A MICROECONOMIC MODEL OF HOUSEHOLD CHOICE: THE HOUSEHOLD AS A DISPUTANT

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This paper applies the methodology of economics to the analysis of resource allocation by households with actual or potential disputes. A model of household production of "legal welfare" is constructed. Household time and money investment decisions over time are analyzed within the household production framework. Finally, a simplified set of functions for measuring household demand for dispute resolution goods and services is presented and discussed.

I. INTRODUCTION

Much has been written about the demand for physical well-being, or health (see, e.g., Grossman, 1972). Even more has been written about the derived demands for doctor and hospital services (see, e.g., Perlman, 1974). But little has been written about either the demand for legal well-being or the derived demands for the services of lawyers, mediators, and others to help resolve breaches in legal and social relationships.

This paper focuses on the household that must make choices about the allocation of resources not only to feed, clothe, and heal itself but also to heal or prevent breaches of relations with other households. A dispute between households may result in legal proceedings, arbitration, mediation, or a combination of these activities. The terms of the ultimate settlement are uncertain. The important idea is that the typical household desires to resolve or avoid such confrontations and can do so by expending household time and money, the household's scarce resources.

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A general characterization of the household's activity can be developed by introducing the concept of legal welfare. Households spend time and money resolving and preventing disputes, because such expenditures are expected to increase legal welfare—an intangible of value to the household. Legal welfare includes more than psychic or subjective rewards derived from obeying the law. It also includes subjective benefits derived from constructing and maintaining orderly relationships according to social norms. Legal welfare may also include more traditional monetary benefits resulting from expenditures either to cultivate or diminish relationships or to protect one's self or property from the claims of others. Like food, clothing, and medical care, legal welfare is part of the household's overall consumption plan.

The basic model developed in this paper directly extends the literature on household production theory to household resource allocations for dispute resolution and prevention. Household members jointly produce and consume legal welfare. When one member of a household becomes involved in a dispute with a third party, that member may call on the total resources of the household for help. Not only the resources of the household, but also the goals and values of the household as a unit, will affect the behavior of the member in dealing with the dispute. Because it is a prime organizational unit in society, the household is the principal unit of investigation in this paper.

An economic model of household dispute resolution and prevention must incorporate three important dimensions. First, the expenditures on dispute resolution and prevention must be treated as investments by the household. Second, past plus present investments contribute to the formation of capital stocks or legal welfare assets available to the household. Third, household investments are made in an environment of uncertainty.

Expenditures on dispute resolution and prevention are investments because of the sequence and timing of purchases and returns. The expenditures are usually linked together in a necessary sequence; they are not independent purchases. For example, an interdependent sequence of time and money expenditures may be required to settle, mediate, or adjudicate a dispute. The return from the sequence of expenditures also occurs over a period of time. An investment in fencing, for example, may yield returns from the prevention of drownings

and tort suits over the life of a swimming pool.[1] Similarly, the outcome from the settlement of a dispute can be a lump sum payment or a flow of monetary and nonpecuniary returns over a period of years.

Once expenditures in dispute prevention and resolution are viewed as investments, the notion of "capital stocks" naturally suggests itself. At any point in time, a given household will possess a capital stock formed from past investments in prevention goods and services. Similarly, the household owns a capital stock of dispute resolution goods and services which provide it with flows of legal welfare. The flows, or benefits per unit of time, increase overall household well-being, thereby justifying expenditures on dispute resolution and prevention.

What complicates the household's investment decision (and therefore the model) is the fact that the household faces uncertain returns from efforts to prevent or resolve disputes. Household welfare increases with increases in service flows of legal welfare from the capital stocks. Hence, the household has an incentive to invest. The return is uncertain, however, because nature and third parties can interrupt the flow of returns from the stocks. Accidents can occur, and the household may suffer a tort suit in spite of large investments in prevention. Significant sums may have been spent in trying a lawsuit, yet the household may suffer an adverse decision by the court.

The important implication for an economic model of household resource allocation is that although the time and money investment of the household in prevention and resolution is known, the state of the household's legal welfare at any future point in time is subject to considerable uncertainty. In spite of this uncertainty, investments in prevention and dispute resolution are made. The household confronts uncertainty with a set of subjective probabilities associated with future events. The household evaluates alternative investment strategies using these subjective probabilities.

