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Applications of Optimal Tax Theory To Problems in Taxing Families and Individuals

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I. INTRODUCTION

The appropriate tax treatment of families has been a matter of debate for decades.[1/] For an economist interested in rationalizing the tax treatment of the family, it is natural to consult the recent literature on optimal taxation (OT). With a few exceptions,[2/] however, writers concerned with OT have focused upon the individual rather than the family. The purpose of this essay is to explore the extent to which the insights and methodology of the OT literature can be applied to the problems of family taxation.

Section II reviews the basic framework of OT theory. Attention is focused not only upon what is contained in the OT literature, but also upon the questions with which it fails to deal adequately. This framework is then used to discuss the following issues in **Sections III through VII**:

(a) the tax treatment of working wives;

(b) the effect of the tax system on incentives to engage in home versus market production, and problems in the valuation of home production;

(c) the treatment of single people versus married couples;

(d) the optimal exemption for dependents;

(e) the implications of mandatory individual filing.

Of course, OT theory cannot provide insights into all aspects of each of these problems. As necessary, other theoretical and empirical literatures will be relied upon.

II. THE OPTIMAL TAX LITERATURE[3/]

In general, two different problems have been studied in the optimal tax literature. The first is to find a set of commodity taxes that is optimal given certain efficiency and (sometimes) equity considerations. In a second strain of the literature, it is assumed that the revenue system is based upon income rather than commodity taxation, and the problem is to determine the optimal degree of progressivity (or regressivity). This section will discuss each of these in turn, and proceed to outline some limitations of the approach.

A. Optimal Commodity Taxation. Assume that R dollars of revenue must be raised by the government via a set of commodity taxes. (Lump sum taxes are excluded from consideration.) If X_i is the quantity of the ith good purchased by the household sector and T_i is the per unit tax, then the revenue constraint is

$$\Sigma T_i X_i = R \ . \tag{1}$$

On the assumption that producer prices are fixed, setting the T_i is equivalent to setting consumer prices. The basic problem of optimal commodity taxation is to choose a set of consumer prices which maximize consumer utility, given the revenue constraint R.

Equivalently, tax rates are to be chosen to minimize excess burden[4/] -- the loss in utility in excess of that which would have been incurred had the tax been collected as a lump sum.[5/] Under certain conditions, minimization of excess burden occurs in accordance with the "inverse elasticity rule",

$$t_r = \frac{\delta}{E_{rr}} \; ; \; r = 1, \ldots, m \qquad (2)$$

where t_r is the tax rate expressed as a percentage of producer price, δ is a constant, and E_{rr} is the elasticity of the ordinary demand function for the rth good. In words, (2) says that the more elastic the demand for a good, the smaller should be the ad valorem tax levied upon it. This is because a high tax placed on a relatively inelastic good will lead to relatively small distortions, other things being the same.

This formula has been a major factor in the formation of economists' intuitions on tax and price regulatory questions. It underlies the notion of charging according to 'what the traffic can bear' in transportation, for example, and is the basis for the acceptance on efficiency grounds of such taxes as those on tobacco and alcohol, the demand for which is presumed price inelastic.

It is important to note the conflict between equity and efficiency which can arise in this context. To the extent that price inelastic goods have low income elasticities, taxing them heavily may be regressive. This conflict is a familiar one; the all-time champion for efficiency purposes, the lump sum tax, is usually an unacceptable alternative due to equity considerations.

B. Optimal Income Taxation. In optimal income taxation studies, the tax base is assumed to be income, and the problem is to find a tax schedule which maximizes some social welfare function. Most of the recent work on this problem stems from a 1971 paper by James Mirrlees [20], so his model will be used as a focus for our discussion.

Mirrlees assumes that society is composed of individuals who have identical atemporal utility functions in after tax income and leisure, and who differ only in their earnings abilities. The government must collect an exogenously determined amount of tax revenue. The problem is to find an income tax schedule (tax function) which maximizes the sum of individuals' utilities subject to this revenue constraint.[6/] The tradeoff between efficiency and equity is central to this problem. To the extent that higher tax rates distribute income to those with low utility,

social welfare increases, but at the same time higher tax rates distort the work-leisure choice implicit in the individual utility functions, thus tending to lower social welfare.

The basic thrust of the literature should now be clear. An exogenously determined amount of tax revenue must be raised by income taxes on individuals whose economic choices are distorted by the presence of those taxes. Given technological and behavioral assumptions, the optimal tax schedule is that which leaves social welfare at a maximum after the tax is collected. The literature indicates that the optimal tax rates are quite sensitive to the underlying assumptions.

C. Two Problems with the Optimal Tax Literature. As OT theory is applied to the problems of the family, various limitations of the approach will become apparent. Therefore, it seems useful to mention two major difficulties at the outset: 1) Administrative costs are not usually included in the optimal tax calculus.[7/] Thus, a judgment as to whether or not a particular scheme is feasible for policy purposes must be made on a more or less *ad hoc* basis. For example, the determination of optimal commodity tax rates in models where individual tastes differ may require information on individuals' utility function parameters.

It is hard to imagine implementing such rates. 2) The notion of horizontal equity is absent from the optimal tax literature. In none of the studies previously discussed does the injunction to treat people in 'equal positions' equally appear as a constraint or an argument in the objective function. Therefore, the schemes will in general fail to provide horizontal equity.[8/]

Although the optimal taxation literature ignores horizontal equity, it has sparked new interest in the topic, and modified the vocabulary of the discussion. No consensus has emerged as to the proper criterion for measuring horizontal equity. Traditionally, individuals are viewed as equal if they have the same income (or in the case of an expenditure tax, the same level of consumption expenditures). This formulation is inadequate because individuals with identical opportunity sets but different tastes will have different incomes.

