

6th Botin Foundation Water Workshop (6BFWW)

“Integrated Water Resource Management in the XXI Century”

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Virtual water trade, food security and sustainability: Latin America and Spain

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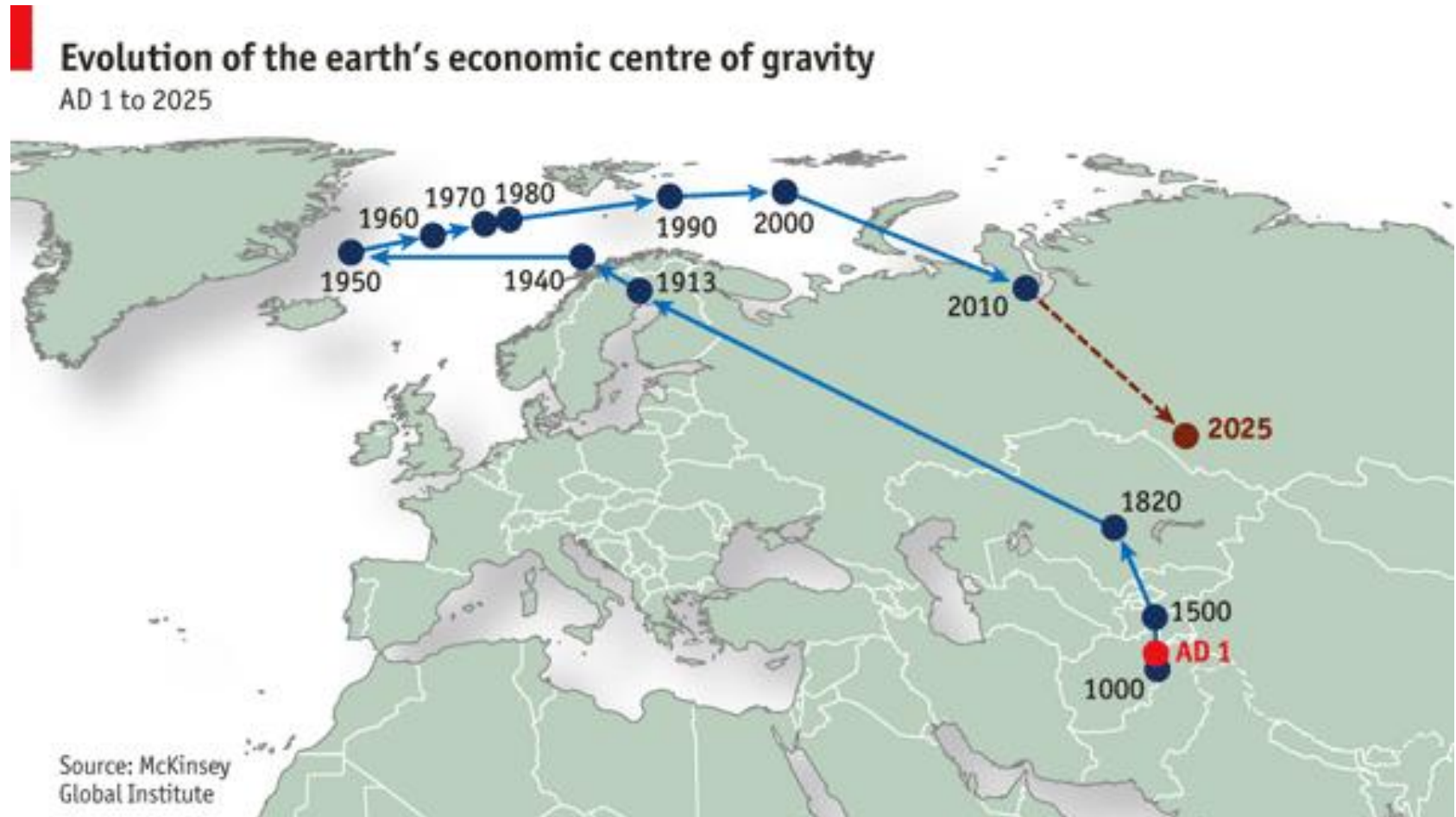
²CEIGRAM, Universidad Politécnica de Madrid

1. World Trends
2. Why trade matters for water resources
3. Impacts of trade in LA
4. Impacts of trade in Spain
5. Policy Implications
6. Pros and cons of regulating trade
7. Concluding remarks

1. World Trends

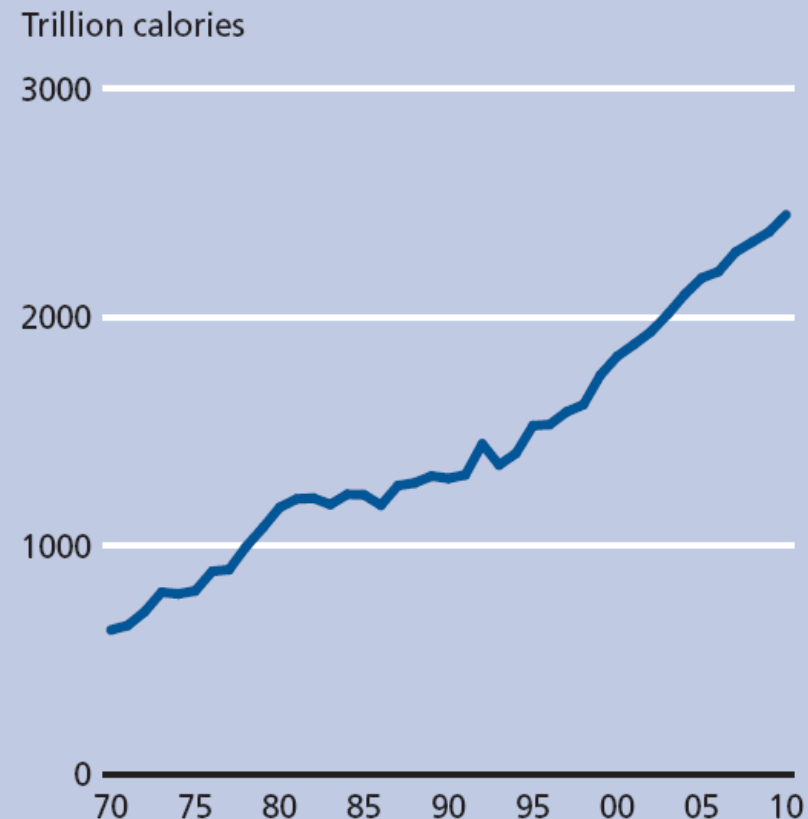
- ☐ Trade growth
- ☐ Changes in diets
- ☐ Population growth
- ☐ Urbanization - 70% of the world population will be urban by 2050
- ☐ Climate change
- ☐ Increasing reliance on less countries

1. World Trends



1. World Trends

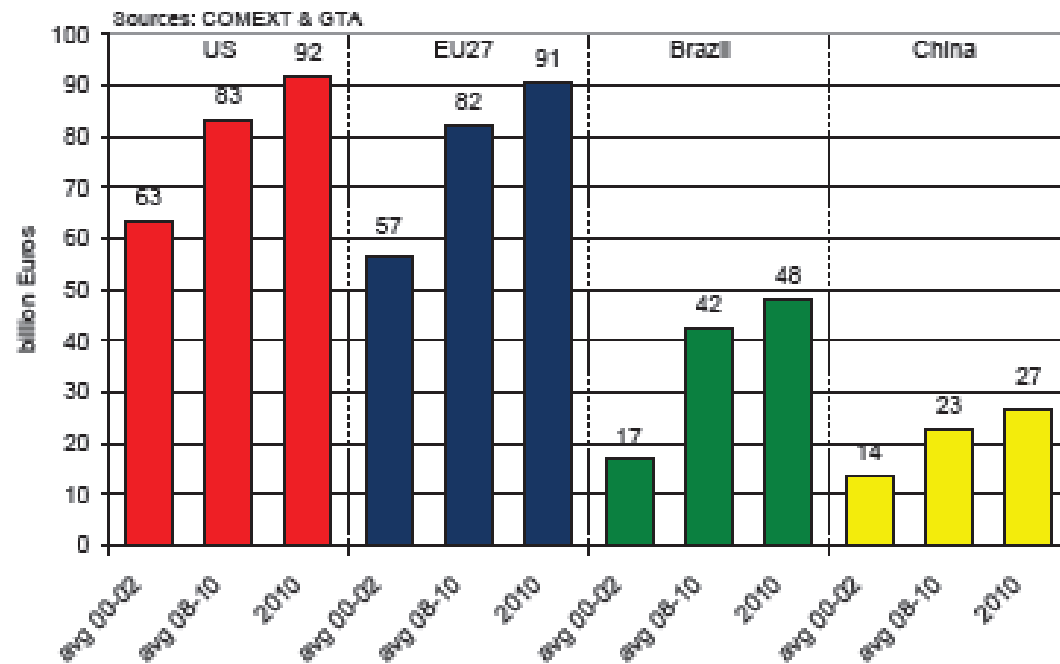
Figure 3.2: Global food trade (trillion calories): 1970-2010



Fuente: Prakash and Christopher L. Gilbert. Cap 3. FAO (2010)

