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Income taxation of couples and the tax unit choice

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Abstract We study the optimal income taxation of couples. We determine the resulting intra-family labor supply allocation and its implication for the choice of the tax unit (individual versus joint taxation). We provide a general condition for full joint taxation to arise. We also study how the spouses' respective labor supply decisions are distorted when the condition does not hold. In particular, we show that, depending on the pattern of mating, the celebrated result according to which the spouse with the more elastic labor supply faces the lower marginal tax rates may or may not hold in our setting.

Keywords Optimal income taxation · Tax unit · Household labor supply

JEL Classification H21 · H31 · D10

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1 Introduction

The tax treatment of couples has been a heavily debated subject among economists and noneconomists alike. Family taxation rules continue to differ significantly across countries, even though there appears to be a trend towards a more “individualized” tax system. It does appear that family (or couple)-based schemes tend to be replaced by systems that rely on the individual as the relevant tax unit. Accordingly, an individual’s tax liability depends less than previously on the spouse’s income. This trend has been observed over the last decades in most tax reforms in OECD countries. Nevertheless, in some countries like France, the systems remain to a substantial part family based.

Accounting for the family dimension when studying optimal income taxation thus appears to be highly important. Among economists, it is generally admitted that the couple’s secondary earner is also the one with the higher elasticity of labor supply (e.g. see Blundell and MaCurdy 1999). Following the traditional Ramsey rule, the secondary wage earner should face a lower linear tax (see Boskin 1975; Boskin and Sheshinski 1983). This pleads in general for a tax unit that is based on individual incomes. However, an individual’s welfare largely depends upon the total couple’s income. Thus, it may be desirable to introduce a certain degree of progressivity depending upon the family’s income.

The literature on this topic is quite scarce and restrictive. Following the seminal paper by Boskin (1975) and Boskin and Sheshinski (1983), authors have usually constrained the analysis of optimal family income taxation to the framework of only linear instruments.¹ As a result, the choice of the tax unit only depends upon the difference between optimal tax rates of the primary and the secondary earners: joint taxation is desirable if and only if these two tax rates are equal.

In reality, the picture is however more complicated than that. The taxation of a couple typically depends upon the primary and the secondary labor incomes. On one extreme, there is pure *joint taxation* if the tax function depends only on the sum of these two incomes. As a result, the marginal tax rate is the same for both spouses of the same couple. On the other extreme, we have *individual taxation* under which the tax paid by the family is the addition of two tax functions each depending only upon one spouse’s income. In this situation, the tax unit is purely based on individual incomes, but this does not, however, preclude the case where both spouses’ marginal tax rates are equal. Between these two polar cases, joint taxation and individual taxation, the most

¹ Examples are papers by Apps and Rees (1988, 1999) or more recently Kleven (2004).

widespread system is one of *selective taxation* under which secondary earners, usually women, are taxed on a separate, lower, progressive tax schedule than that of primary earners.

The design of the tax function is often expressed in terms of the choice of the “tax unit”: couple versus individual. Thus, joint taxation corresponds to choosing the couple as the tax unit, with their combined income being the tax base while individual and selective taxation have the individual as the tax unit and the individual income as tax base. In this paper, we study the conditions that lead to a joint taxation system. Our approach is in the tradition of nonlinear optimal income taxation. We, thus, assume away some of the considerations that can explain the observed move towards individualization of tax rules. One of them is ethical and reflects the view that individuals should be given priority over couples in the name of responsibility. Another one is informational: marital status is assumed to be observable. This is a strong assumption because we live in a world with a wide variety of living arrangement and it is not always easy for tax authorities to sort them out. Typically, couples can pretend living separately if they find it more attractive in terms of tax burden.

We study the optimal income taxation of couples in a nonlinear framework (Mirrlees 1971). We examine whether the optimal (second best) allocation distorts one spouse’s labor supply relative to that of the other’s spouse *for a given level of gross income earned by the family*. This issue, in turn, is strongly connected to the choice of tax unit. We show that pure joint taxation (with total household income as tax base) is equivalent to having no distortion in the allocation of both spouses’ labor supplies for a given level of family income. We derive a general property stating if and how the intra-family allocation of labor is distorted. We also show in more restrictive settings how this condition can be related to the primitives of the model. We also study how the spouses respective labor supply decisions are distorted when the condition does not hold. In particular, we show that the celebrated result according to which the spouse with the more elastic labor supply faces the lower marginal tax rates may or may not hold in our setting, depending on the pattern of mating.

