^*_{-ij,t}} = \frac{e^{\text{own}}_{-ij,t} - e^{\text{cross}}_{-ij,t}}{e^{\text{own}}_{ij,t} - e^{\text{cross}}_{ij,t}}. \tag{21}$$

This is an application of Ramsey's inverse-elasticity rule: tax rates should be higher where behavioral responses are smaller. In general, such responses include not only one's own reaction to a tax change but also the effect on the partner's labor supply, which is usually of the opposite sign.

Note that $e^{\text{cross}}_{ij,t}$ is not exactly the cross-wage elasticity in the usual sense but multiplies the cross-wage derivative by the ratio of one's own wage to the partner's hours. The term thus measures by how much one's hours change (as a percentage of one's partner's hours) in response to a change in the partner's wage rate (as a percentage of one's own wage). This is important because it implies that income effects embedded in the two derivatives cancel out when they are subtracted from each other.

In Appendix A.2, we show that, in our setting with additively separable preferences, the log ratio of optimal marginal tax rates in a household satisfies

$$\theta^*_{ij,t} \equiv \log\left(\tau^*_{ij,t}/\tau^*_{-ij,t}\right) \approx (1-2\gamma)\left(\log e^{\text{Frisch}}_{-ij,t} - \log e^{\text{Frisch}}_{ij,t}\right). \tag{22}$$

As wealth effects cancel out, optimal relative tax rates depend solely on substitution effects, captured by Frisch elasticities. The slope $1-2\gamma$ reflects the household's marginal propensity to earn out of unearned income, 2γ. As γ is negative and empirical estimates tend to be modest, the slope exceeds one but is unlikely to be larger than 1.5. We review the empirical literature on the marginal propensity to earn out of unearned income in Appendix B.

Independent of the specific value of 2γ, the optimal tax rate ratio depends on the difference between spouses' Frisch elasticities of market work. The government should tax more heavily the spouse whose labor supply is less elastic. In our model, such differences in elasticities can arise from gender-specific preferences and from differences in time allocation, with individuals who spend more time on housework exhibiting higher Frisch elasticities.

Substituting the Frisch elasticities of market work from (11), optimal relative marginal tax rates within a household are given by:

$$\theta^*_{ij,t} = \log(\tau^*_{ij,t}/\tau^*_{-ij,t}) = (1-2\gamma)\left(-\log\eta_{g(i)} + \log\eta_{g(-i)} + \log s^{\text{market}}_{ij,t} - \log s^{\text{market}}_{-ij,t}\right). \quad (23)$$

The model thus allows for both gender-based taxation and taxation based on the division of household chores. Which of the two dominates, and how tax codes can be designed to mimic optimal intra-household marginal tax rates is an empirical question that we address in the next section.

Welfare criterion. As a final step before turning to the empirical analysis, we lay out a welfare criterion that allows us to evaluate both existing and counterfactual tax rules. Specifically, denote by Θ^z a system that gives rise to a set of relative intra-household marginal tax rates $\left\{\theta^z_{ij,t}\right\}$. The efficiency of Θ^z can then be assessed by examining its deviations from the optimal relative tax rates $\left\{\theta^*_{ij,t}\right\}$. A standard approach is to approximate the government's value function using a second-order Taylor expansion around the optimum. We define the government welfare function, aggregated over all households, as $V^G_t = \sum_j \omega_j \left\{U_{j,t} + \lambda^G_{j,t}\left(\sum_i \tau_{ij,t} w_{ij,t} n^{\text{market}}_{ij,t} - G_{j,t}\right)\right\}$, where ω_j are welfare weights. Expanding this function around the optimal set $\left\{\theta^*_{ij,t}\right\}$ gives

$$V^G_t(\Theta^z) \approx V^G_t(\Theta^*) + \sum_j \omega_j \left\{\frac{\partial V^G_t}{\partial \theta_{ij,t}}|_{\theta^*_{ij,t}} \cdot (\theta^z_{ij,t} - \theta^*_{ij,t}) - \frac{1}{2}\cdot\frac{\partial^2 V^G_t}{\partial \theta^2_{ij,t}}|_{\theta^*_{ij,t}} \cdot (\theta^z_{ij,t} - \theta^*_{ij,t})^2\right\}. \quad (24)$$

The optimality of $\theta^*_{ij,t}$ implies, by definition, that $\frac{\partial V^G_t}{\partial \theta_{ij,t}}|_{\theta^*_{ij,t}} = 0$ and $\frac{\partial^2 V^G_t}{\partial \theta^2_{ij,t}}|_{\theta^*_{ij,t}} < 0$. Hence, we can define a loss function

$$\mathcal{L}(\Theta^z) \equiv V^G_t(\Theta^*) - V^G_t(\Theta^z) = \frac{1}{2}\cdot\sum_j \omega_j \left|\frac{\partial^2 V^G_t}{\partial \theta^2_{ij,t}}|_{\theta^*_{ij,t}}\right| \cdot (\theta^z_{ij,t} - \theta^*_{ij,t})^2, \quad (25)$$

which is a weighted sum of squared deviations between actual and optimal relative marginal tax rates in a household. Weights are determined by social welfare weights ω_j and the local curvature of welfare, i.e., $\frac{\partial^2 V^G_t}{\partial \theta^2_{ij,t}}|_{\theta^*_{ij,t}}$, which captures how sensitive household j's well-being is to policy deviations.

To stay true to our focus on intra-household efficiency that abstracts from redistributional concerns, we assume that for each household j, the social welfare weight ω_j equals the absolute inverse of the local welfare curvature $\frac{\partial^2 V_t^G}{\partial \theta_{ij,t}^2}|_{\theta_{ij,t}^*}$. This technical assumption implies a local, second-order form of redistributional neutrality in that it makes the government planner treat all errors as equally bad, regardless of who is affected. Formally, the loss function simplifies to

$$\mathcal{L}(\Theta^z) = \frac{1}{2} \sum_j (\theta_{ij,t}^z - \theta_{ij,t}^*)^2. \tag{26}$$

In our empirical analysis, we generate a distribution of optimal relative intra-household marginal tax rates $\theta_{ij,t}^*$ from gender-specific elasticity estimates and observable information on $s_{ij,t}^{\text{market}}$, and a distribution of relative tax rates $\theta_{ij,t}^z$ implied by a linear tax rule Θ^z, obtained as fitted values from a regression with optimal $\theta_{ij,t}^*$ on the left-hand side and the rule's tax determinants on the right-hand side. The R^2 of this regression, given by

$$1 - \sum_j (\theta_{ij,t}^z - \theta_{ij,t}^*)^2 / \sum_j (\theta_{ij,t}^*)^2$$

is a linear function of the loss $\mathcal{L}(\Theta^z)$ associated with the tax rule. The R^2 has an easy interpretation. It takes the value one for the optimal tax rule Θ^* itself and the value zero for rules that have no intra-household differences in marginal tax rates, i.e., $\theta_{ij,t}^z = 0 \; \forall ij$. Such a rule is the status-quo system of joint taxation of married couples, where both spouses face, by construction, identical marginal tax rates. Between these two extremes, the R^2 is linear in the loss $\mathcal{L}(\Theta^z)$, and it thus measures the share of the potential intra-household tax efficiency gains that are realized through applying tax rule Θ^z.

4 Empirical Analysis

In this section, we quantify how well different tax rules, including gender-based taxation, can approximate the optimal relative marginal tax rates within couples, as implied by our model. For this, we first estimate the preference parameter η_g, which measures the Frisch elasticity of total hours worked. We then use these estimates together with observable information on housework and market hours to predict optimal relative marginal tax rates within couples. In the final step, we regress these predicted optimal relative tax rates on observable characteristics that could plausibly serve as conditioning variables in tax policy, such as gender or income. These regressions allow us to assess both the extent to which marginal tax rates should depend on these observables and the potential gains in intra-household tax efficiency that could be achieved by doing so.

4.1 Variable definitions

Data and sample selection. We use (biennial) waves 1999–2021 of the Panel Study of Income Dynamics (PSID), containing information on earnings, time use, and other relevant variables in calendar years 1998–2020. Our sample selection closely follows Bredemeier, Gravert, and Juessen (2023).

We consider married heterosexual couple households in which both spouses are between 25 and 60 years old. We exclude the Survey of Economic Opportunity sample and the immigrant sample, drop observations with wages below half the hourly minimum wage, and exclude households reporting either extremely high asset values (20 million dollars or more) or transfer income exceeding twice the total household earnings. We also drop observations with extreme jumps from one PSID wave to the next, see Blundell, Pistaferri, and Saporta-Eksten (2016) for details.

Our sample consists of stable couples, meaning that we drop couples in the period during which they separate, but include household heads once they marry again, along with their partner. Throughout, we use PSID sampling weights.

Market hours, housework, and wages. The market hours variable is calculated as weeks worked times usual weekly hours plus overtime hours. The PSID provides a housework variable that covers cooking, cleaning, and other work around the house.[3] We treat missing values in the housework variable as zeros and add one before taking the logarithm when including it in the regressions.

