

Financial Development and International Agricultural Trade

Is there a connection?

D. Susanto and C. P. Rosson

Department of Agricultural Economics, Texas A&M University
College Station, Texas



Introduction

Trade theory suggests that:

- Technology and factor endowments are two sources of comparative advantages and thus trade patterns
- Economies of scale can give rise to trade even with the absence of comparative advantage (Krugman, Dixit and Norman, Lancaster)

New Development:

- Financial development as a potential source of a country's comparative advantage

Financial Development and trade

Liquidity constraints (Chaney; Melitz; Beck; Manova)

- When a domestic financial institution is weak or inefficient, firms in export oriented sectors are burdened by liquidity constraints
- Preventing a subset of productive firms to enter the foreign markets



Prediction: financial underdevelopment hinders exports

- With less restrictive liquidity constraints (i.e. due to financial reforms):



- ✓ Investment can increase more in response to a lowering variable export costs
- ✓ Firms with productivity above a certain cut-of level become exporters

Objectives

- To investigate the possible link between financial development and trade flows in agricultural products
- Specifically, attempt to assess the extent to which financial development has contributed to bilateral agricultural trade flows

Empirical Model and Estimation

Empirical Model – The Gravity Equation

$$\begin{aligned}\ln T_{ijt} = & \alpha_i + \gamma_j + \nu_t + \beta_1 LGDP_{ijt} + \beta_2 LGDPI_{ijt} + \beta_3 LGDPP_{ijt} \\ & + \beta_4 LDIS_{ij} + \beta_5 FinReform_{it} + \beta_6 Language + \beta_7 Border \\ & + \beta_8 RTA + u_{ijt}\end{aligned}$$

$LGDP_{ijt}$: bilateral overall country size

$LGDPI_{ijt}$: index of relative country size

$LGDPP_{ijt}$: different in relative factor endowments

$LDIS_{ij}$: geographic distance (log value)

$Fin Re form_{it}$: financial reform index (abiad et al, 2010)

Estimation Procedures:

Serious problem with the logarithmic transformation of the gravity model (Santos Silva and Tenreyro, 2006)

1. Log linear model cannot be expected to provide unbiased estimates of means effects when the errors are heterocedastic
2. The prevalence of zero trade flows

Alternative procedure is to use a count data model, ie. negative binomial model.

Can accommodate (Greene, 1994):

1. The problems of equidispersion assumption
2. Unobserved individual heterogeneity
3. Zero trade flows

Binomial model (Hausman, Hall, and Griliches, 1984):
 The conditional expected value and variance of the random effects negative binomial are

$$E(T_{ijt} | x_{ijt}, \alpha_{ij}) = \alpha_{ij} \lambda_{ijt}$$

$$V(T_{ijt} | x_{ijt}, \alpha_{ij}) = \alpha_{ij} \lambda_{ijt} (1 + \alpha_{ij})^{-1}$$

$$\lambda_{ijt} = \text{Exp}(x'_{ijt} \beta)$$

$(1 + \alpha_{ijt})^{-1}$: is a beta distributed random variable with parameter (a, b)

The joint density of trade flows is

$$\Pr(T_{ij1}, \dots, T_{ijT}) = \left(\prod_{i=1}^T \frac{\Gamma(\lambda_{ijt} + T_{ijt})}{\Gamma(\lambda_{ijt}) \Gamma(T_{ijt} + 1)} \right) x \frac{\Gamma(a+b) \Gamma(a + \sum_t \lambda_{ijt}) \Gamma(b + \sum_t T_{ijt})}{\Gamma(a) \Gamma(b) \Gamma(a+b + \sum_t \lambda_{ijt} + \sum_t T_{ijt})}$$

Estimated using STATA

Data

- ❖ Bilateral exports of agricultural products: 49 countries from 1989 to 2008 (5-year average trade flows) from UN COMTRADE database.
- ❖ GDP and population: World Development Indicator (World Bank).
- ❖ RTA:OECD
- ❖ LDIS: World atlas
- ❖ LANGUAGE: CIA'S World Fact book
- ❖ Financial reform: Abiad et al (2010)

