The Impacts of Trade Facilitation Measures on International Trade Flows

An application to Central America

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Motivation

- In the recent years trade facilitation has become a hot topic of analysis in the context of International Trade
  - The relative success of tariffs reduction force to look other type of frictions in trade relations.
  - The emergence of Global Value Chains significantly increases trade in intermediate goods.
- According to a recent study of the World Economic Forum 2014. A modest improvement in trade facilitation would lead to a 2.6% increase in world GDP with a 9.4% increase in world exports.

Results

- In this paper I study the impact of trade facilitation variables on bilateral trade through an augmented gravity model.
- The analysis use a panel that includes trade data from 2004 and 2010 for the 6 countries in Central America.
- The results shows that trade facilitation variables summarized in time to produce an import or export (without transport) affects negative the trade performance
- Our calculations shows that the average ad valorem equivalents tariff (AVEs) in Central America is about 30%

Literature Review: Gravity Estimation

- We follow the seminal work of Anderson and Van Wincoop (2003) and Eaton and Kortum (2002) that build up the econometric estimation from the solution of a microeconomic model.
  1. This early models assume symmetry in the trading costs
  2. Do not take account the no relation between countries (zero values in trade)
  3. Potencial bias by the heteroscedasticity of the error term in the multiplicative form.
- To solve the first two problems a two stage estimation procedure was propose by Helpman, Melitz and Rubinstein (2008) thereafter HMR.
- And to solve the third Poisson maximum likelihood estimator propose by Silva and Tenreyro (2012).

Literature Review: Trade Facilitation

- Hummels (2001) and Djankov et al., (2008). They study the effect of processing time on trade and found that the delay of one day is associated with a reduction in bilateral trade of at least one percent.
- Dutt y Traca (2007) Analyze the consequences of corruption in trade.
- Limao y Venebles (1999) assess the efficient use of infrastructure.
- Dennis and Pastor (2011) show that improving trade facilitation helps promote export diversification
- On the other hand Zaki (2010) evaluates the different aspects of trade facilitation in developing countries and developed through a gravitational model. He estimates ad valorem equivalent rates (EAVs) of administrative barriers to trade. His results shows that average import AVE is 27.5 % and the average for exports is 14.36 %.

Model: Gravity Setup (HMR)

$$Ln(X_{ijt}) = \beta_0 + \alpha_i * Ln(Y_{ot}) + \beta_j * Ln(Y_{pt}) + \lambda_j + \xi_i + \tau_t - \gamma * ln(D_{ijt}) + f(\omega_{ij}) + u_{ij}$$

- Wher X_{ijt} are the exports from i to j at time t, Y_{ot} represents the GDP of the origin country i, Y_p represents the GDP of the origin country j. λ_j, ξ_i are country fix effects and τ_t is the time fix effect.
- In addition ω_{ij} is the variable that corrects for the non-existence of trade and $f(\cdot)$ is the functional form that entry in the gravitational model. The last term u_{ij} is the stochastic error.

Model: Ad valorem equivalents tariffs (AVEs)

$$AVE^{time}_{(f,i,k)} = \frac{\gamma^{time}_{ik}}{\epsilon_{ik}}$$

- Where, $EAV^{time}_{f,i,k}$ is the cost per day associated to the trade f (import o export) from country i due to delay in the processing from k products; γ^{time}_{ik} is the time coefficient of the gravity equation and and the ϵ_{ik} is the demand elasticity of the product k in the country i.

$$AVE_{(i,j,k)} = AVE^{time}_{(x,i,k)} \cdot Days_x + AVE^{time}_{(m,j,k)} \cdot Days_m \quad (1)$$

Data

- The analysis is based on annual data, the source for trade data is the UN Comtrade. This database provides information on the value and quantity of exports at a 6-digit level of disaggregation in the harmonized system between 1998 and 2010 for about 200 countries.
- Product data is taken from the World Bank Database.
- Indicators of continent, region, common language and Mediterranean origin come from the database that has CEPPI this is also the source of different measures of geographical distances between countries.
- The price variables were taken from the IMF database and the observed rate variables come from WITTS.
- The trade facilitation data are obtained from the Doing Business project web page.

Descriptive Statistics

Table: Trade facilitation World 2004-2010

Variable	N	Mean	Std. Dev.	Min	Max
Doc Exp.	5250	5.4	1.5	3	9
Days Exp	5250	20.5	8.5	10	38
Costo Exp.	5250	991.6	342.1	450	1783
Doc Imp.	4674	7.6	3.02	2	21
Days Imp	4674	28.9	20.5	4	117
Costo Imp.	4674	1516.2	968.5	367	6345

Descriptive Statistics cont.