The hourly wage rate is calculated by dividing annual earnings by annual hours of market work. We discuss below how we account for the division bias resulting from this procedure. Annual earnings are measured in real (year 2000) dollars and include labor earnings, the labor part of business income, and the labor part of farm income. As emphasized by Blomquist (1985, 1988), using gross wage rates in labor-supply regressions biases estimated elasticities. To convert gross into decision-relevant net wages, we compute taxes and determine eligibility for the Earned Income Tax Credit (EITC) and food stamp benefits using program rules relevant for the respective survey years. Our computations account for variation in benefits based on demographic characteristics, such as the number and age of children. Marginal tax rates are determined by calculating the change in net income (after taxes and transfers) induced by a \$500 increase in gross annual earnings. The net wage rate is then obtained by multiplying the gross wage rate by one minus the marginal tax rate.

Additional variables. The approach for estimating labor-supply elasticities developed by Bredemeier, Gravert, and Juessen (2023) uses expenditure variables to account for the distribution of household consumption as a proxy for relative household bargaining power. We follow their preferred specification and include the expenditure share for food alongside total household consumption in the labor-supply regressions. Total household consumption is defined as the sum of expenditures on individual consumption items.

Our labor-supply regressions further include individual and time fixed effects. Individual fixed effects capture heterogeneity in the taste for work and differences in other unobserved characteristics across individuals. Time effects account for both price variation and macroeconomic fluctuations, e.g., economy-wide factors that drive labor demand. To address taste

[3] Shopping and caring for children or adult family members needing assistance are addressed in separate questions, but only since 2017.

shifters that vary over time, we include a third-order polynomial in age and the number of young (below age 7) and older (age 7–17) children in the household. Other determinants of work preferences which are mostly constant over time, such as education, are controlled for through individual fixed effects.

Wage regression. Labor-supply regressions are subject to a division bias when wage rates are computed as earnings divided by hours worked, see, e.g., Altonji (1986), Borjas (1980), Pencavel (1986), and Keane (2011). This induces a spurious negative correlation between the constructed wage rate and hours worked because measurement error in hours worked appears on both sides of the regression equation. Following Bredemeier, Gravert, and Juessen (2023), we address this issue by estimating an initial wage regression separately for men and women and using it to determine predicted wage rates that are uncorrelated with the measurement error in hours worked. We then use predicted log net wage rates, denoted by $\log \widetilde{w}_{ij,t}$, in the labor-supply regressions.

In addition to being uncorrelated with measurement error in hours worked, the variables on the right-hand side of the wage regression should also be uncorrelated with idiosyncratic shocks to the taste for work. This ensures that predicted wage variation reflects shifts in labor *demand*, driven by factors such as changes in productivity or business conditions, which in turn enables identification of the slope of the labor *supply* curve—that is, the labor-supply elasticity.

We consider different specifications of the wage regression to test for robustness. Our baseline specification closely follows Bredemeier, Gravert, and Juessen (2023). The key idea is to exploit education-specific life-cycle patterns in wages. Specifically, we include a third-order polynomial in age and interactions of these terms with education, firm tenure, firm tenure squared, state dummies, year dummies, and, following Altonji (1986), the other regressors from the labor-supply equation, as well as individual fixed effects. In an alternative specification, we include a broader set of wage predictors. In particular, in the spirit of a

Table 1: Market hours and total hours regressions.

	(1)	(2)	(3)	(4)
	log market hours, $\log n_{ij,t}^{\text{market}}$		log total hours, $\log n_{ij,t}^{\text{total}}$	
	men	women	men	women
log wage rate, $\log w_{ij,t}$	0.602***	1.133***	0.380***	0.449***
	(0.046)	(0.082)	(0.034)	(0.042)
log housework hours, $\log n_{ij,t}^{\text{home}}$	-0.042***	-0.141***		
	(0.005)	(0.010)		
Observations	17513	17513	17513	17513

Notes: Dependent variables are log hours worked in the market, $\log n_{ij,t}^{\text{market}}$ (columns (1) and (2)), and log total hours worked, $\log n_{ij,t}^{\text{total}}$ (columns (3) and (4)). All regressions include individual and time fixed effects, taste shifters (number of young kids, number of old kids, cubic in age), log household consumption, log share of food expenditures, and a constant. Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Bartik (shift-share) approach, we include an interaction between the individual's industry and the national unemployment rate, and, following Attanasio et al. (2018), 10-year birth cohorts interacted with education and a quintic time trend. We also examine whether our results are sensitive to accounting for wives' selection into the labor market.

4.2 Labor-supply elasticities

Our sample consists of couples in which both the husband and the wife work for pay. This, by construction, yields identically sized samples for men and women. We begin by estimating the market-hours regression (13), regressing log market hours on predicted log net wage rates, log housework time, individual and time fixed effects, as well as the taste shifters age and the number of children of different ages. In addition, we include log household total consumption and the expenditure share on food. Subsequently, we estimate the corresponding regression for total hours.

The first two columns in Table 1 show the results for market hours. To enhance readability, the tables in the main text omit control variables. Appendix Table 8 reports the full estimation results. For men, the estimated wage elasticity is 0.60, which is similar to the values reported in Bredemeier, Gravert, and Juessen (2023). For women, the estimate is 1.13, and hence almost twice as large. Thus, as expected, the estimates for the Frisch elasticity of market work are substantially larger for women than for men.

Columns (3) and (4) in Table 1 report the results from the total-hours regression, where log total hours is the dependent variable and the log wage rate is the main explanatory variable; see equation (14). As discussed earlier, the conjecture is that the coefficients on the wage rate in this regression are more similar between men and women than in the market-hours regression shown in columns (1) and (2). The empirical results support this conjecture: the estimated total-hours elasticity is 0.38 for men and 0.449 for women. Compared to the pronounced gender differences in the market-hours elasticity, these differences are relatively small.

Taken together, the results in Table 1 are consistent with the mechanism proposed by Alesina, Ichino, and Karabarbounis (2011) as well as with the specific assumptions of their model. In their model, it is assumed that there are no deep gender differences in preferences, i.e., the wage elasticities of total time are assumed to be identical, and differences in market-hours elasticities between men and women arise endogenously due to household decisions, with women on average exhibiting higher market-hours elasticities in response to wages.

Couples without young children. It is interesting to re-estimate our baseline specification using a restricted sample of couples without young children in the household. In such households, the channel of household specialization emphasized by Alesina, Ichino, and Karabarbounis (2011) is arguably less relevant, as the scope for specialization is reduced. Hence, we would expect smaller gender differences in market-hours elasticities compared to the estimates reported in columns (1) and (2) of Table 1. In the restricted sample, the estimated market-hours elasticity is 0.633 for men and 0.93 for women, see Table 9 in Appendix C. Elasticities are thus more similar between men and women in this sample than in the full sample, in line with expectations. These results suggest that the pronounced gender differences in market labor supply elasticities are primarily driven by mothers of

Table 2: Market hours and total hours regressions, broader set of wage predictors.

	(1)	(2)	(3)	(4)
	log market hours, $\log n_{ij,t}^{\text{market}}$		log total hours, $\log n_{ij,t}^{\text{total}}$	
	men	women	men	women
log wage rate, $\log w_{ij,t}$	0.378***	0.672***	0.225***	0.283***
	(0.038)	(0.058)	(0.028)	(0.030)
log housework hours, $\log n_{ij,t}^{\text{home}}$	-0.042***	-0.143***		
	(0.005)	(0.010)		
Observations	17513	17513	17513	17513

Notes: Dependent variables are log hours worked in the market, $\log n_{ij,t}^{\text{market}}$ (columns (1) and (2)), and log total hours worked, $\log n_{ij,t}^{\text{total}}$ (columns (3) and (4)). All regressions include individual and time fixed effects, taste shifters (number of young kids, number of old kids, cubic in age), log household consumption, log share of food expenditures, and a constant. Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

young children, who tend to spend long hours on home production relative to market work.

Robustness. To assess the robustness of our key findings, we re-estimate our regressions using a broader set of regressors when predicting wage rates. In the spirit of a Bartik (shift-share) approach, we augment the wage regression by interacting the individual's industry with the national unemployment rate (lagged by one year). Additionally, we include 10-year birth cohorts interacted with education and a quintic time trend, as proposed by Attanasio et al. (2018). Table 2 presents the results from the labor-supply regressions using this alternative wage-prediction approach. While the estimated elasticities are smaller than in our baseline specification, this exercise again confirms that gender differences in total-hours elasticities—and thus in preferences—are much smaller than gender differences in market-hours elasticities. As discussed in Section 3, model-implied optimal tax rates depend on the *relative* difference in gender-specific total-hours elasticities, while the absolute levels of these elasticities do not play an important role. Estimated relative elasticities are remarkably similar across specifications, with women's total-hours elasticity exceeding men's by a factor between 1.18 (Table 1) and 1.25 (Table 2). For market hours, the ratios of estimates are 1.78 (Table 2) and 1.88 (Table 1), and hence substantially larger.

