Factor Intensity and Choice Pattern in a Household Production Model

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Abstract

THIS paper proposes that preference and choice are aligned with the pattern of factor intensity in household production process. It has proved that households will choose commodities whose production into consumable sets in the households' production process uses its abundant resource more intensively. Normalized relative prices of resources, apart from determining the resource endowment position and the direction of demand at individual household levels, provide the basis for allocation of household resources between the factor markets and the household domestic production activities.

Keywords: Household production activities, resource endowment, factor intensity, choice.

1. Introduction

CONSUMPTION of any commodity entails the use of other economic resources, namely, labour capital goods, complementary/supplementary commodities, and time. Becker (1965) noted that households do not always, at least in most cases, consume the traditional bundles of ready-made commodities but they also use some resources and are involved in what might well be regarded as production. It has been acknowledged that some factor inputs such as labour, capital, energy, raw/intermediate materials (that is, other commodities) and time are required for a typical household to turn some commodities into consumable items that would yield the final utility. The job of the housewife and children of school age can be appreciated and underscored if we recognize the household as a rudimentary firm necessary for transformation of resources into usable commodities. It is the nexus of these informal production activities within the households that even determine the pattern of formal employment among the members of households (Nakamura, *et al*, 1979).

The choice of any commodity depends on the level of complementary requirement of other economic commodities that such a choice would place on consumer in order to satisfactorily enjoy the commodity whose purchase and consumption is under consideration. The need for a video set brings into consideration the time required for the enjoyment of the services since its consumption is time-intensive. The preparation of most continental dishes by African households is labour-intensive. Yet some luxurious private cars are energy-intensive while consumption of the services of a personal computer is both capital- and time-intensive. Child rearing is labour- and time-intensive and their upbringing in terms of education, capital intensive. Indeed, individual taste appears to be closely determined by the extra requirements created in the process of the demand for (purchase of) and consumption of a given commodity.

The question is: does factor intensity in consumption guide the consumers in ordering their preferences and making choices? In order to give answer to this question, we will consider the household not only as a simple economic unit where only consumption takes place, but will also reckon it as the unit where some economic resources are combined in the process of consumption. We also recognize that the cost of any consumption decision is not just the alternatives which the money

spent on the commodity could have bought. The costs of household consumption decision include the value of other physical commodities, labour and time that have to be expended in order to enjoy the services of the commodity in question. The alternative valuation of these resources, some of which are not listed in the financial prices, also accounts for the choice decision on the commodity under study.

This paper, which presents an argument that choice and consumption pattern depend on the factor intensity of consumption, is divided into four sections. After this introduction, section two discusses the theoretical issues on the traditional economic household as a pure final consumer and the modern issues on households as a producer. The third section deals with household production model, factor intensity, choice and consumption pattern. Section four provides conclusion to the study.

2. Theoretical Conceptions of Household as Consumer and Producer

THIS section is subdivided into two sections. The first is concerned with the traditional theory of household behaviour while the second is devoted to issues raised in the household production modelling of the household behaviour.

2.1. Classical consumer's utility maximization

THE conceptualisation of consumer activities differs with respect to assignment of role to the household. Most times, because of analytical convenience associated with high level of abstraction, the household is often regarded as an end, direct consumer of commodities. Under the ordinal utility analysis, a rational consumer is subjected to some assumptions concerning his income, market price and preference ranking among commodities in order to maximize the utility. Under this simple analysis, virtually everything, including the existence of equilibrium in a consumption space, is assumed. These assumptions include lexicographic preference relation whose ordering is complete, transitive, strongly monotone and strictly convex; continuous preference relation that can be represented by continuous function with ordinal utility formulation. The associated budget constraint function is non-empty value set, continuous and convex in income and market prices of commodities (Mas-Colell, Whinston and Green, 1995).

Given these assumptions, the household utility maximization problem can be set as,

$$\text{Max}_{(x\geq 0)} U(x) \quad (1)$$

s.t.

$$px \leq Y$$

where: x is a vector of Xi (i = 1, 2, ... n) market commodities

p is a corresponding price vector to Xi

Y is a single value income of the household.

