Economics Letters 126 (2015) 159–162

Contents lists available at ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Bilateral trade and similarity of income distributions: The role of second moments

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HIGHLIGHTS

- We add differences in first and second moments of income distributions to gravity.
- Similarity of within-country income dispersion increases bilateral trade.
- This robust finding points to the importance of demand-based trade theories.

ARTICLE INFO

Article history:
Received 26 August 2014
Received in revised form
2 December 2014
Accepted 5 December 2014
Available online 12 December 2014

JEL classification:
F10
D31

Keywords:
International trade
Income distribution
Gravity model
Linder hypothesis
Non-homothetic preferences

ABSTRACT

This letter uses an augmented gravity model to revisit the effect of similarity in income distributions on bilateral trade flows. We document a robust new empirical regularity: while differences in average incomes between two countries increase trade, differences in income dispersion reduce it. Our result sheds new light on the Linder hypothesis and stresses the importance of demand-based theories of international trade.

1. Introduction

How do differences between countries' income distributions shape their bilateral trade flows? Supply-side and demand-side theories of international trade offer conflicting answers. According to the Heckscher–Ohlin model, larger differences in capital–labor ratios of two countries (and, hence, in per capita incomes) result in stronger specialization and more trade. Demand-side arguments, proposed by Linder (1961) and recently formalized by Fajgelbaum et al. (2011), predict the opposite: when preferences are non-homothetic, countries with similar income distributions demand similar goods. Due to a home market effect, they specialize in these goods and trade them intensively with each other.

In this letter, we provide new evidence on the relevance of demand-based trade theories by adding differences in the first and second moments of countries' income distributions to an otherwise standard gravity model. We uncover a robust empirical regularity: differences in per capita incomes between two countries increase their bilateral trade, while differences in income dispersion reduce it. The first effect is readily explained by supply-side forces and the second one is consistent with demand-side arguments.

Several empirical studies have incorporated differences in per capita incomes across countries into the gravity model to test Linder's hypothesis. Hallak (2010) shows that this approach fails to provide consistent support for an impact of the demand side on aggregate trade because it confounds this effect with Heckscher–Ohlin forces. However, he finds that similarity in average incomes promotes trade at the sector level. We return to aggregate trade flows and examine whether, beyond average incomes,

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http://dx.doi.org/10.1016/j.econlet.2014.12.007
0165-1765/

Table 1
The impact of similarity in income distributions on bilateral trade.

	Cross-section (2000–2004): OLS[a]			Panel (1995–2009): FE[b]		
	(1)	(2)	(3)	(4)	(5)	(6)
Δy	0.0119***		0.148***	−0.0211**		0.0434**
	(0.00326)		(0.0132)	(0.00829)		(0.0198)
$\Delta\sigma$		0.00378	−0.160***		−0.0311***	−0.0706***
		(0.00378)	(0.0153)		(0.00860)	(0.0205)
(within) R^2	0.858	0.857	0.859	0.445	0.445	0.445
Observations (N)	10,669	10,669	10,669	31,160	31,160	31,160
Country pairs	10,669	10,669	10,669	16,405	16,405	16,405

Dep. var.: log value of aggregate trade in differentiated goods: ln X. All regressions include trade cost proxies and (period-specific) importer- and exporter-dummies. Detailed results are provided in the Web Appendix (see Appendix A). Robust standard errors clustered by country pair in parentheses. Asterisks indicate significance levels: * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.
[a] Columns 1–3 refer to the cross-section in the middle period of our panel (2000–2004).
[b] Columns 4–6 are based on the full panel of three 5-year periods (1995–1999, 2000–2004, 2005–2009).

the second moments of income distributions affect trade. We find robust evidence that they do. Our study extends earlier work by Francois and Kaplan (1996) and Dalgin et al. (2008), which considered importing country inequality only. While Choi et al. (2009) demonstrate that similarity of income dispersion affects the variability of import prices, we show that it increases the level of bilateral trade.

Our results are broadly in line with theoretical work that studies how the distributions of income *within* countries relate in determining bilateral trade flows. In Mitra and Trindade (2005), trade patterns are entirely shaped by specialization in consumption. Their model predicts that the share of intra-industry trade in overall trade is maximized when countries are identical in terms of income inequality. Fajgelbaum et al. (2011) and Markusen (2013) show how inequality interacts with per capita income differences to determine equilibrium trade patterns.

