OPTIMAL TAX TREATMENT OF MARRIED COUPLES

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摘　要

本文旨在擴展 Boskin and Sheshinski（1983）的分析，將夫婦之間的所得移轉納入他們使用之模式內。由本文分析的結果可知：在理論上，我們實在很難證明夫婦所得分開申報制度一定優於聯合申報制度。對夫婦的所得課徵不同的稅率，雖符合 Ramsey 的精神和減少課稅所引起之福利損失，卻可能廣開避稅之門。因此，聯合或分開申報何者可以同時達成所得稅之效率與公正目標，應取決於實證評估或其他經濟社會因素之考慮。

Abstract

This paper attempts to extend Boskin and Sheshinski's analysis (1983) by incorporating the intra-family income transfer into the models they used. It then shows that there is no *a priori* reason to argue the superiority of the separate tax-filing system over the joint returning one. Taxing husbands' and wives' earnings at different rates, even in the Ramsey's spirit, minimizes the dead-weight losses of taxation, but also gives rise to an outlet for potential tax evasion. Whether the joint- or separate-filing system can better achieve efficiency and equity goals of income taxation must be determined by empirical analysis or other socioeconomic consideration.

1. Introduction

Should a married couple be allowed to separate their income and each file a single return? This problem has long been the central issue in designing and implementing

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the national tax system in every country employing direct taxation.[1] Traditionally, a household or family is generally considered to be the appropriate unit of personal taxation since it is within this unit a group of individuals makes some important economic decisions about labor supply, consumption, investment, and paying taxes. In the context of ability to pay, the principle of globability in income taxes calls not only for inclusion of income from all sources, but also of income from all members of the household [Musgrave and Musgrave (1973), p. 257]. Therefore, mandatory joint returns and a uniform rate schedule must be applied to a family's total income.

Recently, the economic thinking cited above, which has dominated the public finance theory for decades, has encountered great challenge. Dramatic changes in family size and composition, the rapid increase in the married woman's participation in labor force, and the soaring of the divorce rate and cohabitant have questioned the appropriateness of the family as a basic unit of taxation. It is further pointed out that the aggregation of the earnings of the two-worker families discourages married women from working and also results in a ''marriage penalty'' when two employed persons marry [Munnell (1980)]. In contrast, treating individuals as tax paying unit has the merit of being neutral with respect to marital status and more conducive to efficiency [Brazer (1980)].

The recent paper by Boskin and Sheshinski (1983) has made an important contribution to the literature of tax treatment of the family since it addresses the fundamental issue about unit of taxation, the efficient allocation of the time of family members between the market and household activities. Applying the optimum taxation approach to series of models, this paper has yielded analytical results and empirical insights which suggest that equal marginal tax rate on husbands and wives, as under a joint filing provision, is nonoptimal by both efficiency and equity criteria. A numerical example based on recent parameter estimates derived from the Stone-Geary utility function suggests a tax rate on husbands twice as much as that on wives [Boskin and Sheshinski, p. 296].

However, it has been widely recognized that a separate filing method may open the loophole for married couples to evade taxes by financial arrangement. In the absence of stringent and arbitrary allocation rules, taxing married people as individuals enables couples to reduce their tax liability by transferring assets to the spouse with the lower income. Such incentive would be particularly strong for high-income families and conspicuous with steep progressive rate structure.[2]. Though this administrative problem is considered to be the most serious objection to seperate filing, no attempt has been made to incorporate it into a theory of optimal tax treatment of the family.

The purpose of this paper is to extend Boskin and Sheshinski's analysis by including the intra-family income transfer into the series of models they used. Section 2 presents a model of identical family and derives the most efficient tax system to raise the government's required revenue. Section 3 analyzes the case of differences across households in earning ability and discusses the trade-off between efficiency losses and redistribution inherent in designing an optimum income tax system. Section 4 summarizes the main conclusion this paper obtains.

2. Optimal Tax Treatment of Indentical Families

It is true by the Ramsey inverse-elasticity theorem that taxing an individual's and his (or her) spouse's income at an identical rate will result in the welfare loss if their wage elasticities of labor supply are different. However, under the system of joint filing, the intra-family income transfer does not exist, since it cannot reduce the total tax burden on the family. Once a couple is allowed to file their returns separately, they can decrease total tax liability simply by shifting part of income or properties on which income is earned from the high-earning (or primary) worker to the low-earning (secondary) one. Apparently, the larger is the amount of tax saved through the income transfer, the higher is the couple's total income and the greater is the difference between the husband's and wife's income shares. It follows that in choosing the appropriate unit of taxation we must weigh the disadvantage of tax evasion with the potential welfare loss mentioned above.