Nonlinear income taxation of couple has so far not received much attention in the literature. One exception is the paper by Schroyen (2003) who studies optimal nonlinear income taxation in a setting where labor supply decisions are made within the household (couple) while the tax schedule is by assumption based on individual filing. He shows that the household structure and particularly the mating pattern affect the structure of an individual based income tax. Another more recent contribution is provided by Brett (2007) who studies optimal income taxes when each spouse productivities can take two values. In other words, he considers a multidimensional screening problem with four types of couples. As a result, optimal marginal income taxes may turn out to be negative for some spouses. He focuses on the sign of the marginal income taxes rather than on the relative size of the labor supply distortions in each

couple (which is our main subject).² Finally, Kleven et al. (2009) study a fairly general problem of optimum taxation of two wage earners family allowing multidimensional differences across families within a unitary model (of family decision making). They are interested in determining whether the tax function is *separable* into two individual and independent tax schedules and in the asymptotic design of these tax functions.³

Our contribution is very much complementary to the one of Kleven et al. (2009). These authors focus on the case where the spouses wages are *independently* distributed and not surprisingly this is when separable tax functions are most likely to occur. Our paper, to a large extent, concentrates on the case where spouses abilities are somehow correlated. While our general condition for joint taxation does not directly rely on any prior assumption about the two wage distributions, the degree of correlation between spouses abilities plays a crucial role. For instance, when both spouses have the same disutility of labor (and the same elasticity parameter), joint taxation arises when wage ratios are identical in all couples. When elasticities differ, on the other hand, the spouses relative wages must obey a more complex (and nonlinear) condition to yield joint taxation. We also study how the spouses respective labor supply decisions are distorted when the condition does not hold. In particular, we show that, depending on the pattern of mating, the celebrated result according to which the spouse with the more elastic labor supply faces the lower marginal tax rates may or may not hold in our setting. Interestingly, while empirical estimations of labor supply elasticities tend to favor lower marginal income taxes for married women, the evidence on wage distribution among French dual earner couples seems to push for higher marginal taxes for married women.

2 The model

2.1 Couples: preferences and productivities

Consider a couple composed of two individuals indexed by $j = w, h$. The couple's preferences over its net income x and labor supplies ℓ_j ($j = w, h$) are represented by a quasi-concave family utility function $U(x, \ell_w, \ell_h)$, with $\partial U / \partial x > 0$ and $\partial U / \partial \ell_j < 0$. The society is composed of N types of couples indexed by superscript i ($i = 1, \dots, N$) who differ in their members' labor productivities a_w^i and a_h^i . The proportion of type i couples in the economy is

²The issue of the choice of the tax base is only briefly addressed in his Proposition 7.

³All these papers, like ours focus on the tax treatment of couples. Another issue in family taxation is the tax treatment of children; see Cigno (1986) and Cigno and Pettini (2003).

denoted by π_i where $\sum_{i=1}^N \pi_i = 1$. The total number of couples is normalized at one for notational convenience.⁴

2.2 Tax instruments and labor supply decisions

As in traditional models of optimal taxation, we assume that the individual productivities and labor supplies are not publicly observable. For any couple, however, before tax incomes of each of the spouses, $y_w^i = a_w^i \ell_w^i$ and $y_h^i = a_h^i \ell_h^i$ are observable. The tax policy consists of a non linear tax $T(y_w^i, y_h^i)$ on the labor incomes of the two wage earners. This general tax function may exhibit some specific properties. In reality, tax functions range from “unitary taxation” to “separable taxation”.⁵ In the first case, the tax function only depends upon the total income of the couple, i.e., $T(y_w^i, y_h^i) = \tilde{T}(y_w^i + y_h^i)$. In the second case, the tax levied on the income of one spouse does not depend upon the income earned by the other spouse, i.e., $T(y_w^i, y_h^i) = \hat{T}(y_w^i) + \hat{T}(y_h^i)$. As mentioned in the introduction, much of the existing literature has concentrated on the class of linear tax functions. The main question addressed in these papers is whether or not the income of both spouses should be taxed at the same (marginal) tax rate. We reconsider this question with nonlinear tax instruments. In such a setting, the issue of equal or unequal marginal tax rate within the couple is particularly interesting because it is closely related to the issue of the choice of the tax base. The requirement that marginal tax rates are equal, namely

$$\partial T(y_w^i, y_h^i) / \partial y_w^i = \partial T(y_w^i, y_h^i) / \partial y_h^i, \quad \forall i = 1, \dots, N, \quad (1)$$

is a necessary condition to have a unitary taxation system. It is also sufficient in the sense that when this condition holds for all couples, the optimal allocation *can* be implemented by a unitary tax function.⁶

Condition (1) is particularly interesting because it implies that the tax system does not distort the intra-family allocation of labor supply. To be more precise,

⁴This model of the couple is a fairly general reduced form of the unitary model. It is consistent with the existence of “private” and “public” goods in the household and with the determination of consumption and labor supply levels through a bargaining process (where the weights are exogenous and not affected by the tax policy). From that perspective, one can think of $U(x, \ell_w, \ell_y)$ as the value function associated with the problem of allocating a household budget x to the various consumption goods, given labor supply levels ℓ_w and ℓ_y . In other words, $U(x, \ell_w, \ell_y)$ specifies the *maximum* level of the households objective (e.g., a weighted sum of utilities or a Nash product) given labor supplies and given its total (after tax budget). Using this reduced form rather than the original household objective in the optimal tax problem does not involve any loss of generality as long as differential commodity taxation is not possible, for instance because individual consumption levels (and thus the allocation of goods within the couple) are not publicly observable.