1. World Trends

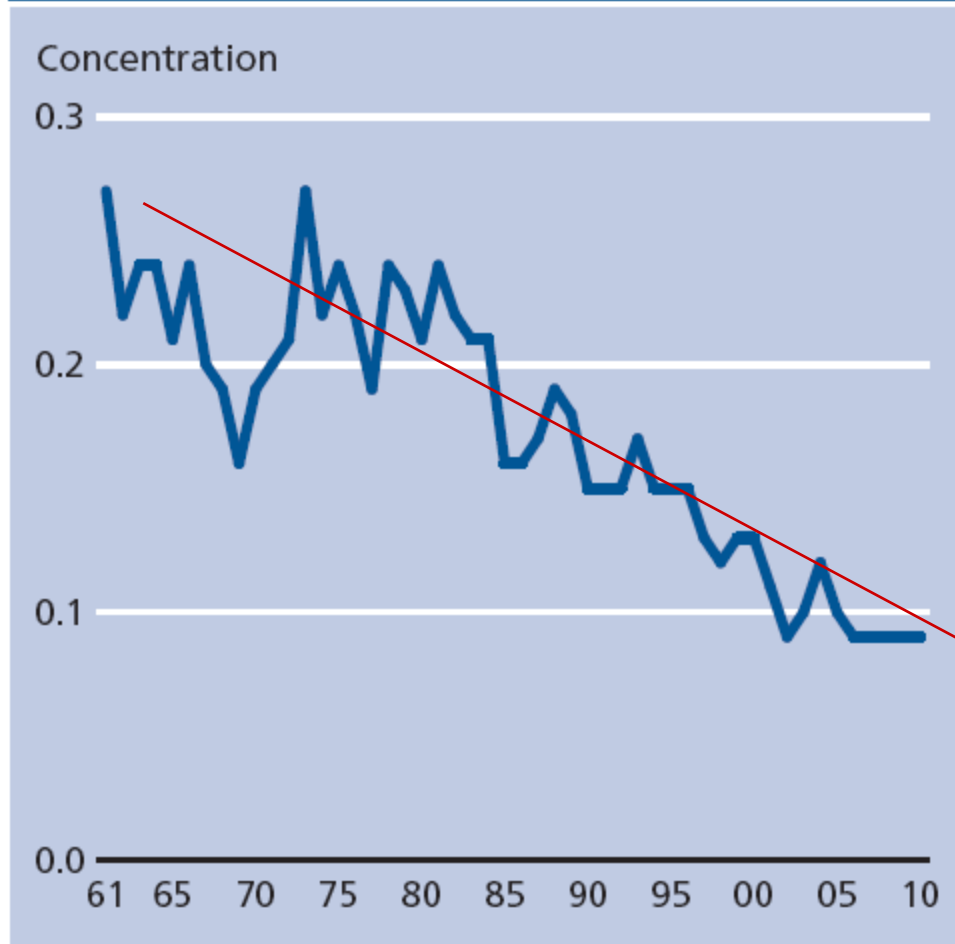
Graph 1: EU27, US & Brazil and China - Agricultural Exports



Fuente: Monitoring Agri-trade Policy (MAP)
E Commission (2011)

1. World Trends

Figure 3.7: Geographical concentration in the global cereal market (1961-2010)



**More trade
More countries'
concentration**

Fuente: Prakash and Christopher L. Gilbert. Cap 3. FAO

1. World Trends

	Pop (mill.)	Disposable income \$ / día (% de pop)					
		<1.25\$	1.25-2\$	2-13\$	>13\$		
Total (2005)	5454	25.7	-200	21.3	48	+1303	4.5
Total (1990)	4362	41.7	21.7	32.7	3.7		

Fuentes: Chen y Ravallion (2008) y Ravallion (2009)

1. World Trends

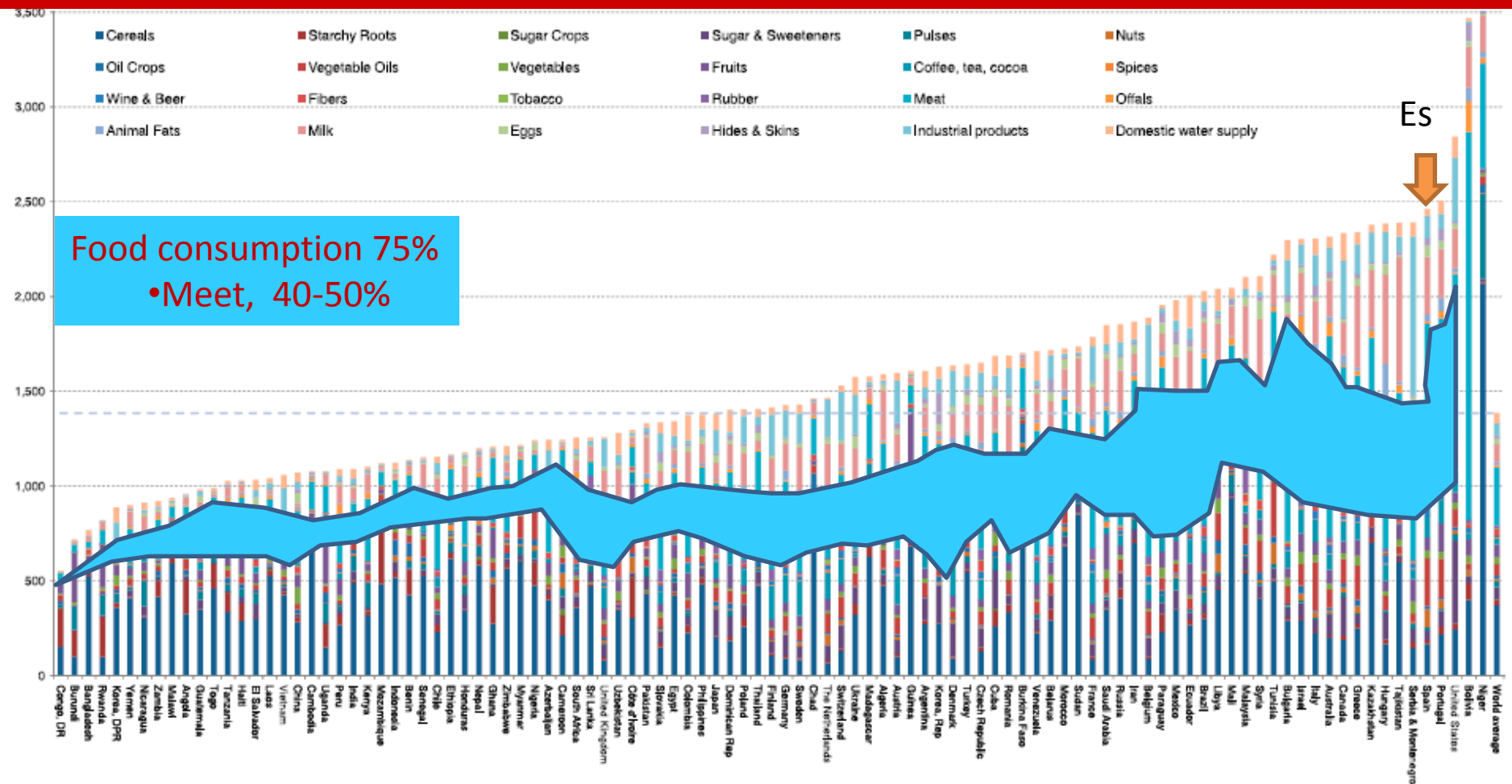


Fig. 3. Water footprint of national consumption for countries with a population larger than 5 million, shown by product category (cubic meter per year per capita) (1996–2005).

2. Why trade matters for water resources

- ❑ A large % of world population live in water scarce countries
 - VWT allows access to global water, usually green, to countries with scarce water resources
 - Import of water-intensive commodities reduces national water demand and potential impacts
 - Mitigates drought cycles
 - Can be an alternative to inter basin water transfers
- ❑ Increasing exports add pressure on resources in exporting countries

2. Why trade matters for water resources

☐ International

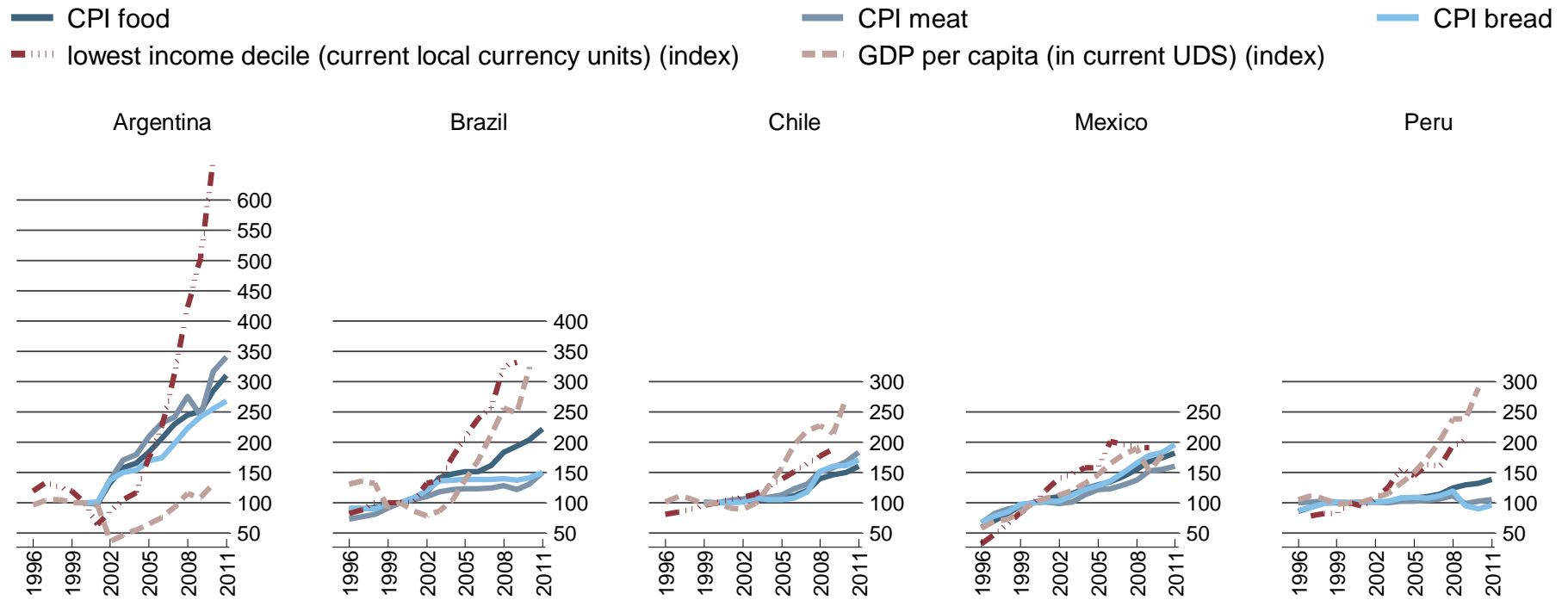
- Global water savings as a result of international trade
- VWT creates dependencies between countries
- Today water and food security are more linked to the economic capacity than to water scarcity

☐ There are policy dimensions:

- Are there winners and losers?
- Room for policy action?
- What challenges does globalisation present?

