

# RE-THINKING PARADIGMS: WATER AND FOOD SECURITY

## 4<sup>th</sup> Marcelino Botín Foundation (MBF) Water Workshop

# Economic aspects of virtual water trade: lessons from the Spanish case

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# Preliminaries

LXXXVII x CCCXCIX = ??

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x		LXXXVIII CCCXCIX
		MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMCMXII

# Preliminaries

$$\text{LXXXVII} \times \text{CCCXCIX} = ??$$

$$\begin{array}{r} \phantom{x} \phantom{\text{LXXXVII}} \phantom{\text{CCCXCIX}} \\ \times \phantom{\text{LXXXVII}} \phantom{\text{CCCXCIX}} \\ \hline \text{MMMCMXII} \end{array}$$

**Year 825**, Al-Khowârizmi

$$\begin{array}{r} \phantom{x} \phantom{399} \\ \times \phantom{399} \\ \hline \phantom{399} 88 \\ \phantom{399} 399 \\ \hline 35112 \end{array}$$

# Preliminaries

LXXXVII x CCCXCIX = ??

$$\begin{array}{r} \phantom{x} \\ x \\ \hline \text{MMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMMCMXII} \\ \phantom{x} \\ \text{LXXXVIII} \\ \text{CCCXCIX} \end{array}$$

**Year 825, Al-Khowârizmi**

$$\begin{array}{r} \phantom{x} \\ x \\ \hline \phantom{x} 88 \\ \phantom{x} 399 \\ \hline 35112 \end{array}$$

**Italy 1434, edicts still prohibited the use of infidel numbers**

## 3 Key facts for thinking about virtual water trade

Gains from trade

Land 'grabs'

Farm trade

## The case of Spain

Time, space and economic dimensions

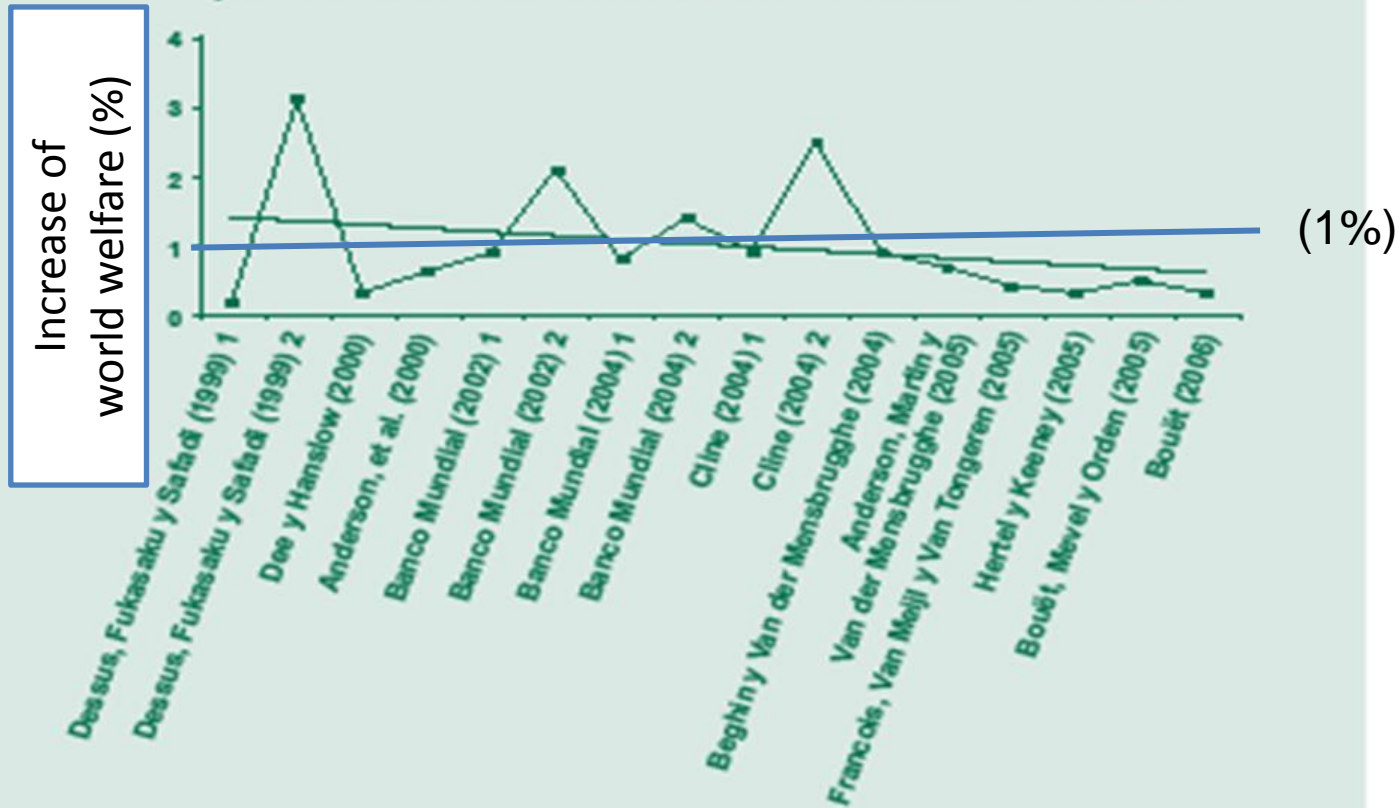
Does virtual water trade exacerbate water scarcity?

