14.581: International Trade
— Lecture 4 —
Comparative Advantage and Gains from Trade (Empirics)

Plan of Today's Lecture

1. Does the law of comparative advantage hold in the data?

2. A primer on the size of the gains from trade

Law of Comparative Advantage
Dixit and Norman (1980) and Deardorff (1980)

- Recall from Lecture 1:

- **Proposition 4** *In a neoclassical trade model, if there is a representative household in country n, then* corr $(p - p_n^a, t_n) \geq 0$

- Where p is the price in a trading equilibrium, p_n^a is the price (for country n) in an autarkic equilibrium, and t_n is the net export vector (for country n) in a trading equilibrium

Testing the Law of Comparative Advantage

- Comments from empirical perspective:
  - Periods of genuine autarky are very rare.
  - It is impossible to observe p^a and t at the same time (latent variable problem)
  - This is a very low-powered prediction. (E.g., compare with coin toss model.)
  - But remarkably, p^a (if you observe it) is a sufficient statistic (albeit a high-dimensional one) for all of the supply and demand features of the economy.

- Alternative: Put a large amount of structure on the problem: model determinants of autarky prices and substitute this model in. This is hard to do, but can in principal avoids above problems. Downside is that tests become joint test of CA and structure. (But still, a lot of what we will see this semester can be thought of as attempts to do this.)

Bernhofen and Brown (JPE, 2004)

- Bernhofen and Brown (JPE, 2004) exploit the (nearly) closed economy of Japan in 1858, and its subsequent opening up to trade in 1859, as a natural experiment to test for Law of CA.
  - Rare example of an (almost) closed economy, so p^a is (almost) what is observed.

- Further attractive features of this setting:
  - Relatively simple production technologies in this time period
  - Subsequent opening up was plausibly exogenous to economic change in Japan (non-autarky was forced upon Japan by USA).
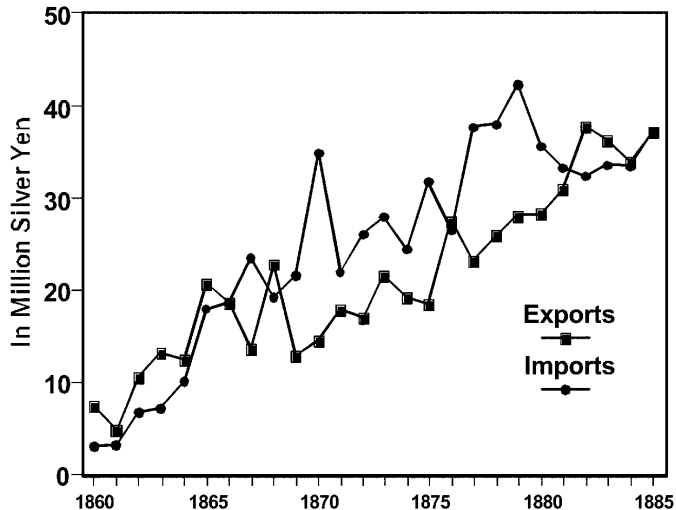
Japan Opening Up

Fig. 3.—The development of Japan's external trade, 1860–85. Source: Sugiyama (1988, table 3-4).

Empirical Methodology

- Suppose 1858 is autarky and 1859 is not.

- BB (2004) effectively observe p_{1858} and t_{1859}.
    - Though in practice BB use years prior to 1858 for p_{1858} and years post-1859 for t_{1859}, to allow for adjustment.

- BB compute $(p_{1859} - p_{1858}).t_{1859}$ and simply check whether it's positive.

- What should we be worried about if this is meant to be a test of the Law of Comparative Advantage? (That is, what assumptions must be true for the test to be valid?)

Assumptions Required by BB (2004) Approach
See discussion in Section III of paper

1. Perfect competition under autarky

2. Japan is price taker on international markets

3. To overcome latent variable problem: Observed autarky prices under autarky (i.e. p_{1858}) are same as what post-1858 Japan's autarky prices would have been if it were in autarky. That is, the theory really calls for us to compute $(p_{1859} - p_{1859}^a).t_{1859}$, where p_{1859}^a is the *counterfactual* price of Japan's 1859 economy if it *were* in autarky. The assumption here is that $p_{1859}^a = p_{1858}$.

   - (Put another way: Assuming that Japan's underlying technology and tastes haven't changed around 1858.)
   - BB (2004) point out that if the unobserved 1859 autarky price (p_{1859}^a) is equal to p_{1858} plus an error term (ε) then the only real worry is that $t^{1859}.\varepsilon < 0$.