3. Impacts of trade in LA

Development of food consumer prices versus income

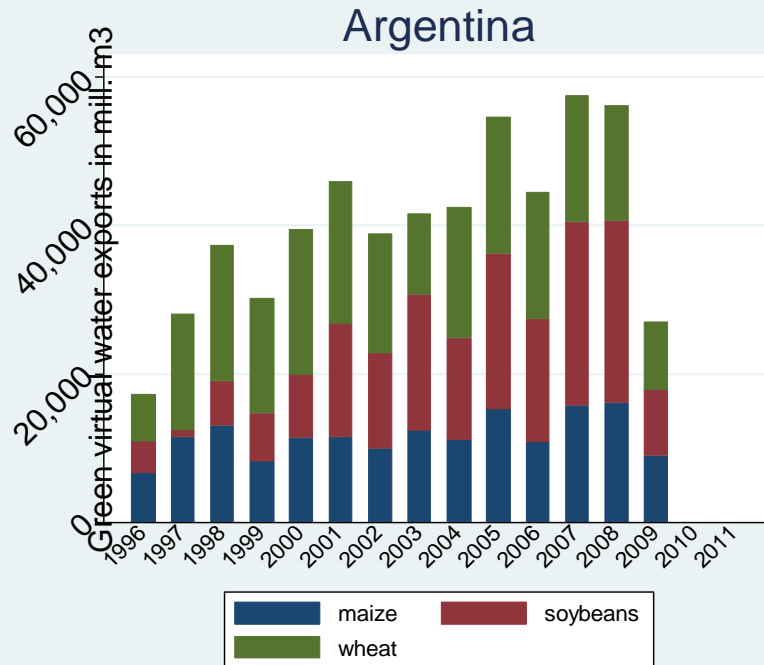


- ✓ **Income of the poor has grown faster than food prices!**
- ✓ **Does trade play a role?**

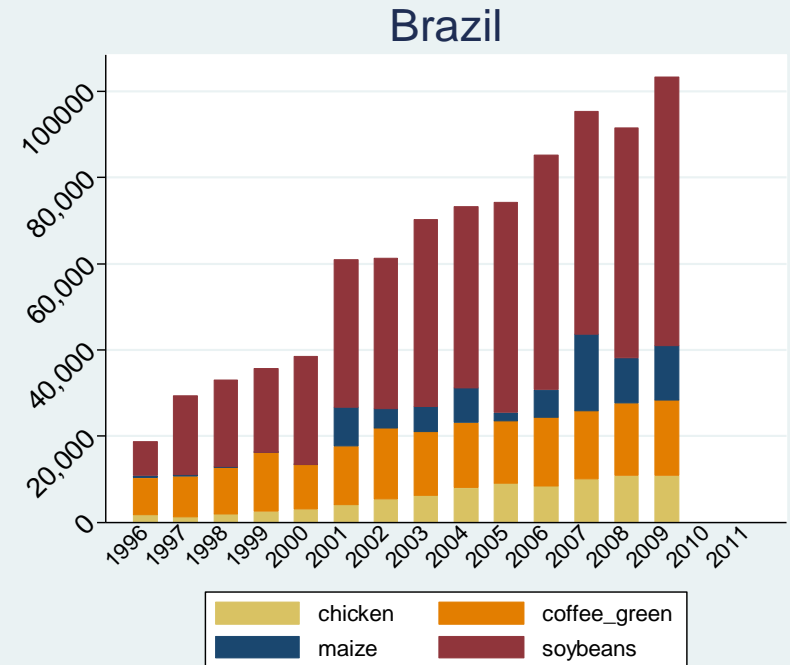
3. Impacts of trade in LA

Green virtual water exports as an opportunity

Green virtual water exports in million m3 (1996-2009)



Source: FAOSTAT(2011) & Mekonnen and Hoekstra (2011)



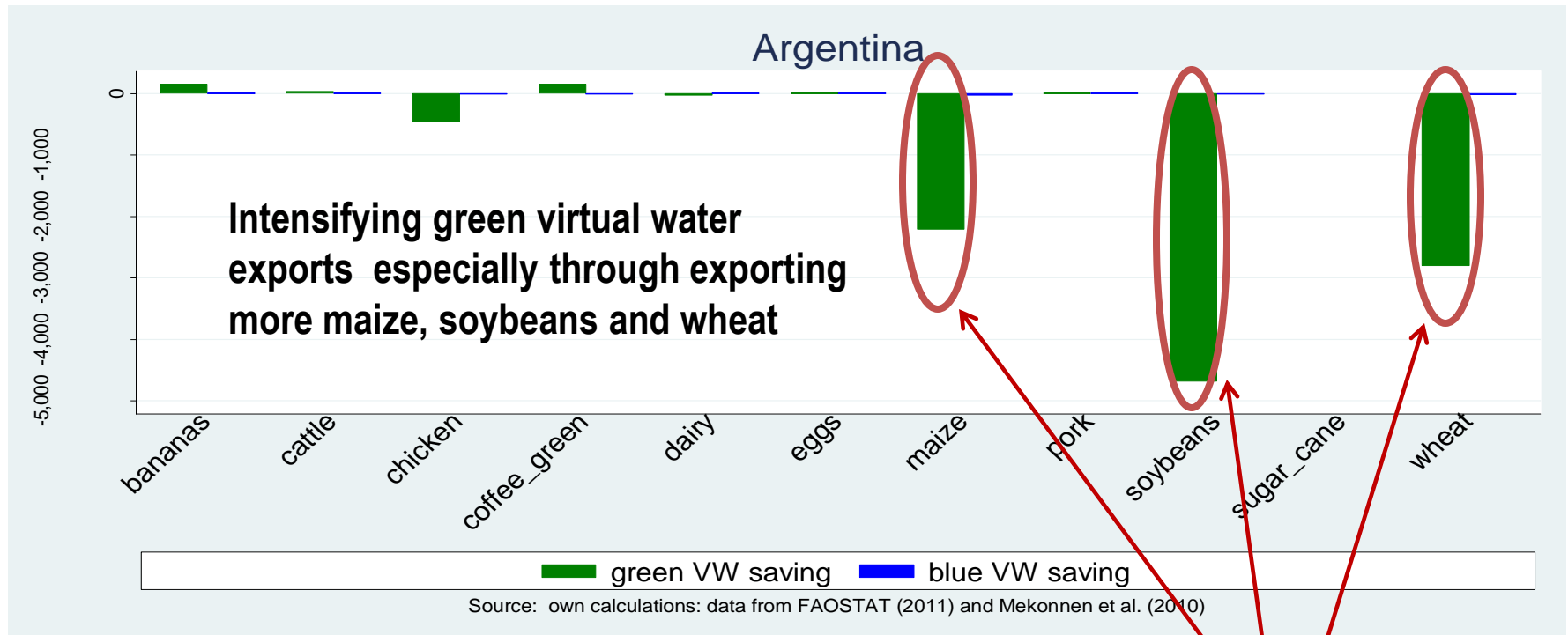
Source: FAOSTAT(2011) & Mekonnen and Hoekstra (2011)

- ✓ Trade allows access to profitable international commodity markets
- ✓ **rainfed** agricultural production => no additional pressure on domestic water resources