⁵This is admittedly a highly stylized and incomplete typology. In particular, it abstracts from the tax treatment of children and relies on the assumption that there are no single individuals.

⁶Which does not necessarily imply that *all* implementing tax functions are unitary.

for a given level of after tax income the labor allocation between the two spouses is not affected by such a tax function. To see this, note that for a given level of after tax income $x = y_w + y_h - T(y_w, y_h)$, the couple chooses (y_w, y_h) to solve:

$$\max_{y_h, y_w} U\left(x, \frac{y_w}{a_w}, \frac{y_h}{a_h}\right) \quad (2)$$

$$\text{s.t. } x = y_h + y_w - T(y_w, y_h). \quad (3)$$

Deriving the FOC and rearranging yields

$$\text{MRS}_{y_w, y_h} = \frac{\partial U / \partial y_h}{\partial U / \partial y_w} = \frac{a_w}{a_h} \frac{\partial U / \partial \ell_h}{\partial U / \partial \ell_w} = \frac{1 - \partial T(y_h, y_w) / \partial y_h}{1 - \partial T(y_h, y_w) / \partial y_w}. \quad (4)$$

The tradeoff between y_w and y_h is not distorted (with respect to a first-best and/or laissez-faire outcome) when $\text{MRS}_{y_w, y_h} = 1$. This is of course always the case when there are no taxes at all. More interestingly, Eq. 4 shows that the tradeoff remains undistorted as long as $\partial T(y_h, y_w) / \partial y_h = \partial T(y_h, y_w) / \partial y_w$, i.e., when the marginal tax on labor income is the same for both spouses.⁷ Based on the same arguments, we will say that the choice between y_w and y_h is distorted towards more y_h (respectively, y_w) when $\partial T(y_h, y_w) / \partial y_w > \partial T(y_h, y_w) / \partial y_h$ (respectively, $\partial T(y_h, y_w) / \partial y_w < \partial T(y_h, y_w) / \partial y_h$).

An alternative view on these distortions consists in saying that the choice between y_w and y_h is distorted towards less y_w if couples who choose to decrease y_w pay less taxes for a given level of total before tax income $GI = y_w + y_h$ that is when:⁸

$$\left. \frac{dT(y_h, y_w)}{dy_w} \right|_{y_w + y_h = GI} = \frac{\partial T(y_h, y_w)}{\partial y_w} - \frac{\partial T(y_h, y_w)}{\partial y_h} > 0.$$

3 The optimal tax function

We characterize the (constrained) Pareto efficient allocations that are obtained by maximizing a weighted sum of utilities subject to the resource constraint and the incentive compatibility constraints. The weight of a type i couple is denoted $\alpha^i \pi^i$ with $\alpha^i \geq 0$ and $\sum_i \alpha^i = 1$. For the remainder of the

⁷When marginal taxes are different from zero, leisure-labor and/or domestic labor-market labor tradeoffs are distorted. However, the intra-family allocation of labor supply (as specified by problem (2)) remains undistorted when marginal tax rates are the same for both spouses.

⁸Similarly, there will be a distortion towards less y_h in the (y_w, y_h) tradeoff when:

$$\left. \frac{dT(y_h, y_w)}{dy_w} \right|_{GI} = \frac{\partial T(y_h, y_w)}{\partial y_w} - \frac{\partial T(y_h, y_w)}{\partial y_h} < 0.$$

paper, we denote the utility function of a type i couple by $U^i(x^i, y_w^i, y_h^i) = U(x^i, y_w^i/a_w^i, y_h^i/a_h^i)$. Because types are private information the following incentive compatibility constraints apply for any $i, j = 1, \dots, N$,

$$U^i = U^i(x^i, y_w^i, y_h^i) \geq U^{ij} = U^i(x^j, y_w^j, y_h^j). \quad (5)$$

In words, couple i must not be able to achieve a (strictly) larger utility level by mimicking couple j , i.e., by consuming the consumption bundle designed for couple j .

Formally, a Pareto efficient allocation is the solution to the following problem:

$$\begin{aligned} \max_{x^i, y_w^i, y_h^i} \quad & \sum_{i=1}^N \alpha^i \pi^i U^i \\ \text{s.t.} \quad & \sum_{i=1}^N \pi^i (y_w^i + y_h^i - x^i) \geq G, \end{aligned} \quad (6)$$

$$U^i \geq U^{ij} \quad i, j = 1, \dots, N. \quad (7)$$

where G is the exogenous revenue requirement while U^i and U^{ij} are defined by Eq. 5.

