

# *On the Interaction between Trade Liberalization on EGS and the Factors markets when reducing CO2 emissions: A CGE evaluation for Argentina, Brazil and Chile*

M. Priscila Ramos and Omar O. Chisari



**arnoldshain** Seminar  
“Institutions, Trade, and Economic Policy”

3 - 6 October 2016

Córdoba and La Cumbre, Argentina

# 1. Motivation

## *EGS trade liberalization negotiations*

- Triple win objective for development, trade and the environment.
- From WTO multilateral EGS negotiation to a plurilateral EGA (17).
- Modalities of Tariffs cut on EGS: APEC list, MFN, SDT

The list approach	Other approaches
The OECD list	The environmental project approach
<b>The APEC list (54 non-agri products)</b>	<b>The request-offer approach (BRA)</b>
The Japan list	<b>The integrated approach (ARG)</b>
The UNCTAD-EPP list	<b>The combined approach (CHI)</b>
	The hybrid approach

- Argentina, Brazil and Chile do not participate of these plurilateral EGA negotiations for now.



Which are the reasons to participate?

# 1. Motivation (cont.)

## *Total CO2eq emissions by country*

	ARG	BRA	CHI
Energy (S2)	50%	17%	97%
Fuels (S2,S4)	0.273	0.156	0.359
Manufactures (S3)	0.137	0.242	0.228
Transport (S5)	0.265	0.420	0.295
Others (S1,S6,HH)	0.243	0.135	0.093
Fugitive Emissions (S2)	0.082	0.046	0.025
Industry (S3)	6%	4%	9%
Agriculture + LULUCF (S1)	38%	78%	-10%
Waste (S1,S2,S3,HH)	7%	1%	4%
Total	100%	100%	100%

# 1. Objective (cont.)

- 1) To evaluate the effects of the **plurilateral EGA** (EGS tariffs elimination) on:
  - **trade**,
  - **Welfare** and
  - the **environment** (CO<sub>2</sub> emissions)according to possible scenarios
  - **EGA 17** (without the active participation of Argentina, Brazil and Chile)
  - **EGA 20** (without the active participation of Argentina, Brazil and Chile)
- 2) To analyze the sensitivity of results to different factors' market assumptions:
  - **Labor** (unemployment with wages rigidities vs. full employment)
  - **Capital** (low/high mobility across sectors)



How do we address these questions?

## 2. Methodological Approach

### *Modelling assumptions*

- 3 static CGE models, one by country (small economies)
- 4 agents, which optimize their consumption/production decisions under constraints:
  - Households, 2 types poor and rich (2-level nested Utility function),
  - Firms, 6 types of sectors: Agriculture (S1), Energy/Mining (S2), **Industry (S3)**, Electricity/Water (S4), Transport (S5) and Services(S6), (nested Production function-> CI and VA Leontief)
  - Government and the Rest of the World
- 2 factors :
  - labor (**unemployment** due to **constant real wages** restriction)
  - capital (mainly fixed and a **lower proportion mobile** across sectors according to the sector return to capital)

## 2. Methodological Approach (cont.)

### *Modelling assumptions (cont.)*

- Traditional closure assumptions
  - saving-driven investment,
  - endogenous RER given the CC equilibrium,
  - endogenous unemployment rate given wages indexation, and
  - perfect competition conditions in other goods, services and factor markets.
  - *numeraire*: remuneration of the foreign factor
- Environmental indicators:
  - Total CO2 emissions index (decomposed in scale and composition effects) and
  - Kuznets index of CO2 emissions

## 2. Methodological Approach(cont.)

### *Calibration data*

- **SAMs** to Argentina and Chile (2006) and Brazil (2008)

### *Simulated EGA scenarios*

- **EGA 17**: Tariff elimination on EGS in the 17 countries engaged on the plurilateral EGA negotiations
  - Increase in EGS (S3) international prices (5%) assuming these countries (Rest of the World) are important players in the EGS international markets and their initial tariffs are already low.
- **EGA 20**: Additional tariff elimination on EGS in Argentina, Brazil and Chile
  - Elimination of tariffs on EGS = Manufactures(S3), assumed as relatively “clean” products.

### *Changes in factors' market assumptions*

- **Labor** :
  - **Full employment**
  - Unemployment due to **Constant Nominal wages** in terms of the international currency
- **Capital** :
  - 50 % of capital becomes mobile across sectors in each country.

