Economic Models of Family Decision-Making, with Applications to Intergenerational Justice

by

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Abstract

The thesis considers economic models of family decision-making, and their application to intergenerational justice. The predictions of several previous "cooperative" models of family decision-making depend crucially on the outcome of failure of spouses to cooperate. The first part of the thesis develops a model which predicts behaviour of caring spouses who fail to cooperate.

The model has three distinctive features. First, caring between spouses is modelled using sympathy preferences. Second, transfers between spouses are made in income. Third, the interdependence between family members is resolved in two ways; first, assuming that family members have Cournot-Nash conjectures, that is, they maximize their own well-being taking the other family member's behaviour as given and, second, assuming that family members have rational conjectures.

The model predicts how the division of income between spouses influences the outcome of family decision-making. When each spouse has enough income to pay for his or her personal expenditures, expenditures are determined by the interaction of both spouses' preferences. When one spouse is poor enough that she receives an income transfer from the other spouse, expenditures reflect the preferences of the wealthier spouse.

The second part of the thesis uses the model to analyze the tax treatment of the family. When spouses' incomes are comparatively equal, or when one spouse is dependent on the other, small government imposed transfers are irrelevant. However, if one spouse earns just enough to pay for her private consumption, income transfers between spouses have effects on social welfare.

The final part of the thesis considers intergenerational altruism in the "original position" described in Rawls' *Theory of Justice.* Intergenerational altruism is crucial to Rawls' account of justice between generations. It is argued that, given the nature of the choice problem, and concern for descendants strong enough to generate positive bequests, Rawls' intuition that intergenerational altruism guarantees intergenerational justice is correct. However, if each child has two concerned parents, and the conditions for intergenerational justice to hold are satisfied, small redistributions of income are irrelevant. This result leads to a re-examination of the intergenerational justice conditions and the background institutions for distributive justice.

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Chapter 1

Economic Models of Family Decision-Making: A Survey

In much of modern micro-economics, the family is conspicuous by its absence. In standard economics text, such as Varian (1987), decisions are made by "consumers". When the family is mentioned, it is usually considered to act as a single unit, maximizing a single, well-behaved, utility function.

A justification for treating the family as a unit is given by, for example, Samuelson (1956, p. 10): "blood is thicker than water". Yet appealing to blood ties is not satisfying on theoretical grounds. First, families are composed of individuals, and there are well-known difficulties with aggregating individual preferences into a group preference function (Arrow, 1963). Moreover, treating the family as a single entity violates the principle of methodological individualism, which states that "economic analysis always begins with the behavior of individuals" (Blaug, 1980, p. 49). Beginning with families is not the same.

It can be argued, in a Friedmanite spirit, that what matters is whether or not a family acts *as if* it were a single individual. But this positivist view does not imply that we can ignore the family. Possibly the family does act like a single individual, but we cannot establish whether or not it does until we compare an individually-based model of behaviour with a family-based model to see which best explains stylized facts about the world.

Furthermore, there are economically interesting questions which cannot be answered considering the family as a single unit such as: "Has increased female labour force participation made women better off?" "Do income support programs affect marital stability?"

The need to explain such phenomena as female labour force participation worked together with interest in methodological individualism to create an expansion of interest in modelling the family.[1] Leuthold's (1968) pioneering work seeks to explain female labour supply. Chiappori (1989, p.3) cites methodological individualism as a motivation for his work "Modelling a *group* (even if reduced to two participants) as if it were a single individual, hence, should be seen as a mere holistic deviation". Leuthold and Chiappori are two examples of a field growing rapidly enough for Pollak (1985, p. 581) to comment "Families are fashionable".

But what is a family? Perhaps the key feature of the modern Western family is caring or altruism. Altruism or caring between family members distinguishes a family from a household. A household is "either one person living alone or a group of people...living...at the same address with common housekeeping" (OPCS, 1981). In contrast, Fishkin (1983) defines the family as a group whose members have (among other attributes) "a close affective and physical relation". A single individual or two roommates form a household but not a family. Altruism has traditionally been considered by economists to be of major importance in explaining the behaviour of the family. For example, according to Marshall (1920, p. 20), "[F]amily affections generally are [a] pure form of altruism". The regularity of altruistic

[1]Other, less charitable explanations might be the desire to find new fields to publish in or new ways to manipulate major data sets.

feelings explains "the distribution of family income between its various members" and bequests. Altruism, in its pure and less than pure forms, is central to the economic models of the family which I develop in this thesis.

Two features common to many if not all families are shared living and descendants. The benefits of shared living enjoyed by families include consumption of goods which are public within the household, companionship, and economies of scale and division of labour in household production. Shared living benefits may be enjoyed by any family (families always contain at least one person), but are easiest to analyze in a two-person model, as there is an extensive literature on two-person decision-making, both cooperative and non-cooperative. Therefore agent's decisions on labour supply or family formation when there exist shared living benefits are generally analyzed in models of marriage - see Becker (1981b) for the division of labour or Lam (1988) for public goods. The analysis generally applies, however, to other two-person families, for example, an elderly mother living with her daughter, or two siblings.

The production of and care for children or descendants is perhaps the oldest reason for family formation. There are numerous aspects of child bearing and rearing which are of economic interest, for example, fertility decisions and the population growth rate, the effect of the presence of children on labour force participation, and the provision of health care and support for the elderly (by people caring for their parents). However, we will be interested, in this thesis, in the convergence of children and altruism in the form of concern for descendants. Concern for descendants has been central to analyses of savings and the effect of government debt (see, for example, Barro, 1974), as well as to accounts of intergenerational justice (Rawls, 1971).

In subsequent chapters we first develop models of family decision making which incorporate altruism and shared living, and then explore concern for descendants and intergenerational justice. But do we need new models to explain the family? In this chapter we summarize the economic literature on family decision-making, highlighting the strengths and weaknesses of previous models, and describe the plan of the remainder of the thesis.

1.1 Survey of the Literature

In the economics literature it is possible to identify four approaches to modelling decision making within the family. The first, the "cooperative" approach, assumes that the allocation of resources within the family is Pareto optimal. The "marriage market" approach of Becker (1973, 1974a, 1981b), Becker, Landes, and Michael (1977), Peters (1986) and Lam (1988) is cooperative, as is the "bargaining" approach of McElroy and Horney (1981) and Manser and Brown (1980). Lommerud (1989) develops a "voice" enforcement model, while Chiappori (1988, 1989) generalizes the cooperative analysis. The various cooperative models can be distinguished, first, according to how the benefits of marriage are modelled and, second, according to how the division of resources within the family is determined. The second approach to analyzing family decision making is "non-cooperative". The key assumption in the non-cooperative approach is that couples are not able to negotiate binding agreements before marriage. Examples of the non-cooperative approach are Leuthold (1968), Becker (1974b, 1981a), Ashworth and Ulph (1981), Ulph (1988) and Bragstad (1989). A third, "institutional" approach to modelling the family is found in Apps (1981). Apps uses trade theory to analyze the interaction between the household production sector and the public production sector. A final approach is that of transactions cost economics, described by Cheung (1972), Ben Porath (1980) and Pollak (1985). Transaction cost economics provides a "theory of the family" parallel to the "theory of the firm" developed by, for example, Coase (1937), Alchian and Demsetz (1972) and Hart and Moore (1988).

1.1.1 The cooperative approach

Cooperative models can be grouped into many person bargaining or marriage market models and two person bargaining models, including Nash bargaining models and voice enforcement models. Peters (1986) is an example of the first type of "cooperative" approach. Partners meet in the marriage market, and decide, first, whether or not to marry and second, the share of total income (M) going to the wife (X) and the husband (M-X). The benefits of marriage are measured by comparing the couple's total income when single with that available if married. Income when single is broadly defined to include "the value of potential new relationships". Income during marriage consists of a "valuable, though partially intangible output" which includes "children, love, security, companionship, money income from market work, and household goods from home production". It is worth stressing that the benefits of marriage in terms of love and companionship are not only assumed to be quantifiable, but that they are measured on a single scale along with money income and household goods. A couple will marry if total income when married is greater than total income when single, because it is then possible for the couple to marry and divide their increased total income in such a way as to make both better off than when single.

A couple must decide the share of total income when married going to each partner. Peters (1986) refers to Becker's (1973, 1981b) model of the marriage market to explain how income is divided. Becker (1973, 1981b) argues that the sharing rule is determined by the interaction of supply and demand in the marriage market. Supply and demand in turn reflect the income (defined to include love, companionship, and children) generated by marriage, the income available to members of each sex when single, and the supply of each sex. For example, an increase in the ratio of men to women increases the supply of men relative to the demand for men, and so "redistributes married output away from men and toward women" (Becker, 1981b, p. 42). It may also have indirect effects, for example, lowering the wages of single women[2], thereby increasing the supply of women to the marriage market and decreasing women's share of marital output. Though possibly not relevant to OECD countries, it is interesting to note that the marriage market analysis, like all the other analyses that will be discussed here, assumes that a woman controls the property rights in herself. If a parent or sibling decides who (and if) a woman is to marry, he may be able to extract any rent accruing to the woman by, for example, increasing the bride-price or decreasing the dowry.

A second variant of the cooperative approach considers two-person bargaining. Two-person bargaining models are developed in McElroy and Horney (1981) and Manser and Brown (1980). The papers are similar in key respects.[3] For the sake of exposition, I will consider the McElroy and Horney paper.

In McElroy and Horney's model, the gains from being married are given by the difference in utility between being married and being single:

$$U^i(x)-V^i(x,\alpha), \quad i=m,f \qquad 1.1$$

[2]With an abundance of men, employers may assume single women are likely to marry and quit work, hence place women in jobs requiring little training.

[3] The two papers model the gains from marriage in similar ways (although Manser and Brown allow for public goods within the household while McElroy and Horney do not), and both use bargaining models, but the specific bargaining solutions used are different: McElroy and Horney only consider the Nash solution, while Manser and Brown consider Nash, dictatorial and Kalai-Smorodinsky solutions.

The term $U^i(x)$ is spouse i's utility when he is married, $x=(x_m,x_f)$ is a vector specifying each spouse's consumption, α a variable indicating marital status and $V^i(x,\alpha)$ is the spouse's utility if he or she were to withdraw from the marriage. The Nash bargaining solution (Nash, 1953) predicts that the spouses divide consumption, x, so as to maximize the product of the gains from cooperation. Consumption is given by

$$\arg\max\,[U^m(x)-V^m(x,\alpha)][U^f(x)-V^f(x,\alpha)] \qquad 1.2$$

The term $V^i(x,\alpha)$ acts as a "threat" or "status quo" point in that it is only the gains to marriage above the status quo point which are bargained over in spouse's negotiations. The model is shown graphically in Figure 1.1. The curve MM represents the possible utility combinations when the spouses are married. The Nash bargaining solution means that, when MM is a straight line, the gains from staying married over and above the status quo levels are split 50-50.

Lommerud (1989) expands the cooperative approach in two respects. First, the benefits from marriage in terms of the division of labour and shared household consumption are modelled explicitly, using a production function for household goods.[4] Second, the allocation of income is agreed upon before marriage is entered so as to maximize a family welfare function which is the sum of the two spouses' expected utilities. The resulting allocation is utilitarian, that is, it will be equal if people have identical utility functions, but may be highly unequal. The novelty of Lommerud's approach here is the notion that a

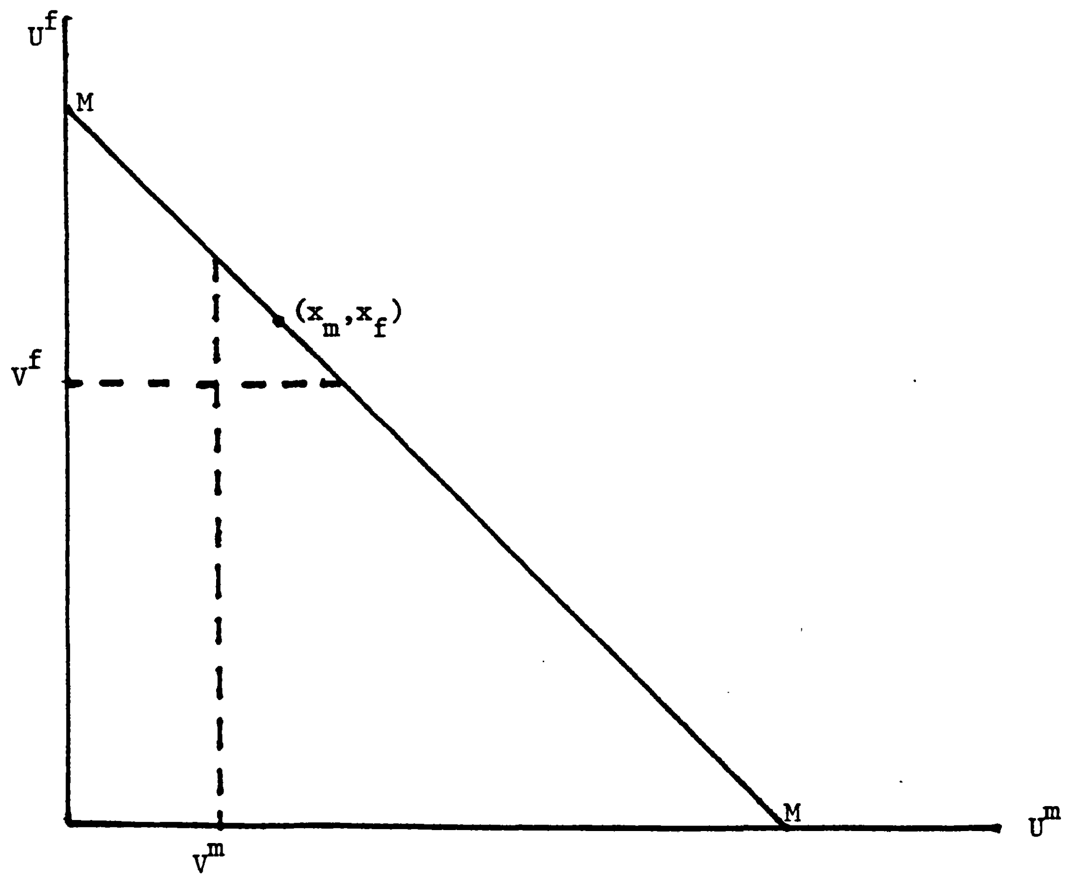
[4] The production function is given by

$$H=h^A f(\beta^A) + h^B f(\beta^B)$$

where H is household good, A,B refer to the spouse, h^i is spouse i's productivity coefficient, β^i the portion of his or her time spent in household work and $f(\beta)$ a common household production function (Lommerud, 1989, p. 116).

couple's implicit marriage contract is maintained through "voice enforcement". Because each spouse cares what the other thinks of him or her, each carries out the original, welfare maximizing agreement.

Figure 1.1: Cooperative bargaining



Considering the three cooperative approaches, that is, the marriage market approach, the bargaining approach, and the voice enforcement approach, it is apparent that a variety of Pareto optimal outcomes can emerge as the outcome of a cooperative model. Chiappori (1988, 1989) generalizes this insight. Instead of referring to a definite bargaining concept, he merely assumes that the household always reaches Pareto efficient agreements. The sharing of income between household members is determined by a sharing rule. Each household's sharing rule can be inferred by observation of the labour supplies of household members (Chiappori, 1989, p. 38). The major appeal of cooperative models is that they predict that family decision making is Pareto efficient. At the same time, however, there are two problems in applying certain of the cooperative models, specifically the "bargaining" and "marriage market" models. The first is defining the "threat point" in spouses' negotiations. The second arises in justifying the assumption, made, for example, in the marriage market model, that spouses are able to negotiate a binding contract specifying the division of the gains from marriage.

In the "bargaining" and "marriage market" models, each spouse's share of marital income is determined, at least in part, by his or her utility when single. For example, in McElroy and Horney's model, the income division maximizes the product of the two spouses' gains from marriage (equation 1.2). Utility when single is the "status quo" or "threat point" in reference to which income allocation is determined. For decisions which are made prior to marriage, utility when single is indeed the appropriate status quo point. Failure to reach an agreement results in the partners remaining single as in, for example, Becker's marriage market. For decisions made after marriage, however, the appropriate status quo point may not be utility when single. Divorce is not the inevitable result of failure to reach agreement, refusal to cooperate may be a more likely outcome. "Non-cooperative" models, discussed below, can be seen as an explanation of what happens when caring spouses fail to reach an agreement.

The observation that decisions may be made after marriage has occurred brings us to a more general difficulty with applying cooperative game theory to marriage. In a cooperative game players must be able to negotiate binding agreements about the allocation of resources; the presence of binding agreements is the key distinction between cooperative and noncooperative games (Friedman, 1986). For example, collusion in oligopoly is often prevented by the absence of a mechanism by which to enforce the cooperative outcome. There are two reasons why couples may not be able to negotiate a binding agreement before marriage. First, the courts generally do not (or, perhaps, cannot) intervene in the division of income between spouses, beyond enforcing a minimum liability to maintain, until they are in the process of divorcing. Second, bounded rationality and asymmetric information make it prohibitively costly to negotiate a long term contract specifying how each spouse should behave in any contingency (Pollak, 1985).

The cost of negotiating complete long-term contracts has been given as an explanation for the existence of firms. This literature, on "the theory of the firm", begins with Coase (1937), and has been developed recently by, for example, Hart and Moore (1988), and Grossman and Hart (1986). Both firms and families are institutions which structure complex, long-term relationships (Pollak, 1985, p. 583). The insights the theory of the firm literature offers to the understanding of families have been explored by Ben-Porath (1980) and Pollak (1985). This "transactions cost" approach is explored below.

The cooperative approach has intuitive appeal; it seems reasonable to believe, as Chiappori (1988, 1989) assumes, that families reach a Pareto efficient allocation of resources.

Yet there are gaps in the cooperative story that need filling in; a task which is undertaken by the non-cooperative, institutional, and transactions cost approaches.

1.1.2 The non-cooperative approach

The non-cooperative approach explains family decisions as the outcome of each family member maximizing his or her own well-being, taking the other's behaviour as given. The maximization is subject to constraints, namely, each spouse's budget constraint, and a constraint that both spouses receive enough utility within marriage that they prefer marriage to divorce.

Becker (1974b, 1981a) is perhaps the best known example of the non-cooperative approach. In Becker's model the household consists of two individuals; h (the altruist) and w (his spouse).[5] The altruist's utility function is given by:

$$U_h=U_h(Z_h,U_w(Z_w)) \qquad 1.3$$

where Z_i is spouse i's consumption of an aggregate commodity Z, and U_w is the wife's utility function:

$$U_w=U_w(Z_w) \qquad 1.4$$

The wife is assumed to be entirely selfish.

The spouses face the budget constraints:

$$Z_w=I_w+y \qquad 1.5$$

$$Z_h=I_h-y \qquad 1.6$$

where y is the net transfer from the altruist to his spouse, and I_i is spouse i's initial income.

[5] For the most part, I follow Becker's notation, including the use of the male pronoun for the altruist.

Initially, the income variable I_i is taken as fixed. With fixed initial incomes I_i, the only decision made by either spouse is the altruist's choice of how to allocate his initial income (I_h) into his own consumption (Z_h) and the transfers to his spouse (y). The decision is made by the altruist so as to maximize:

$$U_h(I_h-y, U_w(I_w+y)) \tag{1.7}$$

Provided I_h is high enough and I_w is low enough that the altruist is at an interior solution (y>0), the final levels of consumption (Z_w,Z_h) maximize the altruist's utility function (1.7). As Becker (1981b, p. 192) puts it, the family has a group preference function which is "identical to that of the altruistic head". If the household maximizes a single utility function, spouse i will not take actions which raise I_i but lower I_j more, for example, taking a job in another community, or reading in bed (when j wants to go to sleep).

> Each beneficiary, no matter how selfish, would maximize the family income of his benefactor, and thereby would internalize all effects of his actions on other beneficiaries (Becker, 1981a, p. 7).

Becker call this result the "Rotten Kid Theorem".

The key to the Rotten Kid theorem is to recognize that the wife's problem is to maximize 1.4 subject to the constraint (substituting for y in 1.5):

$$Z_w = I_w + I_h - Z_h$$

In effect, the wife's income is I_w+I_h-Z_h. However, suppose that the wife takes Z_h as given. She can maximize her own income (and hence her own utility) by maximizing the total household income, I_w+I_h. This proves the Rotten Kid theorem.

Becker's results rely on two strong hypotheses. First, maximization of the altruist's utility function requires a certain distribution of income between the altruist and his spouse, with I_h sufficiently greater than I_w that the desired income transfer, y, is positive. In Becker's terminology, the altruist must be "effectively" altruistic. It is entirely possible for a household to maximize h's utility function when his income is relatively high, maximize w's when she has a high income, and at other times compromise between the two. Moreover, the Rotten kid theorem does not tell us what happens if the poorer spouse has the option of increasing her income enough to gain independence, so that the richer spouse is no longer "effectively altruistic". Becker's arguments, which assume effective altruism, do not hold. We need a more complete model to specify what might happen.

A second assumption relates to the form of support provided by the altruist. Becker assumes that the altruist transfers income to his spouse, that the only good consumed is income, and that the altruist cares only about his spouse's utility. However, in a world with several goods it is entirely possible that the altruist's preferences over his spouse's consumption might differ from hers. For example, he might have imperfect knowledge of his wife's true preferences. While, in this case, the Rotten Kid theorem might hold, we would not necessarily expect the recipient spouse to spend the income transfer in complete accordance with the altruist's preferences, that is, the family's behaviour might not be perfectly described by the altruist's utility function.

Bergstrom (1989) gives a number of examples of cases where the Rotten Kid theorem may not hold. These arise when there is more than one commodity, for example, consumption now and consumption tomorrow. Bergstrom (1989, p. 1148) argues that the Rotten Kid theorem can be rehabilitated if conditional transferable utility is assumed and in certain other cases.

It is interesting to compare Becker's results with the predictions of Arrow's (1963) impossibility theorem. Arrow stressed the difficulties of aggregating individual preferences into a social welfare function. Becker's model is the only one discussed in this chapter which derives a well-behaved family preference function. However, the family preference function derived by Becker is, in Arrow's terms, "dictatorial". There is one person, namely the altruist, whose individual preferences are always reflected in the group preference function. Arrow (1963) takes as axiomatic that any group preference function is not dictatorial. Becker's derivation of a well-behaved family preference function is, therefore, in no way inconsistent with the predictions of Arrow's impossibility theorem.

Non-cooperative models of marriage which relax Becker's assumption of effective altruism are developed by Leuthold (1968), Ashworth and Ulph (1981), Ulph (1988) and Bragstad (1989). Leuthold develops a model in which each spouse maximizes a utility function of the form,

$$U_i=\beta_{1i}\log(Y-Y')+\beta_{2i}\log(L_i-L_i'), \quad \Sigma_j\beta_{ji}=1 \tag{1.8}$$

subject to the constraint

$$Y=\Sigma_{i=1,2}w_i(T-L_i)+R_i \tag{1.9}$$

where R_i is property income, L_i leisure, Y income spent on other goods, and X_i' subsistence requirements of good X. The spouses share all income, so have one budget constraint. Income is a local public good in that each spouse's utility depends on total family income. Interdependence in the spouses' optimization problems arises through income effects as each spouse adjusts his or her work decisions. Maximization of the utility function 1.8 yields a set of first order conditions which can be solved to produce labour supply functions of the form:

$$W_i=b_{0i}+b_{1i}(R/w_i)+b_{2i}(w_j/w_i)+b_{3i}(1/w_i) \tag{1.10}$$

where R represents property income, and the coefficients b_{ji} are defined as:

$$b_{0i}=d_i(T-L_i') \qquad b_{1i}=-(1-d_i)$$

$$b_{2i}=-(1-d_i)(T-L_j') \qquad b_{3i}=(1-d_i)Y' \qquad 1.11$$

where $d_i=\beta_{1i}/(1-\beta_{2i}\beta_{2j})>0$.

Leuthold's estimate of equation 1.10 is presented in Table 1.1. Her results were obtained using a 1962 U.S. cross-section survey of 3,396 households. The sample was weighted to compensate for an over-representation of low income households. Wage rates were measured on an hourly basis; time worked in hours per year. I have not reported several dummy variables from the male labour supply equation; the constant b_{01} is for a married man with no children under 6.

By comparing the estimates in Table 1.1 with the interpretation of the parameters it can be seen that all the coefficients have the predicted sign.

Table 1.1: Leuthold's reduced form estimates

	b_{0i}	b_{1i}	b_{2i}	b_{3i}
i=1[a]	1349[b]	-0.0063	-17.4	32.8
	(90.5)	(0.0047)	(21.9)	(7.6)
i=2	40.11	-0.2089	-244.6	600.8
	(13.89)	(0.0344)	(37.)	(38.7)

a) 1=head (male) 2=spouse (female)

b) Several dummy variables are omitted. The constant term given is for a married man with no children under 6.

The numbers in parenthesis are the standard errors.

Table 1.2: Derived structural form estimates

	β_{1i}	β_{2i}	$T\text{-}L_i^{a}$	$T\text{-}L_i^{b}$
i=1	0.9920	0.0080	1171	1358
i=2	0.7898	0.2102	2762	50.7

a) calculated as b_{2j}/b_{1j}
b) calculated as $b_{0i}/(1-b_{1i})$

It is possible to solve for the utility function parameters β_{ij}, as shown in Table 1.2. Several points about Table 1.2 are worth noting. First, the high estimate of β_{1i} showing a high preference for earnings may reflect caring between spouses, as each desires to earn income to contribute to household expenditures which benefit both. Second, the disparity between the time surplus estimates in columns 4 and 5 may be due to the low significance level of b_{11}. The higher estimates implied by b_{11} are, however, quite reasonable. Full-time work requires about 2000 hours per year, so one would expect time surplus to leisure requirements to exceed that amount. The subsistence income requirements may be estimated as $Y'=-b_{31}/b_{11}=5206$ or $Y'=-b_{32}/b_{12}=2876$. The higher of the two estimates is based on b_{11}, which is not significant. The lower of the subsistence income requirements, \$2876, is reasonable, considering that the study uses 1962 data.

Leuthold's research was carried out in 1968 using 1962 data. She, like Becker (1974b), takes a non-cooperative approach to family decision-making. However she begins with the premise of a common budget constraint, which leads to the prediction that the family's behaviour cannot be described by maximization of one spouse's utility function. Ashworth and Ulph (1981) develop a generalization of the Leuthold model of family labour supply which permits them to test the Leuthold specification of labour supply against the neo-classical model.

Ashworth and Ulph adopt a transcendental logarithmic function as the form of the utility functions for both the neo-classical and the Leuthold specification. A sample of eighty-eight households is used to estimate the model. The sample is limited to married men whose wives worked more than eight hours in the week and have no children under eleven years of age. The budget constraint is linearized by using the net marginal wage that individuals face, given the hours they actually work, and adjusting the non-employment income terms to compensate (Ashworth and Ulph, 1981, p. 125).

Table 1.3: Leuthold versus Neo-classical Models

Leuthold	Wage elasticity: Uncompensated	Wage elasticity: Compensated	Total Income Elasticity
Own wage			
men	-1.10	0.47	-1.47
women	-4.46	-5.02	0.56
Spouse wage			
men	5.05	6.41	
women	0.87	1.48	
Neoclassical			
Own wage			
men	-0.03	2.17	-2.21
women	-1.18	-1.14	-0.04
Spouse wage			
men	1.73	1.81	
women	-0.16	0.75	

Source: Killingsworth (1983)

Ashworth and Ulph's findings are summarized in Table 1.3. The results presented in Table 1.3 are, for the most part, consistent with *a priori* expectations. For example, for men an increase in own wage rates causes a substitution towards more work effort, but the substitution effects are dominated by a larger income effect, leading to a backwards bending labour supply curve. The one anomalous finding is a positive compensated own wage elasticity for the wife in both the Leuthold model and the neo-classical model. This result suggests that there may be a need to improve the procedure used in estimating the models, a point noted by Ashworth and Ulph (1981, p. 131). However, Ashworth and Ulph's empirical work supports the Leuthold model over the neo-classical model. A likelihood ratio test aimed at determining which model best explains the observed data supports the Leuthold model at the five per cent significance level.

Despite some unexpected findings, Ashworth and Ulph's estimates demonstrate that the choice of the Leuthold over the neo-classical model matters. For example, the income elasticity of the wife's labour supply is positive in the Leuthold model and negative in the neo-classical model. As Ashworth and Ulph (1981, p. 127) point out "While we have no way of knowing whether these results are significantly different statistically, the policy implications of using one set of elasticities rather than the other are likely to be very different." The significance of Ashworth and Ulph's work is that they demonstrate, first, that it is possible to test the neo-classical model against household models and, second, that the choice of model affects the estimates of income and substitution effects.

Recent work which has expanded upon the Leuthold (1968) theoretical framework includes Ulph (1988) and Bragstad (1989). Ulph (1988) develops a single framework within which Leuthold's and Becker's models emerge as special cases. Like Leuthold, Ulph allows each family member to maximize their own utility function. He departs from Leuthold, however, in allowing individual budget constraints. The individual budget constraints reduce to Leuthold's single budget constraint if both spouses spend part of their income on the same commodities. The model is equivalent to Becker's when one spouse earns enough of the household income to be effectively altruistic. His work has a number of parallels with the non-cooperative model of Chapter 2, and so I will not discuss it in detail here.

Bragstad's (1989) model, like Leuthold's, has individual utility functions and a common budget constraint. Her innovation is to introduce the concept of a threshold. In terms of housework, one's threshold is the point at which the kitchen/carpet/cupboard under the stairs becomes so dirty that one's utility drops to zero unless some cleaning is done. Men and women may differ in their thresholds due to social norms. Bragstad shows that small differences in thresholds may give rise to large discrepancies in the amount of resources devoted by each individual to housework, particularly if pre-commitment is allows.