Selection. While 93% of married men aged 25–65 participate in the labor market in our sample, the participation rate for married women is lower, at 81%. To assess the relevance of selection into work for our results, we estimate a discrete-choice model of female labor-force participation and compute an inverse Mills ratio, which we then include as an additional regressor in the female wage equation. We follow Blundell, Pistaferri, and Saporta-Eksten (2016) and Del Boca and Lusardi (2003) in the choice of instruments, the latter study providing evidence that female participation rises when households move into home ownership. They therefore propose as instruments the presence of first and second mortgages, interacted with year dummies. Table 10 in the Appendix presents results based on our baseline set of wage predictors, augmented with a correction for selection. In line with the existing literature—see, e.g., Blundell, Pistaferri, and Saporta-Eksten (2016)—we find that correcting for selection has little impact on the results.

4.3 Intra-household efficiency of alternative tax rules

We now analyze how well tax rules, such as gender-based taxation, can approximate optimal relative intra-household tax rates as implied by our model. We use equation (23) to determine for each individual in the sample an implied optimal relative tax rate, $\theta^*_{ij,t}$. We then run regressions with $\theta^*_{ij,t}$ as the dependent variable and potential elements of a tax rule (income, gender, other tags) as independent variables. The estimated coefficients indicate how strongly tax rates should be conditioned on each observable from the perspective of intra-household efficiency. The R^2 statistics of these regressions reflect the share of potential efficiency gains from differentiated marginal tax rates that is actually captured by the respective tax rule; see Section 3.3.

We take gender-specific Frisch elasticities of total working time from our estimates presented in the previous section. As a baseline, we use the estimates for η_m and η_f from columns (3) and (4) of Table 1. Information on market hours n^{market} and total hours $n^{\text{total}} = n^{\text{market}} + n^{\text{home}}$ is taken directly from the PSID. Regarding the multiplicative con-

Table 3: Summary statistics on model-implied optimal relative intra-household marginal tax rates (for $\gamma = 0$), in logs.

	mean	std. dev.
all	0.000	0.718
female	−0.452	0.557
male	0.452	0.557

stant $1 - 2\gamma$, the literature suggests values between 1 and 1.5, see Section 3. However, its exact value is of secondary importance for our analysis, as it only scales the estimated coefficients and has no effect on the R^2, our main measure of interest. For simplicity, we therefore set $1 - 2\gamma = 1$, while acknowledging that the coefficients may be up to 50% larger for other plausible values of γ.

Like related work, our analysis is subject to the caveat that the empirical inputs used to compute implied optimal tax rates reflect behavior, specifically the share of market work in total work, s^{market}, under the current tax system, and would generally change in response to tax reforms.[4] Nevertheless, the resulting gap to actual rates remains informative about potential efficiency gains. For one, our measure of the welfare loss is zero at the status quo if the status quo were optimal.

Further, it is important to consider the likely direction and relevance of such adjustments. Tax systems that better approximate the optimal schedule—by aligning marginal tax rates more closely with individuals' relative contributions to market work and housework—tend to reduce intra-household specialization. Under such systems, the share s^{market} would converge within households, potentially narrowing the optimal marginal tax rate differentials. As a consequence, our analysis may overstate the quantitative efficiency differences between tax systems. However, this does not imply that the efficiency ranking of tax systems would be affected.

[4] In a limiting case of our theoretical framework, which deliberately avoids imposing specific functional forms for utility from home-produced goods and for the home production function, the share s^{market} may indeed remain unaffected by tax reforms. Nevertheless, under realistic preferences, one would expect s^{market} to be policy-variant.

Summary statistics. Table 3 reports summary statistics for the model-implied optimal relative tax rates (in logs). Reflecting women's higher share of housework in total working time, our model implies that, on average, women should face lower marginal tax rates. The implied average gender gap in log relative tax rates is 0.9 for $\gamma = 0$ while the upper bound of $\gamma = 0.5$ implies a gap of 1.35. To put these numbers into perspective, assume as an example an average marginal tax rate of 30% for both genders combined. A 90 log point difference implies men would be taxed at 42.5% and women at 17.5% marginal rates on average. For a 135 log point gap, these rates would be 47.7% for men and 12.3% for women.

This average difference can be achieved through gender-based taxation. However, there is also considerable variation in optimal relative tax rates *within* gender, which by construction cannot be captured by gender alone. It is therefore a quantitative question to what extent gender-based taxation can approximate efficient intra-household taxation.

Results. We now use regressions to quantify how closely different simple tax rules can explain optimal intra-household relative tax rates. We begin by comparing three tax regimes. The first is joint taxation of married couples, which corresponds to the status quo in the U.S. This system implies that, in any given couple, both spouses face identical marginal tax rates, i.e., $\theta_{ij,t} = \theta \; \forall \; ij, t$. We conceptualize this regime by regressing optimal relative within-household tax rates on a constant only. The second regime is gender-based taxation, which we implement by regressing optimal rates on the individual's gender and a constant. Third, we consider a progressive income-tax system where married spouses file taxes individually rather than jointly, such that relative marginal tax rates within couples depend on relative earnings. Specifically, we use (log) relative earnings as a determinant of relative marginal tax rate. We start with an evaluation where, rather than estimating the relative-income sensitivity, we restrict this coefficient to 0.311 as implied by the estimates of Wu and Krueger (2021) for the current U.S. tax-transfer system.[5] This evaluation illustrates the consequences

[5] Wu and Krueger (2021) use the Bénabou (2000) tax function $T = Y - (1-\chi)Y^{1-\mu}$, where T is taxes, Y is pre-tax income, and χ and μ are parameters determining average taxes and tax progressivity, respectively. The marginal tax rate is $T' = 1 - (1-\chi)(1-\mu)Y^{-\mu}$ and its elasticity to pre-tax income is $\mu(1-T')/T'$.

Table 4: Comparison of intra-household tax efficiency under joint taxation of married couples, gender-based taxation, progressive separate taxation, and combinations.

	(1) joint taxation	(2) gender-based	(3) progressive separate taxation	(4)	(5)	(6)
			restricted		unrestricted	
			base	+ gender	base	+ gender
Constant	0.000	-0.452	-0.000	-0.250	0.000	-0.247
	(0.004)	(0.004)	(0.003)	(0.003)	(0.002)	(0.003)
Male		0.904		0.499		0.494
		(0.006)		(0.004)		(0.005)
log relative			*0.311*	*0.311*	0.399	0.315
earnings			—	—	(0.002)	(0.002)
Observations	35026	35026	35026	35026	35026	35026
R^2	0.000	0.397	0.563	0.684	0.592	0.684

Notes: Dependent variable is log relative optimal tax rate, $\theta^*_{ij,t}$. Relative earnings are measured in logs. Standard errors in parentheses. Coefficients without standard errors (in italics) are constrained coefficients.

of abolishing joint taxation of couples while maintaining the overall progressivity of the system. Thereafter, we estimate the income-sensitivity of marginal tax rates that maximizes intra-household efficiency in an unrestricted regression.

Table 4 compares these tax regimes, where optimal intra-household relative tax rates have been determined using our baseline estimates for gender-specific Frisch elasticities of total hours, see columns (3) and (4) in Table 1. By construction, joint taxation of married couples cannot capture any variation in optimal intra-household relative tax rates, see the first column. Relative to this benchmark, gender-based taxation improves intra-household tax efficiency, as optimal tax rates systematically vary by gender. The estimated coefficient on gender is 0.9, which corresponds to the difference in gender-specific mean optimal relative tax rates, and it implies a gender gap of 25–30 percentage points in marginal tax rates in the optimal specification of gender-based taxation. This policy would capture approximately 40% of the variation in optimal relative marginal tax rates within households, allowing the

The (income-weighted) average marginal tax rate is $\mu = (\mathrm{E}\,T' - \mathrm{E}(T/Y))/(1 - \mathrm{E}(T/Y))$. Wu and Krueger (2021) estimate an elasticity of after-tax income to pre-tax income of 0.1327. With a ratio of taxes of GDP of roughly 0.192 (Heathcote, Storesletten, and Violante 2020), this implies an elasticity of marginal tax rates to pre-tax income of 0.311.

government to realize about two-fifths of potential efficiency gains, see the second column of Table 4.

We now turn to the alternative regime of separate progressive taxation, in which relative tax rates vary with relative income. As discussed, we start with specifications where we hold tax progressivity constant at current U.S. levels, i.e., we fix the coefficient on relative income to 0.311, as implied by the estimates of Wu and Krueger (2021). Column (3) shows that the R^2 of this restricted regression is 56%.[6] Thus, simply abolishing joint tax filing would result in more than half of the potential intra-household efficiency gains being realized.

The fourth column in Table 4 examines progressive tax systems in which tax rates are additionally conditioned on gender. The results show that conditioning on gender yields efficiency gains even when tax rates already depend on individual income. The R^2 rises to 68% and the coefficient on being male is significantly positive. Yet, it is only about half as large as in the purely gender-based tax regime shown in column (2). It implies a tax rebate on women's incomes of about 15 percentage points.

In the fifth and sixth columns, we relax the parameter restriction on the coefficient on relative earnings and estimate the degree of tax progressivity that maximizes intra-household efficiency. Without conditioning taxes on gender (column 5), this unrestricted regression yields relative marginal tax rates responding to relative income with an elasticity of 0.399. Such a system would replicate optimal relative intra-household tax rates with an accuracy of approximately 60%, thus realizing about three-fifths of the potential efficiency gains.

