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Modeling Static and Intertemporal Import Demands: The Indirect Production Function Approach

Mao Dongdong (M-B0-5631-1)

Supervisor: Prof. Wong, Ka Kei Gary

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Abstract

Abstract of thesis entitled "Modeling static and intertemporal import demands: The Indirect Production Function Approach", submitted by Mao Dongdong (M-B0-5631-1) for the degree of master of Social Science in Economics at the University of Macau in August 2012.

Recently, international trade becomes an important part of the world economy. Every country needs raw materials from other countries to produce intermediate and final goods that are needed. The objectives of dissertation are therefore two-fold. First, the static import demand system is presented and estimated by employing Deaton & Muelbauer's (1980) Almost Ideal Demand System (AIDS). The indirect production function is applied to generate this system. Because of the limitations of static analysis, the second objective is to incorporate intertemporal production behavior as summarized by the Euler equation. The input demand system and the Euler equation constitute a system of recursive equations with cross-equation parameter restrictions, which require the jointly estimation of the input demand system and the Euler equation. More importantly, these systems are estimated by a careful implementation of the orthogonality conditions using generalized method of moments. The input demand systems are illustrated with an application to Australian quarterly data.

Results indicate that the proposed methods are operational. The signs and size of the estimated Marshallian, Morishima elasticity of substitution, intertemporal elasticity of substitution and Frisch price elasticities are found to be sensible, and capital and imports are found to be substitution, which is inconsistent with the findings in earlier studies.

Keywords: Import Demands; The Almost Ideal Demand System; Intertemporal Two-Stage Budgeting; The Euler Equation

Declaration

I declare that this thesis represents my own work, except where due acknowledgement is made, and that is has not been previously included in a thesis, dissertation or report submitted to this University or to any other institution for a degree, diploma or other qualification.

Signed _____

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Notation

The following are the lists of principal notations used through this dissertation. The notation is also described on its first occurrence in subsequent chapters. Notation which is not be used comprehensively will be explained in the text.

Chapter 2

Notation	**Description**
$\mathbf{x} = (x_1, \dots, x_n)^T$	a vector of input quantities
$\mathbf{p} = (p_1, \dots, p_n)^T$	a vector of input prices
$c = \mathbf{p}^T\mathbf{x}$	the total cost of production
y	the output quantity
$Y(\mathbf{x})$	the direct production function
$\tilde{Y}(\mathbf{p}, c)$	the indirect production function
$C(\mathbf{p}, y)$	the cost function
$X_i^M(\mathbf{p}, c)$	the Marshallian input demand function
$\mathbf{s} = (p_1/c, \dots, p_2/c)^T$	the normalized input price vector
$X_i^H(\mathbf{p}, y)$	the Hicksian input demand function
$W_i^M(\mathbf{p}, c)$	the Marshallian input demand function in cost share form
λ_t	the marginal product of cost in period t
$M_{ij} = \frac{\partial \log X_i^M}{\partial \log p_j}$	the Marshallian price elasticity

$MES_{ij} = \frac{\partial \log\left(C_i(\mathbf{p}, y)/C_j(\mathbf{p}, y)\right)}{\partial \log(p_j/p_i)}$	the Morishima elasticity of substitution
$F_{ijt} = \frac{\partial \log X_{it}^M}{\partial \log p_{jt}}\Big\|_{\lambda_t}$	the Frisch price elasticity
$IES == \frac{\partial \log(c_t)}{\partial \log \lambda_t^{-1}}$	the intertemporal elasticity of substitution

Chapter 3

Notation	**Description**
$\mathbf{x} = (x_1, \ldots, x_n)^T$	a vector of input quantities
$\mathbf{p} = (p_1, \ldots, p_n)^T$	a vector of input prices
$c = \mathbf{p}^T\mathbf{x}$	the total cost of production
$\tilde{Y}(\mathbf{p}, c)$	the indirect production function
$C(\mathbf{p}, y)$	the cost function
$X_i^M(\mathbf{p}, c)$	the Marshallian input demand function
w_i	the cost share of input i
$W_i^M(\mathbf{p}, c)$	the Marshallian input demand function in cost share form
λ_t	the marginal product of cost in period t
$M_{ij} = \frac{\partial \log X_i^M}{\partial \log p_j}$	the Marshallian price elasticity
$MES_{ij} = \frac{\partial \log\left(C_i(\mathbf{p}, y)/C_j(\mathbf{p}, y)\right)}{\partial \log(p_j/p_i)}$	the Morishima elasticity of substitution
$F_{ijt} = \frac{\partial \log X_{it}^M}{\partial \log p_{jt}}\Big\|_{\lambda_t}$	the Frisch price elasticity
$IES == \frac{\partial \log(c_t)}{\partial \log \lambda_t^{-1}}$	the intertemporal elasticity of substitution
$\mathbf{w_t}$	a vector of input share in period t

$\mathbf{u_t}$	a vector of random disturbances
$\mathbf{v_t}$	a vector of normally distributed error term
$\mathbf{R}$	an $(N2-1)\times(N2-1)$ autocorrelation matrix