The maximization conditions are derived using Lagrangean multiplier

$$La_{(\max x,\lambda)} = U(x) + \lambda(Y - px) \quad (2)$$

The consumer's equilibrium level of consumption (that is, consumer's preference set) is determined by solving the partial derivative $\partial L/\partial x$ ($x = X_1, \ldots, X_n$) for the common variables and deriving the commodity bundle at that level where,

$$\frac{MU_1}{MU_2} = \ldots = \frac{MUm}{MU_n} = \frac{P_1}{P_2} = \ldots = \frac{Pm}{P_n} = MRS_{2,1} = \ldots = MRS_{n,m} \quad (3)$$

Although this condition guarantees the evaluation of the consumer behaviour, it is loaded with some unrealistic assumptions such as market prices for individual commodities being the sole indicative determinant of such demand and purchases for consumption being consumed without any further processing of the commodities within the household.

2.2. Household production model (HPM)

A more realistic modelling of household behaviour considers a household as a producing unit that uses market commodities along with non-market household resources to produce consumable commodities. This would make the activities of the households and the firms overlapping but only differ in the level of intensity of the goal pursuit. In the household production model, the household is a little more complex in composition, goal, activities and results than the pure classical household. "The new economies of the family instead views the family as a multiple person production unit, maximizing a production function whose inputs are market goods and, this time, skill, and knowledge of different members of the family" (Blaug, 1992:220).

The new conception about the household as the producer as well as the consumer was adumbrated in the Becker's (1965) article which asserted that the household does not consume goods (X_i) as bought from the market but will combine X_i with time (T_i) to produce consumable commodities Z_i. This means that some level of production takes place within the family household which contains the husband, wife and children and other wards (and sometimes in the unmarried person household, one person or more). This conception also permits the admission of non-market activities of the household members (such as children, wards, housewife, husbands and family friends and relations) and non-market goods and other factor inputs into the analysis of household economic behaviour. Pollak (1978) and Glewwe (1991) have made this observation.

Basically, household production model is built on the fact that market goods and services cannot directly yield the required utility except when combined with some factor inputs within the household to produce consumable commodities that yield utility. Even when such services as haircut, and manicure in the beauty salon, or taking food in a restaurant are considered, one needs to spend time at the salon or restaurants. As Pollak (1978:285) observed, market goods are combined with time in the household to produce commodities; and "these commodities rather than the market goods, are the arguments of the household's preference ordering; the demand for goods and time is a 'derived demand', since goods are not desired for their own sake but only as inputs into the production of commodities". This only restated the assertions by Lancaster (1966) who summarized the essence of the new approach to utility analysis as that -- (a) good per se does not give utility to the consumer, but it possesses characteristics which give rise to utility, (b) a good possesses more than one characteristic, some of which are shared by more than one good, and (c) goods in combination may possess characteristics different from those pertaining to the goods separately.

The simplest form of household production activity can be formed using the Becker (1965) concept of market goods, X_i, combining with non-work time, T_n, to produce consumable, utility-yielding commodity Z. Such production activity is presented thus,

$$Z_i = f_i(X_i, T_n) \tag{4}$$

Lancaster (1966) made an addition to the model by introducing linear technological relationship among market goods X_i in the household production system[1] to derive Y_i, which was a mere assumption in Becker's model. The formulation of a linear model made easy the handling of Lancaster's model as a production function.

$$Y_i = \Sigma \alpha_i X_i$$

$$F_{(Z, Y)} = \Sigma b_i Y_i \; (i = 1, \ldots, m)$$

$$Z_i = \Sigma \alpha_i Y_i \tag{5}$$

In this case non-market time and other non-market factors seem to be given some market valuation (normalized price) and evaluated as market goods X_i. The utility function is, therefore.

$$U = f(Z_i) = f(X_m, X_n, T_i)$$

m = market goods ($1, \ldots, m$)
n = market goods ($1, \ldots, n$), including, time

T_i = leisure (time allocated to i different leisure activities) [1]

With the budget constraint,

$P_m X_m + P_n X_n = A + wL_m$

where w = wage rate; P_m = market prices;

P_n = normalized price [2];

A = Non-labour income; L¬m = market labour, a residual total time adjusted for non-market production activities and leisure.