Hence, to realize as much as possible of the potential intra-household tax efficiency, the tax system would have to be more progressive than it currently is. To put the necessary rise in progressivity into perspective, we calculate the implied (income-weighted) average marginal tax rate.[7] The estimated coefficient of 0.399 implies an average marginal tax rate

[6] We compute the R^2 for specifications with parameter constraints as $R^2 = 1 - \text{SSR/SST}$, where the sum of squared residuals (SSR) and the total sum of squares (SST) are calculated using the model's predicted values and the sample-weighted deviations from the mean.

[7] See footnote 5 for how to calculate the average marginal tax rate from the estimated coefficient.

of 43.4%, whereas in the current U.S. tax system, the average dollar earned is taxed at a marginal rate of 29.9%, according to the estimates of Wu and Krueger (2021). The estimated sensitivity to relative income that maximizes intra-household efficiency is close to the degree of tax progressivity that Wu and Krueger (2021) find to be optimal for married couples in an incomplete-markets model with endogenous labor supply (implied average marginal tax rate 45.0%).[8]

Finally, in column (6), we consider both gender and income as determinants of marginal tax rates without any parameter restrictions. Interestingly, the estimated coefficients, and thus the R^2 are almost identical to those in column (4). This means that if an appropriate tax rebate on women's incomes were introduced, tax progressivity would not have to be raised in order to realize almost all of the efficiency gains that are possible for a rule with these two determinants.

To summarize, Table 4 shows that substantial parts of the potential intra-household efficiency gains can be achieved by moving away from the current tax system (column 1) to feasible alternatives. The most substantial parts of these gains are realized through abolishing joint taxation. Conditioning tax rates on gender and increasing the degree of tax progressivity also lead to efficiency gains, but their impact is smaller.

Ignoring relative housework time as a tax determinant. It is informative to evaluate the bias introduced by ignoring the endogenous dependence of labor-supply elasticities on the intra-household division of labor, and attributing all gender differences in elasticities directly to gender itself. To quantify this, we repeat the previous analysis using counterfactual optimal marginal tax ratios that would arise if the wage coefficients from the *market labor supply regressions*— i.e., columns (1) and (2) of Table 1—were incorrectly interpreted as the Frisch elasticities of *all* men and *all* women, respectively. These coefficients are in fact estimates of the *average* Frisch elasticities by gender, but the model implies that there

[8]The optimal degree of progressivity is typically lower when endogenous human-capital investments are incorporated into the analysis.

Table 5: Comparison of intra-household tax efficiency under gender-based taxation, progressive separate taxation, and combinations, when endogenous dependence of labor-supply elasticities on division of household chores is ignored.

	(1)	(2)	(3)
	gender-	progressive separate	
	based	restricted	unrestricted
Constant	-0.632	0.000	0.000
	(0.000)	(0.003)	(0.003)
Male	1.265		
	(0.000)		
Log rel. earn.		*0.311*	0.215
		—	(0.002)
Observations	35026	35026	35026
R^2	1.000	0.178	0.222

Notes: Dependent variable is log relative optimal tax rate, $\theta^*_{ij,t}$. Relative earnings are measured in logs. Standard errors in parentheses. Coefficients without standard errors (in italics) are constrained coefficients.

is heterogeneity *within* gender as a consequence of differences in relative housework times of household members. Table 5 reports the results using as dependent variables the counterfactual tax ratios that would be implied by the average elasticities by gender, thus ignoring within-gender heterogeneity. By construction, one would conclude that gender-based taxation yields perfect intra-household tax efficiency (the R^2 in column (1) is one). In contrast, the efficiency gains from progressive separate taxation would appear much smaller, amounting to only about 20% of the potential gains (columns (2) and (3)). Hence, ignoring the intra-household division of labor as a determinant of labor-supply elasticities leads to a serious overstatement of the gains from gender-based taxation and a substantial understatement of the efficiency potential of progressive separate taxation.

Sensitivity. To assess the sensitivity of our findings to the specific values used for gender-specific Frisch elasticities of total hours, we replicate the analysis using the parameter estimates from columns (3) and (4) of Table 2. Table 6 summarizes the results. Overall, we obtain a similar pattern of findings. In this specification, gender-based taxation explains an even greater share of the variation in optimal tax rates, but, in parallel, the explanatory

Table 6: Comparison of intra-household tax efficiency under joint taxation of married couples, alternative values for Frisch elasticities of total hours.

	(1)	(2)	(3)	(4)	(5)	(6)
	joint	gender-	progressive separate taxation			
	taxation	based	restricted		unrestricted	
			base	+ gender	base	+ gender
Constant	0.000	-0.516	0.000	-0.313	0.000	-0.310
	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)	(0.003)
Male		1.032		0.627		0.621
		(0.006)		(0.004)		(0.005)
Log rel. earn.			*0.311*	*0.311*	0.421	0.315
			—	—	(0.002)	(0.002)
Observations	35026	35026	35026	35026	35026	35026
R^2	0.000	0.461	0.548	0.718	0.588	0.718

Notes: Dependent variable is log relative optimal tax rate, $\theta^*_{ij,t}$. Relative earnings are measured in logs. Standard errors in parentheses. Coefficients without standard errors (in italics) are constrained coefficients.

power of the alternative tax regimes also increases, leaving the main conclusions unchanged.

Are there better tags than gender? Although taxation based on relative income aligns more closely with optimal relative tax rates than pure gender-based taxation, it has the drawback of relying on an endogenous, tax-dependent variable. This can induce inefficient behavioral responses to taxation. In contrast, gender-based taxation can be interpreted as a form of tagging (Cremer, Gahvari, and Lozachmeur 2010). We now investigate whether other simple observable characteristics, so-called tags, can be identified that outperform gender in achieving intra-household tax efficiency.

Mankiw, Weinzierl, and Yagan (2009) discuss several potential tags for use in optimal tax systems, including the presence and number of children, gender, height, skin color, physical attractiveness, health, and parental education. For example, Mankiw and Weinzierl (2010) provide a quantitative analysis of height-based taxation in a redistributive tax framework. We now evaluate how well some of the tags proposed by Mankiw, Weinzierl, and Yagan (2009) can approximate the predicted optimal intra-household marginal tax rate ratios. Since the number of children in the household, skin color, and parental education are strongly

Table 7: Comparison of intra-household tax efficiency under different forms of tagging in income taxation.

	(1) gender-based	(2) BMI	(3) body height	(4) BMI, height
Constant	-0.454	0.000	-0.000	-0.000
	(0.004)	(0.004)	(0.003)	(0.003)
Male	0.908			
	(0.006)			
Log rel. BMI		0.881		0.353
		(0.016)		(0.015)
Log rel. body height			3.844	3.538
			(0.033)	(0.035)
Observations	33352	33352	33352	33352
R^2	0.396	0.087	0.285	0.297

Notes: Dependent variable is log relative optimal tax rates, $\theta^*_{ij,t}$. All dependent variables except gender are measured in intra-household differences. Standard errors in parentheses. Body mass index (BMI) is *weight/height*^{2}.

correlated within couples—either by definition or due to assortative mating—we focus on body height and, as a proxy for physical attractiveness, the body mass index (BMI).

Table 7 compares various tagging strategies in income taxation, using our baseline estimates of optimal marginal tax ratios as the dependent variable. For completeness, we begin by re-estimating gender-based taxation in the slightly smaller sample for which height and BMI are available.[9] As before, gender-based taxation explains about 40% of the variation in intra-household relative marginal tax rates. Conditioning tax rates exclusively on BMI (column (2)) results in particularly low explanatory power, even compared to gender-based taxation. Moreover, the positive coefficient on BMI contradicts the redistributive logic of taxing physical attractiveness, as a higher BMI is typically associated with lower earnings. Tagging based on relative body height performs better (R^2 around 29%) than BMI (and yields a coefficient consistent with redistributive motives), but still underperforms relative to gender-based taxation. Also a combination of BMI and body height without gender (column (4)) is inferior to purely gender-based taxation (column (1)).

[9]There are missing data on body height and BMI for some individuals.

Hence, if one is concerned about the efficiency losses resulting from individuals' tax-dodging responses under progressive taxation, gender appears to be the most effective tag compared to alternatives such as body height and physical attractiveness. However, it is important to note that the accuracy of progressive separate taxation in aligning with intra-household tax efficiency clearly exceeds that of gender-based taxation. This suggests that, even in the presence of some inefficiencies due to behavioral responses, progressive separate taxation may still outperform gender-based taxation in terms of intra-household tax efficiency.

5 Conclusion

We have explored how household specialization and gender differences in preferences shape labor-supply elasticities and examined their implications for optimal taxation. Our model of joint decision-making in dual-earner households demonstrates that optimal intra-household relative marginal tax rates depend on the relative housework times of spouses and, where preference differences exist, also on gender. Our empirical findings highlight the importance of household specialization, while also suggesting that gender-related factors beyond the division of chores play a role. In evaluating implementable tax rules, we find that there are potential efficiency gains from gender-based taxation. However, these gains are clearly dominated by gender-neutral progressive tax systems with separate taxation of married couples.