Table: Trade facilitation Central America Average 2004-2010

País	Export			Import		
	Doc	**Days**	**Costo $us**	**Doc**	**Days**	**Costo $us**
Costa Rica	5	19.2	1089	5	19	1122
El Salvador	6.8	16.1	848	7.6	14.8	834
Guatemala	7.9	17.2	1338.8	5.5	19.3	1472.5
Honduras	5	16.8	1209.3	6.3	20.2	1257
Nicaragua	5.1	28.1	1140.2	5.2	27.5	1214.3
Panama	3	10	549.3	3	9	914.8

Estimation: Probability to trade

Table: Probit Centro America

Variable	**Coefficient**	**(Std. Err.)**
Distance	-0.749	(0.012)
GDP_d	0.486	(0.005)
GDP_o	0.526	(0.006)
FTA	0.745	(0.013)
Common Lenguageún	0.334	(0.052)
$Mediterranean_d$	-0.311	(0.013)
Intercept	5.025	(.104)
N	210842	
Log-likelihood	-34368.622	
$\chi^2_{(15)}$	26290.32	

Estimation: Trade Facilitation in days

Table: Trade Facilitation: Panel Centroamérica

Variable	**Coefficient**	**(Std. Err.)**	**(N)**	**(R2.)**
Doc Export	1.088	(.0475)	5250	0.9378
Cost Export	3.98	(.06649)	5250	0.9378
Doc Import	.391611	(.0213)	4674	0.9581
Cost Import	.1530	(.0413)	4674	0.9581

Estimation: Gravity Regressions

Variables	OLS	Poisson	Panel FE	Panel RE	Poisson FE	HMR
Dist.	-0.977	-1.022		-1.036		-1.015
	(15.38)**	(34.66)**		(4.94)**		(6.15)**
Time	0.874	-1.362	-1.576	-1.113	-1.362	-1.363
	(0.96)	(88.21)**	(176.02)**	(56.32)**	(145.41)**	(5.50)**
Time	-1.214	-0.884	-1.038	-1.034	-0.575	-0.576
	(7.75)**	(20.34)**	(5.20)**	(5.19)**	(76.02)**	(6.14)**
GDP_d	0.876	0.653	0.636	0.618	0.619	0.786
	(8.93)**	(67.66)**	(4.34)**	(4.23)**	(24.49)**	(3.72)**
GDP_o	0.96	0.886	0.873	0.862	0.7568	0.551
	(32.11)**	(30.54)**	(19.21)**	(13.56)**	(84.19)**	(8.02)**

$*p \leq 0.05$;$**$ $p \leq 0.01$

Coefficients for control dummy variables not shown

This results are similar that the results reported in Head y Mayer (2015)

Gravity Regressions: Sectors Poisson

Table: Results by groups

Variable	Agriculture	Oil & Mining	Food	Textiles	Chemicals
Dist	-0.997	-1.032	-1.152	-1.554	-1.465
	(5.99)**	-1.68	(10.17)**	(11.13)**	(11.77)**
Tariff	-0.015	-1.099	-0.326	-0.326	-0.153
	-0.13	-1.43	(3.68)**	-1.43	-1.38
$Time_d$	-1.451	-3.979	-0.842	-3.477	-1.639
	(5.83)**	(4.77)**	(5.12)**	(19.55)**	(8.44)**
$Time_o$	-0.918	-0.182	-0.545	0.127	-0.196
	(3.84)**	-0.25	(2.54)*	-0.58	-0.85

Gravity Regressions: Sectors Poisson

Table: Results by groups

Variable	Metals	Machinery & Equipment	Other Manufactures
Dist	-1.442	-1.671	-1.634
	(11.34)**	(8.98)**	(12.44)**
Tariff	-0.251	-0.415	-0.011
	(2.38)*	(3.59)**	-0.13
$Time_d$	-0.209	-2.429	-1.68
	-0.78	(6.72)**	(7.40)**
$Time_o$	0.252	0.66	0.349
	-1.01	(2.16)*	-1.52

Average ad valorem equivalents tariff: Partners

Import/Export	CostaRica	El Salvador	Guatemala	Honduras	Nicaragua	Panama
Costa Rica		28.5	30.5	31.2	32.9	28.1
El Salvador	26.6		26.8	27.5	29.2	24.4
Guatemala	32.7	30.8		33.6	35.2	30.5
Honduras	27.3	25.5	27.5		29.9	25.2
Nicaragua	44.2	42.4	44.4	45.1		42.1
Panama	21.8	20.0	22.0	22.8	24.4	

Table: AVE's

Gravity Regressions: Sectors

Import/Export	EEUU	UE28	Asia Pa	RM	Mexico	RestoAP	RestoALC
Costa Rica	27.2	26.7	27.7	29.8	27.4	28.2	29.2
El Salvador	23.4	23.0	24.1	26.2	23.6	24.3	24.9
Guatemala	29.6	29.2	29.9	32.8	29.7	30.7	32.2
Honduras	24.2	23.8	25.9	25.6	24.4	25.3	26.5
Nicaragua	41.1	40.7	41.9	44.1	41.3	42.5	44.9
Panama	18.3	18.7	20.3	20.6	18.9	19.9	20.9

Table: AVE's

Conclusions

- The results shows that trade facilitation variables summarized in time to produce an import or export (without transport) affects negative the trade performance
- Our estimates with the gravitational model are similar to those reported in the literature Head y Mayer (2015)
- Our calculations shows that the average ad valorem equivalents tariff (AVEs) in Central America is about 30%. This value is higher than the reported by Zaki (2010) for the

Extensions

- Look for a new variables that explain the GPD in the sectorial stimations
- Include other trade facilitation variables