The remainder of this paper develops an economic model of household behavior that formally incorporates the concepts of dispute prevention and resolution investments, the

[1] It is important to note that an investment in fencing may also increase household welfare by producing aesthetic pleasure. When a single input, fencing, is used to produce two outputs, legal welfare and aesthetic pleasure, joint production is said to occur. This paper abstracts from the problems associated with jointly produced outputs.

corresponding capital stocks, and the resulting uncertain flows of legal welfare. Section II presents an intertemporal model of household production and consumption under uncertainty. The model provides a systematic framework for examining the allocation of scarce household resources among conventional economic goods (food, shelter, etc.), leisure, and dispute resolution and prevention goods and services. Section III constructs a set of demand equations which embody the household's optimal resource allocation plan. Particular attention is given to one possible set of simplifying assumptions that could be used to adapt the theoretical model of dispute resolution and prevention for empirical work.

II. GENERAL MODEL

The model described in this paper is a general model of household behavior. It is not limited to households which find themselves in the midst of actual disputes. Most households are concerned about their legal welfare. Households recognize that disputes can occur unexpectedly and have uncertain outcomes. Households realize that investing in dispute prevention may be the least expensive way to maximize household welfare. Like the purchase of insurance, installation of a burglar alarm, and construction of a storm basement, small investments in dispute prevention may avert large losses resulting from a later dispute. The model presented in this section is intended as a general characterization of household resource allocation decisions.

Household Objectives

The household receives utility from three sources. Conventional economic goods such as food, clothing, and shelter provide one source. Leisure, an aggregate good representing a variety of nonmarket goods and services produced by the household for its own consumption (Becker, 1965), is a second. The legal welfare service which flows[2] from the stocks of investments in the prevention and resolution of disputes generate a third source of utility. The flows are assumed to be random variables, because the actions of nature

[2] Service flows are benefits (objective or subjective) per unit of time which increase overall household well-being.

and third parties which the household cannot control strongly influence the return on investment.[3]

The particular problem examined in this paper requires that the household's objective function be given a multiperiod character. Dispute resolution may take place over a long period of time, and payoffs from dispute resolution may be multiperiod flows. Investments in prevention goods have more than a single-period lifetime. It follows that time must be incorporated explicitly into the model of household behavior. For generality, we assume that the planning horizon of the household is n time periods long.[4] Since this paper is not an attempt to analyze family investment in human capital—for example, education—it is further assumed that the household investment in human capital has taken place prior to the start of the planning horizon.[5] The stock of human capital is taken as exogenous to the household under study.

The objective of the household is to formulate a multiperiod resource allocation plan which will yield the highest possible level of utility discounted to the date on which the plan is made. The n-period objective function of the household can be represented by the utility function:[6]

$$(1) \quad U = E \sum_{i=1}^{n} \beta^{i-1} U(h_i, X_i, T_i, H) \qquad U' > 0, \quad U'' < 0,$$

where

$h_i \equiv$ a random variable representing the service flow of legal welfare at period i;

$X_i \equiv$ an r×1 vector of ordinary consumption goods and services in period i;

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[3] We do not model the household's problem as a question of bilateral monopoly or oligopoly. These refinements would take the paper into the field of multiplayer games, an interesting field for further research.

[4] A planning horizon is some length of time (e.g., one, two, or three years) for which a household makes a resource allocation plan.

[5] Just as firms invest in machines, buildings, and other types of physical assets, a household makes decisions which can be treated analytically as investments in its own human assets (human capital). The value of these assets is enhanced by formal education, on-the-job experience, etc. These actions are costly, and the analytic treatment of costly decisions which yield returns over time is an important topic considered by capital theory.

[6] The utility function represented in equation (1) does not assume that preferences for conventional goods (X_i) or leisure (T_i) are independent of preferences for legal welfare (h_i). Stated formally, the utility function (1) does not maintain that conventional economic goods and leisure are separable from the service flows of legal welfare. The composition of the household's consumption of conventional goods and leisure may be quite different if the household chooses to invest only modestly rather than intensively in legal welfare.

$T_i \equiv$ leisure in period i;

$H \equiv$ human capital, assumed exogenous and fixed throughout the planning horizon; and

$\beta^{i-1} \equiv$ the discount factor of the household at time i where $0 \leq \beta^{i-1} \leq 1$.

The utility function is assumed to be concave.