References

Akee, Randall K. Q., William E. Copeland, Gordon Keeler, Adrian Angold, and Elizabeth J. Costello. 2010. "Parents' Incomes and Children's Outcomes: A Quasi-Experiment." *American Economic Journal: Applied Economics* 2 (1): 86–115.

Alesina, Alberto, Andrea Ichino, and Loukas Karabarbounis. 2011. "Gender-Based Taxation and the Division of Family Chores." *American Economic Journal: Economic Policy* 3 (2): 1–40.

Alogoskoufis, George S. 1987. “On Intertemporal Substitution and Aggregate Labor Supply.” *Journal of Political Economy* 95 (5): 938–960.

Altonji, Joseph G. 1986. “Intertemporal Substitution in Labor Supply: Evidence from Micro Data.” *Journal of Political Economy* 94 (3, Part 2): S176–S215.

Apps, Patricia F., and Ray Rees. 1999. “Individual Versus Joint Taxation in Models With Household Production.” *Journal of Political Economy* 107 (2): 393–403.

Attanasio, Orazio, Peter Levell, Hamish Low, and Virginia Sánchez-Marcos. 2018. “Aggregating elasticities: Intensive and extensive margins of women’s labor supply.” *Econometrica* 86 (6): 2049–2082.

Auclert, Adrien, Bence Bardóczy, and Matthew Rognlie. 2023. “MPCs, MPEs, and Multipliers: A Trilemma for New Keynesian Models.” *Review of Economics and Statistics* 105 (3): 700–712.

Banerjee, Abhijit V., Rema Hanna, Gabriel E. Kreindler, and Benjamin A. Olken. 2017. “Debunking the Stereotype of the Lazy Welfare Recipient: Evidence from Cash Transfer Programs.” *The World Bank Research Observer* 32 (2): 155–184.

Bastagli, Francesca, Jessica Hagen-Zanker, Luke Harman, Valentina Barca, Georgina Sturge, Tanja Schmidt, and Luca Pellerano. 2016. *Cash transfers: What does the evidence say? A rigorous review of programme impact and the role of design and implementation features.* Technical report. London: Overseas Development Institute.

Bastani, Spencer. 2013. “Gender-based and couple-based taxation.” *International Tax and Public Finance* 20 (4): 653–686.

Bengtsson, Niklas. 2012. “The Marginal Propensity to Earn and Consume out of Unearned Income: Evidence Using an Unusually Large Cash Grant Reform.” *The Scandinavian Journal of Economics* 114 (4): 1393–1413.

Berg, Kristoffer. 2023. *Revealing Inequality Aversion from Tax Policy and the Role of Non-Discrimination.*

Blomquist, N. Sören. 1985. “Labour Supply in a Two-Period Model: The Effect of a Nonlinear Progressive Income Tax.” *The Review of Economic Studies* 52 (3): 515–524.

Blomquist, N. Sören. 1988. “Nonlinear taxes and labor supply.” *European Economic Review* 32 (6): 1213–1226.

Blundell, Richard, Luigi Pistaferri, and Itay Saporta-Eksten. 2016. “Consumption Inequality and Family Labor Supply.” *American Economic Review* 106 (2): 387–435.

Borjas, George J. 1980. “The Relationship between Wages and Weekly Hours of Work: The Role of Division Bias.” *The Journal of Human Resources* 15 (3): 409.

Boskin, Michael J., and Eytan Sheshinski. 1983. "Optimal tax treatment of the family: Married couples." *Journal of Public Economics* 20 (3): 281–297.

Bredemeier, Christian, Jan Gravert, and Falko Juessen. 2019. "Estimating labor supply elasticities with joint borrowing constraints of couples." *Journal of Labor Economics* 37 (4): 1215–1265.

Bredemeier, Christian, Jan Gravert, and Falko Juessen. 2023. "Accounting for limited commitment between spouses when estimating labor-supply elasticities." *Review of Economic Dynamics* 51: 547–578.

Bredemeier, Christian, Falko Juessen, and Roland Winkler. 2023. "Bringing Back the Jobs Lost to Covid–19: The Role of Fiscal Policy." *Journal of Money, Credit and Banking* 55 (7): 1703–1747.

Bénabou, Roland. 2000. "Unequal Societies: Income Distribution and the Social Contract." *American Economic Review* 90 (1): 96–129.

Cesarini, David, Erik Lindqvist, Matthew J. Notowidigdo, and Robert Östling. 2017. "The effect of wealth on individual and household labor supply: Evidence from Swedish lotteries." *American Economic Review* 107 (12): 3917–3946.

Chaudhuri, Anita. 1995. "On the relationship between the Frisch and Slutsky decompositions." *Economics Letters* 47 (3-4): 283–290.

Cremer, Helmuth, Firouz Gahvari, and Jean-Marie Lozachmeur. 2010. "Tagging and Income Taxation: Theory and an Application." *American Economic Journal: Economic Policy* 2 (1): 31–50.

Del Boca, Daniela, and Annamaria Lusardi. 2003. "Credit market constraints and labor market decisions." *Labour Economics* 10 (6): 681–703.

Domeij, David, and Martin Flodén. 2006. "The labor-supply elasticity and borrowing constraints: Why estimates are biased." *Review of Economic Dynamics* 9 (2): 242–262.

Dyrda, Sebastian, and Marcelo Pedroni. 2023. "Optimal Fiscal Policy in a Model with Uninsurable Idiosyncratic Income Risk." *The Review of Economic Studies* 90 (2): 744–780.

Elminejad, Ali, Tomas Havranek, Roman Horvath, and Zuzana Irsova. 2023. "Intertemporal substitution in labor supply: A meta-analysis." *Review of Economic Dynamics.*

Faberman, Jason. 2015. "Revisiting the role of home production in life-cycle labor supply."

Gelber, Alexander, Timothy J. Moore, and Alexander Strand. 2017. "The Effect of Disability Insurance Payments on Beneficiaries' Earnings." *American Economic Journal: Economic Policy* 9 (3): 229–261.

Golosov, Mikhail, Michael Graber, Magne Mogstad, and David Novgorodsky. 2021. *How Americans Respond to Idiosyncratic and Exogenous Changes in Household Wealth and Unearned Income.* Working Paper, Working Paper Series 29000. Cambridge, MA: National Bureau of Economic Research.

Gottfried, Peter, and Wolfram F. Richter. 1999. "The Tax Unit and Household Production Comment." *Journal of Political Economy* 107 (2): 404–409.

Greenwood, Jeremy, Zvi Hercowitz, and Gregory W. Huffman. 1988. "Investment, capacity utilization, and the real business cycle." *The American Economic Review* 78 (3): 402–417.

Gromadzki, Jan. 2023. *Labor supply effects of a universal cash transfer.* Technical report.

Guner, N., R. Kaygusuz, and G. Ventura. 2012. "Taxation and Household Labour Supply." *The Review of Economic Studies* 79 (3): 1113–1149.

Heathcote, Jonathan, Kjetil Storesletten, and Giovanni L. Violante. 2020. "How Should Tax Progressivity Respond to Rising Income Inequality?" *Journal of the European Economic Association* 18 (6): 2715–2754.

Heckman, James J. 1993. "What Has Been Learned About Labor Supply in the Past Twenty Years?" *American Economic Review* 83 (2): 116–121.

Holter, Hans A., Dirk Krüger, and Serhiy Stepancuk. 2023. *Until the IRS do us part: (Optimal) taxation of households.* Mimeo, University of Pennsylvania.

Houthakker, H. S. 1960. "Additive preferences." *Econometrica* 28 (2): 244–257.

Hundsdoerfer, Jochen, and Eva Matthaei. 2020. *Gender discriminatory taxes, fairness perception, and labor supply.*

Imbens, Guido W., Donald B. Rubin, and Bruce I. Sacerdote. 2001. "Estimating the effect of unearned income on labor earnings, savings, and consumption: Evidence from a survey of lottery players." *American Economic Review* 91 (4): 778–794.

Jacob, Brian A., and Jens Ludwig. 2012. "The Effects of Housing Assistance on Labor Supply: Evidence from a Voucher Lottery." *American Economic Review* 102 (1): 272–304.

Jaimovich, Nir, and Sergio Rebelo. 2009. "Can News about the Future Drive the Business Cycle?" *American Economic Review* 99 (4): 1097–1118.

Jones, Damon, and Ioana Marinescu. 2022. "The Labor Market Impacts of Universal and Permanent Cash Transfers: Evidence from the Alaska Permanent Fund." *American Economic Journal: Economic Policy* 14 (2): 315–340.

Keane, Michael P. 2011. "Labor Supply and Taxes: A Survey." *Journal of Economic Literature* 49 (4): 961–1075.

Keane, Michael P., and Richard Rogerson. 2015. "Reconciling Micro and Macro Labor Supply Elasticities: A Structural Perspective." *Annual Review of Economics* 7 (1): 89–117.

Kimball, Miles S., and Matthew D. Shapiro. 2008. *Labor Supply: Are the Income and Substitution Effects Both Large or Both Small?* Working Paper, Working Paper Series 14208. National Bureau of Economic Research.

