



# Revisiting the effects of regional trade agreements on trade flows with proper specification of the gravity model

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## Abstract

This paper uses a gravity model to assess ex-post regional trade agreements. The model includes 130 countries and is estimated with panel data over the period 1962–1996. The introduction of the correct number of dummy variables allows for identification of Vinerian trade creation and trade diversion effects, while the estimation method takes into account the unobservable characteristics of each pairs of trade partner countries, the endogeneity of some of the explanatory variables as well as a potential selection bias. In contrast to previous estimates, results show that regional agreements have generated a significant increase in trade between members, often at the expense of the rest of the world.

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## 1. Introduction

After a long period of neglect from the late 1960s to the late 1980s, the gravity trade model has acquired a second youth. First, new theoretical foundations have

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been proposed both with the advent of trade theories based on increasing returns to scale, in imperfectly competitive markets and firm-level product differentiation (Helpman and Krugman, 1985; Bergstrand, 1985, 1989; Baier and Bergstrand, 2001; Evenett and Keller, 2002) and, within a perfect competition setting, with product differentiation at the national level (Deardorff, 1998; Anderson and Van Wincoop, 2003). Second, the gravity model has been used extensively to study trade patterns, as for example in the case of the drastic changes following the demise of central planning. Most recently, in the estimation of models of geography and trade, the gravity model is, once again, holding center stage (Hummels, 2001; Redding and Venables, 2004; Limao and Venables, 2001; Brun et al., 2002). In fact, the gravity model has also become a favored tool to assess the ex-post trade effects of a currency union (Glick and Rose, 2002; Rose and Van Wincoop, 2001), or the trade creating (TC) and trade diverting (TD) effects associated with regional trade agreements (RTAs) (Frankel, 1997; Soloaga and Winters, 2001). However, for reasons elaborated in this paper, previous estimates of TD and TC are likely to be unreliable.

Along with this renewal in interest, questions have been raised about the proper formulation of the model (choice of variables) as well as about proper econometric techniques, especially when the usual cross-country formulation is amended to include a temporal dimension. Indeed, the discussion about the proper econometric specification of the gravity model has shown that the conventional cross-section formulation without the inclusion of country specific effects is misspecified and so introduces a bias in the assessment of the effects of RTAs on bilateral trade (e.g., Matyas, 1997; Soloaga and Winters, 2001; Anderson and Van Wincoop, 2003). However, it turns out that this panel specification, with three specific effects (exporter, importer and time effects) is only a restricted version of a more general model which allows for country pair heterogeneity (e.g., Cheng and Wall, 1999; Egger and Pfaffermayr, 2003).

In contrast to the traditional cross-section gravity model which includes time invariant trade impediment measures (e.g. distance, common language dummies, border, historical and cultural links as in most studies, see Frankel (1997)), this general proposed specification is more adequate since it accounts for any time invariant (unobserved) bilateral effect. Hence, all factors that influence bilateral trade which were partially captured by regional dummies are now controlled for.

In this paper, I apply this more general panel specification on a recent gravity model specification derived by Baier and Bergstrand (2002) with the addition of: (i) a barrier-to-trade function similar to Limao and Venables (2001) instead of the traditional distance variable and common border dummy, and: (ii) three dummy variables for each RTA considered (intra-trade, imports and exports dummies) to allow for a correct identification of Vinerian trade effects. I show that the predictions of the effects of RTAs in terms of trade creation (TC) and trade diversion (TD) are very different whether one uses a cross-section or a panel specification that controls for the unobservable characteristics of each pair of countries (modeled as random effects). In this setting, one has to check for the potential correlation of some explanatory variables with the country-pair unobservable effects. I show that the use of the instrumental variable method proposed by Hausman and Taylor (1981) is

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