The model is solved forming Lagrangean multiplier function and taking the first differentials and verifying with the performance of the second order differentials. The Lagrangean multiplier function is below:

$$La_{(\max x_i, \lambda)} f(Z_i) + \lambda(px - A - wL) \quad (7)$$

p, x are vectors of market and non-market prices and goods, respectively.

In a study by Pollak (1978), taste endogenization in the analysis of demand was considered. Objective evaluation of taste variation as an argument in choice has to be considered rather than assumed that it remains unchanged. There is need to think of some economic factors that would enter into the formation of taste. Household factor endowment represents relative cost of the factors to the household. Low income families are likely to be labour rich since there is a negative relationship between income on the one hand and number of children, fertility rate and level of education of the members of the family on the other (Blaug, 1992:222). Also as Browning (1992) observes the composition of the family also determines the structure and scale of demand. Pollak (1978:289) also argues that increase in prices does not necessarily entail an increase in cost of living index by the same ratio, in fact according to him, the cost-of-living index may even fall, depending on the change in household technology.

3. Factors intensity, preferences and choice under the HPM

THE proposition that this paper sets out to prove is that the levels of resource endowment and factor intensity in production of commodities are basic determinants of household choice. Before going further, it is good to set out some basic working assumptions.

(1) The household is regarded as a rational economic agent whose goal is to maximize gains [3] from the use of its resources in both the market and domestic activities. In the market activities, the household is both a supplier of inputs (namely labour, financial capital from its savings) and a buyer of market goods which are used as input for its domestic production of consumables. The household is thus involved in multiple goal optimisation problem of cost minimization (or gains maximization) on the use of its resources, the solution of which is determined by the relative price/real cost of both its market and non-market resources and its domestic level of technology.

(2) The household production model is different from business production whose goal is to put back the output on sale for optimal profit. The household production decision is meant to minimize household costs of consumption; and the outputs from household production are meant for consumption not sales. In fact, any household production activity whose final product gets back

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[1] Non-market goods are goods used by the households in their production of consumable commodities which get economic value but are not offered money prices e.g. household (housewife, husband and children) labour, domestic farm products, etc. These goods have their shadow prices, which can be evaluated, as market goods.

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[3] The household necessarily considers the costs and benefits in the use of its resources and decides in favour of the lines of resource use that maximize the difference between its costs and benefits.

to the market ceases to be a household activity and becomes business. Household does not maximize profit except in the nominal sense.

(3) Inactivity in the household production function is impossible. This is opposed to the business production function where output at shutdown, zero, is an element in the production set. That is, for household production function $\emptyset \notin U$. (U being evaluated in bundles market goods that have passed through domestic production in combination with non-market resources). The non-zero solution in household production has to do with impossibility of household existence without consumption.

(4) Households are differently endowed with resources; and production process for every commodity is different but consistent across households. That is, if the production of commodity X_i is intensive in capital in household A, it will consistently remain capital-intensive across other households.

Market commodities purchased by households can be compared to raw and intermediate products in the manufacturing sector's production process. The production of utility from any commodity depends on the availability, within the household, of factors required for processing the commodity. Thus, the constraint to utility maximization in a commodity space comprises both the market and non-market factors. The classical evaluation has considered the market factors and made some rationalizations (assumptions) about the non-market variables. Some of those assumptions concerning the preferences and choice by the consumer can be verified under HPM using factor intensity measurement in a household production process.

The first concern here centres on the proposition that household will choose (reveal its preference for) the commodities whose processing within the household production system requires intensive use of its abundant factors. Conversely, a household will restrain itself, for purely economic reasons, from the consumption of commodities whose production to a utility-yielding level is intensive in its '*scarce*' factors.