Table 1: Summary Statistics of Variables

Variable	Mean	SD	Min.	Max	N
Average agric. exports (million)	123	680	0	26,859	14,112
Geographic distance (ln)	8.26	0.86	3.78	9.42	14,112
LGDP	5.91	1.34	2.00	9.69	14,112
LGDPPI	-1.66	1.08	-7.16	-0.69	14,112
LGDPP	1.62	1.18	0.00	5.09	14,112
Common language dummy	0.16	0.36	0	1	14,112
Contiguity dummy	0.05	0.22	0	1	14,112
Regional trade agreement dummy	0.13	0.33	0	1	14,112
Financial reform index (exporter)					
Total	0.61	0.28	0.00	1.00	14,112
Advanced country	0.78	0.22	0.12	1.00	6,048
Developing country	0.48	0.26	0.00	0.95	8,064

Source: Calculated

Table 2: Random Effects Models of the gravity Equation

Variable	Poisson	Negative Binomial
INTERCEPT	0.3002 (0.3555)	-0.6282 (0.2961)**
LGDP	1.4826 (0.0174)***	0.9293 (0.0227)***
LGDPPI	0.4301 (0.0158)***	0.3109 (0.0239)***
LGDPP	0.2856 (0.0142)***	0.0332 (0.0171)*
LDIST	-1.1046 (0.0353)***	-0.6479 (0.0277)***
BORDER	0.5489 (0.1166)***	-0.3179 (0.0827)***
LANGUAGE	0.5826 (0.0718)***	0.4378 (0.0513)***
RTA	0.2822 (0.0086)***	0.2431 (0.0311)***
FinReform	0.7752 (0.0204)***	0.6646 (0.0897)***
Alpha	1.1655 (0.0344)***	-
a	-	0.9789 (0.0336)
b	-	2.5405 (0.1505)

Notes: ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively

Table 2: Random Effects Models of the gravity Equation

Variable	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
INTERCEPT	1.727** (0.809)	2.156 (1.823)	2.596 (1.926)	-3.109*** (0.934)	1.358 (1.559)	-5.637** (1.191)
LDIST	-0.537*** (0.053)	-0.615*** (0.074)	-0.575*** (0.088)	-0.698*** (0.050)	-0.775*** (0.067)	-0.495*** (0.089)
BORDER	-0.147 (0.120)	-0.112 (0.130)	0.494* (0.270)	-0.246 (0.139)	-0.519*** (0.165)	0.449 (0.288)
LANGUAGE	0.290*** (0.084)	0.444*** (0.107)	0.230* (0.127)	0.582*** (0.082)	0.633*** (0.131)	0.314** (0.125)
RTA	0.276*** (0.037)	0.278*** (0.045)	0.158** (0.077)	0.128** (0.061)	0.243* (0.131)	0.240*** (0.075)
<i>FinReform</i>	0.620*** (0.142)	0.867*** (0.169)	0.196 (0.269)	0.221* (0.125)	0.518** (0.233)	0.249* (0.144)
a	1.157 (0.064)	1.780 (0.194)	1.364 (0.097)	1.076 (0.051)	1.145 (0.075)	1.259 (0.093)
b	4.145 (0.387)	16.34 (2.858)	2.712 (0.291)	1.966 (0.152)	1.694 (0.187)	3.071 (0.359)

Notes: ***, **, and * are significant at the 1%, 5%, and 10% levels, respectively.

Notes:

- ❖ Case 1: Advanced to all countries
- ❖ Case 2: Advanced to advanced countries
- ❖ Case 3: Advanced to developing countries
- ❖ Case 4: Developing to all countries
- ❖ Case 5: Developing to advanced countries
- ❖ Case 6: Developing to developing countries

Key Findings

- ❖ This study provides supporting evidence for the models on trade and financial reforms (financial development)
- ❖ Financial reforms have positive impacts on agricultural trade flows – higher level of financial development the greater the positive impact on agricultural exports.
- ❖ Agricultural trade involving advanced countries respond by a higher degree of magnitude to financial reforms than developing countries

Implications

- ❖ Provides a solid policy foundation for pursuing financial reforms in order to stimulate agricultural trade and economic growth
- ❖ A country with a low level of financial development should benefit of pursuing financial reforms because agricultural exports would expected to rise