Alternatively, then, equal position could be defined in terms of equal opportunity sets. The difficulty here is that characterization of opportunity sets generally requires a vector rather than a single number. Consider, for example, the problem of describing a given family's opportunities. At least three numbers are needed:

husband's wage, wife's wage, and unearned income. In order to compare families, some aggregation of these numbers is necessary. A natural way to do this is via the indirect utility function.

This leads to a final criterion for horizontal equity: "If two individuals would be equally well off (have the same utility level) in the absence of taxation, they should be equally well off if there is a tax." [10] The difficulties involved in implementing such a utility definition of horizontal equity are considerable. Not only do the shapes of indifference curves have to be estimated, but some cardinalization of the utility functions is necessary because interpersonal utility comparisons are needed.

Perhaps this is not as bad as might appear at first. It is hard to imagine that any of the definitions of horizontal equity has ethical content unless it is assumed that individuals' welfares are at least roughly comparable. The utility formulation simply makes the comparisons explicit. The disagreement over criteria for horizontal equity makes it quite difficult to assess the fairness of any given tax statute. In the following discussions, several criteria are considered.

III. WORKING WIVES

In this section two questions are raised: a) Does the present tax system discriminate against working wives?; and b) Is there a more efficient way to tax wives' earnings? For the first question, optimal tax theory *per se* provides no specific answers, although the econometric literature on labor supply yields some interesting insights. With respect to the second question, application of optimal tax theory suggests that the present system is probably inefficient.

A. Is There Discrimination Against Working Wives? Under current law, joint filers pool their incomes, and both spouses face the same marginal tax rate on their last dollar of earnings. It can be argued, then, that the law does not discriminate against working wives for the simple reason that it does not distinguish between the spouses. This reasoning ignores the institutional reality that in most households, it is assumed that the husband will work full time and the wife makes her labor force decision conditional on the husband's income. In effect, then, the first dollar earned by the wife is taxed at the same marginal rate as the last dollar earned by the husband -- she bears a higher tax burden on her earnings.

Is it useful to describe this situation as "discrimination against working wives?" Such a characterization may be misleading for two reasons. First of all, it is their status as secondary wage earners, not as women, that is relevant here. If discrimination exists, it is against secondary workers, not wives *per se*. Secondly, it seems inappropriate to label as discrimination an effect which arises because the tax law treats the family as a unit, instead of treating spouses asymmetrically. Although it is important to recognize that the current system tends to diminish the net returns to working for married women, it probably only confuses public discussion to call this discrimination against working wives.

Does the higher tax burden discourage wives from working? Bittker argues that this disincentive and others that put a wedge between the gross and net wage are "... obviously outweighed by economic pressure or personal inclination for the millions of wives who are employed outside the home." [3, p. 1436]. This is really beside the point. The issue is not whether millions of wives are working, but rather, the change in labor force participation rates and hours of work which would occur under alternative tax regimes.

Delineating the issue in this way raises two related questions. Do the working wives correctly perceive the wedge which the income and payroll taxes impose between the gross and net wage, and if so, is there a substantial labor supply response? I have argued elsewhere [23] that the answer to both these questions is yes. Married women perceive their taxes in the 'rational' manner suggested by economic theory, and most investigators have found that wives' average labor supply elasticity is substantial, although there is disagreement on the exact magnitude. Kosters [19] places the elasticity of the labor force participation rate for all married women with respect to the wage between .4 and 1.5. Hall [14] finds that when the net wage changes from the $1.50 - $1.75 range to the $2.50 - $3.00 range for white married women aged 20 to 39, hours of work show an increase between 520 and 1034 hours, depending on the number of children. Bloch's [4] hours and participation rate equations taken together imply an uncompensated supply elasticity of about 3.0.

Thus, the tax system acts to diminish married women's yearly hours of work.[9/] But this is not the end of the story, for other dimensions of labor supply beside hours of work may be affected by tax laws. These include human

capital investment, occupational choice and intensity of effort. Unfortunately, little is currently known about how the tax system affects these decisions; further research is clearly desirable.

A second possible source of discrimination against women working has been suggested. This is the fact that when a wife chooses to enter the market place, various non-deductible work related expenses are incurred. Moreover, it may become necessary to hire someone to do the housework and take care of the children, expenses which for the most part are also non-deductible.

As Bittker points out, the idea that only two-earner married couples deserve a special consideration in this context "... is curiously narrow. Everyone who works away from home -- not just the working wife -- must get to the job site, dress as the job requires, and pay for lunch if it is inconvenient to bring it in a brown bag. Similarly, everyone who works has less time and energy to keep house, prepare meals, and look for bargains." [3, p. 1435]. It is thus not clear that the absence of such deductions can be said to 'discriminate' against working wives, although it no doubt affects their labor force behavior.

B. Efficient Taxation of the Family. Contemporary economic theory recognizes that membership in a household influences economic behavior. The view is that family members act jointly to maximize some household utility function. Very little has been said about the origins of this utility function. Once more the familiar problems of preference aggregation from the literature on social welfare functions appear.[10/] And just as in the social welfare function context, these difficulties are usually acknowledged and then ignored.

Assume, then, that family utility (U) is a function of three arguments, "husband's yearly hours of non-market activity" (L_1), "wife's yearly hours of non-market activity" (L_2), and "family consumption" (Y):[11/]

$$U = f(L_1, L_2, Y) \ . \qquad (3)$$

Formally, then, L_1 and L_2 are just two commodities in the family utility function, and therefore the insights of the optimal commodity tax literature should be applicable.

Consider, then, applying the inverse elasticity rule.[12/] The econometric result was previously mentioned that wives' elasticity of supply of labor (or alternatively, demand for leisure) tends to be high. On the other hand, studies of the labor force behavior of married men have indicated

that their labor supply elasticity is quite low. (See [4] or [14].) This suggests that in order to tax the family unit efficiently, the wife's earned income should be taxed at a lower rate than the husband's. Yet we have shown that in effect, the tax laws are doing just the opposite!