Denoting the multipliers of constraints (6) and (7) by μ and λ^{ij} , respectively, one can write the Lagrangian expression as follows:

$$\Lambda = \sum_{i=1}^N \alpha^i \pi^i U^i + \mu \left[\sum_{i=1}^N \pi^i (y_w^i + y_h^i - x^i) - G \right] + \sum_{i,j=1}^N \lambda^{ij} [U^i - U^{ij}].$$

The first order conditions with respect to y_w^i and y_h^i , $i = 1, \dots, N$, are given by:

$$\frac{\partial \Lambda}{\partial y_w^i} = \left[\alpha^i \pi^i + \sum_{j=1}^N \lambda^{ij} \right] \frac{\partial U^i}{\partial y_w^i} + \pi^i \mu - \sum_{j=1}^N \lambda^{ji} \frac{\partial U^{ji}}{\partial y_w^i} = 0, \quad (8)$$

$$\frac{\partial \Lambda}{\partial y_h^i} = \left[\alpha^i \pi^i + \sum_{j=1}^N \lambda^{ij} \right] \frac{\partial U^i}{\partial y_h^i} + \pi^i \mu - \sum_{j=1}^N \lambda^{ji} \frac{\partial U^{ji}}{\partial y_h^i} = 0. \quad (9)$$

Denoting $\gamma^i = \alpha^i \pi^i + \sum_{j=1}^N \lambda^{ij}$ and combining Eqs. 8 and 9 yields:

$$\gamma^i \frac{\partial U^i}{\partial y_w^i} \text{MRS}_{y_w, y_h}^i - \gamma^i \frac{\partial U^i}{\partial y_h^i} - \sum_{j=1}^N \lambda^{ji} \frac{\partial U^{ji}}{\partial y_w^i} \text{MRS}_{y_w, y_h}^{ji} + \sum_{j=1}^N \lambda^{ji} \frac{\partial U^{ji}}{\partial y_w^i} = 0,$$

where $\text{MRS}_{y_w, y_h}^{ji} = \partial U^{ji} / \partial y_h^i / \partial U^{ji} / \partial y_w^i$. After some rearrangements this yields:

$$\text{MRS}_{y_w, y_h}^i = \frac{\gamma^i \frac{\partial U^i}{\partial y_w^i} - \sum_{j=1}^N \lambda^{ji} \frac{\partial U^{ji}}{\partial y_w^i}}{\gamma^i \frac{\partial U^i}{\partial y_h^i} - \sum_{j=1}^N \lambda^{ji} \frac{\partial U^{ji}}{\partial y_h^i} \frac{\text{MRS}_{y_w, y_h}^{ji}}{\text{MRS}_{y_w, y_h}^i}}. \quad (10)$$

Combining Eq. 10 with Eq. 4 and rearranging then establishes the following proposition; see Appendix A.

Proposition 1

1. We have $\partial T(y_w^i, y_h^i) / \partial y_w^i \geq \partial T(y_w^i, y_h^i) / \partial y_h^i$ if and only if

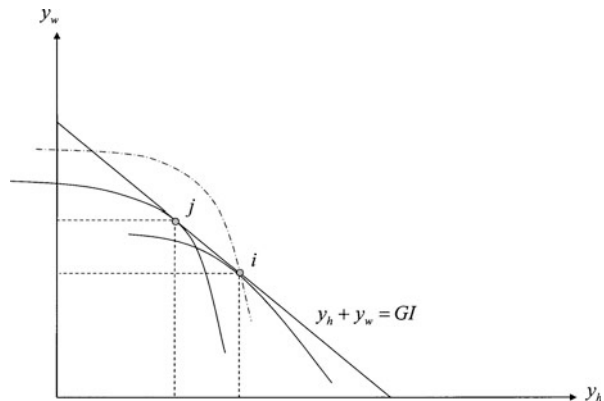
$$\sum_{j=1}^N \lambda^{ji} \frac{\partial U^{ji}}{\partial y_w^i} \left[\frac{\text{MRS}_{y_w, y_h}^{ji}}{\text{MRS}_{y_w, y_h}^i} - 1 \right] \leq 0. \quad (11)$$

2. A Pareto efficient allocation can be implemented by a unitary tax function $T(y_w^i, y_h^i) = \tilde{T}(y_w^i + y_h^i)$ if and only if condition (11) holds as equality for all couples $i = 1, \dots, N$.

Proposition 1 provides a general condition under which a couple's tradeoff between the spouses' labor supplies should not be distorted; specifically this is true when the LHS of Eq. 11 is equal to zero. Otherwise, it ought to be distorted and the direction of the distortion is provided by Eq. 11. When the LHS of this condition is negative, w faces a higher marginal tax rate than h and the tradeoff is distorted towards more y_h . If it is negative, we have the opposite result. This condition is general in the sense that it is valid whatever the pattern of binding incentive constraints and for any welfare weights. The price to pay for this level of generality is that the condition involves endogenous variables. We shall show below that Eq. 11 reduces to a condition on the primitives of the model in special cases. In those cases the interpretation will also be facilitated. In the meantime let us have a look at the interpretation of the general condition.