Kleven, Henrik Jacobsen, and Claus Thustrup Kreiner. 2007. "Optimal Taxation of Married Couples with Household Production." *American Economic Journal: Economic Policy* 1 (1): 200–219.

Kleven, Henrik Jacobsen, Claus Thustrup Kreiner, and Emmanuel Saez. 2009. "The Optimal Income Taxation of Couples." *Econometrica* 77 (2): 537–560.

Mankiw, N. Gregory, and Matthew Weinzierl. 2010. "The Optimal Taxation of Height: A Case Study of Utilitarian Income Redistribution." *American Economic Journal: Economic Policy* 2 (1): 155–176.

Mankiw, N. Gregory, Matthew Weinzierl, and Danny Yagan. 2009. "Optimal Taxation in Theory and Practice." *Journal of Economic Perspectives* 23 (4): 147–174.

Marinescu, Ioana. 2018. *No Strings Attached: The Behavioral Effects of U.S. Unconditional Cash Transfer Programs.* Technical report. Cambridge, MA: National Bureau of Economic Research.

Meier, Volker, and Helmut Rainer. 2015. "Pigou meets Ramsey: Gender-based taxation with non-cooperative couples." *European Economic Review* 77: 28–46.

Pencavel, John. 1986. "Chapter 1 Labor supply of men: A survey." In *Handbook of Labor Economics,* edited by Orley Ashenfelter, R. Layard, and David Edward Card, 1: 3–102. North Holland.

Picchio, Matteo, Sigrid Suetens, and Jan C. van Ours. 2018. "Labour Supply Effects of Winning a Lottery." *The Economic Journal* 128 (611): 1700–1729.

Piggott, John, and John Whalley. 1996. "The Tax Unit and Household Production." *Journal of Political Economy* 104 (2): 398–418.

Robins, Philip K. 1985. "A Comparison of the Labor Supply Findings from the Four Negative Income Tax Experiments." *The Journal of Human Resources* 20 (4): 567–582.

Rupert, Peter, Richard Rogerson, and Randall Wright. 2000. "Homework in labor economics: Household production and intertemporal substitution." *Journal of Monetary Economics* 46 (3): 557–579.

Saez, Emmanuel. 2001. "Using Elasticities to Derive Optimal Income Tax Rates." *The Review of Economic Studies* 68 (1): 205–229.

Schmitt-Grohé, Stephanie, and Martín Uribe. 2012. "What's News in Business Cycles." *Econometrica* 80 (6): 2733–2764.

Wolf, Christian K. 2023. "The Missing Intercept: A Demand Equivalence Approach." *American Economic Review* 113 (8): 2232–2269.

Wu, Chunzan, and Dirk Krueger. 2021. "Consumption Insurance against Wage Risk: Family Labor Supply and Optimal Progressive Income Taxation." *American Economic Journal: Macroeconomics* 13 (1): 79–113.

Appendix

A Theoretical model

A.1 Government optimization and optimal taxation

The maximization problem of the government is

$$\max_{\tau_{ij,t},\tau_{-ij,t}} U_j\left(c_{j,t}, d_{j,t}, n^{\text{home}}_{ij,t}, n^{\text{home}}_{-ij,t}, n^{\text{market}}_{ij,t}, n^{\text{market}}_{-ij,t}\right),$$

subject to (17). The first-order condition is (18).

Substituting the household optimality conditions (15) and (16) into the first-order condition for the government gives

$$\begin{aligned}
&\frac{\partial U_j}{\partial c_{j,t}}\frac{\partial c_{j,t}}{\partial \tau_{ij,t}} + \frac{\partial U_j}{\partial c_{j,t}}\frac{(1-\tau_{ij,t})w_{ij,t}}{\partial f/\partial n^{\text{home}}_{ij,t}}\frac{\partial d_{j,t}}{\partial \tau_{ij,t}} \\
&- \frac{\partial U_j}{\partial c_{j,t}}(1-\tau_{ij,t})w_{ij,t}\frac{\partial n^{\text{home}}_{ij,t}}{\partial \tau_{ij,t}} - \frac{\partial U_j}{\partial c_{j,t}}(1-\tau_{-ij,t})w_{-ij,t}\frac{\partial n^{\text{home}}_{-ij,t}}{\partial \tau_{ij,t}} \\
&- \frac{\partial U_j}{\partial c_{j,t}}(1-\tau_{ij,t})w_{ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}} - \frac{\partial U_j}{\partial c_{j,t}}(1-\tau_{-ij,t})w_{-ij,t}\frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}} \\
&+ \lambda^G_{j,t}\cdot\left(w_{ij,t}n^{\text{market}}_{ij,t} + \tau_{ij,t}w_{ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}} + \tau_{-ij,t}w_{-ij,t}\frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}}\right) = 0\ \forall\ i.
\end{aligned}$$

Rearraning yields

$$\begin{aligned}
\frac{\partial U_j}{\partial c_{j,t}}\Bigg[&\frac{\partial c_{j,t}}{\partial \tau_{ij,t}} + \frac{(1-\tau_{ij,t})w_{ij,t}}{\partial f/\partial n^{\text{home}}_{ij,t}}\frac{\partial d_{j,t}}{\partial \tau_{ij,t}} \\
&- (1-\tau_{ij,t})w_{ij,t}\frac{\partial n^{\text{home}}_{ij,t}}{\partial \tau_{ij,t}} - (1-\tau_{-ij,t})w_{-ij,t}\frac{\partial n^{\text{home}}_{-ij,t}}{\partial \tau_{ij,t}} \\
&-(1-\tau_{ij,t})w_{ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}} - (1-\tau_{-ij,t})w_{-ij,t}\frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}}\Bigg] \\
&+ \lambda^G_{j,t}\cdot\left(w_{ij,t}n^{\text{market}}_{ij,t} + \tau_{ij,t}w_{ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}} + \tau_{-ij,t}w_{-ij,t}\frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}}\right) = 0.
\end{aligned}$$

The responses of $c_{j,t}$ and $d_{j,t}$ to the tax rates can be determined through the household constraints (3) and (4). Applying $a_{j,t+1} = (1+r_t)a_{j,t}$ in the household budget constraint (3) gives

$$c_{j,t} = \sum_i (1-\tau_{ij,t}) w_{ij,t} n_{ij,t}^{\text{market}},$$

which yields

$$\frac{\partial c_{j,t}}{\partial \tau_{ij,t}} = -w_{ij,t} n_{ij,t}^{\text{market}} + (1-\tau_{ij,t}) w_{ij,t} \frac{\partial n_{ij,t}^{\text{market}}}{\partial \tau_{ij,t}} + (1-\tau_{-ij,t}) w_{-ij,t} \frac{\partial n_{-ij,t}^{\text{market}}}{\partial \tau_{ij,t}}.$$

Further, for the home production function (4), it holds that

$$\frac{\partial d_{j,t}}{\partial \tau_{ij,t}} = \frac{\partial f}{\partial n_{ij,t}^{\text{home}}} \frac{\partial n_{ij,t}^{\text{home}}}{\partial \tau_{ij,t}} + \frac{\partial f}{\partial n_{-ij,t}^{\text{home}}} \frac{\partial n_{-ij,t}^{\text{home}}}{\partial \tau_{ij,t}}.$$

Using these results in the optimal-tax condition gives

$$\begin{aligned}
&\frac{\partial U_j}{\partial c_{j,t}} \Bigg[-w_{ij,t} n_{ij,t}^{\text{market}} + (1-\tau_{ij,t}) w_{ij,t} \frac{\partial n_{ij,t}^{\text{market}}}{\partial \tau_{ij,t}} + (1-\tau_{-ij,t}) w_{-ij,t} \frac{\partial n_{-ij,t}^{\text{market}}}{\partial \tau_{ij,t}} \\
&\quad + \frac{(1-\tau_{ij,t}) w_{ij,t}}{\partial f / \partial n_{ij,t}^{\text{home}}} \left(\frac{\partial f}{\partial n_{ij,t}^{\text{home}}} \frac{\partial n_{ij,t}^{\text{home}}}{\partial \tau_{ij,t}} + \frac{\partial f}{\partial n_{-ij,t}^{\text{home}}} \frac{\partial n_{-ij,t}^{\text{home}}}{\partial \tau_{ij,t}} \right) \\
&\quad - (1-\tau_{ij,t}) w_{ij,t} \frac{\partial n_{ij,t}^{\text{home}}}{\partial \tau_{ij,t}} - (1-\tau_{-ij,t}) w_{-ij,t} \frac{\partial n_{-ij,t}^{\text{home}}}{\partial \tau_{ij,t}} \\
&\quad -(1-\tau_{ij,t}) w_{ij,t} \frac{\partial n_{ij,t}^{\text{market}}}{\partial \tau_{ij,t}} - (1-\tau_{-ij,t}) w_{-ij,t} \frac{\partial n_{-ij,t}^{\text{market}}}{\partial \tau_{ij,t}} \Bigg] \\
&\quad + \lambda_{j,t}^G \cdot \left(w_{ij,t} n_{ij,t}^{\text{market}} + \tau_{ij,t} w_{ij,t} \frac{\partial n_{ij,t}^{\text{market}}}{\partial \tau_{ij,t}} + \tau_{-ij,t} w_{-ij,t} \frac{\partial n_{-ij,t}^{\text{market}}}{\partial \tau_{ij,t}} \right) = 0
\end{aligned}$$

