A Dynamic Disaggregated Model of Finnish Imports of Goods

By E. Aurikko, Helsinki

Abstract: The purpose of this paper is to test and estimate dynamic aggregated and disaggregated models of import demand with quarterly Finnish data. The main conclusions are that the log-linear functional form is preferable to the linear form and that there is empirical support in favor of estimation of import demand models in a disaggregated framework. On the whole, adjustment of Finnish imports of goods is relatively fast.

1. Introduction

With increased interest in econometric modelling of the Finnish economy, there have also been numerous econometric studies on Finnish imports of goods. Annual aggregated models are used in Vartia and Halttunen, quarterly disaggregated models in Aurikko [1975, 1984], and annual disaggregated models in Korkman and Mannermaa and Kaski. Important foreign studies include those of Goldstein and Khan [1976] and Goldstein et al.

The purpose of this paper is to test and estimate systematically dynamic models of Finnish imports of goods. Prior to this the choice of the functional form and the necessity of disaggregating the models are considered. The specification of the models is as in the quarterly model BOF3 constructed by the Research Department of the Bank of Finland, in which the dynamics is captured simply by Almon distributed lags [Aurikko, 1984]. While in the majority of the studies on import demand the log-linear functional form is adopted as the convenient form, it has not, in fact, been tested with the Finnish data. Testing the appropriate functional form as well as the desirability of the disaggregation is thus an important point of departure for the dynamic specification searches, which are based on an exhaustive testing procedure.

In the next section some theoretical considerations of import supply and demand are discussed. In section 3 the tests are performed and the methodology of the estimation of import demand models, together with the estimation results and simple simulations, are presented. In the final section some concluding comments are given.

1) Esko Aurikko, Bank of Finland, P.O. Box 160, SF-00101 Helsinki 10, Finland. 0377-7332/85/020103-120$2.50 © 1985 Physica-Verlag, Vienna.
2. Theoretical Background

Because Finnish imports account for only a small share of total world imports and have only a minor influence on world-market prices, it is assumed that import prices are exogenous. Furthermore, it is assumed that the supply of Finnish imports is very elastic at the prevailing world-market price so that ordinary least squares estimation of import demand is appropriate.

Conventionally, import demand is explained by log-linear models with some activity variable and relative prices of imports and domestic production as the main explanatory variables. This specification is based on the assumption that imported goods and domestic goods are imperfect substitutes. In the framework of a general trade theory, the desired import demand \( M_k \) for good \( k \) can be expressed in the form

\[
M_k = aD_k \left( \frac{PM_k}{PD_k} \right)^\delta
\]

Together with supply effects, the specification for the import demand for good \( k \) can be written in log-linear form as

\[
\log M_k = a' + \alpha \log D_k - \delta \log \left( \frac{PM_k}{PD_k} \right) + \beta \log CUT, \tag{1}
\]

where \( D_k \) is the expected total domestic demand for good \( k \), \( PM_k \) and \( PD_k \) are the expected import and domestic prices, respectively, and \( CUT \) is the capacity utilization rate. It is allowed in (1) that \( \alpha \neq 1 \). In addition, supply effects are approximated by the variable \( CUT \). It is assumed that the variable \( CUT \) is a proxy for nonprice rationing [Gregory, 1971].

Alternatively, the use of variable \( CUT \) in (1) might be interpreted as representing the effects of cyclical factors. With \( \alpha \), \( \delta \) and \( \beta \) assumed positive, this implies, in particular, that a rise in domestic capacity utilization increases the propensity to import.

Specification (1) is suitable for imports of final goods where the activity variable is the corresponding total domestic demand. In the case of raw materials, it is assumed that domestic demand for raw materials is proportional to the total demand. A rationalization of this assumption is discussed in Goldstein et al. Thus the model for imports of raw materials is of the form (1), where variable \( D_k \) is replaced by GDP. The extent to which the demand for raw materials is focused on imports depends on the ability of domestic production to compete in terms of price and delivery. The former is approximated by a price ratio variable and the latter by the capacity utilization rate variable. Thus it is assumed that, with increasing domestic capacity utilization, the activity elasticity of imports is larger in the short-run than in the long-run, implying that fluctuations of imports can exceed activity fluctuations in the short-run. Import demand for fuels and lubricants is specified in section 3 in the somewhat different framework of a simple energy model.

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2) See Armington [1969], Hickman and Lau [1973] and Aurikko [1975]. For a recent survey of both theoretical and empirical issues in foreign trade, see Goldstein and Khan [1985].

3) This effect is assumed in the disaggregated models of imports of raw materials and consumption goods.