The strength of the neo-classical models is that they avoid the two weaknesses of the cooperative approach, that is, the possibly unrealistic assumption that spouses are able to negotiate binding agreements and, second, the reliance on an arbitrarily defined status quo point. Much of the remainder of this thesis will focus on the non-cooperative approach to modelling marriage. However, to put the remainder of the thesis into perspective, it is worthwhile to consider the remaining two approaches to modelling the family: Apps' (1981) "institutional" approach and Pollak's (1985) "transactions cost" approach

1.1.3 The "Institutional" Approach

Apps (1981) takes an "institutional" approach to modelling intra-family income allocation. The approach uses a two sector trade model, as in the work of Harberger (1962). The two sectors may be interpreted as household production and market production (Apps, 1981, p. 48). Trade between the sectors takes place within families. For example, a dependent spouse may trade household services for support. The novel feature of Apps' model is the introduction of institutional restrictions on mobility between the sectors which cause certain groups to be "crowded" in one sector of the economy. Specifically, women are crowded into the household production sector.

Two crucial issues are, first, how crowding is enforced and second, why it occurs. Crowding can be enforced by such social attitudes as "a woman's place is in the home" or by legislation restricting women's working hours and conditions. Men may have power to control social attitudes because, historically, their greater physical strength has given them greater physical power and led to the acquisition of wealth and hence political power (Apps, 1981, p. 5). But why would men want to crowd women into the household sector? One reason is that crowding results in higher wages in the uncrowded sector. A second reason is that a man cannot easily identify his own children. "For a man to acquire own children he must persuade a woman to agree to a relationship, such as marriage, which is sufficiently monogamous for him to identify own children" (Apps, 1981, p. 54). It will be easier for men to persuade women to enter such a relationship if women's opportunities outside are marriage are limited. Accordingly, men restrict women's opportunities, and crowding occurs. Men are able to enforce crowding because of their greater political and economic power. They desire to enforce crowding to raise their incomes and produce own children.

In Apps' model the division of income within marriage is determined by the terms of trade between the household and market sectors of the economy, which are a function of the severity of crowding and the factor intensities in each sector. Crowding of women in the household sector lowers their wages[6] (in terms of the payment for their household services) relative to those enjoyed by men in the uncrowded sector of the economy. There is no presumption of equality within the family if women are crowded and have little capital.

If women have less income than men in marriage, why do they marry? Social attitudes and lack of human capital limit women's opportunities outside the family (p. 50). Yet is seems reasonable to suppose that a competitive firm would be prepared to hire a single women endowed with high levels of human capital, providing that the cost of violating social

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[6]In the short run. In the long run wage differentials are compounded by differences in the rate of capital accumulation.

customs was fairly low. A second explanation is that, within the family, there are gains from trade. Even with crowding, the gains from trade may be sufficient to induce women to marry.

Apps' model can be thought of as putting flesh on Becker's (1981b, 1973) model of the marriage market. It expands on Becker's model in two respects. First, trade between men and women occurs not once, as in Becker's marriage market, but on an ongoing basis. Second, Apps' model explains the determinants of each spouse's reservation price in terms of institutional constraints. While there are difficulties in explaining why social constraints are not eroded by competition, Apps' model captures elements of the real world missing from every model discussed so far.

1.1.4 The Transaction Cost Approach

The transaction cost approach (Cheung, 1972; Ben-Porath, 1980; Pollak, 1985) has links with both the institutional and the non-cooperative approach. Like Apps' approach, the transaction cost approach focusses on institutional structures. It seeks to explain why certain forms of production take place within the family. Like the non-cooperative approach, it recognizes that couples do not order their affairs after marriage by writing a contract before marriage. Pollak (1985) is the most comprehensive exposition of the transaction cost approach, and it is on his work that I focus here. He seeks to explain, first, the advantages and disadvantages of the family as a production unit and, second, the nature of the marriage contract. I will discuss both aspects of Pollak's theory, and contrast these with the growing literature of the theory of the firm.

Pollak (1985) discusses both the advantages and disadvantages of organizing production within the family. First, the family is able to monitor its members closely. For example, the family has a particular advantage in providing insurance because within family monitoring can overcome the problems of adverse selection and moral hazard (see also Kotlikoff and Spivak, 1981). Second, the family can offer emotional incentives or punishments, such as expulsion from the family, that is, it can use "voice" to enforce contracts, as Lommerud (1989) notes. Yet the family also has disadvantages. Emotional conflicts or loyalties can spill over into and disrupt economic relationships. The emotional punishments available to the family may be so severe that they are rarely enforced. Finally, the size of the family may limit the scope of family economic activity. Family size may prevent the realization of technologically achievable economies of scale. In the provision of insurance within the family, limits on the number of family members mean limits on the amount of risk pooling. Where technology is complex, limited family size may mean that it is hard to find enough family members capable of doing the job. The advantages and disadvantages of organizing production within the family stem from the intertwining of economic and emotional relationships.

Pollak's explanation of why production takes place within families has parallels to Alchian and Demsetz's (1972) explanation of the emergence of firms. Alchian and Demsetz (1972) focus on monitoring. If production is a team process, that is, each individual's output cannot be directly observed, each team member will have an incentive to shirk his duties. For example, pushing a car is a team process, and each member of a car pushing team may be better off if he shirks and lets others do the pushing. Monitoring prevents firm members from shirking their duties. However, there is a problem with implementing monitoring, namely, who will monitor the monitors? Alchian and Demsetz (1972) argue that monitors themselves will not shirk if they "receive the residual rewards from production" (p. 782). It is the receipt of residual rewards, along with a number of other rights[7] which defines ownership of a firm.

In families there may be one residual claimant or several[8]. In modern Western families, where much of family income is shared either directly, through gifts or transfers, or indirectly, through the purchase of goods consumed jointly by all family members, every family member is, to a greater or lesser extent, a residual claimant. Each has an incentive to monitor the others' performance. Monitoring will be possible to the extent that family members work on separate tasks while living together, hence are able to observe each other's behaviour. Because every family member could monitor every other one, the power of families to monitor is, potentially, greater than the power of firms.[9]

The second part of Pollak's (1985) theory considers the nature of the marriage contract. Pollak stresses that it is impossible for individuals to write a long-term marriage contact which specifies what actions each should take in every possible contingency. Yet when contracts are incomplete agents' actions in the event of uncovered contingencies must be negotiated under circumstances which may give one party or the other a strategic advantage (Pollak, 1985, p. 596). One spouse may be opportunistic, taking advantage of the other's weakness. Opportunistic behaviour can be prohibited by legal rules and social

[7]Specifically, rights to observe input (firm members') behaviour, to be the central party common to all contracts, to alter membership of the firm, and to sell these rights (p. 783).

[8]Examples of family structures with one residual claimant are early twentieth century China (Cheung, 1972) or eighteenth century England (Pollak, 1985). In China, for example, the head of the household, the eldest male, had rights over all family members' earnings.

[9]Pollak (1985) recognizes that families have an advantage over firms in certain dimensions of monitoring. He ascribes this to loyalty. "[F]ulfilling family obligations becomes a source of pleasure, pride and satisfaction, and violating them a source of guilt" (p. 556). He notes that loyalty may be a consequence of the particular incentive and monitoring aspects of the family.

institutions, which treat the ongoing relationships between the parties rather than the contract as central (p. 596). Yet it is not obvious why in certain societies, social institutions have given all marital rights to men, and in other societies, husbands and wives have equal rights.

The theory of the firm makes a number of predictions about the nature of contracts between members of firms (see, for example, Hart and Moore, 1988). However, there are two reasons why their analysis cannot be applied directly to families. First, in the theory of the firm, the nature of a firm's assets are crucial in determining the firm's ownership structure. Unfortunately, a family's assets are not easily defined. It could be argued that a family's assets should include, for example, its children or the fecundity of its female members. Yet to include people as assets is to presuppose that people can be completely controlled, that is, they could be slaves. Second, in the theory of the firm (as developed by Hart and Moore, 1988), the production process in terms of the relationships between individuals' human capital investments, their access to assets, and their productivity are crucial in determining the nature of the contract between firm members. To apply the theory to the family, we need models of family production processes. For example, it is possible to argue that men should have sole rights over their children on the following grounds. A man, once conception has occurred, can behave opportunistically, that is, refuse to support the mother of his child during pregnancy. A woman cannot behave opportunistically if abortion is not available, that is, she must carry the fetus to term. If a man's support is indispensable to a woman during pregnancy, it may be efficient for him to have all rights in the child. At the same time, if a woman's actions during pregnancy have effects on the fetus's health (for example, smoking or drinking), it may be efficient for rights in the child to be shared. The efficient allocation of rights will depend upon the hypothesized nature of the production process.

The transaction cost approach yields insights and generates new questions. It provides novel explanations of the benefits to family organization, specifically, monitoring and incentive advantages. It stresses the incompleteness of contracts between family members. Yet by stressing the importance of social institutions in structuring relationships between family members it raises the question: what determines the nature of social institutions? Turning to the theory of the firm provides no easy answers, but points to issues which need further consideration, specifically, the nature of a family's assets and the production process within a family.

Conclusions

This chapter has surveyed four approaches used in the economics literature to understand the family; the cooperative, non-cooperative, institutional and transaction cost approaches. Models of the household can be distinguished first, according to how the division of resources within marriage is determined, and second, according to how the benefits of marriage are modelled.

In the cooperative approach, the division of resources is determined by an agreement reached prior to marriage. There are a variety of ways of modelling the cooperative agreement, ranging from Becker's (1973, 1981b) marriage market model to McElroy and Horney's (1981) Nash bargaining model and Chiappori's (1988, 1989) model, which allows any Pareto optimal agreement to emerge as a cooperative solution. In the noncooperative approach, the division of resources is determined by each spouse maximizing his or her own utility taking the other spouse's behaviour as given. In Apps' institutional approach, the division of resources is determined by the terms of trade between the market and household sectors of the economy. The transaction cost approach does not give any clear-cut predictions about how resources are allocated within households. However, it predicts that the rule for sharing household resources will influence family member's incentives.

There are a variety of ways of modelling the benefits from family formation. The first is to amalgamate all the benefits of marriage into income (Becker, 1973, 1974a,b, 1981a,b; Peters, 1986) or into a utility parameter (McElroy and Horney, 1981). The second is to model explicitly the household production process (Lommerud, 1989). A third approach is to allow income or goods to be jointly consumed by all family members (Leuthold, 1968; Ashworth and Ulph, 1981; Ulph, 1988, Bragstad, 1989). The first of these ways of modelling is used in both the non-cooperative and cooperative approaches, the second is used primarily in the cooperative approach, and the third primarily in the non-cooperative approach.

A fourth way of modelling the benefits from family formation is in terms of the gains from trade between the household and market sectors of the economy, as Apps (1981) does in her institutional approach. A fifth way of modelling the benefits from family formation is found in the transaction cost approach, especially Pollak (1985). Pollak stresses the family's advantages in monitoring and incentives, and its disadvantages in terms of limited size.

The various models of the family have advantages and disadvantages. There are two issues which have not been fully resolved in the literature to date. The first is the tension between the reasonableness of the cooperative models' presumption that families cooperate and the empirical observation that family members are unable to commit themselves to cooperative behaviour through binding contracts. The second issue is caring. Caring between spouses is modelled in a variety of ways. In Becker's (1973, 1981b) and Peters' (1986) marriage market, caring is a form of income, and can be fully monetized. In Becker's (1974b, 1981a) model, only one spouse, the household head, cares for the other. In Ulph (1988) caring is modelled in terms of joint consumption, that is, if a person cares for the other, he cares about her consumption. In Lommerud (1989) caring is an explanation of "voice" enforcement of contracts. In the transaction cost approach, emotional relationships are a source of the family's monitoring and incentive advantages. However, in a number of these models, caring is amalgamated with, and indistinguishable from, other gains to marriage. Caring is not modelled explicitly. In chapter 2 we develop a model which models caring in a new way. First, however, we will outline the plan of the remainder of the thesis.

Outline for Chapter 2 to Chapter 5

The aim of the thesis is to develop economic models of family decision-making, and use the models to analyze family taxation policy and intergenerational justice. Chapter 2 develops a model of family decision-making which incorporates caring in a new way, that is, using the notion of sympathy preferences. One additional distinctive feature of the model is that transfers between spouses are made in income. An extensive empirical literature on income transfers within marriage can be used to test the predictions of the model. A second distinctive feature is that the interdependence between family members' optimization problems is resolved in two ways; first, with the Cournot-Nash solution and, second, with the concept of rational conjectures.

The model illustrates how, when individuals retain control of their earnings, the division of income between spouses influences the outcome of family decision-making. At an "interior solution", when spouses' incomes are comparatively equal, expenditures patterns are determined by the interaction of both spouses' preferences, and the equilibrium is unaffected by small redistributions of income. At a "no-transfers corner solution", when one spouse is too poor to contribute to public goods expenditures, but not poor enough to receive income transfers from the other spouse, income redistribution is no longer neutral. Changes in relative incomes change expenditure patterns. However, at the "positive transfers solution", when one spouse is poor enough that she receives an income transfer from the other spouse, expenditures reflect the preferences of the wealthier spouse.

Chapter three considers the aims for government taxation policy towards the family. Two issues are discussed, that is, neutrality as an aim for government policy and the treatment of caring between individuals in welfare analysis. As regards neutrality, it is argued that it is impossible for government's treatment of the family to be neutral in every respect within a progressive tax system. Alternative conceptions of neutrality need to be traded off against each other, and against other aims for government policy, such as equity or the public interest. The second issue discussed is the treatment of caring between individuals. Here a range of views, including those of Barry (1989), Dworkin (1977), Griffin (1986) and Sen (1966) are discussed.

The fourth chapter of the thesis considers the optimal tax treatment of the family using the model developed in Chapter 2. The results obtained in the chapter illuminate the properties of the model of family decision making. Two cases are considered: first, a linear income tax and, second, lump-sum taxes. In analyzing the linear income tax we find, somewhat surprisingly, a rationale for a higher tax rate on the second earner than has been suggested elsewhere in the literature. The lump-sum tax provides an illustration of the trade-off between equity and efficiency. Equity requires that the incomes of both spouses be equilibrated; efficiency requires a certain amount of inequality, as that leads to an increase in the level of household expenditures.

The final chapter of the thesis considers inter-generational altruism and the irrelevance of redistribution in Rawls' original position. Chapter 2 developed the idea that, under certain conditions, redistribution of income between family members is irrelevant. Chapter 5 argues that, given the nature of the choice problem, and concern for descendants strong enough to generate positive bequests, Rawls' intuition that intergenerational altruism guarantees intergenerational justice is correct. However, if each child has two concerned parents, and the conditions for intergenerational justice to hold are satisfied, income redistribution is irrelevant.

Chapter 2

A Non-cooperative Model of Family Decision Making

This chapter develops a two person non-cooperative model of family decision-making. As in Leuthold (1968) and Ulph (1988), family decision making is modelled as the outcome of individual, rather than household, optimization. Caring between the two individuals - the "spouses" - is incorporated through "sympathy preferences"; a concept used in other contexts by Arrow (1963), Sen (1966), and Harsanyi (1955, 1977). The interdependence between the spouses' optimization problems is resolved in two ways; first, using the conventional Cournot-Nash solution, and second, using the concept of rational conjectures developed by Ulph (1980), Laitner (1980) and Bresnahan (1981).

One distinctive feature of the model is that transfers between spouses are made in income, which is then used to purchase commodities. The main advantage of this approach is that there is an extensive empirical literature on income transfers within households (see, for example, Pahl, 1983), which can be brought to bear on the empirical predictions of the model.

The first section of the chapter sets out the spouses' optimization problems. The following three sections solve three variants of the model; the Cournot-Nash equilibrium solution, the rational conjectures equilibrium solution, and the solution when couples adopt a shared management system.

The first variant of the model considers a Cournot-Nash equilibrium. The model is similar to those of Leuthold (1968) and Ulph (1988). The differences lie in the modelling of individual preferences, the treatment of labour supply and public goods, and the form taken by transfers between spouses. The Cournot-Nash equilibrium is criticized in oligopoly theory on the grounds that "firms base their decisions on the assumption that their rival will not react to changes in their output. Yet this assumption gives rise to negatively sloped reaction curves which falsify the underlying conjecture (Ulph, 1983, p. 131)". The same criticism applies in more force within a family, where individual preferences are more likely to be known, and responses are more easily predicted. A solution concept which avoids the inconsistency of the Cournot-Nash equilibrium is rational conjectures, developed in Laitner (1980), Ulph (1980, 1983), and Bresnahan (1981). Section 2.3 defines rational conjectures formally, and solves the second variant of the model, which assumes rational conjectures.

In the first two variants of the model the nature of the equilibrium is found to depend upon the distribution of income, including property income, between spouses. When one spouse is much wealthier than the other, aggregate family demands are essentially those that would prevail if the family maximized the wealthier spouse's welfare, as in Becker (1974b, 1981a,b). If the two spouses are relatively equal in income, aggregate family demands have certain familiar properties; specifically, they are locally independent of the distribution of family income between the spouses. In the intermediate case, between equality and substantial inequality, the distribution of income (including property income) does shape expenditure patterns, contrary to the predictions of the neoclassical model.

The third variant of the model, solved in Section 2.4, describes a shared management system, under which all family members have equal access to household funds. Couples may guarantee equal access by making financial commitments, such as joint ownership of major assets. The predictions of the shared management model are essentially the same as those of the Cournot-Nash model when spouses are relatively equal.

2.1 The Model

Two spouses, the husband, h, and wife, w, maximize welfare subject to two types of constraints.[1] Time constraints are the same in each variant of the model. Budget constraints vary, with individual control budget constraints holding in the first and second variant of the model, and a shared management budget constraint applying in the third variant.

The time constraints are easily described. Each spouse i allocates a fixed amount of time, T, between leisure, L_i, and market work, W_i, so that:

$$L_i+W_i=T \qquad 2.1$$

Neither spouse engages in household production. This may be thought of as the result of an earlier cost minimization, in which the couple found that working and buying market goods was cheaper than producing goods at home.[2]

The budget constraints summarize two pieces of information; the funds to which each spouse has access, and the expenditures for which he or she is responsible. In terms of

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[1] Although I use the terms husband and wife, the analysis applies equally to any cohabiting couple.

[2] Such a result would require both spouses' wage rates to be high relative to their home productivity, the price of market substitutes for home produced goods to be relatively low, and the price of material inputs to home production to be relatively high.

access, there are two possibilities; individual control and shared management. Individual control means that each spouse has access to his or her income. Neither spouse has guaranteed access to his or her spouse's income. Each spouse is responsible for certain expenditures, and the couple may maintain a joint account for general household expenses. In Britain, individual control is the status quo which will prevail unless spouses commit themselves to another system, in as much as each partner is the direct recipient of his or her earnings. The alternative to individual control is shared management, under which each spouse has guaranteed access to all household funds. An example of a completely shared management system would be a couple whose earnings and all other income were paid into a joint bank account.

Individual control households vary according to the division of responsibility for household expenditures. Pahl (1983) identifies three budgeting systems which fall into my "individual control" category; the allowance, independent management, and whole wage systems.[3] Under an *allowance system*, one earner gives the other a set allowance; each is responsible for specific items of household expenditure, P_i, and his or her personal expenses, Q_i. With an *independent management* system, each household member is again responsible for specific expenditures, but there is no set allowance. With a *whole wage* system, one partner, usually the wife, administers the couple's finances, except for the other's personal spending money. Both the independent management and whole wage systems are special cases of the allowance system. Under an independent management system, the allowance is

[3] Pahl's classification system is also used by McRae (1987). Variants of Pahl's system are used by Edwards (1981) and Gray (1979).

nil. With a whole wage system, the allowance is equal to the husband's income, less his personal spending money.

The systems may be represented by the budget constraint:

$$R_i+w_iW_i=p_1P_i+p_2Q_i+\pi_{ij} \tag{2.2}$$

Where R_i is spouse i's property income, w_i is spouse i's wage, π_{ij} ($=-\pi_{ji}$) is the net transfer from spouse i to spouse j, and p_1 and p_2 are the prices of P and Q respectively. Under an independent management system, $\pi_{ij}=0$. With a whole wage system, with the husband as primary earner, $p_1P_h=0$, and $\pi_{hw}=w_hW_h-p_2Q_h$. In this context a transfer of income is taken to mean a transfer of decision making as well as a transfer of funds. The recipient completely controls the money transferred to him or her. So, for example, a transfer of thirty pounds accompanied by a bill for that amount is not a genuine transfer; one spouse is executing the other's purchase decisions. A transfer should be distinguished from a "housekeeping allowance" part of which may be allocated to specific expenditures the magnitude of which is decided by the husband (examples might be the husband's shirts or car repairs).

Under a *shared management* system, the couple pools all income. Both partners have access to and responsibility for the common pool. The budget constraint with shared management system is given by:

$$\Sigma_{i=w,h}(R_i+w_iW_i-p_1P_i-p_2Q_i)=0 \tag{2.3}$$

Budget constraint 2.3 is the sum of the two individual control budget constraints (i=h,w in equation 2.2).

Each spouse has a utility function, U^i, which depends upon the aggregate level of household expenditures ($P=P_i+P_j$), his personal expenditure (Q_i), and leisure (L_i):

$$U^i=U^i(L_i,Q_i,\bar{P}) \tag{2.4}$$

Household expenditures are expenditures on commodities such as housing or, possibly, children,[4] and private expenditures are expenditures on goods such as clothing or hobbies. The formulation 2.4 requires that household expenditures represent pure public goods and personal expenditures are purely private. The division between public and private goods is, in practice, not clear-cut (an individual might derive utility from having a well-dressed spouse, say), but the distinction will be useful throughout this analysis.

Caring between spouses is incorporated using sympathy preferences. An individual's sympathy preferences are described by a welfare function, W^i, which depends both on his utility, U^i, and the utility of his spouse, U^j. The caring or sympathy, s_{ij}, that family member i feels for family member j, determines the weight given to j's utility in i's welfare function:

$$W^i=\Sigma_j s_{ij} U^j(P,Q_j,L_j), \quad 1\geq s_{ij}\geq 0,\ s_{ii}=1 \qquad 2.5$$

In this formulation, only family members enter into an individual's welfare function. I take the welfare function, rather than the utility function, as the individual's objective function.

Welfare maximization requires that each spouse know the other's preferences. Certain ordinal preferences are revealed by spouses through consumption decisions. In order to misrepresent his preferences, a deceiver must consume a non-optimal consumption bundle, and therefore suffer a loss in welfare. The limitation to this preference revelation argument is that spouse i may have difficulty distinguishing between spouse j's preference for public goods and j's sympathy, s_{ji}, as spouse j may purchase public goods because he derives utility from his own consumption, or because his welfare is increased by his spouse's consumption of public goods.

[4]Taking the view that children are, essentially, consumer durables.

For the welfare functions to be well-defined, each spouse must be able to compare her own and her spouse's utility. A change in the units in which one utility function is measured will change the equilibrium, as it will change the weight placed on that utility function relative to the other in each individual's welfare function. However, a change in either zero point will not change the equilibrium. There are two justifications which may be given for assuming comparability of utility functions. First, as noted above, spouses have many opportunities to observe each other's preferences. Interpersonal comparisons between spouses are more plausible than the interpersonal utility comparisons between unrelated individuals which occur in Harsanyi (1977), for example. Secondly, utility comparisons are unavoidable in any model in which the interdependence of the utility of family members is recognized as in, for example, Becker (1981a).

The additive formulation of the welfare function assumes that one spouse's utility is independent of the other's consumption choices. There is no complementarity between spouses' leisure or consumption. The additive formulation also requires that spouses are indifferent to the degree of utility inequality between spouses. If $W^i=U^i+U^j$, i's welfare is the same whether the division of utilities is (10,90) or (50,50). However, there will be a preference for income equality if the spouses have concave utility functions. The spouses' attitude towards inequality is embodied in the cardinalization of the utility function.

Throughout much of this chapter, I assume a Stone-Geary welfare function:

$$W^i=\Sigma_{k=i,j}s_{ik}[\beta_{1k}\log(P-P')+\beta_{2k}\log(Q_k-Q_k')+\beta_{3k}\log(L_k-L_k')],\quad \Sigma_i\beta_{ik}=1 \qquad 2.6$$

where x_i' is individual i's requirement of good x. Both spouses are assumed to have the same public goods consumption requirements, to simplify the calculation of demand functions. The individual's problem is to maximize his or her welfare function, subject to the time and budget constraints. The predictions reached about the outcome of family decision making using the Cournot-Nash equilibrium concept hold whenever the equilibrium exists and is unique. The rational conjectures analysis, however, requires use of a specific functional form for calculation of conjectures.

2.2 Individual Optimization: Cournot-Nash Solution

This section describes the Cournot-Nash equilibrium solution to the spouses' optimization problems. The first part of the section describes interior solutions; the second, corner solutions. The spouses are assumed to adopt an individual control management system (shared management is discussed in Section 2.4). Initially inter-spouse transfers are constrained to zero, as in independent management. I then ask whether, at the independent management equilibrium, spouses would voluntarily make income transfers. I find that, at an interior solution, transfers are neutral in that they have no effect on expenditure patterns or welfare levels. At a corner solution, transfers are no longer neutral. One spouse may voluntarily transfer income to the other, if his income is sufficiently high relative to hers.

A spouse's optimization problem is to choose the values of public goods (P_i) private goods (Q_i) and leisure (L_i) which maximize welfare. The spouse's problem can be written as:

$$\max_{P_i,Q_i,L_i} W^i=\Sigma_{k=i,j} s_{ik} U^k(P,Q_k,L_k)$$

subject to the constraint

$p_1P_i+p_2Q_i+w_iL_i=w_iT+R_i$. 2.7

The constraint 2.7 is found by combining the time constraint (equation 2.1), and the budget constraints (equation 2.2), while constraining the transfer (π_{ij}) between spouses to zero. A spouse's expenditures and leisure time are equal to his or her full income.

2.2.1 The Interior Solution

The first order conditions to the spouse's maximization problem are (substituting for Q_i using the budget constraint above):

$$\frac{\partial W^i}{\partial P_i}\left(1-\frac{\partial P_j}{\partial P_i}\right)-\frac{p_1}{p_2}\frac{\partial W^i}{\partial Q_i}=0 \qquad 2.8$$

and

$$\frac{\partial W^i}{\partial L_i}-\frac{w_i}{p_2}\frac{\partial W^i}{\partial Q_i}=0 \qquad 2.9$$

At a Cournot-Nash equilibrium each spouse's expenditures on leisure, private goods, and public goods solve the two first order conditions above, given that each person takes the other's behaviour as given, that is, in expression 2.8, $\partial P_j/\partial P_i=0$. I will consider first the "neutrality" property of the Cournot-Nash equilibrium and, second, under what conditions the equilibrium will exist.

One property of the Cournot-Nash equilibrium is that income transfers between spouses are neutral. This can be seen by examining the first order conditions for welfare maximization, 2.8 and 2.9. Suppose that an outside agent attempted to make a transfer of π from spouse h to spouse w. Spouse h could simply lower his public goods expenditures by π and spouse w could increase hers by π. Each spouse would then be consuming the same bundle as he or she was prior to the transfer. Since that bundle satisfied the first order conditions prior to the transfer, it will satisfy the first order conditions after the transfer. A similar result has been proven in the context of the private provision of public goods by Warr (1983) and Bergstrom, Blume and Varian (1986).

The neutrality of income transfers implies that demands depend on total household income, as the neoclassical model of household behaviour suggests. The distribution of household income is not important because public goods expenditures effectively pool the spouse's incomes.

Under fairly weak conditions, a Cournot-Nash equilibrium will exist.[5] I will give a proof here that shows the existence of an equilibrium either at an interior solution or at a corner solution when π, the transfer between spouses, is zero. First, note that, because spouse j's household public consumption expenditures, P_j, are given, spouse i's problem of choosing her public goods purchases P_i, is equivalent to choosing total public goods consumption, P, and so the objective function can be rewritten as:

$$\max_{P,Q_i,L_i} W^i(P,Q_i,L_i,Q_j,L_j) \qquad 2.10$$

Second, note that her budget constraint can be rewritten (by adding p_1P_j to both sides of 2.7) as

[5] The proof of existence given here draws from the analysis of Bergstrom, Blume and Varian (1986). However, the proof given here expands the Bergstrom, Blume, and Varian results to take account of utility interdependence arising from caring.

$$p_1P + p_2Q_i + w_iL_i = w_iT + R_i + p_1P_j. \qquad 2.11$$

Because we are considering a Cournot-Nash equilibrium, spouse j's behaviour is taken as given, so the terms Q_j and L_j in the welfare function 2.10 can be treated as parameters, and hence the problem defined by 2.10 and 2.11 is formally the same as a standard consumer demand problem.

Providing that preferences are convex and monotonic, the problem can be solved to find the total household public expenditures:

$$P=P(\mathbf{p},Q_j,L_j,I_i+p_1P_j) \qquad 2.12$$

where $\mathbf{p}=(p_1,p_2,w_i,w_j)$ is a vector of prices, and $I_i=w_iT+R_i$ is spouse i's income. The private goods reaction functions are given by:

$$Q_i=\max\{0,Q_i(\mathbf{p},Q_j,L_j,I_i+p_1P_j)\} \qquad 2.13$$

The reaction function for L_i is parallel to 2.13. Using 2.12 we can define a public goods reaction function for spouse i:

$$P_i=\max\{0,P_i(\mathbf{p},Q_j,L_j,I_i,P_j)\} \qquad 2.14$$

Now define $S=S^i$ S^j in as the set of all possible consumption purchases for the spouses, where S^i is the set of combinations of P_i,Q_i, and L_i, satisfying the budget constraint 2.7. The set is clearly compact and convex. The spouse's reaction functions (see 2.13 and 2.14) define a continuous mapping from the set S onto itself. By Brouwer's fixed point theorem, there must exist a fixed point, which will be the Cournot-Nash equilibrium.

