

STRUCTURAL EQUATIONS FOR PE MODELS IN GROUP 5 (MANY COUNTRIES)

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Abstract

This paper presents the structural equations for the fifth group of Euler method simulation models of changes in trade policy that are available for download on the USITC's PE Modeling Portal at https://www.usitc.gov/data/pe_modeling/index.htm.

The models described in this paper are the result of ongoing professional research of USITC staff and are solely meant to represent the professional research of individual authors. These papers are not meant to represent in any way the views of the U.S. International Trade Commission or any of its individual Commissioners. Please address correspondence to david.riker@usitc.gov.

1 Introduction

There are a pair of many country trade models that have been translated into a user-friendly spreadsheet format.

2 Tariff Model with Two National Markets

This model includes two source countries that are also destination markets, the domestic economy (d) and the foreign economy (f). Equations (1) through (6) describe this multi-region model.

$$P_d = ((p_d)^{1-\sigma} + b_{fd} (p_f \tau_{fd})^{1-\sigma})^{\frac{1}{1-\sigma}} \quad (1)$$

$$P_f = (b_{df} (p_d \tau_{df})^{1-\sigma} + (p_f)^{1-\sigma})^{\frac{1}{1-\sigma}} \quad (2)$$

$$q_d = k_d (P_d)^{\eta_d} \left(\frac{p_d}{P_d}\right)^{-\sigma} + k_f (P_f)^{\eta_f} \left(\frac{p_d \tau_{df}}{P_f}\right)^{-\sigma} b_{df} \quad (3)$$

$$q_f = k_d (P_d)^{\eta_d} \left(\frac{p_f \tau_{fd}}{P_d}\right)^{-\sigma} b_{fd} + k_f (P_f)^{\eta_f} \left(\frac{p_f}{P_f}\right)^{-\sigma} \quad (4)$$

$$q_d = a_d (p_d)^{\epsilon_d} \quad (5)$$

$$q_f = a_f (p_f)^{\epsilon_f} \quad (6)$$

This model simulates the effects of tariff changes of either country, on prices and volumes of

imports and domestic production in both of the markets (d and f).¹

3 Many Country Model of Country-Specific Supply Shocks

This model includes up to five source countries and as many destination markets. It is an endowment economy model with exogenous supplies in each country and the product is not differentiated by country source. c_j is the quantity of the product consumed in country j .

$$c_j = E_j p^\phi \tag{7}$$

E_j is aggregate expenditure in country j , p is the price of the product, and $\phi < 0$ is the price elasticity of demand in each country. y_j is the inelastic supply of the product in each country. Equation (8) is the global market clearing condition.

$$\sum_j c_j = \sum_j y_j \tag{8}$$

Equation (9) is the implies global equilibrium price.

$$p = \left(\frac{\sum_j E_j}{\sum_j y_j} \right)^{-\frac{1}{\phi}} \tag{9}$$

Finally, Equation (10) is the quantity of net imports of country j

$$nx_j = c_j - y_j \tag{10}$$

The model simulates the effects of country-specific supply shocks on global prices and country-specific trade flows and consumption levels.

¹There is also a tariff model with three national markets available on the portal as a Mathematica notebook.