Consider first the simple case. Assuming all families have identical preferences and endowments, we may treat social welfare as the utility of a representative family. Designate by L_1 the labor of the primary earner, L_2 the labor of the secondary earner, B the amount of income transfer (to reduce tax payment) between the couple, and C nonleisure consumption. The welfare of each family (and social welfare) may be summarized by the well-behaved utility function,

$$U\ (L_1,\ L_2,\ B,\ C) \tag{1}$$

where $0 \leq L_i \leq 1$, $U_i \equiv \partial U/\partial L_i < 0$ $(i = 1, 2)$ and $U_4 \equiv \partial U/\partial C > 0$. Note that since in most countries the conduct of evading tax is deemed to be against the law, we may assume $U_3 \equiv \partial U/\partial B < 0$. This assumption implies that as B increases, the probability the income transfer is detected increases, and hence the subjective utility derived from tax evasion decreases. It follows that for $B > 0$, the marginal benefit (in terms of tax savings) of the transfer must at least equal its marginal disutility. (see eq. (9b)) On the other hand, if it were assumed that $U_3 \geq 0$, then every family would have incentive to make this intra-family transfer, a phenomenon which is against the reality.

In addition to the above subjective disutility, it is further assumed that once detected, the income transfer is subject to a legal penalty or publishment which will result in some monetary loss. Obviously, this objective loss depends on the probability the transfer is discovered and, once being found out, the severity of penalty on it. For simplicity, let τ denote the certainty-equivalent average fine on each dollar transferred.[3] If t_1 and t_2 represent the average marginal rates of tax on the primary and secondary worker's income, then the total tax savings from the transfer is $(t_1 - t_2 - \tau)$ B.

Within the context of such a framework, we inquire under what conditions the income of the primary and secondary earners should be taxed at the same rate or at different rates. Specifically, we wish to derive the optimal rates of t_1, t_2, and τ.

Assume non-leisure consumption to be the untaxed numeraire and choose scales of measurement in such a way that initial net prices for all goods are unity. Assume further that the government attempts to seek the tax rates to minimize the dead-weight loss from the tax system, subject to raising the required revenues per family, R. With these assumption, the problem is to

$$\min_{t_1 t_2 t_3} \ell = -\frac{1}{2}\left[t_1^2 S_{11} + t_2^2 S_{22} + t_3^2 S_{33} + 2t_1t_2S_{12} + 2t_1t_3S_{13} + 2t_2t_3S_{23}\right] + \lambda\left[t_1L_1 + t_2L_2 - t_3B - R\right] \tag{2}$$

where $t_3 \equiv t_1 - t_2 - \tau$, and S_{ij} $(i, j = 1, 2)$ is the ijth Hicksian income-compensated cross-effect of a change in the net wage of i with respect to the leisure of j, and S_{i3} is the compensated cross effect of a change in the net wage of i with respect to the income transfer.

The first-order conditions are as follows:

$$\begin{bmatrix} S_{11} & S_{12} & S_{13} & -L_2 \\ S_{21} & S_{22} & S_{23} & -L_2 \\ S_{31} & S_{32} & S_{33} & B \\ -L_1 & -L_2 & B & 0 \end{bmatrix} \begin{bmatrix} t_1 \\ t_2 \\ t_3 \\ \lambda \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ -R \end{bmatrix} \tag{3}$$

or $[D]\,[T] = [Z]$

Solving by Cramer's rule we obtain

$$t_1^* = |D|^{-1}R \begin{vmatrix} S_{12} & S_{13} & -L_1 \\ S_{22} & S_{23} & -L_2 \\ S_{32} & S_{33} & B \end{vmatrix} \qquad t_2^* = -\,|D|^{-1}R \begin{vmatrix} S_{11} & S_{13} & -L_1 \\ S_{21} & S_{23} & -L_2 \\ S_{31} & S_{33} & B \end{vmatrix}$$

$$t_3^* = |D|^{-1}R \begin{vmatrix} S_{11} & S_{12} & -L_1 \\ S_{21} & S_{22} & -L_2 \\ S_{31} & S_{32} & B \end{vmatrix} \tag{4}$$

where $|D|$ (< 0) is the determinant of $[D]$ and the asterisk denotes the optimal value of a variable.