The properties of the Cournot-Nash equilibrium in an interior solution can be seen clearly using an example, to which I will now turn.

An example: Stone-Geary Welfare Function

If the spouses each have a Stone-Geary welfare function, and the spouses are at an interior solution, welfare maximization yields the private goods demand function (L_i is analogous to Q_i):

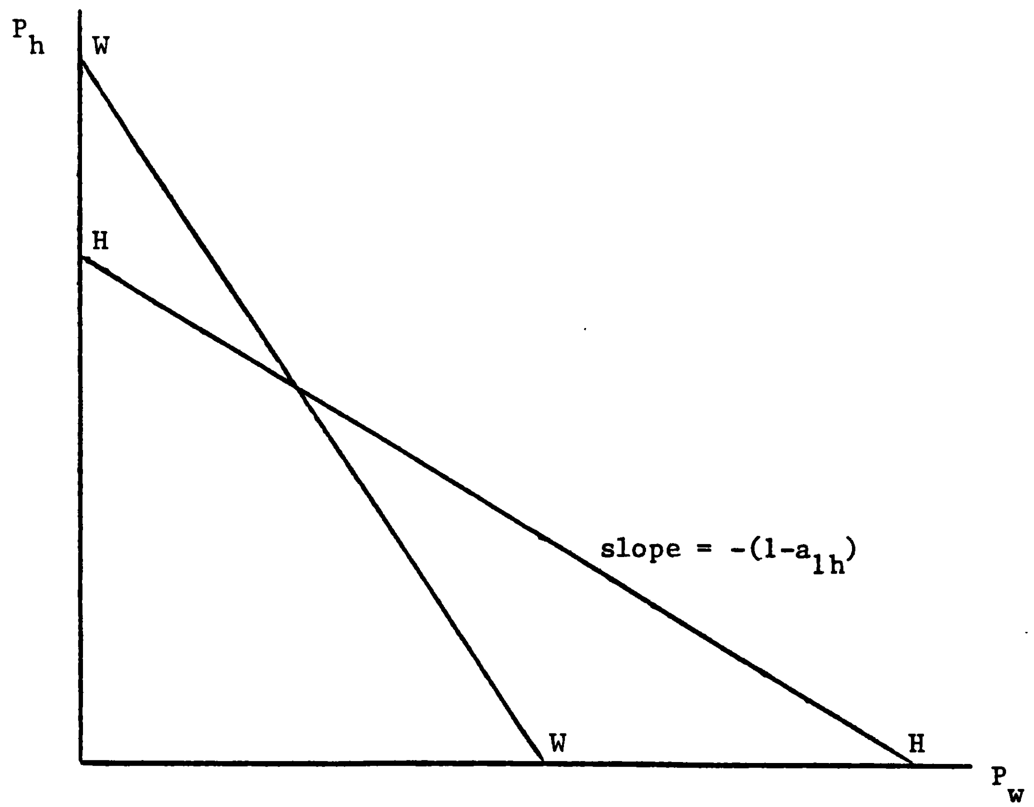
$$Q_i = Q_i' + \frac{a_{2i}}{p_2}(I_i + p_1 P_j) \text{ where } a_{2i} = \frac{\beta_{2i}}{1 + s_{ij}\beta_{1j}} \tag{2.15}$$

The public goods reaction function is given by:

$$P_i = P' - P_j + \frac{a_{1i}}{p_1}(I_i + p_1 P_j) \text{ where } a_{1i} = \frac{\beta_{1i} + s_{ij}\beta_{1j}}{1 + s_{ij}\beta_{1j}} \tag{2.16}$$

The parameters a_{1i} and a_{2i} represent the relative weight placed on public goods and private consumption, respectively, in spouse i's welfare function. The term in the final set of parentheses, $I_i+p_1P_j$, is full supernumerary income, plus the partner's contribution to the household public expenditures. Full supernumerary income, I_i, is defined as $I_i=R_i+w_iT-p_1P'-p_2Q_i'-w_iL_i'$. This is essentially full income, as defined by Becker, including both property income R_i and the value of the individual's time endowment, w_iT, less the amount of income which needs to be spent meeting subsistence requirements. The other spouse's public good purchases (p_1P_j) act like an increase in income. However, in the public goods reaction function (2.16), they have the additional affect of decreasing spouse i's subsistence expenditures on public goods.

Figure 2.1: Cournot-Nash equilibrium



WW = wife's reaction function
HH = husband's reaction function

The interaction between the family members is shown graphically in Figure 2.1. The slope of the husband's reaction function HH is $-(1-a_{1h})$ or $-(a_{2h}+a_{3h})$. This coefficient represents the weight the husband places on his own private consumption relative to the sum of his private and the household public expenditures in his welfare function. The greater his relative preference for private expenditures, the more the husband will decrease his household public expenditures when the wife increases hers. Stability of the equilibrium requires that the wife's reaction function is steeper than the husband's, or that $a_{1w},a_{1h}<1$.

The intersection of the two reaction functions is a Cournot-Nash equilibrium. This point is given by the public goods expenditure function:

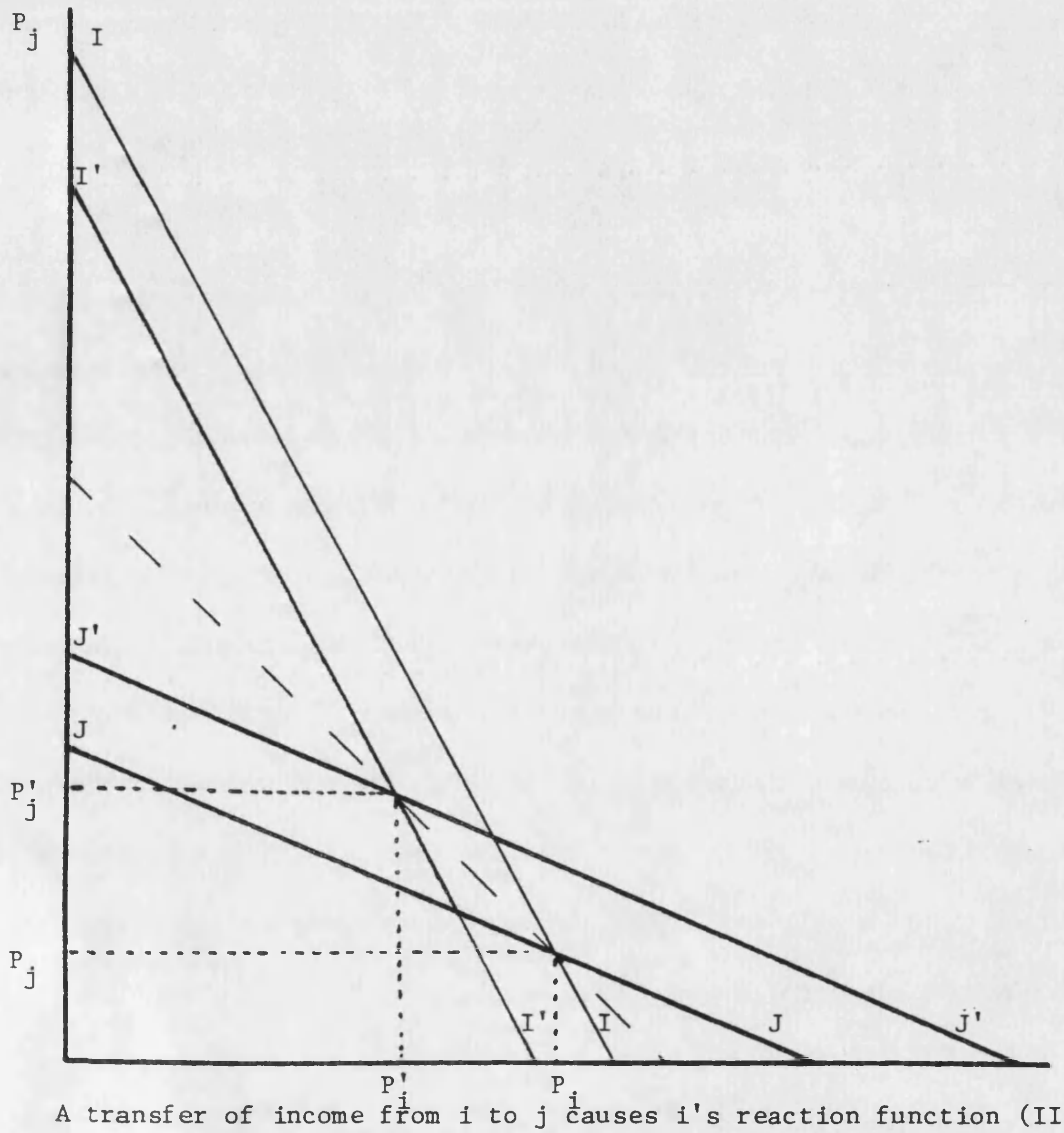
$$p_1P_i=c_iI^*_i - (1-c_i)I_j \tag{2.17}$$

where

$$c_i=\frac{a_{1i}}{a_{1i}+a_{1j}-a_{1i}a_{1j}}$$

The term I_i^* represents full supernumerary income without deducting subsistence expenditures on public goods. Public goods expenditures depend positively on own supernumerary income and negatively upon the other spouse's supernumerary income. The constant c_i may be interpreted as the effective share of household income (sum of public, P, and private (Q_j, L_j) good budget shares) consumed by spouse j. Spouse j's effective share is greater when he puts relatively more weight on his private consumption (a_{1j} decreases) or when his partner puts more weight on household public consumption (a_{1i} increases). The term c_i will be between zero and one as long as $0<a_{1i},a_{1j}<1$, which is guaranteed if neither spouse puts a negative weight on their own private consumption or household consumption.

Figure 2.2: Neutrality in the Cournot-Nash equilibrium



A transfer of income from i to j causes i's reaction function (II) to shift inwards to I'I', while j's shifts outwards from JJ to J'J'. The amount of public goods purchased by i decreases from P_i to P_i', while the amount purchased by j increases from P_j to P_j', leaving total purchases unchanged.

When welfare maximization subject to the constraint of no intra-family income transfers produces an interior solution, relaxation of the constraint that there are no transfers between spouses ($\pi_{ij}=0$) has no real effect. A transfer of income between spouses will be exactly offset by a change in public goods expenditure, and hence utility and welfare will be unchanged. A net transfer of π_{ij} from spouse i to spouse j reduces the former's supernumerary income to $I_i-\pi_{ij}$, and raises the latter's to $I_j+\pi_{ij}$. The effect of a transfer on spouse i's level of public goods expenditure under Nash conjectures is given by:

$\partial p_1P_i/\partial\pi_{ij} = -c_i-(1-c_i)=-1.$

Similar reasoning shows that $\partial p_1P_j/\partial\pi_{ij}=1$. The transfer causes a one-for-one decrease in spouse i's public goods expenditures and a corresponding increase in spouse j's public goods expenditures. The effect of the transfer is shown graphically in Figure 2.2. Spouse i's reaction function, II, shifts inward to I'I' when her income is decreased. Spouse j's reaction function shifts outward from JJ to J'J', reflecting the increase in his income. The amount of public goods purchased by i, P_i, falls, while j's purchases rise. The total level of purchases, however, is unchanged. Moreover, since the changes in each spouse's public goods expenditures exactly offset the changes in income, the amount of income available for purchases of private goods and leisure is unchanged. Each spouse is able to attain the level of welfare which he or she enjoyed prior to the transfer.

2.2.2 The Corner Solution

The analysis so far has assumed that neither spouse is at a corner with respect to public goods expenditures. This need not be the case; one spouse's income may be so low (and the marginal utility of income correspondingly high) that the first order conditions for welfare maximization are not satisfied at any positive level of public goods expenditures. For example, in Figure 2.1, the wife would make no public goods expenditures if her reaction function intersected the P_h axis below the husband's reaction function. In what follows, I consider cases in which spouse j (the wealthier spouse, say the husband) purchases a positive amount of the public good P, while spouse i (say, the wife) is constrained, that is, P_i=0. Initially income transfers between spouses are constrained to zero, and then the effect of allowing income transfers is examined. I will begin with the general case, and then go on to consider a specific example.

Transfers between spouses constrained to zero.

The spouses will be at a corner solution when the poorer spouse (say the wife) maximizes her welfare by making no public goods purchases. This will be the case when

$(1/p_1)(\partial W^w/\partial P_w)<(\partial W^w/\partial I_w)$

The contribution to welfare of the last dollar spent on public goods is less than the marginal contribution of income to welfare.

As a Nash equilibrium exists, it is possible to solve for the spouse's demand functions, and substitute into each spouse's utility function to find each spouse's indirect utility function. The indirect utility functions will be of the form:

$$V^i=V^i(I_w,I_h,p) \tag{2.18}$$

Note that each spouse's utility (as well as their welfare) depends on both spouse's incomes. The wife's utility clearly depends upon the husband's income because she consumes the public goods he purchases. The husband's utility may depend upon the wife's income if her consumption is a complement to his. For example, his demand for leisure may depend on her leisure, in turn, is a function of her income.

From the indirect utility function 2.18 we can define a welfare function $W^h=V^h+s_{hw}V^w$. The wealthier spouse, the husband, will choose to transfer income to his wife if doing so increases his welfare. Suppose the husband is contemplating a transfer, π_{hw}, to his wife which increases her supernumerary income I_w to $I_w+\pi_{hw}$ and decreases spouse h's to $I_h-\pi_{hw}$. The utility maximizing transfer will be one which satisfies the first order condition:

$$\frac{\partial V^h}{\partial I_h}+s_{hw}\frac{\partial V^w}{\partial I_h}=\frac{\partial V^h}{\partial I_w}+s_{hw}\frac{\partial V^w}{\partial I_w}$$

The marginal contribution to the husband's welfare of his own income is equal to the marginal contribution of his wife's income. A wealthier husband will transfer less income to a poorer wife if she has a higher preference for public goods relative to private goods ($\partial V^w/\partial I_h$ is large relative to $\partial V^w/\partial I_w$). If this is the case, it is more efficient for him to transfer income indirectly by making higher public goods purchases. A more caring husband (one with large s_{hw}) will put more weight on his wife's preferences, which may be reflected in either more public goods purchases or more income transfers, depending on the relative size of $\partial V^w/\partial I_h$ and $\partial V^w/\partial I_w$.

As discussed in Chapter 1, Becker (1981a) has argued that a transfer from a wealthier spouse to a poorer spouse will induce the latter to maximize family income, a result which he states in the form of the "Rotten Kid Theorem":

> Each beneficiary, no matter how selfish, would maximize the family income of his benefactor, and thereby would internalize all effects of his actions on other beneficiaries. (Becker, 1981a, p. 7)

A simple proof of the Rotten Kid Theorem can be given using the model developed here.

If the husband makes a transfer to the wife, his budget constraint becomes:

$$\pi_{hw} + p_1P_h + p_2Q_h + w_hL_h = w_hT + R_h. \tag{2.19}$$

while hers becomes:

$$p_2Q_w + w_wL_w = \pi_{hw} + w_wT + R_w. \tag{2.20}$$

Substitution of budget constraint 2.19 into 2.20 yields the new budget constraint for the wife:

$$p_2Q_w + w_wL_w = w_hT + R_h + w_wT + R_w - (p_1P_h + p_2Q_h + w_hL_h)$$

The income available for her own consumption is the total family income less her husband's consumption. If she wishes to maximize her own consumption, taking her husband's consumption as given, she will attempt to maximize family income, as the Rotten Kid Theorem predicts.

An example: The Stone-Geary Welfare Function

As for the interior solution, an example will serve to clarify the results given. Suppose each spouse has a Stone-Geary welfare function. Then, as in the interior solution, the wealthier spouse's (say spouse h's) demands are given by equations 2.15 and 2.16. Substituting the demand functions into spouse h's direct utility function (noting P_w=0) yields the indirect utility function:

$$V_h^C = \log I_h + \beta_{1h}\log(a_{1h}/p_1) + \beta_{2h}\log(a_{2h}/p_2) + \beta_{3h}\log(a_{3h}/w_h) \tag{2.21}$$

Note that the husband's utility depends on his own income, and not his wife's, because the Stone-Geary welfare function is separable in each spouse's leisure and private consumption expenditures.

The constrained spouse's (the wife's) private good demand function is given by (from the first order conditions on private goods and leisure):

$$Q_w = Q'_w + \frac{a^*_{2w}}{p_2} I^*_w \text{ where } a^*_{2w} = \frac{\beta_{2w}}{\beta_{2w}+\beta_{3w}}$$

The demand for leisure is exactly analogous. Substituting these demand equations, and the husband's public goods demand, into the wife's direct utility function yields the indirect utility function:

$$V_w^C = \beta_{1w}\log(a_{1h}/p1) + \beta_{2w}\log(a^*_{2w}/p_2) + \beta_{3w}\log(a^*_{3w}/w_w)$$
$$+ \beta_{1w}\log I_h + (\beta_{2w}+\beta_{3w})\log I_w^* \qquad 2.22$$

The wife's utility depends upon the husband's supernumerary income, as well as her own, because she benefits indirectly from his income through his public goods expenditures. The coefficient on the own supernumerary income term is given by $\beta_{2w}+\beta_{3w}$; the utility parameters corresponding to the goods the wife "purchases"; leisure and private goods.

Introducing transfers between spouses.

Now suppose that we allow transfers of income between spouses. The husband will choose the net transfer[6] which maximizes his welfare. A net transfer of π_{hw} from the

[6] It can be shown that when the wealthier spouse makes a voluntary transfer, π_{ji}, to the other, the poorer spouse will not wish to make a positive transfer unless s_{ij}>$(1/s_{ji})$. This condition will not be satisfied in the usual case where s_{ji},s_{ji}<=1.

wealthier spouse to the poor increases spouse w's supernumerary income from I_w to $I_w+\pi_{hw}$ and decreases spouse h's to $I_h-\pi_{hw}$. Substituting 2.21 and 2.22 into h's welfare function $W^h=V^h+s_{hw}V^w$, maximizing W^h with respect to π_{hw}, and solving yields:

$$\pi_{hw}=\frac{s_{hw}(1-\beta_{1w})I_h-(1+s_{hw}\beta_{1w})I_w^*}{1+s_{hw}}$$

2.23

When the wife has no supernumerary income, the husband, transfers a portion $s_{hw}(1-\beta_{1w})/(1+s_{hw})$ of his income to her, where the portion depends positively on his sympathy, s_{hw}. If the poorer spouse's income increases, the transfer is reduced by a portion $(1+s_{hw}\beta_{1w})/(1+s_{hw})$ of the income increase, with the portion being less when the sympathy term s_{hi} is higher. The transfer is lower when the wife's preference for public goods, β_{1w}, is higher. When β_{1w} is high, the husband is better off transferring income to his wife indirectly by purchasing public goods, rather than directly through a money transfer.

Rewriting equation 2.23, it may be seen that the transfer is positive if and only if:

$$\frac{s_{hw}(1-\beta_{1w})}{I_w^*}>\frac{(1+s_{hw}\beta_{1w})}{I_h}$$

2.24

The interpretation of equation 2.24 is straightforward. The left hand side of the equation is the contribution to the wealthier spouse's welfare of a marginal increase in the poorer spouse's income. The right hand side is the contribution to the wealthier spouse's welfare of a marginal increase in own income. If the wealthier spouse's marginal valuation of his partner's income is higher than his own, he will transfer income to his partner.

When condition 2.24 holds we have an allowance system, with a positive income transfer from the wealthier to the poor spouse. The Nash equilibrium level of public goods expenditures is found by substituting for π_{ji} in the wealthier spouse's (j's) demand function (2.16, $\partial P_i/\partial P_j=0$, $P_i=0$), which yields:

$$p_1P_j = p_1P' + \frac{\beta_{1j}+s_{ji}\beta_{1i}}{1+s_{ji}}(I_j+I_i^*)$$

The wealthier spouse's private goods expenditures are given by

$$p_2Q_j = p_2Q_j' + \frac{\beta_{2j}}{1+s_{ji}}(I_j+I_i^*)$$

The poorer spouse makes no public goods expenditures. Her private goods expenditures are given by:

$$p_2Q_i = p_2Q_i' + \frac{s_{ji}\beta_{2i}}{1+s_{ji}}(I_j + I_i^*)$$

The share of total supernumerary income taken up by purchases (net of subsistence requirements) for each good corresponds to the weight placed on that good in the wealthier spouse's welfare function, when the welfare function is normalized so that $\Sigma_i\beta_{ij}+s_{ji}\Sigma_j\beta_{ji}=1$. All demand functions and, therefore, the indirect utility function which measures each spouse's level of well-being, depend on the couple's total supernumerary income, and not on the division of income between spouses.

Housekeeping Allowances.

The provision by the wealthier spouse of a housekeeping allowance above and beyond the voluntary transfer has no effect on the equilibrium. Consider, initially, a situation where the poorer spouse is receiving an exogenously imposed transfer π_{ji} and consuming a welfare maximizing level of Q_i and L_i (P_i=0, otherwise a transfer would have no real effect). She receives an allowance, A, with which she purchases private goods for him (Q_j). A reduction in the allowance of some amount accompanied by an equal reduction in her expenditures on the other spouse's private good (Q_j) leaves her level of welfare unchanged. If Q_i and L_i were optimal prior to any decrease in the allowance, they will be so after such a decrease. The argument still holds when the allowance is used to purchase public goods P_j. The presence or absence of a housekeeping allowance will not alter the level of public goods purchases the wealthier spouse desires to make, and so the final level of purchases will be unaffected by changes in the housekeeping allowance. If the wealthier spouse's purchases P_j do not change, the poorer spouse can maximize her utility by decreasing her purchases of (P_j) to offset a change in the allowance level and consuming the same level of Q_i and L_i as before.

Budgeting systems and relative incomes

Condition 2.24 is not satisfied for all corner solutions. The spouses will be at a corner solution without transfers if:

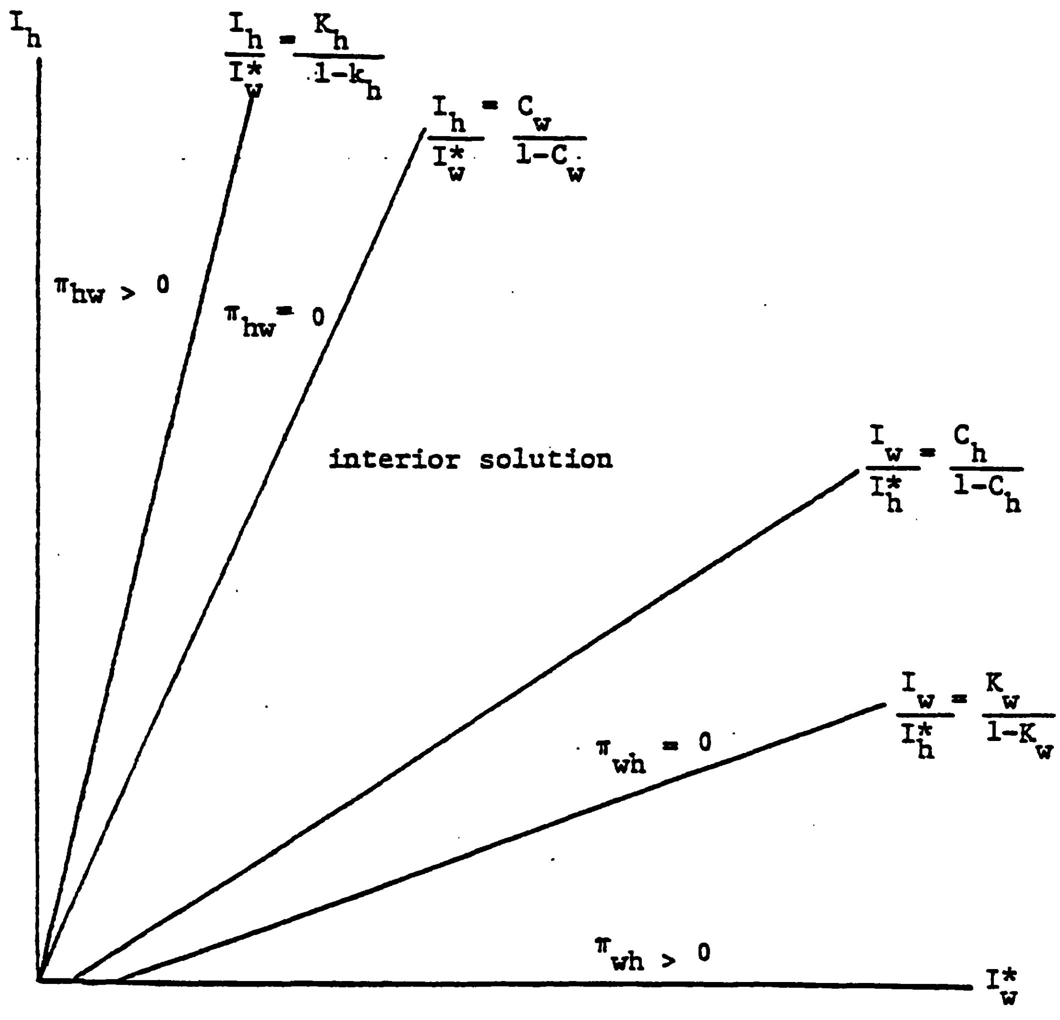
$$\frac{k_h}{1-k_h} > \frac{I_h}{I_w^*} > \frac{c_w}{1-c_w} \quad where \quad k_h = \frac{1+s_{hw}\beta_{1w}}{1+s_{hw}}$$

2.25

Such a region will exist if $k_h > c_w$. It can be shown that $k_h > c_w$ if and only if $s_{hw}s_{wh} < 1$, that is, at least one of the spouses cares more for himself than for his partner. If $s_{hw}s_{wh} = 1$, so that each person cares as much for the other as for himself, then $k_h = c_w$, and transfers begin as soon as one spouse reaches a corner solution, and the relative incomes of the spouses do not affect either spouse's consumption. The possibility that $s_{hw}s_{wh} > 1$ was ruled out above in equation 2.5. The analysis here shows the necessity for this assumption. If each spouse cared more about the other than about him or herself, each would desire to make positive transfers even when incomes are relatively equal, and transfers are neutral.

Using equation 2.25, we can describe how household budgeting systems vary with the spouses' relative incomes. When relative incomes are in the range described in equation 2.25, we have an independent management system. The wife makes no public goods purchases and receives no income transfer from her husband. The wife's income is spent on private goods and leisure; the husband's on public goods, as well as his private goods and leisure. If the first inequality is reversed, that is, $I_h/I_w^* > k_h/(1-k_h)$, the husband will transfer income to the wife. The household has an allowance budgeting system. When the second inequality is reversed, we are at an interior solution, where both spouses contribute to public goods. Income transfers have no effects, and couples are indifferent between allowance, shared and independent management budgeting systems.

Figure 2.3: Relative incomes and solutions to the model



I_h = husband's full supernumerary income
I^*_w = wife's full income less leisure and private goods subsistence requirements
π_{ij} = income transfer from i to j.

Figure 2.3 summarizes the results of the theoretical analysis. When incomes are relatively equal, spouses will be in the interior solution. When the poorer spouse has some income, but not enough to make public goods purchases, the wealthier spouse's welfare maximization initially dictates no transfers (π_{ij}=0). Then, if the poorer spouse has sufficiently low relative income, one spouse will begin to make transfers to the other (π_{ij}>0).

The size of the interior solution, positive transfers, and no transfers regions depends upon the spouses' preferences. As the caring of the husband for the wife increases, the positive transfers region π_{hw}>0 becomes larger. At the same time, if the wife's sympathy parameter s_{wh} increases, the boundary between the interior and no transfers regions, $I_h/I_{w^*}=c_w/(1-c_w)$, rotates upwards. So as s_{hw} and s_{wh} approach one, the no-transfers region disappears. Holding the amount of caring constant, an increase in the dependent spouse's preferences for public goods (β_{1w}, say), will decrease the size of the positive transfers region. The wealthier spouse will be able to increase in dependant's well-being by purchasing public goods (which benefit both spouses) rather than by making transfers.

Empirical evidence is consistent with the theoretical predictions of the model. In fact, Pahl (1984) has found that the independent management system is most common in dual-earner couples, who would be expected to be indifferent between shared and other forms of management, as shown in Table 2.1. Allowance or whole wage systems, which involve a transfer from one spouse to the other, appear in single-earner couples, where one partner is more likely to have a low enough income that transfers of income occur voluntarily, as the theory predicts.

There are also regional differences in the choice of budgeting system, which may be due to either economic or cultural factors. Studies of couples in the South of England (Pahl, 1984; McRae, 1987), have found shared management to be the most common budgeting system, as shown in Table 2.2. However elsewhere in Britain, and in Australia, the majority of couples adopt either whole wage or allowance systems (Gray, 1979; Edwards, 1981; Morris, 1984), as shown in Table 2.3.

Table 2.3 reveals a large study-to-study variation in the number of couples adopting independent and shared management. The variation may be partly attributable to differences among researchers as to what constitutes shared or independent management. It may also be explained by differences in sample composition; for example, Morris's survey sample consisted of steel workers who had recently been made redundant. Finally, changes over time in banking technology and female labour force participation rates may have decreased the proportion of couples adopting the whole wage or allowance systems.

Table 2.1: The relation between employment status and budgeting system.

	Both or wife employed	Husband only employed	Neither employed
Whole wage	10	10	56
Allowance	16	30	18
Shared or Independent management	75	60	36

Source: Pahl (1984)

Table 2.2: Budgeting systems in the South of England.

