

MODELS OF CONSUMER'S CHOICE

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Introduction

In the modern market economy where the supply exceeds demand, the importance of the "consumer's behaviour in the market analysis" continuously increases. Consumer's preferences are viewed as exogenous variables in a neoclassical theory. They are not explained in a framework of the concept but are viewed as given ones. Methodological individualism, rational behaviour, equilibrium and perfect information of a consumer are next features of this concept. Simple precautions are a necessary condition for the model application.

Methodological individualism means that principles of individual subjects behaviour are the most important determining factors of model functioning. These subjects abide by the principle of total utility maximizing in given conditions. The concept of equilibrium is static. Perfect information precautions need not be necessarily fulfilled because contemporary concepts of consumer's behaviour function in the conditions of risk and uncertainty.

Institutional concepts of consumption are derived from T. Veblen's theory of leisure class consumption [8]. Preferences are influenced by the position of a consumer subject in the social hierarchy. Not only preferences, resources and individual behaviour but also social institutions are important factors of consumption in institutionalist concepts. Consumption is also viewed as social behaviour. Psychological aspects of consumer subjects behaviour are also important.

In this article, we use a mathematical model of consumer's behaviour optimization with a utility function that analyzes mutual relations between two kinds of goods and also allows the differentiation of consumer's price demand elasticity. This utility function is beneficial while investigating the consumers demand.

1. Materials and Methods

Models resulting from Pareto's equilibrium concept are a basic part of the neoclassical theory of consumer's behaviour. The article is concerned with their application and uses indifference curves, the budget line of consumers and other tools of the marginal analysis. These models are deterministic.

Some of contemporary theories of consumer's behaviour are models of expected utility, which means total utility functions in the conditions of risk and uncertainty based on O. Morgenstern. Von Neumann-Morgenstern models are probabilistic. Models based on the cumulative prospect theory of D. Kahneman and A. Tversky use important psychological knowledge as a new dimension of a consumer's behaviour analysis.

2. Results and Discussion

2.1 Basic Models of Consumer's Behaviour

Finding models

Finding models analyze subject's behaviour in the situation in which he/she has a basic idea about possible alternatives but he/she does not know exactly the results of given alternatives. Finding is viewed as the analysis of limited alternatives of choice. The goal of a finder is to find out what result he/she can expect, after the choice is made. In models with a full return, a consumer can choose each of reachable alternatives and decide about the optimal number of alternative's supervisions in given conditions.

Returns of next visit must be higher than costs of it. If returns are not higher than costs, finding will be stopped and choice will be realized according to the reached knowledge. From mathematical point of view the function of net returns is maximizing.

Expectations creation models

Models of expectation creation analyze consumer's behaviour if he/she does not know at least one of the important data influencing his/her decision-making process, but he/she can predict this missing parameter. This idea is the basis of the term expectation. These models can be classified according to the concept of unknown magnitude:

- pure expectations mean that this magnitude can reach one of two values 0 or 1,
- combined expectations mean that more levels could exist (for example 0, 0.5, 1),
- expectations according to the framework (the variables and data of which influence consumer's decision-making) – static, adaptive or rational expectations.

Sufficient models

Sufficient models are a specific kind of consumer's behaviour models, for instance H. Simon's model of limited rationality. Sufficient models analyze consumer's behaviour not only from the point of view of the following final situation (result) but also from the point of view of finding steps.

The main idea of these models is that the subject chooses alternatives, which are for him/her sufficient. These alternatives are better than a given level (for example a minimal total utility level) but worse than maximal utility in given conditions. This minimal acceptable level of utility expresses consumer's idea about his/her possibilities in a given situation and about his/her rational idea about the reachable result of choice.

A characteristic feature of these models is the precaution of imperfect information and limited rationality. A consumer does not have 100% knowledge about the situation but he makes his choice in a simple situation which he/she determines according to his/her abilities.

The main representative of this attitude is H. Simon. His concept can be characterized as a sufficient model without expectations and with adaptation. The subject makes his choice according to a sufficient level of an aspect and a sufficient activity. If he/she finds this alternative, he/she will take it. If he/she does not find it he/she will decrease in minimal level of utility. That means he will decrease the level of an aspect by one grade, which is more insufficiently fulfilled. If he/she finds this

alternative very quickly, he/she will increase the minimum level at least for one aspect, the results of which were most of the time sufficient. Various subjects will invest different levels of time and effort to this finding.

People do not act as rational subjects according to standard models of rational behaviour but they often make their choices with using a random spectrum of information and after reaching a minimal level of them. They do not find maximal satisfaction but a sufficient one. These attitudes are summarized in Hawking's work [4].