As emphasized in section II, in its current state of development, the OT approach is not applicable to matters of political and administrative feasibility. Although it is hard to imagine Congress implementing separate schedules for primary and secondary earners, there are at least two feasible proposals which would move in the direction of reducing tax induced inefficiencies. One is an earned income allowance for secondary workers. The other is mandatory individual filing, which will be discussed in section VII.

IV. MARKET VERSUS HOME PRODUCTION

Although the model in which family utility depends only upon non-market activity and income yielded some interesting insights, it is now useful to expand it to allow explicitly for household production. As Gronau [13, p. 634] suggests, family members can be viewed as allocating time according to their comparative advantages in the production of home and market goods, these being determined by their relative wage rates and their efficiency in producing household goods. Currently, time spent in household production is untaxed while remuneration from market activity is taxed. How does this asymmetry in the treatment of home versus market work affect labor force participation rates? Is it efficient? These questions will first be explored, and then some difficulties in the valuation of time spent in home production will be discussed.

A. Effects on Labor Force Participation. Consider the problem of allocating time between market work and non-market activity (See Figure 1). Assume that prior to imposition of the tax, the individual's budget constraint is AB, so the wage is the slope of that line. ON is

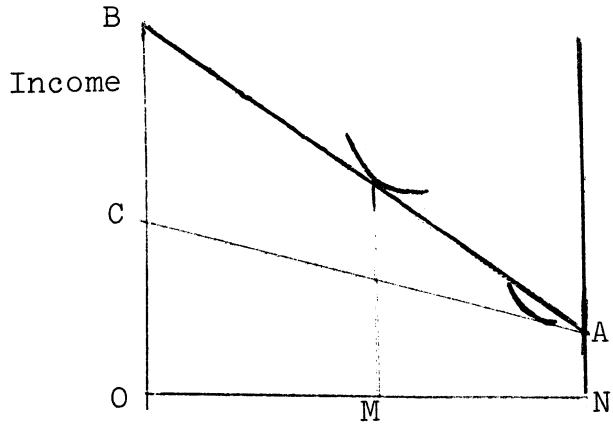

FIGURE 1

the total time endowment and MN hours per year are spent on market activity. Now consider a tax which changes the budget constraint to AC. As drawn in Figure 1, the individual stays out of the market, devoting his or her time exclusively to housework and leisure. Of course, it cannot be determined *a priori* that imposition of the tax will lead to a diminution of hours of market activity because of the familiar conflict between the income and substitution effects. However, with respect to labor force participation rates, a stronger statement can be made. A tax induced decrease in the net wage will never induce an individual into the market. The result is unambiguous because at zero hours of labor market work, there is no income effect to work against the substitution effect.

Given all this, one can say that the tax system biases secondary earners against work in the market. It should be noted, however, that this is not exactly the same thing as saying the individual is biased toward housework -- non-market activity increases, but it has two components, leisure and household production. To determine the impact of taxes on hours spent in household production, we require data on hours of work, hours of leisure, and hours of housework along with appropriate information on the individual's market characteristics. Bloch [4] found that

when a woman's market wage increases by $1, her yearly hours of regular housework fall by about 640. This result is consistent with the preceding theory. Of course, it must be viewed with some caution in light of likely reporting errors in hours of housework. In addition, there are difficult conceptual problems in defining hours of housework. Is playing with an infant 'leisure' or 'home production'?

B. 'Neutrality' Between Home and Market Production. I have suggested that failure to tax the imputed wage in home production results in fewer labor resources being devoted to the market sector than would otherwise be the case. Some students of the tax system, noting this phenomenon, have argued that ideally, home production and market work should be taxed at the same rate. The feeling is that such a system would be 'neutral' between household and market activity, and therefore more efficient. However, a straightforward application of optimal tax theory indicates that this assertion is wrong. Since there will in general be different supply elasticities of time spent in the market and time spent in household production, differential taxation of time spent in the home and in the market place is likely to be necessary to secure efficient tax treatment. Even if it were administratively feasible to tax time spent in home production at the same rate as

that in market production, it would probably be sub-optimal.[13/] (This result is derived more rigorously in Appendix B.)

C. Imputing the Value of Time Spent in Household Production. It has been argued in this paper that: a) although failure to tax imputed income from household production may be unfair, it is no more discriminatory against working wives than anyone else;[14/] and b) efficient treatment of the family does not necessarily require taxing time spent in the home and time spent in the market at the same rate. So far, the question of how spouses' time spent in the home should be valued has not been dealt with adequately. This question is of some interest even if one has no intention of actually taxing time spent in home production. For example, one might want to include imputed income from housework in the tax base in order to see how it affects progressivity calculations.

For family members who participate in the labor force, the value of time spent in home production is the wage rate. For such individuals, the value of time spent in housework could be calculated simply by taking the number of hours of housework and multiplying by the wage, providing that the number of hours of housework could be ascertained.

A major difficulty occurs when a spouse does not participate in the labor force. The fact that a spouse opts out of market work indicates that the value of time in the home exceeds the potential wage rate. This has two implications: a) the housespouse's value of time cannot be imputed from any observed market value; and b) the value of the housespouse's time "... is not exogenously given, but rather determined by the maximization process. A change in the parameters changes both the optimum solution and the price placed by the family on the wife's time ..." [13, p. 640].

