

Estimating the impact of quantitative export restrictions on agricultural trade and prices

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Introduction

- In past years, there has been a raising concern on the implementation of export restrictive measures, specially on agriculture products and natural resources.
- Export restrictions on agriculture are applied for a number of reasons, among them food security concerns.
- In recent years, even in a context of decreasing food prices, the number of measures applied and the number of countries imposing export restrictions has increased.
- Quantitative export restrictions account for more than 60% of export restrictions.
- In a partial equilibrium analysis, export restrictions reduce domestic prices, reduce domestic production and reduce exports. What happens in general equilibrium?

Objectives

- Analyze recent trends in the implementation of new export restrictive measures
- Estimate ad valorem equivalents of quantitative restrictions, in order to
 - i) assess to which extent restrictions are binding and have an impact on trade
 - ii) compute a measure of export restriction by country, product and type of QER
 - iii) provide a valuable input that can be used in CGE models.
- Analyze the impact of introducing quantitative restrictions in a global general equilibrium model

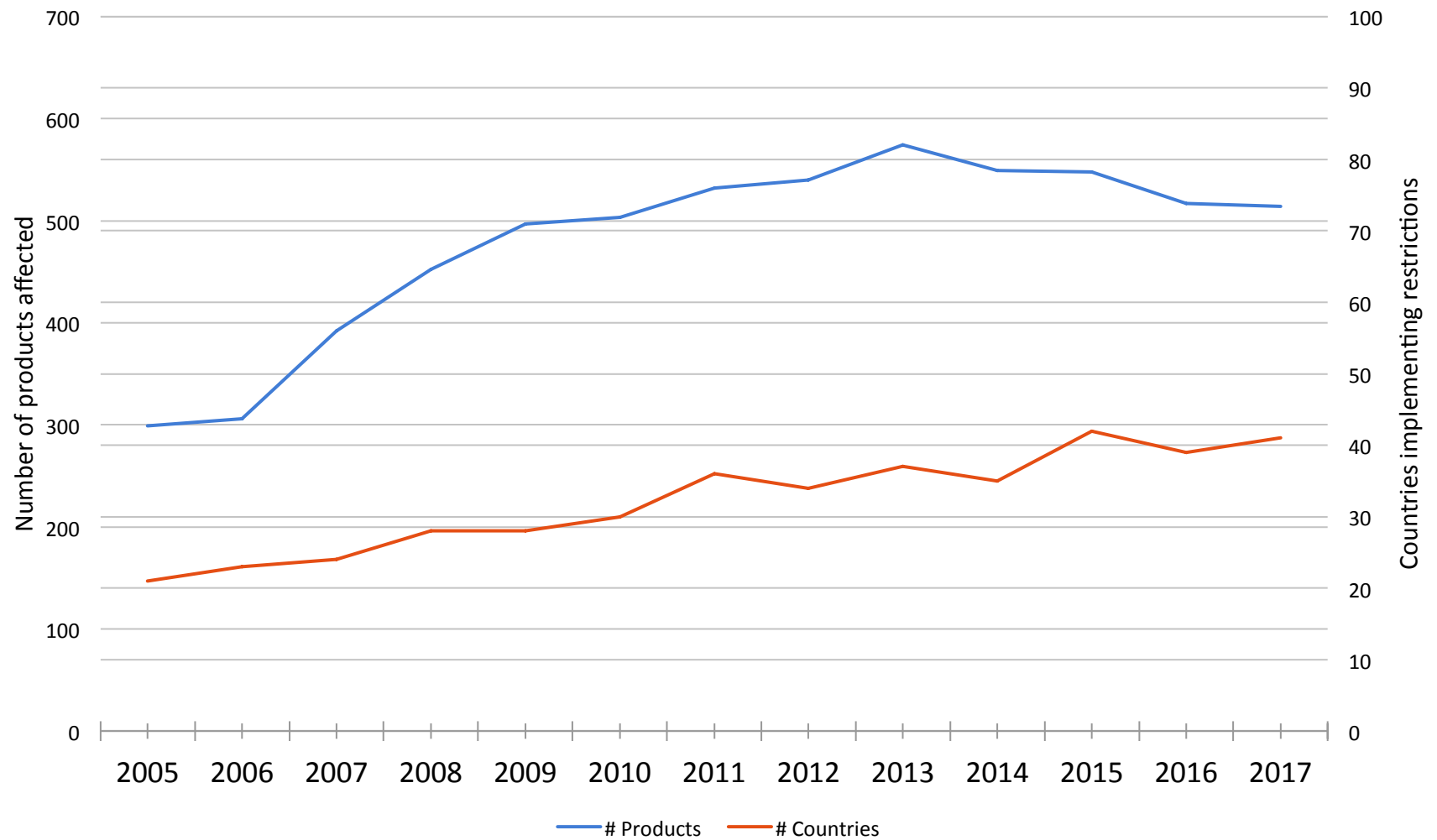
Literature

- Some studies on the general equilibrium impact of export taxes (Laborde et al. 2013; Solleder 2013; Beckman et al. 2019)
- Fewer studies analyze the impact of other export restrictions
 - Estrades et al. (2017) evaluate the impact of all type of export restrictions in agricultural trade using panel gravity estimations. Their results show that between 2005 and 2013, quantitative export restrictions had an impact on prices of some agricultural products, among them cereals, dairy products, oilseeds, and edible preparations.
- Ad valorem equivalent estimations
 - AVE of non-tariff measures (Kee, Nicita & Olarreaga 2009; Kee & Nicita 2016; Cadot, Gourdon & van Tongeren 2018)
 - AVE of barriers to services (Fontagné et al. 2016; Jafari and Tarr 2017)