Results: Graphical

NB: y-axis is $p - p^a$, not p^a (but recall that $p.t = 0$ by balanced trade).
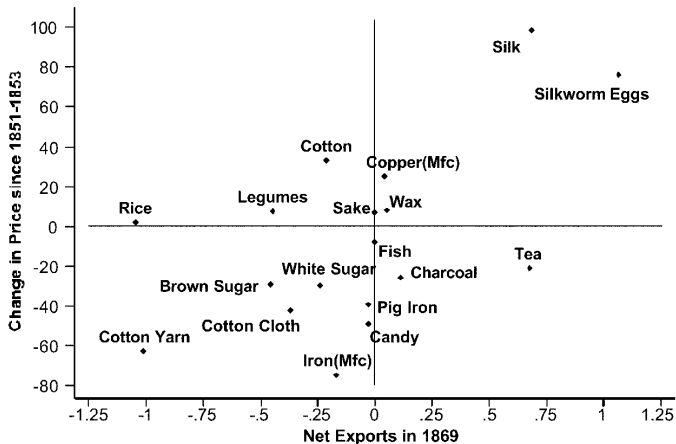

FIG. 4.—Net exports and price changes for 1869. Source: Japan Bureau of Revenue (1893) for trade data and Kinyu Kenkyukai (1937), Miyamoto (1963), Ono (1979), Yamazaki (1983), and Mitsui Bunko (1989) for price data.

TABLE 2
Approximate Inner Product in Various Test Years (Millions of Ryō)

Components	Year of Net Export Vector							
	1868	1869	1870	1871	1872	1873	1874	1875
1. Imports with observed autarky prices	−2.24	−4.12	−8.44	−7.00	−5.75	−5.88	−7.15	−7.98
2. Imports of woolen goods	−.98	−.82	−1.29	−1.56	−2.16	−2.50	−1.56	−2.33
3. Imports with approximated autarky prices (Shinbo index)	−1.10	−.95	−.70	−.85	−1.51	−2.08	−1.60	−2.65
4. Exports with observed autarky prices	4.07	3.40	4.04	5.16	4.99	4.08	5.08	4.80
5. Exports with approximated autarky prices (Shinbo index)	.09	.03	.07	.07	.15	.07	.11	.10
Total inner product (sum of rows 1–5)	**−.18**	**−2.47**	**−6.31**	**−4.17**	**−4.28**	**−6.31**	**−5.11**	**−8.06**

Source.—For sources of price data, see Sec. IVB and n. 17. For rows 3 and 5, current silver yen values are converted to values of 1851–53 by deflating them with the price indices for exports and imports found in Shinbo (1978, table 5–10).

Note.—All values are expressed in terms of millions of ryō. The ryō equaled about $1.00 in 1873 and was equivalent to the yen when it was introduced in 1871. The estimates are of the approximation of the inner product ($\tilde{\mathbf{p}}_i^*\mathbf{T}$) valued at autarky prices prevailing in 1851–53. An explanation of the assumptions underlying the approximation is contained in the text.

Comments

- Theory says nothing about which goods are 'up' and which are 'down' in Figure 3, only that the scatter plot should be upward-sloping.

- Low power test (?). Harrigan (2003 *Handbook* chapter on Empirical Trade): "I think I can speak for many economists who have taught this theory with great fervor when I say 'thank goodness'."

- Why is $(p - p^a).t$ growing in magnitude over time?

1. Does the law of comparative advantage hold in the data?

2. **A primer on the size of the gains from trade**

How Large Are the Gains from Trade (GT)?

- Many approaches to this question.

- Today we will discuss some recent answers employing a 'reduced-form' (and quite aggregate — as seems appropriate for the aggregate nature of the question at hand) approach:
  - Bernhofen and Brown (AER, 2005)
  - Frankel and Romer (AER, 1999)
  - Feyrer (2009a, 2009b)

- Many other approaches in the literature will come up throughout the course and next semester too (estimating GT is of fundamental interest throughout). See Donaldson (ARE, 2015) for review.

Bernhofen and Brown (2005)

- Measure gains (to a representative Japan consumer) of Japan's opening up in 1858.