Since the value of time spent in the household for such spouses cannot be observed, various imputation procedures have been developed (see [13], [14], and [16]). The issue to be focused upon is the reliability of such estimates for the policy maker who is interested in using them for purposes of income imputation. Even if the underlying assumptions of the various models are believed, the outcomes are not very stable in a statistical sense. For example, the estimated standard deviation of Heckman's [16] equation for the logarithm of the asking wage is .532. Considering that the log of a wage like $1.75 is only .559, this is a large standard error. I conclude that given the current state of the art, any use of imputed wages

to augment the tax base must be done with great caution. Several different values for housespouses' time should be used in any given problem in order to assess the sensitivity of the substantive results to differences.[15/]

V. SINGLES VERSUS MARRIEDS

Consider the following three propositions:

a) The income tax should be progressive.

b) Married couples with equal incomes should, other things being equal, pay equal taxes.

c) An individual's tax burden should not change when he/she marries.

It is easy to show that a tax system which satisfies any two of these propositions will not in general satisfy the third. (See, for example, [3].) Given what seems to be a firm societal commitment to progressivity, then, the real choice is between b) and c). Under current law, b) is the prevailing principle, and much controversy has arisen over the consequent violation of c) -- many individuals' tax burdens increase when they marry.[16/]

As it stands, objections to proposition c) can be raised on the grounds that due to scale economies in housekeeping, two married individuals with a given income have more 'ability to pay' than if they were single. Therefore, their tax liability should be greater. It will be discussed in section B whether or not such economies of scale should be considered by tax policy makers. In the meantime, we merely observe that if one adheres to this view, c) should be modified to read

"The only change in an individual's tax burden when he/she marries should be that which corrects for economies of scale." Even with this version of c), in general there will be a conflict with b).

The first part of this section deals briefly with the concept of 'marriage neutrality', and whether or not it is a desirable feature of a tax system. In the second part, the choice of an appropriate unit of taxation is discussed.

A. Marriage Neutrality. A tax system will be defined as 'marriage neutral' if, other things being equal, an individual's tax burden is the same whether or not he/she is married.[17/] Alternatively, a tax system is marriage neutral if it leaves unchanged the price of 'marriage services'. It could easily be argued that marriage neutrality is inefficient -- the demand for marriage services is probably quite inelastic,[18/] and therefore, relatively little excess burden would be generated by taxing it. However, I think that proponents of marriage neutrality view it as an equity rather than an efficiency criterion -- it is unfair to tax those who have a 'taste' for marriage more than those who don't share this taste, or have not been able to indulge it.[19/]

B. Equity Aspects of the Marriage Tax. The natural way for a public finance economist to think about the ethical implications of a given statute is in terms of vertical and horizontal equity. The straightforward use of this traditional framework is impossible in this context, however, because it presupposes a unit of observation. It begs the fundamental question: should one look at equity among individuals or among families?

One of the most cogent arguments for the family as the appropriate unit of taxation is found in the well-known report of the Carter Commission [25]: "We believe firmly that the family is today, as it has been for many centuries, the basic economic unit in society" (p. 123). "Taxation of the individual in ... disregard of his inevitably close financial and economic ties with the other members of the basic social unit of which he is ordinarily a member, the family, is in our view [a] striking instance of [a] lack of a comprehensive and rational pattern in [a] tax system" (p. 122).

The case for the family unit is not as compelling as the Carter Commission report suggests. Traditional family arrangements are not as omnipresent today as they once were. Marriage is certainly the predominant institution, but individuals can choose other ones. As Bittker argues,

"If married couples are taxed on their consolidated income, for example, should the same principle extend to a child who supports an aged parent, two sisters who share an apartment, or a divorced parent who lives with an adolescent child? Should a relationship established by blood or marriage be demanded, to the exclusion, for example, of unmarried persons who live together, homosexual companions and communes?" [3, p. 1398].

It might be useful to examine these two different views in terms of the analytical structure used in section III. The Carter Commission implicitly assumes, as has been assumed in this paper, that there exists a family utility function, $U = U(L_1, L_2, Y)$ where the variables are as previously (see equation (3)) defined. It is important to note that with this formulation, it is a matter of indifference how Y is distributed within the family. Property rights of the spouses are viewed as absolutely irrelevant.

On the other hand, if property rights within the family are important and spouses are more like individuals who care about one another than a single unit, then two utility functions are involved:

$$U_1 = U_1(L_1, \alpha Y, U_2) \tag{4}$$

and

$$U_2 = U_2(L_1, (1-\alpha)Y, U_1), \tag{5}$$

where α is the first spouse's share of family income. Even this story is too simple, however, because many of the goods consumed by the household have a public goods aspect (for example, housing). Therefore, Y should be broken up into three components: "his", "hers", and "theirs". The problem of efficient taxation is solvable either with formulation (3) or formulation (4)-(5). But OT theory says nothing about which formulation is to be preferred.

Another issue which arises with respect to the treatment of singles versus marrieds is economies of scale. Two may not be able to live as cheaply as one, but they may be able to live as cheaply as (say) one point five. Thus, the argument goes, a married couple has more 'ability-to-pay' than two singles with the same total income, and should therefore pay more taxes. Some have gone so far as to suggest that the whole matter of horizontal and vertical equity should be examined in terms of per adult equivalents in order to take such economies explicitly into account. (See, for example [18]).

I find this line of reasoning unconvincing. Non-marrieds generally have the opportunity to join together with others in order to enjoy the economies of scale of living together. If they do not, it simply shows that the value of living apart more than compensates for such

economies. Neither is it a universal rule that marriage results in economies of scale; in some two earner families, it is necessary to maintain separate residences.

This section can only be concluded with the hope that our analysis has helped clarify the nature of the issues surrounding marriage neutrality, although it has provided no definite answers. Solutions here are even more dependent on one's views of how society should operate than is usually the case.

VI. TREATMENT OF CHILDREN

Currently, the family is allowed a tax exemption of $750 per child. This can be rationalized in several ways: 1) It adjusts for the effect of the number of children on ability to pay; 2) It provides more progressivity at the bottom end of the income scale; and 3) It may be an instrument of optimal population policy. In this section, focus is centered only on 1) and 2). Optimal population policy is an exceedingly difficult problem which is just beginning to receive attention. (See, for example, [21].) 20/

It will be argued that the number of children is an inappropriate way to adjust ability to pay. However, in view of the widespread social acceptance of the exemption, we will then discuss how the optimal child exemption might be determined <u>given</u> that it is to be used.