	Pahl Kent 1982-83	McRae S. England 1982-1983
Whole wage	14	-
Allowance	22	10
Shared management	56	50
Independent management	9	40
	n=102	n=30

Source: Pahl (1984), McRae (1987).

Table 2.3: Budgeting systems in Britain and Australia.

	Morris Wales 1982	Edwards Australia 1981	Gray Edinburgh 1979
Whole wage	54	50	63
Allowance	18	14	46
Shared management	20	14	2
Independent management	-	22	-
	n=40	n=50	n=97

Sources: Gray (1979, Edwards (1981), Morris (1984).

Factors other than relative incomes no doubt influence a couple's choice of budgeting system. One possibility is that monitoring considerations play a role. For example, whole wage systems are common when incomes are low, and an attempt by the wife to use a large share of family funds for personal consumption is soon evidenced by unpaid bills.

2.3. Individual Optimization: Rational conjectures solution

In Section 2.2's Cournot-Nash equilibrium each agent takes the other's behaviour as given. He expects that the other agent will not respond to a change in his behaviour. The Cournot-Nash equilibrium concept is criticized by oligopoly theorists on the grounds that agents' conjectures are falsified by actual experience. If one agent actually, say, increases her public goods purchases, the other will respond by lowering his, contrary to the first agent's conjectures. Rational or consistent conjectures, developed in Laitner (1980), Ulph (1980) and Bresnahan (1981), require that spouses' conjectures be correct.

2.3.1. Definition of rational conjectures

Rational conjectures require that agents' beliefs about $\partial x_i/\partial x_j$ should be at least locally correct. Consider the "reaction function" $x_i=f_i(x_j)$ defined by the first order conditions to spouse i's maximization problem. An agent's conjecture r_i will be locally correct at a point x_i^*, x_j^* where

$$r_i=\partial f(x_j^*)/\partial x_i, \qquad 2.26$$

and similarly for r_j.[7] Intuitively, one agent's rational conjecture is given by the slope of the other agent's reaction function at the equilibrium point.

The definition of rational conjectures given by equation 2.26 above does not require that agents' conjectures on the second derivative of the reaction function be correct; that is, it is not the case that $r_i'=f''(x_i)$. Ulph (1983) shows, in a general duopoly model, that, if the

[7] The conjectures are locally correct in that the difference between agent j's actual response to a change in x_i and the conjectured response r_i can be made arbitrarily small (less than some $\varepsilon>0$) by taking a sufficiently small change in x_i. The actual response is not necessarily equal to the conjectured response, even for very small changes in x_i, contrary to what is suggested by Bresnahan (1981), for example.

derivatives of the conjecture r_i are allowed to vary freely, any output combination[8] can be a rational conjectures equilibrium with appropriate conjectures. Ulph argues for restricting the agents to constant conjectures (r_i=k, some constant) at interior equilibria. A justification of linear conjectures is that agents' may have limited experience of behaviour away from the equilibrium point. As will be discussed in Section 2.3.2, the linearity of conjectures is crucial in determining whether income transfers between spouses have real effects.

The concept of rational conjectures needs to be more carefully defined at a point (x_i*,x_j*) where either f_i or f_j is not differentiable. Nondifferentiability may occur when one spouse reaches a corner with respect to expenditures on x_i, so that a decrease in x_j leads to an increase in expenditures on x_i, but an increase in x_j causes no change in x_i. In Section 2.3.3 I argue that the conjectured response to an increase in public goods expenditures (say) will then differ from the conjectured response to a decrease in public goods expenditures. As a result, the spouses' reaction functions may be discontinuous, and the rational conjectures equilibrium may be indeterminate.

2.3.2. Rational conjectures: Interior solution

As with the Cournot-Nash equilibrium, I begin by solving the welfare maximization problem assuming no intra-family transfers, and then explore the effect of relaxing this constraint. Welfare maximization produces the Stone-Geary reaction function:

[8] That both firms believe could be chosen, and which does not violate second order conditions.

$$P_i = P' - P_j + \frac{a_{1i}\left(1+\frac{\partial P_j}{\partial P_i}\right)}{1+a_{1i}\frac{\partial P_j}{\partial P_i}}\left(\frac{I_i}{p_1}+P_j\right)$$

2.27

The imposition of rational conjectures as defined by equation 2.26 requires that (taking the derivative of the public goods reaction function 2.27 with respect to P_j and noting $\partial P_j/\partial P_i = r_i$):

$$r_j = \frac{\partial P_i}{\partial P_j} = -\frac{1-a_{1i}}{1+a_{1i}r_i}$$

2.28

A similar conditions applies for r_i. Solving these two conditions yields the result:[9]

$r_j = -(1-a_{1i})/a_{1j}$ 2.29

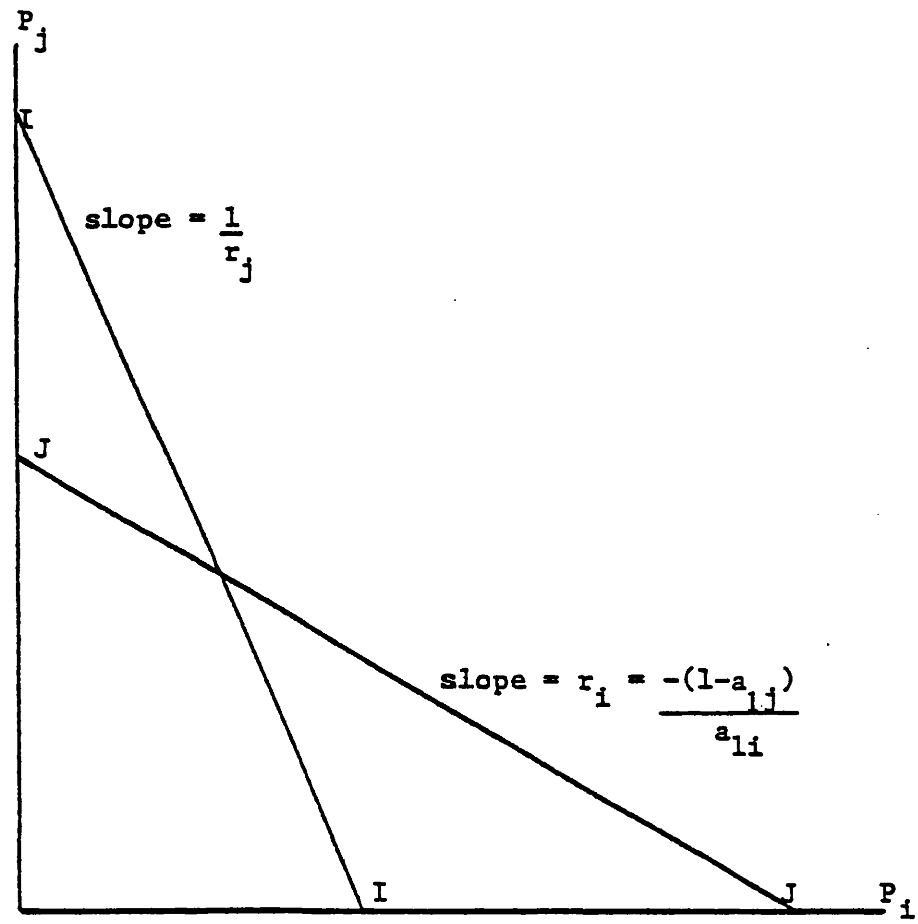
Each spouse's conjecture, r_j, is a constant, which depends upon the parameters of both spouses' welfare functions, but not upon either spouse's income or public goods expenditures.

Stability of the rational conjectures equilibrium requires first that $-1<r_i,r_j<0$. If this was not the case, a spouse would conjecture that a decrease in her public goods expenditures would lead to a greater increase in her husband's expenditures, and so would immediately reduce her expenditures to the minimum possible. Second, j's reaction function (JJ) must be flatter than i's (II), that is, the slope of JJ (r_i) is less negative than the slope of II ($1/r_j$), as shown in Figure 2.4. Both of these conditions reduce to $r_ir_j<1$ or $a_{1i}+a_{1j}>1$. Note that $r_ir_j<1$

[9] Another solution to the set of equations implied by 2.28 has $r_i=r_j=-1$ and $P=P'$. The equilibrium is not stable, as the breakdown of P' into P_i and P_j is indeterminate.

is equivalent to $r_i > (1/r_j)$ since $r_j < 0$. The rational conjecture (2.29) will not be stable if each spouse puts too little weight on public goods relative to his or her own private consumption in the welfare function. The condition $a_{1i}+a_{1j}>1$ represents a strong restriction on the values which may be taken by the parameters β_{1i} and s_{ij}.

Figure 2.4: Rational conjectures equilibrium



II = spouse i's reaction function.
JJ = spouse j's reaction function.

Substituting for the conjecture r_i into spouse i's public goods demand function, equation 2.27, yields:

$$p_1P_i=p_1(P'-P_j)+[(a_{1i}+a_{1j}-1)/a_{1j}][I_i+p_1P_j] \qquad 2.30$$

The requirement of rational conjectures is satisfied, since the derivative $\partial P_i/\partial P_j$ from equation 2.30 is equal to the expression for j's conjecture, r_j, from equation 2.29. The coefficient on income in (2.30), $(a_{1i}+a_{1j}-1)/a_{1j}$, is smaller than the Cournot-Nash income coefficient, a_{1i}, unless $a_{1j}=1$, in which case the two are equal. For a given level of income, less of the public good is demanded, because spouse i realizes that an increase in her expenditures will provoke a decrease in the other's (unless $a_{1j}=1$, in which case of all j's income is spent on public goods). Using equation 2.30 and the corresponding expression for P_j to solve for the level of public goods expenditure yields:

$$p_1P_i=a_{1i}I_i^*-(1-a_{1i})I_j \qquad 2.31$$

Public goods expenditures depend positively on own supernumerary income and negatively on the other spouse's supernumerary income.

Relaxing the constraint that transfers are nil has no effect on the level of public goods expenditures or welfare. The effect of a transfer π_{ji} from spouse j to spouse i is given by (from equation 2.31):

$$\partial p_1P_i/\partial\pi_{ji}=-(1-a_{1i})-a_{1i}=-1.$$

As in the case of Nash conjectures, a transfer of income from husband to wife is completely offset by changes in expenditures on public goods.

Transfers are neutral for all rational conjectures for which r_i is a constant. As in the Nash equilibrium, the first order condition for welfare maximization is given by 2.8 and 2.9. A transfer of income, accompanied by offsetting changes in public goods expenditures, has no effect on either spouse's welfare or their conjectures (because conjectures are constant), therefore the first order conditions for optimization will still be satisfied.

As argued in Section 2.3.1, there are good reasons for restricting the conjectures r_i, r_j to constants. However, if we allow for more general conjectures, neutrality does not necessarily hold. Taking a more general definition of rational conjectures (Ulph, 1983, or Ulph, 1987), suppose that agent i has conjectures about agent j's choice x_j of the form

$$x_j=\Phi_i(x_i,x_i^*,x_j^*)$$

where x_i^*, x_j^* is the equilibrium level of public good expenditures, and $r_i=\partial\Phi/\partial x_i$. Neutrality requires that the derivatives of Φ_i with respect to x_i depend only on other expenditures, Y_i, and x^*, where $x^*=x_i^*+x_j^*$ is the total equilibrium expenditures. If this is the case then a redistribution of income and public goods expenditures leaves the value of the first order conditions unchanged. There is, however, no reason why this restriction necessarily holds.

2.3.3 Corner solutions

Except at one point, the rational conjectures corner solution coincides with the Nash equilibrium described in Section 2.2. I will begin by showing that the Nash corner solution can be supported by rational conjectures, and then go on to consider three solutions: one, the corner solution with no transfers; two, the corner solution with transfers; and three, the boundary between the corner and interior solutions.

Nash solution supported by rational conjectures.

Suppose that the poorer spouse, say the wife, is at a corner solution with respect to her public goods purchases. Her desired level of public goods expenditures is less than zero, formally (from equation 2.31):

$$a_{1w}I_w^{*}-(1-a_{1w})I_h<0$$

In this case, the rational conjectures equilibrium is the Cournot-Nash equilibrium.

The husband's conjecture, r_h, is equal to zero. A small change in his public goods expenditure will not shift the wife's expenditures away from zero. Substituting $r_h=0$ into equation 2.27 yields the reaction function

$$p_1P_h=p_1P'-p_1P_w+a_{1h}(I_h+p_1P_w) \qquad 2.32$$

Equation 2.32 describes both the Cournot-Nash and the rational conjectures (no transfers) corner solution. Differentiating equation 2.32 gives the wife's rational conjecture $r_w=\partial P_h/\partial P_w=-(1-a_{1h})$. The conjecture is larger (less negative) than the interior rational conjecture given by equation 2.29, reflecting the steeper slope of the husband's Cournot-Nash reaction function. The wife's conjecture $r_w=-(1-a_h)$ justifies the husband's belief that $P_w=0$. Substituting for r_w and P_h (from 2.32) into equation 2.27 yields equation 2.31 - by assumption, the value of p_1P_i predicted by this equation is less than or equal to zero. The equilibrium conjectures are given by $r_h=0$, $r_w=-(1-a_{1h})$, and the equilibrium levels of expenditure are the same as with Nash conjectures.

The corner solutions

Rational conjectures (pre-transfer) demands are identical to Nash demands at a corner solution, and so the welfare maximizing transfer is given by equation 2.23. The transfer will be positive under the same conditions as held for the Cournot-Nash equilibrium, equation

2.24. Condition 2.24 is not satisfied for all corner solutions. Rewriting equation 2.31, the wife will be at a corner solution with respect to public goods expenditures when:

$$\frac{I_w^*}{I_h} \leq \frac{1-a_{1w}}{a_{1w}} - \frac{1-\beta_{1w}}{\beta_{1w}+s_{wh}\beta_{1h}} \qquad 2.33$$

When condition 2.33 holds with strict inequality but 2.24 does not, there will be no transfers between spouses. For there to be a region where this is true, we must have $s_{wh}s_{hw}<(1/\beta_{1h})$. Note that the restrictions on caring are less strict that in the Cournot-Nash equilibrium case. The financial management system will be one of independent management. The equilibrium will correspond to the rational conjectures no-transfers corner solution described above. The wife makes no public goods purchases. Her income is spent on private goods and leisure; the husband's income goes towards buying public goods, as well as his private goods and leisure.

When condition 2.24 holds with strict inequality, the husband's rational conjecture is that $\partial P_w/\partial P_h=0$. His demand for public goods is given by

$p_1P_h=p_1(P'-P_w)+a_{1h}(I_h+P_w-\pi_{hw})$.

The wife's rational conjecture, accordingly, is:

$\partial P_h/\partial P_w=-1+(a_{1h}/p_1)(1-\partial\pi_{hw}/\partial P_w)=-1.$ 2.34

The result 2.34 holds because the husband will decrease his public goods expenditures one for one if the wife increases hers, using his additional disposable income to increase his transfer to her. With a conjecture of $r_w=-1$, the wife will not make positive purchases of public goods (substituting for r_w and P_h in 2.27), even if the husband makes a marginal increase in his public goods purchases. Hence the husband's conjecture $\partial P_w/\partial P_h$ is supported by the wife's behaviour.

The boundary between interior and corner solutions

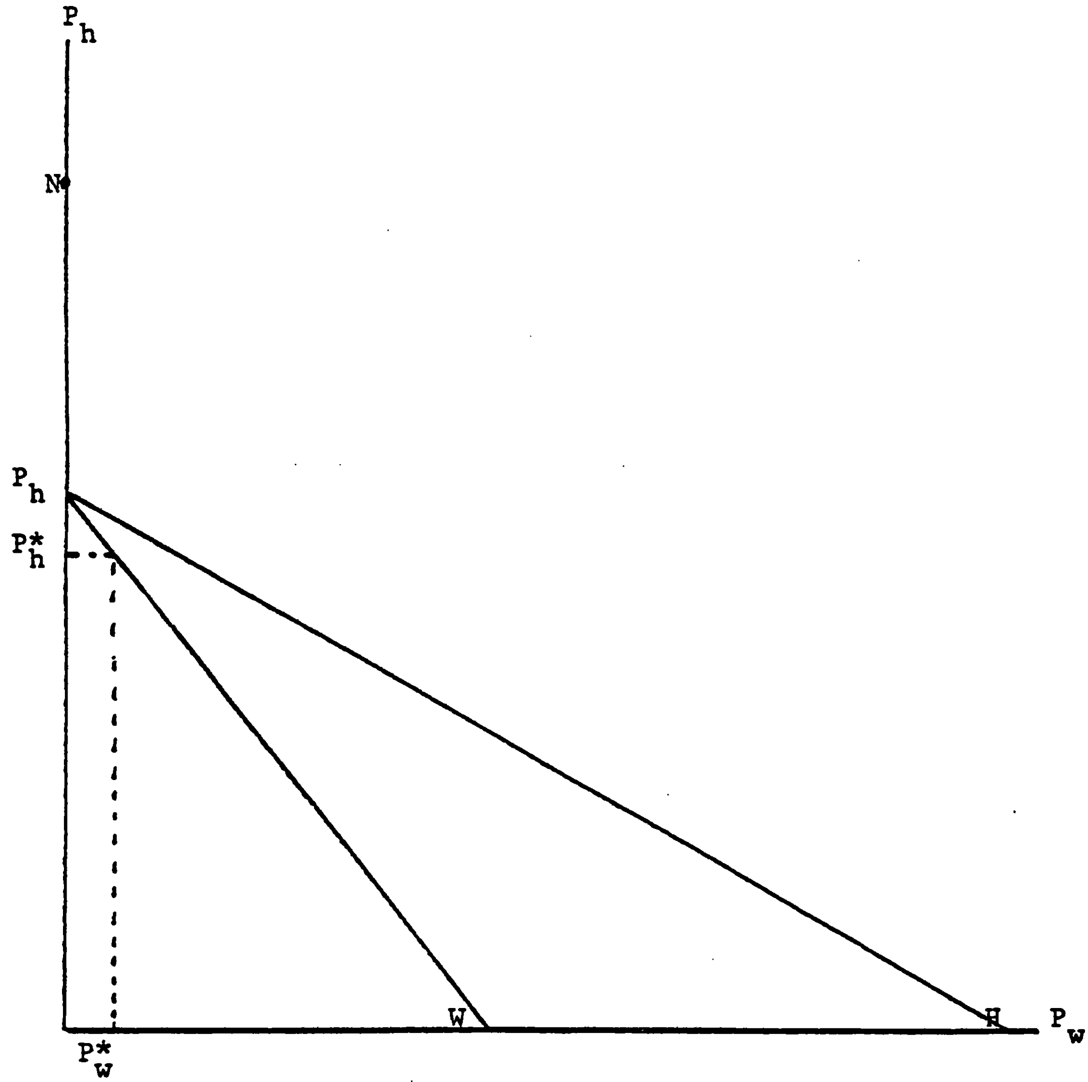
The wife will be at the boundary between the interior and corner solutions when (from equation 2.30)

$$p_1P_w=p_1(P'-P_h)+[(a_{1w}+a_{1h}-1)/a_{1h}][I_w+p_1P_h]=0 \qquad 2.35$$

When equation 2.34 holds, the rational conjectures equilibrium must be carefully defined. The husband, when increasing his public goods expenditures, may rationally conjecture $r_h=0$. The wife's desired level of public goods expenditures (from 2.30) falls to less than zero. However, she is constrained to keeping expenditures at zero, hence her level of spending does not change. If, however, the husband decreases his public goods purchases by some $\varepsilon>0$, the wife desires to increase her public goods purchases. The husband's rational conjecture on his wife's response to an increase in his public goods expenditure is some $r_h<0$.

If the husband has two conjectures - one for increases in his expenditures and one for decreases - which conjecture do we substitute into 2.27 to find his reaction function? Ulph (1983) argues, in the context of a duopoly model, that the appropriate conjecture is the non-zero conjecture (p. 147). An explanation of why this is so might be that, if a firm i has conjectures $r_i=0$, then it will decrease its output (the Cournot-Nash output level being lower than the rational conjectures output level). The decrease in its output will induce an increase in its rival's output, falsifying the conjecture r_i=0.[10]

Figure 2.5: The boundary between interior and corner solutions



N = endpoint of husband's Cournot-Nash reaction function
HP_h = husband's rational conjectures reaction function
WP_h = wife's rational conjectures reaction function

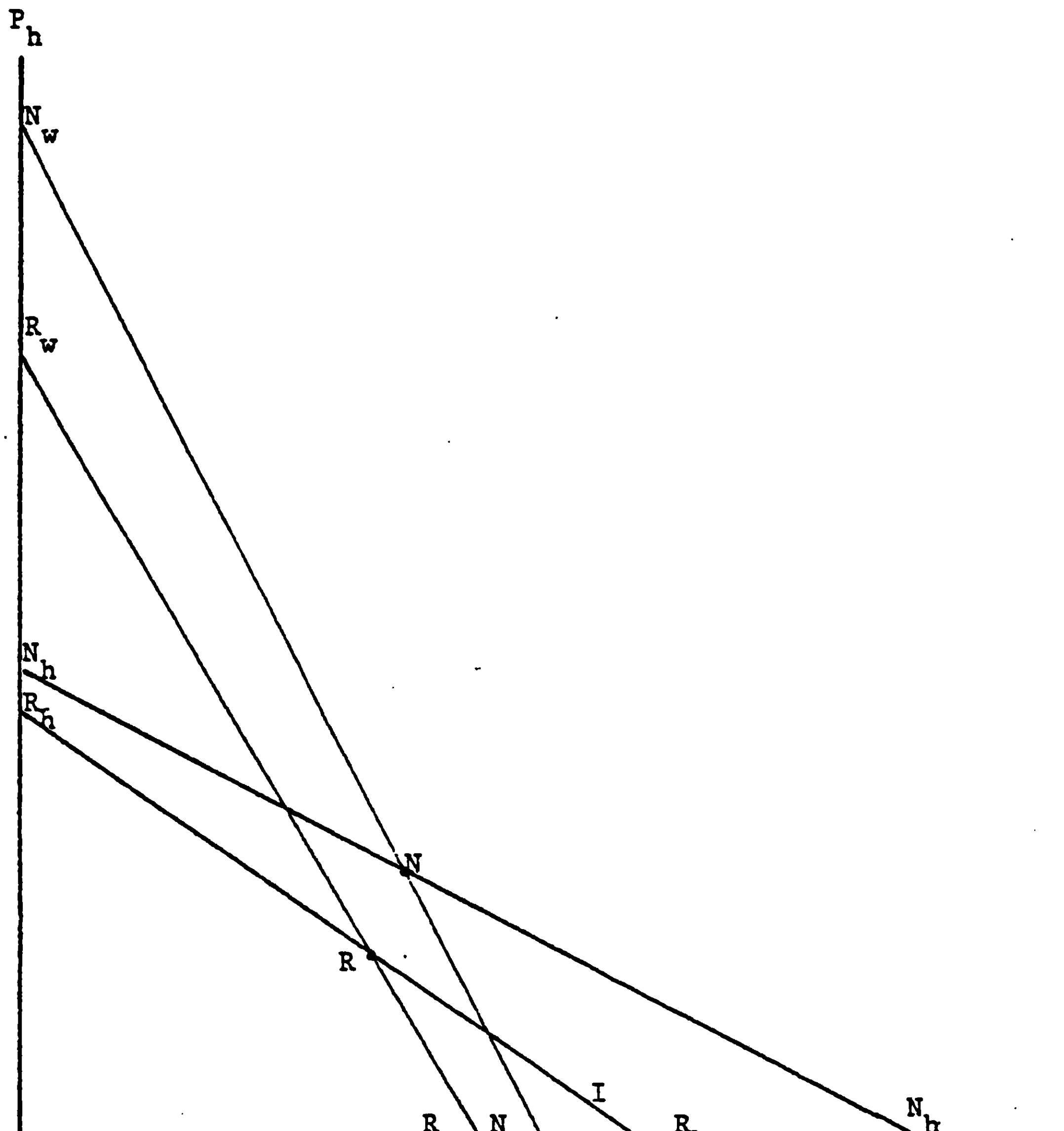
[10] "If firm 2 were to try to exploit firm 1's lack of response by *increasing* its profit, it would actually reduce its profits by moving away from the profit-maximizing output" (Ulph, 1983, p. 146).

In the case of marriage, however, if the husband conjectures $r_h=0$ he will increase his public goods expenditure. This is shown in Figure 2.5. The husband's rational conjectures reaction function (as given by 2.30) is denoted by HP_h and the wife's by WP_h. The endpoint of the husband's Cournot-Nash reaction function (2.16) is represented by point N. If the husband conjectures $r_h=0$ he is adopting Cournot-Nash conjectures. His level of public goods purchases increases from P_h to the Cournot-Nash level, point N. The wife cannot decrease her expenditure in response to this increase, and so the conjecture $r_h=0$ is confirmed by experience. At the same time, however, if the husband tries to confirm the conjecture $r_h<0$ by experimentally decreasing his expenditures, the wife will increase her expenditures, hence $r_h<0$ can also be confirmed. As an experiment in the form of changes in expenditures can confirm either conjecture, the husband's behaviour at the boundary between interior and corner solutions is indeterminate.

2.3.4. Comparison of Nash and Rational Conjectures Equilibria

The rational conjectural equilibrium is compared with the Nash equilibrium in Figure 2.6. The wife's rational conjectures reaction function is given by R_wR_w and her Nash reaction function by N_wN_w, while the corresponding reaction functions for the husband are R_hR_h and N_hN_h. The husband's rational conjectures reaction function is steeper than his Nash reaction function. A unit increase in the wife's public goods expenditure causes a greater decrease in the husband's public goods expenditure under rational conjectures, since the husband anticipates that the wife will increase her expenditure when he decreases his. The husband's rational conjectures reaction function also has a lower P_h intercept than his Nash reaction

Figure 2.6: Comparison of Nash and Rational Conjectures Equilibria



Total expenditures are higher ar the Nash equilibrium (N) than at the national conjectures equilibrium (R).

function. That is, when the wife's public goods expenditures are nil, the husband's public goods expenditures will be lower if he has rational conjectures. Each spouse's public goods expenditure is lower at a rational conjectures equilibrium (providing $a_{1i},a_{1j}<1$), with the difference in expenditure levels being given by:

$$p_1P_i^N-p_1P_i^R=(c_i-a_{1i})(I_i+I_j^*)$$

The difference is always positive since

$$c_i-a_{1i}=[a_{1i}(1-a_{1i})(1-a_{1j})]/[a_{1i}+a_{1j}-a_{1i}a_{1j}]>0$$

The gap the equilibria depends on the couple's total supernumerary income, that is, income net of consumption requirements, and the parameters of the spouses' welfare functions. The closer a_{1j} and a_{1i} are to one, that is, the greater the relative weight put on public expenditures, the smaller the difference will be. It is worth noting that our results differ from Cornes and Sandlers (1984) analysis of voluntary public goods provision. Cornes and Sandler find that allowing for a range of conjectural variations leads to a solution closer to the Pareto optimum. This is because, with their conjectures, a person expects his provision to be matched by others. People follow a Kantian "do unto others as you would have them do unto you" behavioural rule. The rational conjectures we find are of the "free-ride on others before they free-ride on you" variety, that is, a person expects an increase in his public goods provision to lower, not raise, other individual's provision levels.

2.4. Shared management

In Sections 2.2 and 2.3, spouses adopted individual control systems of financial management. The spouses' optimization problems were linked through consumption externalities. Under a shared management system, interdependence arises through income effects, as one spouse's work decision alters the common budget constraint. In the first part of this section, I discuss Leuthold (1968), which develops the basic shared management model. In the second, I expand Leuthold's model to include caring. In the third, I introduce private goods, and show that, in this case, shared management produces the individual control interior solution.

As discussed in Chapter 1, Leuthold (1968) develops a model in which each spouse maximizes a utility function of the form,

$$U_i=\beta_{1i}\log(Y-Y_i')+\beta_{2i}\log(L_i-L_i'), \quad \Sigma_j\beta_{ji}=1.$$

subject to the constraint

$$Y=\Sigma_{i=w,h}w_i(T-L_i)+R_i \qquad 2.36$$

where R_i is property income, L_i leisure and Y income spent on other goods. Each spouse's problem in Leuthold's model is technically the same as that under an individual control management system when $s_{ji}=s_{ij}=0$, all goods are public (so P=Y), and the spouses' budget constraints (equations 2.1 and 2.2) are substituted into the identity $P_i+P_j=P$. Although the mathematical structure of the two models is similar, the interpretation of the equations is different. Leuthold's model represents a shared management system. Each spouse faces the same budget constraint, and so interdependence in the spouses' optimization problems arises through income effects as each spouse adjusts his or her work decisions.

Caring may be introduced into Leuthold's model by changing the spouse's objective function to a welfare function, as discussed in Section 2.1.3. Suppose each spouse maximizes a welfare function

$$W^i=\Sigma_{j=i,j}s_{ij}[\beta_{1j}\log(Y-Y_j')+\beta_{2j}\log(L_j-L_j')], \; s_{ii}=1, \; s_{ij}\leq 1 \qquad 2.37$$

subject to the constraint 2.35. To make it easier to solve for W_i I assume that $Y_i'=Y_j'$. With Nash conjectures, $\partial W_j/\partial W_i=0$. Solving as in Section 2.2 produces the equilibrium level of earnings:

$$w_iW_i=d_iw_i(T-L_i')-(1-d_i)(w_j(T-L_j')-Y'+R) \qquad 2.38$$

where

$$d_i=\frac{(1+s_{ji}\beta_{1i})(\beta_{1i}+s_{ij}\beta_{1j})}{\beta_{2i}(\beta_{1j}+s_{ji}\beta_{1i})+(1+s_{ji}\beta_{1i})(\beta_{1i}+s_{ij}\beta_{1j})}=\frac{a_{1i}}{a_{1j}a_{2i}+a_{1i}}$$

Equation 2.37 differs from the interior individual control Nash equilibrium in public goods (equation 2.17) in two respects: first, c_i in equation 2.17 replaces the parameter a_{2i} with $a_{2i}+a_{3i}=1-a_{1i}$, that is, it includes the private goods parameter; second, own property income R_i is pooled with the other spouse's supernumerary income, reflecting the pooling which actually occurs with shared management.

