A Theory of Social Interactions

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1 Introduction (+ Summary)

The important concept is "social income".

2 Theoretical Framework

2.1 Equilibrium for a single person

Suppose a basic household production model $U_i = U_i(Z_1, \cdots Z_m)$. Z are the commodities. Each commodity's production function is $Z_j = f_j^i(x_j, t_j E^i, R_j^1, \cdots R_j^r)$, where x are quantities of market goods, t is quantity of time input, E is education or experience, and R are characteristics of other persons that affect his output of commodities. Ignore t and E, and assume that the person i can change R_j by his own efforts. So maximizing utility will be equivalent to maximizing the output of the commodity, and can be written as $U_i = Z(x, R)$. R can be written as $R = D_i + h$, where h measures the effect of i's efforts, and D_i the level of R when i makes no effort (D_i is the i's "social environment").

His budget constraint is $p_x x + p_R h = I_i$. I_i is money income, $p_R h$ is the amount he spends on R, and p_R is the price to him of a unit of R. Combine this constraint with the equation of R, and we have $p_x x + p_R R = I_i + p_R D_i = S_i$. The RHS gives the sum of i's money income and the value to him of his social environment, and we call this his social income. The LHS shows how his social income is spent, partly on his own goods, and partly on the characteristics on others (R).

If i maximizes the utility-output function, equilibrium condition is

$$\frac{\partial U_i}{\partial x} \Big/ \frac{\partial U_i}{\partial R} = \frac{p_x}{p_R}$$

If i chooses not to spent money on R, then p_R is the shadow price, measured by the monetary equivalent of the marginal utility of R to i when $R = D_i$ (or when $h = 0$).

Figure 1 shows when R has a positive marginal effect. That is, for example, when R refers to the respect accorded i rather than to his envy of others. The quantity 0-D measures his social environment, and 0-X0 his own income (measured in terms of x), so that the endowed point E0 gives his utility when he spends nothing on R. If E0-S0 measures the opportunities available for purchasing additional R, he would max his utility by moving along E0-S0 to point e0, where the slope of his opportunity curve equaled the slope of his indifference curve. His equilibrium purchase of R is measured by the line segment h0.

Figure 2 is when R has a negative marginal product. That is when for example, it measures the income or prestige of persons that i envies. The section of the opportunity curve to the southeast of point $E0$ is now irrelevant, and he moves along the southwest section E0-So' to point e0. He is willing to give up R, since his utility increases by reducing R. At e0, he spends enough resources to reduce R by h0. Note that in this case, his social income is less than his own income. Note too that as long as the marginal utility of R is not zero at the endowed position, his social income would differ from his own income, and he would move from that initial position.

Figure 1: When R has a positive marginal product in the production of Z
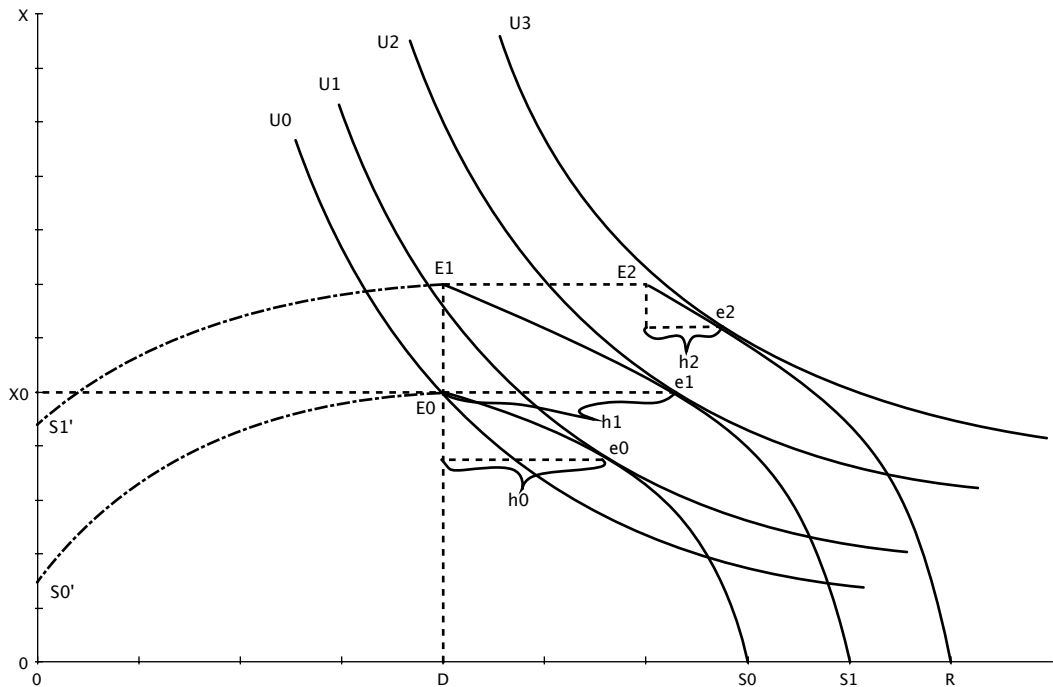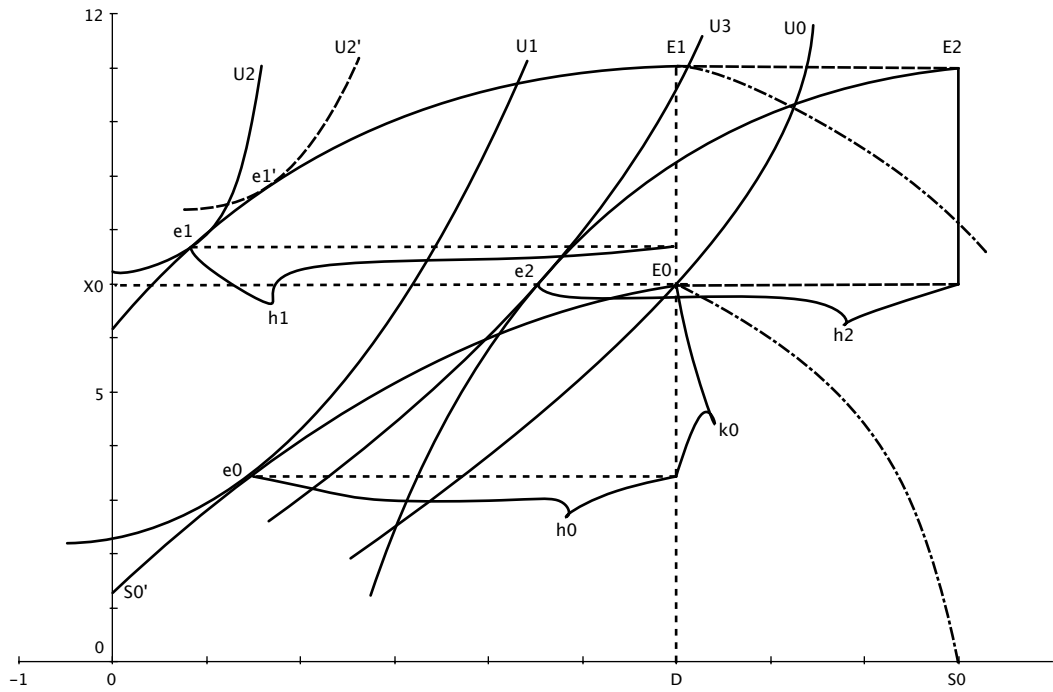