A. <u>Children and Ability to Pay</u>. The basic argument for the exemption as an adjustment in ability to pay can be condensed as follows: 21/ Taxable income should include only that income in excess of subsistence. The addition of a child increases the level of income required for family members to survive, and therefore an exemption equal to this change is needed.

There are some who agree with the basic idea that the number of children affects ability to pay, but object to correcting for it with an exemption. The dollar value of an exemption, they note, is an increasing function of the family's marginal tax rate. Therefore, rich families gain more from it than the poor. The proposed solution is either a vanishing exemption (an exemption which diminishes as income increases), or a tax credit for each

child (a dollar amount which does not vary with income).

It has been argued for many years that all such approaches are misdirected (see, for example, [27]). If a husband and wife choose to devote family resources to the rearing of children, this is their business, but there is no particular reason to award a tax reduction for such behavior. Indeed, it can be argued that such a policy is an outright violation of horizontal equity. Sets of spouses who have identical opportunities, but different tastes regarding family size, are treated unequally under such a regime.

The extent to which non-economists ridicule the view taken in the last paragraph is striking. The typical bemused reaction is that of Bittker[3]: "...the decision to have children is irreversible; they cannot be abandoned, like a hobby that has become burdensome or boring. Moreover, society feels an obligation to support the children--but not the hobby--if the taxpayer is unable to do so. No one but a tax theorist, it might be asserted, could fail to see the difference (p. 1448)...I doubt that even the most computerized econometrician weighs the value of a dependency exemption before procreation" (p. 1449).

Part of this reaction is probably due to a failure to view decision-making in a life-cycle context--the dependents simply exist and have to be taken care of. Little thought is given to the fact that children are components of some long-term consumption plan. But part of the reason for the rejection of the idea of 'children as consumption', I think, is the way it is 'packaged' by economists. The argument is often framed in terms like 'children are just another good, no different from apples or yachts'. This

is misleading--although children's services appear as arguments in the utility function like apples or yachts, they are regarded differently by parents. Indeed, unlike apples or yachts, it is possible that children can change the form of the utility function by influencing the household decision making process. Perhaps the idea might be more palatable if it were emphasized that children are a choice, rather than that children are a good.

In any case, a fundamental equity problem arises if the 'children as a choice' approach is taken. Although this approach would help secure horizontal equity between sets of spouses, it would not necessarily secure equality in opportunity between children. Similarly, a policy designed to subsidize child rearing might foster equality of opportunity for children, but at the expense of creating inequities between the parents. This appears to be an insoluble dilemma. The provision of certain child-care services by the public sector might be a partial solution, but raising the funds to run them would, of course, induce economic distortions. The proper mix of subsidies and direct expenditures needed to arrive at the socially determined amount of child care can be analyzed as an application of optimal tax theory, but is beyond the scope of this paper.[22/]

Finally, if the argument were accepted that children are just another commodity, how might children's services be taxed most efficiently? Currently there is not enough consensus as to the appropriate elasticities to venture a guess.[23/] It is not even clear how to define the price of children's services. At this time, then, there is a lack of sufficient empirical information to implement

efficient taxation of children's services. For reasons similar to those discussed with respect to marriage services, most people would view such a tax as inequitable and unacceptable anyway.

B. The Optimal Child Exemption. There are some who view the child exemption less as a subsidy than as an instrument for gaining progressivity at the bottom end of the income scale. Suppose the number of children per family is given exogenously, and it has been decided that some exemption per child is to be given. What should be the size of the exemption?

This is similar in structure to the basic problem of the optimal income tax literature. Assume as before that each family has a utility function which depends on family income and time spent in non-market activity. Assume further that each family's tax bill depends upon its income, but that taxes are reduced a given amount for each child. The optimal tax problem is to choose the income tax rate and child care exemption so as to maximize social welfare subject to the constraint that a given amount of tax revenue be collected.

Given appropriate assumptions on specific functional forms and parameter values, this problem presumably could be solved either analytically or numerically.[24/] For the purposes of this paper, however, it is sufficient to call attention to some general characteristics of the solution.

a) In general, the optimal child exemption must be determined jointly with the optimal tax rate.

b) The exemption depends upon the relationship between number of children and earnings abilities of parents.

c) Value judgments on the proper degree of egalitarianism influence the optimal exemption. If, for example, the social welfare function weighs increments to the incomes of the poor more than to those of the rich, and poor families tend to have more children than the rich, then this will tend to increase the exemption.

d) The notion that children increase the 'subsistence needs' of a family is absent from this model. 'Poverty lines' need not be calculated in order to generate a positive exemption.

If the tax function allowed for increasing marginal tax rates, the question of exemptions versus credits could be explored. I have suggested elsewhere [24] that such changes are unlikely to have much influence one way or another as far as their overall impact on a utilitarian social welfare function. The differences involved are not substantial enough to significantly matter from either an efficiency or equity point of view.

VII. MANDATORY INDIVIDUAL FILING

Some criticisms of joint filing as it is done under current law have previously been asserted: it imposes a relatively large burden on secondary workers, fails the test of marriage neutrality, assumes that property rights within the family are irrelevant, and ignores social changes which are lessening the primacy of the family as the basic social unit. In light of these considerations, it has been suggested that joint filing be eliminated, and that all individuals be required to file separately. In this section, a few implications such a move might have for labor supply, economic efficiency, and the distribution of income will be discussed.