- Consider Slutsky compensation to consumers in (autarkic) 1858:

$$\Delta W = e(p_{1858}^a, c_{1858}^t) - e(p_{1858}^a, c_{1858}^a)$$

- Here, c_{1858}^t is the counterfactual consumption of Japan in 1858 if it *were* open to trade (the 't' superscript is for 'trade').
  - Of course, by WARP, c_{1858}^t was not affordable in 1858 or else it would have been chosen.
  - ΔW measures the amount of income that would have made counterfactual c_{1858}^t affordable.

Towards an Observable Expression

- Rearrange this to get something observable (let y be output):

$$
\begin{aligned}
\Delta W &= e(p^a_{1858}, c^t_{1858}) - e(p^a_{1858}, c^a_{1858}) \\
&= p^a_{1858} . c^t_{1858} - p^a_{1858} . c^a_{1858} \\
&= p^a_{1858} . (c^t_{1858} - y^t_{1858}) + p^a_{1858} . (y^t_{1858} - y^a_{1858}) \\
&= -p^a_{1858} . t^t_{1858} - p^a_{1858} . (y^a_{1858} - y^t_{1858}) \\
&\leq -p^a_{1858} . t^t_{1858}
\end{aligned}
$$

- Here, the last line follows from profit maximization.
- Note that t^t_{1858} is counterfactual too (1858 was autarky!) BB (2005) make similar assumption to that in BB (2004), namely that $t^t_{1858} = t^t_{1859}$, where t^t_{1859} is observed (by 1859 Japan is in the 't' regime).
- Then the DDN CA statistic puts an upper-bound on GT. Not super surprising: $p^a_{1858} . t^t_{1858} \leq 0$ because of GT in Proposition 4...

Results
NB: These gains in terms of "gold ryō" translate into 5.4-9.1 % of GDP

TABLE 2—CALCULATIONS OF THE PER CAPITA GAINS FROM TRADE
(In gold ryō)

Group of goods	$p^a_{1850s}T_i$ (i = 1868 ... 1875)								$p^a_{1850s}\tilde{T}_{1850s}$
	1868	1869	1870	1871	1872	1873	1874	1875	
(1) Goods with observed autarky prices	−0.05	0.03	0.16	0.08	−0.01	0.02	0.03	0.05	0.037
(2) Goods with estimated autarky prices	0.02	0.02	0.02	0.02	0.04	0.07	0.05	0.08	0.035
(3) Woolens and muskets	0.08	0.08	0.12	0.15	0.22	0.26	0.17	0.19	0.141
Gains per capita in ryō	0.05	0.13	0.30	0.25	0.24	0.34	0.26	0.32	0.219

Sources: Nakai (1989), Miyamoto (1963), Ono (1979), Kinyu Kenkyukai (1937), Yamazaki (1983), and Great Britain, *Consular Reports,* for the ports of Nagasaki and Kanagawa in 1859 and in 1860; von Scherzer (1872, p. 262) and Lühdorf (1857, pp. 141, 248–249) for price data. See the text for the estimate of the autarky valuation of imports of woolens and imports of muskets, and of goods without observed autarky prices. Crawcour and Yamamura (1970, Table A1) provide the exchange rate used to convert the inner product from momme into ryō.

Notes: The inner product is decomposed into three groups of commodities: the goods for which autarky prices are available from the existing historical sources; woolens; and goods with estimated autarky prices. $p^a_{1850s}\tilde{T}_{1850s}$ is the average of the annual estimates from 1868 through 1875 with the additional assumption that GDP per capita grew by an annual rate 0.4 percent from 1851–1853 to the test period.

Interpretation I

- "Small" (upper-bound) effects in BB (2005) surprising to some
- What potential gains/losses from trade are not being counted in BB (2005) calculation?

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- A partial list often mentioned in the literature (most of which we will return to throughout this course and/or in 14.582 next semseter):
    - Selection of more productive domestic firms
    - New goods available (for consumption and production)
    - Pro-competitive effects of openness to trade.
    - 'Dynamic effects' of openness to trade (typically defined as something, like innovation or learning, that moves the PPF).
    - Institutional change driven by openness to trade.

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- Some more pedestrian answers:
    - A few percentage points of GDP is not trivial (i.e. "small" relative to what?)
    - GT depend on how much you trade (and Japan c. 1859 may have faced large transport costs on international trade, so didn't trade that much when tariffs removed).

Frankel and Romer (1999)

- Extremely influential paper (one of AER's most highly cited articles in recent decades).

- FR (1999) takes a huge question ("Does trade cause growth?") and answers it with more attention to the endogenous nature of trade than previous work.