The rational conjectures equilibrium is found by imposing the equilibrium condition $r_i=\partial W_j/\partial W_i$ and solving for r_i. Some calculation shows that the rational conjecture is given by:

$$r_i=-[(1-a_{1j})/a_{1i}](w_i/w_j),$$

where $a_{1i}=[(\beta_{1i}+s_{ij}\beta_{1j})/(1+s_{ij}\beta_{1j})]$, the weight placed on public goods in spouse i's welfare function. It should be noted that, in order to simplify calculation of the rational conjecture, I have not substituted for L_j in spouse i's welfare function. The rational conjecture under shared management is differs from that calculated under independent management in that the shared management conjecture depends upon the relative wage rate. Substituting for r_i into the reaction functions and solving yields the following expression for earnings:

$$w_iW_i=a_{1i}(w_i(T-L_i'))+(1-a_{1i})(w_j(T-L_j')+R-Y') \qquad 2.39$$

Equation 2.38, like equation 2.37, differs from the corresponding individual control rational conjectures interior solution, equation 2.31, in that all property income is pooled together with the other spouse's supernumerary income.

When private goods are introduced, shared management produces the individual control interior solution. The spouses' budget constraint becomes:

$$\Sigma_i(R_i+w_iW_i-p_2Q_i)=P$$

Note that the price of public goods is normalized to equal one. Substituting for P and L_i in spouse i's welfare function (equation 2.36), taking the first order conditions with respect to W_i and Q_i, and solving, with the assumption of Nash conjectures, yields the demand functions:

$$w_iW_i=-a_{3i}[I_i+R_j+w_jW_j-p_2Q_j] + w_i(T-L_i') \qquad 2.40$$

and

$$p_2Q_i=a_{2i}[I_i+R_j+w_jW_j-p_2Q_j] + p_2Q_i' \qquad 2.41$$

where a_{3i} is the weight placed on leisure in i's welfare function, and a_{2i} is the weight placed on private consumption, as in the independent management Nash equilibrium. Substituting for W_i and Q_i in spouse j's demand functions (using 2.39 and 2.40) produces two equations in Q_j and W_j. These can be solved to give:

$$w_jW_j=-a_{3j}c_i(I_i+I_j+P') + w_j(T-L_j') \qquad 2.42$$

and

$$p_2Q_j=a_{2j}c_i(I_i+I_j+P') + p_2Q_j' \qquad 2.43$$

where c_i is the coefficient on supernumerary income in the independent control Nash equilibrium (see equation 2.17). As the model is symmetric, the solutions for Q_i and W_i are analogous. Equations 2.41 and 2.42 are, in fact, identical to the demand for private goods and labour supply in the individual control interior solution.[11] The intuitive reasoning behind the result is straightforward. Public goods expenditures in the individual control interior solution effectively act as an income pooling device, producing the same result as shared management.

The difference between shared management and individual control occurs when one spouse's desired public goods expenditures are zero or even negative. With individual control, the poorer spouse cannot make a negative level of public goods expenditures. With shared management, however, the poorer spouse is not so constrained. By taking out more from the income pool than she contributes, she makes a negative contribution to the public pool, effectively making negative public goods expenditures.

Conclusions

This chapter has developed a model of family decision making. Each variant of the model illustrates an interesting point.

The first variant of the model illustrates how, with individual control of resources, the division of income between spouses influences the type of equilibrium obtained and, in certain cases, expenditures patterns. At an "interior solution", when spouses' incomes are comparatively equal, expenditures patterns are determined by the interaction of both spouses'

[11] To check that this is the case, substitute 2.41 and 2.42 into the budget constraint. The resulting expression for public goods expenditures is the sum of individual public goods demands in the individual control model (equation 2.17, i=i,j).

preferences, and the equilibrium is unaffected by small redistributions of income. When one spouse is too poor to contribute to public goods expenditures, but not poor enough to receive income transfers from the other spouse, income redistribution is no longer neutral. Changes in relative incomes change expenditure patterns. However, when one spouse is poor enough that she receives an income transfer from the other spouse, expenditures reflect the preferences of the wealthier spouse.

The assumption of rational conjectures changes the results in two significant ways. First, it is no longer possible to give a general proof that, in the interior solution, small income transfers have no effect. However, with a Stone-Geary welfare function, neutrality is found to hold. A second difference is the non-existence of rational conjectures when one spouse reaches a corner solution and a concomitant discontinuity in the other spouse's demand functions.

With shared management, spouses are, in effect, always at an interior solution. The pooling of income and the purchasing of public goods are equivalent in their effects on spouses' decision-making.

Having developed an individualistic model of the family, we are now in a position to discover whether or not it yields new insights. Our test case is the analysis of family taxation policy. In chapter 4 we use the model to explore the properties of the optimum tax rates for husband and wife. As a preliminary to the optimal taxation analysis, however, we need to discuss the appropriate role of government in private, family affairs. Chapter 3 considers goals for government policy towards the family.

Chapter 3

Goals for tax policy towards the family

Why a taxation policy towards the family? Because decisions on labour supply, household production and fertility made within the family have consequences for a nation's economic performance. Taxation may have an effect on the decisions that families make. Examples of such policies are the U.K. income tax system, which provides an additional tax allowance for married couples, and the permitting of income splitting between husband and wife under the U.S. tax code, which ensures that primary and secondary earners face the same marginal tax rate. Such programs create incentives to marry and alter the incentives for labour force participation, although the extent of these effects is a matter of some debate (see for example Bishop, 1980).

An attractive aim for government policy is "neutrality" in the treatment of the family. The government should not intervene in family life. However, it can be argued that neutrality as a goal is infeasible, because alternative conceptions of neutrality conflict. History, equity, and the public interest are as important in directing tax policy as neutrality. In section 3.1 we explore some family taxation policy debates.

If we cannot be completely neutral in our treatment of the family, how can we trade off neutrality and other goals? The welfarist perspective of economic analysis provides one framework for making such trade-offs. Values such as neutrality, equity and efficiency are traded off by policy makers on the basis of individuals' preferences. Section 3.2 compares welfarism with a number of other approaches to trading off various policy goals.

One subject which has been problematic for welfarist analysis is interdependence between people's well-being. Suppose a person enjoys seeing others suffer and would prefer to live in a community where suffering was widespread. Should society as a whole respect the individual's preferences and not try to prevent suffering? Or should such meddlesome preferences be ignored? While we cannot hope to resolve the issues raised by interdependence in well-being which have troubled many utilitarians, we do outline certain of the main features of the debate, and suggest a way forward which allows us to proceed to optimal tax analysis.

3.1 Neutrality and the policy debate

It is a feature of much recent liberal thought that the fundamental institutions of government and of the legal order are required to be neutral as to rival moral ideals and conceptions of the good life (Gray, 1988, p. 136). Although Rawls (1971) does not use the term "neutrality" his discussion of toleration and the common interest (section 34) contains a good description of what is meant by the term:

> ...particular associations may be freely organized as their members wish, and they may have their own internal life and discipline subject to the restriction that their members have a real choice of whether to continue their affiliation. (Rawls, 1971, p. 212).

For Rawls, neutrality is an application of moral liberty, freedom of thought and belief, and of religious practice (pp. 211-212). It is regulated, like other liberties, by the state's interest in public order and security, as disruption of these conditions is a danger for the liberty of all.

Political neutrality is closely related to economic notions of neutrality. If the organization of associations is determined entirely by their members' decisions, and these decisions are not distorted by government policy, then economic neutrality holds.

Neutrality has two implications for taxation policy. First, the state should be neutral as to the organization of the family, and so families with equal resources and equal needs should be treated equally in all respects, including taxation. No particular family type (such as two-earner couples) should be subsidized at the expense of other family types. The tax unit is the family, that is, there should be joint taxation, either with or without income splitting. Second, public policy should be neutral with respect to marital status so that, in Rawls' phrase, "members have a real choice of whether to continue their affiliation". Two single individuals should be taxed on the same basis as a married couple, as any other basis for taxation will create either an incentive or a disincentive to marry. The tax unit is the individual.

A progressive tax system cannot be neutral with respect to marital status and also neutral with respect to family structure. For example, consider a tax system designed so that people (married or single) earning £10,000 per year pay £2,000 in tax whereas those earning £20,000 per year pay £5,000 in tax. A married couple with two earners, each earning £10,000 per year, will pay £1,000 less tax than a single-earner married couple, in which the earner's income is £20,000 per year. The tax system favours the two earner couple. If, on the other hand, the tax system was based on a married couple's total earnings without income splitting, the two earner couple would have to pay £1,000 per year more tax when married than when cohabiting, creating a disincentive to marry. If income splitting were allowed, the single earner couple would pay £1,000 less per year when married, creating an incentive to marry. With or without income splitting, the tax system is not neutral with respect to marital status.

Considering actual tax systems, the reasons given for preferring either joint taxation (and neutrality with respect to family structure) or individual taxation (and neutrality with respect to marital status) fall into a number of categories. Historical marriage laws were one factor contributing to the establishment of joint taxation. It is justified today on the grounds that, because income is shared within the family, joint taxation is a more equitable form of taxation. A final consideration, which may favour either joint or individual taxation, is the public interest.

The United States currently and the United Kingdom until recent reforms[1] have systems of joint taxation, with and without income splitting, respectively. In both countries, historical factors contributed to the presence of joint taxation. In the United States, joint taxation was allowed first in states that had "community property" systems inherited from Spain, which presumed that all property of a married couple was held in common. As many states began to adopt community property systems to lower residents' tax burdens and stop wealthy residents from moving away, income splitting provisions were extended to all states (Groves, 1963). In the United Kingdom, at the time of the Napoleonic Wars, when the first income tax laws were passed, a married woman had few property rights, and so her income

[1]While changes in the tax treatment of investment income, for example, have moved the U.K. system towards an individual taxation basis, traces of joint taxation remain. For example, Inland Revenue form 33 (1988) contains the instructions "If you are a married woman living with your husband, please complete the form with your husband's details (or, if you prefer, ask him to complete it). This is because your husband's Tax Office is responsible for your joint tax affairs." Also, the married couple's allowance has remained in place, and goes automatically to the husband, unless his taxable income is less than the sum of his personal allowance plus the married couple's allowance (The Observer, "MCA and MCPs", 1 April 1990).

was deemed to be that of her husband for the purposes of tax.

The oldest historical reason for treating a married woman's property as that of her husband is that husband and wife are fused by love, custom, or nature into a single political and economic entity. Blackstone argued that, under coverture, man and woman become one when they marry, that one being the man. (Blackstone, Commentaries on the Laws of England, cited in Pateman, 1988, pp. 155-6). Political philosophers in the social contract tradition, including such influential thinkers as Locke, Hobbes and Hegel reached similar conclusions to Blackstone on the rights of married women (an excellent discussion of the views of these writers on the relationship between men and women can be found in Pateman, 1988). For example, Hegel writes "The family is represented in public by the husband, the 'one person' created by the marriage contract [i.e., by marriage]" (Pateman, pp. 176-77). Hegel views the family as a private entity, separate from civil society, and represented in civil society by the man, because marriage "creates a substantive relation constituted by 'love, trust, and common sharing of their entire existence as individuals'" (Philosophy of Right, quoted by Pateman, 1988, p. 174). Historically, it has been thought that the bonds between husband and wife prevent the wife from being an independent member of society. Although today women and men have equal rights to participate in society, at least part of the reasoning leading up to, say, Hegel's conclusions still finds favour. The presumption of equal sharing within the family provides an equity argument for joint taxation.

The equity argument for joint taxation is based on two considerations. First, tax liabilities should be based on ability to pay. Second, the appropriate measure of a family's ability to pay is its total income, because income is shared between all family members. "Spouses in the normal case pool and share their income" (Groves, 1963, p. 70). "There is a powerful school of thought which holds that ability to pay as related to families depends on the combined income of all members of the family" (Mockler, Smith and Frenette, 1966). MacRae (1980, p. 104-5) advocates income splitting[2] for married couples to account for the presence of direct cash transfers from high earning to low earning spouses, and the contribution of high earners to household expenses. Yet there are problems with this line of reasoning. There is little empirical evidence on the extent of sharing within families, or theoretical reasons to believe that sharing is the norm, as discussed in Chapter 1. Even if it is accepted that sharing is the norm, the fact remains that government policy is likely to matter most in those, perhaps unusual, families where sharing is less than complete. It is for those families that it matters, for example, which spouse receives the family allowance cheque.

A number of countries have recently switched from joint to individual taxation, such as Austria (1973), Denmark (1970), Finland (1976), Italy, (1976), the Netherlands (1973), and Sweden (1971) (OECD, 1986). The argument for individual taxation, and neutrality with respect to marital status, like the argument for joint taxation, revolves around equity considerations. Commentators in both the U.K. and the U.S. have attacked specific aspects of joint taxation on equity grounds. In the U.K., Freeman, Hammond, Masson and Morris (1988) use the criterion of "fairness" to decide the issue. They favour individual taxation on the grounds that it is not fair for unmarried taxpayers to subsidize married couples, as occured under the system of joint taxation (1988, p. 109) with the married man's allowance. In the U.S. Munnell (1980) also argues for an individually based taxation system which is neutral

[2] That is, "the appropriate tax for the couple is...twice the tax on their average income" (MacRae, 1980, p. 105).

with respect to marital status. She questions the assumption that total household resources is the appropriate measure of ability to pay: "In the contemporary environment it may be more reasonable to assume that each spouse has a proprietary interest in his or her own income and would prefer to be taxed individually" (Munnell, 1980, p. 252). A more general equity argument against the U.S. system of joint taxation with income splitting is that it is unfair for a single earner family to pay the same taxes as a two earner family, since the single earner family benefits from the (untaxed) home production of the non-working spouse. From the number of equity arguments for both individual taxation and joint taxation, it is clear that equity considerations alone are not enough to choose between the two. A possible further consideration is the public interest.

Society may have overall goals such as the encouragement (discouragement) of population growth or care for the elderly or handicapped in the home. A government with such goals may favour (tax) marriage or give tax breaks to single earner (dual earner) couples. It can be argued that regulation is justified on the grounds that, say, population growth causes indirect harm to or provides indirect benefits for other members of society. For example, Carlson (1985) argues for an increase in the value of the exemption for dependent children provided in the U.S. tax code from $1,040 to $4,000 (p. 15) on the grounds that economic growth and care of the elderly requires a growing population (p.14).[3] However, the case could be made that it is wrong to meddle with incentives for family formation, a point which will be taken up below.

It could be argued that the division between joint and individually based taxation is

[3] In more spirited language, Carlson argues that "the continuation of the American experiment in free society requires a reweighting of incentives in favor of family life" (p. 14).

a false dichotomy. Why not allow a married couple to opt to be treated either as two singles or as one tax unit? Doesn't this achieve neutrality? One can observe, first, that it is not neutral unless unmarried couples have the same freedom to opt for either tax treatment. Otherwise there would be an advantage to marriage, namely the advantage of choice of tax treatment. And if, to achieve neutrality, the advantages of choice are extended to unmarried heterosexual couples, why should the same advantages not be given to homosexual couples, or any two cohabiting individuals? Yet if we accept that these groups have rights to be taxed as married couples, we run up against other obstacles. For example, it seems doubtful that a policy of extending the U.K. married couple's allowance to unmarried couples would be politically feasible. It would result in a large revenue loss, and there is no compelling equity or public interest reason to tax cohabiting couples less than single individuals.

In summary, neutrality with respect to the family is not a viable guide for public policy. Neutrality can be interpreted in at least two ways, that is, as neutrality with respect to family structure or as neutrality with respect to marital status. These two interpretations can and do conflict. When we try to understand the conflict by examining the consequences of neutrality in more general terms, we see that marriage has special features. Husband and wife have historically been treated as one because of their presumed natural and social bonds. Today we no longer believe that when man and woman marry, they become one, that one being the man. However, governments still give families special treatment. The arguments for doing so frequently revolve around the public interest. Hence the question arises: How much of a benefit to the public interest justifies intervention in private life?

3.2 Trading off neutrality

There are a range of approaches to the trade-off between neutrality and other values. The libertarian view is that liberty is prior to any other value (see, for example, Nozick, 1974). Pluralist views allow partial commensurability of liberty and social welfare (Griffin, 1986). Finally, welfarism takes the view that the welfare of society is a function of the well-being of individual members of society (Sen, 1982, p. 19). Any commodity is of value in so far as it contributes to individual utility.

The libertarian viewpoint, exemplified by Nozick (1974), gives a coherent view of treatment of the family. People are free to organise their domestic arrangements as they wish. With a minimal state, and hence a minimal tax burden, the distortions imposed by taxation on family life are minimal. What are the objections to the Nozickian libertarian view? Nozick's arguments are based on the primacy of property rights. Yet there are other values, such as the value of human life. There may be times when the lives of the starving can only be saved by violating the property rights of the well-endowed. In this case, valuing human life above private property rights entails rejecting Nozick's libertarian conception of justice (Lessnoff, 1978, p. 145). People at times will choose to give up a certain amount of liberty for other values, such as life. There are circumstances under which people can and do choose to sacrifice liberty.

The pluralist view recognises that values may conflict, and is adopted by Fishkin (1983) and Griffin (1986). Fishkin argues that three widely accepted liberal principles, that is, the principles of merit, equality of life chances, and the autonomy of the family, inevitably conflict. In response to the conflict, he offers a "limited liberalism" or "ideals without an ideal" (p. 193). There is a plurality of principles, to be traded off in particular cases (p. 192).

The question of how principles are to be traded off is left open by Fishkin. Griffin (1986), however, addresses the question further. There are a number of values, of which liberty is one. When values conflict, we rank them in the sense that we "not just choose one rather than the other, but regard it as worth more. That is the ultimate scale here: worth to one's life" (p. 90). Griffin comes closer than either Nozick or Fishkin to the welfarist view that two social states can be compared on the basis of a social welfare function which depends on individual well-being on each of the two states.

In Griffin's account, as in work in welfare economics (Arrow, 1963), an individual's well-being in each of several social states is measured by his ranking of these states. Yet Griffin's account of well-being is not exactly the same as welfarist well-being. What gives the satisfaction of desires in a state of society value is being informed by "a perception of the nature of object of desire" (Griffin, 1986, p. 323). Desires not so informed, such as a desire to count blades of grass all day, do not count. Liberty and prosperity (or efficiency or equity) each have value, to be assessed within the single framework of well-being (p. 309) by informed individuals. In contrast, the welfarist view takes social welfare to be a function of (possibly uninformed) individuals' well-being. Given two states of the world, A and B, identical except that, in A, a person is able to count blades of grass all day if he chooses, while in B he is not, A is preferred to B, because one person is better off in A than in B. Just as states of the world can be traded off, values can be traded off against each other by examining how individuals rank them.

Welfarism is the approach generally used in economic analysis; for example, see Atkinson and Stiglitz (1980) in the context of taxation and Dreze and Stern (1987) in cost benefit analysis. Welfarism avoids libertarianism's adherence to the supremecy of property rights in the face of individuals' willingness to trade rights to property against rights to life. Unlike Griffin's pluralism, it does not require the analyst to be informed about "the nature of the object of desire", only about people's preferences. For these two reasons, I adopt a welfarist view in my analysis of taxation and the family in Chapter 4. If there are reasons, perhaps arising from considerations of neutrality or liberty, for not intervening in family life, these can be compared with the efficiency and equity gains from such intervention within a welfarist framework.

3.3 Welfarism and Caring

Welfarism is not a simple solution. The various difficulties with welfarism are discussed at length in Sen (1982). Here I wish to discuss only one of the issues related to welfarism, namely, the treatment of interdependence between the well-being of different individuals.

According to welfarism, public policy aims to maximize the sum (or a weighted sum) of the welfares or utilities of individuals in society. One contributor to an individual's welfare is the well-being of those for whom he cares. Yet we find ourselves in a quandry if we attempt to incorporate such interdependence into the social welfare function. If the social welfare function respects people's caring for each other, more resources will be allocated to the selfish, who care only about their own consumption, and less to the unselfish, who derive satisfaction from the consumption of others, if asymmetries exist in the degree of caring of individuals for each other. Yet social justice is frequently thought to require impartiality which "excludes favoritism based on friendship, similarity of race or class, and so on" (Barry, 1989, p. 290). Whether or not social welfare should consider interdependence of well-being has been the subject of an extensive debate. The reasons which may be given for excluding interdependence of well-being are impartiality and equality (Dworkin, 1977). Against excluding interdependence is the argument that it is not meaningful to differentiate between alternative sources of well-being (Griffin, 1986). Indeed, most economic analyses make no such distinction (see, for example, Hochman and Rodgers, 1969).

Impartiality is one reason for wishing to exclude utility interdependence. An example of a model which follows this reasoning is Sen (1966). Sen considers caring in the context of a cooperative enterprise. Each family in the enterprise has an egocentric (family-centric) utility function U_i defined over income (y_i) and labour (l_i):

$$U_i=U(y_i,l_i) \qquad U_y>0,\ U_l<0,\ U_{yy}<0,\ U_{ll}<0,\ U_{yl}=U_{ly}=0 \tag{3.1}$$

Each family also has a "sympathetic" welfare function, which is a weighted sum of the utilities of each family in the cooperative:

$$W_j=\Sigma_{i=1,N}a_{ij}U_i \qquad a_{jj}=1,\ 0\leq a_{ij}\leq 1 \tag{3.2}$$

The sympathetic welfare function is the family's objective function, that is, each family is assumed to try to maximize its own welfare. Social welfare is an aggregate of the individual utility functions 3.1:

$$W=\Sigma_{i=1,N}U_i \tag{3.3}$$

Sen, in commenting on the social welfare function 3.3, notes that people adhering to it will be non-discriminating. Being non-discriminating requires that caring be ignored.[4]

Sen is not the only writer to have excluded forms of utility interdependence from a welfarist analysis. Harsanyi (1977) makes an exception to his principle of acceptance, which states that the utility of individual j is defined in terms of his own personal preferences, in

[4]Although in Sen's analysis including caring would not change the social welfare function, as it is assumed that there is symmetric good will, that is, $\Sigma_j a_{ij}$ is equal for every family i.

the case of sheer hostility, malice, envy, and sadism. "[H]uman sympathy can hardly require that i should help sadists to cause unnecessary human suffering" (1977, p.62). The moral point of view is that of "a *sympathetic* but *impartial* observer" (p. 49). Human sympathy requires ignoring some forms of utility interdependence.

Egalitarianism is, according to Dworkin (1977, p. 275), "the principal source of the great appeal that utilitarianism has had, as a general political philosophy, over the last century". If a utilitarian philosophy is not egalitarian it has little appeal within Dworkin's framework. Interdependence in well-being may well lead to inequality. Given the individual welfare function 3.2 above the sum total W_i+W_j is maximised by an allocation of consumption, x_i, at which:

$$(a_{ii}+a_{ji})\frac{\partial U_i}{\partial x_i}=(a_{jj}+a_{ij})\frac{\partial U_j}{\partial x_j} \qquad 3.4$$

Suppose that there are no intrinsic difference between the individuals, so they have identical utility functions, and, moreover, that both have diminishing marginal utility of income. If individual i receives more sympathy than he gives ($a_{ji}>a_{ij}$), then he must have a lower marginal utility of consumption in order for 3.4 to hold, which will be obtained only if he enjoys a higher level of consumption. By the same reasoning, an individual j who cares more for others than they care for her receives, at the welfare maximizing allocation, less income. Inequality results from the interdependence of people's well-being. Accordingly, "the fact that a policy makes the community better off in a utilitarian sense would *not* provide a justification compatible with the right of those it disadvantages to be treated as equals" (Dworkin, p. 235). Yet with Dworkin's analysis we have to provide a prior justification for our commitment to egalitarianism, perhaps using some notion of rights.

There are a number of arguments which, in contrast to those based on impartiality and equality, suggest that all preferences, whether personal or external, should be included in welfare analysis. First, it is argued that the distinction between preferences over one's own consumption and preferences over other's consumption is not meaningful. Indeed Sen (1982, p. 92) makes the point that

> It can be argued that behaviour based on sympathy is in an important sense egoistic, for one is oneself pleased at others' pleasure and pained by others' pain, and the pursuit of one's own utility may thus be helped by sympathetic action (Sen, 1982, p.92).

Perhaps what ultimately matters is people's well-being, not the source of that well-being. A second argument attacks the claim that egalitarianism requires us to ignore well-being interdependence. Griffin (1986, p.24) gives an example which illustrates how interdependence is compatible with utilitarianism's main claim to being egalitarian, namely, Bentham's doctrine that everybody is to count for one: "A father's happiness can be at stake in his child's happiness - two persons' welfare riding on one person's fate. Allowing that is no violation of everybody counting for one; it merely allows the father, like everyone else, also to count for one." Egalitarianism requires, in a utilitarian framework, equality in well-being.

The if and hows of incorporating interdependence in well-being into a welfarist framework have been the subject of much debate, and it is a debate that we can only survey in this chapter, not resolve. Our ultimate aim is to go beyond this debate into the realm of concrete policy analysis. There is a way of going forward into applications without resolving the various claims to impartiality and equality of the ignoring interdependence and the incorporating interdependence approaches. This way is the subject of section 3.4.

3.4 A social welfare function

In practice, we can avoid making a prior commitment to either achieving impartiality by ignoring the interdependence of people's well-being or respecting all preferences, selfish or unselfish. This is done by using a general formulation of the social welfare function:

$$F = b_h U^h + b_w U^w \qquad 1 \leq b_i \leq 2 \qquad 3.5$$

The social welfare function, F, describes the ranking by society as a whole of various social states. The function U^i is i's egocentric utility function, which describes the pleasure an individual gets from her own consumption and leisure. The parameter b_i is the weight placed on by society on U^i. Under certain conditions both the ignoring interdependence and the incorporating interdependence views can be represented as special cases of 3.5.

Suppose we wish to have a social welfare function which respects all preferences, selfish or unselfish. We may adopt a sympathetic social welfare function, S, in which social welfare is defined over individuals' sympathetic welfare functions, W^i.

$$S=\Sigma_{i=1,N}W^i \qquad 3.6$$

As in Sen (1966), W^i describes each individual's well-being including both concern about himself and others. The equation 3.6 will be equivalent to 3.5 when each individual's well-being is additively separable in the utility derived from their own consumption and the well-being derived from other's utility. When additive separability holds, an individual j's sympathetic welfare function is defined as a weighted sum of egocentric utility functions:

$$W^i=\Sigma_{k=i,j}s_{ik}U^k \qquad s_{ii}=1,\ 0\leq s_{ij}\leq 1 \qquad 3.7$$

The parameters s_{ij} represents one person's concern about another. In terms of the social welfare function (F), sympathetic welfare means that $b_i^S=(1+s_{ji})$.

Impartiality in the form of ignoring interdependence in well-being can also be represented as a special case of 3.5. To achieve impartiality, we define social welfare as the sum of individuals' egoistic utilities:

$$E=U^{w} + U^{h} \tag{3.8}$$

Equation 3.8 is equivalent to 3.5 with $b_w=b_h=1$. Each person's egoistic preferences have equal weight. The formulations 3.6 and 3.8 will be equivalent (up to a scalar) when there is symmetric goodwill, that is $s_{hw}=s_{wh}$. Both are special cases of the more general social welfare function.[5]

Conclusion

Welfarism provides a coherent framework for analysing the tax treatment of the family. It allows us to recognise government goals of neutrality, and to trade these off against considerations of efficiency and equity. The major difficulty encountered in using a welfarist approach to analyse the family is the treatment of interdependence between individual well-being. There are persuasive arguments for excluding interdependence, based on impartiality and egalitarianism, and also arguments against, drawing upon the notion that it is meaningless to separate sources of human satisfaction. Rather than try to resolve the issue for once and for all, it is possible to use a general social welfare function which represents either the sum of egoistic utility or depends upon sympathetic welfare. With this social welfare function, we can proceed to an economic analysis of government policy towards the family.

[5]It may be noted that, with the sympathetic social welfare function, the government is indifferent to the amount of inequality in welfare between the spouses, and with the egocentric social welfare function, to inequality in utilities. This does not mean that the government is indifferent to inequality in consumption. However, a transformation of the social welfare function which increases social aversion to inequality and, at the same time, retains the additive separability property of the social welfare function, is equivalent to a transformation of each spouse's welfare function.

Chapter 4

Optimal Tax Treatment of the Family

The optimal tax treatment of the family is of major importance in the structure of taxation. Questions which arise in public policy discussions are: Should a husband and wife face the same marginal tax rate? Does it matter which family member receives tax credits or family allowance payments? The answers to these questions depend upon how families operate. Do families, at least as a first approximation, act like a single individual? How complementary or substitutable are husband and wife's earnings? Is the outcome of family decision making less equal than an egalitarian policy maker would wish?

Taxation of the family has received a limited amount of attention in the optimal taxation literature. Boskin and Sheshinski (1983) derive an optimal tax structure for the family under the assumption that there exists a single family utility function. They make a significant contribution by finding optimal tax rates for married men and married women, and the optimal structure for a progressive linear income tax when there is more than one household. Apps and Rees (1988) expand on Boskin and Sheshinski's analysis in three respects. First, Apps and Rees allow for household production. Second, lump-sum transfers are given to each individual, rather than to the family as a unit. Third, their model permits dissonance between society's preferences over individual family members' consumption and the family's preferences. The model developed in this chapter complements the work of Boskin and Sheshinski (1983) and Apps and Rees (1988). We consider households which maximize a single utility function, those discussed by Boskin and Sheshinski, as a special case. However, like Apps and Rees, we allow an element of dissonance between the preferences of policy makers and the household head, which results in a change in policy prescriptions.