Agricultural policy conclusions

## Conclusions

# 1st Key fact: games from trade

## Evaluation of the impact of full trade liberalisation



Source: Doët (IFPRI, 2009)

# 1st Key fact for thinking

## The bulk of farm trade is performed by 14 countries+EU

### Leading exporters and importers of agricultural products, 2006

Taken from WTO (2009)

(Billion dollars and percentage)

	Value	Share in world exports/imports				Annual percentage change			
	2006	1980	1990	2000	2006	2000-06	2004	2005	2006
<b>Exporters</b>									
European Union (25)	405.25	-	-	41.5	42.9	10	14	7	9
extra-EU (25) exports	95.31	-	-	10.1	10.1	9	11	8	13
United States	92.66	17.0	14.3	12.9	9.8	4	4	4	12
Canada	44.23	5.0	5.4	6.3	4.7	4	19	3	7
Brazil	39.53	3.4	2.4	2.8	4.2	17	27	14	13
China	32.54	1.5	2.4	3.0	3.4	12	9	19	13
Australia	22.18	3.3	2.9	3.0	2.3	5	35	-4	5
Thailand	21.58	1.2	1.9	2.2	2.3	10	13	4	21
Argentina	21.33	1.9	1.8	2.2	2.3	10	13	12	11
Indonesia	18.32	1.6	1.0	1.4	1.9	15	27	16	30
Russian Federation a	17.06	-	-	1.4	1.8	14	13	20	16
Malaysia	15.57	2.0	1.8	1.5	1.6	12	14	2	16
Mexico	14.69	0.8	0.8	1.6	1.6	8	13	13	17
India a, b	14.41	1.0	0.8	1.2	1.5	14	8	26	34
New Zealand	13.24	1.3	1.4	1.4	1.4	10	24	7	2
Chile	11.49	0.4	0.7	1.2	1.2	10	22	11	14
<b>Above 15</b>	<b>784.09</b>	-	-	<b>83.5</b>	<b>83.0</b>	-	-	-	-
<b>Importers</b>									
European Union (25)	433.66	-	-	42.3	43.3	9	14	6	8
extra-EU (25) imports	123.72	-	-	13.3	12.4	8	13	5	9
United States	103.65	8.7	9.0	11.6	10.3	7	14	9	8
Japan	65.62	9.6	11.5	10.4	6.6	1	12	1	0
China	51.65	2.1	1.8	3.3	5.2	18	39	7	14
Canada d	23.95	1.8	2.0	2.6	2.4	8	8	11	12
Russian Federation a, d	23.38	-	-	1.6	2.3	17	13	23	22
Korea, Republic of	18.58	1.5	2.2	2.2	1.9	6	11	5	11
Mexico d	18.46	1.2	1.2	1.8	1.8	9	11	7	12
Hong Kong, China	11.90	1.2	1.9	2.0	1.2	0	3	-1	7
retained imports	7.79	1.0	1.0	1.1	0.8	3	9	3	7
Taipei, Chinese	9.67	1.1	1.4	1.3	1.0	3	13	5	2
Switzerland	8.85	1.2	1.3	1.0	0.9	8	9	4	7
United Arab Emirates a, c	8.81	0.3	0.4	0.6	0.9	...	31	17	...



# 3 Key facts for thought

- 1. ‘Land-grabs’ (Sources: The Economist / Ifpri)
  - Sudan has ‘reserved’ 20% of its farmland to Arab countries
  - China has purchased/leased 2.8 mill ha and set up 11 experimentation centres in Africa.
  - 15-20 mill ha (evaluated at \$ 20-30 bill) already leased.
  - Representing 30-40 mill. T of cereals (where 220 mill are trade each year worldwide).
  - Peter Brabeck-Letmathe, Nestlé, CEO: “The purchases weren’t about land, but water” “The great water grab”

# 3 Key facts for thought

- 1. 'Land-grabs' (Sources: The Economist / Ifpri)

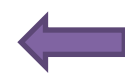
	Renewable resources	Withdrawal	Per cap withadrwal	Arable Land	A	B	B/A
	(km3)	(km3)	m3/p/yr	(1000 ha)	Irrigated land (1000 ha)	gation potential (1000 ha)	Pot / actual
Africa							
Angola	184	6.07	22	3000	60	3700	61.7
Cameroon	285	0.99	61	5960		290	
Ethiopia	110	5.56	72	10000	300	2700	9.0
Madagascar	337	14.96	804	2900	899	1500	1.7
Mali	100	6.55	484	4634	232	566	2.4
Mozambique	216	0.63	32	3900	117	3070	26.2
Niger	33.7	2.18	156	14483	145	270	1.9
Nigeria	286.2	8.01	61	28200	282	2330	8.3
Sudan	154	37.32	1030	16233	1786	2700	1.5
Zambia	105	1.74	149	5260	158	523	3.3

Source: FAO and Gleick (2009)

# 3 Key facts for thought

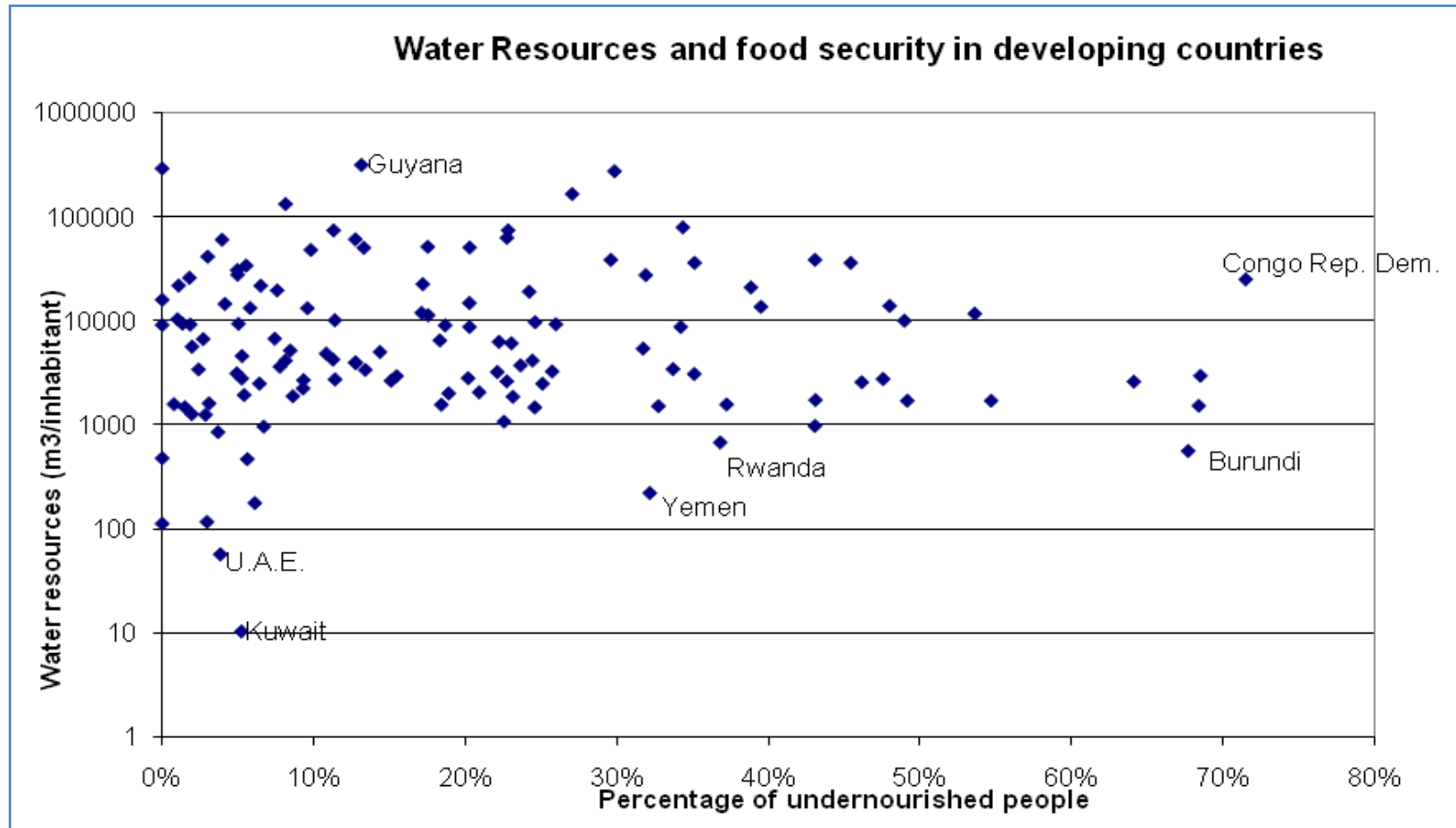
- 1. 'Land-grabs' (Sources: The Economist / Ifpri)

