Summary of A Theory of the Allocation of Time

Evan Zuofu Liao

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Part I
The Model

Households are assumed to combine time and market goods to produce commodities that directly enter their utility function. These commodities are called Z_i and written as

$$Z_i = f_i(x_i, T_i) \tag{1}$$

where x_i is a vector of market goods and T_i a vector of time inputs. The production function (1) can be written in the equivalent form

$$\begin{cases} T_i & \equiv t_i Z_i \\ x_i & \equiv b Z_i \end{cases} \tag{2}$$

where t_i is a vector given the input of time per unit of Z_i and b_i is a similar vector. The households problem is to maximize a utility function

$$U = U(Z_1, ...Z_m) \tag{3}$$

subject to a budget constraint

$$\sum p_i x_i + \sum T_i \bar{w} = V + T\bar{w} \tag{4}$$

Where V is other income, $\bar{w}$ is a vector giving the earnings per unit of time and T gives the total time available. By using (2), (4) can be written as

$$\sum \underbrace{(p_i b_i + t_i \bar{w})}_{\pi_i} Z_i = \underbrace{V + T\bar{w}}_{S'} \tag{5}$$

Following equation (5), the relative marginal importance of time (time-intensive) is defined as

$$\gamma_i = \frac{t_i}{p_i b_i + l_i t_l} \tag{6}$$

where $l_i = \frac{\partial L}{\partial T_i}$ is the marginal forgone earnings of using more time (L is the total earnings forgone).

Part II
Applications

Hours of Work

This section considers the effects of changes in income, earnings, and market prices on the time used on consumption T_c and hours worked, T_w.

- If full income S' increased solely because of an increase in V there would be a parallel shift with no change in relative commditiy prices. The consumption of most commodities would have to increase; if all did, T_w would decrease. T_w could increase only if relatively time-intensive commodities were sufficiently inferior.

- A uniform percentage increase in earnings would increase the cost per hour used in consumption by the same percentage. The relative prices of commodities would also change as long as forgone earnings were not equally important for all. Then the theorem of demand would come into play.

- A compensated uniform rise in earnings would lead to a shift away from earnings-intensive commodities and toward goods-intensive ones. Then consumption would be shifted away from time-intensive commodities, resulting in a reduction in the total time spent in consumption.

- The effect of an uncompensated increase in earnings on hours worked would depend on the relative strength of the substitution and income effects. The former would increase hours, the latter would reduce them.

The Productivity of Time

Similar to the previous section, the effects of changes in the productivity of time are analyzed through the relative prices of commodities and the subsequent substitution and income effects.

Income Elasticities

One interesting application is to the relation between family size and income. Traditional view has been that an increase in income leads to a reduction in the number of children per family. However, if birth control knowledge and other variables were held constant, economic theory suggests a positive (but weak) relation between family size and income.

Transportation

Detailed analysis is skipped.

The Division of Labor within Families

Members who are relatively more efficient at market activities would use less of their time at consumption. An increase in the relative market efficiency of any member would effect a reallocation of the time of all other members toward consumption.

Part III
Substitution between Time and Goods

Time and goods have been assumed to be used in fixed proportions in producing commodities. This assumption is now dropped.

- A rise in the cost of time would induce a reduction in the amount of time and an increase in the amount of goods. Thus not only would a rise in earnings induce a substitution away from earnings-intensive commodities but also substitution away from time and towards goods in the production of commodity.
- A rise in income due to a rise in earnings would increase the quality of goods purchased. A rise in income due to a rise in property income would not cause any substitution, and should have less effect on the quality of goods.