which can be simplified to

$$\begin{aligned}
\frac{\partial \mathcal{L}}{\partial \tau_{ij,t}} = &\frac{\partial U_j}{\partial c_{j,t}} \Bigg[-w_{ij,t} n_{ij,t}^{\text{market}} + \frac{(1-\tau_{ij,t}) w_{ij,t}}{\partial f / \partial n_{ij,t}^{\text{home}}} \left(\frac{\partial f}{\partial n_{ij,t}^{\text{home}}} \frac{\partial n_{ij,t}^{\text{home}}}{\partial \tau_{ij,t}} + \frac{\partial f}{\partial n_{-ij,t}^{\text{home}}} \frac{\partial n_{-ij,t}^{\text{home}}}{\partial \tau_{ij,t}} \right) \\
&\quad -(1-\tau_{ij,t}) w_{ij,t} \frac{\partial n_{ij,t}^{\text{home}}}{\partial \tau_{ij,t}} - (1-\tau_{-ij,t}) w_{-ij,t} \frac{\partial n_{-ij,t}^{\text{home}}}{\partial \tau_{ij,t}} \Bigg] \\
&\quad + \lambda_{j,t}^G \cdot \left(w_{ij,t} n_{ij,t}^{\text{market}} + \tau_{ij,t} w_{ij,t} \frac{\partial n_{ij,t}^{\text{market}}}{\partial \tau_{ij,t}} + \tau_{-ij,t} w_{-ij,t} \frac{\partial n_{-ij,t}^{\text{market}}}{\partial \tau_{ij,t}} \right) = 0.
\end{aligned}$$

From (16) it follows that $(1-\tau_{ij,t}) w_{ij,t} / (\partial f / \partial n_{ij,t}^{\text{home}})$ is the same for both household members

i and $-i$. Using this in the optimal-tax condition and multiplying out gives

$$\frac{\partial U_j}{\partial c_{j,t}}\Bigg[-w_{ij,t}n^{\text{market}}_{ij,t}+\frac{(1-\tau_{ij,t})w_{ij,t}}{\partial f/\partial n^{\text{home}}_{ij,t}}\frac{\partial f}{\partial n^{\text{home}}_{ij,t}}\frac{\partial n^{\text{home}}_{ij,t}}{\partial \tau_{ij,t}}+\frac{(1-\tau_{-ij,t})w_{-ij,t}}{\partial f/\partial n^{\text{home}}_{-ij,t}}\frac{\partial f}{\partial n^{\text{home}}_{-ij,t}}\frac{\partial n^{\text{home}}_{-ij,t}}{\partial \tau_{ij,t}}$$
$$-(1-\tau_{ij,t})w_{ij,t}\frac{\partial n^{\text{home}}_{ij,t}}{\partial \tau_{ij,t}}-(1-\tau_{-ij,t})w_{-ij,t}\frac{\partial n^{\text{home}}_{-ij,t}}{\partial \tau_{ij,t}}\Bigg]$$
$$+\lambda^G_{j,t}\cdot\left(w_{ij,t}n^{\text{market}}_{ij,t}+\tau_{ij,t}w_{ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}}+\tau_{-ij,t}w_{-ij,t}\frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}}\right)=0.$$

In the square brackets, all but the first term cancel, which gives

$$-\frac{\partial U_j}{\partial c_{j,t}}w_{ij,t}n^{\text{market}}_{ij,t}+\lambda^G_{j,t}\cdot\left(w_{ij,t}n^{\text{market}}_{ij,t}+\tau_{ij,t}w_{ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial \tau_{ij,t}}+\tau_{-ij,t}w_{-ij,t}\frac{\partial n^{\text{market}}_{-ij,t}}{\partial \tau_{ij,t}}\right).$$

Dividing by $w_{ij,t}n^{\text{market}}_{ij,t}$ yields (19).

A.2 Simplification of relative optimal marginal tax rates

As shown by Chaudhuri (1995), $\partial n^{\text{market}}_{ij,t}/\partial w_{ij,t}$ and $\partial n^{\text{market}}_{ij,t}/\partial w_{-ij,t}$ can be decomposed into

$$\frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{ij,t}}=\frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{ij,t}}|_\lambda+n^{\text{market}}_{ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial y_{j,t}}-\xi^{\text{own}}_{ij,t},$$
$$\frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{-ij,t}}=\frac{\partial n^{\text{market}}_{-ij,t}}{\partial w_{ij,t}}|_\lambda+n^{\text{market}}_{-ij,t}\frac{\partial n^{\text{market}}_{ij,t}}{\partial y_{j,t}}-\xi^{\text{cross}}_{ij,t},$$

where $y_{j,t}$ is the period-t value of household j's stream of unearned income. In both equations, the first term is the derivative of the Frisch labor-supply function, the second term is the classical income effect known from textbook Slutsky decompositions, and the final term, $\xi^{\text{own}}_{ij,t}$ and $\xi^{\text{cross}}_{ij,t}$, respectively, is the general substitution effect (Houthakker 1960). The general substitution effect captures the changes in income in response to behavioral changes, specifically the changes in all supply and demand decisions according to the respective Frisch supply or demand functions.

In our case with additively separable preferences, the only Frisch responses are with respect to the decision variable's own price. This implies

$$\xi^{\text{own}}_{ij,t} = \frac{\partial n^{\text{market}}_{ij,t}}{\partial y_{j,t}} w_{ij,t} \frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{ij,t}} |_{\lambda},$$
$$\xi^{\text{cross}}_{ij,t} = \frac{\partial n^{\text{market}}_{ij,t}}{\partial y_{j,t}} w_{-ij,t} \frac{\partial n^{\text{market}}_{-ij,t}}{\partial w_{-ij,t}} |_{\lambda}.$$

Further, additively separable preferences imply that the Frisch cross-wage derivative in $\partial n^{\text{market}}_{ij,t}/\partial w_{-ij,t}$ is zero. Consequently, the difference between the own-wage and the cross-wage elasticities in (21) simplifies to

$$\begin{aligned}
e^{\text{own}}_{ij,t} - e^{\text{cross}}_{ij,t} =& \frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{ij,t}} \cdot \frac{w_{ij,t}}{n^{\text{market}}_{ij,t}} - \frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{-ij,t}} \cdot \frac{w_{ij,t}}{n^{\text{market}}_{-ij,t}} \\
=& \left(\frac{\partial n^{\text{market}}_{ij,t}}{\partial w_{ij,t}} |_{\lambda} + n^{\text{market}}_{ij,t} \frac{\partial n^{\text{market}}_{ij,t}}{\partial y_{j,t}} \right) \cdot \frac{w_{ij,t}}{n^{\text{market}}_{ij,t}} - n^{\text{market}}_{-ij,t} \frac{\partial n^{\text{market}}_{ij,t}}{\partial y_{j,t}} \cdot \frac{w_{ij,t}}{n^{\text{market}}_{-ij,t}} \\
& - \xi^{\text{own}}_{ij,t} \cdot \frac{w_{ij,t}}{n^{\text{market}}_{ij,t}} + \xi^{\text{cross}}_{ij,t} \cdot \frac{w_{ij,t}}{n^{\text{market}}_{-ij,t}} \\
=& e^{\text{Frisch}}_{ij,t} - \frac{\partial n^{\text{market}}_{ij,t}}{\partial y_{j,t}} \cdot w_{ij,t} \cdot \left(e^{\text{Frisch}}_{ij,t} - e^{\text{Frisch}}_{-ij,t} \right)
\end{aligned}$$

and the analogous steps for $e^{\text{own}}_{-ij,t} - e^{\text{cross}}_{-ij,t}$ give

$$e^{\text{own}}_{-ij,t} - e^{\text{cross}}_{-ij,t} = e^{\text{Frisch}}_{-ij,t} - \frac{\partial n^{\text{market}}_{-ij,t}}{\partial y_{j,t}} \cdot w_{-ij,t} \cdot \left(e^{\text{Frisch}}_{-ij,t} - e^{\text{Frisch}}_{ij,t} \right)$$

Thus, optimal relative marginal tax rates depend on (Frisch) substitution effects, while income effects cancel out. Further notice that the latter term tends to be small when the two household members' Frisch elasticities are not too different.

To simplify terms further, we apply a first-order Taylor approximation of $e^{\text{own}}_{ij,t} - e^{\text{cross}}_{ij,t}$ around the situation where spouses are identical in all respects, implying, for example, equal Frisch elasticities. This gives, in logs,

$$\log(e^{\text{own}}_{ij,t} - e^{\text{cross}}_{ij,t}) \approx (1-\gamma) \log e^{\text{Frisch}}_{ij,t} + \gamma \log e^{\text{Frisch}}_{-ij,t},$$

with $\gamma = w \cdot \partial n / \partial y$ being the (individual) propensity to earn out of (family) unearned income in the point of approximation where no individual indices are needed due to symmetry. Using the approximation, we can write

$$\begin{aligned}\log(e^{\text{own}}_{ij,t} - e^{\text{cross}}_{ij,t}) - \log(e^{\text{own}}_{-ij,t} - e^{\text{cross}}_{-ij,t}) \\ &\approx (1-\gamma)\log e^{\text{Frisch}}_{ij,t} + \gamma \log e^{\text{Frisch}}_{-ij,t} - (1-\gamma)\log e^{\text{Frisch}}_{-ij,t} - \gamma \log e^{\text{Frisch}}_{ij,t} \\ &= (1-2\gamma)\log e^{\text{Frisch}}_{ij,t} - (1-2\gamma)\log e^{\text{Frisch}}_{-ij,t}.\end{aligned}$$

Using this result in (21) gives (22).