	IRWR	Total volume of freshwater utilization km <sup>3</sup> /yr	Freshwater utilization by purpose						Utilization* as % of resources
			Domestic use		Industrial use		Agricultural use		
			km <sup>3</sup> /yr	%	km <sup>3</sup> /yr	%	km <sup>3</sup> /yr	%	
<b>World</b>	<b>43 764</b>	<b>3 811.3</b>	<b>376.2</b>	<b>9.9</b>	<b>783.0</b>	<b>20.5</b>	<b>2 652.1</b>	<b>69.6</b>	<b>9%</b>
Latin America and the Caribbean	13 570	265.1	50.4	19.0	27.4	10.3	187.3	70.7	2%
Near East and North Africa (b)	516	322.6	25.1	7.8	19.5	6.0	278.0	86.2	63%
Sub-Saharan Africa (c)	3 856	98.1	6.9	7.0	2.8	2.9	88.3	90.1	3%
East and Southeast Asia (d)	8 720	977.4	71.2	7.3	192.3	19.7	714.0	73.0	11%
South Asia	1 761	917.8	58.7	6.4	39.6	4.3	819.6	89.3	52%
Oceania developing	874	0.1	0.1	35.5	0.0	28.4	0.1	36.2	0%



Source: CAWMA (2007)

# 3 Key facts for thought



Taken from FAO (2009)

## In short...

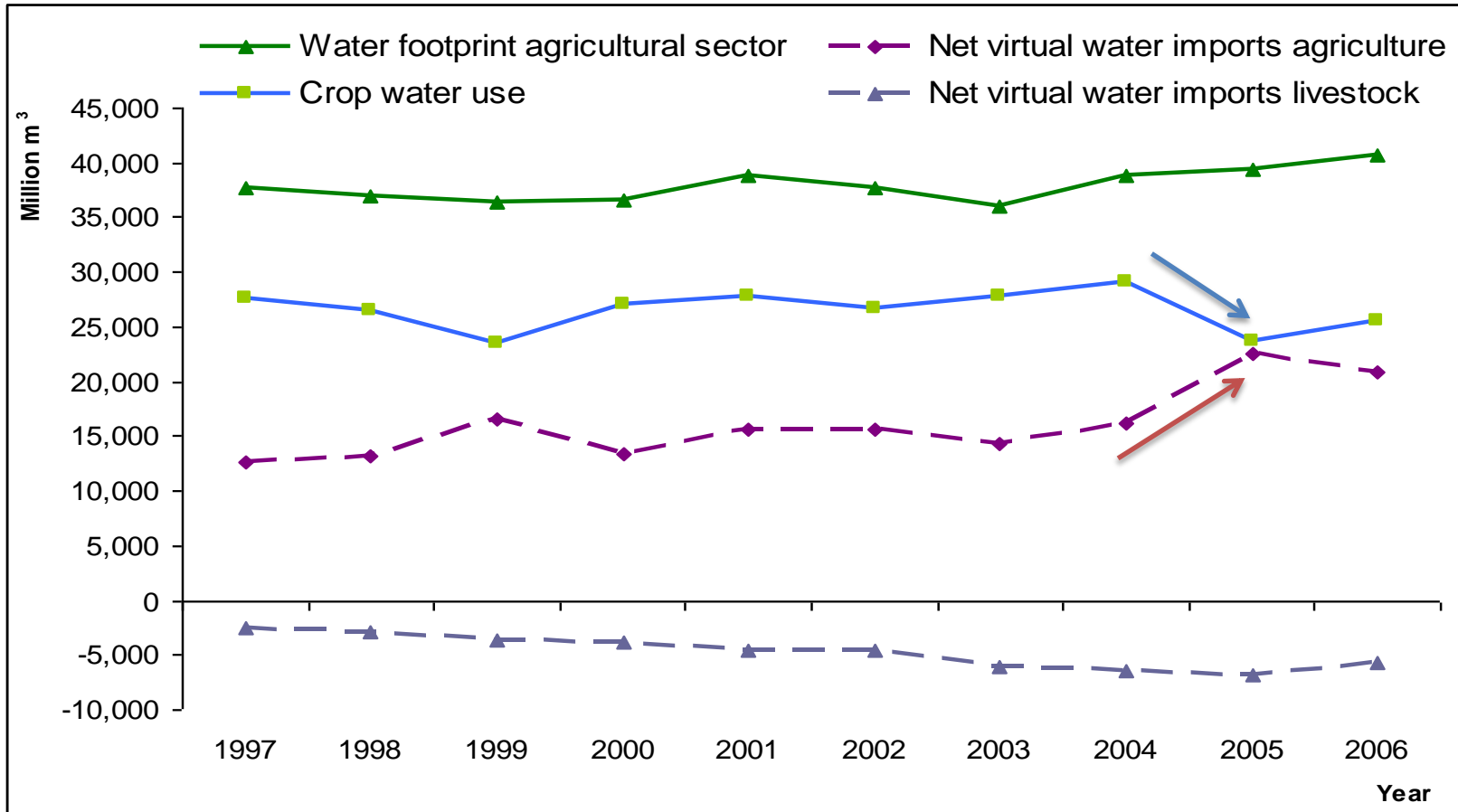
1. Africa has great potential, but needs capital, expertise and know-how. Africa can become a large food (energy) exporter.
2. Land-grabs are testimony of the huge gains-from-trade that can be achieved (it raises acute equity issues)
3. Many world agricultural regions are producing much below their productive potential (low input, little capital, lack of access markets)