Uncertainty

Uncertainty enters the model because the service or welfare flow from the stocks of investments in dispute resolution and prevention during any period depends upon actions of third parties which the household cannot control. Some examples of such third-party actions could include injury to a neighbor on the household's property, a relative's decision to contest a will, or a judge's decision that the household is not entitled to the return of a security deposit. The uncertain service flow, however, depends not only on accidents which befall others, decisions by potential litigants, activities of others during litigation, and decisions by judges, but also upon the activities of friends, respected citizens, social agencies, mediators, and arbitrators who may affect the welfare of the household. The flow also depends upon events at various stages of formal dispute resolution proceedings over which the household has no control.

The flow of welfare from investments in dispute resolution and prevention at period i can be represented by the equation:

$$(2) \qquad h_i = h_i(SD_i, SP_i, \mu_i) \qquad (i = 1,2, ..., n),$$

where

$SD_i \equiv$ the net stock of investments made by the household up to and including period i in an effort to resolve disputes;

$SP_i \equiv$ the net stock of investments made by the household up to and including period i in an effort to prevent disputes; and

$\mu_i \equiv$ a random variable representing the uncertainty attached to the service flow at period i.

Consequently, the flow of legal welfare, h_i, is also a random variable.

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Household Investment

The household is assumed to make time and money investments to prevent and resolve disputes each period. Very simple investment functions have the form:

$$ID_i = ID_i(L_i, TD_i) \qquad ID_i' > 0, \quad ID_i'' < 0$$

(3)

$$IP_i = IP_i(TP_i, Z_i) \quad IP_i' > 0, \quad IP_i'' < 0 \quad (i = 1,2, ..., n),$$

where

$ID_i \equiv$ the gross investment in dispute resolution at time i;

$IP_i \equiv$ the gross investment in dispute prevention at time i;

$L_i \equiv$ lawyers' services purchased at time i to resolve disputes;

$TD_i \equiv$ household time spent at time i in disputing with others;

$TP_i \equiv$ household time spent at time i attempting to prevent disputes with others; and

$Z_i \equiv$ a composite good representing money expenditures of the household on prevention at time i.

The inputs to the production of dispute prevention and resolution include lawyer time, household time, and ordinary market goods.[7] In this simplified model lawyer time can be considered a proxy for a host of third-party services which can be used by the household.[8] Similarly, the prevention good which the household can purchase abstracts from the variety of items, from fences to title searches, which a household can buy to prevent disputes and promote legal welfare.

It is assumed that investments in dispute resolution and prevention last for more than one period, but not indefinitely. The net stocks of investments at time i can be represented by:

[7] It is important to emphasize that households may retain lawyers for purposes other than resolving disputes. Households may consult lawyers regarding estate planning and tax matters. Expenditures like these do not enter the investment equations (3), but are represented in the vector of ordinary consumption goods X appearing in equation (1).

[8] Note the assumption that the household controls its lawyers. This assumption might be relaxed by positing an objective function for lawyers and then modeling the interaction between lawyers and the household.

$$SD_i = ID_i + (1 - \delta_i)SD_{i-1}$$
$$(4) \qquad (i = 1,2, ..., n)$$
$$SP_i = IP_i + (1 - \eta_i)SP_{i-1}.$$

The variables SD_o and SP_o are fixed exogenously. The parameters δ_i and η_i are depreciation rates representing the fact that investments have finite lifetimes.[9]

The household can adjust the net stock of its investments by changing the level of the inputs to the investment equations (3). However, it is important to emphasize that the service flow from the net stocks will be subject to uncertainty because of the random variable in equation (2). Thus h_i is random even though SD_i and SP_i are known with certainty.

Subjective Probability Distribution

Though the service flows from investments in all future periods are uncertain, the household needs to invest in the prevention and resolution of disputes. In order to make rational choices, the household must assign its personal or subjective probability distribution to the random variables μ_i $(i = 1,2, \ldots, n)$.

The household's probability distribution reflects the *household's* subjective perception of the likelihood of occurrence of events affecting the flows of welfare from its past and present investments. That perception is influenced by, among other things, the household's education, demographic characteristics, and past experiences. The probability distribution is also based on the information available to the household at the initial planning period. It is important to note that neither this information nor the resulting probability distribution need be correct relative to the "true" probability distribution of service flows. What is required is that the household's subjective probability distribution reflect its personal perception of the likelihood of alternative events.