The aim of this chapter is to bring together the literature on the economics of family decision making (Leuthold, 1968; Becker 1974a,b, 1981a,b; and Ulph, 1988) and the optimal taxation literature. In the model of family decision making which I will be using, the behaviour of the family will depend on the relative endowments of family members. The family will maximize a single utility function only when one family member is well-off enough to induce others maximize his welfare through his altruistic behaviour. The family utility function will then be that of the altruistic household head. Section 4.1 describes the model of family decision-making.

If the policy maker has preferences over the well-being of individual family members which differ from those of the household head, or if no family member is well-off enough to impose his preference on others, maximization of social welfare involves more than maximizing the well-being of the head of the household. Accordingly, results derived in the previous optimal taxation of the family literature must be modified. Section 4.2 considers the derivation of an optimal linear income tax using the model of family decision making developed in section 4.1.

When no one family member is sufficiently well-off to impose his preferences on others, we can no longer assume that the family maximizes a single utility function. In certain of these cases, individuals' demand functions have almost none of the standard properties (Ulph, 1988, p.40). Optimal tax analysis is far from straightforward. In section 4.3 we consider a benchmark case, namely optimal lump-sum transfers within the family, which sheds some light on the optimal policy in a more general case. The analysis illustrates the trade-off between equity and efficiency within the family.

4.1. A Model of Family Decision Making

The reactions of economic agents to changes in taxation policy will be predicted using the model of family decision making developed in Chapter 2. The two driving features of the model are that spouses care for each other, and derive benefits from goods that are public within the family.

In the model, spouses make three choices. First, they allocate the total time available to them (T) between leisure (L) and paid work (l). Second, they allocate their property and earned income ($R_i+w_il_i$) between their own personal expenditures, p_2Q_i, and household expenditures, p_1P_i. Finally, one spouse may transfer an amount of his income to the other. These choices are limited by the individual budget constraint

$$Y_i = R_i + w_i l_i - p_1 P_i + p_2 Q_i + \pi_{ij}$$

4.1

where π_{ij} ($=-\pi_{ji}$) is the net transfer from spouse i to spouse j.

A spouse's preferences over his or her own consumption are represented by the egocentric utility function, U^i, which depends upon the aggregate level of consumption of household goods ($P=P_i+P_j$), his personal consumption (Q_i), and leisure (L_i):

$$U^i=U^i(L_i,Q_i,P). \qquad 4.2$$

This formulation requires that household goods are pure public goods and personal consumption is purely private. A person's actions are guided by her preferences about her own consumption and her caring for her spouse. Her objective is to maximize her welfare function, W^i, where

$$W_j=\Sigma_{i=1,N}s_{ij}U_i(L_i,Q_i,P) \quad s_{jj}=1,\ 0\leq s_{ij}\leq 1 \qquad 4.3$$

The welfare function is a convenient way of representing the interdependence between spouses, and lends itself to normative analysis.

It may be seen from equations 4.2 and 4.3 that the household expenditures of one spouse enter into the other's welfare function. The wife's expenditures on household goods will depend on how many household expenditures she expects her husband to make. In this chapter, I will assume that both spouses have Cournot-Nash conjectures about household expenditures, that is, each takes the other's behaviour as given.

The model, as outlined above, has three types of solutions (see Figure 3.3). At the interior solution, incomes are relatively equal, and so both spouses contribute to household expenditures. The spouses move from an interior solution to a "no-transfers" corner solution as the relative incomes of the spouses become more unequal. The better off spouse makes all the household purchases, and the less well-off spouse uses her income to finance her private consumption. Finally, when one spouse is sufficiently well-off relative to the other, and is concerned about her welfare, he transfers part of his income to her. The better off spouse purchases his private consumption goods and the household expenditures; the dependent spouse uses her income and the transfer received to purchase her private consumption.

The positive transfers solution is the case described in Becker's (1974b, 1981a) "Rotten Kid Theorem". The presence of transfers reduces the two spouses' budget constraints (4.1 with i=h,w) to a single budget constraint. Each family member's consumption depends on total family income, hence each maximizes family income. The resulting behaviour patterns maximize the well-being of the individual making the transfers.[1]

When there are no transfers from the high earning to the low earning spouse, the behaviour of the family can no longer be described by a single welfare function. It is difficult to make general predictions about the behaviour of families when there are no transfers. However, by placing certain restrictions on the form of spouses' utility functions, we can make some progress.

Each spouse is assumed to maximize the welfare function 4.3 subject to the budget constraint 4.1. Suppose we assume that the utilities of both spouses are separable in household goods, P, and the lower income spouse's private consumption (L_w,Q_w). Given the structure of the welfare function 4.3, it follows that each spouse's welfare function W^i will be separable in (L_w,Q_w) and (P,L_h,Q_h). Using standard results on the possibility of two stage

[1]Bergstrom (1989) has given a number of examples in which the Rotten Kid Theorem fails to hold. The theorem holds in this model because the benevolent spouse's welfare function respects the other spouse's preferences.

budgeting with the separability of utility functions (Deaton and Muellbauer, 1980, pp. 122-24) we can conclude that the wife's leisure demand function, L_w, may be written as:

$$L_w=L_w(R_w+w_wT,w_w,p_2) \tag{4.4}$$

The wife's demand for leisure depends upon her own full income R_w+w_wT, the price of leisure, w_w, and the price of private goods, p_2, on which all her earnings are spent. The household goods demand function can be written as:

$$P=P(R_h+w_hT,w_h,p_1,p_2) \tag{4.5}$$

As the husband purchases all household goods, the demand for these goods depends upon his full income, the price of household goods p_1 and the prices of the other goods which he buys, leisure (w_h) and private goods (p_2). The demand functions will have the usual properties because they arise from what are, essentially, independent welfare maximization problems for the husband and the wife.

Since the wife's utility depends upon both her consumption of household goods and her leisure, her indirect utility function may be written (substituting 4.4 and 4.5 into 4.2):

$$U^w=U^w(R_h,R_w,w_h,w_w,p_1,p_2)$$

Note that each spouse's income enters the utility function separately, instead of in a single total income term. The wife's indirect utility function may be contrasted with that of her husband:

$$U^h=U^h(R_h,w_h,p_1,p_2)$$

The indirect utility of the higher income spouse depends upon his own income and on the prices of the goods he consumes, that is, leisure, household expenditures, and his private expenditures. These are the arguments of the household goods demand function 4.5, and because of the separability assumption made above, will be the arguments of the husband's demand for his own private consumption and leisure.

The equilibrium with no transfers between the spouses is straightforward to analyze because, given our separability assumptions, one spouse's purchase decisions have no effect on the other spouse's demands. At the interior solution, by way of contrast, we need to make strong assumptions to avoid complex interactions between the two spouses' optimization decisions.

In the interior solution, each spouse contributes to household expenditures. The contributions effectively pool the spouses' incomes, with two consequences. First, demands depend on total income, not the division of income between spouses. Second, any change in, say, one spouse's wage rate has more than one effect the other's consumption. Usually one spouse's decisions affect the other because of complementarity or substitutability between the spouses' leisure. At the interior solution, however, there is a further indirect effect. An increase in the husband's wage will cause him to substitute away from leisure and toward buying more public goods, say. As his public goods expenditures increase, the wife will decrease her public goods expenditures and increase her demand for leisure or private consumption. Even if we assume away the usual sources of interdependence in spouses' decisions using separability, indirect interdependence still remains. The one exception arises for welfare functions which produce constant budget shares, such as the Stone-Geary welfare function. We use the Stone-Geary example extensively below.

In the remainder of this chapter, we consider the optimal tax treatment of the family using the model outlined above. Section 4.2 derives an optimal linear income tax for the first two of the three solutions. Section 4.3 discusses optimal lump-sum taxes.

4.2. Optimal Linear Income Tax

Optimal taxation analysis formulates the government's problem in terms of achieving social welfare goals subject to given revenue requirements. The government's problem, therefore, has three elements. The first is to predict the reactions of economic actors to and the effects on their well-being of changes in economic variables. We will predict these changes using the model of family decision making developed above in section 4.1. Next, the tax instruments available to the governments and its revenue requirements must be specified. The final stage is the specification of social welfare goals in the form of a social welfare function. The government's tax instruments and policy goals are the subject of the first part of this section.

4.2.1 Tax instruments and policy goals

Many tax policies affect the family. This section focuses on income taxes, while section 4.3 considers lump-sum taxes. The reasons for limiting our attention to income and lump-sum taxes while ignoring commodity taxes are discussed in the Appendix. Lump-sum taxes are of interest because they are, *a priori*, the most efficient form of taxation. Income taxes are of interest for a number of reasons. Income taxes directly affect the division of income receipts between husband and wife so have, potentially, equity effects. Policy makers have considerable freedom to alter the marginal tax rates faced by family members, especially the tax rate faced by second earners at low income levels. Moreover, because income taxes distort labour supply decisions, the optimal choice of tax rate can contribute to economic efficiency.

The income tax instrument that we will consider is a flat-rate linear income tax. The linear income tax is simple to analyze yet allows us to answer such basic policy questions as whether a husband and wife should face the same marginal tax rate. We discuss the most straightforward case which still permits interesting analysis, that is, the choice of flat rate taxes on husband and wife's incomes for a single, representative family.

With a linear income tax the tax rate on spouse i's income be given by a constant t_i. The government's revenue constraint is:

$$t_h w_h l_h + t_w w_w l_w = R_o \qquad 4.6$$

The terms $w_i l_i$ represent each individual's earnings, that is, their wage rates times their labour supply. The interpretation of 4.6 is that the revenue raised by taxation, each individual's tax rate multiplied by their earnings, must be equal to R_o, the revenue required by government. Normalizing so that $w_h=w_w=1$, and letting $w_i(1-t_i)=\beta_i$, the after tax wage rate, we can rewrite the government's budget constraint 4.6 as:

$$l_w + l_h = R_o + \beta_w l_w + \beta_h l_h \qquad 4.7$$

The government's problem is to satisfy its budget constraint with the minimum reduction in efficiency and equity.

Efficiency and equity considerations are represented by the government's social welfare function. We assume that all families are identical, and so the social welfare function can be defined over the well-being of members of a representative family.

$$F = W^h + bU^w \qquad 4.8$$

For the case in which one spouse is dependent upon the other, the family's behaviour is described by W^h, the welfare of the higher income spouse, assumed to be the husband. By incorporating U^w as well as W^h, the social welfare function 4.8, like Apps and Rees (1988), permits dissonance between the preferences of the policy maker and those of the household head. The policy maker may put more or less weight (b>0 or b<0) on the dependent spouse's utility than does the household head.

Combining 4.7 and 4.8 we have the policy maker's objective function:

$$L = F + \mu[l_w + l_h - R_o - \beta_w l_w - \beta_h l_h] \tag{4.9}$$

The government's objective, as represented in 4.9, is to maximize social welfare subject to its revenue constraint. Which tax structure best satisfies this objective will depend upon individuals' reactions to government policy. We will, therefore, need to consider separately each family type, beginning with those headed by a Beckeresque effective altruist, and going on to those where the lower income spouse is no longer directly dependent on the altruist.

4.2.2 Optimal taxation when the family maximizes the head's welfare

Optimal taxation when the family maximizes the head's welfare is the easiest case to analyze, as the family's behaviour is described by W^h, the welfare function of the household head. Let us redefine W^h as the indirect welfare function of the husband, that is, $W^h=W^h(\mathbf{R},\mathbf{\beta},\mathbf{p})$ where $\mathbf{R}$ is the vector of property incomes, $\mathbf{\beta}$ is the vector of after tax wage rates, and $\mathbf{p}$ is the vector of commodity prices. We can then write the first order conditions for maximizing the government's objective function 4.9 with respect to the wife's after tax wage rate as:

$$\frac{\partial L}{\partial \beta_w}=\frac{\partial W^h}{\partial \beta_w}+b\frac{\partial U^w}{\partial \beta_w}+\mu[-l_w+(1-\beta_w)\frac{\partial l_w}{\partial \beta_w}+(1-\beta_h)\frac{\partial l_h}{\partial \beta_w}]=0 \tag{4.10}$$

where X_i is the i'th element of vector $\mathbf{X}$, where $\mathbf{X}=(L_w,Q_w,P)$.

Since the function W^h represents the well-being of the household head, as well as describing the family's behaviour, we can use standard results to reduce 4.10 to a more manageable form. Optimization on the part of the household head gives us Roy's identity, that is, $\partial W^h/\partial \beta_w=\alpha(T-L_w)$, where α is the marginal value of property income to the wealthier spouse.[2] The Slutsky equations for changes in own income and for changes in spouse's income are given by:

$$\frac{\partial l_i}{\partial \beta_w}=S_{iw}+l_w\frac{\partial l_i}{\partial M}\quad i=w,h$$

where M is the family's money income. The term S_{ij} is the change in i's labour supply induced by a change in j's net wage rate. An increase in own wage rate, all else held constant, causes a substitution away from leisure towards labour supply, so $S_{ii}\geq 0$. The cross-effects S_{wh}, S_{hw} may be either positive or negative, as one spouse's leisure complements or substitutes for the other. Substituting the above conditions into 4.10 and rearranging gives:

$$(1-\beta_w)S_{ww}+(1-\beta_h)S_{hw}=[1-(1-\beta_w)\frac{\partial l_w}{\partial M}-(1-\beta_h)\frac{\partial l_h}{\partial M}-\frac{\alpha}{\mu}]l_w-\frac{b}{\mu}\frac{\partial U^w}{\partial \beta_w} \tag{4.11}$$

If we take 4.11 and the equivalent expression for β_h and solve we have

$$(1-\beta_w)(\frac{S_{ww}}{l_w}-\frac{S_{wh}}{l_h})=(1-\beta_h)(\frac{S_{hh}}{l_h}-\frac{S_{hw}}{l_w})+\frac{b}{\mu}[\frac{1}{l_h}\frac{\partial U^w}{\partial \beta_h}-\frac{1}{l_w}\frac{\partial U^w}{\partial \beta_w}] \tag{4.12}$$

---

[2]Since $W^h=W^h(R,\beta,p)$ and $R=-\beta_w(T-L_w)-\beta_h(T-L_h)+p_1P+p_2(Q_w+Q_h)$ the first order conditions for maximization of W^h with respect to β_w are $(\partial W^h/\partial R)(\partial R/\partial \beta_w)+(\partial Wh/\partial \beta_w)=0$, from which the required condition can easily be derived.

Without the final term on the right hand side, expression 4.12 is equivalent to the condition derived by Boskin and Sheshinski (1983). It is optimal for the husband and wife to face equal marginal tax rates if

$$(S_{ww}+S_{hw})/l_w=(S_{hh}+S_{wh})/l_h. \qquad 4.13$$

Equal tax rates are optimal if the substitution effects induced by a change in the wife's net wage rate relative to her labour supply are equal to the substitution effects relative to labour supply for a change in the husband's wage rate. Since the efficiency losses caused by taxation are due to substitution effects, the condition is saying that equal tax rates are optimal when the relative efficiency losses are equal for both spouses. In general, one would not expect equal tax rates to be optimal. If tax rates are equal then, because we have normalized so that $w_w=w_h=1$, we can multiply through 4.13 by the wage rate w and, noting that $S_{hw}=S_{wh}$, rewrite 4.13 as

$$\eta_{ww}+\eta_{wh}=\eta_{hh}+\eta_{hw} \qquad 4.14$$

It is optimal for spouses to face equal marginal tax rates if the sum of own and cross price elasticities of substitution are equal for both spouses. In fact, Apps and Savage (1989) estimate the compensated own wage elasticities as 0.0714 for males and 0.1201 for females. With the elasticity for females being almost twice the elasticity for males, the case for equal tax rates seems far from convincing.

The final term on the right hand side of expression 4.12 results from the divergence between the policy maker's preferences and those of the household head. Taking this divergence into account has an ambiguous effect on after tax wage rates. Suppose, initially, that $S_{ww}/l_w > S_{wh}/l_h$, so that the right hand side of 4.12 is positive.[3] If the last term in 4.12 is positive, then taking it into account increases the right hand side of the equation, and the wife's after tax wage rate $ß_w$ must fall (and $ß_h$ rise) to achieve the optimal tax. That is, a decrease in the wife's after tax wage rate is required to reduce intra-household income inequality if

$$(\partial U^w/\partial ß_w)(1/l_w) < (\partial U^w/\partial ß_h)(1/l_h) \qquad 4.15$$

Condition 4.15 is more likely to hold if the husband works few hours and the wife works many or if a decrease in the wife's wage rate induces the household to substitute towards goods the wife values more than a decrease in the husband's wage rate would. For example, a fall in the wife's wage rate would induce the household to substitute towards wife's leisure away from other goods, possibly making the wife better off.

It is difficult to determine whether 4.15 holds in general. A change in either wage rate may trigger a number of substitution effects, depending on the patterns of substitutability in the household head's welfare function. We can, however, abstract from complex substitution effects by supposing that family members have Stone-Geary welfare functions of the form:

$$W^i = \Sigma_{k=i,j} s_{ik}[ß_{1k}\log(P-P') + ß_{2k}\log(Q_k-Q_k') + ß_{3k}\log(L_k-L_k')], \quad \Sigma_i ß_{ik}=1$$

In this case it can be shown that taking special account of the wife's utility always leads to a reduction in the wife's after tax wage rate. Condition 4.15 can be shown to be equivalent to requiring that

$$-(1-ß_{3h})ß_{3w}w_h(T-L_h') - (1-ß_{3w})ß_{3h}w_w(T-L_w') - ß_{3w}ß_{3h}(p_1P' + p_2(Q_w' + Q_h')) < 0 \qquad 4.16$$

---

[3]Recall that S_{ij} is the substitution effect of a change in j's net wage on i's labour supply. We would expect $S_{ww} > S_{wh}$ unless the husband's and wife's leisure were strongly complementary, and also we would expect $l_h > l_w$, so the assumption $S_{ww}/l_w > S_{wh}/l_h$ is reasonable.

Clearly 4.16 always holds. The reason we get the result expressed in equation 4.16 is, in fact, quite straightforward. Using the Stone-Geary welfare function eliminates any complications arising from the substitutability or complementarity of either spouse's leisure or other goods. All that remains is one effect. The wife's earnings all go into the general household pool from which consumption purchases are made according to the husband's preferences. A rise in the wife's wage rate may have some effect on total household income - but the magnitude of that effect may not be large, as the government will lower the husband's wage rate to maintain its revenue. Even if the increase in the wife's wage does increase household income, only as much as the husband desires will go towards her consumption. At the same time, an increased wage rate makes the wife's leisure more expensive, and so the household substitutes away from her leisure and towards other goods. Hence she is no better off.

What are we to make of these results? Do we conclude that the fact that women in, say, the U.S. face a higher marginal tax rate than Boskin and Sheshinski's estimates suggest they should represents a concern on the part of enlightened policy makers for the well-being of women? Or do we think that there might be something wrong with the model that we have been using so far? I would tend to favour the latter conclusion. The key assumption which ensures that the family maximizes the well-being of the household head is that the household head supports the other family member. The dependent family member's earnings are not enough to reduce the support by the household head to zero. In fact, one can easily imagine situations where this would not be the case. A dependent spouse might get more income from a part-time job than she ever received in transfers from the higher earning spouse. All of this suggests the need to try to expand our model to more than rotten kids and rotten spouses.

4.2.3 No transfers between spouses

If the lower income spouse does not receive any income transfers from the higher earning spouse, her welfare no longer depends upon total family income. This has an immediate consequence: her welfare may be increased (or, perhaps, decreased) by policies which increase her income at the expense of her husband's income. Perhaps section 4.2.2's recommendation of raising tax rates on second earners will no longer hold.

The optimal tax rates will be those that maximize the government's objective function 4.9. The first order conditions for social welfare maximization are given by 4.10, as in section 4.2.2:

$$\frac{\partial L}{\partial \beta_w}=\frac{\partial W^h}{\partial \beta_w}+b\frac{\partial U^w}{\partial \beta_w}+\mu[-l_w+(1-\beta_w)\frac{\partial l_w}{\partial \beta_w}+(1-\beta_h)\frac{\partial l_h}{\partial \beta_w}]=0$$

4.10 (repeated)

To put equation 4.10 into a form that is a bit more revealing, we need to note two relations. Both of the relations derive from the observation that, because (by assumption) transfers between spouses are zero and the wife's well-being is separable in the goods she purchases and those her husband purchases, her utility maximization is carried out independently of her husband's decisions. It is a straightforward utility maximization problem. It follows, therefore, from the first order conditions for utility maximization, that $\partial U^w/\partial \beta_w=\alpha_w(T-L_w)$, where α_w is the marginal utility to the wife of her own income. Secondly, we have

$$\frac{\partial l_w}{\partial \beta_w} = S_{ww} + l_w \frac{\partial l_w}{\partial M_w}$$

4.17

Equation 4.17 is simply the usual Slutsky equation for labour supply, with S_{ww} being the substitution effect of a change in the wife's wages on her labour supply.

Substituting the above two relations into 4.10, noting that $\partial l_h/\partial ß_w=0$ and $\partial W^h/\partial ß_w=s_{hw}\partial U^w/\partial ß_w$ gives:

$$(1-\beta_w)S_{ww} = l_w(1-\frac{\alpha_w(s_{hw}+b)}{\mu}-(1-\beta_w)\frac{\partial l_w}{\partial M})$$

4.18

Equation 4.18 can be contrasted to equation 4.11, the condition which gives the optimal tax rate for the wife when the family maximizes the husband's welfare. First, note that the cross-price effect of the wife's wage rate on the husband's income enters into the first optimal tax condition but not the second, which is not surprising given that the assumptions we have made about substitution effects combined with the absence of income transfers ensure that $\partial l_h/\partial ß_w=0$. However, an implication of the absence of cross-price effects is that, in the no-transfers equilibrium, the optimal tax rate for the wife only interacts with the husband's optimal tax rate via the parameter measuring the tightness of the government's revenue constraint, μ. The independence of the two tax rates is seen again in the optimal condition for the husband's tax rate.

The optimal tax rate for the husband is derived in the same way as the optimal tax rate for the wife. The first order conditions for maximization of social welfare with respect to $ß_h$ are parallel to those given in 4.10. The term $\partial W^h/\partial ß_h$ is equal to $\partial U^h/\partial ß_h+s_{hw}\partial U^w/\partial ß_h$.

Roy's identity, as before, gives $\partial U^h/\partial \beta_h = \alpha_h(T-L_h)$. The term $\partial U^w/\partial \beta_h$ can be written more revealingly as $(\partial U^w/\partial P)(\partial P/\partial \beta_h)$. The Slutsky equation (4.17) applies to the husband, for the same reasoning as held for the wife. We also have $\partial l_w/\partial \beta_h=0$ (see equation 4.4). Noting these relations we have the condition for the husband's optimal tax rate:

$$(1-\beta_h)S_{hh}-l_h(1-\frac{\alpha_h}{\mu}-\frac{s_{hw}+b}{l_h\mu}\frac{\partial U^w \partial P}{\partial P \partial \beta_h}-(1-\beta_h)\frac{\partial l_h}{\partial M}) \qquad 4.19$$

Equation 4.19 is similar in structure to the optimal tax condition for the wife, equation 4.18, but there are two differences between the equations which are worth noting. First, the marginal utility of income to the wife (α_w) in 4.18 is prefaced by the term (s_{hw}+b) while the marginal utility of income to the husband (α_h) in 4.19 is not. The reason for this disparity is that the social welfare function which we are maximizing is $F=W^h+bU^w=U^h+(s_{hw}+b)U^w$. If the social welfare function puts equal weight on both spouses' utilities, s_{hw}+b will be equal to one. The second difference between the two conditions is that 4.19 contains the term $(\partial U^w/\partial P)(\partial P/\partial \beta_h)$. The wife's well-being is indirectly effected by changes in the husband's tax rate via changes in his level of public goods purchases. It is not obvious from equation 4.19 whether the externality generated by the husband's public goods purchases should result in an increase or decrease in his tax rate.

We can see the impact of the public goods externality on the husband's tax rate more clearly by solving 4.19 for the tax rate, $1-\beta_h$:

$$(1-\beta_h)-\frac{l_h}{\partial l_h/\partial\beta_h}(1-\frac{\alpha_h}{\mu})-\frac{s_{hw}+b}{\mu(\partial l_h/\partial\beta_h)}\frac{\partial U^w\partial P}{\partial P\partial\beta_h}$$

4.20

The last term in equation 4.20 represents the social evaluation of the benefits to the wife generated by the change in purchases of P induced by a change in the husband's wage rate. The term may be either positive or negative, depending on whether $\partial P/\partial \beta_h$ and $\partial l_h/\partial \beta_h$ are positive or negative (the term $(s_{hw}+b)(\partial U^w/\partial P)$ is always positive). If the labour supply curve is not backwards bending and if household expenditures are normal and not too complementary with leisure, then both $\partial P/\partial \beta_h$ and $\partial l_h/\partial \beta_h$ will be positive. In this case, a rise in the after tax wage rate (compared to the level calculated without taking into account interdependence between spouses) increases the husband's labour supply and household goods purchases (P). The increased expenditures make the wife better off, hence social welfare is improved by a decrease in the husband's tax rate.

For the no transfers case, then, we have one result which is parallel to that derived when the household maximizes the head's welfare function: the primary earner receives what is, in a sense, preferential tax treatment. The reason for the result in the no transfers case is that the husband's household purchases generate an externality from which the wife benefits. In the positive transfers case, however, the motivation for the result was that raising the wife's tax rate would induce her to take more leisure.

The results derived so far tend to suggest that after tax wage differentials are not such a bad thing. Perhaps we should ask: how much equality within the household is desirable? One way of answering this question is to leave the realm of the second best and consider the degree of equality that would be desirable if we could implement lump-sum transfers within the household. Section 4.3 considers lump-sum taxes and transfers.

4.3. Lump-sum taxes and transfers

In this section we will examine what level of lump-sum transfers between family members the government would impose if its aim was to maximize social welfare. The taxes considered are redistributive in that they redistribute income within the household to improve efficiency and equity. The government's revenue requirement is nil, and no money is taken out of the household. To simplify the analysis, we consider one representative household, which is assumed to behave according to the model outlined in section 4.1.

In designing a system of lump-sum taxes and transfers, we need to consider government policy at each of the three equilibria: no transfers corner, positive transfers and interior solutions. We will begin with the no-transfers corner solution, that is, when one spouse is at a corner with respect to household expenditures, but does not receive a transfer from the other spouse. For this solution, we can use differential calculus to find the optimal transfer. In the other two equilibria, small externally imposed transfers can be completely offset by either a reduction in the voluntary transfer from one spouse to another, or by compensating increases and decreases in each spouse's household expenditures.

The social welfare maximizing transfer, π^o, will be the one which maximizes the social welfare function $F=b_hV^h+b_wV^w$ subject to the constraint that the transfer given by the better off spouse is equal to the one received by the less well-off spouse. Since transfers are made in the form of income, we need to rewrite F as a function of the family members' indirect utility functions. If, for families in which the husband is the better off spouse, preferences are separable between the commodity groups (Q_w, L_w) and (P,Q_h,L_h), then the social welfare function F becomes:

$$F=b_h V^h(p,I_h) + b_w V^w(p,I_w,I_h)$$

where V^i is spouse i's indirect utility function and I_i is spouse i's full income. Note that the indirect utility of the wife depends on the income of the husband because she benefits from his household expenditures.

The effect of a transfer π from husband to wife is to decrease I_h to $I_h-\pi$ and to increase I_w to $I_w+\pi$. The optimal transfer is such that:

$$b_h\frac{\partial V^h}{\partial I_h}+b_w\frac{\partial V^w}{\partial I_h}=b_w\frac{\partial V^w}{\partial I_w} \qquad 4.21$$

The right hand side of equation (4.21) is the marginal social evaluation of the wife's income, that is, the marginal contribution to the wife's utility of increases in her income, weighted by society's valuation of her welfare. The left hand side is the marginal social evaluation of the husband's income. A transfer from husband to wife will be optimal if the marginal social evaluation of the wife's income is greater than the husband's (providing there is diminishing marginal utility of income). The properties of the optimal transfer can be described more precisely using a specific example, to which we will now turn.

An example: Stone-Geary Welfare Function

The Stone-Geary welfare function is given by:

$$W^i=\Sigma_{k=i,j}s_{ik}[\beta_{1k}\log(P-P')+\beta_{2k}\log(Q_k-Q_k')+\beta_{3k}\log(L_k-L_k')],\ \ \Sigma_i\beta_{ik}=1 \qquad 4.22$$

where X_i' is spouse i's subsistence expenditure on good X, P is a public good, Q_i is i's private consumption and L_i is her leisure. At a no-transfers corner solution, the husband's indirect utility function is given by

$$V^{hC}=\log I_h + \beta_{1h}\log(a_{1h}/p_1) + \beta_{2h}\log(a_{2h}/p_2) + \beta_{3h}\log(a_{3h}/w_h) \qquad 4.23$$

where $a_{1h}=(\beta_{1h}+s_{hw}\beta_{1w})/(1+s_{hw}\beta_{1w})$, is the share of household expenditures (net of subsistence requirements) in spouse h's budget or the weight placed on household goods relative to all goods that the husband consumes in his welfare function, and $a_{2h}= \beta_{2h}/(1+s_{hw}\beta_{1w})$ is the budget share of private expenditures. The variable I_h is the husband's full supernumerary income, that is full income (w_hT) less the expenditure necessary to meet subsistence requirements ($p_1P'+p_2Q_h'+w_hL_h'$), while I_w^* is full supernumerary income, with all subsistence requirements except those for public goods deducted. The wife's indirect utility function is given by:

$$V^{wC}=\beta_{1w}\log(a_{1h}/p1) + \beta_{2w}\log(a^*_{2w}/p_2) + \beta_{3w}\log(a^*_{3w}/w_w)$$
$$+ \beta_{1w}\log I_h + (\beta_{2w}+\beta_{3w})\log I_w^* \qquad 4.24$$

where $a^*_{2w}=\beta_{2w}/(\beta_{2w}+\beta_{3w})$ is the share of the wife's income going to her private expenditures or the weight placed on private goods relative to all the goods she purchases in her welfare function.

