Do Borders Really Slash Trade?

A Meta-Analysis

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MAER-Net Conference, 12 Sept 2015
Prague, Czech Republic

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The Border Effect

- McCallum (1995): Canadian provinces are likely to trade about twenty times less with US states than with other Canadian provinces.
- Estimated by gravity equations (usually in logs):

$$\text{Trade}_{ij} = G \cdot \text{Exporter}_i \cdot \text{Importer}_j \cdot \text{Distance}_{ij}^{-\alpha} \cdot \exp(\textit{home} \cdot \text{Same country}_{ij}) \cdot \text{Access}_{ij},$$

- We are interested in the coefficient *home*. Border effect $= \exp(\textit{home})$.

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What Explains the Border Puzzle?

Several methodological solutions have been suggested, but have not been entirely successful in explaining the puzzle away:

1. Inclusion of multilateral resistance terms
2. Consistent measurement of within- and between-country distance
3. Disaggregation
4. Treatment of zero trade flows
5. Actual shipping distance instead of the great-circle formula

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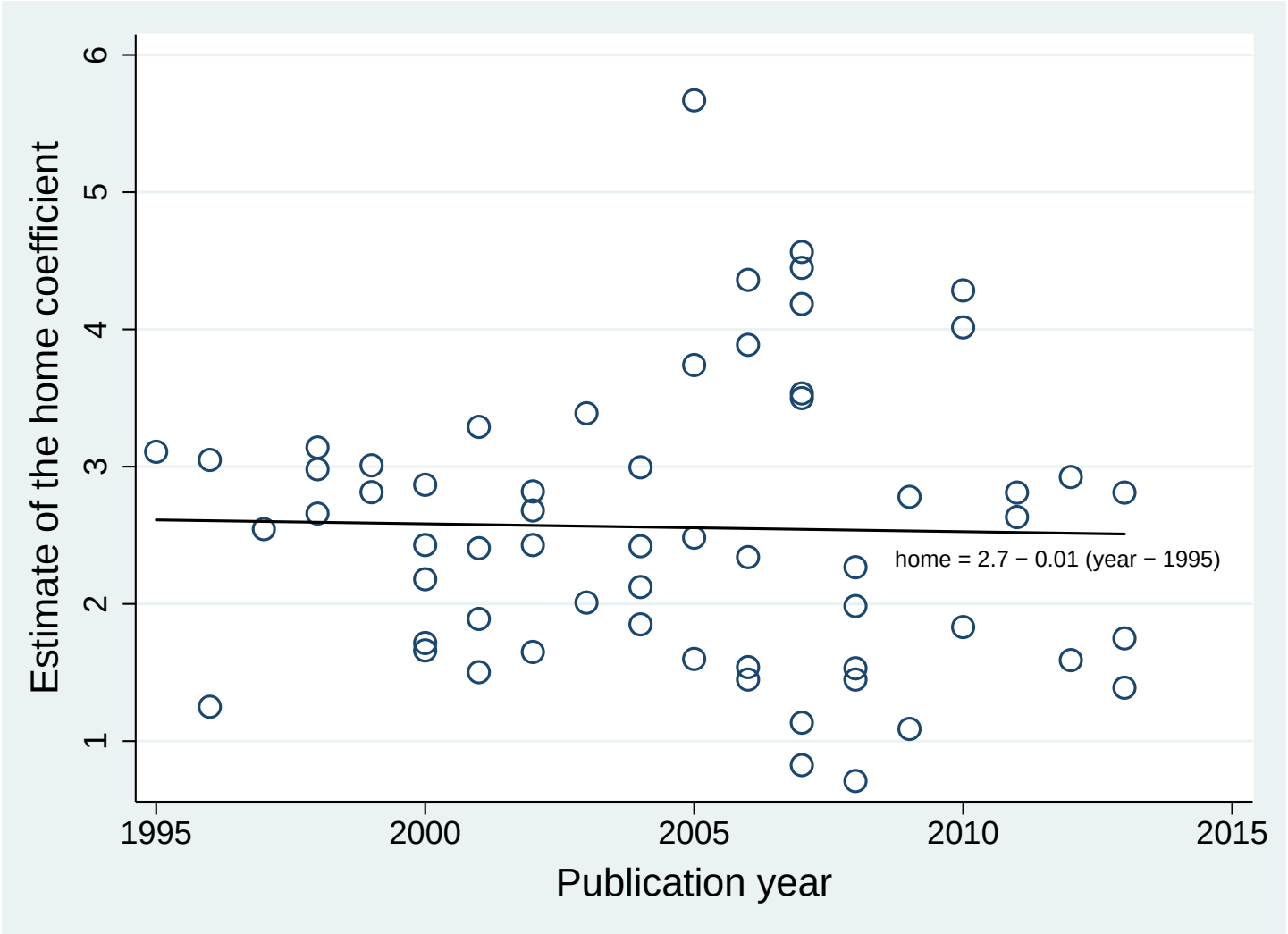
The Reported Border Effects Diverge, not Decrease



Data

- Start with RePEc search: `(border OR home bias) AND trade AND gravity` → 370 hits.
- Read the abstracts; download the potentially useful studies.
- Exclude papers on within-country border effects.
- Exclude papers that don't report standard errors.
- We're left with 61 papers, which provide 1,271 estimates.