  - Key idea: FR instrument for a country's trade (really, its 'openness') by using a measure of distance: how far that country is from large (i.e. rich) *potential* trade partners.

FR (1999): First-Stage (Part I)

- First-stage regression has two parts.
- First is based on well-known "gravity" equation.
  - We will have much to say about the empirics of gravity equations in a few weeks.
  - Key idea: bilateral trade flows fall with bilateral trade costs (and variables like bilateral distance, and whether two countries share a border, appear to be correlated with trade costs).

- Gravity equation estimated is the following (NB: as we shall see later, this isn't really conventional by modern standards):

$$\ln(\frac{X_{ij} + M_{ij}}{GDP_i}) = a_0 + a_1 \ln D_{ij} + a_2 N_i + a_3 N_j + a_4 B_{ij} + e_{ij}$$

- Where $(X_{ij} + M_{ij})$ is exports plus imports between country i and j, D_{ij} is distance, N is population and B_{ij} is a shared border dummy. FR (1999) also control for each country's area, landlocked status, as well as interactions between these variables and B_{ij}.

TABLE 1—THE BILATERAL TRADE EQUATION

	Variable	Interaction
Constant	−6.38	5.10
	(0.42)	(1.78)
Ln distance	−0.85	0.15
	(0.04)	(0.30)
Ln population	−0.24	−0.29
(country i)	(0.03)	(0.18)
Ln area	−0.12	−0.06
(country i)	(0.02)	(0.15)
Ln population	0.61	−0.14
(country j)	(0.03)	(0.18)
Ln area	−0.19	−0.07
(country j)	(0.02)	(0.15)
Landlocked	−0.36	0.33
	(0.08)	(0.33)
Sample size	3220	
R^2		0.36
SE of regression		1.64

Notes: The dependent variable is $\ln(\tau_{ij}/\text{GDP}_i)$. The first column reports the coefficient on the variable listed, and the second column reports the coefficient on the variable's interaction with the common-border dummy. Standard errors are in parentheses.

- Now FR (1999) aggregate the previously estimated gravity regression over all of country i's imports from all of its bilateral partners, j:

$$\widehat{T}_i = \sum_{i \neq j} e^{\widehat{a} X_{ij}}$$

- This constructed variable $\widehat{T}_i$ is then used as an instrument for how much a country is actually trading (which they, somewhat confusingly, denote by T_i). Think of $\widehat{T}_i$ as 'gravity predicted trade'.

- That is, the real first-stage regression is to regress T_i (exports plus imports over GDP) on $\widehat{T}_i$ and population and area.

First-Stage Results (Part II)

- This is now the real first stage (i.e. regress T_i on $\widehat{T}_i$ and controls).
- SE's corrected for generated regressor (Murphy and Topel, JBES 2002)

TABLE 2—THE RELATION BETWEEN ACTUAL AND
CONSTRUCTED OVERALL TRADE

	(1)	(2)	(3)
Constant	46.41	218.58	166.97
	(4.10)	(12.89)	(18.88)
Constructed trade share	0.99		0.45
	(0.10)		(0.12)
Ln population		−6.36	−4.72
		(2.09)	(2.06)
Ln area		−8.93	−6.45
		(1.70)	(1.77)
Sample size	150	150	150
R^2	0.38	0.48	0.52
SE of regression	36.33	33.49	32.19

Notes: The dependent variable is the actual trade share. Standard errors are in parentheses.

FR (1999): The Second-Stage

- Now, finally, FR (1999) run the regression of interest—"Does trade cause growth?":

$$\ln \frac{Y_i}{N_i} = a + bT_i + c_1 N_i + c_2 A_i + u_i$$

- Here, $\frac{Y_i}{N_i}$ is GDP per capita and A_i is area.

- FR run this regression using both OLS and IV.
  - The IV for T_i is $\widehat{T}_i$ (which, recall, is itself, in a sense, instrumented for with distance in the gravity equation).