Some calculation shows that the optimal transfer, π^o is given by:

$$\pi^o = \frac{b_w(1-\beta_{1w})I_h - (b_h+b_w\beta_{1w})I_w^*}{b_w + b_h} \qquad 4.25$$

The transfer is an increasing function of the income of the better off spouse, the husband in this example, and a decreasing function of the wife's income. If the wife's preference for public goods, β_{1w} is large, the optimal transfer will be small, as it will be more efficient to increase her well-being indirectly with public goods purchases. The optimal transfer is increasing in b_w, the weight placed on the wife's utility in the social welfare function, and decreasing in b_h, the weight placed on the husband's utility.

The optimal transfer will be positive if $\pi^o>0$, which is equivalent to

$$\frac{I_h}{I_w^*}>\frac{r}{1-r} \text{ where } r=\frac{b_h+b_w\beta_{1w}}{b_w+b_h}$$

4.26

The numerator of the term r is the increase in social welfare with a unit change in $\log I_h$, while the denominator is the sum of increase in social welfare with a unit change in $\log I_h$ and the increase with a unit change in $\log I_w^*$.

Condition 4.26 can be compared to the boundaries of the no-transfers corner solution which are, as in Figure 3.3, given by:

$$\frac{k_h}{1-k_h}>\frac{I_h}{I_w^*}>\frac{c_w}{1-c_w}$$

4.27

where $k_h=(1+s_{hw}\beta_{1w})/(s_{hw}+1)$, and c_w is the wife's effective share of household income, given by $c_w=a_{1w}/(a_{1w}+a_{1h}-a_{1w}a_{1h})$. When the right hand side inequality holds, the husband is no longer making a voluntary transfer to his wife, when the left hand side inequality holds, the wife is making no contribution to household expenditures.

Is $r/(1-r)$ from equation 4.26 less than or greater than $c_w/(1-c_w)$? If the former (i.e., $r<c_w$), then whenever we are at a no-transfers corner solution, the desired transfer will be

positive. If the latter (that is, $r>c_w$), then there will be an income range in which one spouse will be dependent on the other, but the optimal transfer will be negative, that is, it will be a transfer to the spouse making the household expenditures. In fact, some calculation shows that $r>c_w$ if

$$b_w > \frac{1}{\beta_{1h}} - \frac{1}{\beta_{1w}} \tag{4.28}$$

Condition 4.28 will be fulfilled in the standard case in which $1<b_w<2$, and the preferences of the spouses for household public goods are fairly similar. There will often be a range in which the optimal transfer is to the spouse making household expenditures. The explanation for this result is that, because we are at a Cournot-Nash equilibrium, there is underprovision of public goods. However, if income is transferred to the better off spouse, the level of public goods purchases increases, because the wealthier spouse spends money on public goods to increase his own utility and that of his partner. Initially, the welfare gains from the reduction of underprovision may well exceed the welfare losses from increased inequality. The exception occurs when the better off spouse cares little for his partner, and his preferences for household public goods are low, while the preference of the wife for household public goods is high, in which case β_{1h}, and b_w are low, β_{1w} is high, and condition 4.28 is not fulfilled. The increase in public goods provision accompanying inequality is small, relative to the increase desired by the dependent spouse.

What are the effects of the transfer? The effect of an optimal transfer is to change the wife's income level to:

$$I_w^* + \pi^o = (1-r)(I_h+I_w^*) \tag{4.29}$$

This can be compared to the boundary between the interior and no-transfers corner solution $I_w^*=(1-c_w)(I_w^*+I_h)$. The post-transfer income level will be less than the income level at which the wife begins to contribute to household expenditures if $r>c_w$ which, as before, requires condition 4.28 to hold.

Voluntary positive transfers

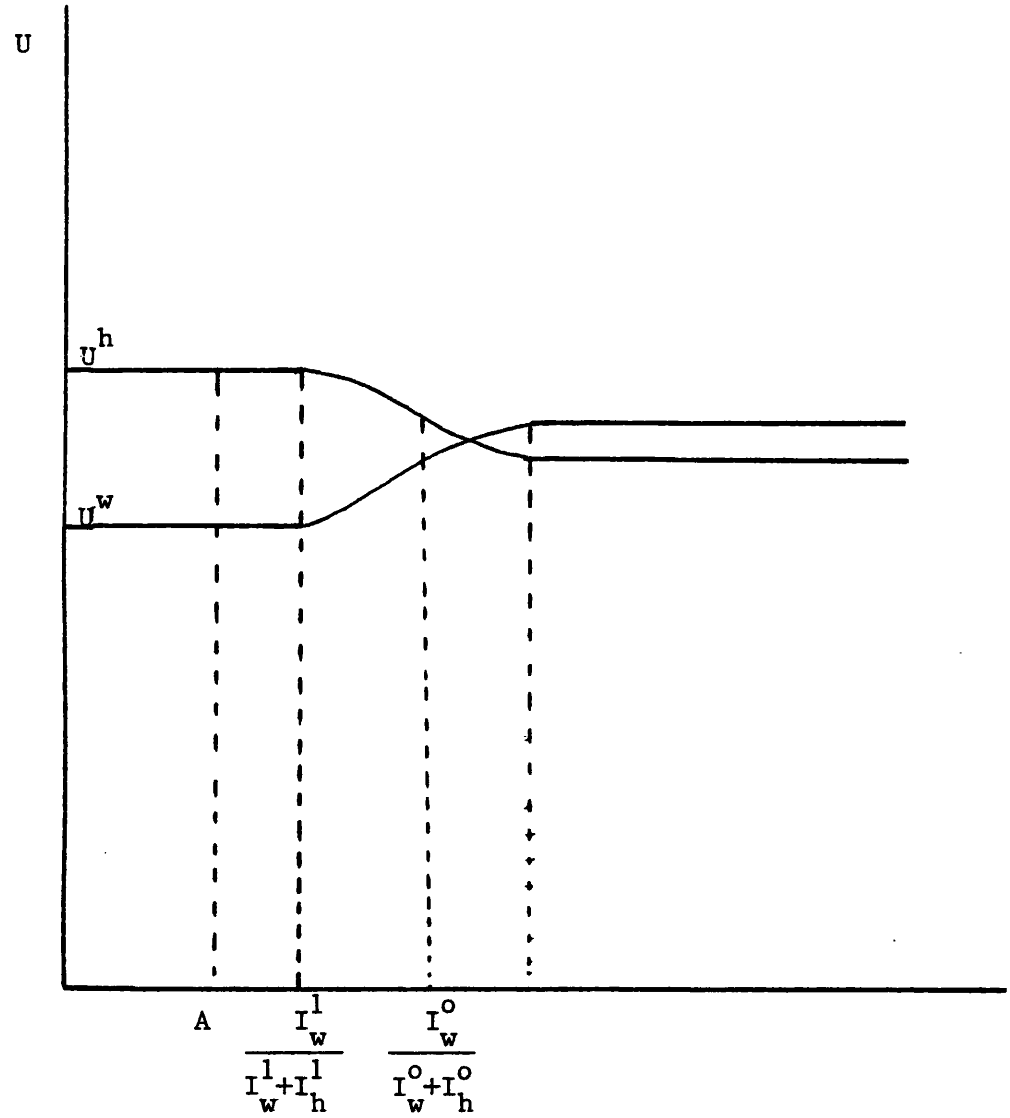
The optimal transfer was calculated assuming that the spouses were at a no-transfer corner solution, that is, one spouse was making all the household expenditures, while the other only financed her own consumption. The transfer so calculated is a global maximum over the whole no-transfers corner income range. This can be seen by noting that $\partial^2F/\partial\pi^2<0$ throughout the range. But how does the optimal transfer compare with the transfer made voluntarily at the positive transfers solution, where one spouse is completely dependent on the other?

It can be shown, as in Figure 4.1, that there is no discontinuity in the spouses' indirect utility functions at the boundary between the positive transfers and the no-transfers corner solution $(I_w^1/(I_w^1+I_h^1))$. Social welfare is the same at some point within the positive transfers region, such as A, as it is at the boundary between the no-transfers and positive transfers solutions. Since social welfare is increased by making a transfer from husband to wife which moves them from $I_w^1/(I_w^1+I_h^1)$ to $I_w^o/(I_w^o+I_h^o)$, social welfare would also be increased by moving all individuals making voluntary transfers to the optimal, post-transfer income levels.

Government imposed transfers sufficient to change the wife's income to 4.29, the social welfare maximizing level, are shown by line TT in Figure 4.2. The optimal transfer as a fraction of total household income is the distance between the wife's actual share of household income, as shown by say point A, and her share which maximizes social welfare

$I_w^o/(I_w^o+I_h^o)$. The transfer can be broken up into two parts. The first reallocates income to $I_w^1/(I_w^1+I_h^1)$, that is, it imposes a sufficiently large transfer that voluntary transfers are reduced to zero. The second part is the movement to the optimal income level.

Figure 4.1: Utility and relative incomes



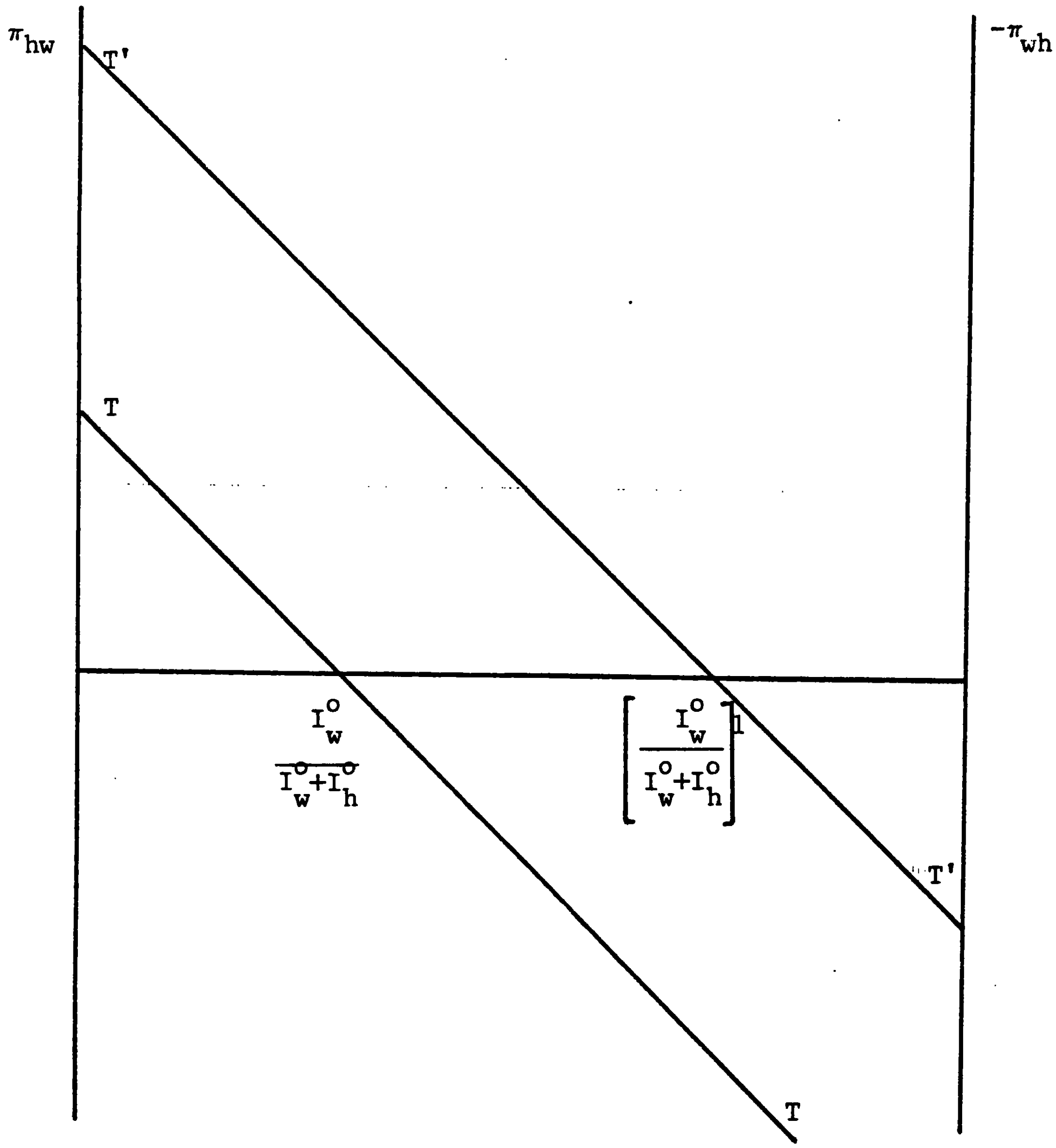
Interior solution

Figure 4.2 shows two optimal transfer curves. These correspond to the two social welfare maximizing outcomes, $I_w^\circ/(I_w^\circ+I_h^\circ)$ and $[I_w^\circ/(I_w^\circ+I_h^\circ)]^1$. At the first of these outcomes, the husband makes all household expenditures, at the second, the wife makes all expenditures. At the interior solution, social welfare may be increased by moving to one of the two optimal income levels, but there is no a priori basis for choosing between the two.

The analysis of the optimal lump-sum transfer provides another example of the trade-off frequently found in public finance between equity and efficiency. Equity would seem to require a move to the interior solution, but it is there that underprovision of public goods is most severe. Efficiency requires a move towards the positive transfers solution, where the household acts as one individual, and the problem of underprovision of public goods is minimized. The optimal income allocation represents a balance of efficiency and equity considerations.

Because the results derived here are driven by the framework of public goods and utility interdependence, they shed some light as to the desirability of "paternal" philanthropic behaviour, that is, the construction of public projects by wealthy altruists. The analysis suggests that, if the wealthy are altruistic enough, then the presence of inequality mitigates the underprovision of public goods. So, for example, in Britain, income inequality produces the Sainsbury Wing of the National Gallery. The efficiency of relying upon philanthropy depends crucially on how altruistic the altruists are. Moreover, the efficiency of philanthropy needs to be compared with alternative means of mitigating underprovision, such as government intervention.

Figure 4.2: Optimal transfer curves



Conclusions

When beginning this analysis, I expected that an economic analysis which took account of both the possibility of conflict between caring family members and valued each individual family member's well-being would advocate a lowering of tax rates on secondary earners and transfers to dependent family members.

The first of these expectations had no support from the analysis. Valuing each family member's well-being requires us to raise the rate of tax on secondary earners, and thereby encourage them to enjoy more leisure. The second of the expectations had somewhat more support. Transfers to a dependent spouse may increase social welfare. However, the benefits of increased equality must be set against a loss in efficiency as the extent of underprovision of household goods increases. The feature of the model which drives this last result is that there is no mechanism to enforce cooperative behaviour within the family, so family members free-ride, with the extent of free-riding depending on the degree of caring between family members.

Appendix: Instruments for Government Tax Policy

In this chapter, we aimed to discover what system of taxes and transfers led to the social welfare maximizing distribution of household income. In redistributing household income, the government has three tax instruments; commodity taxes, lump-sum taxes and transfers, and income taxes. These instruments were compared in the chapter on the grounds of equity and efficiency. This appendix asks whether any tax instrument be ruled out on the basis of administrative cost.

Commodity taxes may redistribute income between family members. First, goods which are age or sex specific, such as children's clothing, women's clothing, or alcohol, can be taxed or subsidized to transfer income from adults to children or from men to women. Second, a good which is public within the household, such as housing, may be subsidized to encourage purchases which benefit all family members. Third, goods which are luxuries, and may be inferred to benefit better off family members, may be taxed. There are, however, a number of problems with implementing redistributive commodity taxes. First, it is not always clear which goods fall into which categories. This has two consequences. The first is administrative costs. For example, petite women's clothing is of a similar size to some children's clothing, and some teenagers fit adult sizes. In certain jurisdiction, such as British Columbia, where children's clothing is exempt from tax, individuals buying such clothing must sign a form stating the name and age of the child for whom the clothing is being bought. The second consequence of uncertainty is that the categorization of goods into various categories can become politicized. For example, the British government's decision in 1988 to recategorize crunchy cereal bars, thereby making them standard-rated for VAT purposes, made national news (Hills, 1988). A second problem with redistributive commodity taxes is that the benefits may not go to the intended group. For example, a subsidy on women's clothing would benefit poor housewives to some extent, but would have disproportionate benefits for professional women making large expenditures on clothing. It would seem to be more straightforward to use lump-sum taxes and transfers or the income tax system to redistribute family income.

Lump-sum transfers between family members are, a priori, the most efficient method of redistributing household income. As such, they provide a benchmark case. But besides being efficient, lump-sum taxes are, potentially, feasible. It is possible to imagine circumstances in which lump-sum transfers between family members might be imposed through taxation. For example, the Canadian federal government's 1987 White Paper on Tax Reform suggested that individuals with a dependent spouse should be able to claim a tax credit of $850 per year (Cloutier and Fortin, 1989). There is no reason why the credit should not be paid to the dependent spouse, instead of being used to reduce the higher earner's tax liability, apart from the administrative cost of putting a cheque in a separate envelope and affixing a stamp. A feasible scheme of lump-sum transfers between spouses may be nested within a system of income taxation. A second example of a lump-sum tax affecting household members on an individual basis is the community charge presently (in 1990) being implemented in England. All adults in a household are assessed and liable to pay the charge, even those, such as homemakers, not in receipt of any income (provided the homemaker's spouse's income is above a specified level). However, spouses are liable for each other's charges. The implementation of the community charge will provide a test of whether or not it is feasible to tax individual household members on a lump-sum basis, and may highlight the need for a better understanding of the process of intrafamily income allocation.

The structure of the income tax system affects the flows of income within the family. For example, consider the contrast between individual and joint taxation. Under a system of joint taxation, a couple's tax liabilities are based on total earnings, and the lower earner faces the same marginal tax rate as the higher earner. The former's after tax income is generally lower than under individual taxation, provided that the tax system is progressive and the tax revenue collected from each household is the same in both cases. Income taxation certainly redistributes the receipt of income between family members. Moreover, it does not suffer from certain of the disadvantages of commodity taxes. Money income entering a household is generally received by one spouse, particularly in the case of wage income, hence it is easy to identify whose money income is affected by a tax. It is also possible to identify a person as either the primary or the secondary earner, and tailor taxes accordingly.

The decision to focus the discussion of this chapter on income taxes and lump-sum taxes was made after consideration of the administrative costs of commodity taxes, lump-sum taxes, and income taxes. Commodity taxes may well redistribute income within the household, particularly from adults to children, but it is administratively costly to categorize goods, and the benefits of lower taxes on goods consumed by women or children may go disproportionately to high income women or children, if the subsidized items are normal or luxury goods. Accordingly, we decided to reject commodity taxes in favour of a detailed analysis of lump-sum and income taxes.

Chapter 5

Intergenerational Altruism and the Irrelevance of Redistribution in Rawls' Original Position

Rawls' A Theory of Justice contains an account of justice between generations, the key to which is intergenerational altruism.

> ...since it is assumed that a generation cares for its immediate descendants, as fathers say care for their sons, a just savings principle, or more accurately, certain limits on such principles, would be acknowledged (p. 288).

Concern for descendants motivates even the first generation, who reap no direct rewards from any accumulation, to save.

Rawls' account of intergenerational justice has been criticized on a number of grounds. Richards (1983, p. 138) argues against the assumption of concern for descendants: "To write such assumption into the foundations of serious moral theory is to compromise the neutral theory of the good with a specifically modern romanticism about child-rearing". Some question whether the Humean circumstances of justice, adopted by Rawls, apply to the problem of justice between generations (Barry, 1978, 1989; Richards, 1983). Barry (1977, p. 277) argues that the concern for descendants assumption fails to provide a basis for intergenerational justice in the presence of ecological sleeper-effects, that is, actions that have no effects for perhaps hundreds of years, and then catastrophic effects. An example might be the creation of toxic waste.

Yet despite extensive criticism, interest in Rawls' account of intergenerational justice remains strong. The problem of justice between generations provides, as Rawls suggests (1971, p. 284), a severe test of any ethical theory. Rawls' treatment of the problem brings out fundamental difficulties within his own theory. Moreover, Rawls' account of intergenerational justice provides a starting point for other analyses of the difficult problem of justice between generations.

The problem of intergenerational justice as formulated by Rawls is one of choosing the amount to save for future generations. The first part of this chapter examines how choices are made by people in Rawls' original position. Three features of the choice problem are emphasized. First, people in the original position lack knowledge of their individual identities, because of the imposition of a "veil of ignorance". Second, individuals are guided by coherent set of preferences. They are rational. Towards other members of their own generation they feel mutual disinterest; towards their descendants they feel concern. Finally, they have sufficient control over their bequests to future generations to enact their choices.

Given the nature of the choice problem, and concern for descendants strong enough to generate positive bequests, Rawls' intuition that intergenerational altruism guarantees intergenerational justice is correct. This is true even if there are ecological sleeper effects, if present generations can compensate future generations for environmental damage. The second part of the chapter gives an example of how people might choose a just savings schedule, and sets out the conditions under which they can overcome sleeper effects.

The original position is constructed so that "the deliberations of any one person are typical of all (Rawls, 1971, p. 263)." As Pateman (1988, p. 43) comments, "In effect, there is only one individual in the original position behind Rawls' 'veil of ignorance'". Yet how is this construction to be justified? Rawls, (1971, p.18) notes that "To justify a particular description of the initial situation one shows that it incorporates... commonly shared presumptions". One common presumption about social life is that society is made up of men and women who together have children.

The final part of this chapter examines the implications for Rawls' theory of modifying his framework to allow each child to have two concerned parents. The results are striking. Under conditions sufficient to enable individuals to overcome sleeper effects, income redistribution is irrelevant. If the irrelevance of redistribution is accepted, we need to question Rawls' description of the background institutions for distributive justice (section 43). If the result is rejected, Rawls' account of intergenerational justice is called into question.

The arguments in this chapter draw from Barro's (1974) proof of Ricardo's proposition that government spending financed by debt has no real effects, applied in various contexts by Feldstein (1976), Carmichael (1982), among others, and recent criticisms of Barro's work by Bernheim and Bagwell (1988) and Abel and Bernheim (1988). For much of this chapter, I follow these authors in assuming a neo-classical economy -- production exhibits constant returns to scale, consumers and producers are perfectly informed, and no small group of firms or trade unions dominates any market. The assumptions of neo-classical economics, like Rawls' description of the original position, make the problem of justice tractable.

5.1 Intergenerational altruism and intergenerational justice

In A Theory of Justice moral principles, including principles for intergenerational justice, are reached by the unanimous agreement of rational individuals in an original position of equality. Rawls insures that agreements will be unanimous by removing from individuals all knowledge of their individual identity by imposing a "veil of ignorance". Individuals' choices can be predicted because their decisions are guided by "mutually disinterested rationality" in conjunction with concern for descendants.

Unanimous agreement in the original position is possible because the members of every generation are behind a 'veil of ignorance'. Each has no knowledge of his place in society, plan of life, or the particular circumstances of his society. Because all are equally ignorant, "the deliberations of any one person are typical of all (Rawls, 1973, p. 263)". The veil of ignorance alone, however, does not mean that each generation will act as one individual. When deciding on the level of collective goods, such as savings for the future, many individuals acting in isolation may not choose the optimal level of provision. Rawls, following Sen (1961), calls this the isolation problem. In the original position, it is assumed that the isolation problem and the associated problem of assurance are overcome. This, together with the veil of ignorance, allows us to represent the collective choice of one generation as the choice of one individual.

The veil of ignorance means that an individual does not know his particular desires and interests. He only knows that, whatever these desires happen to be, he will be better able to fulfil them, the more "primary social goods" he has at his disposal. Primary social goods are rights and liberties, opportunities and powers, and income and wealth (Rawls, 1971, p. 92). To construct a single index which aggregates the three broad categories of primary social goods would be difficult. Therefore, I assume that any individual has the same fundamental liberties and opportunities. Power and income are assumed to be proportional to wealth.

Each person is concerned about his own index of primary social goods, and not about the levels of primary social goods enjoyed by others. Individuals are assumed to be in a position of "mutual disinterest". They take no interest in one another's interest (Rawls, 1971, p. 128). Mutual disinterest does not mean that people are egoistic, only that each is concerned with pursuing his own, possibly altruistic, ends. People are indifferent to the amount of primary social goods enjoyed by their contemporaries.

An individual's preference for more social goods rather than less can then be represented by an indirect utility function, relating his utility, V^t, to his wealth, k_t:

$$V^t=V^t(k_t) \qquad \partial V^t/\partial k_t>0 \tag{5.1}$$

The utility function summarizes the individual's ranking or ordering of the options open to him. A person prefers more wealth to less, because he prefers more primary social goods to less. The utility function (5.1) expresses the postulate of mutual disinterest in that a person's utility depends only on the resources available to him to pursue his ends. Other people's income enters neither negatively, as it would if he were motivated by envy, or positively, as it would if he were motivated by benevolence. A person is "not moved by affection or rancor" (Rawls, 1971, p. 144).

An individual's ability to rank the options open to him follows from Rawls' assumption that the representative individual is rational. He has:

> a coherent set of preferences between the options open to him. He ranks these options according to how well they further his purposes; he follows the plan which will satisfy more of his desires rather than less....(p. 143)

If the individual follows the plan which satisfies more of his desires rather than less, he can be said to be maximizing his utility. His preferences can be represented in two ways. First, as in equation (5.1), by describing the maximum satisfaction an individual can attain given a certain level of primary social goods. A second, and equivalent, representation, links a person's satisfaction to the state of the world. For example, a person's satisfaction could be linked to his own consumption and his descendant's well-being.

Concern for descendants is the motivation for saving in A Theory of Justice. Rawls expands the assumption of concern for descendants as follows:

> What is essential is that each person in the original position should care about the well-being of some of those in the next generation, it being presumed that their concern is for different individuals in each case. Moreover, for anyone in the next generation, there is someone who cares about him in the present generation (Rawls, 1971, pp. 128-9).

Having concern for others means caring about their well-being (Rawls, 1971, p. 128). A person who cares for his descendant gets pleasure from his descendant's well-being as well as from his own consumption. These preferences can be represented by saying that the direct utility of the individual in the present generation, U^t, depends positively on his descendant's well-being, V^{t+1}, and his own consumption c_t:

$$U^t=U^t(c_t,V^{t+1}) \qquad \partial U^t/\partial V^{t+1}>0 \qquad 5.2$$

An individual's consumption is limited by his resources net of bequests to his descendant.

Rawls frames the problem of intergenerational justice in terms of the choice of a "just savings principle". By a just savings principle, I interpret Rawls as meaning a schedule assigning an appropriate rate of accumulation to each level of social advance which requires each generation to uphold and further just institutions (p. 289). If just institutions require primary social goods for their maintenance, the just savings principle requires individuals to uphold and further the stock of primary social goods which, when liberty has been achieved, involves the maintenance of wealth.

The interpretation of the just savings principle as a schedule specifying rates for the accumulation of wealth is not as narrow as it might first appear. A society's wealth includes, for example, the infrastructure of roads and communication networks, and reserves of natural resources, as well as factories and houses. It would be possible to think of people's education and skills as part of society's human capital. Yet human capital differs from physical capital in that one generation does not simply bequeath human capital to the next. Human capital is acquired through experience and contact with others. To include human capital in society's wealth would make the model more realistic, as income from capital would then include wage income. However, the transmission of physical wealth often requires conscious decisions and sacrifices on the part of initial generations, and therefore poses more interesting ethical problems than actions, such as passing on a language, which are largely beyond individual control. In this chapter, I wish to focus on forms of savings which people are able to vary freely.

The just savings schedule is decided by persons in the original position considering how much, at each stage of advance, they would be willing to save for their immediate descendants:

> They [the persons in the original position] try to piece together a just saving schedule by balancing how much at each stage they would be willing to save for their immediate descendants against what they would feel entitled to claim of their immediate predecessors. Thus imagining themselves to be fathers, say, they are to ascertain how much they should set aside for their sons, by

> noting what they would believe themselves entitled to claim of their fathers (Rawls, 1971, p. 289).

Rawls does not discuss explicitly how individuals decide how much they are willing to save. Behind the veil of ignorance, social conventions cannot guide their decisions.

One way of representing an individual's trade-off between his own consumption and his descendant's well-being is to use the calculus of individual utility maximization or rational choice. This is the approach taken by Arrow (1973) and Dasgupta (1974) in their work on Rawls' just savings principle.[1] An individual's choices are limited by his wealth. He cannot bequeath more than his wealth, k_t, less his consumption, c_t. If there is no means to borrow from other generations, his wealth will be the bequest he received from the previous generation, b_{t-1}, plus any interest income, $r_t b_{t-1}$. His budget constraint is:

$$(1+r_t)b_{t-1} = c_t + b_t \qquad 5.3$$

A person's utility (5.2) is maximized when the marginal cost of an additional pound bequeathed is equal to the marginal benefits:

$$\frac{\partial U^t}{\partial c_t} = (1+r_{t+1}) \frac{\partial U^t}{\partial V^{t+1}} \frac{dV^{t+1}}{dk_{t+1}} \qquad 5.4$$

An individual's willingness to save is decided, on the one hand, by the cost of making a bequest to future generations, the decrease in an individual's consumption ($\partial U^t/\partial c_t$). This cost will be positive except for people who are so satiated that they are indifferent between consuming and throwing away goods. On the other hand, there are the benefits of saving.