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Border Effects Differ Across Countries

Mean estimated semi-elasticities for different regions:

		Unweighted			Weighted		
	Obs.	Mean	95% conf. int.		Mean	95% conf. int.	
Canada	213	2.86	2.66	3.06	2.81	2.58	3.05
US	64	0.72	0.03	1.40	1.36	0.99	1.73
EU	263	2.55	2.04	3.05	2.59	2.18	2.99
OECD	98	2.35	1.71	3.00	2.41	1.90	2.91
Emerging	82	5.05	4.59	5.51	4.14	3.18	5.10
All countries	1,271	3.03	2.54	3.53	2.59	2.23	2.95

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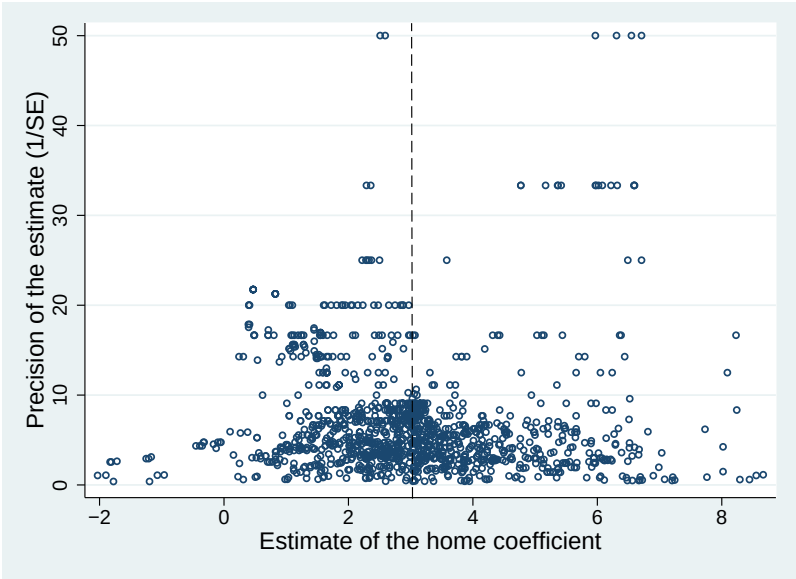
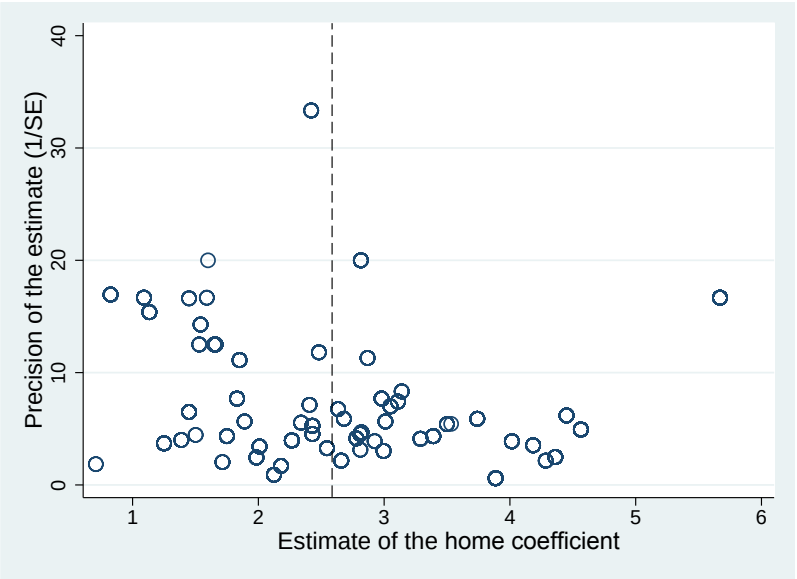
Funnel Plots Suggest Little Publication Bias

If there is no publication bias, estimates should be distributed symmetrically around the most precise ones.

(a) All estimates



(b) Median estimates in studies



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Funnel Asymmetry Test

In the absence of publication bias the funnel should be symmetrical:

$$\text{estimate}_i = \underbrace{\beta}_{\text{true effect}} + \underbrace{\beta_0 SE_i}_{\text{publication bias}} + \mu_i.$$

The equation is heteroscedastic. Weighted least squares yield

$$t_i = \beta_0 + \beta \left(\frac{1}{SE_i} \right) + \vartheta_i.$$

The no. of obs. can be used as an instrument for SE.