# The case of Spain

1. Virtual imports and exports
2. Time-dimension
3. Space dimension
4. Economic dimension
5. Does virtual water trade exacerbate water scarcity?

# The case of Spain

## Agricultural Water footprint



Source: Garrido et al. (2009)

# The case of Spain

## Virtual water imports

Country	(10 <sup>9</sup> m <sup>3</sup> /Year)
Japan	94
Mexico	65
Italy	59
China	56
Algeria	45
Russian Fed	41
Iran	37
Germany	34
Korea	34
UK	33
Morocco	27

...

(Source: Hoekstra and Chapagain, 2008)

**Spain**

**25 (2006)**

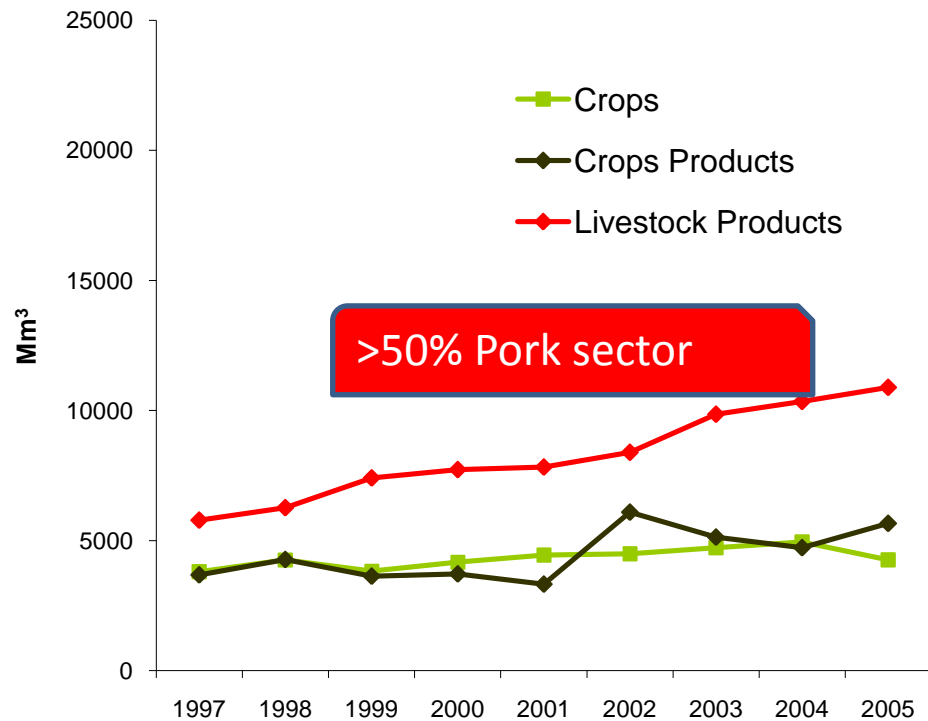
(Source: Garrido et al. 2009)



