

Trade and Income (Long-Term Growth)

International Trade

Prof. Harris Dellas

Lecture Slides

May 2018

Outline

- 1 Trade, income, economic growth
- 2 Micro-econometric analysis
- 3 Other work

DOES TRADE LEAD TO HIGHER INCOME (AND LONG TERM GROWTH)?

Trade, income, economic growth

Trade and the level of income: The standard theory of trade predicts that the level of national income increases with free trade because of greater specialization. An additional important channel may be through the effects of greater competition on productivity and output.

Trade and the rate of economic growth

- (a) Market size and IRS
- (b) Diffusion of knowledge
- (c) Elimination of duplicate research effort

Empirical evidence

Cannot simply regress level of income (y) on degree of openness (x/y).
Problem of *simultaneity*: Rich countries tend to trade much.

Using trade policy as an instrument for trade does not solve the simultaneity problem. Rich countries may follow more free market policies in general.

Search for alternative instrument: *Geographical location*

We will present results that are based on the last approach from "Does Trade Cause Growth?", Frankel-Romer (AER, 1999)

Geographic characteristics are not affected by income, policies of other factors that affect income.

The objective is to estimate an equation such as:

$$\ln y_i = a + b(\text{INT.TRADE})_i + c(\text{DOM.TRADE})_i + u_i$$

$$\text{INT.TRADE}_i = a_1 + \phi(\text{PROXIMITY})_i + \zeta_i$$

$$\text{DOM.TRADE}_i = a_2 + \lambda(\text{SIZE})_i + \varsigma_i$$

$$\ln y_i = a_3 + b(\text{INT.TRADE})_i + \gamma(\text{SIZE})_i + v_i \quad \gamma = c\lambda$$

Proximity and size are negatively correlated.

Four variables: Income (y), International Trade (T), size (S) and proximity (P)

- Income: Real, per capita income
- International Trade: $T_i = \sum_{j \neq i} \frac{T_{ij}}{GDP_i} = \sum_{j \neq i} \frac{EX_{ij} + IM_{ij}}{GDP_i}$
- Size: Population, area
- Proximity: $\ln \frac{T_{ij}}{GDP_i} = a_0 + a_1 \ln D_{ij} + a_2 \ln S_i + a_3 \ln S_j + a_4 \ln X + e_{ij}$
 X = other geographical variables (common border, landlocked, ...)

Use the fitted part of this equation to calculate the geographical component of trade by summing over all the estimated bilateral effects (using even the countries that lack bilateral data). This is the measure of proximity.

Quality of the instrument: Is the estimated, geography based, trade instrument any good?

The relationship between the constructed and actual trade variables is high. *Geographical variables seem to account for a major part of the variation in trade.*

Quality of instrument : Are geographic variables major determinants of **bilateral** trade?

TABLE 1—THE BILATERAL TRADE EQUATION

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

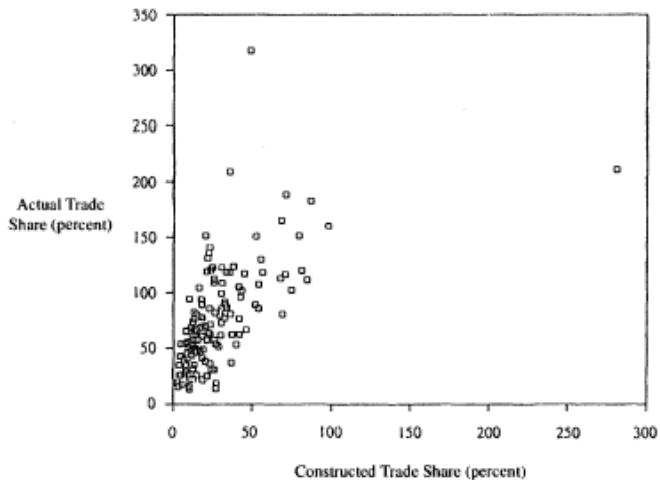


FIGURE 1. ACTUAL VERSUS CONSTRUCTED TRADE SHARE

Figure : Does geography explain actual trade?

Main results of income regression

$$\ln y_i = a + b\tau_i + cN_i + kA_i + u_i$$

$\ln y$ = log income per person

N = (log) population

A = (log) area

TABLE 3—TRADE AND INCOME

	(1)	(2)	(3)	(4)
Estimation	OLS	IV	OLS	IV
Constant	7.40 (0.66)	4.96 (2.20)	6.95 (1.12)	1.62 (3.85)
Trade share	0.85 (0.25)	1.97 (0.99)	0.82 (0.32)	2.96 (1.49)
Ln population	0.12 (0.06)	0.19 (0.09)	0.21 (0.10)	0.35 (0.15)
Ln area	-0.01 (0.06)	0.09 (0.10)	-0.05 (0.08)	0.20 (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

The OLS seems to underestimate the effect of trade. But the instrumental variables estimate is only marginally statistically significant.

- (a) OLS: 1% increase in trade share increases income by 0.85%
Statistically significant
Size also matters positively for income

- (b) Instrumental variable estimation (use $\tau\tau$ instead of τ): 1% increase in trade share increases income by 2%

Various problems

- (a) Robustness: Outliers: Luxembourg and Singapore
- (b) Continent effects
- (c) Data quality

The channels

Channels through which trade affects income

Decomposition of income

$$Y_i = K_i^\alpha \left[e^{f(S_i)} A_i N_i \right]^{1-\alpha}$$

$$Y_i = \left(\frac{K_i}{Y_i} \right)^{\frac{\alpha}{1-\alpha}} e^{f(S_i)} A_i N_i$$

$$\ln \left(\frac{Y_i}{N_i} \right) = \frac{\alpha}{1-\alpha} \ln \left(\frac{K_i}{Y_i} \right) + f(S_i) + \ln A_i$$

Physical capital, human capital, MFP growth: All three channels are important

Conclusion: Trade openness seems to have strong effects on income but there are problems of statistical significance.