Substracting t_2^* from t_1^* and making use of the row sum conditions on the Slutsky matrix, $\sum_{j=1}^{4} S_{ij} = 0$, $i = 1, 2, 3$, we obtain from (4) that

$$t_1^* - t_2^* = |D|^{-1}R \begin{vmatrix} -S_{14} & S_{13} & -L_1 \\ -S_{24} & S_{23} & -L_2 \\ -S_{34} & S_{33} & B \end{vmatrix} \tag{5}$$

Further simplification is necessary to have some definite results from (5).[4] We impose a certain restriction on the utility function so that $S_{13} = S_{23} = 0$. This assumption may be justified on the ground that in practical world transferring wage income from a man to his spouse or vice versa, for purpose of relieving tax burden, is rare. Therefore, a rise in his or his wife's net wage will not create the incentive for income transfer. Under this assumption, the optimal rates of tax are, from (5) and (4), respectively,

$$t_1^* - t_2^* = |D|^{-1}RS_{33}\,(L_1S_{24} - L_2S_{14}) \tag{6a}$$

$$t_3^* = |D|^{-1}RB\,(S_{11}S_{22} - S_{12}^2) \tag{6b}$$

Note that S_{33} is the compensated own-substitution term and, by the familiar consumer theory, $S_{33} < 0$. From (6a), we obtain $t_1^* = t_2^*$ as $\eta_{14} = \eta_{24}$, where η_{i4} denotes the compensated cross elasticity of the ith individual's demand for leisure with respect to a change in the price of the non-leisure consumption. Moreover, it can readily be proven from (4) that, with the assumption $S_{31} = S_{32} = 0$, when $t_1^* = t_2^*$, $t_3^* = 0$[5]. It follows from the definition of t_3 that $\tau^* = 0$. Summarize these results as follows:

Proposition 1. *The values of t_i ($i = 1, 2, 3$) which minimize the constrained welfare loss in (2) are that if $\eta_{14} = \eta_{24}$, $t_1^* = t_2^*$ and $\tau^* = 0$.*

On the other hand, eq. (6a) states that $t_1^* \gtreqless t_2^*$ as $L_1S_{24} \gtreqless L_2S_{14}$ (since $|D| < 0$), or equivalently,[6]

$$t_1^* \gtreqless t_2^* \text{ as } L_1(S_{21} + S_{22}) \lesseqgtr L_2(S_{11} + S_{12}). \tag{7}$$

In case $t_1^* \neq t_2^*$, eq. (6b) implies that $t_3^* \gtreqless 0$ as $B \lesseqgtr 0$ (since $S_{11}S_{22} > S_{12}^2$). That is, the penalty should be made stringent (for example, when $B > 0$, then $t_3^* < 0$ or $\tau^* > t_1^* - t_2^*$) to curb the income transfer between a couple. From the administrative point of view it would be desirable to have $B = 0$. This can be attained by setting $\tau^* = t_1^* - t_2^*$. We summarize these results as follows:

Proposition 2. *Within the context of the model, assuming further $S_{13} = S_{23} = 0$, then $t_1^* \gtreqless t_2^*$ as $L_1(S_{21} + S_{22}) \lesseqgtr L_2(S_{11} + S_{12})$. When $t_1^* \neq t_2^*$, the penalty on income transfer should be such that $\tau^* = t_1^* - t_2^*$.*

Two comments are in order here. First, if the utility function in (1) is of the Stone-Geary type, which is often used in empirical studies as cited by Boskin and Sheshinski, it can be readily shown that the condition $\eta_{14} = \eta_{24}$ is satisfied.[7] If that is the case, to achieve efficiency goal of taxation we require a couple to file their tax returns jointly. Second, eqs. (6a) and (6b) consititute the optimal combination of t_1, t_2, and τ under a separate filing system. Together, they imply that existence of tax differential between a man's and his wife's earnings may creat an potential environment for tax evasion which can be eliminated by severe punishment.

3. Ability Differences and the Optimal Tax Treatment of the Family

3.1 Household Behavior

To account for the equity goal of taxation we assume that households have identical utility function as given in eq. (1), but differ in their earning ability. Denoting by W the wage rate per hour and $\bar{A}$ the fixed amount of before-tax property income, the income after transfer is thus $Y_1 \equiv W_1L_1 + \bar{A}_1 - B$ for the primary worker and $Y_2 \equiv W_2L_2 + \bar{A}_2 + B$ for the secondary earner.[8] The household's total gross income is $Y \equiv Y_1 + Y_2 \equiv \sum_{i=1}^{2} (W_iL_i + \bar{A}_i)$.

For simplicity, the income tax schedule is assumed to take the general linear form, $-\alpha + t_1Y_1 + t_2Y_2$, where α is an income guarantee. The average rate of penalty on per dollar transfer between a couple is given by τ. The total amount of taxes and fines a household pays is $T = -\alpha + t_1Y_1 + t_2Y_2 + \tau B$. Therefore, the household's budget constraint is written as

$$
\begin{aligned}
C &= Y_1 + Y_2 - T \\
&= \alpha + \sum_{i=1}^{2} (1 - t_i)(W_iL_i + \bar{A}_i) + t_3B.
\end{aligned}
\tag{8}
$$

Obviously, as long as $t_3 \gtrless 0$, a positive (or negative) value of B will certainly increase C.