OLS and IV results

TABLE 3—TRADE AND INCOME

	(1)	(2)	(3)	(4)
Estimation	OLS	IV	OLS	IV
Constant	7.40	4.96	6.95	1.62
	(0.66)	(2.20)	(1.12)	(3.85)
Trade share	0.85	1.97	0.82	2.96
	(0.25)	(0.99)	(0.32)	(1.49)
Ln population	0.12	0.19	0.21	0.35
	(0.06)	(0.09)	(0.10)	(0.15)
Ln area	−0.01	0.09	−0.05	0.20
	(0.06)	(0.10)	(0.08)	(0.19)
Sample size	150	150	98	98
R^2	0.09	0.09	0.11	0.09
SE of regression	1.00	1.06	1.04	1.27
First-stage F on excluded instrument		13.13		8.45

Notes: The dependent variable is log income per person in 1985. The 150-country sample includes all countries for which the data are available; the 98-country sample includes only the countries considered by Mankiw et al. (1992).

Why does trade increase GDP per capita?

Is it capital deepening, schooling (S_i), or TFP? 1960 Levels or 1960-1990 growth?

TABLE 4—TRADE AND THE COMPONENTS OF INCOME

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable	$\frac{\alpha}{1-\alpha} \ln(K_i/Y_i)$		$\phi(S_i)$		$\ln A_i$		$\ln(Y/N)_{1960}$		$\Delta \ln(Y/N)$	
Estimation	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Constant	−0.72	−1.29	0.10	−0.37	7.47	3.05	7.45	4.27	−0.50	−2.65
	(0.34)	(0.93)	(0.30)	(0.81)	(0.74)	(2.84)	(1.03)	(3.07)	(0.39)	(1.66)
Trade share	0.36	0.59	0.18	0.37	0.27	2.04	0.38	1.66	0.45	1.31
	(0.10)	(0.36)	(0.08)	(0.31)	(0.21)	(1.10)	(0.29)	(1.19)	(0.11)	(0.65)
Ln population	0.02	0.04	0.06	0.07	0.21	0.32	0.09	0.17	0.12	0.18
	(0.03)	(0.04)	(0.03)	(0.03)	(0.06)	(0.11)	(0.09)	(0.12)	(0.03)	(0.06)
Ln area	0.04	0.07	−0.01	0.01	−0.13	0.08	−0.02	0.13	−0.03	0.07
	(0.02)	(0.05)	(0.02)	(0.04)	(0.05)	(0.14)	(0.07)	(0.15)	(0.03)	(0.08)
Sample size	98	98	98	98	98	98	98	98	98	98
R^2	0.13	0.13	0.09	0.08	0.14	0.06	0.03	0.02	0.24	0.20
SE of regression	0.32	0.33	0.28	0.29	0.69	0.92	0.96	1.06	0.36	0.47
First-stage F on excluded instrument		8.45		8.45		8.45		8.45		8.45

Note: Standard errors are in parentheses.

- These are big effects, that surprised many people. Possible explanations:

Comments I

- These are big effects, that surprised many people. Possible explanations:
  - The IV results are still biased upwards. (A small amount of endogeneity in an IV gets exaggerated by the IV method.) Countries that are close to big countries are rich not just because of trade, but because of spatially correlated true determinants of prosperity (eg, 'institutions').
  - 'Openness' is proxying for lots of true treatment effects of proximity to neighbors: multinational firms, technology transfer, knowledge spillovers, migration, political spillovers. Not just 'Trade'.
  - The dynamic effects of 'openness,' accumulated over a long period of time, are larger than the static one-off effects of opening up to trade.
- Effects are many orders of magnitude higher than BB 2005 results. But not clear how to compare them:
  - BB focus on consumption/welfare. FR focus on real GDP (which is not necessarily consumption/welfare in an open economy).

- It's very surprising that the IV coefficients are *larger* than the OLS coefficients. Possible explanations:

Comments II

- It's very surprising that the IV coefficients are *larger* than the OLS coefficients. Possible explanations:
  - Weak instrument. (But the F-stat on the first stage is reasonably high.)
  - OLS is not biased after all.
  - Sampling variation: OLS and IV coefficients not statistically distinguishable from one another.
  - Measurement error. (FR: "Trade is an [imperfect] proxy for the many ways in which interactions between countries raise income—specialization, spread of ideas, and so on.")
  - Heterogeneous treatment effects—IV only gets at the LATE, which might be higher than ATE (i.e. what OLS estimates if unbiased).

Follow-on Work from FR (1999), part I

- Because of importance of question, and surprising findings, FR (1999) generated a lot of controversy and follow-on work.

- Rodrik and Rodriguez (2000) were most critical.

- Fundamental message (that has now also been confirmed for many cross-country studies, in all fields) is that these regressions are not that robust.

  - Inclusion of various controls can change the results a great deal (again, this is true in many/most cross-country, cross-sectional studies).
  - Different measures of 'openness' yield quite different results.