Consumption can also be viewed in wider circumstances, for instance environmental impacts of consumer's activity can be studied [2]. Carter and other authors analyze consumer's behaviour from the point of view of uncertainty [1].

Deterministic models (neocardinal or ordinal) of consumer's equilibrium with using marginalistic methods are not the only ones explaining consumer's behaviour but they are a very important part of the analysis.

2.2 Consumer's Optimal Choice – Deterministic Models

Now we will concentrate on deterministic models. A consumer with specific preferences decides about the consumption of quantity of two kinds of goods and he/she is limited by his/her income level and prices. His/her goal is to reach a maximal level of the total utility.

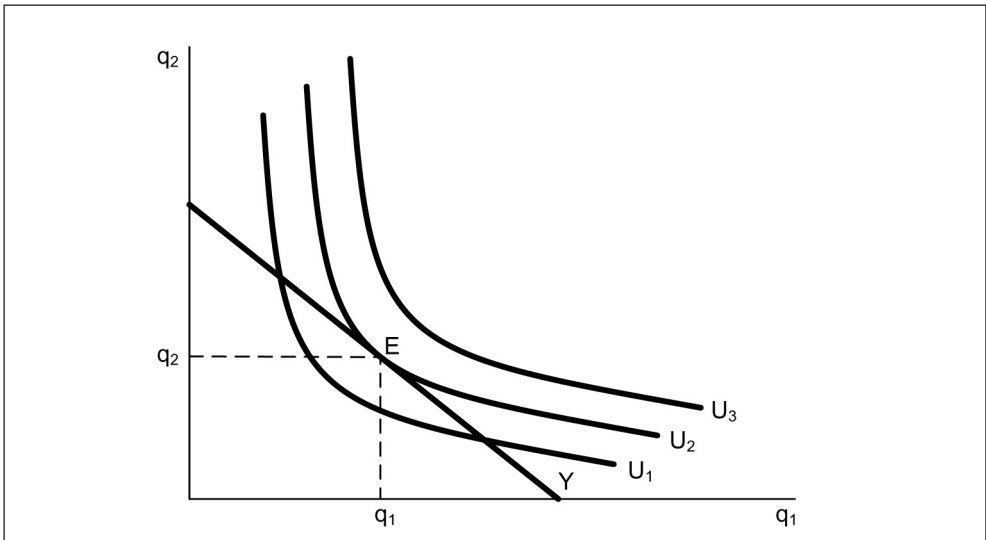
A basic model of an optimal combination in the simple choice of a consumer is known. We can use it as a basis for a mathematical model with wider possibilities of a consumer's choice analysis.

Indifference curves express consumer's preferences of two kinds of goods. The indifference curve which lies far from 0 expresses a higher level of utility. The consumer prefers combination on U_3 , not U_2 , combination on U_2 , not U_1 . His/her budget limit is given by the line Y. If he/she uses his/her income he/she will choose the combination on this line. Point E is optimal for him/her because he/she reaches the highest utility level which is achievable.

2.3 Choice of a Consumer with Complicated Preferences

In simple models, preference coefficients in utility functions are constant. But we can use

Fig. 1: Indifference Curves and an Optimal Point in the Model of Two Kinds of Goods



Source: [9]

one of the more complicated coefficients of these functions.

U is total utility; q_1, q_2 are quantities of consumed goods, P_1, P_2 are prices of goods respectively.

$$U = (a + eq_1)q_1 + bq_2 + q_1q_2, \quad (1)$$

$$a > 0, b > 0$$

$$U = aq_1 + eq_1^2 + bq_2 + q_1q_2 \quad (2)$$

U – total utility $U > 0$,

q_1 – quantity of the good 1 $q_1 > 0$,

q_2 – quantity of the good 2 $q_2 > 0$,

a, b, e are coefficients which express preferences of a consumer $a > 0, b > 0$,

e can be higher, lower or equal to zero $e > 0, e < 0, e = 0$.

If $e = 0$, preference coefficients are constant but if $e \neq 0$, we get the situation in which one preference coefficient depends on a used quantity of consumed goods.

Now we will use the comparison of marginal utilities and prices and the equation of budget limits.

MU_1 – marginal utility of the good 1,

MU_2 – marginal utility of the good 2,

P_1 – price of the good 1,

P_2 – price of the good 2,

Y – consumer's income.

Constant e can be higher, lower or equal to 0. If $e = 0$, marginal utilities depend only on the quantity of the opposite good ($MU_1 = a + q_2, MU_2 = b + q_1$) but if $e \neq 0$, we get the situation in which the first marginal utility also depends on a used quantity of the consumed good 1 ($MU_1 = a + 2eq_1 + q_2$).