The important implication for the household's multiperiod consumption plan is that the plan will depend on the

[9] In the context of traditional economic theory, investments in capital goods (e.g., buildings and equipment) are assumed to wear out or depreciate over time. The legal welfare model similarly allows for the possibility that investments which increase legal welfare may depreciate over time. The value of lawyers' services received in the past, for example, can depreciate as new precedents or statutes affect the usefulness of the legal advice received in the past.

household's subjective probability distribution. In response to new information, the household might abandon the original plan and seek investments with higher utility flows for the remainder of the planning horizon. Examples of such information could be the announcement of precedent-setting decisions or, more simply, the advice offered by friends, lawyers, and agencies.

Budget Constraints

Households face two budget or conservation constraints. A household can neither spend more than the present value of its endowment of money nor use more than its natural endowment of time. The money constraint states that no more than the present value of earned and property income can be allocated to expenditures on conventional goods, lawyers' services, and prevention goods. Formally:

$$(5) \qquad \sum_{i=1}^{n} \beta^{i-1}(PL_i \bullet L_i + P_i \bullet X_i + PZ_i \bullet Z_i) = \sum_{i=1}^{n} \beta^{i-1}(W_i \bullet TW_i) + A_o,$$

where

$PL_i \equiv$ the price of lawyers' services in period i;

$P_i \equiv$ an r×1 vector of the prices of the r×1 vector of conventional goods;

$PZ_i \equiv$ the price of the composite prevention good;

$TW_i \equiv$ the amount of time the household works;

$W_i \equiv$ the rate of pay for the household; and

$A_o \equiv$ an exogenous endowment of property wealth available to the household in the initial period.

The left-hand side of equation (5) represents expenditures on goods and services. The right-hand side represents discounted money wealth available to the household. The time constraint states simply that the household cannot use more time than given by nature. The constraint can be expressed as:

$$(6)\quad TW_i + TD_i + TP_i + T_i = \Omega \qquad (i = 1,2,\ldots, n),$$

where $\Omega \equiv$ the time endowment of the household in period i. The left-hand side of equation (6) represents the uses of household time—work, dispute, prevention, and leisure. The right-hand side of (6) represents the exogenous time endowment of the household. The constraint must hold at each period of time.

The two constraints can be combined for simplicity into a composite full-wealth constraint having the form:

$$(7)\quad \sum_{i=1}^{n} \beta^{i-1}[PL_i \bullet L_i + P_i \bullet X_i + PZ_i \bullet Z_i + W_i(TD_i + TP_i + T_i)] = \sum_{i=1}^{n} \beta^{i-1}(W_i\Omega) + A_0.$$

This constraint says that the household cannot spend more money and time than the amount of its endowment. More precisely, the constraint states that the household exactly spends the amount of its endowment.[10]

The Optimization Problem and Household Equilibrium

At this point we summarize the formal model of household behavior and derive the conditions for an optimal resource allocation plan. The reader uninterested in the formal derivations can proceed directly to the more intuitive discussion below.

Derivation of Conditions for Optimal Resource Allocation: The household's optimization problem can be restated as follows. The household maximizes its expected utility by formulating an optimal multiperiod plan for the allocation of household time as well as money, subject to the household's full-wealth budget constraint, its information set or subjective probability distribution, and market prices. The problem can be written formally:

[10] This requirement is imposed on the model for simplicity. The model could be analyzed if equation (7) were written as an inequality. The budget constraint also assumes that the household does not want to leave a bequest to succeeding generations. Such a bequest could be incorporated into the model if desired, but would not affect the substantive conclusions of the paper.

$$(8) \qquad \text{Max} \qquad E \sum_{i=1}^{n} \beta^{i-1} U(h_i, X_i, T_i, H)$$

$$\{X_i, L_i, Z_i, TD_i, TP_i, T_i\}_{i=1}^{n}$$

$$\text{st: } \sum_{i=1}^{n} \beta^{i-1}[PL_i \bullet L_i + P_i \bullet X_i + PZ_i \bullet Z_i + W_i(TD_i + TP_i + T_i)] =$$

$$\sum_{i=1}^{n} \beta^{i-1}(W_i\Omega) + A_0.$$

$$SD_i = ID_i + (1 - \delta_i)SD_{i-1}$$

$$SP_i = IP_i + (1 - \eta_i)SP_{i-1}$$

$$ID_i = ID_i(L_i, TD_i)$$

$$IP_i = IP_i(TP_i, Z_i)$$

$$h_i = h_i(SD_i, SP_i, \mu_i) \qquad (i = 1,2, \ldots, n)$$

SD_o, SP_o given.

The operator E denotes the mathematical expectation at time 0 taken with respect to the subjective joint probability distribution function for the random variables μ_i.