At this point, there is a need to be clearer with the conditions of a household relative level of factor endowment. Physical availability of the factors required in production is necessary for the household to be described as being abundant in such factor. But that alone could be misleading and grossly insufficient condition. Economic availability must be introduced wherein household resources are weighted with appropriate alternative market prices. A household has more abundantly the resources whose alternative market prices, w_m, are lower than their non-market prices, w_n, as evaluated by the household.

This involves a comparative valuation between the market value and household valuation of resources. Given this definition, a household may be physically rich in human labour, but lacks it when economic valuation is introduced – that is, when the available labour market opportunities are adjusted for. Paid employment opportunities available and high expected future wages and other residual gain (such as prestige) for schooling children may make physical labour abundant family to be in need of labour. Such family will not choose labour-intensive pattern of consumption. That means, the economic market valuation of household resources influences availability of such to the household. Lower valuation of the resources in the market than within the household makes such resources to be retained for household usage and therefore the household of them for its domestic usage.

Assuming that R_i ($i = 1, 2, \ldots, n$) are the household resources whose w_{im} and w_{in} are market and non-market prices of R_i, then, a household is more abundant in, say R_2 than R_1 if the available market opportunity for R_1 relative to its non-market household opportunity is greater than a comparative opportunity for R_2. This is, given

$$\frac{w_{1m}}{w_{1n}} R_1 > \frac{w_{2m}}{w_{1n}} R_2 \qquad (8)$$

then, the household has abundance of R_2 than R_1 for use in its production. In the inequality (8) above, a few assertions can be made. First, the market price of R_1 is greater than the market price of R_2, their non-market valuations are equal ($w_{1n} = w_{2n}$). Or second, $w_{1n} < w_{2n}$ while their market prices are equal.

Or third, the price ratios may be equal but the physical quantity index of R_1 is greater than R_2, making it reasonable to offer R_1 for market transaction while R_2 sales may not bring in as much.

Let $w_{im}/w_{in} = \rho_i$, than, $\rho_1 R_1 > \rho_2 R_2$ means that the household will offer R_1 to the market and will use R_2 domestically. This makes the household to be described as having abundant of R_2, when considering the household production and choice of factor for use within the model. It is more profitable to offer the household resources whose market value is higher and use domestically the ones whose market value is lower in household production process. Abundance of factors within the household relates to the factor whose utilization in the household production process rather than offer such for sale in the factor markets will increase the welfare of that household.

Another clarification necessary is regarding factor intensity in the HPM. Given a commodity choice spectrum X_i ($i = 1, 2, \ldots, n$) which sets X_i being close substitutable bundles, each of X_i (say, X_1) has a clearly different, unique production (processing) technique from all others (namely, X_2, X_3, …, X_n), but all having uniquely different processing techniques. The technique is defined in terms of the input ratios in the production process. The differentiation of technique axiom means that for an *n*-commodity choice set, there are n-technology choice spectrum. Let the number of resources that the household has and can use in the production of commodities to utility-yielding goods be aggregated to two (R_1, R_2) and the number of commodities restricted to three (X_1, X_2 X_3). Factor intensity in the production of the three commodities is defined by the ratio of the two inputs required for production of a unit of each commodity. That is α_{11}, α_{21} are the technically efficient amounts or resources R_1, R_2 required for production of X_1; α_{12}, α_{22} for X_2; and α_{13}, α_{23} for X_3, then, the factor intensity ratios for each line of household production are:

$$\frac{\alpha_{11}}{\alpha_{21}}, \frac{\alpha_{12}}{\alpha_{22}}, \frac{\alpha_{13}}{\alpha_{23}} \tag{9}$$

Given the assumption of technique uniqueness and differentiation then comparison can be introduced into the three ratios. For example,

$$\frac{\alpha_{13}}{\alpha_{23}} > \frac{\alpha_{11}}{\alpha_{21}} > \frac{\alpha_{12}}{\alpha_{22}} \tag{10}$$

With the household under consideration, production of X_3 uses R_1 more intensively than the others while X_2 is the least intensive in R_1, or X_2 is the most intensive in the use of R_2. Production of X_1 requires more of R_1 than does X_2; but production of X_1 uses R_2 less intensively than X_2. [4] Now the problem is how do we resolve the issue of choice of commodities by the household based on its resource endowment and technological requirements? This calls for bringing in the household's factor endowment index alongside technical ratios of factor intensity.