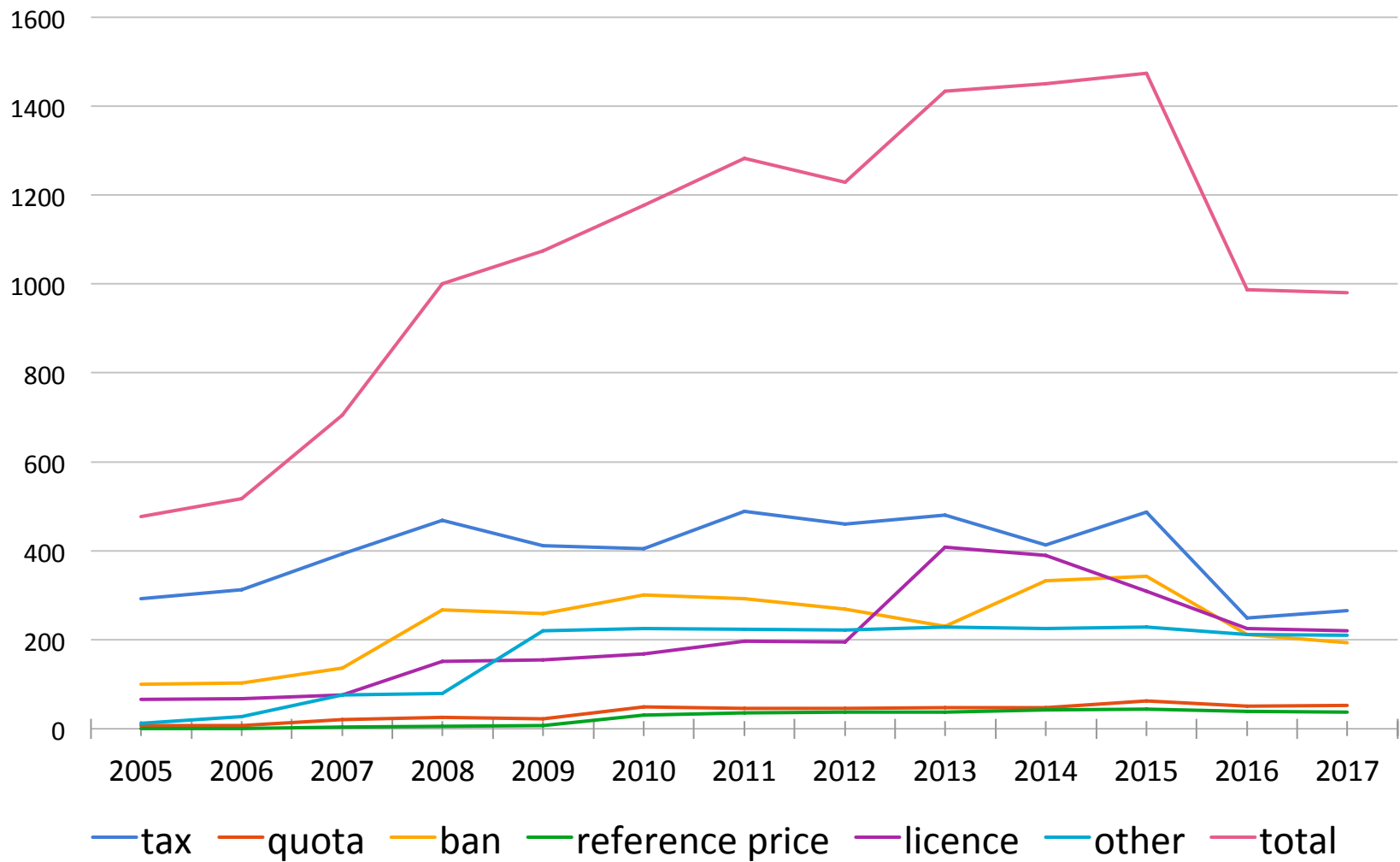
ERA database

- Export restriction in agriculture (ERA) database (Estrades et al. 2017)
- All types of export restrictions (taxes, bans, quotas, non-automatic licenses, and other restrictions) applied globally to all agriculture products (6 digit HS2002)
- The database includes information on the number of days the measure was on, and the reason it was implemented.
- Coverage 2005-2014- update to 2017
- Publicly available: <http://cienciassociales.edu.uy/departamentodeeconomia/wp-content/uploads/sites/2/2017/05/ERA-database.xlsx>

