

# How confident can we be of CGE-based assessments of Free Trade Agreements? ☆

Thomas Hertel <sup>a,\*</sup>, David Hummels <sup>a</sup>, Maros Ivanic <sup>b</sup>, Roman Keeney <sup>a</sup>

<sup>a</sup> *Purdue University, West Lafayette, IN 47907-1145, United States*

<sup>b</sup> *World Bank, United States*

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## Abstract

Computable General Equilibrium models, widely used for the analysis of Free Trade Agreements, are often criticized for having poor econometric foundations. This paper improves the linkage between econometric estimates of key parameters and their usage in CGE analysis in order to better evaluate the likely outcome of a Free Trade Area of the Americas (FTAA). Our econometric work focuses on estimation of a particular parameter, the elasticity of substitution among imports from different countries, which we show to be central to our evaluation of the normative impacts of the FTAA. We match the data in the econometric exercise to the policy experiment at hand, and employ both point estimates and the associated standard errors in our FTAA analysis which takes explicit account of the degree of uncertainty in the underlying parameters. In particular, we sample from the distribution of parameter values given by our econometric estimates in order to generate a distribution of model results, from which we can construct confidence intervals. We find that imports increase in all regions of the world as a result of the FTAA, and this outcome is robust to variation in the trade elasticities. Nine of the thirteen FTAA regions experience a welfare gain in which we are more than 95% confident. We conclude that there is great potential for combining econometric work with CGE-based policy analysis in order to produce a richer set of results that are likely to prove more satisfying to the sophisticated policy maker.

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\* Corresponding author.

*E-mail addresses:* [hertel@purdue.edu](mailto:hertel@purdue.edu) (T. Hertel), [hummelsd@purdue.edu](mailto:hummelsd@purdue.edu) (D. Hummels), [ivanic@gmail.com](mailto:ivanic@gmail.com) (M. Ivanic), [rkeeney@purdue.edu](mailto:rkeeney@purdue.edu) (R. Keeney).

“The econometric cat was set among the pigeons when a second government-commissioned modelling study on the FTA was finally released... The second reason for the contradictory results is differing assumptions about an arcane economic relationship known as Armington elasticity.” (*Australian Financial Review*, 2003)

## 1. Introduction

With the proliferation of Free Trade Agreements (FTAs) over the past decade, demand for quantitative analysis of their likely impacts has surged. The main quantitative tool for performing such analysis is Computable General Equilibrium (CGE) modeling. Yet these models have been widely criticized for performing poorly (Kehoe, 2002) and having weak econometric foundations (McKittrick and Ross, 1998; Jorgenson, 1984). FTA results have been shown to be particularly sensitive to assumptions on the price elasticity of export demand (henceforth, the trade elasticity). As will be demonstrated in Section 2, small trade elasticities generate large terms of trade effects by reducing the responsiveness of export demand. On the other hand, small trade elasticities reduce the likelihood of trade diversion, as import sourcing becomes less sensitive to relative prices. Of course, large trade elasticities lead to the opposite results. Critics are understandably wary of results being heavily influenced by the authors' choice of trade elasticities. Indeed, the sensitivity of welfare results to the choice of trade elasticities has even surfaced in the popular press as witnessed in the opening quotation to this paper.<sup>1</sup>

Where do these trade elasticities come from? CGE modelers typically draw the elasticities from econometric work that uses time series price variation to identify an elasticity of substitution between domestic goods and composite imports (Alaouze, 1977; Alaouze et al., 1977; Stern et al., 1976; Gallaway et al., 2003). This approach has three problems: the use of point estimates as “truth”, the downward bias in the magnitude of the point estimates created by problems in the estimation technique, and a mis-match between the data sample and source of variation in the econometric exercise and the policy experiment explored in the CGE exercise.

Consider the first problem. CGE modelers typically take point estimates drawn from the econometric literature, while ignoring the precision of these estimates. As we will make clear below, the confidence one has in various CGE conclusions depends critically on the size of the confidence interval around parameter estimates. Standard “robustness checks” such as systematically raising or lowering the substitution parameters fail to properly address this problem because they ignore information about which parameters are known with precision and which are highly uncertain.

A second problem with most existing studies derives from the use of import price series to identify home vs. foreign substitution. This approach tends to systematically understate the true elasticity because these estimates take price variation as exogenous when estimating the import demand functions, while ignoring quality variation. When quality is high, import demand and prices will be jointly high. This biases estimated elasticities toward zero. A related point is that the fixed-weight import price series used by most authors are theoretically inappropriate for estimating the elasticities of interest. CGE modelers generally examine a nested utility structure, with domestic production substituting for a CES composite import bundle. The appropriate price series is then the corresponding CES price index among foreign varieties. Constructing such an index requires knowledge of the elasticity of substitution among foreign varieties (see below). By

<sup>1</sup> In this article, two studies of the Australia-USA FTA are discussed, one which reports a gain, and one which reports a loss. Differing assumptions about the benefits of services liberalization was the first reason identified, while the second difference for the contradictory results was identified as the assumptions about the Armington elasticities.

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