From inequalities (8) and (10) above, we can combine the normalized returns on factors with the physical requirement in production to get a normalized monetized valuation for the technological requirement for each line of production. That is, let

$$\rho_1\alpha_{11} = \gamma_{11};\ \rho_1\alpha_{12} = \gamma_{12};\ \rho_1\alpha_{13} = \gamma_{13}$$
$$\rho_2\alpha_{21} = \gamma_{21};\ \rho 2\alpha_{22} = \gamma_{22};\ \rho 2\alpha_{23} = \gamma_{23} \tag{11}$$

Then the factor intensity ratios can be represented in normalized monetized valuation that can allow us to relate the household factor endowment to the production process factor intensity and therefore ascertain the pattern of choice of commodities. That is relating (10) to (11) above, we then have:

$$\frac{\gamma_{13}}{\gamma_{23}} > \frac{\gamma_{11}}{\gamma_{21}} > \frac{\gamma_{12}}{\gamma_{22}} \tag{12}$$

[4] If commodities X_1, X_2, X_3 are close substitute in the sense that they are meant to satisfy the same want such that purchase of one rules out the need for others, the intervening factor intensity ratios (here α_{12}/α_{21}) will not be relevant for economic decision only the extreme values will be considered when all factors are brought into the computation of the ratios.

Since the numerators and the denominators in these ratios were multiplied by a given value ρ_1 and ρ_2 the outcomes do not change the inequality.

From the inequality (12) above the production of X_2 is most intensive in the use of R_3, which given the going market and household valuation is more available to the household for domestic usage. The household will thus choose X_2. For a household that is rich in R_2 the preference ranking will be:

$X_2 \phi X_1 \phi X_3$

where ϕ is the strong preference ranking relation.

The household that has R_1 more abundantly will have the preference and choice pattern of the form.

$X_3 \phi X_1 \phi X_2$

Here, the choice could be X_3, which uses R_1 more intensively in its production.

For preference ranking by the household, what is necessary and sufficient, therefore, are both the knowledge of the market prices of the commodities and household's resources and the household valuations (normalized prices) of the resources. Once a household's evaluation, given the market and non-market factors, reveals that a commodity can be processed at minimum cost the household will prefer that commodity to all others.

This ranking can be extended to an n-commodity, n-resource and n-household analysis.

Change in household production technology leading to alteration in factor intensity index and change in resource market prices and/or change in resource physical supply within household leading to a change in resource endowment index, will both lead to a change in household preference ranking and choice in favour of the commodities that use the currently abundant factor more intensively. Thus taste of the household will change along with change in factor endowment or factor intensity. It is needless to say that if factor intensity index changes towards R_1 while the endowment index changes by the same proportion in favour of R_2, then, there will be no effect on the household choice of commodities.

Given the definition of resource endowment for household as $\rho_1R_1, \rho_2R_2, \ldots, \rho_nR_n$, the change in resource endowment can come from a change in ρ_i or R_1. Hence, for a two factor aggregation:

$\rho_1' R_1 >,=,< \rho_2 R_2$

$\rho_1 R_1 >,=,< \rho_2' R_2$ ..... effect of change in relative factor prices

$\rho_1 R_1' >,=,< \rho_2 R_2$

$\rho_1 R_1 >,=,< \rho_2 R_2'$ ..... effect of change in physical resource supply

$\rho_1' R_1' >,=,< \rho_2' R_2'$ ..... effect of change in resource relative prices and physical endowment

Since γ_i is normalized monetized valuation (ρ_i) of physical resource (α_i) that goes into household production, then the change in pi will alter the factor intensity ratio, γ_i/γ_j and the direction of choice. This is the basic reason through which economic development and monetization of economic activities have led to a reduction in household production activities, shifting such production to the market. The household becomes better off if it can obtain more from the commodity market by offering its resources at the new market prices and using the proceeds to pay for production which could have taken place within the household. This explains why some households offer their resources to the factor markets and use the income to pay for some traditional household services like taking children to day-care and nursing homes, hiring gardeners and cooks or eating in restaurants. It is simply the change in household factor endowment and intensity indices which make the economic assertion that as "an economy develops, production shifts from households to markets" (Devereux and Locay, 1992), to hold.