To do this, let us first compare the choices of labor supplies, (y_w, y_h) , by couples i and j for a given level of gross income $GI = y_w + y_h$. Each couple chooses a pair (y_w, y_h) that lies at the point of tangency between indifference curves and the gross income line, i.e., where $\text{MRS}_{y_w, y_h}^j = \text{MRS}_{y_w, y_h}^i = 1$. Figure 1 illustrates this choice in the (y_h, y_w) plane where couples j and i choose a different combination of spouses' gross incomes (labeled j and i respectively). In the case that is depicted, the marginal rate of substitution between y_w and y_h evaluated at point i is larger (in absolute value) for couple j than for couple i , so that it chooses a higher y_w and a lower y_h . Now assume that the incentive compatibility constraint preventing couple j to mimic couple i is binding and recall that at the point (y_w^i, y_h^i) couple j has a steeper indifference curve than couple i . To make couple i 's consumption bundle (y_w^i, y_h^i) less attractive for couple j , it is then desirable to distort the choice of couple i towards less y_w (moving to the right along the income line). In other words,

Fig. 1 The (y_w, y_h) choice for a given level of gross income GI



a higher marginal tax on y_w^i would be desirable to relax an otherwise binding incentive compatibility constraint. Alternatively, when the marginal rate of substitution is lower (in absolute value) for couple j then it is desirable to distort the choice of couple i towards more y_w , i.e., to have a higher marginal tax on y_h . This graphical argument has a direct economic interpretation. As long as spouses contributions to a given gross household income differ between couples, the government can gain from observing not only the total household income, but how this income is divided between the spouses.

So far, we have concentrated on one pair of couples. However, the solution may well imply that several incentive constraints towards type i are binding. Condition (11) considers *all* couples j for which the incentive compatibility constraints towards the type i couple is binding, i.e., all the j such that $\lambda^{ji} > 0$. For each binding incentive compatibility constraint, there is a desirable distortion on the (y_w^i, y_h^i) choice. As argued above, the sign of this distortion depends upon the difference between the two couples in the marginal rates of substitution. Proposition 1 states that the total distortion on couple i 's (y_w^i, y_h^i) tradeoff depends upon a weighted sum of distortions imposed by each binding self-selection constraints in which i is the mimicked type.⁹

Observe that a couple i such that $\lambda^{ji} = 0$ for all j (if it exists) never faces a distortion (the LHS of Eq. 11) is always equal to zero). This is the counterpart to the traditional no distortion at the top result in this multidimensional setting. For all other types i (with at least one $\lambda^{ji} > 0$) the LHS of Eq. 11 may or may not be zero, depending on the marginal rates of substitution of the mimicker and the mimicked couples. A sufficient condition for this to be the case is that $MRS_{y_w, y_h}^{ji} = MRS_{y_w, y_h}^i$ at the point (y_w^i, y_h^i) for all pairs of couples with $\lambda^{ji} > 0$.

⁹This statement is related to Proposition 5 of Brito et al. (1990). In our set up, their proposition implies that if $\partial T(y_w^i, y_h^i) / \partial y_w^i > \partial T(y_w^j, y_h^j) / \partial y_w^j$ (respectively, $<$), then there exists a non empty set of couples $K \subset N$ such that for $k \in K$, $\lambda^{ki} > 0$ and $MRS_{y_w, y_h}^i < MRS_{y_w, y_h}^k$ (respectively, $>$).

In words, this (sufficient) condition requires that all pairs of couples linked by a binding incentive constraint have the same marginal rate of substitution (at the labor supply bundle of the mimicked couple).

4 The role of labor supply elasticities

A more intuitive version of condition (11), based solely on exogenous variables, can be obtained for specific classes of utility functions. Let $P^i = a_w^i/a_h^i$ denote the intra-household productivity gap between spouse w and spouse h in couple i (HPG).¹⁰ The following proposition is established in Appendix B.