2. Gravity model

We use a standard gravity model, which we augment by two terms capturing the similarity of the trading partners' income distributions.[1] The main equation to be estimated explains the value of differentiated goods exports X_{ij} shipped from country i to country j:

$$\ln X_{ij} = \beta_y \Delta y_{ij} + \beta_\sigma \Delta\sigma_{ij} + \boldsymbol{\gamma}\mathbf{T}_{ij} + \delta_i + \delta_j + \varepsilon_{ij}, \tag{1}$$

by the difference in average incomes y : $\Delta y_{ij} \equiv \left(\ln y_i - \ln y_j\right)^2$ (2) and the difference in within-country income dispersion σ :

$$\Delta\sigma_{ij} \equiv \left(\ln \sigma_i - \ln \sigma_j\right)^2. \tag{3}$$

We use the standard deviation as a baseline measure of income dispersion σ.[2] The vector $\mathbf{T}_{ij}$ collects proxies for trade costs: the log of bilateral distance, dummy variables for a common border, language, colonial link, or colonizer, and lagged dummies indicating joint membership in a Free Trade Agreement (FTA) or in the World Trade Organization (WTO). We deal with unobserved multilateral resistance by including importer and exporter fixed effects δ_i and δ_j. They make the inclusion of monadic variables such as $\ln y_i$ or $\ln \sigma_i$ redundant.[3]

To obtain unbiased estimates of β_y and β_σ, the identifying assumptions $\text{cov}(\Delta z_{ij}, \varepsilon_{ij}|\delta_i, \delta_j, \mathbf{T}_{ij}) = 0$, $z \in \{y, \sigma\}$ must hold. Under the standard assumption that ε_{ij} has zero conditional mean, and using (2) and (3), it implies

$$\text{cov}\left(z_i z_j, \varepsilon_{ij}|\delta_i, \delta_j, \mathbf{T}_{ij}\right) = 0. \tag{4}$$

If z_i and z_j are independent, assumption (4) is met. It requires that any trade shock ε_{ij} must be orthogonal to the joint realization of z in both countries. In other words, we need that aggregate conditions in country i are independent of aggregate conditions in country j. Clearly, this condition can be violated if i is an important trade partner for j or vice versa. We thus run robustness checks that eliminate each importer's five largest trading partners from the sample.

A positive estimate of β_y can be interpreted as evidence of Heckscher–Ohlin forces, while a negative sign favors the traditional Linder hypothesis. If the second moments capture similarity in demand, and if this promotes trade, we should observe $\beta_\sigma < 0$.

3. Data

We obtain the shares of total net income received by deciles and quintiles of the population from the World Bank's World Development Indicators (WDI), complemented by Eurostat and the national statistics offices of the US and Canada. Due to limited data availability, we take averages over 5-year periods: 1995–1999, 2000–2004, and 2005–2009. Dispersion measures are computed from all available data within each period. The resulting unbalanced panel covers 145 countries, of which 114 are included in the middle period. Since the arguments in the theoretical literature mostly relate to trade in differentiated goods, we use disaggregate trade data from COMTRADE. We select only those products for which neither an organized exchange nor a reference price exists according to Rauch's (1999) 'liberal' classification and aggregate up to obtain one trade flow per exporter, importer, and time period.[4]

4. Results

4.1. Main findings

The first three columns of Table 1 display our main results for the cross-section of 2000–2004. As in Hallak (2010), the 'traditional' Linder test fails to provide evidence that differences in per capita incomes reduce trade (column 1). Differences in standard deviations between countries do not seem to affect trade in any way (column 2). Only if both terms Δy and $\Delta\sigma$ are included,

[1] Our regression equation is in line with usual gravity modeling (see Head and Mayer, 2014), but it is not derived from any specific theory.

[2] We do not normalize the dispersion measures in (3) by average incomes in order to capture unconfounded variation in σ; the bilateral difference in average incomes is controlled for by Δy_{ij}. We provide robustness checks using alternative dispersion measures below.

[3] When using panel data, we add time-specific dummies (δ_{it}, δ_{jt}) and a pair fixed effect δ_{ij} to the model.

[4] The Web Appendix provides details on our data and sample (see Appendix A).