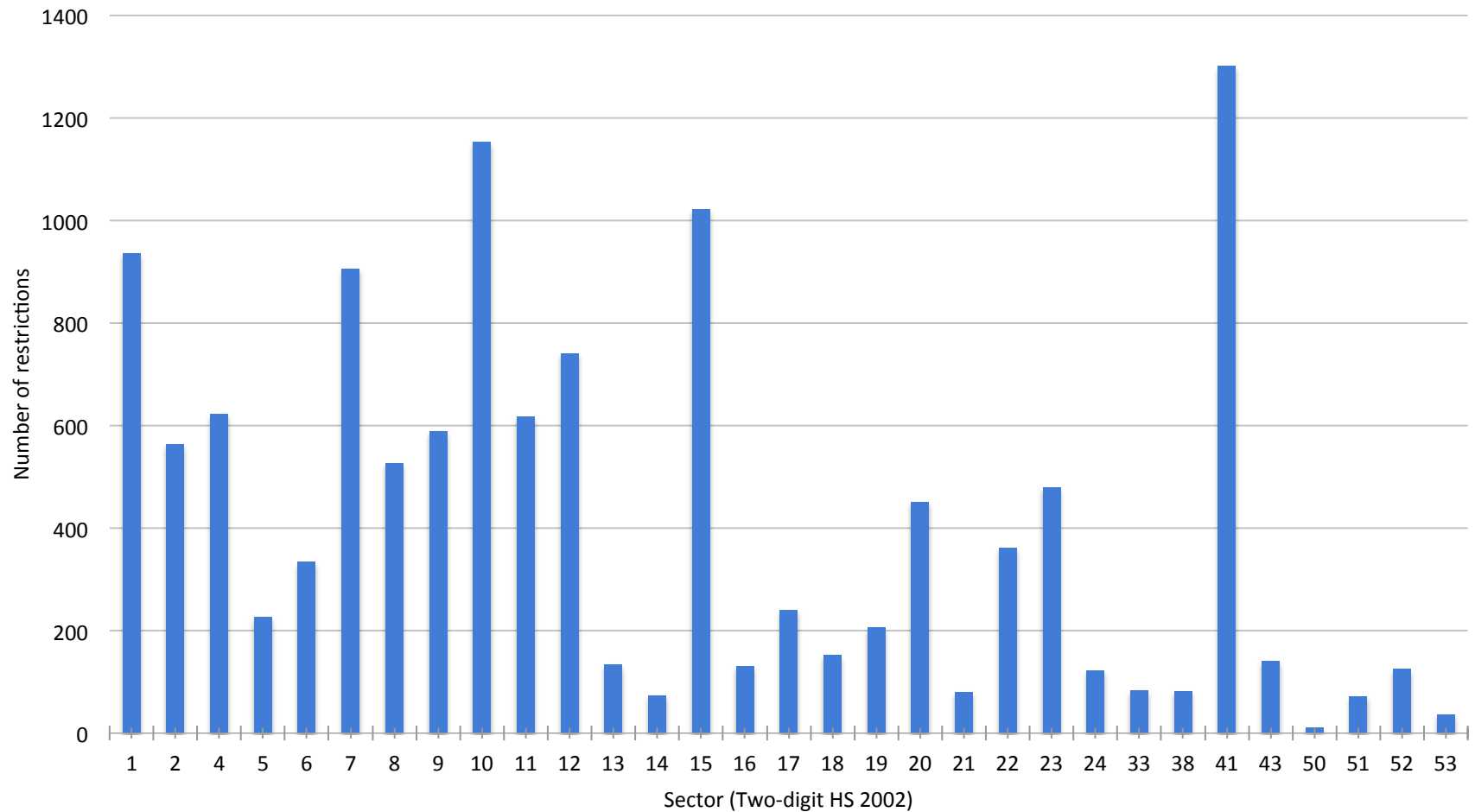
Total export restrictions 2005-2017



By type of measure



By HS chapter



AVE estimation: Econometric specification

- We follow Cadot et al. (2018) approach and we estimate a gravity equation in unit values, to get the price effect without the need of export supply elasticities

$$\ln uv_{ijk} = \beta_0 + \beta_{1ijk} ER_{ijk} + \beta_{2ijk} (ER_{ijk} s_{ik}) + \beta_{3ijk} (ER_{ijk} s_{jk}) + \beta_{4ijk} \ln(1 + t_{ijk}^e) + \beta_{5ijk} \ln(1 + t_{ijk}) + \beta_5 \delta_i + \beta_6 \delta_j + \beta_7 \delta_{ij} + \mu_{n,c}$$

s_{ik} and s_{jk} are the shares of i and j in world trade of product k

δ_i and δ_j are countries' characteristics

Δ_{ij} are country pairs characteristics

t_{ijk}^e are export taxes

t_{ijk} are import tariffs

ER_{ijk} is the export restriction variable:

- 1 if there is a ban
- 0.5 if there is a quota
- 0.2 if there are other restrictions

AVEs & Data

- We estimate the gravity equation by GTAP sector and exporting country, and we obtain the AVE:

$$AVE^{igtap} = \exp(\beta_1 + \beta_2 s_{ik} + \beta_3 s_{jk}) - 1$$

- Data:
 - Export restrictions and export taxes: ERA database
 - Import tariffs: TRAINS
 - Trade data: BACI
 - Countries' characteristics: CEPII, WDI
 - Gravity variables: CEPII

Results

- 79 statistically significant AVEs with the expected sign
- 15 countries
 - Countries with higher rates: China, Argentina, Australia, India, Russia, Vietnam
- 17 GTAP sectors
 - Sectors with higher rates: Forestry, Vegetables and fruits, Cereal grains, Animal products, Oilseeds, Crops

Ad valorem equivalents of export restrictions

Rates above 10%

Country	GTAP sector	AVE rate (%)