The maximum value function associated with this problem is:

$$(9) \quad V = \text{Max} \quad E \sum_{i=1}^{n} \beta^{i-1} U(h_i, X_i, T_i, H) + \lambda \left[\sum_{i=1}^{n} \beta^{i-1}(W_i\Omega) + A_0 \right.$$

$$\{X_i, L_i, Z_i, TD_i, TP_i, T_i\}_{i=1}^{n}$$

$$\left. - \sum_{i=1}^{n} \beta^{i-1}[PL_i \bullet L_i + P_i \bullet X_i + PZ_i \bullet Z_i + W_i(TD_i + TP_i + T_i)] \right]$$

This problem has a solution characterized by the following necessary conditions:

$$(10a) \quad E\left[\frac{\partial U}{\partial X_i} - \lambda P_i\right] = 0$$

$$(10b) \quad E\left[\frac{\partial U}{\partial T_i} - \lambda W_i\right] = 0$$

$$(10c) \quad E\left[\frac{\partial U}{\partial h_i}\frac{\partial h_i}{\partial SD_i}\frac{\partial ID_i}{\partial L_i} + \beta(1-\delta_i)\frac{\partial U}{\partial h_{i+1}}\frac{\partial h_{i+1}}{\partial SD_{i+1}}\frac{\partial ID_i}{\partial L_i} + \right.$$

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$$\ldots + \beta^{n-i}(1-\delta_n)^{n-i}\frac{\partial U}{\partial h_n}\frac{\partial h_n}{\partial SD_n}\frac{\partial ID_i}{\partial L_i} - \lambda PL_i \Big] = 0$$

$$\text{(10d)}\quad E\left[\frac{\partial U}{\partial h_i}\frac{\partial h_i}{\partial SP_i}\frac{\partial IP_i}{\partial Z_i} + \beta(1-\eta_i)\frac{\partial U}{\partial h_{i+1}}\frac{\partial h_{i+1}}{\partial SP_{i+1}}\frac{\partial IP_i}{\partial Z_i} + \right.$$

$$\left. \ldots + \beta^{n-i}(1-\eta_n)^{n-i}\frac{\partial U}{\partial h_n}\frac{\partial h_n}{\partial SP_n}\frac{\partial IP_i}{\partial Z_i} - \lambda PZ_i \right] = 0$$

$$\text{(10e)}\quad E\left[\frac{\partial U}{\partial h_i}\frac{\partial h_i}{\partial SD_i}\frac{\partial ID_i}{\partial TD_i} + \beta(1\text{-}\delta_i)\frac{\partial U}{\partial h_{i+1}}\frac{\partial h_{i+1}}{\partial SD_{i+1}}\frac{\partial ID_i}{\partial TD_i} + \right.$$

$$\left. \ldots + \beta^{n-i}(1-\delta_n)^{n-i}\frac{\partial U}{\partial h_n}\frac{\partial h_n}{\partial SD_n}\frac{\partial ID_i}{\partial TD_i} - \lambda W_i \right] = 0$$

$$\text{(10f)}\quad E\left[\frac{\partial U}{\partial h_i}\frac{\partial h_i}{\partial SP_i}\frac{\partial IP_i}{\partial TP_i} + \beta(1-\eta_i)\frac{\partial U}{\partial h_{i+1}}\frac{\partial h_{i+1}}{\partial SP_{i+1}}\frac{\partial IP_i}{\partial TP_i} + \right.$$

$$\left. \ldots + \beta^{n-i}(1-\eta_n)^{n-i}\frac{\partial U}{\partial h_n}\frac{\partial h_n}{\partial SP_n}\frac{\partial IP_i}{\partial TP_i} - \lambda W_i \right] = 0$$

$$\text{(10g)}\quad \sum_{i=1}^{n}\beta^{i-1}(W_i\Omega) + A_o - \sum_{i=1}^{n}\beta^{i-1}[PL_i \bullet L_i + P_i \bullet X_i +$$

$$PZ_i \bullet Z_i + W_i(TD_i + TP_i + T_i)] = 0, \qquad (i = 1,2,\ldots,n).$$

Interpretation of the Conditions for Optimal Resource Allocation: Although the necessary conditions for household welfare maximization (10) appear formidable, they reveal intuitively persuasive information. Examine condition (10a). This condition actually consists of r equations, one for each of the r conventional economic goods. Consider two such goods, X_1 and X_2. By taking ratios of the equations in (10a), the formula

$$\text{(11)}\quad \frac{E[MU_{X_1}]}{E[MU_{X_2}]} = \frac{P_1}{P_2}$$

can be derived.[11] The expression on the left-hand side of (11) is the ratio of the expected marginal utility of the good X_1, say fuel, to the expected marginal utility of the good X_2, say food. The expression on the right-hand side of (11) is the price ratio of fuel to food, the market terms of trade between the two commodities.