It should be stated that all non-market factors that are considered in demand enter into household valuation numeraire. Therefore, the high sounding assumptions about choice and preference in the classical models can be contained in a more realistic modelling, based on data obtained by administering appropriate questionnaire or using other techniques to collect relevant information from the household.

In a situation where the commodity under consideration has utility flow that will last longer than one period, the household factor inputs and market goods required for the production into consumable state throughout its life-span will be considered by the household. The problem therefore becomes minimization of the costs of production of the goods throughout its life-span. That is, the household will have to consider what factor inputs will be required most for the derivation of consumable form from the good throughout the period of its expected flow of utility-services and whether the household has in abundance the factor required intensively. (A commodity may require high financial capital at purchase but be labour-intensive at usage, making the household which is rich in labour go for it while families that are capital abundant will not buy it.)

In the case of purchases of good produced by big-time companies with long-established history of quality dependability, the choice is also considerate of factor intensity. The household has to consider the costs of future repairs, the probable costs of complete defectiveness and the disutility from malfunction period, that may arise as a result of purchasing of newer and cheaper brand substitutes. These costs to the family household are evaluated by the resources intensity of the expected repairs and replacement besides the disutility of the waiting period during repairs/replacement. These expected repair/replacement factor intensity requirements are built into the own-factor-intensity of the commodity before the choice is made. If in the end, own factor intensity plus the expected maintenance factor intensity make the costs of the long-established brand relatively cheaper compared to the newer and pecuniary cheaper brands, the older and pecuniary dearer brand may still be chosen/preferred. This offers part of the explanation for high preference for older-brand-named goods to newer ones even when their relative monetary prices suggest otherwise.

4. Implications and conclusion

WHAT are the implications of this HPM choice process to choice formulation in consumer behaviour analysis? First, this analysis alludes to the fact that consumers revealed taste, preference and choice can be explained by the resource valuation and production technology of the household. Choice is explained by factor intensity of the production within the household. The formulation of consumer's demand problem should rather consider the normalized resources costs to the household alongside prices of commodities.

Again, given the verification of the pi within the household, economists can understand more the importance and economic rational for housewives', house-helps' and children's production activities in the HPM. Since many non-market production activities take place within households, most of which can be given appropriate monetary valuations, economic analysis should shed light on the understanding of such economic activities as child rearing, domestic chores, compound farming, cooking, and other family management activities. Besides, in developing economies such as in Africa, where level of non-market subsistence activities is so high, the analysis of household production activities can be used to supplement the official national income accounting so that the true valuation of aggregate economic activities might be known.

However, there are some activities within the household such as interpersonal leisure relationship and child rearing that attract increasingly higher normalized prices than the market valuations as the economy develops. This is the justification for housewife and children allowances paid by employers for the service of parent members of households.

Child-rearing is commonly known to be intensive in labour, which is more abundant in the rural sector than in the urban areas. Family sizes in the rural areas are larger, with more children, than those

in the urban areas. Even though demand for children depends on availability of labour for their initial rearing (at infancy), the quality transformation of children through education is intensive in financial capital. This additional determinant variable deters some families, especially those with educated parents, from raising large number of children. But this discouraging factor is less influential in rural families because of low level of education, leaving us still with the conclusion that rural families have larger number of children. This trend of choice of family size and demand for children has serious implication for rural surplus labour, low wage rates, unemployment and poverty problems, which seem to be defying stop-gap poverty alleviation policies.

Generally, relative factor endowment position as specified by the normalized prices for household resources above is the basis for which prices of factor input in the factor market must continually rise, especially in a developing economy, in order to bid resources away from the non-market household sector to the monetized market sector. That is the basis for an outward shift in the market sector production possibility frontier and development.