Proposition 2 *Assume couples utility functions are of the form*

$$U(x, \ell) = u(x) - \frac{\beta_w}{(1 + \beta_w)} \ell_w^{\frac{(1+\beta_w)}{\beta_w}} - \frac{\beta_h}{(1 + \beta_h)} \ell_h^{\frac{(1+\beta_h)}{\beta_h}}, \quad (12)$$

where $\beta_k \geq 0$ for $k = w, h$. Then, a sufficient condition to have $\partial T(y_w^i, y_h^i) / \partial y_w^i = \partial T(y_w^i, y_h^i) / \partial y_h^i$ is:

$$\left(\frac{P^j}{P^i} \right)^{\frac{1+\beta_h}{\beta_h}} \left(\frac{a_w^j}{a_w^i} \right)^{\frac{1+\beta_h}{\beta_h} - \frac{1+\beta_w}{\beta_w}} = 1 \text{ for all } i, j = 1, \dots, N. \quad (13)$$

To interpret this result, note that β_k measures the elasticity of labor supply of spouse $k = w, h$. To be more precise, β_k is the Frisch elasticity (also called intertemporal elasticity of labor supply, see MaCurdy 1981), that is the response of ℓ to an increase in the wage, holding marginal utility of wealth (and thus consumption) constant.¹¹

Assume first that the male and female labor elasticities are the same, i.e., $\beta_w = \beta_h$. Condition (13) for equal marginal tax rates requires that the HPG be the same for all couples ($P^i = P^j$). The underlying mating pattern thus implies a perfect correlation between the productivities of the spouse. This is an extreme form of assortative mating which is unlikely to be observed in reality. However, some studies suggest that couples are becoming more and more similar over time so the correlation between spouses' incomes increases in most industrial societies; see e.g., Kalmijn (1994). As soon as the two labor supply elasticities are different, having equal HPG can no longer imply equal marginal

¹⁰The ratio between spouses productivities is typically referred to a "gap" in the empirical literature. We follow this tradition here.

¹¹Formally, the Frisch labor supply elasticity ε is here defined by:

$$\varepsilon = \frac{U_\ell}{\ell \left(U_{\ell\ell} - \frac{(U_{\ell g})^2}{U_{gg}} \right)},$$

where subscripts denote partial derivatives.

income tax rates. As shown in Eq. 13, the relation between the productivity ratio is not linear anymore.

The results obtained so far do not depend on the pattern of binding incentive constraints. We can gain further insights, particularly pertaining to the relative distortions of spouses labor supplies by making some additional assumption on the distribution of wages and thus ultimately on the pattern of binding incentive constraints. Assume now that couples $i = 1 \dots N$ are ordered such that $a_k^N > \dots > a_k^{i+1} > a_k^i > \dots > a_k^1$ for $k = w, h$ so that couple $i + 1$ is richer than couple i . With this assumption a single level of a_w is associated with any given level of a_h . Put differently, we can express a_w as an *increasing* function of a_h . This effectively reduces our problem to a single dimension of heterogeneity and it is reasonable to assume that incentive compatibility constraints are binding from high ability to low ability couples.¹² To simplify notation suppose further that only *adjacent* downward incentive compatibility constraints are binding, i.e., that $\lambda^{i+1,i} > 0$ and $\lambda^{i+1,j} = 0$ for all $i = 1 \dots N - 1$ with $j \neq i$.¹³

In this case, there is no distortion for the couple of type N . Furthermore, for $i = 1, \dots, N - 1$, Proposition 1 (i) is equivalent to

$$\begin{aligned} \partial T(y_w^i, y_h^i) / \partial y_w^i &\geq \partial T(y_w^i, y_h^i) / \partial y_h^i \\ &\Leftrightarrow \\ \text{MRS}_{y_w, y_h}^{i+1,i} &\geq \text{MRS}_{y_w, y_h}^i. \end{aligned}$$

To see this, it is sufficient to replace j by $i + 1$ in condition (Eq. 11) while keeping in mind that $\partial U^j / \partial y_w^i < 0$. Using the expressions for the marginal rates of substitution derived from utility function (12), we then obtain the following proposition.

Proposition 3 Assume that $a_k^N > \dots > a_k^{i+1} > a_k^i > \dots > a_k^1$ for $k = w, h$ and that only adjacent downward incentive compatibility constraints are binding, i.e., that $\lambda^{i+1,i} > 0$ and $\lambda^{i+1,j} = 0$ for all $i = 1 \dots N - 1$ with $j \neq i$. With isoelastic utility functions as in Eq. 12, one has $\partial T(y_w^i, y_h^i) / \partial y_w^i \geq \partial T(y_w^i, y_h^i) / \partial y_h^i$ ($i = 1, \dots, N - 1$) if and only if

$$\frac{\text{MRS}_{y_w, y_h}^{i+1,i}}{\text{MRS}_{y_w, y_h}^i} = \left(\frac{P^{i+1}}{P^i} \right)^{\frac{1+\beta_h}{\beta_h}} \left(\frac{a_w^{i+1}}{a_w^i} \right)^{\frac{1+\beta_w}{\beta_w} - \frac{1+\beta_h}{\beta_h}} \geq 1. \quad (14)$$

¹²With our assumption couples can be ordered by the $>_F$ relation defined by Brett (2007), and the determination of the pattern of binding incentive constraints is dramatically simplified.