HOWEVER: Opportunity costs of green water = LAND USE CHANGE

3. Impacts of trade in LA

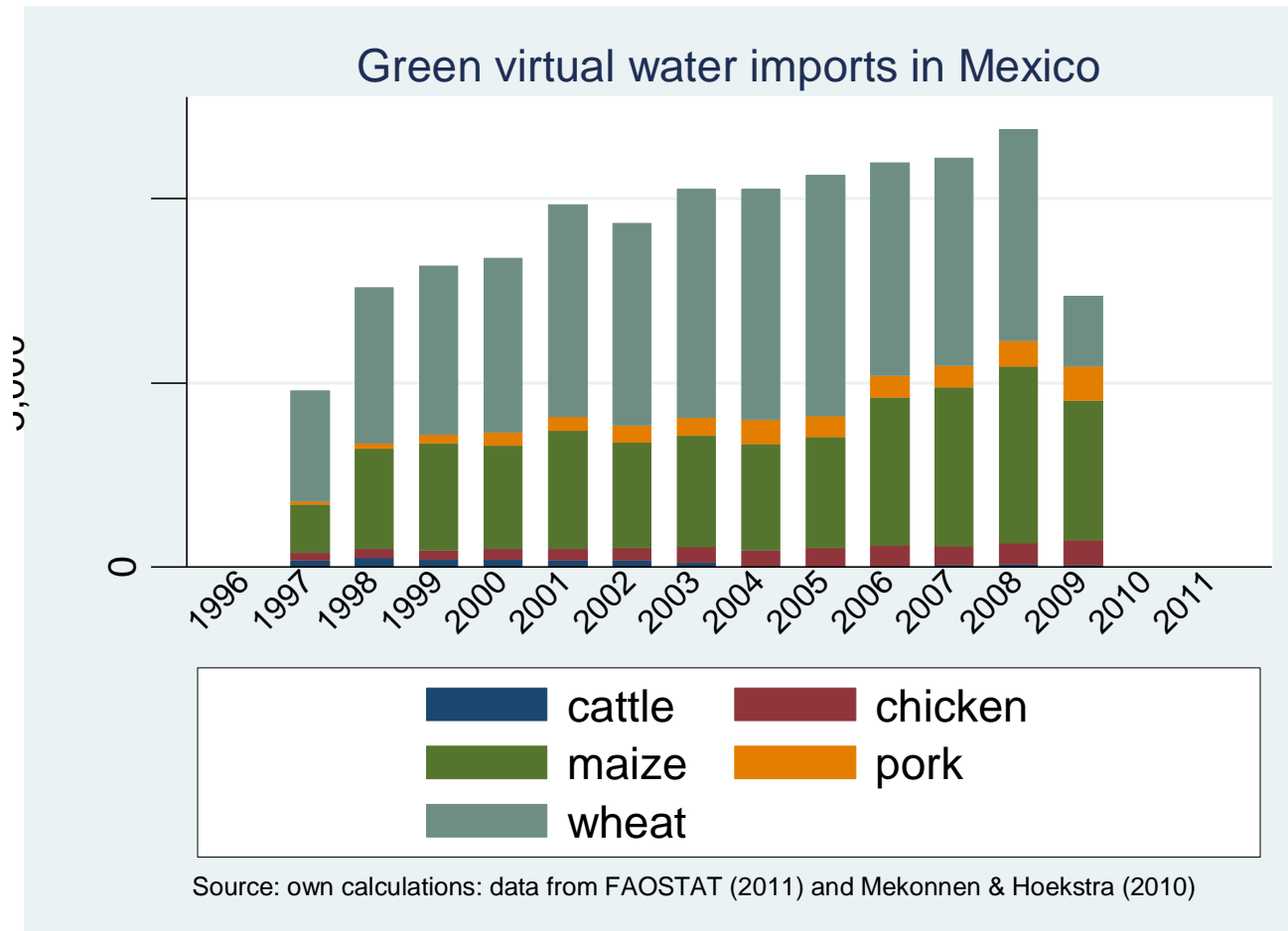
$$[(VW_{imports,2009,crop}) - (VW_{imports,1996,crop})] - [(VW_{exports,2009,crop}) - (VW_{exports,1996,crop})]$$



- ✓ Mainly **rainfed agriculture** of export crops
- ✓ Lower opportunity costs from a water perspective

Green water exports have grown faster than imports
=> more water outflow in 2009 compared to 1996

3. Impacts of trade in LA



Trade offers the opportunity:

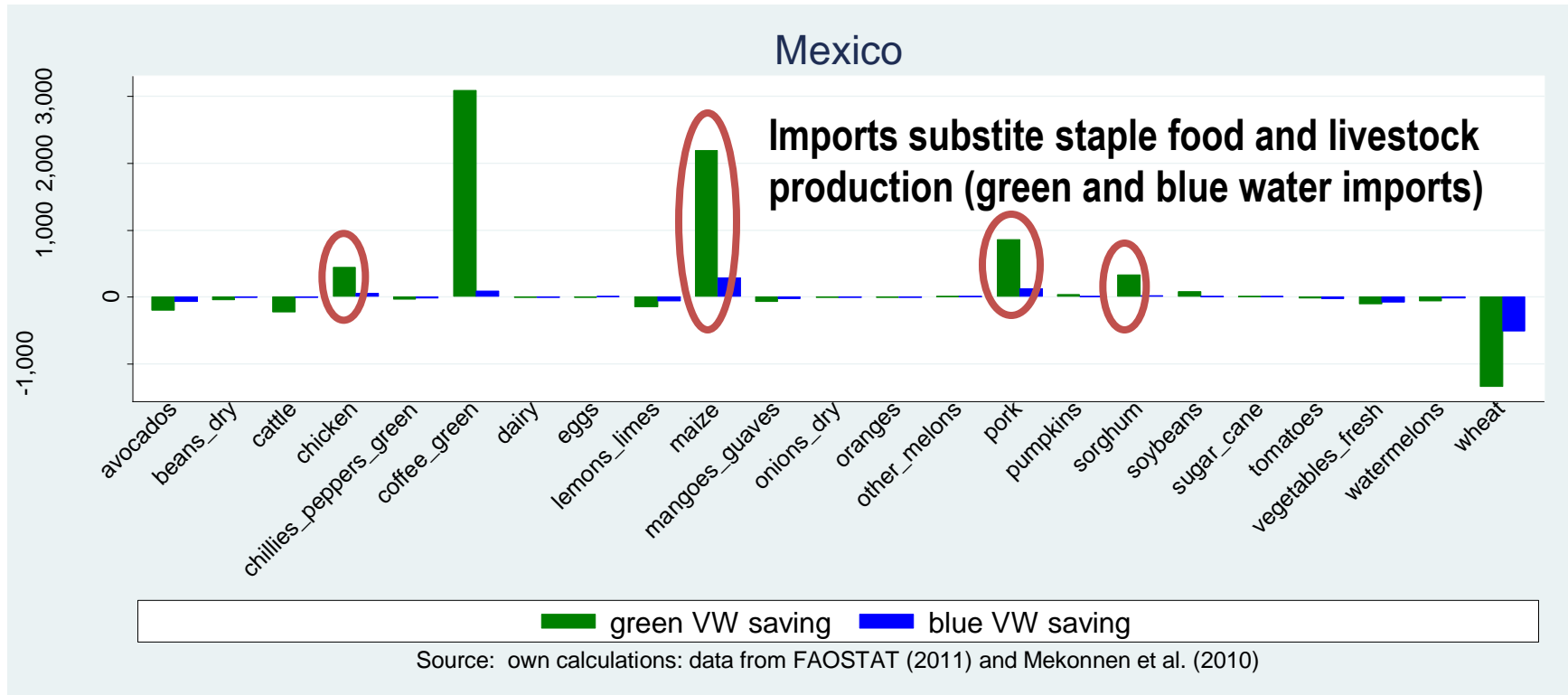
- ✓ to import **green water** staples and livestock,
- ✓ instead of domestic production with **blue water** resources.

TRADE offers the opportunity:

- ✓ to import **green water** staples and livestock,
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3. Impacts of trade in LA

Altered virtual water inflows and outflows between 1996 and 2009

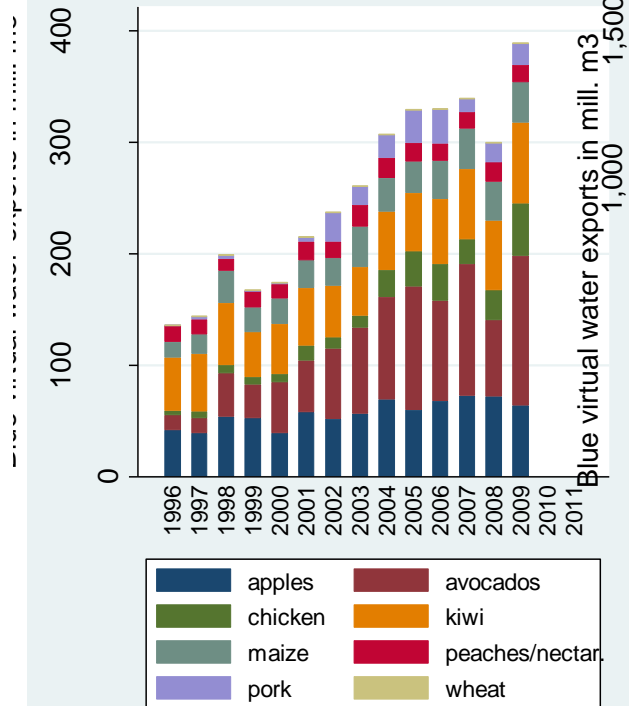


- ✓ Mainly imports of food produced under **rainfed** conditions
- ✓ Virtual water imports (staples, livestock) have grown faster than their exports => more water inflow in 2009 compared to 1996

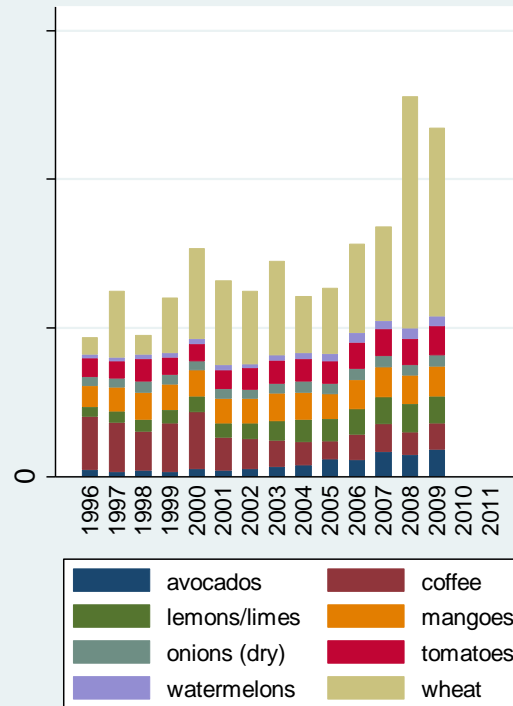
3. Impacts of trade in LA

Blue virtual water exports (1996-2009)