A. Labor Supply and Efficiency. When speculating about mandatory individual filing, a primary problem involves the treatment of unearned income. Would high earnings individuals transfer capital to their mates in order to lower family tax bills ("bedchamber transfers of property")? It is difficult to predict. My guess is that property rights within families do matter in many cases. After all, significant amounts of estate tax could be avoided if more *inter vivos* gifts were made, but they are not--individuals appear to be willing to pay high prices to retain control of their property.[25/] To the extent inter-family property transfers to avoid taxes did take place, the result would be a lower rate of taxation on capital income. It is unclear whether or not this would be desirable from a social point of view. It should be noted, however, that the overall effect of mandatory filing cannot

be determined a priori. It depends upon how the rate structure would be changed to adjust for revenue changes.

In a recent attempt to ascertain the effects of mandatory individual filing, [26] I assumed that half of non-earned income is imputed to each spouse for purposes of computing taxable income, and the spouse with the higher adjusted gross income takes all the deductions and exemptions to which the family is entitled. Note that if each spouse faces the same rate schedule as the family faced prior to the introduction of individual filing, total tax revenues would change. Therefore, in this exercise, the marginal tax rates for each bracket were adjusted proportionately to keep revenue collections constant. In this way, the degree of progressivity of the rate schedule was maintained.

When this change in the tax law was simulated using a sample of middle-aged white families, the following results emerged:

a) Hours per year of market work increase for wives in all income brackets, and the change in hours of work is greatest for women for whom other family income is the highest. This result is not hard to understand. Since the elasticity of married women's labor supply is positive, the change in the number of hours of work is an increasing function of the increase in the net wage. Because women with high earnings husbands faced the highest tax rates under joint filing, the move to individual filing gives them the largest inducement to work more. The change in tax regime is assumed to have no effect on husbands' yearly hours of work. This assumption

simplifies the analysis greatly, and probably is not a bad approximation to reality. For example, in Hall's [14] careful study of the labor supply behavior of married males, no significant wage effect is isolated.[27]

b) The excess burden of the tax system decreases by about thirty percent. This is a consequence of the fact that the tax burden has been moved from a set of workers with high elasticities of supply (wives) to those with low elasticities (husbands). These results are consistent with the earlier discussion of efficient taxation of secondary earners.

Since these calculations are based upon a sample which is not representative of the entire population, the figure of thirty percent must be viewed as only a rough approximation of the efficiency gain in moving to mandatory single filing. A further complication arises if the wage varies with the number of hours of work, that is, if there are economies of scale of work in the market place. In this case, there would be efficiency losses due to the discouragement of the division of labor. Not much is known about whether or not this is an important phenomenon empirically. (See [23] for some preliminary results.) There can be little doubt, however, that such a move would lower the excess burden of the tax system.

B. Distribution of Welfare. As just mentioned, a consequence of adopting mandatory individual filing is that wives from wealthier families tend to work more hours. Therefore, the incomes of these wealthier families would tend to go up by greater dollar amounts than those of the poor, and the distribution of family income

(according to some measures) would become more unequal.

However, the change is less inegalitarian than might first appear. Households that gain the most in terms of income are also losing the most in terms of either leisure or household production--the distribution of family utility changes less than the distribution of income. Nevertheless, some inequality is introduced by the move, and the question is whether it outweighs the benefits of increased efficiency. My calculations indicate that for a wide variety of egalitarian preferences, changing to mandatory individual filing leads to a small <u>positive</u> change in social welfare. If these results are at least qualitatively correct, they suggest that such a move would be beneficial. Note, however, that this is conditional on a view that does not attach normative significance to the fact that families with the same total incomes can pay different amounts of taxes.

VIII. CONCLUDING COMMENTS

Many problems associated with the taxation of the family have not been discussed. For example, no mention has been made of the interesting problems which arise with respect to the treatment of gifts and bequests. If the bequest motive induces some amount of saving, then optimal taxation of bequests would have to balance off equity (redistribution of wealth) and efficiency using tools similar to those of optimal income tax theory. Presumably, the elasticity of bequests with respect to the 'price of bequests' would be a key parameter in the problem.

A different set of problems arises when considering gift-giving within the family unit. Whether gifts should be taxed at all depends on whether individuals or families are viewed as the taxable unit. These problems were analyzed in the discussion of the marriage tax.

Neither has any attention been devoted to the question of alternative bases for family taxation. It has been suggested, for example, that a consumption based personal tax might be superior to the present one. (See, for example, [10].) The analyses of this paper transfer easily from an income to a consumption tax, although some details would change.[28/] Whatever the tax base, however, policy makers will still have to worry about such problems as the unit of taxation, marriage penalties, and child-care deductions.

In conclusion, it should be emphasized again that OT theory cannot provide an escape from making certain basic value judgments. However, on a variety of issues which involve efficiency (for example, tax treatment of secondary earners) or tradeoffs between equity and efficiency (for example, determination of the optimal child care exemption), a very theoretical literature has yielded some extremely useful insights.

FOOTNOTES

* The author would like to thank D. Bradford, M. Feldstein, K. Small, and members of the Office of Tax Analysis Seminar for useful comments.

1/ For a history of the family's tax treatment in America, see Bittker [3].

2/ See, for example, the paper by Boskin [5].

3/ For a more extensive discussion of the OT literature, see D. Bradford and H. Rosen, "The Optimal Taxation of Commodities and Income," American Economic Review, May 1976.

4/ For 'small' taxes, it can be shown (see Harberger [15] that if taxes on m goods are being considered, then the excess burden is

$$\sum_{j=1}^{n} \sum_{i=1}^{m} S_{ij}\, dp_i dp_j$$

where S_{ij} is the Slutsky coefficient (the compensated change in consumption of good i with respect to a change in the price of good j) and dp_j is the tax induced change in the price of the jth good.