- RR (2000) also critical of the identification assumption behind FR (1999)'s IV. They also point out that it is not guaranteed that the effects of distance on GDP via openness are the same as the effects of a policy variable like tariffs on GDP via openness.

Follow-on Work from FR (1999), part II

- Lots of work used micro-data and trade liberalization episodes to go beyond the cross-country comparisons in FR (1999):
  - Do individual firms (or industries) become more productive when they open to trade?
  - Hallak, Levinsohn and Dumas (2004) argue the case for micro-studies.
  - Eg: Trefler (2004), Pavcnik (2002), Tybout (various years).
  - We will review this literature later in the course (and next semester).
  - But note that when studying the productivity responses of individual firms, we're drifting away from theoretical arguments establishing GT in a neoclassical world (in which technologies are held fixed).

- In two 2009 papers, James Feyrer revamped interest in the cross-country approach by using panel data and an IV based on a time-varying component of 'distance'.
  - Feyrer (2009) Paper 1: "Trade and Income—Exploiting Time Series in Geography"
  - Feyrer (2009) Paper 2: "Distance, Trade, and Income—The 1967 to 1975 Closing of the Suez Canal as a Natural Experiment"

Feyrer (2009) Paper 1

- Uses panel of country-level GDP and trade data from 1960-1995

- Exploits fact that marginal cost of shipping via air fell faster over this period than marginal cost of shipping via sea.

- This will make trade costs (or 'distance') fall over time. And importantly, trade costs between country pairs will be affected very differently by this:
  - Germany-Japan sea distance is 12,000 miles, but only 5,000 air miles. (Think of this as the "Treatment group")
  - Germany-USA sea and air distances are basically the same. ("Control group")

- Feyrer uses this variation to get a time-varying instrument for trade openness, and then pursues a FR 1999 approach.

Consistent with a change in relative cost of using each mode.

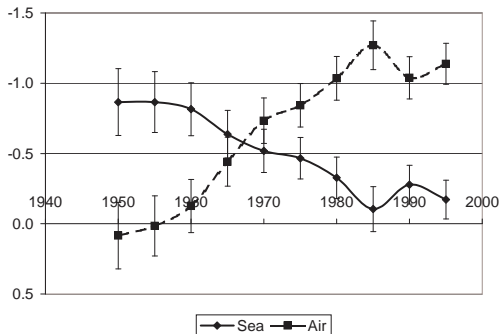Figure 1: Air Freight Share of US Trade Value (excluding North America)
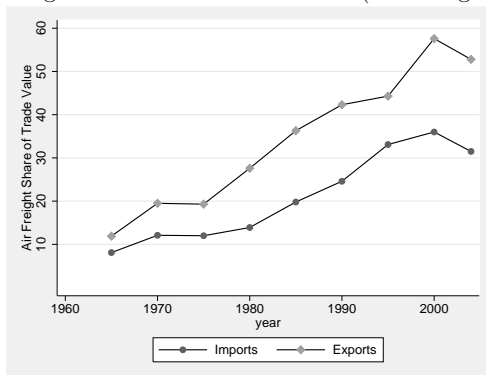
source: Hummels (2007), pp 133.

Coefficients on Air and Sea Distance

$$\ln(Trade_{ijt}) = \gamma_i + \gamma_j + \gamma_t + \beta_{sea,t} \ln(seadist_{ij}) + \beta_{air,t} \ln(airdist_{ij}) + \varepsilon_{ijt}$$

Figure 3: The Change in Elasticity of Trade with Respect to Sea and Air Distance over Time

source: Coefficients from regression table 9 column 2.

Each point represents the coefficient on (sea or air) distance over a 5 year interval. Estimates are from a gravity model with country fixed effects.

Error bars represent plus or minus two standard errors for each coefficient.