Maximization of U subject to (8) yields the first-order conditions:

$$U_i + w_iU_4 = 0 \qquad i = 1, 2 \tag{9a}$$

$$U_3 + t_3U_4 \leqq 0, \qquad \text{for } |B| > 0 \tag{9b}$$

where $w_i = (1 - t_i)w_i$. Eq. (9a) specifies the familiar marginal relationship between labor supply and the non-leisure consumption, and eq. (9b) gives the optimal condition of intra-family transfer. For $|B| > 0$, the marginal benefit from tax savings (t_3) must be at least equal to the marginal cost ($-U_3/U_4$). Assuming the second-order condition for this maximization is satisfied and ignoring the inequality sign in (9b),[9] we can derive from (9a), (9b), and (8) the optimal values of L_1, L_2, B, and C as a function of w_1, w_2, t_3, and M, where M ($\equiv \alpha + \bar{A}_1 + \bar{A}_2$) is the total non-labor income. Substitution into U gives the indirect utility function:

$$V = V(w_1, w_2, t_3, M) \tag{10}$$

This function will be used in the analysis below to obtain the optimal values of tax-policy instruments.

3.2 The Government's Behavior

Let the variations of W_1 and W_2 among households be represented by the joint probability density function $f(W_1, W_2)dW_1dW_2$. The social welfare function the government attempts to maximize can thus be summarized by

$$SW = \int_0^{\infty} \int_0^{\infty} \psi[V(w_1, w_2, t_3, M)]f(W_1, W_2)dW_1dW_2, \tag{11}$$

where ψ is concave with respect to its argument. Naturally, the optimization is subject to the following budget constraint:

$$\int_0^{\infty} \int_0^{\infty} [-\alpha + t_1(W_1L_1 + \bar{A}_1) + t_2(W_2L_2 + \bar{A}_2) - t_3B]f(W_1, W_2)dW_1dW_2 = R. \tag{12}$$

where R is the net required revenue.

Forming the Lagrangean, we can obtain the first-order condition for maximization of (11) by using properties of the indirect utility function (see Mathematical Appendix):[10]

$$\int\int W_1(t_1W_1S_{11} + t_2W_2S_{12} + t_3S_{13})dF(W_1, W_2) = \int\int h(W_1, W_2)\bar{Y}_1dF(W_1, W_2) \tag{13a}$$

$$\int\int W_2(t_1W_1S_{21} + t_2W_2S_{22} + t_3S_{23})dF(W_1, W_2) = \int\int h(W_1, W_2)\bar{Y}_2dF(W_1, W_2) \tag{13b}$$

$$\int\int (t_1W_1S_{31} + t_2W_2S_{32} + t_3S_{33})dF(W_1, W_2) = -\int\int h(W_1, W_2)BdF(W_1, W_2) \tag{13c}$$

$$\int\int h(W_1, W_2)dF(W_1, W_2) = 0 \tag{13d}$$

where $h(W_1, W_2) \equiv \dfrac{\psi'\lambda}{\beta} + t_1W_1\dfrac{\partial L_1}{\partial M} + t_2W_2\dfrac{\partial L_2}{\partial M} - t_3\dfrac{\partial B}{\partial M} - 1$

$\overline{Y}_i \equiv W_i L_i + \overline{A}_i$, $F(W_1,W_2)$ is the joint distribution of W_1 and W_2, λ and β are, respectively, the Lagrangean undetermined mulitplier for the household and for government maximization.

Following Boskin and Sheshinski (1983), we assume for simplicity that W_2 is a nonrandom, strictly monotonic function of W_1. The problem is thus reduced to one dimension, so the subscript for W in the density function can be omitted. Also with this assumption, eq. (13d) can be rewritten as

$$\int H(W)dF(W) = 0 \tag{14d}$$

where $H(W) \equiv h(w_1, w_2)$. In the literature of optimum taxation, H(W) is interpreted as the net social marginal utility of an increase in α (the income guarantee) and is assumed to be a decreasing function of W [see, for example, Atkinson and Stiglitz (1980), Chang (1988)]. Eq. (14d) then states that the optimal value of α is that the social marginal utility of an increase in its value averages to zero over the population.