Trade within countries is also important (size matters for income)

Micro-econometric analysis

- Plant-level data sets: Effects of trade policy on production, employment and technological performance of firms
- Bi-directional relationship between productivity and exports
- Efficient producers tend to become exporters. But trade also improves productivity

Some prominent findings in the literature:

Bernard and Jensen, 2006

- 1 Industries experiencing relatively large declines in trade costs exhibit relatively strong productivity growth.
- 2 Low productivity plants in industries with falling trade costs are more likely to die.
- 3 Relatively high productivity non-exporters are more likely to start exporting in response to falling trade costs
- 4 Existing exporters increase their shipments abroad as trade costs fall.
- 5 Productivity growth within firms in response to decreases in industry-level trade costs.

Tybout, 2003

- 1 Mark-ups generally fall with import competition,
- 2 Import-competing firms cut back their production levels when foreign competition intensifies
- 3 Trade rationalizes production in the sense that markets for the most efficient plants are expanded, but large import-competing firms tend to simultaneously contract.
- 4 Exposure to foreign competition often improves intra-plant efficiency.
- 5 Firms that engage in international activities tend to be larger, more productive, and supply higher quality products

The growth rate of per-capita GDP and trade restrictions:

Measures of trade restrictions

- 1 The average tariff rate = total import duties / volume of imports
- 2 Coverage ratio for non-tariff barriers to trade

The relationship between these measures and growth *after* controlling for levels of initial income and secondary education is slightly negative but statistically insignificant.

This finding is not atypical. Simple measures of trade barriers tend not to enter significantly in well-specified growth regressions, regardless of time periods, sub-samples, or the conditioning variables employed.

But both measures may be problematic. Average tariff rate underestimates protection because it does not take into account the effect on the volume of trade. The coverage ratio is not informative enough.

Alternative strategies:

- (a) Use alternative indicators of openness (for instance, the Dollar (1992) indicator, the Sachs and Warner indicator (1995), subjective indicators, Edwards (1992, geography ...
- (b) Compare convergence experience among groups of liberalizing and non-liberalizing countries (Ben-David 1993).

Dollar (1992)

Outward orientation. It means a combination of two factors: First, the level of protection, especially for inputs into the production process, is relatively low (resulting in a sustainable level of the real exchange rate that is favorable to exporters); and second, there is relatively little variability in the real exchange rate, so that incentives are consistent over time.

Sachs-Warner (1995)

The SW openness indicator (OPEN) is a zero-one dummy, which takes the value 0 if the economy was closed according to any one of the following criteria:

- 1 it had average tariff rates higher than 40% (TAR);
- 2 its nontariff barriers covered on average more than 40% of imports (NTB);
- 3 it had a socialist economic system (SOC);
- 4 it had a state monopoly of major exports (MON);
- 5 its black market premium exceeded 20% during either the decade of the 1970s or the decade of the 1980s (BMP)

The SW dummy has been found to be a significant in growth regressions.

The point estimate of its effect on growth is 2.44 (with a t-statistic of 5.50): Economies that pass all five requirements experience on average economic growth of two and a half percentage points higher than those that do not. The coefficient appears to be highly robust.

In a recent paper which subjects 58 potential determinants of growth to an exhaustive sensitivity analysis, the average p-value for the Sachs-Warner index is less than 0.1 percent.

Question: Which of the individual components of the index are responsible for the strength of the SW dummy?

It derives mainly from the combination of the black market premium (BMP) and the state monopoly of exports (MON) variables.

Are the black-market premium and state monopoly variables measures of trade policy or are they a proxy for policy and institutions in general?

Their significance in explaining growth may be due to their correlation with other determinants of growth: macroeconomic problems in the case of the black-market premium, and location in Sub-Saharan Africa in the case of the state monopoly variable.

Examine this possibility explicitly by using indicators of macroeconomic and political trouble and institutional quality. ICRG, is an index of institutional quality based on underlying numerical evaluations relating to the rule of law, bureaucratic quality, corruption, expropriation risk, and governmental repudiation of contracts (Knack and Keefer, 1995).

DISEQ, is a dummy variable which is equal to one if the country exhibited signs of macroeconomic or political distress such as a debt-GNP ratio greater than 125%, an average inflation greater than 10%, a decline in its terms of trade of more than 20%, or involvement in war. DISEQ is also equal to 0 if the country was in Africa.

The correlations of DISEQ and ICRG with OPEN are respectively 0.64 and 0.72.

Edwards (1998)

Regressions of total factor productivity growth on nine alternative indicators of openness (as well as initial income and a measure of schooling).

- (i) the Sachs-Warner openness index
- (ii) the World Bank's subjective classification of trade strategies in *World Development Report 1987*
- (iii) Leamer's (1988) openness index, built on the basis of the average residuals from regressions of trade flows
- (iv) the average black market premium
- (v) the average import tariffs from UNCTAD (Barro and Lee, 1994)

- (vi) the average coverage of non-tariff barriers, from UNCTAD (Barro and Lee, 1994)
- (vii) the subjective Heritage Foundation index of Distortions in International Trade
- (viii) the ratio of total revenues on trade taxes (exports + imports) to total trade
- (ix) Wolf's regression-based index of import distortions for 1985

Weighted least squares (WLS) regressions of TFP growth on (i)-(ix), where the weighting variable is GDP per capita in 1985. Six of the nine indicators are significant and all but one have the expected sign.

According to Rodriguez and Rodrick, 1999, the robustness of the regression results is an artifact of weighting and identification assumptions.

Case studies

- Latin America
- East Asia
- Africa