¹³This assumption is stronger than necessary, but it dramatically simplifies notation. All our qualitative results go through if we assume simply that only downward incentive constraints are binding. To see this, observe that the pairwise comparisons of MRS we perform are valid also when $j \neq i + 1$. The translation into marginal tax rates is slightly more complicated because we may have that more than one IC constraint towards a given type is binding. However, we may recall from Eq. 11 that the total effect is obtained by adding the pairwise effects. Consequently, when all these effects go in the same direction, the study of the pairwise effects is sufficient.

Assume first that the two Frisch labor supply elasticities are equal, i.e., $\beta_h = \beta_w$. Equation 14 implies that $P^i > P^{i+1}$ yields $\partial T(y_w^i, y_h^i) / \partial y_w^i < \partial T(y_w^i, y_h^i) / \partial y_h^i$. It means that the spouse w in the mimicked couple faces a lower marginal tax rate than spouse h , when the mimicked couple has a higher HPG. With the considered profile of the spouses productivity ratios such a distortion has a more significant impact on the utility of the mimicking couple than on that of the mimicked couple and, as explained in the previous section, the differential taxation of the spouses incomes relaxes a binding incentive constraint. Conversely, $P^i < P^{i+1}$ yields $\partial T / \partial y_w^i > \partial T / \partial y_h^i$ and we have exactly the opposite result (but the same intuition).

Now assume $P^i = P^{i+1}$, but $\beta_w > \beta_h$. Condition (14) then implies that $\partial T / \partial y_w^i < \partial T / \partial y_h^i$. In other words, the marginal income tax is lower for the female spouse in the low productivity couple if her elasticity of labor supply is higher. It is interesting to note that our result vindicates studies by Boskin (1975) and Boskin and Sheshinski (1983) who argue that the tax rate on the spouse with the highest elasticity of labor supply should be lower. However their argument stands on the inverse-elasticity rule in an affine taxation framework while our result hinges on the fact that a lower marginal income tax on one spouse mitigates an otherwise binding self-selection constraint. This result continues to hold when HPGs are not too different. However, when the spouse w in the mimicked couple has a much lower HPG than in the mimicking couple, the result could be reversed. To see this, note that when P^i is much lower than P^{i+1} i.e., the HPG is much lower in the poor couple) then the ratio in the LHS of Eq. 14 may well be greater than one so that the marginal income tax on spouse w will be higher. In this case the traditional result by Boskin (1975) and Boskin and Sheshinski (1983) does not hold anymore: the marginal income tax can be higher on the spouse with the higher labor supply elasticity.

Our analysis has shed some light on the role of labor supply elasticities and HPGs on the differential tax treatment of spouses. To illustrate the relevance of these results, it is interesting to see what the empirical literature says about elasticities and HPGs among married couples. In order to have good measures of what the men and women Frisch elasticities are, one has to rely on models of intertemporal labor supply popularized by MaCurdy (1981). Furthermore, as suggested by Blundell et al. (1993), the Frisch elasticities estimates are biased if extensive margin labor supply decision and marital status are not accounted for. To the best of our knowledge, Kimmel and Kniesner (1998) present the only study which satisfies these requirements. Their estimations lead to Frisch intensive labor supply elasticities of 0.40 and 0.67, respectively, for men and women belonging to a dual earner couples. In light of our results, this evidence supports a higher marginal income tax on married men. But this argument is based solely on the elasticity term in expression (14). Turning to the other term, estimates based on data from the French INSEE survey *Budget des Familles* See INSEE (2000), show an elasticity of HPGs (as measured

by the ratio of annual gross wages) with respect to the couple's total yearly labor income of 0.36 among dual earner couples. In other words, the HPG appears to be an increasing and concave function of the couple's income so that there is less heterogeneity among richer couples. This suggests that in expression (14) we have $P^i < P^{i+1}$ so that the HPG term implies higher marginal tax rates for married women. To sum up, estimates of Frisch labor supply elasticities and of the distribution of HPGs among couples provide conflicting evidence regarding the spouses' respective marginal tax rates. At the very least, the profile of HPGs mitigates the effect of the elasticities. The available evidence is not sufficient to determine whether it can be reversed. Hopefully future empirical work will provide the foundation for a more precise assessment.

5 Conclusions

Understanding the implications of optimal taxation theory for the fiscal treatment of couples is a big challenge. This paper is an attempt to explore some aspects of the problem. Specifically, we have provided a general framework to study the intra-family labor allocation under an optimal nonlinear income tax schedule. Whether this allocation is distorted or not depends upon the tax unit choice. The literature distinguishes between two "tax units": the couple vs the individual. It also considers three tax systems: joint taxation, individual taxation and selective taxation. The first corresponds to choosing the couple as the tax unit while the second and the third have the individual as the tax unit.