There are a number of ways to solve this problem (see Sandmo [26]. The basic result which emerges is that if tax rates are excess burden minimizing,

$$\sum_i T_i S_{ij} = \beta X_k; \qquad k=1,\ldots,m,$$

where β is independent of k, and other variables are as defined above. The left hand side gives an estimate of the change in demand for the kth good which would occur if taxes were removed. Thus, the equation suggests that for maximum efficiency, the proportional change in demand should be the same for all commodities.

5/ A loss in utility in excess of the tax receipts arises because the taxes lead to a misallocation of resources.

6/ Assuming that utility functions are Cobb-Douglas and the earnings ability distribution is lognormal or pareto, the following results emerge: a) The optimal tax function is approximately linear with a negative intercept; and b) it is characterized by 'low' marginal tax rates which fall somewhat with income. (Atkinson's [2] interpolations of Mirrlees' results indicate rates in the neighborhood of 20 percent for a zero-revenue purely redistributive tax.)

7/ There has been some work on tax evasion. See [1].

8/ It can be shown that if all individuals have identical tastes and there is only one type of ability, then horizontal equity will be satisfied by virtually any broad-based tax. (See Feldstein [10].) Such assumptions, as we have seen, are built into a number of the optimal tax studies. (For an exception, see Diamond and Mirrlees[8].)

9/ Alternatively, we can think of the tax system as increasing the yearly hours of non-market activity. (This aspect of the problem will be considered later.)

10/ For a discussion, see Ishikawa [17].

11/ In this atemporal model there is no saving.

12/ The inverse elasticity rule applies strictly only when the husband's and wife's labor supplies are independent of each other. The more general case with interdependent labor supplies is discussed in Appendix A.

13/ Although such a program would not be optimal, it might be superior to the present system in which household production is entirely untaxed. It would be necessary to compute the excess burdens associated with each of these suboptima in order to ascertain which was superior.

14/ Although this provision is not particularly unfair to wives as a group, it might be thought of as discriminating against households in which the wife has a relatively strong taste for engaging in market activity.

15/ As an alternative to calculating the value of time spent in home production, one might consider calculating the value of market substitutes for housewives' time. This approach also involves serious estimation problems.

16/ For a discussion of how the size of the 'marriage tax' varies with the spouses' incomes and number of dependents, see [22].

17/ Bittker argues that neutrality cannot be defined without prior agreement on what constitutes taxpaying capacity: "Neutrality...is a destination, not a guidepost" [3, p. 1449]. It is hard to see the basis for this argument.

18/ Note, however, that changes in the price of marriage might lead to divorce, separation or postponement of the date of marriage.

19/ In addition, there are some who believe marriage should not be discouraged because of moral principles.

20/ To the extent that unplanned children are a concern of tax policy makers, a fourth rationalization is possible. The exemption can be viewed as a form of insurance against unplanned children.

21/ For a more detailed defense, see [7].

22/ For a general theory of the optimal mix of "tax expenditures" and direct subsidies to achieve set goals, see Feldstein [11].

23/ For an interesting study of the determinants of the demand for children, see [12].

24/ The mathematical structure of the problem is as follows. Let the ith family's utility function be $U_i = U(L_{1i}, L_{2i}, Y_i)$, where the variables are as previously defined. Assume a linear tax function $T_i = a + bY_i - \zeta C_i$, where a is the (positive or negative) transfer payment per family, b is the marginal tax rate, ζ is the exemption per child, and C_i is the number of children in the ith family. The family maximizes utility subject to the budget constraint $Y_i = (1-b)W_{1i}(T-L_{1i}) + (1-b)W_{2i}(T-L_{2i}) - a + \zeta C_i$. Given a revenue constraint, R, the optimal exemption is part of the solution to the problem $\max_{a,b,\zeta} W = W(U_1,\ldots,U_N)$, subject to $\Sigma T_i = R$, where W is the social welfare function.

25/ This ignores the existence of 10-year grantor trusts, in which an individual can transfer a trust's income to his/her spouse for 10 years, at the end of which time the principle reverts back to the individual. It is not known how widespread the use of such trusts is.

26/ The study uses data from the year 1967. See [24].

27/ This should not be interpreted as an assertion that taxes have no impact on work effort. Other dimensions of labor supply such as human capital investment, occupational choice and time of retirement may very well be affected by the tax system.

28/ Interestingly, part of the case for the consumption tax relies on the application of optimal tax theory. When certain separability conditions on the intertemporal utility function are obtained, it can be shown that a consumption tax has a smaller excess burden than an equal yield income tax. See [10].

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APPENDIX A

The purpose of this appendix is to generalize the analysis of Section III to the case where the labor supply behaviors of the husband and wife are interdependent. The problem of efficiency is to choose a tax rate for the wife (t_2) and for the husband (t_1) to minimize excess burden:

$$(t_2 w_{2g}, t_1 w_{1g}) \begin{bmatrix} S_{L_2,w_2} & S_{L_2,w_1} \\ S_{L_1,w_2} & S_{L_1,w_1} \end{bmatrix} \begin{pmatrix} t_2 w_{2g} \\ t_1 w_{1g} \end{pmatrix}$$

subject to a revenue constraint $t_2(\bar{T}-L_2)w_{2g} + t_1(\bar{T}-L_1)w_{1g} = R$, where: w_{1g} and w_{2g} are the gross wages of the husband and wife, respectively; S_{L_2,w_2} is the compensated derivative of the wife's hours of work with respect to her net wage, and the other elements of the Slutsky matrix are defined analogously; and $\bar{T}$ is the time endowment.

In an interesting paper, Michael Boskin [5] has solved this problem using his estimates of the Slutsky matrix from econometric analysis of cross section data. According to his calculations, the leisure of husbands and wives should not be taxed at the same rate. Even given cross substitution effects, efficiency would be gained if wives were taxed less heavily than their spouses, the same general conclusion as was found in Section III.