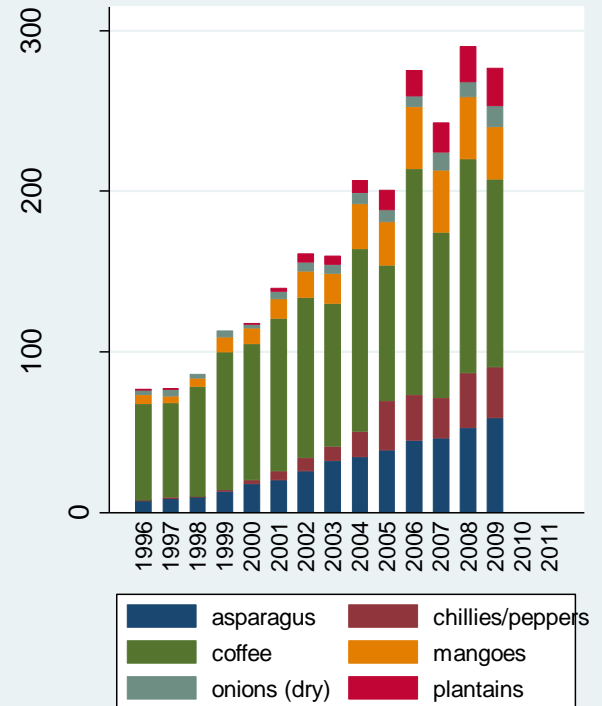
Chile



Mexico



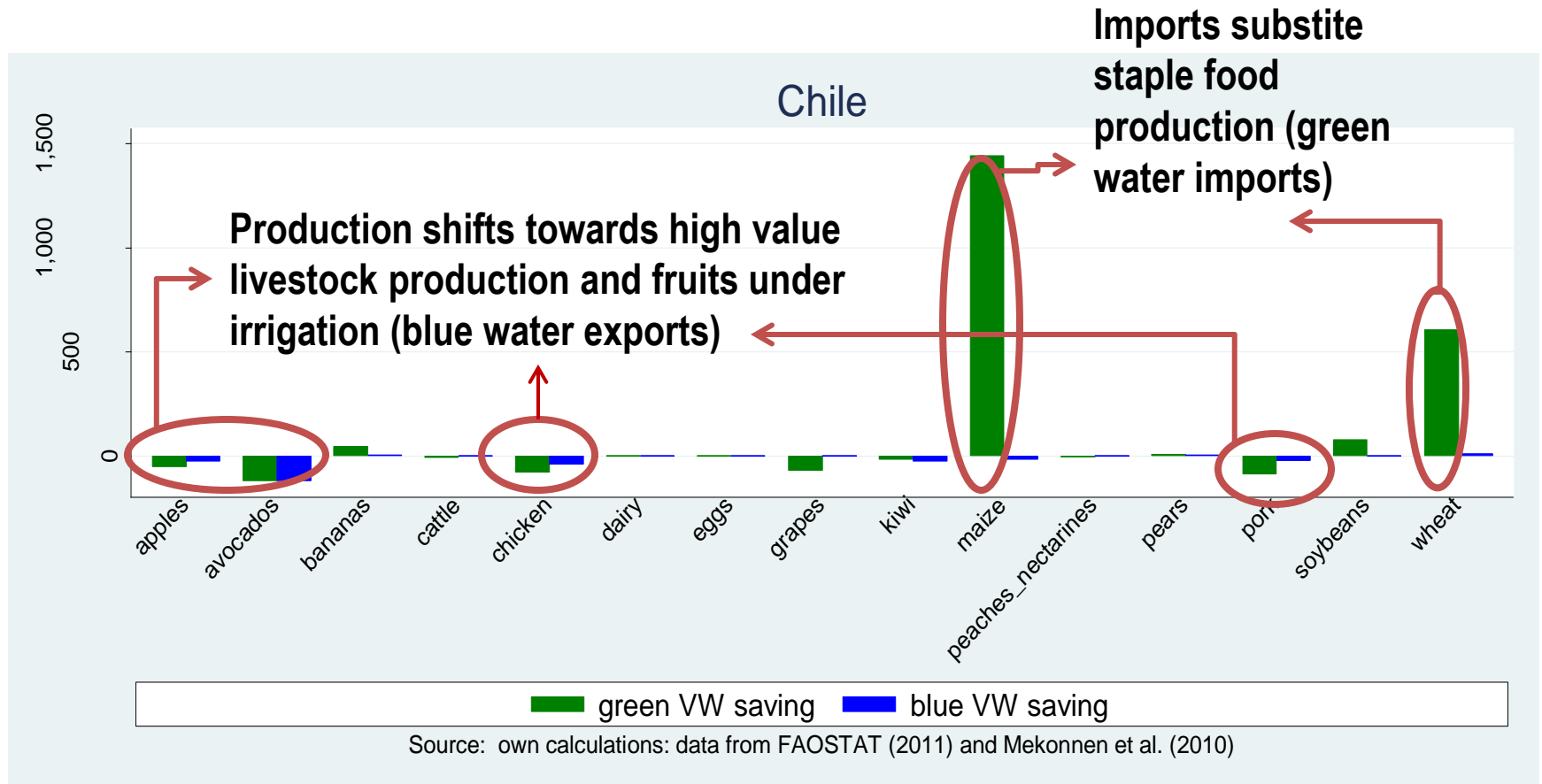
Peru



✓ Mainly high value fruits and vegetables are irrigated

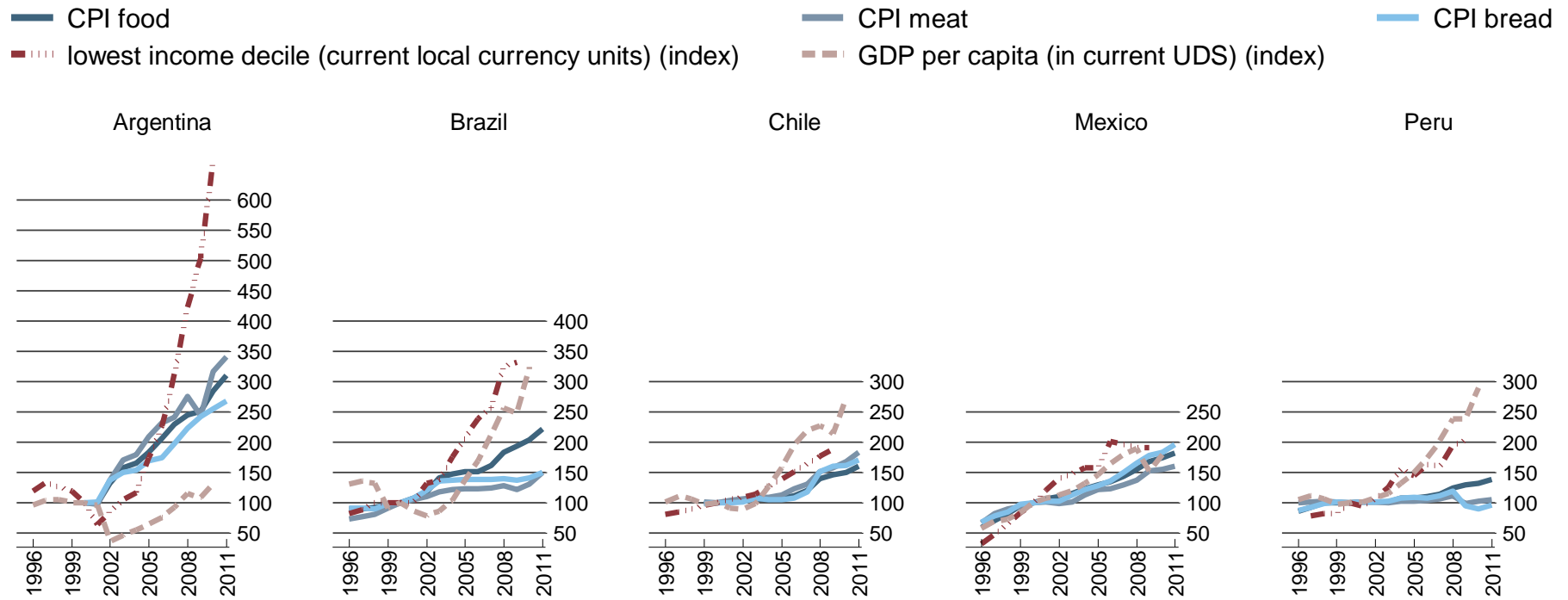
3. Impacts of trade in LA

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3. Impacts of trade in LA

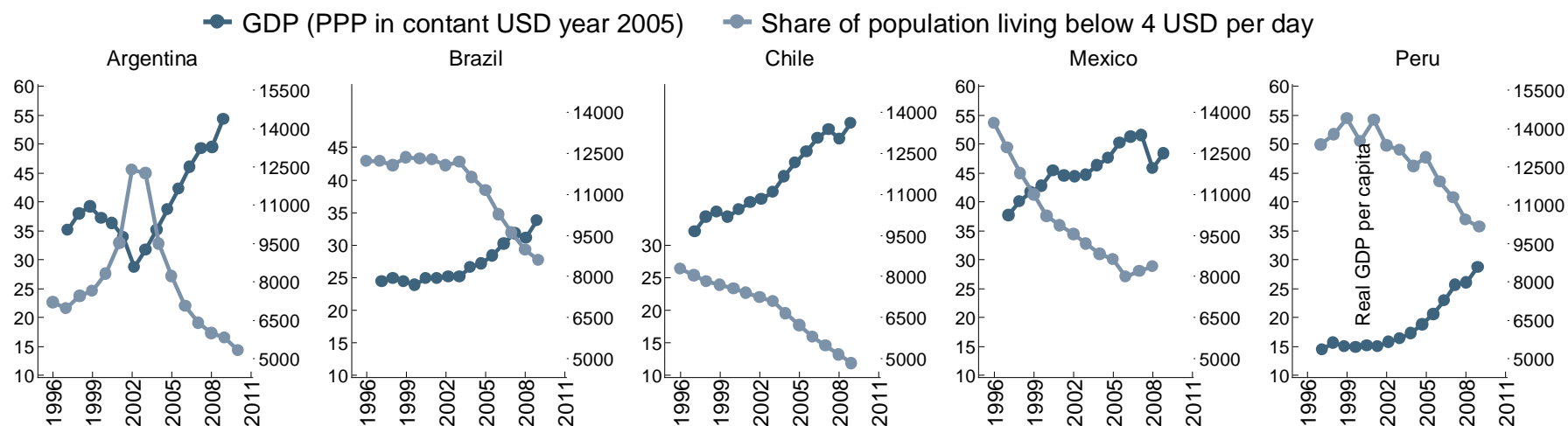
Development of food consumer prices versus income