Eqs. (14a), (14b), and (14c) now change to

$$\int W_1(t_1W_1S_{11}+t_2W_2S_{12}+t_3S_{13})dF(W) = \int H(W)\overline{Y}_1dF(W) \tag{14a}$$

$$\int W_2(t_1W_1S_{21}+t_2W_2S_{22}+t_3S_{33})dF(W) = \int H(W)\overline{Y}_2dF(W) \tag{14b}$$

$$\int (t_1W_1S_{31}+t_2W_2S_{32}+t_3S_{33})dF(W) = -\int H(W)BdF(W) \tag{14c}$$

The total income before transfer of a husband, $\overline{Y}_1$, and of a wife, $\overline{Y}_2$, are usually assumed to be nondecreasing with the wage rate [Boskin and Sheshinski (1983)]. On the other hand, the variation of B may be assumed, not unrealistically, to be independent of W since it is very difficult, if not impossible, to transfer wage income between a husband and his wife to reduce their total tax burden. Under these assumptions, the term on the right-hand side of eq. (14a) or (14b) is negative and that of eq. (14c) is zero.

In order to obtain certain definite results from eqs. (14a)−(14c), let us further impose some restrictions on the family's utility function. Assuming first $S_{31} = S_{32} = 0$, it can be easily seen from (14c) that $t_3^* = 0$ or $t_1^* = t_2^* + \tau^*$ (since $S_{33} \neq 0$). Also with this assumption, eqs. (14a) and (14b) imply that when $S_{12} = 0$, then $t_1^* > 0$ and $t_2^* > 0$; when $S_{12} < 0$ (when two types of labor are Hicksian complements), either $t_1^* > 0$ or $t_2^* > 0$.

Proposition 3. *If the variation of B is independent of W and if* $S_{31} = S_{32} = 0$, then (a) $t_1^* = t^* + \tau^*$. *Assuming further H(W) is nonincreasing in W and income is nondecreasing with the wage rate, then (b)* $t_1^* > 0$ *and* $t_2^* > 0$ *when* $S_{12} = 0$; *(c) either* $t_1^* > 0$ *or* $t_2^* > 0$ *when* $S_{12} < 0$.

It worths emphasizing that the conditions required to attain Proposition 3(a) are, actually, not very restrictive. The assumption $S_{31} = S_{32} = 0$ implies that for each family the incentive of income shifting does not respond to a change in the husband's or wife's wage rate. The independence of B and W indicates that among the population the amount of income transfer is not in any way correlated with family's wage income. These conditions can be met in reality since, as was indicated previously, the intra-family transfer may only occur with property income.

Further simplification is made by assuming that S_{ij} are constant. The following equations can be derived from (14a) – (14c):

$$t_1^* = |D_2|^{-1}[-\gamma_1(S_{22}\delta_{22}S_{33}\delta_{33} - S_{23}^2\delta_{23}^2) - \gamma_2(S_{12}\delta_{12}S_{33}\delta_{33} - S_{13}\delta_{13}S_{23}\delta_{23})], \tag{15a}$$

$$t_2^* = |D_2|^{-1}[-\gamma_1(S_{12}\delta_{12}S_{33}\delta_{33} - S_{13}\delta_{13}S_{23}\delta_{33}) + \gamma_2(S_{11}\delta_{11}S_{33}\delta_{33} - S_{13}^2\delta_{13}^2)], \tag{15b}$$

$$t_3^* = |D_2|^{-1}[\gamma_1(S_{12}\delta_{12}S_{23}\delta_{23} - S_{13}\delta_{13}S_{22}\delta_{22}) - \gamma_2(S_{11}\delta_{11}S_{23}\delta_{23} - S_{12}\delta_{12}S_{13}\delta_{13})] \tag{15c}$$

where $|D_3|$ is the determinant of the 3 × 3 matrix, $[S_{ij}\delta_{ij}]$, and is negative, S_{ij} the variance or covariance of the price variables, W_1, W_2, and P (the price of the commodity the family consumes),[11] and

$$\gamma_i \equiv \int H(W)\bar{Y}_i d(W), \quad i = 1, 2$$

Note that when $\delta_{31} = \delta_{32} = 0$, i.e., when the husband's and wife's wage rate are not correlated with the price of the commodity they consume, then the conclusions Proposition 3 states are completely valid here.

Proposition 4. *Assuming constant* S_{ij}, *if* $\delta_{31} = \delta_{32} = 0$, *then Proposition (3a) – (3c) still hold.*

Under the assumptions of Proposition 4, the tax differential is determined by

$$t_1^* - t_2^* = |D_2|^{-1}S_{33}\delta_{33}[\gamma_1(S_{22}\delta_{22} + S_{12}\delta_{12}) - \gamma_2(S_{11}\delta_{11} + S_{12}\delta_{12})]. \tag{16}$$

It follows that $t_1^* \gtreqless t_2^*$ as $\gamma_1 \, (S_{22}\delta_{22}+S_{12}\delta_{12}) \gtreqless \gamma_2(S_{11}\delta_{11}+S_{12}\delta_{12})$. From this relationship we can deduce the following results: Other things being equal, t_1^* should exceed (fall short of) t_2^*,

(i) assuming $S_{22}\delta_{22} = S_{11}\delta_{11}$, if $|\gamma_1| > (<) |r_2|$, i.e., if the covariance between the marginal social utility of income and total income before transfer of husbands is greater (smaller) than that of wives.