Feyrer (2009) paper 1: OLS and IV results

IV is predicted trade (aggregated across partners) from gravity equation

Table 5: Panel Estimates of Trade on per capita GDP

	(1)	(2)	(3)	(4)	(5)	(6)
			IV RESULTS			
			ln(Real GDP per Capita)			
ln(trade)	0.578	0.589	0.427	0.429	0.459	0.417
	(0.082)**	(0.090)**	(0.078)**	(0.075)**	(0.097)**	(0.092)**
			FIRST STAGE			
			ln(trade)			
ln(predicted trade)	0.993	0.942	2.055	2.033	1.385	1.696
	(0.144)**	(0.145)**	(0.418)**	(0.410)**	(0.251)**	(0.365)**
R^2	0.975	0.975	0.958	0.958	0.973	0.954
F-stat on Instrument	47.6	42.2	24.2	24.6	30.4	21.6
Instrument Partial R^2	0.170	0.163	0.216	0.223	0.100	0.145
			REDUCED FORM			
			ln(Real GDP per Capita)			
ln(predicted trade)	0.573	0.555	0.877	0.873	0.636	0.708
	(0.116)**	(0.119)**	(0.242)**	(0.234)**	(0.185)**	(0.226)**
R^2	0.947	0.947	0.958	0.959	0.943	0.956
Observations	774	774	560	560	774	560
Countries	101	101	62	62	101	62
Years	10	10	10	10	10	10
		characteristics of predicted trade regressions				
Bilateral Controls	no	yes	no	yes	—	—
Balanced Panel	no	no	yes	yes	no	yes
Country dummies	yes	yes	yes	yes	no	no
Pair Dummies	no	no	no	no	yes	yes

Feyrer (2009) Paper 2

- IV coefficient in Feyrer (2009) Paper 1 is still large.
- Perhaps, therefore, omitted variable bias was not as big an issue as previously thought.
- But a fundamental question of *interpretation* remains:
  - Is 'openness' capturing channels related purely to the trade of goods, or is it possible that this variable is (also) proxying for other elements of international interaction (FDI, migration, knowledge flows) made cheaper by the rise of air travel?
- Feyrer (2009) Paper 2 exploits the closing and re-opening of the Suez Canal between 1967 and 1975 to dig deeper:
  - (Implicit) logic: No one is doing FDI or migration by sea during this period, so only thing a change in sea distance can affect is trade.
  - Short-run shock.
  - Can trace the timing of the impact.
  - Very nice feature that it turns off and on: Should expect symmetric results from static trade models, but asymmetric results if driven purely by (e.g.) spread of knowledge.

Figure 1: Average bilateral trade residuals grouped by Suez Distance Increase
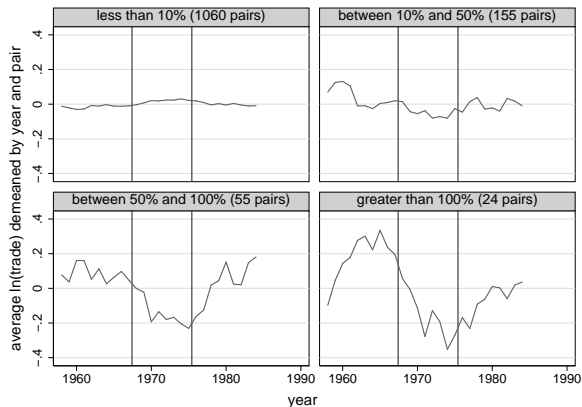
Source: IMF direction of trade database, author's calculations.
The vertical lines mark the closing and reopening of the Canal in 1967 and 1975.
Residuals from a regression with country pair and year dummies.

Feyrer (2009) paper 2: Trade and Sea Distance

NB: Gravity equation distance coefficient is much smaller than typically found.

Table 1: Trade Versus Sea Distance with the Closure of Suez 67-75

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
				Pairwise ln(trade)				
ln(sea dist)	-0.149+	-0.266**	-0.312**	-0.458**				
	(0.084)	(0.091)	(0.074)	(0.083)				
ln(sea dist) (67)					-0.330**	-0.402**	-0.473**	-0.558**
					(0.111)	(0.123)	(0.106)	(0.116)
ln(sea dist) (74)					-0.024	-0.147	-0.155	-0.329**
					(0.114)	(0.119)	(0.104)	(0.108)
Test 67 == 74 (p-value)					0.04	0.11	0.03	0.13
Pairs	2,605	2,605	1,294	1,294	2,605	2,605	1,294	1,294
Observations	60,920	46,726	34,938	27,174	60,920	46,726	34,938	27,174
R-squared	0.871	0.866	0.906	0.902	0.871	0.866	0.906	0.902
Balanced Panel	No	No	Yes	Yes	No	No	Yes	Yes
Omit Transition	No	Yes	No	Yes	No	Yes	No	Yes

** $p<0.01$, * $p<0.05$, + $p<0.1$
Regressions include country pair and year dummies.
Standard errors clustered by country pair
Years 1967-1969 and 1975-1977 are the transition periods.

