

Estimating cost reductions of multinational activity of a potential Investment Facilitation Agreement

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- 2 Methodology (Gravity)
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Background – A timeline of current negotiation

- The Trade Facilitation Agreement was concluded in 2013, attention now turn to investment
- First breakthrough at the 2016 G20 Summit – 9 non-binding guiding principles for investment policymaking
- At the WTO's 11th Ministerial Conference (2017), 70 Members had signed the 'Joint Ministerial Statement on Investment Facilitation for Development'
- Finally, negotiation formally began on September 2020 with over 100 Members

Overview

The structure of the paper:

- Part 1: estimating costs to investment through a gravity model
- Part 2: express barriers in the form of ad-valorem equivalents (AVEs), and calculated cost reduction based on potential liberalisation scenarios

Our goals:

- A first glance of the potential economic effects of an Investment Facilitation Agreement
- AVEs can be subsequently used as inputs in a CGE-FDI Model
 - linkages with previous presentations

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Estimation Equation

$$\begin{aligned}
 FAS_{ij,k} = \exp(&\beta_1 + \beta_2 Border_{ij} + \beta_3 IFI_i \times Border_{ij} + \beta_4 FDIR_{i,k} \times Border_{ij} \\
 &+ \beta_5 WBDB_i \times Border_{ij} + \beta_6 RGI_i \times Border_{ij} + \beta_7 WGI_i \times Border_{ij} \\
 &+ \beta_8 \ln(DIST_{ij}) + \beta_9 Colony_{ij} + \beta_{10} Religion_{ij} + \beta_{11} ComLang_{ij} \\
 &+ \beta_{12} ComLegal_{ij} + \beta_{13} FTA_{ij} + \beta_{14} EEA_{ij} + \eta_{i,k} + \mu_{j,k} + \epsilon_{ij,k})
 \end{aligned}$$

- We regress foreign affiliate sales on interaction of border dummy and host-country policy variables, identifying such policy variables in presence of country fixed effects
- Country Coverage: 59 host countries and 64 source countries
- ISIC4 Sectoral Coverage: Agriculture (A), Mining and Quarrying (B), Manufacturing (C) and 5 service sectors – Wholesale (G), Transportation (H), Communication (J), Finance (K), Professional (M)

Methodology of the Gravity Model

1. Pseudo Poisson Maximum Likelihood (PPML) estimator to account for zero observations and heteroskedasticity
2. The Investment Facilitation Index (IFI) and several control variables are only available for one year
 - Restricting our estimation to a **cross-sectional** analysis
 - For variables with time dimension (e.g. FATS), 3-year average of 2016-2018 is taken to maximise coverage and reduce volatility
3. To calculate sector-specific AVEs, we run gravity estimation separately for each sector

Methodology of the Gravity Model (Continued)

4. Country-specific variables (which include the IFI) will be absorbed by importer and exporter fixed effects, included to control for multilateral resistance terms

- Solution: include an intra-national element (domestic sales) in the dataset [Heid et al., 2017]
- Constructed as 'extra' observations with symmetric country-pair and distinguished using a border dummy.

Host	Source	Value	Border Dummy
Country A	Country B	FATS	1
Country A	Country C	FATS	1
Country A	Country A	Domestic Sales	0

- Identification of host-specific variables is made possible by interacting with the border dummy: we measure impact of policy variables on FAS relative to sales by domestic firms.

Constructing Domestic Sales

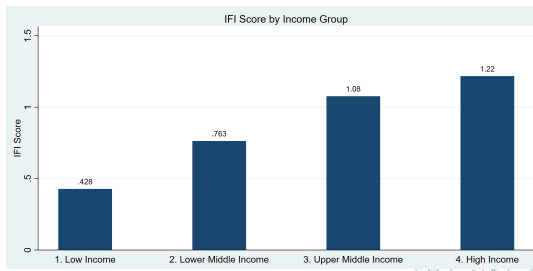
- Concept – domestic sales refer to output of domestically owned firms, the emphasis is on **ownership**, not end consumers
- Domestic Sales = Gross Output – Total Foreign Affiliate Sales
- Data Sources: sectoral gross output at basic prices are collected from the UNSD and OECD

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Key Interest Variable – Investment Facilitation Index

A recap of the IFI [Berger et al., 2019]:

- A measurement of a country's investment climate, focusing on issues of transparency, electronic governance and focal points
- One score per country which ranges from 0 (worst) to 2 (best)
- Available for 68 countries and the year 2018 (Version 1)
- Richer countries generally score higher



Dependent Variable

Three-dimensional (bilateral and by sector) foreign affiliate sales statistics are adopted as dependent variable:

- Data sources: Eurostat FATS database and national sources (e.g. BEA data from the US)
- Turnover is preferred due to greater availability
- Mirrored values are adopted to maximise coverage

What about FDI data?