(ii) assuming $\gamma_1 = \gamma_3$, if $|S_{22}\delta_{22}| > (<) |S_{11}\delta_{11}|$, i.e., if the weighted wage elasticity of labor supply of wives, weighted by the variance of wage rates, is greater (smaller) than that of husbands.

In the literature of optimum taxation, γ is considered to be a marginal measure of inequality (Stiglitz, 1976). Therefore, condition (i) only implies that to achieve the equity goal of taxation, the tax rate on husbands' earnings should be higher than that on wives' earnings if the distribution of the former group of income is more unequal than that the latter group of earnings. On the other hand, condition (ii) is the Ramsey equation revises by adjusting wage elasticities with respective income variance (Note that $S_{ii} = \epsilon_i L_i/w_i$, ϵ_i is the wage elasticity of labor supply). Therefore, this condition indicates that for both efficiency and equity, the tax on husbands' earings should be higher than that on wives' earnings if the weighted wage elasticity of husbands, labor supply is smaller than that of wives'.

Implicitly made in the discussion above is the assumption that the government can determine the value of τ. However, in most countries adopting the individual income tax (except U.S., U.K., Conada, Japan, and etc.) tax administration is generally ineffective so that the probability of detecting a tax fraud is extremely small. The value of τ approaches zero no matter how high the penalty on tax evasion (if found) is. In that case, $t_3 = t_1 - t_2$ and eq. (14c) no longer exists (since τ is not a choice variable). Direct calculation yields

$$t_1^* = |D_3|^{-1}[\gamma_1(S_{22}\delta_{22}-S_{23}\delta_{23})-\gamma_2(S_{12}\delta_{12}-S_{13}\delta_{13})] \tag{17a}$$

$$t_2^* = |D_3|^{-1}[-\gamma_1(S_{12}\delta_{12}+S_{23}\delta_{23})+\gamma_2(S_{11}\delta_{11}+S_{13}\delta_{13})] \tag{17b}$$

and thus

$$t_1^* - t_2^* = |D_3|^{-1}[\gamma_1(S_{22}\delta_{22}+S_{12}\delta_{12})-\gamma_2(S_{11}\delta_{11}+S_{12}\delta_{12})] \tag{17c}$$

where $|D_3| = (S_{11}\delta_{11}S_{22}\delta_{22}-S_{12}^2\delta_{12}^2)+S_{13}\delta_{13}(S_{22}\delta_{22}+S_{12}\delta_{12})-S_{23}\delta_{23}(S_{11}\delta_{11}+S_{12}\delta_{12})$

By the second-order condition of maximization, $|D_3|> 0$.[12] Apparantly, for this inequality to be satisfied, we require that $|S_{ii}\delta_{ii}| > |S_{ij}\delta_{ij}|$ (i, j = 1, 2; j ≠ i), and $S_{13}\delta_{13} < 0$, $S_{23}\delta_{23} > 0$. In the following analysis these relationships (sufficient for $|D_3| > 0$) are assumed to hold. With the assumptions made above, it is seen from (17a) and (17b) that $t_1^* > 0$ and $t_2^* > 0$ if $S_{12} \geq 0$, on the other hand, if $S_{12} < 0$, then the sign of $t_1{}^*$ or t_2^* is ambiguous.

Moreover, since eq. (17c) is similar to (16), the conclusions attained there are thus applicable here. This of course implies that whether a uniform or differentiated rate of tax should be imposed on a husband's and his wife's earnings depends on, among other things, the social welfare function and the distribution of family income in the population. For example, if husbands' and wives' incomes are distributed in such a way that $\gamma_1 = \gamma_2$, and if the cross substitution effects are sufficiently small relative to own substitution effects, then $t_1^* \gtrless t_2^*$ as $|S_{22}\delta_{22}| \gtrless |S_{11}\delta_{11}|$. This is exactly what the revised Ramsey theorem (referred above) states.

The policy implication of the conclusion above deserves a comment. Even in a country where the income tax is poorly administered, a separate filing method may still be the optimal tax returning scheme. Intuitively, as far as efficiency is concerned, a non-uniform tax in the Ramsey's spirit, though opening the loophole of tax evasion, can attain the minimum level of distortion in a couple's labor-leisure choice. Furthermore, there seems no a *priori* reason to support that the covariance between income and its marginal utility for husbands are equal to that for wives (i.e., $\gamma_1 = \gamma_2$). Therefore, a separate-filing system may be better than a joint-returning one in achieving efficiency and equity goals of income taxation.

