An Analysis of Personal Consumption Structure in Austria
Using a Theoretical Utility Function

By K.K. Val’tukh and A. V. Ryzhenkov, Novosibirsk

Summary: This paper develops a theoretical concept for mass consumer behaviour and tests it against data on private consumption in Austria for the period 1954–1974. It also tries to explain some attributes of major structural changes in the consumption pattern of the Austrian population.

The objective of the paper is to test statistically a theoretical law of mass consumer behaviour and concurrently to explain some attributes of major structural changes in the consumption pattern of the Austrian population. The study is largely based on statistics for 1954–1974. Aggregates of goods and services are considered, that can be approximately put in simple correspondence to particular needs. We designate these needs by \( j; \ j = (1, \ldots, n) \).

Consumers' behaviour is considered as a process determined by concrete historical conditions. The following concepts are used: full needs \( (v_j^\text{max}) \), historically formed necessary levels of their satisfaction, or normal needs \( (v_j^\text{min}, 0 < v_j^\text{min} < v_j^\text{max}) \), and perspective needs \( (v_j^\text{max} - v_j^\text{min}) \). Consumption vectors \( v \) such that \( v_j^\text{min} < v < v_j^\text{max} \) are considered. It is assumed that given incomes and prices, consumers seek to maximize the following utility function:

\[
D = e^D \left( \frac{\prod_j z_j^{k_j}}{\sum_{j} z_j^{k_j}} \right)^{1/(\sum_j k_j)}
\]

1) Valuable assistance in preparing the English text was rendered by D.I. Shtearmer. The computing programme used in calculations was prepared by A.V. Shcherbinskaia, L.G. Krivosharpova, E.V. Balitskaia and N.A. Mandrygina took part in calculations and in the technical preparation of the manuscript. The authors express their sincere gratitude to all these colleagues and to the two anonymous referees.

2) Prof. Dr. K.K. Val’tukh, Institute of Economics, Siberian Branch of the Academy of Sciences, Prospect Nauki, 17, Novosibirsk 90, U.d.S.S.R.

3) For details, see Val’tukh [1981].
Here, $D$ is the degree of satisfaction of the whole system of personal needs for goods and services (within the range of normal and full satisfaction of all needs); $z_j$ is the degree of satisfaction of perspective need $j$:

$$z_j = \frac{v_j - v_j^{\min}}{v_j^{\max} - v_j^{\min}},$$

$k_j$ is a coefficient eliminating the effect of aggregation in the calculation of $D$.

The function $D$ is an implicit one. It was derived from the following assumption about the marginal rate of substitution between the satiation degrees of needs:

$$\frac{dz_j}{dz_{j'}} = -\frac{k_j z_j (1 - z_j)}{k_j z_{j'} (1 - z_{j'})} \left( \sum_{j=1}^n \frac{\partial D}{\partial z_j} dz_j = 0 \right)$$

for any $j$ and $j'$. It is shown that $k_j = (p_j v_j^{\max})/(p_{j'} v_{j'}^{\max})$, where $p_j$ and $p_{j'}$ are corresponding prices. If $v_j^{\max}$ and $v_{j'}^{\max}$ are measured in money units, then $p_{j'} = p_j = 1$, $k_j = v_j^{\max} / v_{j'}^{\max}$.

Let consumers choose a consumption structure by solving (unconsciously, of course) the following problem (for convenience the time index $t$ is omitted):

$$D(z) \to \max,$$

$$\sum_{j=1}^n z_j (v_j^{\max} - v_j^{\min}) p_j = C - \sum_{j=1}^n r_j p_j v_j^{\min}, v_j^{\min} < v_j < v_j^{\max},$$

$$j = (1, \ldots, n).$$

Here $C$ is a sum total of consumption expenditures including not only expenses from current income and earlier accumulated savings but also evaluation of incomes in natural form from all sources (households, the state and other institutions). It is assumed for simplicity that

- transit stocks of non-durable commodities can be neglected;
- purchases and removal of curable and semi-durable goods occur at the beginning of every year $t$ practically instantaneously;
- the manner of purchases (by cash, by installments and so on) is not important.

We designate the aggregates which include non-durable goods and services by index $j = (1, \ldots, k)$, and the aggregates including durables and semi-durables by $j = (k + 1, \ldots, n)$. The consumption vector during a year $t$ is

$$v_j^t = v_j^{t-1} (1 - r_j^t) + x_j^t,$$

where $r_j^t$ is the rate of removal and $x_j^t$ is current purchases. For non-durables and serv-