China	Vegetables & fruit	94.7
Argentina	Coarse grains	68.6
China	Forestry	47.1
Argentina	Oilseeds	35.6
India	Other animal products	22.5
Australia	Other animal products	19.6
Argentina	Vegetable oils and fats	17.1
China	Other crops	16.7
Russia	Coarse grains	16.0
Ukraine	Coarse grains	15.0
China	Other animal products	14.5
Kazakhstan	Wheat	13.4

GTAP Data/Model

- 2014-prerelease 3 database
 - Aggregate regions/sectors based on what products/countries use export interventions (32 regions/countries)
 - Results are those who use export interventions vs those who do not
- Basic GTAP model... how to model export interventions?
 - Export taxes would be straightforward (*txs*), but, how to model an export ban vs export quota?
 - For this work we use a single AVE, applied to *ams*, the iceberg trade cost variable in GTAP
- Model considers changes to exports, production, and welfare if export interventions (but not taxes) are in place
- Static model; medium term closure

Impact on prices (% change)

	Global	Regions using interventions	Regions not using interventions
<i>Products with interventions</i>			
Paddy rice	-0.18	-0.50	0.23
Wheat	-0.07	-0.47	0.39
Coarse grains	1.04	-0.69	1.80
Vegetables & fruit	0.28	-0.83	1.57
Oilseeds	0.47	-1.37	1.59
Cattle	0.12	-0.25	0.35
Other animals	0.09	-0.58	0.85
Beef	0.13	-0.22	0.27
Other meat	0.23	-0.24	0.49
Processed sugar	0.00	-0.43	0.20
Processed rice	-0.12	-0.31	0.28
Vegetable oil	0.20	-0.46	0.90
Processed food	0.26	-0.20	0.49
Beverages & tobacco	0.06	-0.26	0.22
Fishing	-0.16	-0.44	0.05
Chemicals, rubber, plastics	0.04	-0.11	0.12
<i>Other agriculture</i>	-0.10	-0.76	0.33
<i>Nonagriculture</i>	-0.01	-0.20	0.09