In conclusion, households do not just buy commodities from the market and consume and derive utility directly as supposed in classical analysis of consumer behaviour. A typical household is a producing unit where commodities are bought for its processing into utility-yielding consumable sets. What determines the choice of any commodity is not just its market price but also the technological requirements for its processing within the household production model. A household will only choose those commodities that use its abundant resources more intensively in the processing of such commodities to consumable, utility-yielding goods. Preference and taste are influenced by the household evaluation of its resource endowment and its technological capability...

References

[1] Beeker, G. 1965. A Theory of Allocation of Time. *Economic Journal*. 75. pp. 493-517

[2] Beeker, Gary S. 1991. *A Treatise on the Family*. Massachusetts: Harvard University Press.

[3] Blaug, M. 1992. *The Methodology of Economics – Or how do economists explain*. Cambridge University Press.

[4] Browning, M. 1992. Children and household economic behaviour. *Journal of Economic Literature*. Vol. XXX(3), 1434 – 1475.

[5] Barten, A. P. and V. Bohm. 1982. Consumer theory. In: *Handbook of Mathematical Economics*. Vol. II, K. J. Arrow and M. D. Intriligator, eds. North-Holland Publishing Company, Amsterdam, pp. 381 –429.

[6] Deaton, A. 1986. Demand analysis. In: *Handbook of Mathematical Economics*. Vol. 3. Z. Griliches and M. D. Intriligator, eds. North-Holland Publishing Company, Amsterdam, pp. 1767 - 1839.

[7] Devereux, J. and L. Locay, 1992. Specialization, household production, and the measurement of economic growth. *American Economic Review*. 82(2), 399 – 403.

[8] Glewwe, P. 1991. Investigating the determinants of household welfare in Cote d'Ivoire. *Journal of Development Economics*, 35, 307 – 337.

[9] Hartman, R. S., M. J. Doane and C-K, Woo. 1991. Consumer rationality and the status quo. *The Quarterly Economic Journal*, XCXVI (Feb), 141 – 162.

[10] Juster, F. T. and F. P. Stafford. 1991. The allocation of time: Empirical findings, behavioural models, and problems of measurement. *Journal of Economic Literature*. Vol: XXIX (June): 471 – 522.

[11] Lancaster, K. 1957. The Heekscher-Ohlin trade model: A geometric treatment. *Economica*. Vol. 24, 19 –39.

[12] Lacaster, K. J. 1966. A new approach to consumer theory. *Journal of Political Economy*. Vol. 74: 132 – 157.

[13] Landers, R. M., J. B. Rebitzer and L. J. Taylor, 1996. Rat race redux: Adverse selection in the determination of work hours in law firms. *American Economic Review*, 86(3): 329 – 348.

[14] Mas-Colell, A., M. D. Whinston and J. R. Green, 1995. *Microeconomic Theory*. Oxford: Oxford University Press.

[15] Nakamura, M., A. Nakamura and Dalla Cullen. 1979. Job opportunities, the offered wage, and labour supply of married women. *American Economic Review*. Vol. 69(5): 787 – 805.

[16] Pollak, R. A. 1978. Endogenous tastes in demand and welfare analysis. *American Economic Review*. Vol. 68(2): 374 – 379.

[17] Pollak, R. A. 1978. Welfare evaluation and cost-of-living index in the household production model. *American Economic Review*. 68(3), 285 - 299.

[18] Pollak, R. A. 1978. A transaction cost approach to families and households. *Journal of Economic Literature*. Vol. XXIII, 581 - 608.

[19] Schoemaker, P. J. 1982. Expected utility model: Its variants, purposes, evidence and limitations. *Journal of Economic Literature*, Vol. XX 529 – 563.

[20] Slovic, P., and S. Lichtenstein. 1983. Preference \reversals: A broader perspective. *American Economic Review*, Vol. 73(4): 596 – 605.

[21] Varian, H. R. 1992. *Microeconomic Analysis*. W. W. Norton & Company Inc., New York.