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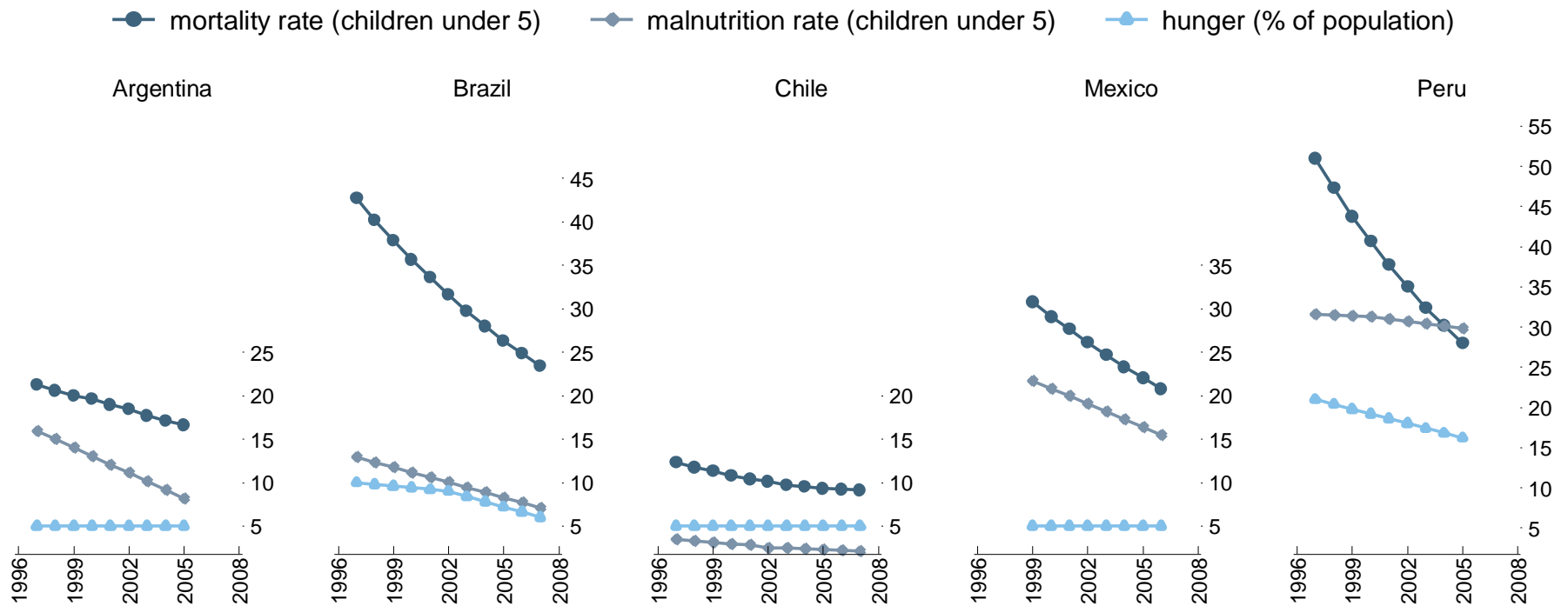
Development of GDP and poverty incidence



- ✓ Real GDP has grown while poverty situation has improved!
- ✓ Does trade play a role?

3. Impacts of trade in LA

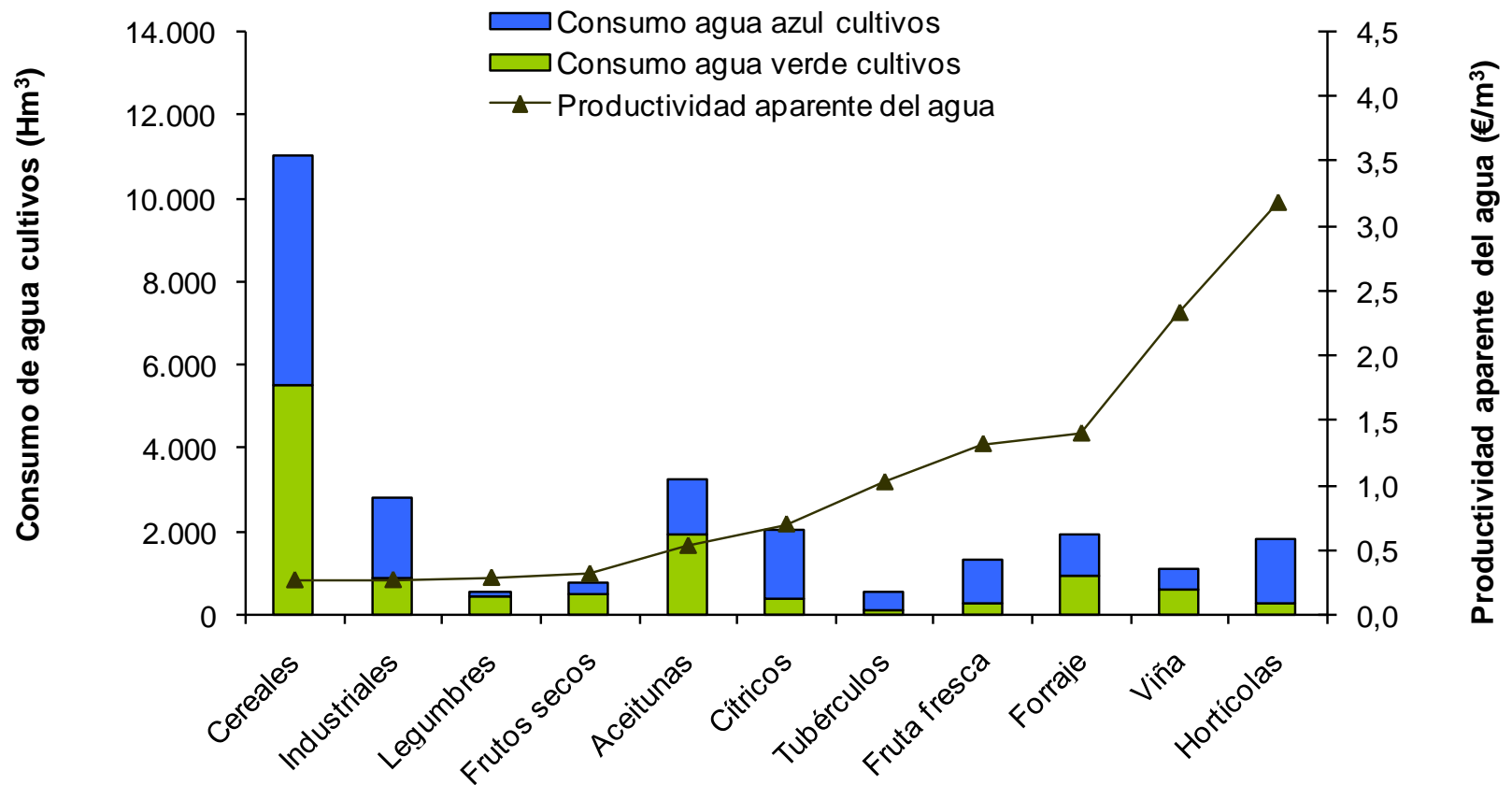
Food security indicators over time



✓ Food security situation has improved in all countries!

✓ Does trade play a role?