APPENDIX B

In this Appendix it is shown that in general, efficiency will not require equal rates of tax on household and market activity. To do this, one version of Gronau's [13] model of family economic activity is used. Let M = market goods, H = home goods, L_1 = husband's leisure and L_2 = wife's leisure. Then family utility U is

$$U = U(M, H, L_1, L_2) \quad . \tag{1}$$

Market goods are produced by combining market inputs into the home production function process, X, and the time of the spouses. Assume that the husband devotes no time to household work, both spouses participate in the labor force, and home production is governed by a Leontief technology. These assumptions make the discussion easier, and for our purposes, result in no important loss of generality.

Under these assumptions,

$$H = \min\left(\frac{X}{\gamma}, \frac{T_2}{\delta}\right) \tag{2}$$

where $1/\gamma$ is the marginal product of market inputs in home production and $1/\delta$ is the marginal product of wife's time in home production (T_2). Inputs thus vary proportionately with amounts of home goods produced.

$$X = \gamma H \tag{3}$$

$$T_2 = \delta H \ , \tag{4}$$

so that the price of home goods, π, is given by

$$\pi = \gamma p_x + \delta w_2 \ , \tag{5}$$

where p_x is the price of market inputs into home production, and w_2 is the wife's price of time (equal to her market wage since she participates in the market).

Finally, note that the family budget constraint can be written

$$p_m M + p_x X = w_1(\bar{T}-L_1) + w_2(\bar{T}-T_2-L_2) + V , \qquad (6)$$

where p_m is the price of market goods, $\bar{T}$ is the time endowment, w_1 is the husband's price of time, and V is non-labor income.

Suppose the husband's earned income is taxed at rate t_1, wife's earned market income at t_2, and the value of wife's time spent in the home at t_H. This changes the prices of the items in the utility function in the following way: the price of husband's leisure goes from w_1 to $w_1(1-t_1)$; the price of wife's leisure goes from w_2 to $w_2(1-t_2)$; and the price of home goods goes from $\gamma p_x + \delta w_2$ to $\gamma p_x + \delta w_2(1+t_H)$. Therefore, the excess burden of the tax system can be written as

$$(\delta_2 w_2 t_H, \; - t_1 w_1, \; - t_2 w_2) \begin{bmatrix} S_{H,\pi} & S_{H,w_1} & S_{H,w_2} \\ S_{L_1,\pi} & S_{L_1,w_1} & S_{L_1,w_2} \\ S_{L_2,\pi} & S_{L_2,w_1} & S_{L_2,w_2} \end{bmatrix} \begin{pmatrix} \delta_2 w_2 t_H \\ -t_1 w_1 \\ -t_2 w_2 \end{pmatrix} \qquad (7)$$

where the S_{ij} are the components of the appropriate Slutsky matrix.

If (7) is minimized subject to the revenue constraint

$$(\bar{T}-L_1)w_1 t_1 + (\bar{T}-L_2-T_2)w_2 t_2 + T_2 w_2 t_H = R ,$$

we find

$$t^*_H = -\frac{1}{2} \frac{\begin{vmatrix} S_{L_1,w_1}w_1^2 & S_{L_2,w_1}w_1w_2 & \lambda(\bar{T}-L_1)w_1 \\ S_{L_2,w_1}w_1w_2 & S_{L_2,w_2}w_2^2 & \lambda(\bar{T}-L_2-T_2)w_2 \\ -S_{L_1,\pi}w_1\delta_2w_2 & -S_{L_2,\pi}w_2^2\delta_2 & \lambda T_2w_2 \end{vmatrix}}{\Delta} \qquad (8)$$

$$t^*_2 = -\frac{1}{2} \frac{\begin{vmatrix} S_{L_1,w_1}w_1^2 & \lambda(\bar{T}-L_1)w_1 & -S_{L_1,w_1}w_1\delta_2w_2 \\ S_{L_2,w_1}w_1w_2 & \lambda(\bar{T}-L_2-T_2)w_2 & -S_{L_2,\pi}w_2^2\delta_2^2 \\ -S_{L_1,w_1} & T_2w_2 & S_{H,\pi}w_2^2\delta_2^2 \end{vmatrix}}{\Delta} \qquad (9)$$

where $\Delta = \begin{vmatrix} S_{L_1,w_1}w_1^2 & S_{L_2,w_1}w_1w_2 & -S_{L_1w_1}w_1\delta_2w_2 \\ S_{L_2,w_1}w_1w_2 & S_{L_2,w_2}w_2^2 & -S_{L_2,w_1}w_1\delta_2w_2 \\ -S_{L_1,w_1}w_1\delta_2w_2 & -S_{L_2,\pi}w_2^2\delta_2 & S_{H,\pi}w_2^2\delta_2^2 \end{vmatrix}$

and λ is the Lagrangian multiplier associated with the revenue constraint. It is clear from a glance at the expressions for t^*_2 and t^*_H that only in very special cases will they be equal--'neutrality' is in general inefficient.

In the absence of reliable estimates of elements of the Slutsky matrix and the parameters of the household production function, is there anything else to be said about the neutrality issue? If it is assumed that household demand for home goods is relatively inelastic and cross effects are all 'small,' then the inverse elasticity rule suggests that t_H should be higher than t_2 at the optimum. Suppose, however, that for reasons of administrative feasibility t_2 must be zero. Can anything be done to reach the optimum? In this model, since market inputs are perfect complements to wife's time, they can be taxed instead. More specifically, suppose that the value of t_H which minimizes (7) is t_H^* , that is, $\pi^* = \gamma p_x + \delta w_2(1+t_H^*)$. Then a tax on market inputs, t_x^*, can be found such that $(1+t_x^*)\gamma p_x + \delta w_2 = \gamma p_x + \delta_2(1+t_H^*)$.

In a model with a more general specification of the household production process, we might still want to tax household inputs to gain efficiency, but without perfect complementarity, the relationship between t_H^* and t_x^* would be more complex.