# 3. Findings

## A) Main Results

### Macroeconomic and Environmental impacts of EGA

	Argentina		Brazil		Chile	
	EGA 17	EGA 20	EGA 17	EGA 20	EGA 17	EGA 20
GDP	2.93	3.48	2.15	2.62	1.75	1.84
Exports	8.81	9.96	10.25	11.84	4.32	4.46
Imports	10.28	11.79	9.49	10.94	5.22	5.42
Households' Welfare (av. rate)	3.18	4.05	2.22	2.84	2.28	2.51
Unemployment (av. rate )	9.12	8.82	5.35	4.59	3.44	4.89
CO2 Emissions	1.28	1.61	0.99	1.31	5.95	6.15
<i>Scale effect</i>	2.23	2.80	2.13	2.78	1.96	6.05
<i>Composition effect</i>	-0.95	-1.19	-1.14	-1.47	3.99	0.11
Kuznets index of CO2 Emissions	-1.60	-1.80	-1.13	-1.28	4.13	4.24



### 3. Findings (cont.)

#### *B) Sensitivity to change in factors' markets assumptions*

##### Full labor employment

	Full employment					
	Argentina		Brazil		Chile	
	EGA 17	EGA 20	EGA 17	EGA 20	EGA 17	EGA 20
GDP	1.13	1.16	0.81	0.87	0.08	0.06
Exports	8.35	9.00	8.38	9.36	2.54	2.56
Imports	10.09	11.08	7.78	8.69	3.50	3.58
Households' Welfare (av. rate)	1.35	1.69	0.92	1.14	0.65	0.76
Unemployment (av. rate )						
CO2 Emissions	0.32	0.37	0.33	0.44	4.67	4.79
<i>Scale effect</i>	-1.82	-1.99	-2.14	-2.03	2.04	2.11
<i>Composition effect</i>	2.14	2.36	2.47	2.47	2.63	2.68
Kuznets index of CO2 Emissions	-0.81	-0.78	-0.47	-0.42	4.59	4.72

### 3. Findings(cont.)

#### *B) Sensitivity to change in factors' markets assumptions (cont.)*

Unemployment with Fixed Nominal wages in terms of the international currency

	Constant Nominal Wages					
	Argentina		Brazil		Chile	
	EGA 17	EGA 20	EGA 17	EGA 20	EGA 17	EGA 20
GDP	8.70	9.64	5.03	5.09	4.23	4.36
Exports	15.02	16.63	14.30	15.35	6.90	7.07
Imports	16.56	18.55	13.17	14.14	7.69	7.93
Households' Welfare (av. rate)	8.62	9.89	5.01	5.23	4.69	4.95
Unemployment (av. rate )	5.99	5.45	0.00	0.00	3.44	3.36
CO2 Emissions	4.19	4.72	2.41	2.53	7.63	7.86
<i>Scale effect</i>	7.96	8.92	2.11	2.12	3.67	3.78
<i>Composition effect</i>	-3.78	-4.21	0.30	0.41	3.96	4.08
Kuznets index of CO2 Emissions	-4.15	-4.49	-2.50	-2.44	3.26	3.36

### 3. Findings(cont.)

#### *B) Sensitivity to change in factors' markets assumptions (cont.)*

##### Greater proportion of mobile capital across sectors

	Argentina		Brazil		Chile	
	EGA 17	EGA 20	EGA 17	EGA 20	EGA 17	EGA 20
GDP	3.97	4.55	2.40	2.95	3.17	3.31
Exports	12.31	14.08	12.71	14.67	5.84	6.07
Imports	14.49	16.80	11.95	13.76	7.00	7.32
Households' Welfare (av. rate)	4.21	5.17	2.48	3.18	3.84	4.13
Unemployment (av. rate )	8.65	8.32	5.04	4.18	2.47	2.43
CO2 Emissions	-1.80	-1.19	1.83	2.45	9.90	10.26
<i>Scale effect</i>	3.24	3.84	2.39	3.11	3.38	6.73
<i>Composition effect</i>	-5.04	-5.03	-0.56	-0.66	6.53	3.53
Kuznets index of CO2 Emissions	-5.55	-5.48	-0.56	-0.49	6.53	6.72

## 5. Final Remarks

### *Main conclusions*

1. EGA scenarios: not enough to for a triple win situation because carbon emissions could increase even when some negative composition effect appears.
2. Labor market modelling and CO2 emissions: look for a real and accurate model assumptions to avoid unreal and misestimated results.
3. Greater capital mobility across sectors combined with positive unemployment and constant real wages could reduce carbon emissions through a large composition effect.

## 5. Final Remarks (cont.)

### *Methodological limitations*

- Data:
  - Imperfect correspondence and aggregation in CO2 emissions and sectors' data
- Modeling assumptions:
  - No technological transmission and change (no latent “clean” technologies)
  - Static version (no domestic and foreign investment in “clean” sectors)

### *How can we improve proposals to be close to a triple win situation?*

- Improving detailed data and modelling to evaluate the scenarios
- Identifying a list of potential EGS to Argentina, Brazil and Chile
- Enlarging trade liberalization to NTBs and taking into account FDI, financial aids and technological transfers to countries with lower level of development.

Thank for your attention  
Comments and questions are welcome!