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Funnel Asymmetry Tests Show No Bias

Panel A: unweighted regressions	All estimates	Published	Fixed effects	Instrument
SE (publication bias)	0.604	0.599	0.383	-0.797
	(0.514)	(0.522)	(0.534)	(2.020)
Constant (effect beyond bias)	2.852***	2.932***	2.918***	3.270***
	(0.321)	(0.339)	(0.159)	(0.724)
Studies	61	48	61	61
Observations	1,271	1,144	1,271	1,271
Panel B: weighted regressions	Precision	Study	Impact	Citations
SE (publication bias)	0.246	1.489	3.062	5.073
	(1.964)	(1.170)	(2.024)	(4.272)
Constant (effect beyond bias)	2.959***	2.204***	1.634***	1.235**
	(0.723)	(0.395)	(0.424)	(0.501)
Studies	61	61	53	49
Observations	1,271	1,271	1,124	1,069

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What Explains the Differences in Conclusions? (1)

Data characteristics	
Mid-year of data	The midpoint of the sample.
Panel data	= 1 if panel data are used in the gravity equation.
Disaggregated	= 1 if trade is disaggregated at the sector or product level.
Obs. per year	The logarithm of the number of observations per year included in the gravity equation.
No. of years	The logarithm of the number of years in the data.
Design of the analysis	
No internal trade	=1 if within-country trade flows are not observed but estimated using production data.
Inconsistent dist.	=1 if within-country distance is measured differently from between-country distance.
Actual distance	=1 if actual distance traveled by road or sea is used instead of the great-circle formula.
Total trade	=1 if imports and exports are summed before taking logs.
Asymmetry	=1 if it captures cross-border flows in one direction.
Instruments	=1 if instruments for GDP are used.

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What Explains the Differences in Conclusions? (2)

Treatment of multilateral resistance	
Remoteness	=1 if remoteness terms are included.
Country fixed eff.	=1 if destination and origin fixed effects are included.
Ratio estimation	=1 if trade flows are normalized by trade with self.
Anderson est.	=1 if the non-linear estimation method developed by Anderson and van Wincoop (2003) is used.
No control for MR	=1 if the gravity equation does not account for multilateral resistance terms.
Treatment of zero trade flows	
Zero plus one	=1 if one is added to observations of zero trade flows.
Tobit	=1 if the gravity equation is estimated by the Tobit model.
PPML	=1 if the gravity equation is estimated by the Poisson pseudo-maximum likelihood estimator.
Zeros omitted	=1 if observations of zero trade flows are deleted.

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What Explains the Differences in Conclusions? (3)

Control variables	
Adjacency control	= 1 if the gravity equation controls for adjacency.
Language control	= 1 if the gravity equation controls for shared language (when needed).
FTA control	= 1 if the gravity equation controls for free trade agreements (when needed).
Publication characteristics	
Published	= 1 if the study is published in a peer-reviewed journal.
Impact	The recursive discounted RePEc impact factor of the outlet (collected in January 2014).
Citations	The logarithm of the mean number of Google Scholar citations received per year since the study appeared in Google Scholar (collected in January 2014).
Publication year	The year when the study first appeared in Google Scholar (base: 1995).