Impact on exports (% change)

	Global	Regions using interventions	Regions not using interventions
<i>Products with interventions</i>			
Paddy rice	-0.65	-4.93	0.55
Wheat	-0.16	-2.15	0.87
Coarse grains	4.47	-17.21	12.87
Vegetables & fruit	-1.09	-29.30	4.45
Oilseeds	1.16	-15.82	3.95
Cattle	-0.01	-0.23	0.03
Other animals	-0.59	-28.90	9.10
Beef	0.09	2.24	-0.97
Other meat	-0.62	-15.68	0.35
Processed sugar	-0.15	-2.19	0.18
Processed rice	0.79	-0.10	1.96
Vegetable oil	0.80	-1.87	2.42
Processed food	0.00	1.36	-0.34
Beverages & tobacco	-0.04	1.21	-0.15
Fishing	-0.30	0.61	-0.50
Chemicals, rubber, plastics	-0.25	-6.14	0.77
<i>Other agriculture</i>	0.11	-0.83	0.30
<i>Nonagriculture</i>	-0.01	0.80	-0.27

Impact on production (% change)

	Global	Regions using interventions	Regions not using interventions
<i>Products with interventions</i>			
Paddy rice	-0.10	-0.06	0.07
Wheat	-0.02	-0.32	0.57
Coarse grains	-0.09	-1.81	2.66
Vegetables & fruit	-0.05	-0.61	1.53
Oilseeds	-0.34	-2.20	2.19
Cattle	0.08	0.27	-0.16
Other animals	-0.10	-0.69	1.06
Beef	-0.07	0.19	-0.21
Other meat	-0.12	-0.22	-0.04
Processed sugar	-0.12	-0.23	0.05
Processed rice	-0.10	-0.04	0.18
Vegetable oil	0.11	0.12	1.15
Processed food	-0.08	0.06	-0.17
Beverages & tobacco	-0.05	0.02	-0.08
Fishing	-0.04	0.10	-0.13
Chemicals, rubber, plastics	-0.01	-0.71	0.52
<i>Other agriculture</i>	-0.10	-0.09	0.00
<i>Nonagriculture</i>	-0.01	0.10	-0.06

Impact on real GDP and welfare

		Real GDP	Welfare			Real GDP (%)	Welfare
		(% change)	(\$ million)			change)	(\$ million)
Export intervention users	Australia	-0.01	-372	Non users	Oceania	-0.02	183
	China	-0.02	-4,814		DevAsia	-0.05	-3,727
	Indonesia	-0.11	-508		EastAsia	-0.18	-889
	Vietnam	-0.66	-942		SouthAsia	-0.23	-514
	India	-0.11	-8,306		Canada	-0.01	407
	Pakistan	-0.11	-204		USA	-0.01	1,814
	Argentina	-0.09	-5,554		Mexico	-0.01	-7
	Bolivia	-0.09	11		Brazil	-0.02	1,292
	Venezuela	-0.07	-294		SouthAm	-0.07	201
	Uruguay	-0.12	84		CentralAm	-0.04	15
	Russia	-0.02	-614		EUEFTA	-0.02	-1,864
	Ukraine	-0.03	-76				
	Kazakhstan	-0.04	-171		EasternEur	0.00	78
	Belarus	-0.02	5				
	Egypt	-0.20	-466		FormerUSSR	-0.08	-2,463
	Morocco	-0.26	-169		Africa	-0.10	-1,431
	IvoryCoast	-0.08	-31				
	Mauritius	-0.28	-17				

Final remarks

- Quantitative export restrictions represent 60% of total export restrictions.
- They comprise a wide range of measures, some with low impact and some with high impact on agricultural markets.
- Ad valorem equivalent rates of these measures can be high for some products and countries.
- Average AVE rate estimated 6.8% (average export tax 2.5%)
- Overall, export restrictions increase prices and reduces production of agriculture products, but some agricultural exporters benefit from the imposition of the measures.
- Global welfare losses due to export restrictions: 29 billion USD

Moving forward

- Controlling for endogeneity
- Estimating AVE separately for bans, quotas and other restrictions
- How to incorporate the different restrictions in GTAP model
- Estimating AVE for different periods (2005-2007/2008-2011/2012-2015)
- Compare results with impacts from export taxes

Thank you!

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