- FATS provide direct measurement of multinational activities
- Firms covered in FATS must be majority foreign controlled (50% voting right)
- The nationalities of firms are assigned according to their ultimate investor

Control Variables

Control variables can be separated into two groups

First group consists of various country-specific policy indices:

- OECD FDI Restrictiveness Index; World Bank Doing Business Score; Regulatory Governance Index; World Bank Worldwide Governance Indicator
- They represent other barriers to investment and are included to prevent over-estimation of the effect of IFI (omitted variable bias)

Second group consists of bilateral variables (mostly from CEPII):

- Log of distance; Colonial Relationship; Common Language; Religious Proximity Index; Common Legal Origin; FTA; EEA
- Standard controls

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VARIABLES	(1) Pool	(2) A - AGRI	(3) B - MINE	(4) C - MANU	(5) G - WHOREP	(6) H - TPST	(7) J - INFCOM	(8) K - FIN	(9) M - PROF
Investment Facilitation Index	4.816*** (0.987)	1.494 (13.79)	-0.495 (3.185)	4.813*** (1.582)	6.126*** (1.819)	5.182*** (1.363)	1.238 (1.968)	3.466* (1.872)	3.474*** (1.324)
FDI Restrictiveness Index	-6.658*** (0.732)	-435.8 (269.7)	-16.95*** (6.200)	-15.13*** (4.460)	-28.47** (11.81)	-4.623*** (1.038)	-5.354*** (1.170)	4.007 (4.256)	0.120 (1.260)
Doing Business Score	0.00546 (0.0254)	-0.235 (0.183)	0.315*** (0.121)	-0.00132 (0.0417)	-0.0363 (0.0785)	-0.0396 (0.0287)	0.0985*** (0.0358)	-0.0285 (0.0389)	-0.0865** (0.0345)
Regulatory Governance Index	0.579*** (0.208)	0.173 (5.523)	4.394*** (1.266)	0.374 (0.343)	0.304 (0.385)	1.511*** (0.228)	1.279*** (0.402)	1.587*** (0.456)	0.459 (0.291)
Worldwide Governance Index	0.719*** (0.220)	9.074 (6.857)	2.255** (1.075)	0.984*** (0.369)	1.438** (0.589)	1.692*** (0.396)	1.040** (0.425)	1.100*** (0.407)	0.819*** (0.302)
Border Dummy	-12.71*** (1.378)	3.794 (45.79)	-49.41*** (7.084)	-11.70*** (1.795)	-10.82*** (3.592)	-14.88*** (2.097)	-18.94*** (2.896)	-14.23*** (3.121)	-4.762** (2.102)
Log of Distance	-0.773*** (0.0675)	-5.107* (3.069)	-1.045*** (0.293)	-0.711*** (0.0918)	-0.581*** (0.0921)	-1.255*** (0.104)	-0.635*** (0.119)	-0.688*** (0.143)	-0.788*** (0.144)
Colonial Relationships	-0.181 (0.151)	0.791 (1.204)	0.210 (0.450)	-0.128 (0.221)	0.0134 (0.127)	-0.0557 (0.206)	-0.715** (0.278)	0.321 (0.256)	0.417 (0.337)
Common Language	0.470*** (0.141)	1.563 (1.239)	0.452 (0.571)	0.990*** (0.221)	-0.182 (0.172)	0.215 (0.203)	0.732*** (0.216)	-0.0579 (0.257)	0.848*** (0.249)
Religious Proximity Index	0.730*** (0.199)	-1.289 (3.149)	1.105* (0.632)	0.822*** (0.284)	1.090*** (0.330)	0.637** (0.298)	0.659 (0.454)	0.0387 (0.507)	-0.754* (0.412)
Common Legal Origin	0.339*** (0.0695)	-0.587 (1.057)	0.192 (0.520)	0.203** (0.0933)	0.476*** (0.113)	0.336** (0.158)	0.535*** (0.150)	0.464** (0.215)	0.184 (0.135)
Free Trade Agreement	-1.407*** (0.184)	2.921 (2.844)	-0.211 (0.622)	-1.366*** (0.229)	-0.616** (0.257)	-2.098*** (0.326)	-1.364*** (0.283)	-1.490*** (0.309)	-1.645*** (0.376)
European Economic Area	-0.605*** (0.163)	-8.261 (5.897)	0.0719 (0.515)	-0.855*** (0.247)	0.575** (0.245)	-1.286*** (0.270)	-0.689* (0.354)	-0.0422 (0.298)	-0.769** (0.303)
Observations	8,988	556	1,165	1,296	1,270	1,305	1,299	787	1,310
Host-sector F.E.	Yes	No	No	No	No	No	No	No	No
Source-sector F.E.	Yes	No	No	No	No	No	No	No	No
Host F.E.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Source F.E.	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Robust standard errors in parentheses



Robustness Checks

1. Following [Benz and Jaax, 2020], include 'Services Trade Restrictiveness Index' from the OECD and WB/WTO as additional controls for service sectors
 - The newly added STRIs are not statistically significant in most sectors, coefficients of other variables are largely unchanged
 - Implication: current control variables for service sector are sufficient
2. Removing policy indices (i.e. country-specific control variables) from the model specification
 - Very noticeable increase in the magnitude of the IFI coefficients. Mining (B) and Communication (J) sector also turned significant
 - Implication: trade off between multicollinearity and omitted variable bias

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Calculation of AVEs

Formula:

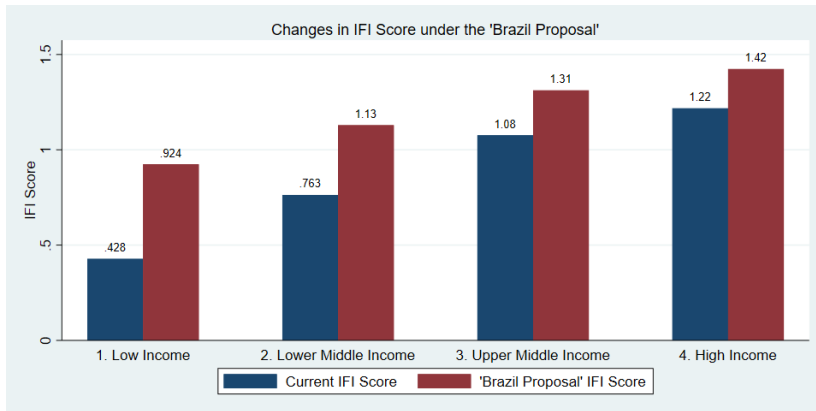
$$AVE_{ik}^{\Delta IFI} = \exp \left(\frac{(IFI_{ik}^{new} - IFI_{ik}^{old}) * \beta_{IFI,k}}{(1 - \sigma)} \right) - 1$$

- Based on FAS Armington demand with τ_{ijk} per unit costs of operating as a multinational firm:

$$FAS_{ijk} = \left(\frac{\tau_{ijk} p_{ik}}{P_{jk}} \right)^{1-\sigma} E_{jk}$$

- The IFI coefficients, $\beta_{IFI,k}$, come for the gravity estimation
- The improvements in IFI score (i.e. liberalisation scenario) for each country is provided by [Berger et al., 2019] based on a draft treaty proposed by Brazil in early 2018
- The one remaining component needed to calculate AVEs is the elasticity of substitution – σ

Liberalisation Scenario (Brazil Proposal)



- Lower income countries will see higher gains

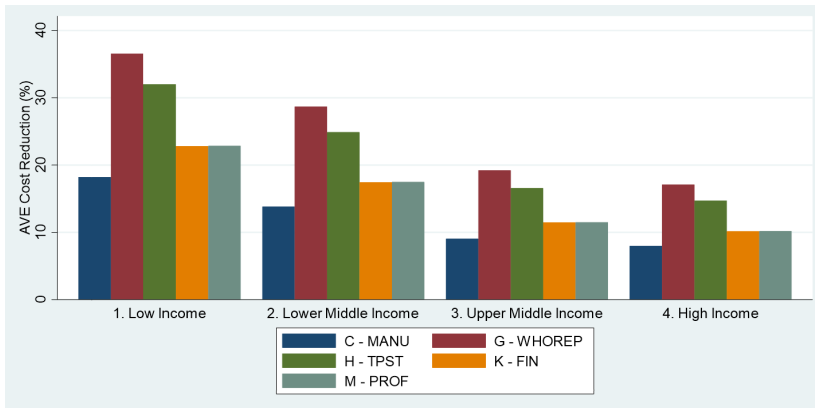
Calibration of σ

1. There is a lack of literature calculating the substitution elasticity between the products of domestically owned firms and foreign affiliates
2. Instead, we adopted the elasticity of substitution for trade in the GTAP database and multiply them by two to be consistent with the values in CGE simulations
 - According to the GTAP-FDI module, the doubling of elasticity is to reflect firm level product differentiation [Lakatos and Fukui, 2014]
 - With a different assumption on σ , the AVEs can easily be adapted

INPUTS	(1) A - AGRI	(2) B - MINE	(3) C - MANU	(4) G - WHOREP	(5) H - TPST	(6) J - INFCOM	(7) K - FIN	(8) M - PROF
Elas_Trade	4.76	11.83	6.41	3.8	3.8	3.8	3.8	3.8
Elas_FATS	9.52	23.66	12.82	7.6	7.6	7.6	7.6	7.6

3. Due to lower elasticities, the gains will be higher in service sectors

Results



- Based on benchmark specification – Agriculture (J), Mining (B) and Communication (K) are excluded (not statistically significant)

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Key Takeaways

1. A country's investment environment, as proxied by the IFI, is relevant for attracting FDI and foreign affiliates
 - And this apply to most sector as well
2. Lower income countries generally have lower IFI score and therefore have the most to gain from joining the treaty negotiation
3. When costs are expressed as AVEs, due to lower substitution elasticity (σ), at the sectoral level most of the cost reduction are centred in service sectors

Upcoming Plans

1. Investment Facilitation Index (comparing with version 1 of 2019):
 - Greater country coverage from 68 to more than 100 WTO Members
 - Reconfiguration of measures
 - More up-to-date liberalisation scenarios
2. Expanding sectoral coverage:
 - Detailed 2-digit output data from UNIDO allows the disaggregation of manufacturing sector into five sub-sectors
 - Updated data from the OECD brings in four additional service sectors
3. Input the calculated AVEs into a GTAP-FDI model to study the wider economic impacts of the treaty

Thank You!

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