Now we will use the comparison of marginal utilities and prices and the budget equation $Y = P_1 \cdot q_1 + P_2 \cdot q_2$.

$$MU_1 = a + 2eq_1 + q_2 \quad (3)$$

$$MU_2 = b + q_1 \quad (4)$$

A specific feature of this asymmetric total utility function is the fact that the marginal utility of the good 1 depends on the consumption level of the good 1 even of the good 2 and the marginal utility of the good 2 depends only on the consumption of the good 1 ($e \neq 0$). Constant

e can be higher, lower or equal to 0. If $e = 0$, marginal utilities depend only on the quantity of the opposite good ($MU_1 = a + q_2$, $MU_2 = b + q_1$).

Equation (6) expresses the budget line of a consumer. The following equations express the deriving of a demand function for the good 1 from two relations:

$$\frac{P_1}{P_2} = \frac{MU_1}{MU_2} \quad (5)$$

$$Y = P_1 \cdot q_1 + P_2 \cdot q_2 \quad (6)$$

$$q_2 = \frac{Y}{P_2} - \frac{P_1}{P_2} \cdot q_1 \quad (7)$$

$$\begin{aligned} \frac{a + 2eq_1 + q_2}{b + q_1} &= \frac{P_1}{P_2} = \frac{a + 2eq_1 + \frac{Y}{P_2} - \frac{P_1}{P_2} q_1}{b + q_1} = \\ &= \frac{a + \frac{Y}{P_2} + (2e - \frac{P_1}{P_2})q_1}{b + q_1} \quad (8) \end{aligned}$$

$$bP_1 + P_1q_1 = aP_2 + Y + 2eP_2q_1 - P_1q_1 \quad (9)$$

$$bP_1 + 2P_1q_1 = aP_2 + Y + 2eP_2q_1 \quad (10)$$

$$q_1 = \frac{Y + aP_2 - bP_1}{2(P_1 - eP_2)} \quad (11)$$

$$q_2 = \frac{(P_1 - 2eP_2)Y + (bP_1 - aP_2)P_1}{2(P_1 - e)P_2} \quad (12)$$

In the next part we will be interested in the price elasticity for the good 1 which we compute from the equation (11) according to the formula $E = dq_1/dP_1 \times P_1/q_1$. The following equation is for the price elasticity of the good 1 in the absolute value:

$$|E| = \frac{1 + \frac{b}{2q_1}}{1 - e \frac{P_2}{P_1}} \quad (13)$$

If consumer's preferences are simple ($e = 0$) a utility function can lead to a demand function with a low price elasticity ($b < 0$, $0 < |E| < 1$), to a demand function with a high price elasticity ($b > 0$, $|E| > 1$) or to a demand function with the price elasticity equal to 1 ($b = 0$, $|E| = 1$), possibilities are wider now.

Conclusions

The analysis of consumer's behaviour has more varieties. Deterministic models have the advantage of exact results and the using of a mathematical apparatus. Precautions must be determined and next determinants must be eliminated.

According to Woll and other authors (for example P. Samuelson, G. Stigler), a marginalist theory of consumer's behaviour is too abstract concept especially in its deterministic form. They come with the following arguments.

Scarcity is a relative term and has another importance for various consumers. Impacts of consumer's mutual relations, interdependence of preferences or specific kinds of consumption are eliminated in this concept. Stability of preferences is questionable. Supposed perfect information and rational expectations of consumer's subjects are both the advantage and the limitation of deterministic models. The difficult deriving of indifference curves and difficult testing of utility functions are also characteristic features of this concept.

These methodological aspects are changed. H. Simon has not the precaution of perfect information but of limited rationality. Expectation creation models and sufficient models are again important in the consumer's behaviour analysis. Problems of uncertainty in consumer's behaviour are analyzed by Carter [1]. Neoclassical and institutionalist attitudes have their importance in the analysis of consumer's behaviour.

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Abstract

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The article is concerned with the consumer's choice models and with the determining factors of his/her behaviour particularly according to the attitudes of a neoclassical theory and its modern modifications, which are compared with the concepts of other authors. It contains a short summary of important concepts of a consumer's choice analysis. The goal of the article is to give a basic survey of attitudes to the analysis of consumer's behaviour. However, it is especially concerned with the possibilities of the marginalist analytical apparatus use in a consumer's choice.

Consumer's preferences are viewed as exogenous variables in a neoclassical theory. They are not explained in a framework of the concept but are viewed as given ones. Methodological individualism, rational behaviour, equilibrium and perfect information of a consumer are next features of this concept. Simple precautions are a necessary condition for the model application.

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Key Words: *cardinalism, ordinalism, neoclassical theory, institutionalism, equilibrium, marginalist analysis.*

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