# How often are propositions on the effects of regional trade agreements theoretical curiosa?

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## Abstract

This paper uses computational techniques to assess whether or not various propositions that have been advanced as plausible in the literature on regional trade agreements may actually hold. The idea is to make probabilistic statements as to whether propositions of interest might hold, rather than to restrict assumptions so they unambiguously hold. Our aim is to blend theory and numerical simulation and go beyond the ambiguous analytically derived propositions that dominate the theoretical literature so as to assess the likelihood of propositions holding for particular model specifications.
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## 1. Introduction

In this paper, we generate repeated model solutions for alternative numerical specifications of a simple (few countries and commodities) general equilibrium trade

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model so as to map out the extent of the parameter space for which each of a series of propositions regarding customs unions is true.[1] The idea is to blend theory and numerical simulation, in contrast to theoretical work in this area which sets out assumptions under which propositions unambiguously hold, and demonstrates their validity using analytical techniques. Here we take a different approach of trying to determine the frequency with which various results hold so as to obtain an indication of which statements are more likely to hold and which not.

We apply the techniques we develop to the analysis of various propositions in the customs union literature because despite nearly 50 years of research on regional trade agreements, which originates with Viner's (1950) work on Customs Unions, no set of generally accepted propositions regarding the effects of regional trade agreements has yet emerged to guide policy makers and public officials. Whether individual countries necessarily gain by entering a customs union (CU) is unproven, and the use of alternative reference points, such as free trade or non-cooperative Nash, only further clouds the picture. Whether world welfare is higher under a CU is also unknown, as is whether customs unions generate higher external tariffs compared to a non-cooperative Nash equilibrium in tariffs. Other propositions are widely thought to be true, but without explicit confirmation; such as that CUs generally improve the terms of trade of member countries; and that non-member countries prefer that no customs union be formed against them.

Specifically, we consider a three-country, three-good, pure exchange model with CES preferences, and use both random draws and a grid search over the space defining preference parameters and endowments. We compare both free trade and three-country non-cooperative (Nash) equilibria to partial cooperation regional agreement equilibria where two countries form a regional agreement and play non-cooperatively against the third country (CU). If we assume a uniform prior over the parameter space (admittedly a strong assumption) and then calculate the percentage of cases for which certain results hold, our sample frequencies can be interpreted as the probability of particular propositions holding conditional on both the model and the assumed prior.

Taken as a set, our results show that numerical simulation can be an important and useful adjunct to theory in economics. None of the propositions we consider holds unambiguously; some hold over 80% of the time, others considerably less frequently. We also investigate the reasons why particular propositions seem to hold more frequently than others using additional model analyses. Thus, where theory does not yield clear and unambiguous results, numerical simulation can be used to generate insights as to the likelihood of and reasons for particular propositions holding and, we believe, yield significant benefits in many other areas.

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[1] This differs from previous work on systematic sensitivity analysis for general equilibrium models due to Pagan and Shannon (1986) and Harrison et al. (1993) which focuses on the sensitivity of counterfactual equilibrium results to key parameters, such as elasticities, in calibrated models for which parameter estimates are scarce. Sample frequencies for propositions are our objective more so than sensitivity analysis of central case results. In the process we compute non-cooperative game theoretic solutions as well as cooperative solutions for draws from the entire parameter space and we also go beyond existing literature in this dimension.