Comments on :

Lugovskyy, O. Skiba, A. (2014). Effect of Distance on Trade under Slope Heterogeneity and Cross-Correlated Effects. 21 pages, Version of July 10.

This is basically an attempt to :

(i) use a simplified version of Wei's (2006) model, duly and correctly referenced in the text;

(ii) estimating it by year (25 models for the period 1980-2004), for a subset of countries meeting a minimum level of trade and number of partners, using two logarithmic specifications of the Distance term. The basic model specification is provided in Equations 7 and 8;

(iii) test for a presumed endogeneity bias only on the Distance term, but not on the « remoteness » indices introduced by Wei (as enrichments of the classical Gravity model) despite the fact that these indices are just weighted distances.

Consider the points in turn.

(i) Wei did not constrain the dependent variable to be equal to

$$T_{ij} = \frac{Trade_{ij}}{GNP_i\ GNP_j}$$

The reason is that the actual powers of export and import generators are never equal in trade or transport models. There are many reasons for this including the fact that tradeflows are never balanced (there exist net money flows in the other direction, but these are not observed). This is true whether the trade is measured in money or in tons, as demonstrated with multiple data sets in the Gaudry (2004) paper which includes the well known McCallum model as a special case.

By constraining the dependent variable in this way, the authors introduce a constraint that would certainly be rejected by the data if it were tested. In addition, they generate biased « fixed effects » that they are interested in accounting for.

ii) The authors presume that all variables enter the equation in log form. This makes sense in gravity models, because it is very hard to do better that a log form with trade or transport flow data on the dependent and activity level variables, but it might well be false for the Distance term. It would have been better to have tested this variable with a Box-Cox transformation which avoids the « single distance elasticity of trade » (p. 8, 7 lines from bottom) by making it variable without resorting to artificial and dubiously connectable piecemeal-linear approximations.

The authors are finicky about fixed and common effects but fail to account for heteroskedasticity, unavoidable in trade models (as demonstrated also in the Gaudry paper), and for autocorrelation over time. This is a panel with 25 observations and there no doubt exists at least first order serial correlation, and probably second as well. One wonders if so-called « remoteness » variables should not have stable signs…. If one thinks that some sub-periods are different, one needs to demonstrate this against a reference (say common) model for all years.

Without taking heteroskedasticity and serial correlation into account, all t-statistics are biased. It is probable that spatial correlation is also present but difficult to take into account simultaneously with heteroskedasticity and serial correlation (although this could be done, but at significant cost). In addition, the distance elasticity would be quite affected by heteroskedasticity (as demonstrated in the same Gaudry paper).

iii) but there is a fundamental underlying problem about endogeneity tests on log distance, used as a proxy for transport costs.

How good is distance at representing true transport conditions? This matters if the simplistic log of distance form is used to compare impedance effects from samples pertaining to different moments of time (Buch *et al*., 2004): assumed proportionate changes in costs between the samples will be accounted for in the yearly constant (s) but not in the coefficient of the distance term. This problem (call it the "proportionate change in transport costs test") does not arise if a Box-Cox form is used to transform the distance term: changes over time in distance elasticities will then be proper surrogates of changes in price elasticities (the effect will not go into the constant). Clearly, gains from moving away from the fixed log form for distance go much beyond those of mere fit gently implied above —some "distance" effects can only be identified if the log-log form is *not* optimal! The authors' 25 models fail the proportionate change in transport cost test.

Conversely, the use of distance as a proxy for price in time series, say from 1970 until 1995 or 1999 (Ghosh and Yamarik, 2004; Fratianni and Kang, 2006) is incorrect in a gravity trade model of log-log form, even with period dummy variables: it simply reflects basic constant propensities to trade with more or less distant partners, independently from the desired critical role of changing transport conditions in explaining increased globalization flows.

Therefore distance has to be used *in addition to* transport costs if trade flow explanations are tested with time-series data, as some authors do (Giuliano *et al*., 2006). And, to the extent that more sophisticated measures of impedance than distance are in rough proportion to it, any proper comparison of the roles of distance and of its more sophisticated replacements, *even for the same period*, also requires that the form *not be* logarithmic.

Conclusion. We reject the use of distance as a proxy for transport costs if, in a cross-section, its form is logarithmic and, in time series, if it is used in any form without a cost variable as well.

In this context, it is not clear what any endogeneity distance tests means — to say nothing of the fact that all standard errors are biased and that fixed effects depend on an incorrect assumption on the units of the dependent variable.

References

Buch, C. M., Kleinert, J. and F. Toubal, The distance puzzle: on the interpretation of the distance coefficient in gravity equations, Economics Letters 83, 293-298, 2004.

Fratianni, M. and H. Kang, Heterogeneous distance–elasticities in trade gravity models, Economics Letters 90, 68-71, 2006.

Gaudry, M, "The Robust Gravity Form in Transport and Trade Models", Zeitschrift fűr Kanada-Studien 24, 1, Band 44, 144-161, 2004 (18 p). Also on Demand analysis page, AJD-27, www.e-ajd.net.

Ghosh, S. and S. Yamarik, Does trade creation measure up? A reexamination of the effects of regional trading arrangements, Economics Letters 82, 213-219, 2004.

Giuliano, P., Spilimbergo, A., and G. Tonon, "Genetic, Cultural and Geographical Distances", Discussion Paper No. 2229, Institute for the Study of Labor (IZA), Bonn, 37 p., July 2006.