If condition (11) is not satisfied, then the household can rearrange its purchases of fuel and food in a pattern that

[11] Note suppression of the time subscript for simplicity.

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increases expected household welfare. The ratio of the expected marginal utilities of food and fuel represent the household's calculation of the trade-off between food and fuel as they are employed in the household. Condition (11) says that the household will maximize its expected welfare by adjusting consumption patterns so that the household calculation of the food-fuel trade-off equals the market terms of trade between food and fuel.

A symmetric interpretation applies to condition (10b). Taking (10a) and (10b) together, one finds that the ratio of the expected marginal utility of a conventional good to the expected marginal utility of leisure must equal the ratio of the price of the good to the wage rate, a familiar result from the theory of household behavior.

Similar results hold for each pair of necessary conditions involving (10c) through (10f). Complications are introduced only because the household does not consume lawyers' services, disputing time, prevention time, and prevention goods directly. Instead, the household purchases these goods and services as investments in the prevention and resolution of disputes. The household actually consumes a flow of legal welfare from the stocks of investments it has made. The additional terms introduced by equations (10c) through (10f) adjust for this multiperiod investment characteristic of some of the household purchases.[12]

The basic interpretation, however, remains unchanged. The household will invest in a prevention good and lawyers' services until the ratio of the discounted expected utility from an additional unit of the prevention good to the discounted expected utility from an additional unit of lawyers' services equals the market terms of trade, the ratio of prices, between those commodities.

An example involving the relationship between a prevention good and lawyers' services can be taken from the law governing landlords and tenants. Consider a household which, acting as landlord, contemplates renting a house that is in serious disrepair. In some jurisdictions, a tenant may sue the landlord if the rental property is "uninhabitable." Before renting to tenants in such jurisdictions, the landlord must decide how much, if anything, to spend on building repairs.

[12] Note that both the discount rate β and the depreciation rates η and δ appear in (10c) through (10f). The marginal utility of a present investment in any future period is not only discounted back to the present but is also depreciated as smaller and smaller proportions of the economic value of the initial investment survive over time.

Since the household has a finite budget (the constraint [10g]), the landlord wants to minimize expenditures on repairs. However, if an insufficient amount is spent, the landlord realizes that it may later incur legal expenses in addition to court-ordered payments.

Equations (10c) and (10d) reveal how a rational household will resolve the trade-off between spending on repairs before renting and budgeting for probable later expenditures for lawyers' services to help resolve a future dispute. A primary factor which will affect the household's decision is the price of lawyers' services over the household's planning horizon relative to the price of current repairs. These prices appear in (10c) and (10d). The household's estimate of the likelihood of a dispute (modeled by the random variables μ_i, h_i, $\partial h_i / \partial SD_i$, and $\partial h_i / \partial SP_i$ and the expectation operator E) as well as the investment characteristics of the repairs and lawyers' services (δ_i, η_i, $\partial ID_i / \partial L_i$, and $\partial IP_i / \partial Z_i$) will also affect the household's decision. In addition, the landlord's decision will be influenced both by the household's risk preferences (modeled by the underlying utility function and the derivative $\partial U_i / \partial h_i$) and by its subjective rate of discount (β^{i-1}). The rational household will consider all of these factors and, following the behavioral rules described by (10c) and (10d), will make a decision consistent with overall household welfare maximization.

At the same time the household allocates resources between current repairs and future lawyers' services it also must allocate resources between food and repairs. Equations (10a) and (10d) guarantee that the prospective landlord will take into account the fact that money spent on repairs is money not available to feed the household. Once again this trade-off will be resolved in a way that maximizes the welfare of the household in light of market prices, discount rates, risk preferences, income, and other information available to the household.

The household's allocation of *time* among leisure, disputing, and prevention activities is based on factors analogous to those considered by the household in making allocations of money. The necessary conditions (10b), (10e), and (10f) suggest that the household will invest its time such that the expected marginal utilities (discounted and depreciated) of these three uses of household time are equalized. These relationships and all others implied by the necessary conditions must hold at each point of time in order for the household to be maximizing its expected utility.