Feyrer (2009) paper 2: OLS and IV results

Table 5: Output and Trade

	(1)	(2)	(3)	(4)	(5)	(6)
IV RESULTS						
	ln(GDP per capita)					
ln(trade)	0.228*	0.253**	0.157**	0.170**	0.179**	0.159**
	(0.087)	(0.094)	(0.052)	(0.063)	(0.062)	(0.057)
FIRST STAGE						
	ln(trade)					
Suez Shock	−0.941**			−1.318**		
	(0.245)			(0.263)		
ln(Predicted Trade)		3.301**			4.817**	
		(0.950)			(0.941)	
ln(Predicted Trade) dynamic			3.341**			3.022**
			(0.676)			(0.651)
Instrument R-squared	0.010	0.010	0.023	0.018	0.019	0.020
Instrument F-Stat	14.8	11.9	24.4	25.1	26.1	21.5
REDUCED FORM						
	ln(GDP per capita)					
Suez Shock	−0.215+			−0.224+		
	(0.120)			(0.116)		
ln(Predicted Trade)		0.834+			0.863*	
		(0.472)			(0.423)	
ln(Predicted Trade) dynamic			0.525*			0.480+
			(0.252)			(0.254)
Countries	80	80	80	80	80	80
Observations	1,771	1,771	1,771	1,351	1,351	1,351
Transition Years Included	Yes	Yes	Yes	No	No	No

** $p<0.01$, * $p<0.05$, + $p<0.1$

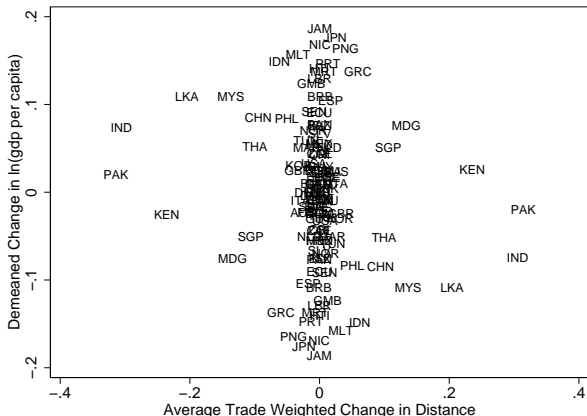Years 1967-1969 and 1975-1977 are the transition periods.

All regressions include a set of country and year dummies.

Standard errors clustered by country

Feyrer (2009) paper 2: Reduced Form

Very nice: we can see how few (and which) country observations are driving the result.

Figure 7: Log change in GDP per capita versus Suez Distance Shock

Source: World Development Indicators, author's calculations.
GDP change based on average for three periods, 1960-1966, 1970-1974, 1978-1984.

Other Recent Work

1. Pascali (AER, 2017):
   - Uses the invention of steam-powered oceanic shipping (which affected relatively more those countries with poor wind-powered connections to other countries) to estimate relationships similar to Feyrer's (c. 1900).
   - Surprisingly, this IV-driven openness seems to have benefited initially relatively rich countries and actually *harmed* initially relatively poor countries

2. Zimring (JIE, 2015):
   - Studies the blockade imposed on the Gaza Strip from 2007-2010 (compared to West Bank)
   - Modern setting, so has access to price data as well as household consumption and firm production data (and so can also look at inequality).
   - Large measured losses (and return after 2010), in particular due to reduced labor productivity.

Conclusion

- CA seems to hold, in one place where tested.

- GT appear to vary considerably across estimates.

  - But GT are hard to measure. There are aspects of welfare (e.g. change in the number of varieties available) that are not captured in the studies we've seen above, but which might be important (or not!).

  - Also very hard to get exogenous change in ability to trade.

Areas for future research

- Are there other ways (or places) in which to test CA?

- Can we find more natural experiments that affect regions' abilities to trade, to shed more light on the size of GT?

- More work is needed on quantifying empirically (ideally as non-parametrically as possible) the different mechanisms behind GT

- Are there ways to formalize the connection (or lack thereof) between reduced-form estimates of GT (that we saw today) and GT predicted by commonly-used models of trade (that we will see later)? Donaldson (2015 ARE) did some short calculations. Buera and Oberfield (2016) uses an explicit growth model.

- How well do the measures that statistical agencies use to measure economic welfare correspond with the concepts of welfare in the models we have seen? See Burstein and Cravino (AEJMacro, 2015) for a discussion.