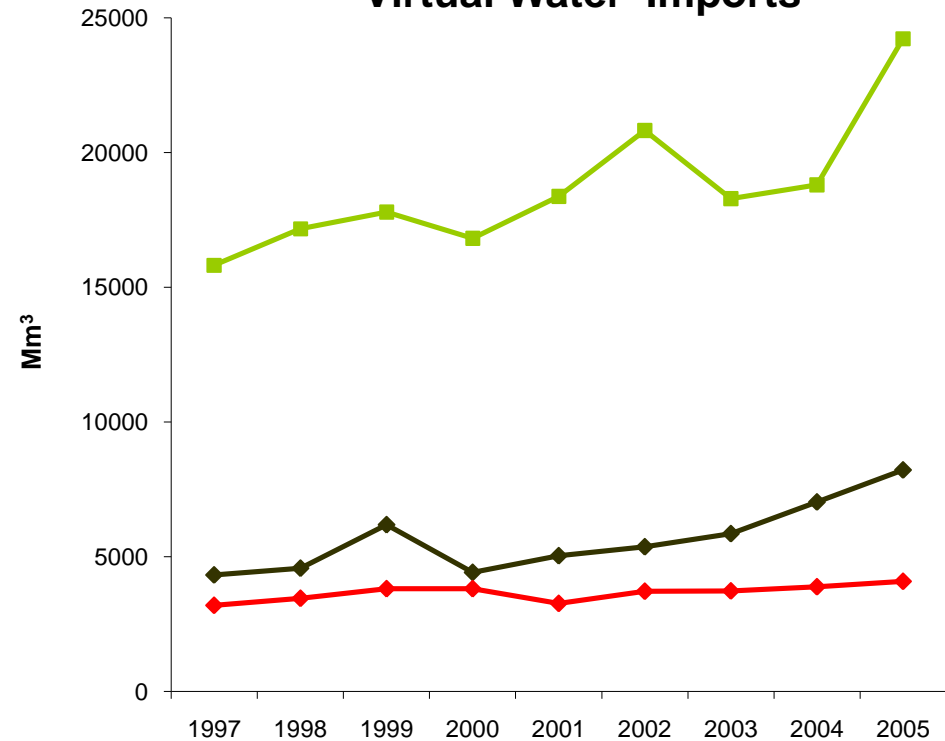
# The case of Spain

## Crop and livestock connections

### Virtual Water 'Exports'

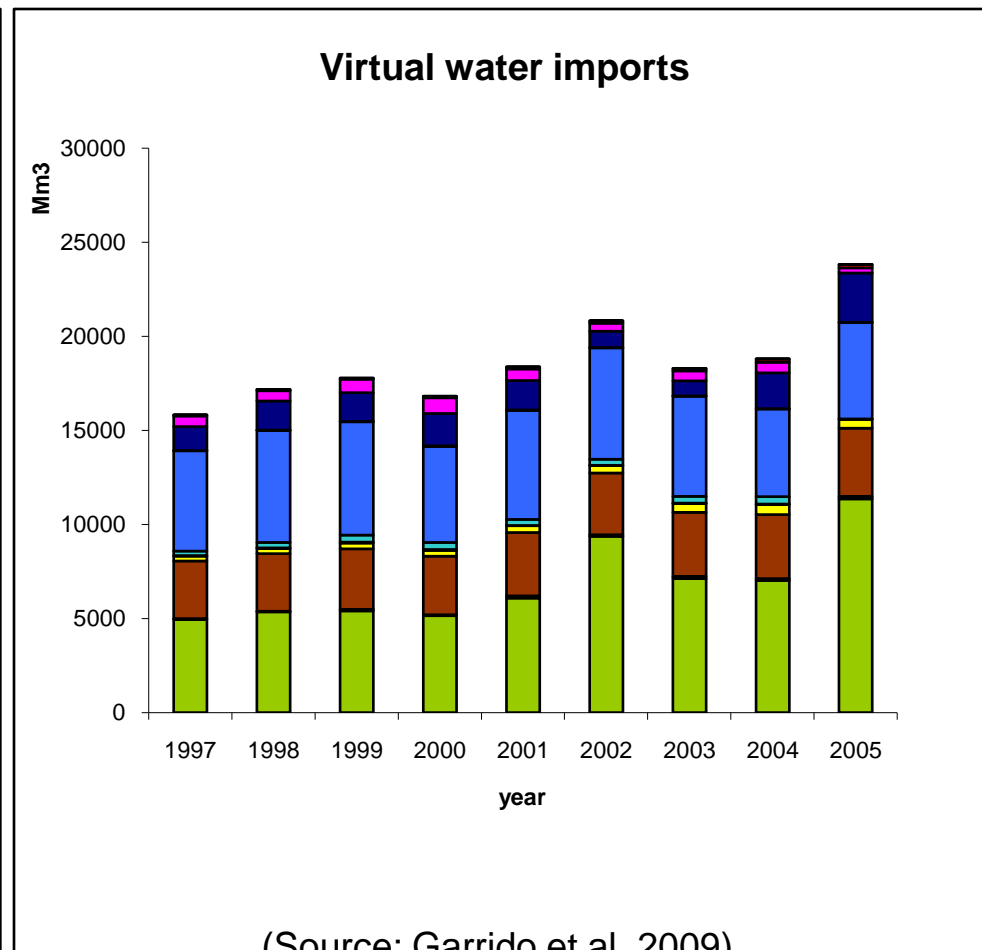
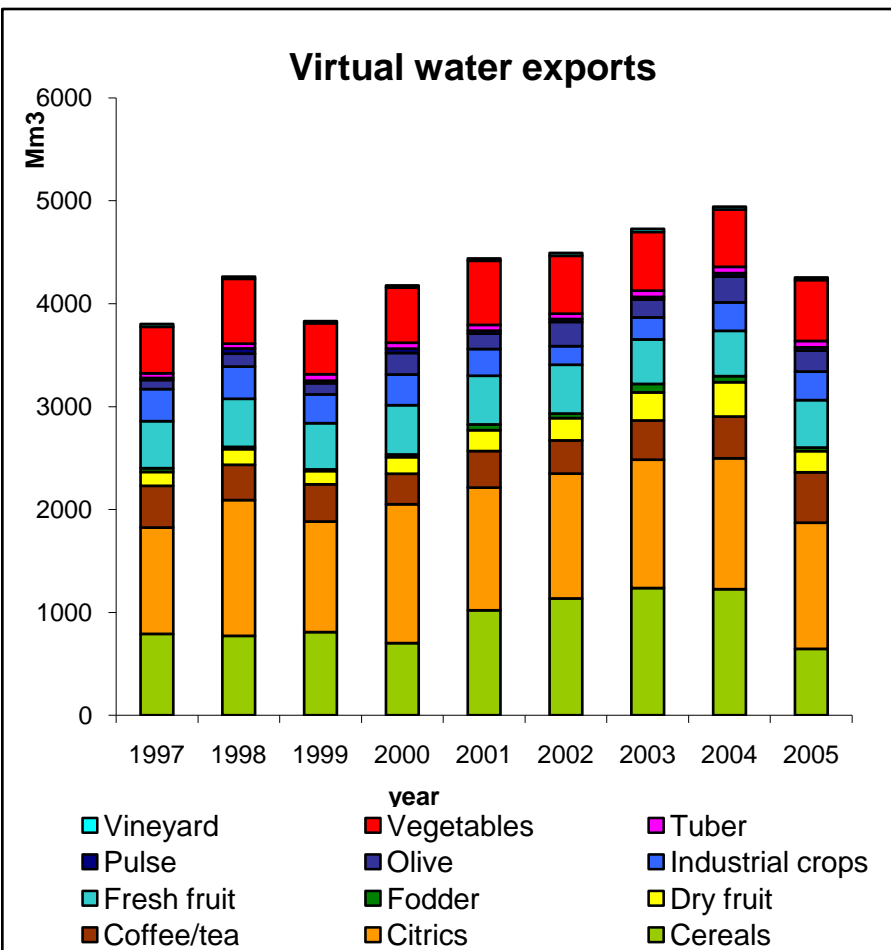


### Virtual Water 'Imports'



(Source: Garrido et al. 2009)