However, the result is somewhat different if the value of S_{i3} (i = 1, 2). in eq. (17c) is very large. This can happen (even in a developed country) if the income tax is preceived to be so inefficient and unfair that the incentive of avoiding or evading tax payments is relatively large. In that case, $|D_3|$ of eq. (17c) approaches infinity and $(t_1^* - t_2^*)$ becomes zero. The intuition for this conclusion that t_1^* should be equal to t_2^* is straight-forward. The welfare gain from preventing the potential tax fraud under uniform taxation overwhelms the losses from interference with a couple's labor supplies and from neglecting (possibly) the equity objective of taxation (if $\gamma_1 \neq \gamma_2$), thus making the joint returning method the optimal scheme of tax-filing system.

4. Conclusion

The conclusion obtained from previous analyses seems quite obvious. *a priori* there is no reason to argue that separate filing is superior or inferior to joint returning. Taxing husbands' and wives' earnings at different rates, even in the Ramsey's spirit, can minimize the dead-weight losses from taxation, but gives rise to an outlet for potential tax evasion. It remains to be determined by empirical analysis or (and) socioeconomic factors whether the joint or separate-filing system can better fulfill both efficiency and equity objectives of income taxation.

Footnotes

1. Recently, the Tax Reform Commission in Taiwan has suggested to replace the present practice of mandatory joint returns with the separate filing scheme.
2. Whether high-income families would take full advantage of transfer to minimize their tax liability is unclear. With a high probability of divorce, spouses may be reluctant to surrender ownership of assets. See Munnell, p. 273. See, also, Kay and King (1983), pp. 213-214.
3. Let π denotes the probability the income transfer is detected, B the amount of transfer, and G the penalty (in terms of monetary loss) if the transfer is found out. The expected rate of penalty on transfer is thus equal to $\tau = \pi G/B$.
4. It might tempt to conclude that if $S_{i3} = 0$ or $S_{i4} = 0$ ($i = 1, 2, 3$), $t_1^* = t_2^*$. However, it can be readily shown that these condition imply $|D| = 0$ and hence $(t_1^* - t_2^*)$ is undefined.
5. With this assumption, $B = 0$ as $t_1^* = t_2^*$. Substitution into eq. (4) will yield $t_3^* = 0$.
6. This is also obtained by Boskin and Sheshinski (1983).
7. It can be shown that if $U = b_1\log(1-L_1)+b_2\log(1-L_2)-b_3\log B+b_4\log C$, where $\Sigma b_i = 1$, then $\eta_{14} = \eta_{24} = b_4$.
8. Of course, a negative value of B implies a transfer from a wife to husband.
9. The corner solution is assumed not to exist.
10. At no risk of confusion, the upper and lower limits of intergrals are omitted.
11. Though the non-leisure commodity is chosen as the numeraire, to account for difference in household's consumption, the price of the Hick's composite commodity is assumed to be different among households.
12. The assumption of dominant own-substitution effect, $|S_{ii}\delta_{ii}| > |S_{ij}\delta_{ij}|$, may not be unrealistic since an individual's labor supply normally responds to his own wage changes in a greater magnitude than it responds to his spouse's wage changes.

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Mathematical Appendix

The purpose of this appendix is to derive eqs. (14a) – (14d) in the text. Formulating the Lagrangean and then setting to zero the partial derivatives to zero, we obtain

$$\int\int[\psi'(\frac{\partial V}{\partial w_1}\frac{\partial w_1}{\partial t_1} + \frac{\partial V}{\partial t_3}\frac{\partial t_3}{\partial t_1} + \frac{\partial V}{\partial M}\frac{\partial M}{\partial t_1}) + \beta(W_1L_1 + t_1W_1\frac{\partial L_1}{\partial t_1} + \overline{A}_1$$

$$+ t_2W_2\frac{\partial L_2}{\partial t_1} - B\frac{\partial t_3}{\partial t_1} - t_3\frac{\partial B}{\partial t_1})]f(W_1,W_2)dW_1dW_2 = 0 \tag{A.1.a}$$

$$\int\int[\psi'(\frac{\partial V}{\partial w_2}\frac{\partial w_2}{\partial t_2} + \frac{\partial V}{\partial t_3}\frac{\partial t_3}{\partial t_2} + \frac{\partial V}{\partial M}\frac{\partial M}{\partial t_2}) + \beta(t_1W_1\frac{\partial L_1}{\partial t_2} + W_2L_2 + t_2W_2\frac{\partial L_2}{\partial t_2}$$