B Marginal propensity to earn out of unearned income

We briefly review the empirical literature on the marginal propensity to earn out of unearned income, or the wealth effect on labor supply. A large body of research suggests that this wealth effect is small or close to zero. For instance, Schmitt-Grohé and Uribe (2012) estimate an RBC model and find the wealth effect on labor supply to be essentially zero. This result is consistent with several quasi-experimental studies on the impact of cash transfers in developed and developing countries. Marinescu (2018) summarizes quasi-experimental designs from high-income countries, while Banerjee et al. (2017) and Bastagli et al. (2016) review field experiments in low-income settings. All three conclude that cash transfers have little to no adverse effect on labor supply.[10]

Exploiting the quasi-random nature of lottery wins, several studies estimate the marginal propensity to earn out of unearned income. Imbens, Rubin, and Sacerdote (2001), Cesarini et al. (2017), and Picchio, Suetens, and van Ours (2018) all find modest labor-supply responses.[11] The extensive empirical evidence pointing to small wealth effects has motivated

[10] Synthesizing the findings from the negative income tax experiments in the 1970s, Robins (1985) estimates the marginal propensity to consume out of unearned income to lie between −0.06 and −0.10. Using a difference-in-differences strategy based on casino payments to Native American families, Akee et al. (2010) find no labor-supply response to unearned income. Jones and Marinescu (2022) use a synthetic-control design for the Alaska Permanent Fund Dividend and similarly find no effect on employment. However, macroeconomic spillovers, such as wage adjustments, may offset underlying wealth effects.

[11] Cesarini et al. (2017) and Picchio, Suetens, and van Ours (2018) examine how couples adjust labor earnings after receiving one-time windfall gains. In the year of the shock, household earnings decline by 1.4% (Cesarini et al. 2017) and 1.8% (Picchio, Suetens, and van Ours 2018) of the amount received, respectively. Multiplying this initial response by the average remaining years in the labor market, as in Cesarini et al. (2017), yields upper-bound estimates for the marginal propensity to earn out of unearned income of −0.225 and −0.358, respectively. Imbens, Rubin, and Sacerdote (2001) study lottery prizes paid out in annual installments

the development of utility functions consistent with this property (Greenwood, Hercowitz, and Huffman 1988; Jaimovich and Rebelo 2009). As a result, many macroeconomic studies adopt models in which income effects are assumed to be negligible (Auclert, Bardóczy, and Rognlie 2023; Bredemeier, Juessen, and Winkler 2023; Dyrda and Pedroni 2023; Wolf 2023).

Yet, some studies estimate larger wealth effects on labor supply. Gromadzki (2023) exploits the design of a child benefit program in Poland and finds a marginal propensity to earn out of unearned income of -0.14. Gelber, Moore, and Strand (2017) use a regression discontinuity in eligibility for disability insurance payments in the U.S. and estimate a propensity of -0.2. Kimball and Shapiro (2008) rely on survey responses to hypothetical lottery wins and report values close to -0.3, similar to what is found by Bengtsson (2012) when analyzing a reform to unconditional cash transfers in South Africa. The largest microeconometric estimate we are aware of is -0.51, reported by Golosov et al. (2021), who use an event-study design based on variation in the timing of lottery wins.

To summarize, most estimates suggest that the marginal propensity to earn out of unearned income is negligible or moderate at most, typically ranging between 0 and -0.5.

and report a marginal propensity to earn of approximately 11% for individuals. Jacob and Ludwig (2012) analyzes the effects of winning a housing voucher lottery in Chicago and finds a similarly small response, with a marginal propensity to earn of about -0.09.

C Additional regression results

For completeness, Table 8 reports the full estimation results for our baseline specification. To enhance readability, the tables in the main text omit control variables.

Table 8: Market hours and total hours regressions (complete estimation results)

	(1)	(2)	(3)	(4)
	log market hours, $\log n_{ij,t}^{\text{market}}$		log total hours, $\log n_{ij,t}^{\text{total}}$	
	men	women	men	women
log wage rate, $\log w_{ij,t}$	0.602*** (0.046)	1.133*** (0.082)	0.380*** (0.034)	0.449*** (0.042)
log housework hours, $\log n_{ij,t}^{\text{home}}$	-0.042*** (0.005)	-0.141*** (0.010)		
age	-0.204*** (0.025)	-0.372*** (0.040)	-0.111*** (0.018)	-0.146*** (0.020)
age^2	0.004*** (0.001)	0.008*** (0.001)	0.002*** (0.000)	0.003*** (0.000)
age^3	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
# kids age 0–5 = 1	-0.028** (0.010)	-0.281*** (0.017)	-0.004 (0.007)	-0.084*** (0.009)
# kids age 0–5 = 2	-0.040** (0.014)	-0.410*** (0.023)	0.004 (0.010)	-0.108*** (0.012)
# kids age 0–5 = 3	-0.011 (0.029)	-0.565*** (0.048)	0.051* (0.021)	-0.085*** (0.025)
# kids age 6–17 = 1	0.007 (0.009)	-0.013 (0.015)	0.008 (0.006)	0.012 (0.008)
# kids age 6–17 = 2	0.022* (0.011)	-0.026 (0.020)	0.023** (0.008)	0.018 (0.010)
# kids age 6–17 = 3	-0.004 (0.018)	-0.063 (0.032)	0.003 (0.013)	0.017 (0.017)
# kids age 6–17 = 4	0.051 (0.035)	0.075 (0.062)	0.058* (0.026)	0.121*** (0.032)
# kids age 6–17 = 5	-0.074 (0.083)	-0.086 (0.137)	0.019 (0.062)	0.091 (0.070)
log consumption, $\log \widetilde{c}_{j,t}$	0.007 (0.009)	0.090*** (0.014)	0.013* (0.006)	0.046*** (0.007)
log food share, $\log\left(\frac{\widetilde{c}_{k,j,t}}{\widetilde{c}_{j,t}}\right)$	0.007 (0.006)	-0.005 (0.010)	0.005 (0.005)	0.001 (0.005)
Constant	9.423*** (0.328)	9.897*** (0.510)	4.581*** (0.242)	4.534*** (0.262)
Year dummies included	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
Observations	17513	17513	17513	17513

Table 9 presents the results of gender-specific labor-supply regressions for a restricted sample of couples without young children. Table 10 displays results from labor-supply regressions in the full sample with a correction for women's selection into the labor force. In Table 10, the regressions for men are identical to those in the baseline specification (Table 1) and are repeated for convenience.

Table 9: Market hours and total hours regressions, sample of couples without young children.

	(1)	(2)	(3)	(4)
	log market hours, $\log n_{ijt}$		log total hours, $\log l_{ijt}$	
	men	women	men	women
log wage rate, $\log w_{ijt}$	0.633***	0.929***	0.412***	0.395***
	(0.052)	(0.089)	(0.039)	(0.047)
log housework, $\log h_{ijt}$	-0.039***	-0.113***		
	(0.006)	(0.012)		
Observations	12519	12519	12519	12519

Notes: Restricted sample without children below age 7. Dependent variables are log hours worked in the market, $\log n_{ij,t}^{\text{market}}$ (columns (1) and (2)), and log total hours worked, $\log n_{ij,t}^{\text{total}}$ (columns (3) and (4)). All regressions include individual and time fixed effects, taste shifters (number of young kids, number of old kids, cubic in age), log household consumption, log share of food expenditures, and a constant. Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.

Table 10: Market hours and total hours regressions, controlling for selection effects.

	(1)	(2)	(3)	(4)
	log market hours, $\log n_{ijt}$		log total hours, $\log l_{ijt}$	
	men	women	men	women
log wage rate, $\log w_{ijt}$	0.602***	1.137***	0.380***	0.449***
	(0.0455)	(0.0818)	(0.0337)	(0.0420)
log housework, $\log h_{ijt}$	-0.0415***	-0.141***		
	(0.0049)	(0.0100)		
Observations	17513	17513	17513	17513

Notes: Dependent variables are log hours worked in the market, $\log n_{ij,t}^{\text{market}}$ (columns (1) and (2)), and log total hours worked, $\log n_{ij,t}^{\text{total}}$ (columns (3) and (4)). All regressions include individual and time fixed effects, taste shifters (number of young kids, number of old kids, cubic in age), log household consumption, log share of food expenditures, and a constant. The female wage regression underlying this specification additionally includes an inverse Mills ratio, estimated from a probit model of female labor-force participation, as described in the main text. Standard errors in parentheses. $^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.01$.