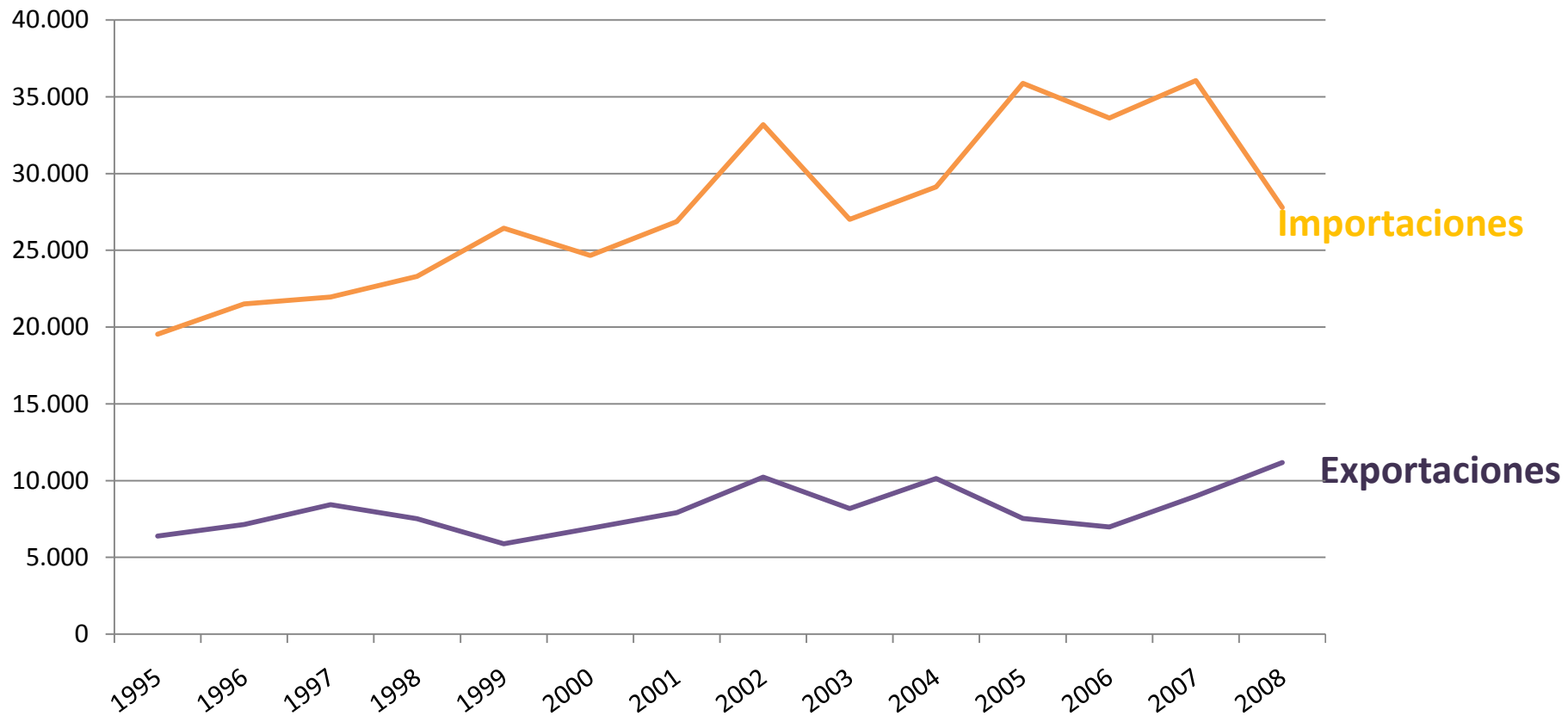
4. Impacts of trade in Spain



Fuente: Garrido y coatores (2010)

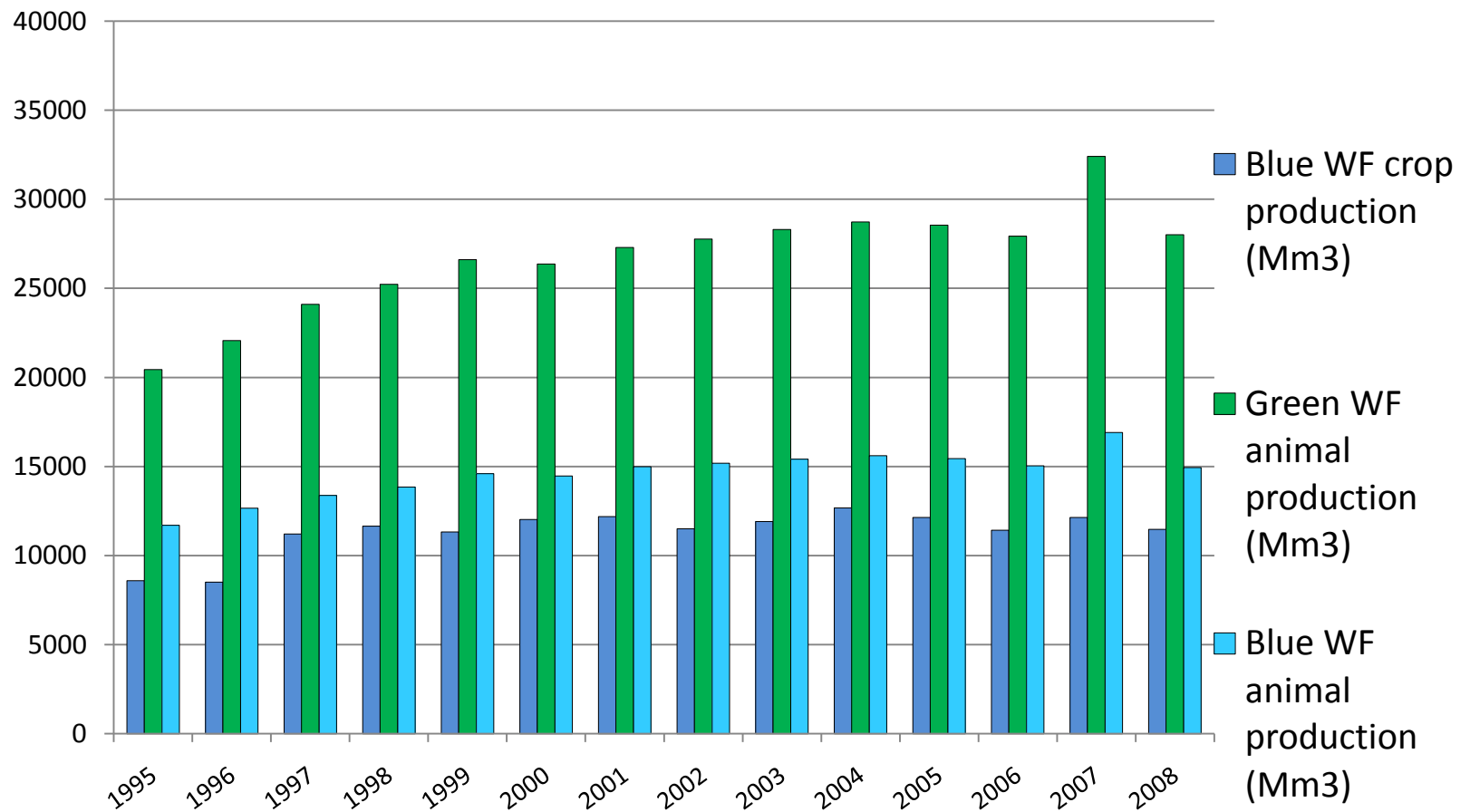
4. Impacts of trade in Spain

Virtual water trade in Spain (Hm³/year)



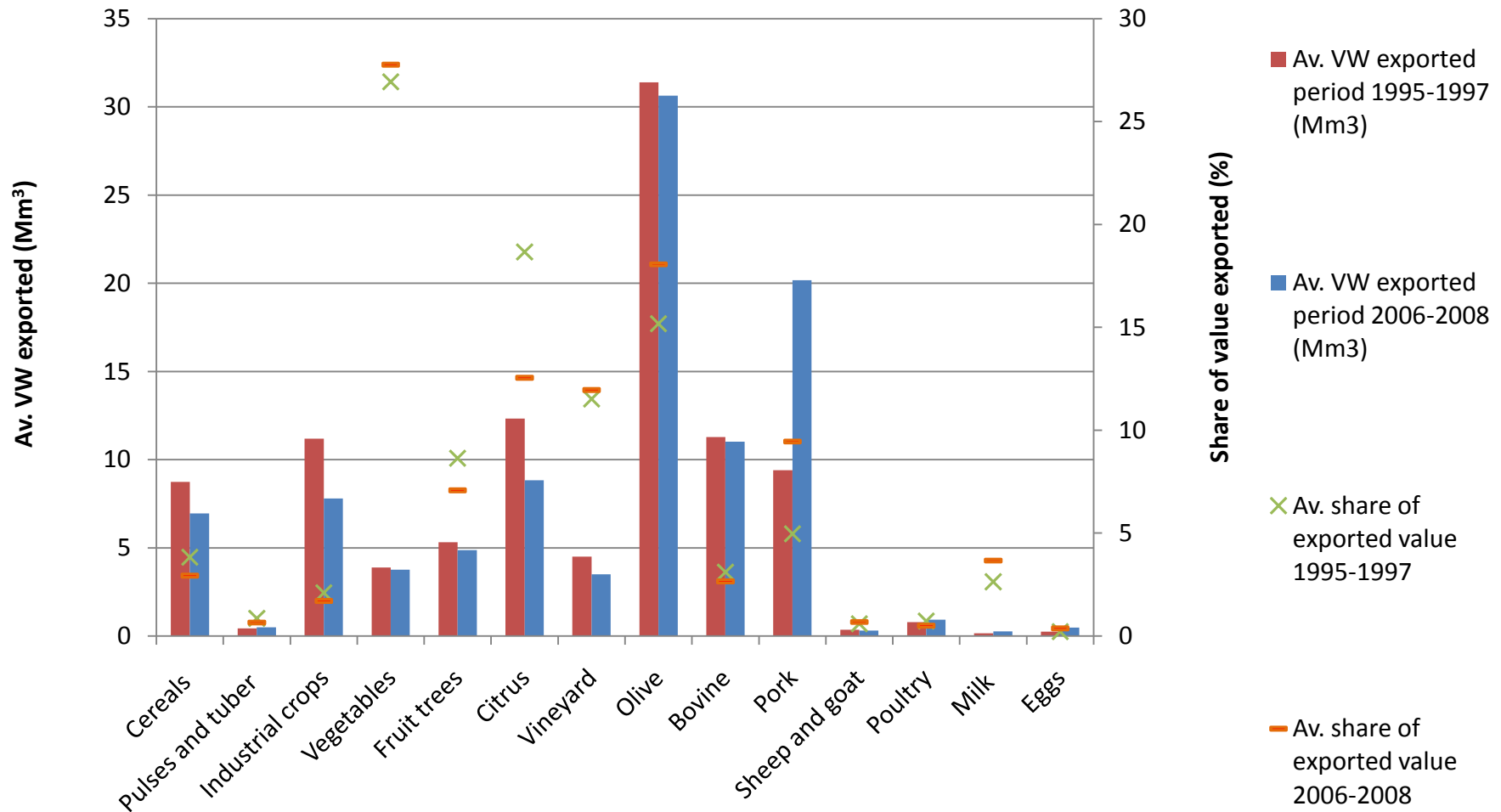
Fuente: Chico y Garrido (2012)