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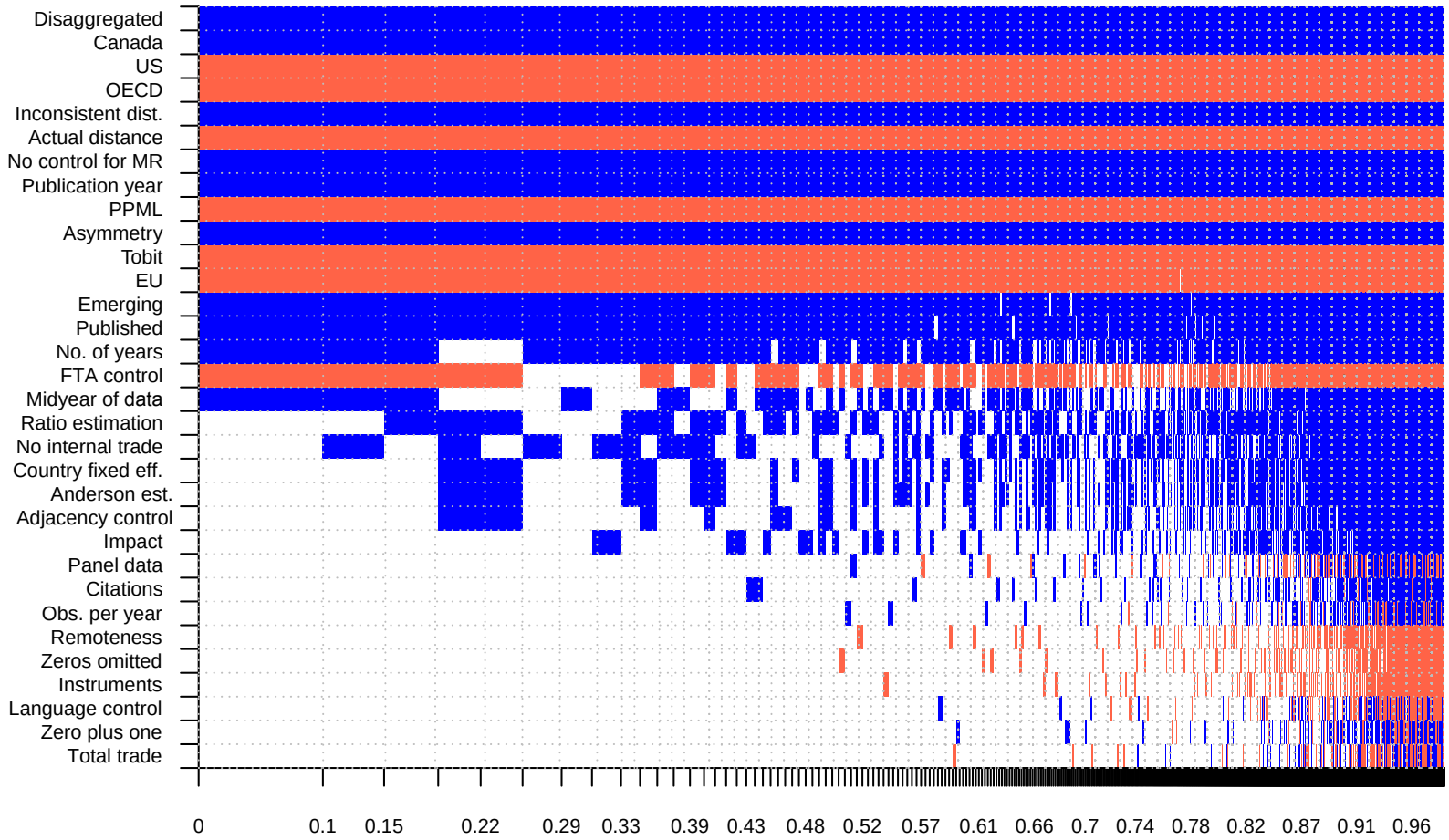
Model Inclusion in Bayesian Model Averaging



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Advances in Methodology Shrink the Border Effect

Best-practice estimate

I compute a mean estimate conditional on a huge data set, best possible publication characteristics, and lack of major mistakes in measurement.

	Weighted				Unweighted			
Best pract.	Est.	95% conf. int.		Diff.	Est.	95% conf. int.		Diff.
Canada	2.19	1.26	3.12	-0.63	2.60	1.19	4.01	-0.25
US	0.67	-0.27	1.62	-0.69	0.56	-0.50	1.63	-0.15
EU	1.46	0.44	2.49	-1.12	0.83	-0.51	2.17	-1.72
OECD	0.54	-0.59	1.67	-1.86	0.63	-0.79	2.05	-1.72
Emerging	3.16	1.73	4.59	-0.98	3.21	1.97	4.44	-1.85
All countries	1.76	0.84	2.67	-0.84	1.82	0.53	3.11	-1.21

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A Sketchy General-Equilibrium Estimate

- Anderson and van Wincoop (2003, "Gravity with Gravitas"): the general equilibrium trade impact of borders is smaller than what the *home* coefficient suggests.
- We should take into account price index, wage, and GDP changes in response to changes in trade costs.
- Approximation using exact hat algebra and data on bilateral trade between and within 84 countries.
- Result: for an average country borders reduce international trade by only 1/3.

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Results

Main Findings

1. Recent innovations in methodology shrink the border effect to a 33% reduction in international trade.
2. Especially important is the level of aggregation, measurement of distance, control for multilateral resistance, and treatment of zero trade.
3. The border effect varies across regions: it is large in emerging countries, but negligible in OECD countries.

Project Website

www.meta-analysis.cz/border

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For Further Reading


Stanley, T. D. & C. Doucouliagos (2012): Meta-Regression Analysis in Economics and Business.
Routledge, 1st. edition.


Chetty, R., A. Guren, D. Manoli, & A. Weber (2013): Does Indivisible Labor Explain the Difference between Micro and Macro Elasticities? A Meta-Analysis.
NBER Macroeconomics Annual 2013: pp. 1–56.


Havranek, T. (2015): Measuring Intertemporal Substitution: The Importance of Method Choices and Publication Bias.
Journal of the European Economic Association, in press.

Reading list on RePEc: Google “meta-analysis in economics.”

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