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[1] Rawls does not welcome utility maximization. However, as Barry (1989) points out, Rawls' rejection of an intergenerational application of the difference principle carries with it the notion that the gains to future generations from saving outweigh the losses of earlier, poorer, generations. There is a trade-off between the two.

A descendant's well-being increases with his command over primary social goods. Indeed, if the descendant is extremely poor, the value to him of an increase in his wealth, dV^{t+1}/dk_{t+1}, will be extremely large, and on the very marginal of survival, will be infinite. The value of an increase in descendant's well-being to an individual in the present generation is determined by his concern for his descendant ($\partial U^t/\partial V^{t+1}$).

If a person is completely unconcerned about his descendant, so $\partial U^t/\partial V^{t+1}$ is zero, there are no benefits to saving. Utility maximization would require that a person transfer wealth from his descendant to himself until he either reaches physical limits on the transfer of resources or is satiated. In the former case, condition (5.4) would not hold with equality, as an individual's utility could be increased if he could take more resources from his descendant. In the later case, both sides of condition (5.4) would be equal to zero.

A person who has positive concern for his descendant will bequeath to him some wealth. One feature of this model is that a person has no wealth except his inheritance. An increase in the descendant's inheritance from zero to a survival level will cause an infinite increase in his well-being. If an individual places any value on his descendant's well-being, this increase would be sufficient to outweigh the costs of making a bequest, provided the bequest did not reduce the individual in the present generation to starvation.

Just savings requires more than just positive bequests; it requires that the stock of wealth be maintained from generation to generation. For just savings, concern needs to be "sufficiently strong" in order to outweigh the cost to an individual of giving up his own consumption. Less concern is needed to induce people to maintain wealth levels when interest rates are high or when the a person's descendant is expected to be relatively badly off (and so have a relatively high marginal utility of income). More concern is needed to generate just savings when a person is poor, and suffers greatly from any decrease in his own consumption. In any case, just savings will be achieved providing that concern is sufficiently strong.

This section has attempted to set out conditions under which a just savings principle will be reached. The veil of ignorance allows for unanimous agreement. Mutually disinterested rationality enables people to choose between options available to them. Freedom to vary bequests to future generations permits people to enact their choices. Concern for descendants, if sufficiently strong, guarantees that a just savings principle, requiring each generation to uphold and further just institutions, will be acknowledged.

5.1.1 An example: Intergenerational justice and sleeper effects

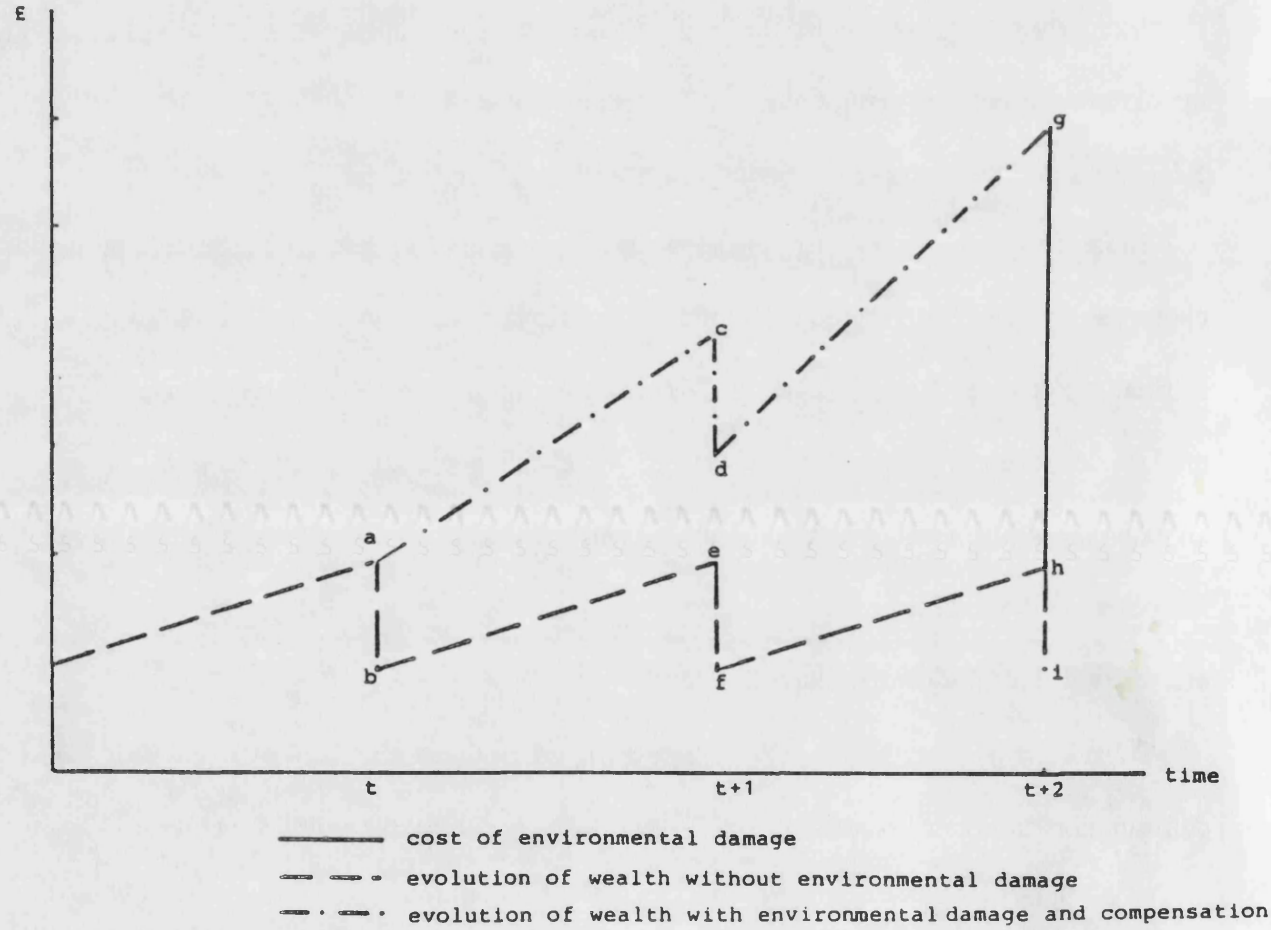
So far it has been shown that people can arrive at a just savings schedule through rational choice, as represented by the outcome of utility maximization, provided certain conditions are fulfilled. Yet given Rawls' (1971, p. 287) rejection of "the calculus of advantages", there may be doubts as to the propriety of the rational choice approach. In this section I present an example of just savings as rational choice and argue that, when people act rationally and the other conditions for arriving at a just savings principle are fulfilled, ecological "sleeper effects" will be fully compensated for.

Consider, for example, a society where each generation's trade-off between their own consumption and their descendants' well-being is described by the utility function:

$$U^t = 10\log c_t + k_{t+1} \qquad 5.5$$

The interest rate is assumed to be 100 per cent, and the initial level of wealth (k_t) is £10. Utility maximization requires that each generation maintains their successor's wealth at £10, by leaving a bequest of £5, and consumes £5, as shown in Figure 5.1.

Figure 1: Savings, compensation, and environmental damage



What happens to individuals' choices if we introduce ecological sleeper effects? For example, consider environmental damage which benefits the first generation £5, has no effect on immediate descendants, but costs the initial generation's grandchildren £20. The cost of environmental damage to the third generation is equal to the benefits received from the damage by the first generation, compounded at the rate of economic growth, r_t. This level of environmental damage is the level which the initial generation is just able to compensate for.

First, note that the course of action chosen before the possibility of environmental damage arose may still be pursued afterwards. The same level of consumption can be achieved by each generation - even when environmental damage occurs - if the initial generation increases its bequest enough to compensate for the damage, and the intermediate generation passes on the bequest. Barry (1977, p. 277) recognizes that we can leave more to our remote successors by leaving more to our immediate successors. However, he argues "we take the risk that they simply blue the lot anyway". But will they?

Consider the decision of the intermediate generation. They receive compensation from the initial generation of £10. If they squander, say, £5 of the compensation, their consumption will be £10 and their descendants' wealth will be nil. But the combination of £5 for their own consumption and £10 for their descendants' wealth was preferred to the alternative of £10 and nil before the possibility of damage arose. There is no reason why the intermediate generation should now want to consume more and leave a smaller net bequest to their children. The initial generation recognizes that the intermediate generation will pass on compensation, and so is able to pursue the consumption patterns previously chosen.

The line of argument applies when damage is experienced by generation n, where n is a large number, instead of generation 3. If the first n-2 generations pass on compensation, the n-1th generation will, as not to do so would involve a departure from the optimal consumption choice. The n-2th generation will then pass on compensation, knowing that generation n-1 will do so, and so on. Sleeper effects do not prevent families from following a just savings principle.

A number of points about the argument used here are worth noting. First, in the pre-sleeper effects equilibrium, each generation voluntarily makes a positive bequest to its descendants. If the desired level of bequests was less than the actual level of bequests, in this example £5, a generation would effectively decrease its bequest to its descendants, by not passing on the full amount of the compensation. Acceptance of a just savings principle guarantees that positive bequests will be desired. Second, all individuals care about their descendants -- one uncaring generation is enough to break the chain. Rawls explicitly assumes concern for descendants. Third, people are concerned with their descendants' overall wealth, not the size of their own bequest. This condition insures that the intermediate generation, say, views leaving a bequest of £25, part of which compensates for environmental damage of £20, as equivalent to a bequest of £5. Rawls does not eliminate explicitly the possibility that people care about the components of the bequest their descendants receive. However, it could be argued that this possibility is eliminated by the assumption of absence of affection or rancor, for these are the sort of sentiments which would make a person concerned about the components of a bequest. Fourth, people's decisions are made by rational choice -- in the example given, by maximizing utility function (5.5). Rationality is explicitly assumed by Rawls. These conditions reappear in the discussion of the irrelevance of redistribution. The irrelevance results emerge when a more complex family structure is incorporated in the original position.

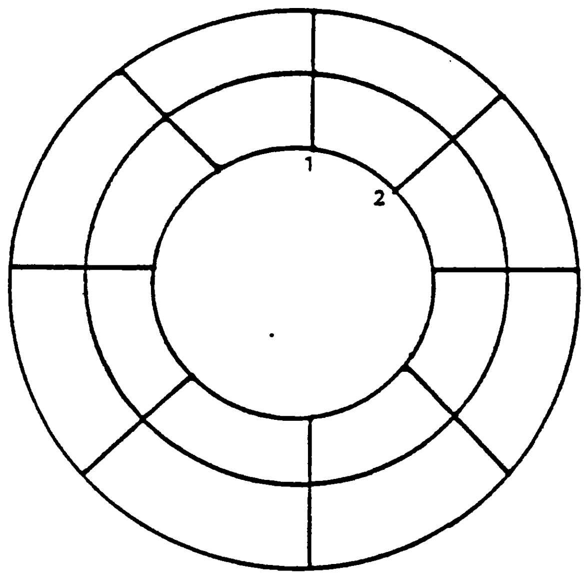
5.2 Family Structure in the Original Position

The concern for descendants assumption made by Rawls presupposes a certain type of family structure. It may be recalled that Rawls (1971, p. 128-29) requires that "each person in the original position should care about the well-being of some of those in the next generation, it being presumed that their concern is for different individuals in each case" [emphasis added]. Each person in the next generation has only one person caring for him in the previous generation.

One family structure which permits concern for descendants in the form Rawls describes is shown in Figure 5.2. The negotiators in the original position (shown in the inner circle) are thought of as "heads of families" (p. 128). Each has a son, shown in the next circle out, who in turn has his own son (indicated by arms for families 1 and 2). The assumption of concern for descendants means that "a generation cares for its immediate descendants as fathers...care for their sons" (p. 288). Successive father-son links make up chains or, as Rawls puts it, "continuing lines of claims" or "deputies for a kind of everlasting moral agent or institution" (p. 128).

It is possible to think of three circumstances under which a family structure as described by Rawls would exist. First, if women (or men) in some sense did not matter. For example, parents might have no concern for daughters (or sons). Alternatively, women (or men) might not be allowed to hold property. However, the liberty principle implies that gender differences in basic rights must be justified on the ground that they benefit the restricted sex. As Rawls writes "if, say, men are favored in the assignment of basic rights, this inequality is justified...only if it is to the advantage of women and acceptable from their standpoint" (p. 99). The family structure will be as Rawls assumes if women hold no property, but this inequality is unlikely to be acceptable to women. A second possibility is to suppose that women only care for their daughters, and men for their sons (or vice versa). Third, we might have an endogamous family structure, where marriage within the family (between siblings or cousins) was encouraged. While such family structures are conceivable and do exist, they do not appear to be plausible restrictions to place on the original position.

Figure 5.2: Rawlsian Family Structure



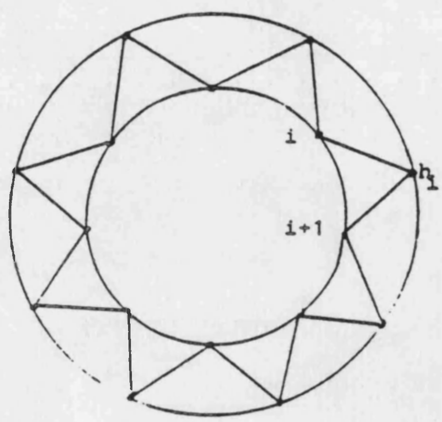
initial generation is represented by inner circle
subsequent generations are represented by outer circles
1, 2 indicate families.

The Rawlsian family structure is not easily justified. Are there better assumptions to make about family structure? To answer this question, we turn to Rawls' description of how the original position is formulated:

> To justify a particular description of the initial situation one shows that it incorporates...commonly shared presumptions. One argues from widely accepted but weak premises to more specific conclusions. Each of the presumptions should by itself be natural and plausible; some of them may seem innocuous or even trivial.

The best assumption to make about family structure is the one which seems most natural. Perhaps the least restrictive assumption to make is that men and women come together and have children, for which they both feel concern.

Figure 5.3: Two-sex family structure



Each household in initial generation (inner circle) has two descendants, shown by branches. Each descendant forms a new household (outer circle) with "the person next door".

A family structure which satisfies the above description is shown in Figure 5.3.[2] In the initial generation we have n husband-wife households, shown on the inner circle. Each has two children, a boy and a girl. We can arrange the households so that each girl marries "the boy next door" to form a new generation of households, shown in the second ring. With a husband-wife family structure, households in the initial generation are linked through their children's marriages. The following section explores the consequences of such linkages under conditions sufficient to overcome sleeper effects.

5.3 Irrelevance of Redistribution

When four conditions are satisfied, redistribution of income between linked individuals is irrelevant. This is easiest to see for men and women linked by shared concern for their children, but is also true for couples connected through their children's marriage or for two individuals linked through a chain of such connections.

The conditions for the irrelevance of redistribution are as follows:

C1: Each adult makes a strictly positive bequest to his or her descendants.

C2: All adults are concerned about their children.

C3: Adults care about their children's total bequest, not its components.

C4: Each adult's bequest is determined by rational choice.

It should be noted that condition C1 is stronger than that used in the sleeper effects example in that it applies to each individual in a generation.

When conditions C1-C4 are satisfied, small redistributions of wealth between husband and wife do not matter. A small change in the wealth distribution can be offset by changes in bequests, leaving consumption patterns unchanged. The reasoning is that used in the sleeper

[2] Figure 3 is taken from Abel and Bernheim (1988).

effects example. A redistribution of wealth does not alter the opportunities available to the adults. If a certain consumption pattern is the adults' best choice before any redistribution of wealth, it should still be the best choice after the redistribution.[3]

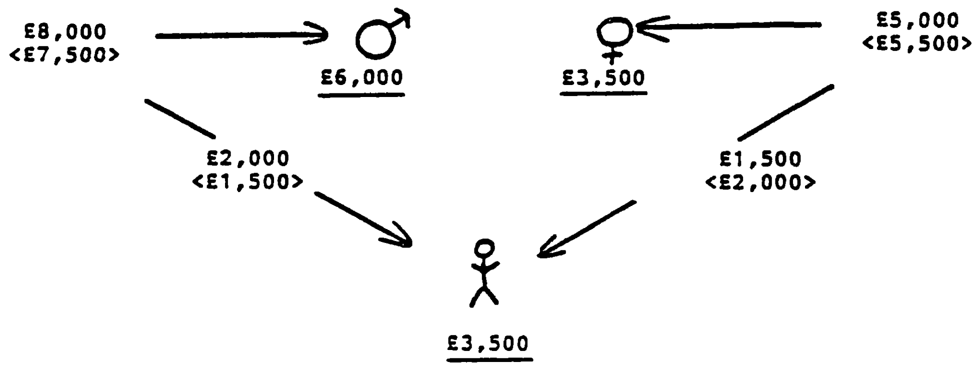
An example may clarify the argument. Figure 5.4 shows a family composed of two adults and a child. The husband has wealth of £8,000, and the wife wealth of £5,000. The husband plans to leave £2,000 to his child, consuming £6,000, and the wife plans to leave £1,500. Now suppose a tax reform decreases the husband's wealth to £7,500, and increases the wife's to £6,500 (in the U.K. a change similar in direction to this resulted from the conversion of the child tax allowance to child benefit). If the husband decreases his bequest to the child by £500, and the wife increases hers by £500, each will be enjoying the same level of consumption as before the reform (£6,000, £3,500 and £3,500 for husband, wife, and child, respectively). This level of consumption was preferred to the no-adjustment alternative (£5,500, £4000 and £3,500) before the reform, so should still be preferred, after the reform. The redistribution of wealth through tax reform is offset by changes in bequests.

[3] Let the two adults (1 and 2) have utility functions of the form required by condition two: $U_i^t = U_i^t(c_i, V^{t+1}((1+r_{t+1})b_t))$ where c_i is own consumption, b_t is the amount bequeathed to 1 and 2's common descendant, where $b_t = b_{1,t} + b_{2,t}$, the sum of 1 and 2's individual contributions. The contribution $b_{i,t}$ is determined by rational choice (C4), which requires:

$$-\frac{\partial U^{it}}{\partial c_i} + \frac{(1+r_{t+1})\partial U^{it}}{\partial V^{t+1}} \frac{dV^{t+1}}{dk_{t+1}} (1 + \frac{\partial b_{j,t}}{\partial b_{i,t}}) = 0$$

This equation will hold with equality since condition C1 guarantees that we are at an interior solution. The conjectured value of $\partial b_{j,t}/\partial b_{i,t}$ may be assumed to be a constant (as it will be under Cournot-Nash conjectures, for example). A redistribution of wealth from parent 1 to parent 2 accompanied by an equal increase in $b_{2,t}$ and decrease in $b_{1,t}$ will leave c_i and b_t unchanged, hence the first order conditions will still be maximized - provided that the redistribution is not so large as to force one individual to a corner solution.

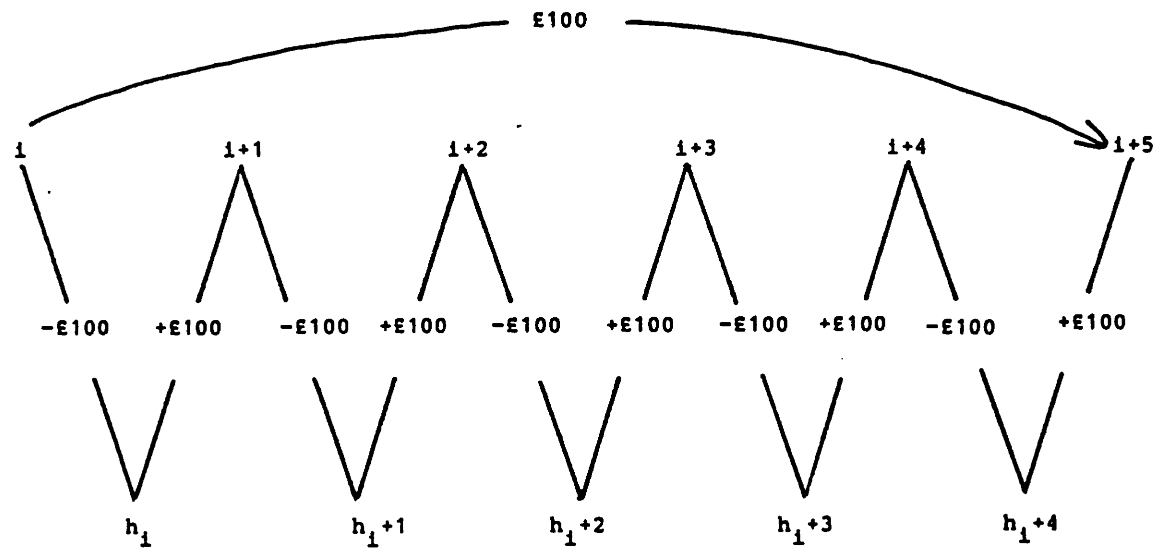
Figure 5.4: An example



Initial incomes and contributions are shown without brackets.
Post-reform incomes and contributions are shown in brackets < >.
Final consumption levels are underlined.

The argument that wealth redistribution will be offset by changes in bequests applies across households, as well as within households. Bequests to a second generation household h_i links two first generation households, say i and i+1, as indicated in Figure 5.3. A small redistribution of wealth between the households i and i+1 can be offset by changes in bequests to household h_i. Moreover, it will be offset, as people act to regain their optimal consumption/bequest choice.

Figure 5.5: Wealth redistribution across households.



An income transfer from i to i+5 is offset by changes in bequests.

By the same line of reasoning, we can argue that small redistributions of wealth (say £100) from household i to, say, household i+5, will be irrelevant, as shown in Figure 5.5. Suppose that household i decreases its bequest to h_i by £100, and household i+1 switches £100 in bequests from h_{i+1} to h_i, and so on. The original levels of consumption, which by the assumption of rational choice were optimal, will be restored. It is worth noting, however, that the decrease in household i's bequest to h_i of £100 cannot occur unless the original bequest is at least £100. The same holds for households i+1 through to i+4. By "small" redistributions of wealth we mean redistributions which are smaller in size than the smallest bequest in the chain of operative linkages.

The linkages created by marriage mean that each person's level of well-being is a function of other people's wealth. Generally, if a person i is one of a group of m connected people then his utility, Vi, is given by:

$$V^i=V^i(k_1,\ldots,k_m) \qquad 5.6$$

Equation (5.6) holds whenever there are operative links between the m connected people, that is, each makes positive bequests (C1). Abel and Bernheim (1988) show that, if there are no frictions in the links between people (C1-C4 hold) consumption, bequests, and utility depend on the aggregate wealth of the connected group:

$$V^i=V^i(\Sigma_{j=1}\ mk_j) \qquad 5.7$$

If the whole population is interconnected, individual utility depends on the aggregate capital stock, and not upon its distribution between individuals. Distribution is irrelevant.

How large can we expect the groups of interconnected individuals to be? Bernheim and Bagwell (1988, p. 322) carried out a Monte Carlo simulation to estimate the probability of households being connected. Although they assume random mating, they note that

> even with a near-perfect caste system, it takes only one "intermarriage" to link the entire population. In practice, marital links between identifiable population subgroups are probably quite common.... As a result, we suspect that our assumption [of random mating] is probably innocuous.

They describe their results as follows:

> In each simulation, we fixed the number of households (N) in the initial generation and, under the assumption that each household produced two children, arranged marriages between these children. We then repeated this procedure for grandchildren. We took all marriages to be equally likely and, in particular, did not rule out marriages between siblings. Out of 100 simulations with N=20, the population was completely interconnected in 96 cases. For N=50, the figure was 100 out of 100, and for N=100, it was 98 out of 100. We also conducted 20 simulations for N=1,000 and found that the population was completely interconnected in every case. Furthermore, every instance of incomplete interconnection resulted from the existence of a single, completely incestuous family (i.e. siblings married siblings in two consecutive generations).

Intermarriage links large groups of people either directly or indirectly.

If we imagine a husband-wife family structure, our view of the parties' reasoning in the original position must change. Each person in the original position is still behind a veil of ignorance. He does not know who his descendants will marry. But he knows that the marriage of his descendants will link him to other families and that these links, if certain conditions are satisfied, make the small redistributions of wealth within the linked group irrelevant.

Conclusions

The irrelevance of redistribution requires each adult in a generation to make positive bequests (C1), whereas overcoming sleeper effects only requires that one individual representative of an entire generation makes positive bequests. Condition C1 is stronger than those Rawls imposes on the original position, and may not be satisfied. Indeed, he recognizes the possibility that the less favoured will not take "an active part in the investment process" (p. 292).

What if the less favoured do not make positive bequests, whereas wealthier people do? The well-being of the better off will depend on the aggregate resources of groups of interconnected individuals. That of the less favoured will depend only on their own resources. There is no reason for small redistributions of wealth within groups that make positive bequests, as such redistribution will be irrelevant. A transfer of wealth from a better off person to a less favoured person, however, both increases the less favoured person's wealth, and decreases the well-being of all the members of the group with whom the wealthier individual is connected. Transfers from the more favoured to the less favoured can reduce inequality, and can be justified on equity grounds. Transfers to reduce wealth inequality within the group of better off people are irrelevant.

In the extreme case when all members of society make positive bequests, individual wealth depends on society's wealth. Decision makers may adopt a maximize total wealth rule. Alternatively, the institutions of distributive justice could be retained to make large transfers of wealth between individuals, that is, wealth transfers so large that they could not be offset by changing bequests.

The irrelevance of redistribution is of interest in part because of what it tells us about the structure of Rawls' theory. The irrelevance result can arise because of idealizations Rawls makes. Perfect rationality is an idealization, as is concern for descendants and even mutual disinterest. However, despite the many advantages of such idealizations, they may, as O'Neill (1988, pp. 5-6) observes, "fail to apply to any significant domain of human choosing". Replacing Rawls' idealized family structure with a somewhat more realistic one leads to an unrealistic prediction - the irrelevance of redistribution within groups of linked individuals. There are ways in which the prediction can be avoided, for example, by admitting that people are not perfectly rational or may not be concerned about their descendants. Yet to drop any one of the conditions C2-C4 would fundamentally alter Rawls' theory.

Conclusions

The goal for our study has been to develop models of the family which adhere to methodological individualism and to apply the models to government family taxation policy and justice between generations. Reflecting upon our models, we may draw conclusions about taxation policy, intergenerational justice and methodological individualism.

A government policy on family taxation is unavoidable. No progressive tax system can be neutral in its treatment of the family in the sense of treating all families equally regardless of the division of labour in the family and, simultaneously, in the sense of providing no incentive or disincentive to form families. Neutrality is not a viable policy option, and neither ability to pay nor the public interest provide unequivocal grounds for adopting particular family policies. In keeping with the welfarist spirit of modern economic analysis, however, we may take the relevant aim for policy makers to be to tax the family so as to minimize inequality and inefficiency.

Given equity and efficiency goals, our conclusions as to the optimal tax treatment of the family depend crucially on how we model the family. We postulated in Chapter 2 first, that family decision-making was non-cooperative, second, that spouses cared for each other but fell short of perfect altruism, third, that each had (under individual control budget constraints) control over their own income, and finally, that the benefits from family formation took the form of shared public goods consumption. These premises led to the conclusions that the level of public goods provision in the household is less than Pareto optimal, and that inequality may exist within the family. The results of the optimal tax analysis were driven partially by the need to mitigate the under-provision of public goods in order to achieve Pareto efficiency. Efficiency could be increased by raising the income of the spouse providing household expenditures, either through transfers or through a reduction in tax rates. The second factor driving the optimal tax results is equity. Equilibriating the well-being of the spouses requires income transfers to the less well-off spouse, or a tax on her income, which will induce her to take more leisure.

Moving from a single generation family to one of many generations, we turn to the problem of intergenerational justice. Rawls's (1971) theory of intergenerational justice, like in our model of family decision making in Chapter 2, turns on the notion of altruism. Altruism, in Rawls' theory, is the altruism of parents for their children, for example, fathers care for their sons. We modify Rawls's theory, in the methodological individualist spirit, to allow children have more than one parent and parents have at least one child. Marriage and reproduction then leads to complicated patterns of interdependence between members of society. Such interdependence, however, contradicts another element of Rawls's theory, namely, the assumption that individuals are in a position of mutual disinterest with respect to one another, and casts into doubt the possibility of income redistribution. Rawls's theory is shown to require serious reworking to incorporate families made up of men and women.

The view of the family as a collection of caring but rational individuals does not lead to predictions about behaviour as tidy as those of the traditional, single family utility function, view. There is a trade-off in modelling between the neatness of results, and the adherence to methodological individualism. Individualism can be sacrificed, as is evidenced by macroeconomics, which contains many propositions not reducible to individual utility maximization. Our objective should be to make the trade-off between elegance and individualism thoughtfully. Individualism will receive greater weight in modelling the family when, a priori, interactions between family members decisions are expected, for example, in modelling labour supply; when the family as a unit is in question, for example, in marriage and divorce decisions; and when we are concerned about the distribution of income or well-being between individual family members, men, women, and children. An economist often will not know in advance how strong, say, family ties through intermarriage will be. All we can ask, then, is for an individualistic model of the family to be recognized as an ideal, for researchers to be aware of intra- and inter-family ties, and to pause and reflect before writing down a single family utility function.

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