4. Impacts of trade in Spain



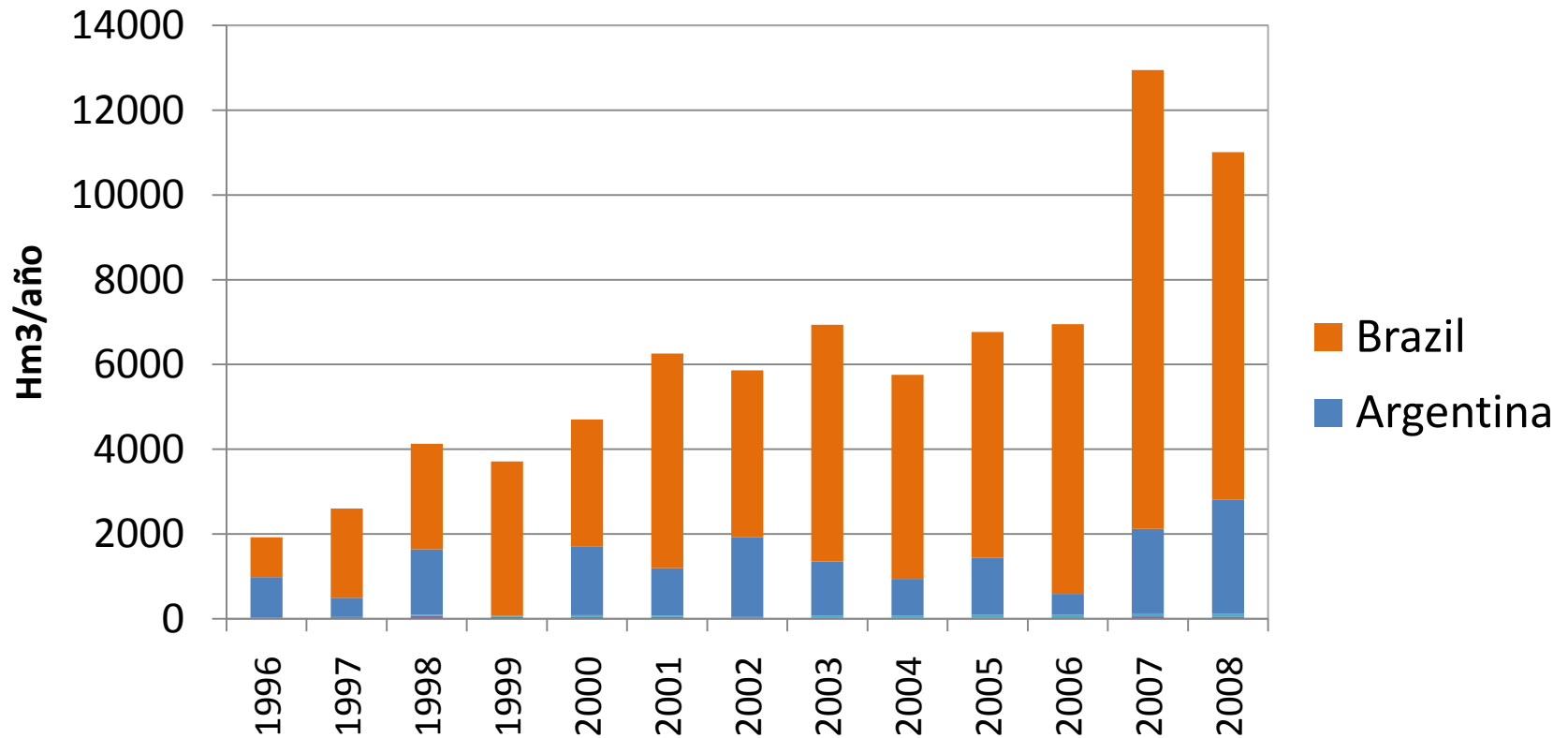
Fuente: Chico y Garrido (2012)

4. Impacts of trade in Spain



4. Impacts of trade in Spain

Virtual water imports in Spain

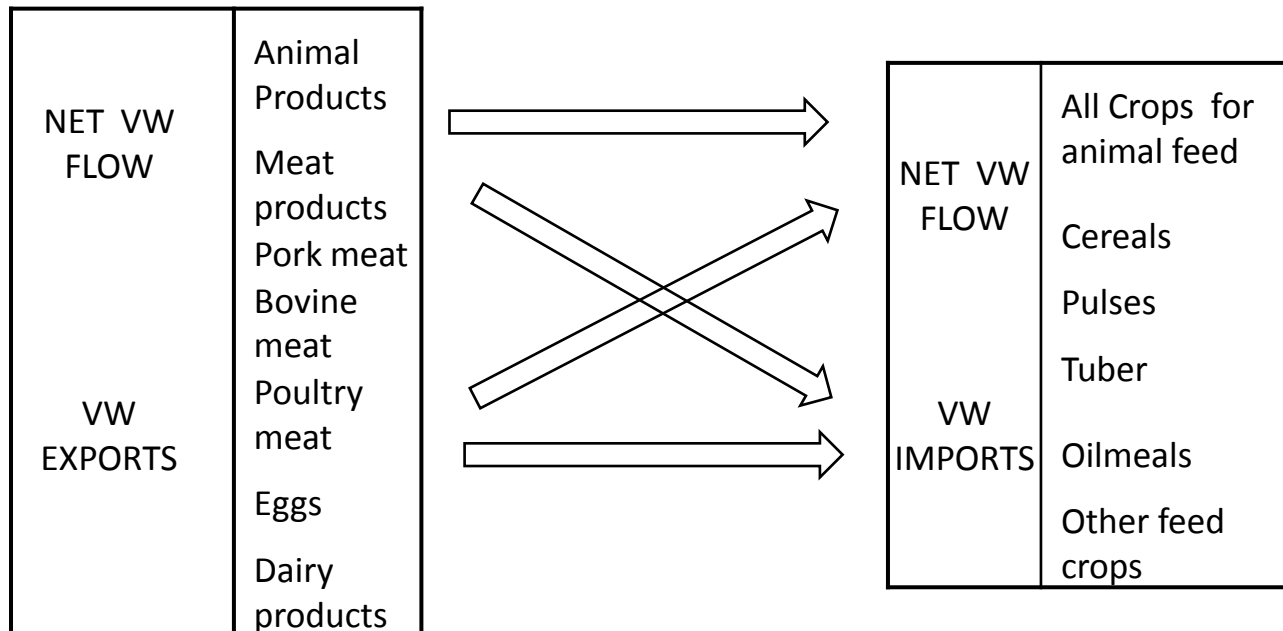


Fuente: Niemeyer, Garrido (2011)

4. Impacts of trade in Spain

VW Flows causality analysis:

- **Analysis of VW trade and agricultural products WF** for the period 1995-2008;
Green and blue WF per country and product. (120 agricultural productions, 90 traded products, 145 countries)
- **Causality test of the VW flows** for Animal products and Crops for animal feed



4. Impacts of trade in Spain

VW Flows causality analysis: Granger Test

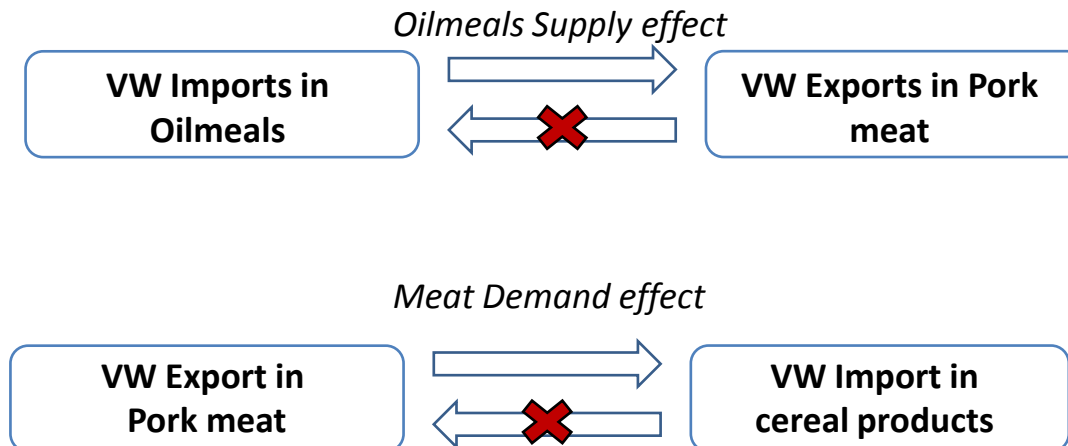
Granger test **allows** us to **establish** the direction of the causality in some of the studied relations.

At a Statistically significant level, VW imports related to oilmeat conditioned VW exports **of** pork products.

On the other hand, Net VW flow in animal products conditioned VW imports of cereals.

However, no relation was found between Net WF of animal products and Net WF of crop products,

both looking at **an aggregate of livestock products** or at the relations one by one.



5. Policy implications

- ☐ International Water Pricing Protocol
- ☐ Virtual water trade is mainly a consequence of agricultural (crop and livestock) policies
- ☐ Perverse subsidies
- ☐ The principles of product transparency and non-discrimination
- ☐ An international water label (not yet possible)
- ☐ Monopolies
- ☐ Political embargos

Gaps

- ☐ Water accounting advanced, impact assessment in development
- ☐ Intangible values

6. Pros and cons of regulating trade

- ❑ Rationale for considering water in trade regulations:
 - If trade will become so important, the regime has to handle market externalities
 - Commodity prices distorted
 - A race-to-the-bottom might emerge, with the weakest countries suffering the consequences
 - International trade can contribute to addressing problems related to the unequal geographical distribution of water and help achieve water and food security for all

6. Pros and cons of regulating trade

- ❑ Rationale for NOT considering water in trade regulations:
 - Porter hypothesis may be true: national environmental protection increases competitive edge (Cases of Mex, Braz and Argentina?)
 - Regulatory mechanisms are not feasible (more serious unintended consequences).
 - It creates dependencies between countries

7. Concluding remarks

- ☐ Trade is crucial for ensuring food security in both developed and developing countries.
- ☐ International trade is conditioned by: WTO rules, subsidies and policies

Thank you, Gracias

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