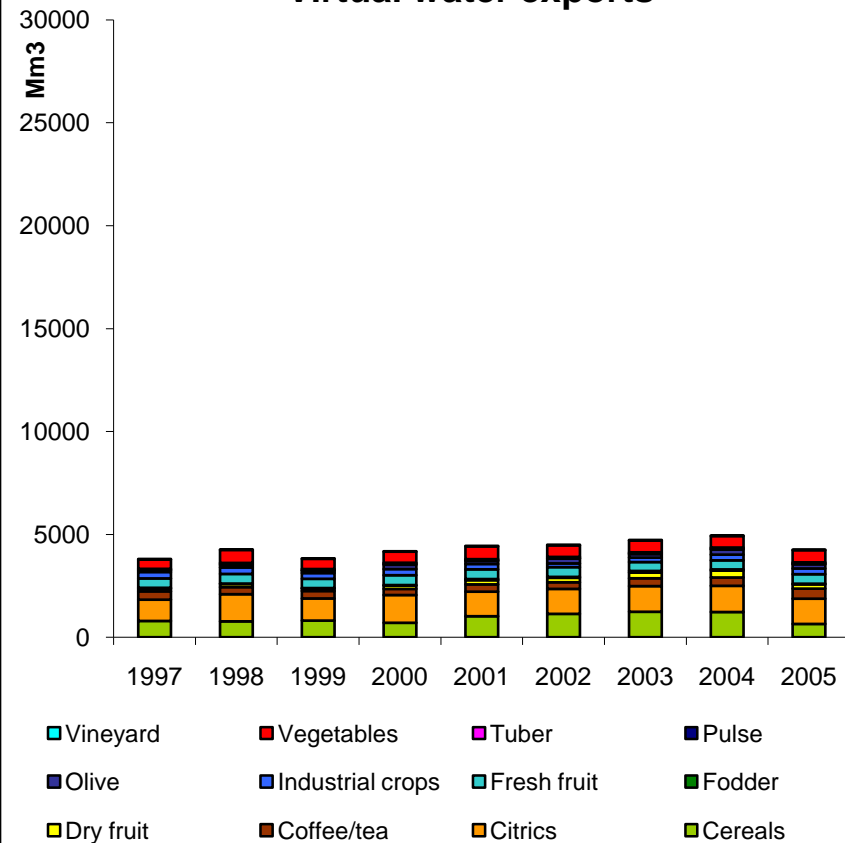
# The case of Spain: Virtual water trade through crops' trade



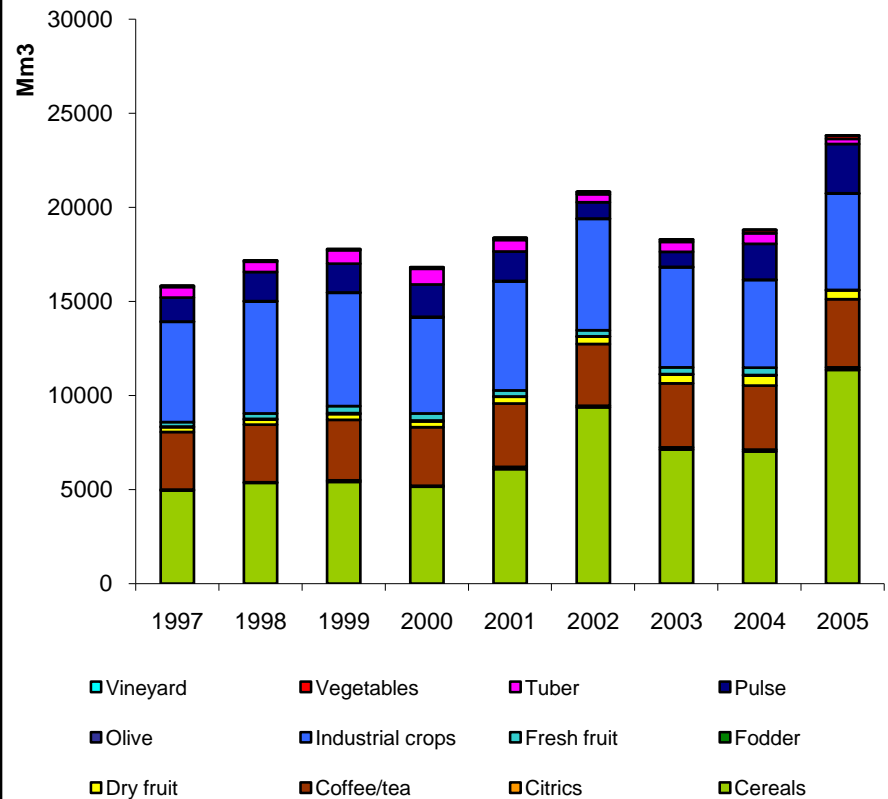
(Source: Garrido et al. 2009)