An example illustrates the behavioral information contained in (10b), (10e), and (10f). Suppose that a household owns a house with a front entrance used only by nonfamily members. Suppose further that the steps leading to the front entrance are in such disrepair that if a visitor were injured on the steps, the household would be liable in damages to the injured person for negligence. The household might hire a carpenter to fix the steps—that is, spend money on prevention goods and services. Assume, however, that carpenters are unavailable so that the only method of repair is the "do-it-yourself" job.

The household's choice essentially is to determine how much time to spend repairing the steps. If repair is not undertaken, time may have to be spent at a later date in resolving a dispute with an injured visitor. Equations (10b), (10e), and (10f) indicate the factors a rational household will consider in making an optimal allocation of time and provide rules for an optimal allocation. The household will consider its wage rate—the opportunity cost of household time—as well as the time required to make repairs. Risk preference and the subjective rate of time discount will be important. The household's assessment of the probability of injury and the probability of a lawsuit will also influence the household's decision. Even the rate of depreciation of the repaired steps would have some impact on the final decision.

The rule the household will use in allocating time is simply that the ratio of expected marginal benefits between any two uses of household time must be equalized. If at the margin the household gains more from working additional hours than from spending these same hours on repairs, the steps will not be repaired. Stated alternatively, the rational household may accept the risk of a lawsuit in the future with its expected costs in household time (and money) in exchange for a small nearly certain increase in present income.

The model of consumer choice summarized in equations (10a) through (10g) has an important characteristic that deserves emphasis. Given the general representation of the utility function[13] and the characterization of the legal welfare variables as random, it follows that the first-order conditions associated with each decision variable, including those associated with conventional goods (10a) and leisure (10b), are functions of the random variables h_i and therefore μ_i. This

[13] See note 6.

accounts for the expectation operator E in equations (10a) through (10f). Consequently, uncertainty regarding its future states of legal welfare affects the household's *total* consumption plan. As discussed above, the household confronts uncertainty with a subjective probability distribution based on the information available to it in the planning period. The important implication is that a different information set, perhaps due to legal counsel or different perceptions of third parties' objectives, would lead to a different subjective probability distribution and, given the structure of equations (10), to a different consumption plan.

III. DEMAND ANALYSIS

The Empirical Study of Household Resource Allocation

The derivation of the first-order conditions (10) for optimal household resource allocation is only the first step in a study of investments in dispute resolution and prevention. The next step is to examine the response of the household to changes in data such as wage rates, prices of lawyers' services, prices of ordinary consumption goods, and subjective probability distributions.

Two approaches to the investigation of such responses are possible. Qualitative results can be derived analytically. This approach, called comparative dynamics, uses additional mathematical analysis of the first-order conditions (10) in an effort to predict the qualitative responses (positive or negative) of household resource allocation patterns to changes in "data." Alternatively, quantitative results can be derived empirically. This second approach manipulates first-order conditions like (10) into an empirically measurable model. Actual data such as household wage rates and prices are then used to measure household responses to variations in data observed in a given sample of households.

The difficulty with analytical qualitative analysis is that ambiguous results are usually obtained, except in the case of very simple models. The qualitative analysis of system (10) follows the general rule. Even the analysis of a one-period version of (10) assuming a binomial subjective probability distribution leads to inconclusive qualitative results.

The ambiguity is not surprising. System (10) reveals that the optimal resource allocation patterns of households depend on complicated intra-household and technical trade-offs between the decision variables identified in (10). Household

preferences determine the personal internal terms of trade between the variables defined in the household's utility function (1). Production relationships determine the technical terms of trade between the variables within each investment equation (3). Both technical and personal considerations determine the substitution possibilities between the two capital stocks in the legal welfare equation (2). All these trade-offs interact throughout system (10). Without knowing their individual signs *and* magnitudes, it is not possible to answer in the abstract questions like: will a household buy more lawyers' services if the household wage rate is increased?

The important conclusion is that meaningfully evaluating household resource allocation patterns requires empirical analysis. Qualitative analysis is, at best, inconclusive. Quantitative results can be obtained only by measuring household resource allocations with a specific set of data.

Demand Analysis as a Measurement Tool

Demand equations express the relationship between the decision variables of a household and the price, wage, endowment, and subjective probability "data" which the household must consider in order to make a resource allocation decision. The demand equations for the household can be found by solving the first-order conditions (10) together with the investment equations (3) for the decision variables of the household: consumption goods, lawyers' services, prevention goods, disputing time, prevention time, and leisure.