$$+ \overline{A}_2 - t_3\frac{\partial B}{\partial t_2} - B\frac{\partial t_3}{\partial t_2})]f(W_1,W_2)dW_1dW_2 = 0 \tag{A.1.b}$$

$$\int\int[\psi'(\frac{\partial V}{\partial t_3}\frac{\partial t_3}{\partial \tau}) + \beta(t_1W_1\frac{\partial L_1}{\partial \tau} + t_2W_2\frac{\partial L_2}{\partial \tau} - t_3\frac{\partial B}{\partial \tau} - B\frac{\partial t_3}{\partial \tau})]$$

$$f(W_1,W_2)dW_1dW_2 = 0 \tag{A.1.c}$$

$$\int\int[\psi'\frac{\partial V}{\partial M}\frac{\partial M}{\partial \alpha} + \beta(-1 + t_1W_1\frac{\partial L_1}{\partial \alpha} + t_2W_2\frac{\partial L_2}{\partial \alpha}$$

$$- t_3\frac{\partial \beta}{\partial \alpha})]f(W_1,W_2)dW_1dW_2 = 0 \tag{A.1.d}$$

Recall the properties of the indirect utility function:

$$\frac{\partial V}{\partial w_i} = \lambda L_i,\ i = 1,\ 2;\ \frac{\partial V}{\partial \tau} = \lambda B,\ \frac{\partial V}{\partial M} = \lambda$$

From an individual's optimum condition, we know

$$\frac{\partial L_i}{\partial t_j} = - W_j \frac{\partial L_i}{\partial w_j} + \frac{\partial L_i}{\partial \tau} + \overline{A}_j \frac{\partial L_i}{\partial M}, \ i, j = 1, 2$$

Substitution of these relationship into (A.1.a) — (A.1.d) gives

$$\int\int[t_1W_1(-W_1 \frac{\partial L_1}{\partial W_1} + \frac{\partial L_1}{\partial t_3} - \overline{A}_1 \frac{\partial L_1}{\partial M}) + t_2W_2(-W_1 \frac{\partial L_2}{\partial w_1} + \frac{\partial L_2}{\partial M} - \overline{A}_1 \frac{\partial L_2}{\partial M})$$

$$- t_3 (-W_1 \frac{\partial B}{\partial w_1} + \frac{\partial B}{\partial t_3} - \overline{A}_1 \frac{\partial B}{\partial M})] = -\int\int(1-\frac{\psi'\lambda}{\beta})Y_1f(W_1,W_2)dW_1dW_2 \qquad \text{(A.2.a)}$$

$$\int\int[t_1W_1(-W_2 \frac{\partial L_1}{\partial w_2} - \frac{\partial L_1}{\partial t_3} - \overline{A}_2 \frac{\partial L_1}{\partial M}) + t_2W_2(-W_2 \frac{\partial L_2}{\partial w_2} - \frac{\partial L_2}{\partial t_3} - \overline{A}_2 \frac{\partial L_2}{\partial M}) -$$

$$t_3(- W_2 \frac{\partial B}{\partial w_2} - \frac{\partial B}{\partial t_3} - \overline{A}_2 \frac{\partial B}{\partial M})]f(W_1,W_2)dW_1dW_2 = -\int\int(1-\frac{\psi'\lambda}{\beta})$$

$$Y_2f(W_1,W_2)dW_1dW_2 \qquad \text{(A.2.b)}$$

$$\int\int(-t_1W_1 \frac{\partial L_1}{\partial t_3} - t_2W_2 \frac{\partial L_2}{\partial t_3} + t_3 \frac{\partial B}{\partial t_3})f(W_1,W_2)dW_1dW_2$$

$$= -\int\int(1 - \frac{\psi'\lambda}{\beta})Bf(W_1,W_2)dW_1dW_2 \qquad \text{(A.2.c)}$$

$$\int\int(1 - \frac{\psi'\lambda}{\beta} - t_1w_1 \frac{\partial L_1}{\partial M} - t_2W_2 \frac{\partial L_2}{\partial M} + t_3 \frac{\partial B}{\partial M})f(W_1,W_2)dW_1dW_2 = 0 \qquad \text{(A.2.d)}$$

Substract (A.2.c) from (A.2.a) and (A.2.b), respectively, and make use the Slutsky equation,

$$\frac{\partial L_1}{\partial w_j} = - S_{ij} + L_j \frac{\partial L_i}{\partial M}, \ i, j = 1, 2,$$

$$\frac{\partial B}{\partial w_j} = S_{3j} + L_j \frac{\partial B}{\partial M} .$$

After so doing, we obtain eqs. (14a) – (14d).