# The case of Spain: Virtual water trade through crops' trade

## Virtual water exports

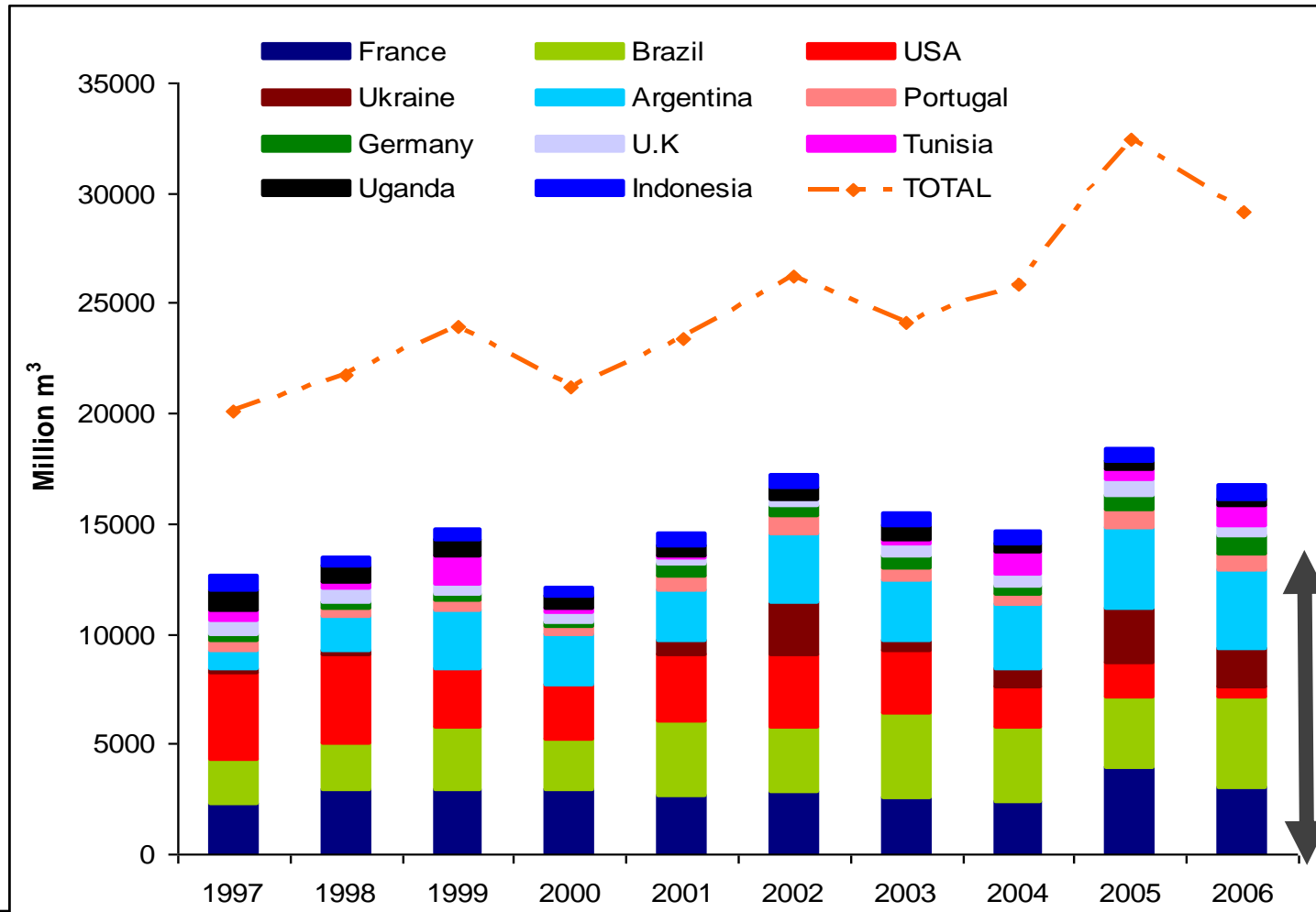


## Virtual water imports



(Source: Garrido et al. 2009)

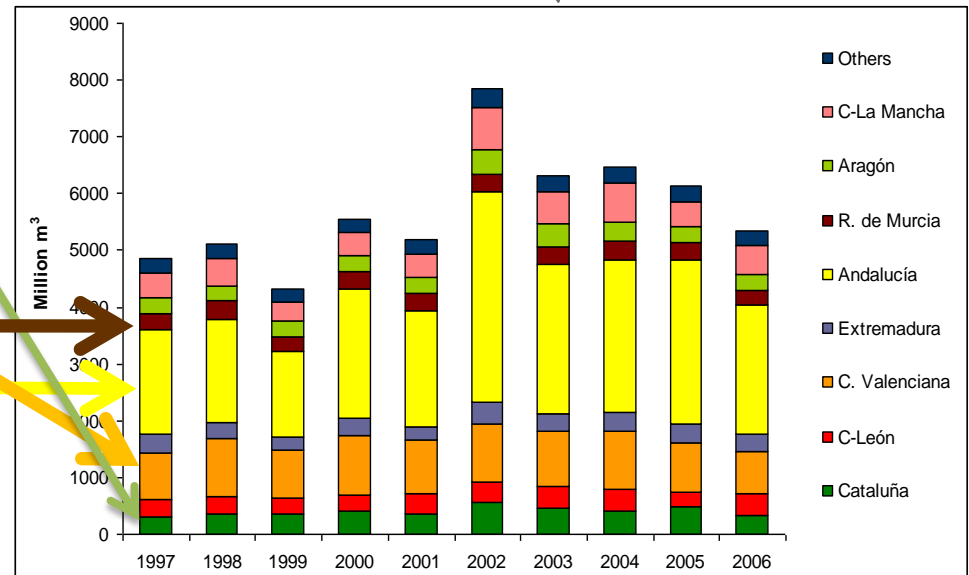
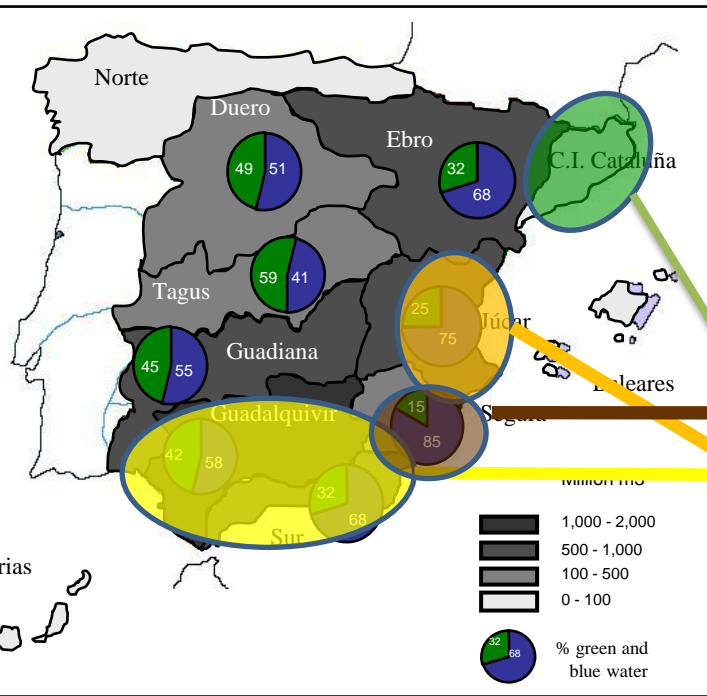
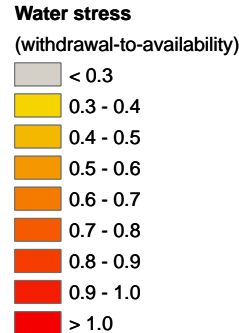
# The case of Spain: Virtual water imports