The demand equations embody the optimal resource allocation decisions of a household. Given a set of price, wage, endowment, and subjective probability data, the demand functions determine the welfare maximizing purchase plan of the household. If empirical measurements of the demand functions are available, it is possible to analyze the optimal response of a household's purchase plan to changes in the data.

Unfortunately, the demand equations which are derived from (1) are extremely complex. Each decision variable at every time period is a function of the price, wage, endowment, and probability data in *every* time period. The data required to measure such a demand system are simply not available.

Simplified Demand Functions

When there are insufficient data to measure a theoretical model, it is necessary to replace data with assumptions. The task of applied economics is to choose those assumptions

which make the analysis tractable without sacrificing the richness of the questions which initially motivated the research. For example, if one were interested primarily in the effects of changing prices of lawyers' services on the consumption patterns of persons in differing income groups, one would not want to simplify the model by suppressing the distinction between necessary goods like food and shelter and luxuries like entertainment. Similarly, if the allocation of "own time" among leisure, prevention activities, and disputing is the sole focus of the research, it may be appropriate to ignore the demand functions for conventional goods, prevention goods, and lawyers' services. The important point is that the appropriate assumptions are determined in large part by the central hypotheses to be examined.

The objective of this final section is to suggest one set of assumptions which leads to a much simplified model which then could be used to empirically analyze basic demand behavior hypotheses. Two assumptions greatly simplify the demand functions of the household. First, assume that decision making takes place in an environment of certainty. The household correctly anticipates the outcome of its investments in dispute resolution and prevention. Second, assume that resource allocation plans are drawn up for only one time period. The household, for cost or other reasons, does not make multiperiod resource allocation plans. Given these assumptions the demand functions of the household can be written:

$$
\begin{aligned}
X &= F(P, W, PL, PZ, \Omega, A_o, H) \\
L &= L(P, W, PL, PZ, \Omega, A_o, H) \\
Z &= Z(P, W, PL, PZ, \Omega, A_o, H) \\
TD &= TD(P, W, PL, PZ, \Omega, A_o, H) \\
TP &= TP(P, W, PL, PZ, \Omega, A_o, H) \\
T &= T(P, W, PL, PZ, \Omega, A_o, H).
\end{aligned} \tag{12}
$$

System (12) is still not ready for empirical measurement. A functional form (e.g., linear, logarithmic, etc.) must be assumed before measurement can proceed. The parameters of the assumed functional form would be estimated from an actual sample of households.

The estimated parameters would provide a basis for qualitative and quantitative analyses of household resource

allocation decisions. Qualitative analysis can be conducted by testing hypotheses about the signs of and relationships among various parameters. Quantitative analysis can be conducted using the magnitudes of estimated parameters in conjunction with the actual data sample.

One caveat is in order. Even system (12) requires a great deal of data for proper measurement. The prices of all commodities purchased by a household in addition to data on wages and the price of legal services are required for measurement. To the extent that this array of data is unavailable, additional assumptions may have to be made in order to simplify the demand system for empirical measurement.

The important conclusion, however, is that given the proper mix of data and assumptions, a tremendous amount of insight can be gained from an empirical analysis of a set of equations like system (12).[14] The complementarity or substitutability of lawyers' services and own disputing time can be examined. The effect of a change in the household's wage rate on its demand for legal services and on its time spent on disputes can be readily computed. The effect of a change in the price of lawyers' services on the household's demand for both lawyers' services and prevention goods can be determined. The effect of changes in the prices of commodities such as food, shelter, and fuel on the demand for legal services can be explored. The model can also be used to quantify the importance of the household's education and wealth endowment in determining the level as well as the mix of purchased legal services and own time spent on dispute resolution. The demand relations defined in (12) provide a powerful tool for determining the structure of household preferences for market and nonmarket goods and services.

IV. CONCLUSION

This paper began with a multiperiod model of household resource allocation under uncertainty. Simplifying assumptions were made in order to adapt the complex analytical model for practical empirical work. It is hoped that as data become more readily available, demand systems such as (12) will be estimated. Such estimates should greatly aid not only scientific research into household disputing behavior

[14] See, for example, the applied model suggested in Marquardt (1980).

but also systematic evaluation of social policies aimed at the price and delivery of legal services.

For references cited in this article, see p. 883.