The Structure of Consumer Preferences, Federal Republic of Germany, 1950—1973

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1. Introduction

In a recent paper, Christensen, Jorgenson and Lau (1975) have introduced systems of indirect and direct logarithmic demand functions to test restrictions on patterns of substitution implied by the theory of consumer behavior. They represent consumer preferences by translog utility functions that are quadratic in the logarithms of their arguments. These representations of consumer preferences do not require the assumptions of additivity and homotheticity implicit in the traditional approach to statistical demand analysis. In another paper, Jorgenson and Lau (1975 b) have introduced translog utility functions with time-varying preferences to test restrictions on the corresponding system of demand functions implied by integrability of these functions. They reject the hypothesis that the system of demand functions under consideration is integrable. By employing their methodology and by using German data for the same commodity groups, Conrad and Jorgenson (1978) accept the hypothesis of an integrable system of demand functions.

The objective of this paper is to analyze the structure of consumer preferences and changes in preferences over time by using the same set of data as in Conrad and Jorgenson (1978). Our research is based on the methodology introduced by Jorgenson and Lau (1975 a) for analyzing the structure of consumer preferences. In the following section we briefly summarize the basic relationships between direct and indirect utility functions and the direct demand system. In Section 3 we consider demand systems associated with restrictions on the structure of consumer preferences and changes in preferences over time. We begin with groupwise separability and
groupwise homotheticity of preferences. For each set of restrictions on preferences, we derive parametric restrictions on the corresponding system of demand functions. In Section 4 we present a summary of our alternative sets of tests and in Section 5 we present empirical results of the tests, based on time series data for FRG consumption expenditures of three commodity groups — durables, non-durables, and energy — for the period 1950—1973. Finally, we compare our structure of consumer preferences with the structure obtained by Jorgenson and Lau (1975a) for U.S. data.

2. Transcendental Logarithmic Utility Functions With Time-Varying Preferences

A quasi-concave direct utility function $U$ with time-varying preferences can be written in the form:

$$\ln U = F (X_1, X_2, X_3, t), \quad (2.1)$$

where $X_i$ ($i=1, 2, 3$) is the quantity consumed of the $i$th commodity and $t$ is time. The theory of consumer behaviour can be derived by maximizing utility, subject to the budget constraint:

$$\sum \frac{P_i}{M} X_i = 1, \quad (2.2)$$

where $P_i$ ($i=1, 2, 3$) is the price of the $i$th commodity and $M$ is the value of total expenditure.

Expressing the maximum level of utility, say $V$, as a function of ratios of prices to total expenditure $\frac{P_i}{M}$ ($i=1, 2, 3$) and time $t$, we can write the indirect utility function in the form:

$$\ln V = G \left( \frac{P_1}{M}, \frac{P_2}{M}, \frac{P_3}{M}, t \right), \quad (2.3)$$

where $V$ is quasi-convex. From the logarithmic form of Roy’s identity,

$$\frac{\partial \ln V}{\partial \ln \frac{P_j}{M}} = \frac{P_j X_j}{M} \sum \frac{\partial \ln V}{\partial \ln \frac{P_i}{M}} \quad (j=1, 2, 3), \quad (2.4)$$

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1. $P_i$ ($i=1, 2, 3$) are called money prices and $\frac{P_i}{M}$ ($i=1, 2, 3$) “real” prices.

2. For a discussion of duality of the direct utility function $U$ and the indirect utility function $V$, see Lau (1977) and the references given there.

3. See Roy (1943).