Argentina  
Ukraine  
Brazil  
US  
France

# The case of Spain: Space dimension

## Blue water exports



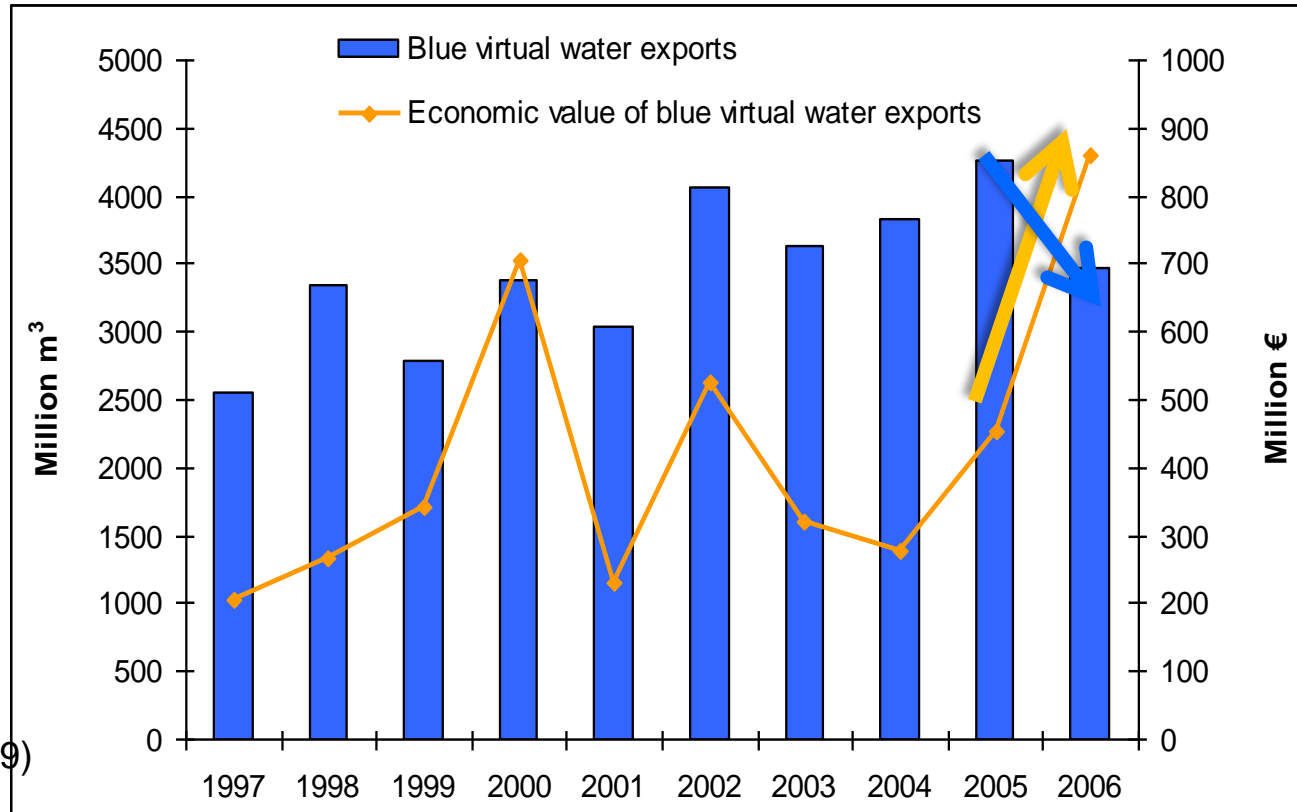
(Source: Garrido et al. 2009)

# The case of Spain:

## The economic dimension: the scarcity value of water (€/m<sup>3</sup>)

Blue water exports

Not all exported m<sup>3</sup> are equally valuable



(Source: Garrido et al. 2009)

# The case of Spain: Does virtual water trade exacerbate water scarcity?

Based on statistical analysis

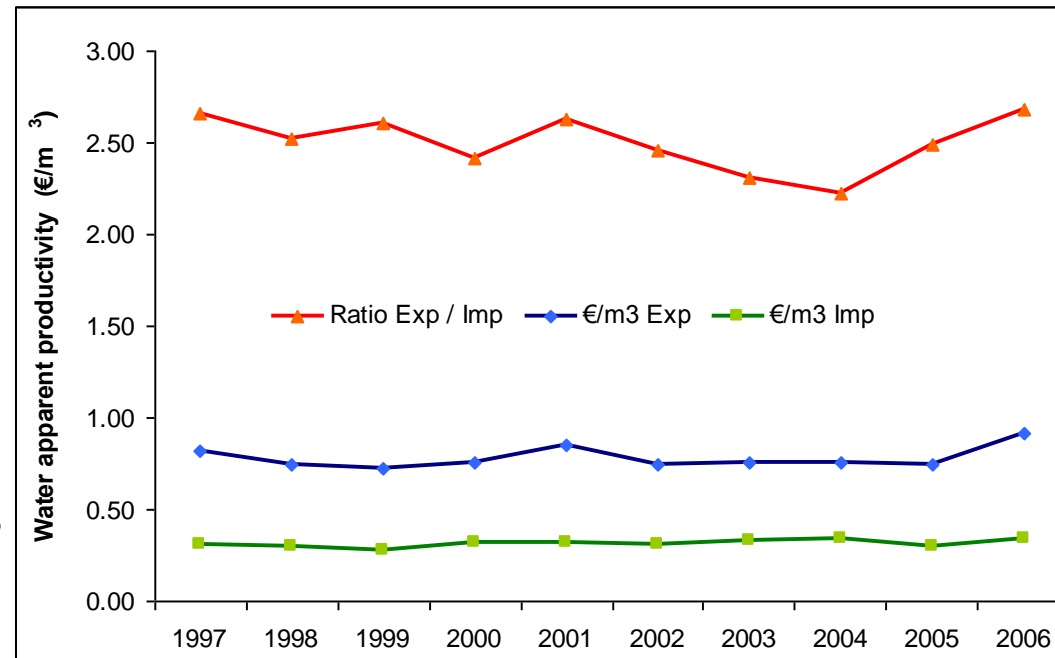
(41 provinces, 10 years, cross-section, time-series analysis)

- No, it does not exacerbate water scarcity. Virtual water exports are the result of:
  - Natural endowments
  - Access to markets
  - Existence of capital infrastructure
  - Work productivity
  - Water policies

# The case of Spain:

## Does Spanish water trade contribute efficiently to world water productivity?

- Yes, it converts green water into blue water, and has specialised in:
  - Meat production
  - Fruits and vegetables
- “Water” exchange terms have remained stable (1996-2006)





# THANK YOU

Soon available:

Garrido, A., M.R. Llamas, C. Varela-Ortega, M.M. Aldaya, P.Novo and R. Rodríguez-Casado. “***Water Footprint and Virtual Water Trade in Spain***”. Springer, NY

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