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The home-market effect and bilateral trade patterns: A reexamination of the evidence

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ABSTRACT

This paper finds that the evidence for the home market effect (HME) found by Hanson and Xiang (AER, 2004) is sensitive to the way the dependent and the independent variables are constructed. Second, we also find that the HME evidence goes away when we estimate their difference-in-difference gravity model on a truncated sample of positive trade flows. With Eaton–Tamura–Tobit, Heckman, and Helpman–Melitz–Rubinstein estimation of the gravity equation using Hanson and Xiang's data, we are unable to find any evidence for the HME. Finally, the HME evidence is also absent for a sample of Canadian provinces' exports to U.S. states. All of our results, taken together, do not reject the existence of the HME in general but rather suggest that the HME results found by Hanson and Xiang may not be robust.

1. Introduction

Hanson and Xiang (2004) develop a multi-sector, monopolistic competition model and use it to reveal a systematic relationship between the strength of the home-market effect and industry characteristics.[1,2] The multisectoral nature of their model, by suggesting "treatment" and "control" sectors, allows them to devise a difference-in-difference gravity approach to empirically test the home-market effect. The home-market prediction is that industries with high transport costs and low substitution elasticities (more highly differentiated products) will tend to be more concentrated in large countries than industries with low transport costs and high substitution elasticities. Hanson and Xiang treat the former industries as "treatment" industries and the latter as "control" industries. Using this innovative approach, they are able to address major econometric concerns about earlier tests of the home-market effect, including possible correlation between industry demand and supply shocks and a failure to control for "remoteness" of exporting and importing countries, both of which can lead to biased coefficient estimates. Because Hanson and Xiang's approach provides a novel and potentially quite useful methodological breakthrough, we examine the robustness of their findings to changes in data handling, changes in sample, and changes in estimation procedure. Overall, the

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[1] HME: the home-market effect; OLS: ordinary least squares; ET-Tobit: Eaton–Tamura Tobit.

[2] Note that the HME hypothesis is an important prediction of new trade theory and new economic geography. Empirical studies on the HME include for example Head and Ries (1998), Behrens et al. (2009) and Kamal, Lovely, and Ouyang (2012). It is important here not to view the HME hypothesis in international trade as analogous or similar to the equity home bias puzzle in international finance. The latter refers to the fact that individuals and institutions in most countries hold modest amounts of foreign equity in their portfolios. See, for instance, French and Poterba (1991), Jinlan (2009) and Fugazza, Giofre, and Nicodano (2011).

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weight of evidence from reasonable amendments to the Hanson–Xiang methodology and from a large number of robustness check runs against the presence of a significant home-market effect in trade flows.

Our observation is that in a difference-in-difference gravity specification in which there is a constant and/or a squared term for the independent variable of interest and both the dependent and independent variables are in ratios (differences in log values) for exporting country pairs, the method used to eliminate redundant observations affects both the sign and magnitude of the coefficient estimated for the independent variable of interest. Since each exporting country pair should only enter the sample once for a given destination country (and for a given treatment and control pair), some method for choosing one out of the two permutations associated with each pair of exporting countries must be used. Unfortunately, there exists no theoretical guidance about what the configuration of exporter pairs in the dependent variable or/and the independent variable must be. Our empirical analysis confirms that the configuration of exporter pairs powerfully affects the HME regression results. Specifically, when we apply Hanson and Xiang's difference-in-difference gravity specification using different configurations of exporter pairs we obtain completely conflicting results about the HME. In most specifications there is no evidence of the HME. When the HME is found in a few specifications it is reduced by more than 50%.

Second and importantly, we find that the data used by Hanson and Xiang are characterized by the pervasive presence of zero trade flows and that the strategy Hanson and Xiang use to incorporate information on zero trade flows into their analysis influences their empirical findings. Specifically, when the dependent variable is in double ratios (ratio of ratios), its value is powerfully affected by the value imputed to zero trade flows (even if the value to which each zero is set is small). Unfortunately, there is neither theoretical nor empirical justification for choosing a particular value to impute to zero trade flows, even though Hanson and Xiang follow many researchers in setting these values to unity. As expected, the influence of these imputed values on the inferences one may draw from estimation rises as the number of zero values in the trade data rises.

When we drop observations that contain zero trade values from the Hanson and Xiang sample we find no evidence of a home-market effect in the difference-in-difference gravity regression. Truncated OLS, Tobit-Style, Heckman and Helpman–Melitz–Rubinstein estimators of the gravity equation, which are methods better suited to samples with many zero values and are applied with intercept, without intercept and with intercept that varies depending on the way the explanatory variable of interest is configured, also do not yield support for the home-market effect.

We also look for the evidence of the HME using a sample of Canadian provinces' exports to U.S. states. This exercise is motivated by the fact that there exists established evidence of clustering of economic activity in Canadian largest provinces. Yet we also don't find any evidence of the HME under different econometric specifications.

Looking at different theoretical models that generate the HME hypothesis, we also provide some explanations for the absence of the HME. We show that in Hanson and Xiang's model the HME is determined not only by factors such as trade costs and the elasticity of substitution between varieties but also factors such as the tastes of exporting countries and the intensity of scale economies of industries. Failing to take into account those factors may explain why we have found no evidence of the HME or even the evidence of a reversed HME.

Finally, it is important to point out that, taken together, our results suggest that the HME evidence found by Hanson and Xiang may not be robust. However, our results must not be taken as evidence rejecting the HME hypothesis of the new trade theory or new economic geography models in general. Rather, the results of the econometric exercises in this paper must be seen as contributing to the discussion about the applicability of suitable econometric methods in future empirical studies of the HME effect.

2. Sensitivity of the difference-in-difference gravity specification to configuration of country pairs

The econometric specification Hanson and Xiang rely on to test the home-market effect is the following cross-section, difference-in-difference regression:

$$V_{jhk} = \ln\left(\frac{S_{mjk}/S_{mhk}}{S_{ojk}/S_{ohk}}\right) = \alpha + \beta f\left(Gdp_j/Gdp_h\right) + \varphi\left(X_j - X_h\right) + \theta \ln\left(d_{jk}/d_{hk}\right) + \varepsilon_{mojhk} \quad (1)$$

where Gdp_l ($l = j, h$) is exporter l's market size (as measured by its gross domestic product) and d_{lk} ($l = j, h$) is the distance between the exporting country l and the destination country k. $(\mathbf{X}_j - \mathbf{X}_h)$ is a vector of control variables that determine relative production costs for industries m, high-transport-cost and low-substitution elasticity industries, and industries o, low-transport-cost and high-substitution-elasticity industries, in exporter j relative to that in exporter h. This vector also includes level differences in standard gravity dummy variables such as common border and common language. The dependent variable V is composed of four export values with S_{dlk} ($d = m, o$ and $l = j, h$) denoting exports of country l to destination country k in industry d.

The function $f(Gdp_j/Gdp_h)$ captures the relative number of product varieties in the exporting country pair. Hanson and Xiang show that this ratio of product varieties can be approximated by a linear function of polynomials of two alternative relative market size measures: $\mathrm{Ln}(Gdp_j/Gdp_h)$ or $(Gdp_j/Gdp_h) - 1$. As Hanson and Xiang show theoretically, an estimated coefficient for β that is positive and statistically significant is evidence of HME, or whether larger countries export more of high transport cost, low substitution elasticity goods.