Figure 2: When R has a negative marginal product in the production of Z

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2.2   Income and price effects

The effect of a change in his own income on his utility output is smaller, the more important his social environment is. Put differently, the greater the contribution of his social environment to his social income, the more his welfare is determined by the attitudes and behavior of others than by his own income. So, those who stress the social environment, its normative requirements and sanctions for compliance and noncompliance, and the helplessness of the individual in the face of his environment naturally see society dominating individual efforts, and consequently see little scope for important choices by individuals.

Back to figure 1 and 2, income increase without any change in the environment is shown by a vertical increase in the endowed position from E0 to E1. Equilibrium position will change from e0 to e1, the change in R is equal to h1-h0, the change in i's contribution to R. The percentage change in R in figure 1 is clearly less than that of h, since R is the sum of h and fixed D. Since percentage change in R in figure 2 is negative, it is also less than that of h, which is positive (since h is negative). However, if R had been increased by the increase in i's own income, is, say, the new equilibrium position was at point e1', the percentage change in R would be positive and would clearly exceed in algebraic value the negative percentage change in h.

A change in social environment is shown by a horizontal movement of the endowed position. An increase in the environment shifts the endowment in figure 1 from E1 to E2, the equilibrium position is changed from e1 to e2 (higher indifference curve), and i's contribution declines from h1 to h2. In figure 2, the equilibrium is changed from e1 to e2 (lower indifference curve), and i's contribution increases from h1 to h2[1].

3   Applications

3.1   The family

Assume that i cares about hit spouse j in the sense that i's utility function depends on j's welfare. j does not care about i. A change in the distribution of family income between i and j has no effect at all on the consumption or welfare of either, as long as i continues to transfer resources to j. This implication is applicable to larger families. If one member, the "head" cares about all other members and transfer general resources to them, redistribution of income among members would not affect the consumption of any member, as long as the head continues to contribute to all.

The result on the unimportance of the distribution of income among persons linked by transfers can also be used to understand the interaction among generations. Increased government debt etc are financed by increased taxed on future generations, or increased public investment is financed by taxes on present generations and benefits future generations. If the two generations were fully connected by series of inter-generational transfers, then each of these apparent changes in the relative resources of present and future generations would tend to be offset by equal but opposite changes in bequests.

The "head" automatically internalizes the "external" effects of his actions on other families, since his utility will increase as the others' welfare increases. So he would read in bed at night only if the value of reading exceeded the value (to him) of the loss in sleep suffered by his wife.

As for the other members, the implication is that if a head exists, other members also are motivated to maximize family income and consumption, even if their welfare depends on their own consumption alone (the "rotten kid" problem). In other words, if one members cares sufficiently about other members, all members have the same motivation as the head to maximize family opportunities and to internalize fully all within-family "externalities", regardless of how selfish these members are.

3.2   Charity

As the family head was motivated to improve other member's welfare, charity can also be motivated by a desire to improve well-being (the "family" will be the charitable person and the recipients). But the implication in charity is that the increase in the incomes of recipients would reduce giving. Therefore, an increase in the

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[1]in the graph, it seems decreasing, but it should be increasing!!

incomes of both recipients and givers should not increase giving by as much as an increase in the incomes of givers alone.

3.3 Envy and hatred

An envious person would feel better off if some other persons become worse off in certain respects. He could "harm" himself (use his own resources) to harm others. In figure 2, he gives up k0 units of his own consumption in order to harm others by h0 units. The terms of trade between his own harm and the harm to others, given by the curve E0-S0' is partly determined by his skill at "predatory" behavior and partly by public and private expenditures to prevent crime etc. Since an increase in these expenditures would increase the cost to him of harming others, he would be discouraged to harm others.

Also, rise in own income would tend to reduce predatory expenditures. An increase in the social environment, on the other hand, would necessarily increase these expenditures, unless own consumption were and inferior good. So a rise in the social environment and own income by the same percentage would reduce predatory expenditures by less than would a rise in own income alone, and might even increase them.