We have provided conditions that lead to a non-distorted intra-family tradeoff and thus to a joint tax system. Not surprisingly, these conditions are rather restrictive. For instance, when the family utility function is separable, the labor disutility function is isoelastic and both spouses have the same labor supply elasticity pure joint taxation arises when the ratio between the two earners' productivity is the same in all couples (there is perfect assortative mating). When labor supply elasticities differ between spouses, the spouses' relative wages must obey a more complex (and nonlinear) condition to yield joint taxation. We have also studied how the spouses' respective labor supply decisions are distorted when the condition does not hold. In particular, we show that the celebrated result according to which the spouse with the more elastic labor supply faces the lower marginal tax rates may or may not hold in our setting, depending on the pattern of mating. Empirical evidence suggests that the traditional wisdom that women should face lower marginal income tax is challenged, or at least mitigated, by the observed mating pattern among French couples.

It is important to note that the restrictive character of the assumptions that imply joint taxation does not mean that the assumptions needed to obtain separate taxation are less restrictive.

While allowing a quite general framework, our analysis suffers from an important drawback namely that it is based on the so-called unitary approach. It is well known that this approach is usually not supported by the empirical evidence. In the future, we plan to study such problems within the framework of collective models initiated by Chiappori (1988).

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Appendix

A Proof of Proposition 1

Combining Eqs. 4 and 10 yields

$$\frac{1 - \partial T(y_h^i, y_w^i) / \partial y_h^i}{1 - \partial T(y_h^i, y_w^i) / \partial y_w^i} = \frac{\gamma^i \frac{\partial U^i}{\partial y_w^i} - \sum_{j=1}^N \lambda^j \frac{\partial U^j}{\partial y_w^i}}{\gamma^i \frac{\partial U^i}{\partial y_h^i} - \sum_{j=1}^N \lambda^j \frac{\partial U^j}{\partial y_h^i}} \frac{\text{MRS}_{y_w, y_h}^j}{\text{MRS}_{y_w, y_h}^i},$$

so that

$$\Leftrightarrow \frac{\gamma^i \frac{\partial U^i}{\partial y_w^i} - \sum_{j=1}^N \lambda^{ji} \frac{\partial U^j}{\partial y_w^j}}{\gamma^i \frac{\partial U^i}{\partial y_w^i} - \sum_{j=1}^N \lambda^{ji} \frac{\partial U^j}{\partial y_w^j} \frac{\text{MRS}_{y_w, y_h}^j}{\text{MRS}_{y_w, y_h}^i}} \geq 1. \quad (15)$$

Numerator and denominator of Eq. 15 are negative. Consequently this property is equivalent to

$$\begin{aligned} T(y_w^i, y_h^i) / \partial y_w^i &\geq \partial T(y_w^i, y_h^i) / \partial y_h^i \\ \Leftrightarrow \gamma^i \frac{\partial U^i}{\partial y_w^i} - \sum_{j=1}^N \lambda^j \frac{\partial U^j}{\partial y_w^i} &\leq \gamma^i \frac{\partial U^i}{\partial y_h^i} - \sum_{j=1}^N \lambda^j \frac{\partial U^j}{\partial y_h^i} \frac{\text{MRS}_{y_w, y_h}^{ji}}{\text{MRS}_{y_w, y_h}^{ii}}. \end{aligned}$$

Simplifying and rearranging the last inequality establishes Proposition 1.

B Proof of Proposition 2

When preferences are represented by (12) one has:

$$\begin{aligned} \text{MRS}_{y_w, y_h}^i &= \frac{(a_w^i)^{\frac{1+\beta_w}{\beta_w}} (y_h^i)^{\frac{1}{\beta_h}}}{(a_h^i)^{\frac{1+\beta_h}{\beta_h}} (y_w^i)^{\frac{1}{\beta_w}}}, \\ \text{MRS}_{y_w, y_h}^{ji} &= \frac{(a_w^j)^{\frac{1+\beta_w}{\beta_w}} (y_h^i)^{\frac{1}{\beta_h}}}{(a_h^j)^{\frac{1+\beta_h}{\beta_h}} (y_w^i)^{\frac{1}{\beta_w}}}, \\ \frac{\text{MRS}_{y_w, y_h}^{ji}}{\text{MRS}_{y_w, y_h}^i} &= \frac{(a_w^j)^{\frac{1+\beta_w}{\beta_w}} (a_h^i)^{\frac{1+\beta_h}{\beta_h}}}{(a_h^j)^{\frac{1+\beta_h}{\beta_h}} (a_w^i)^{\frac{1+\beta_w}{\beta_w}}}, \end{aligned}$$

so that

$$\frac{\text{MRS}_{y_w, y_h}^{ji}}{\text{MRS}_{y_w, y_h}^i} = \left(\frac{a_h^i/a_w^i}{a_h^j/a_w^j} \right)^{\frac{1+\beta_h}{\beta_h}} \left(\frac{a_w^j}{a_w^i} \right)^{\frac{1+\beta_w}{\beta_w} - \frac{1+\beta_h}{\beta_h}}.$$

Rearranging the terms and making use of the definition of P^i establishes the proposition.

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