Food Security and Trade

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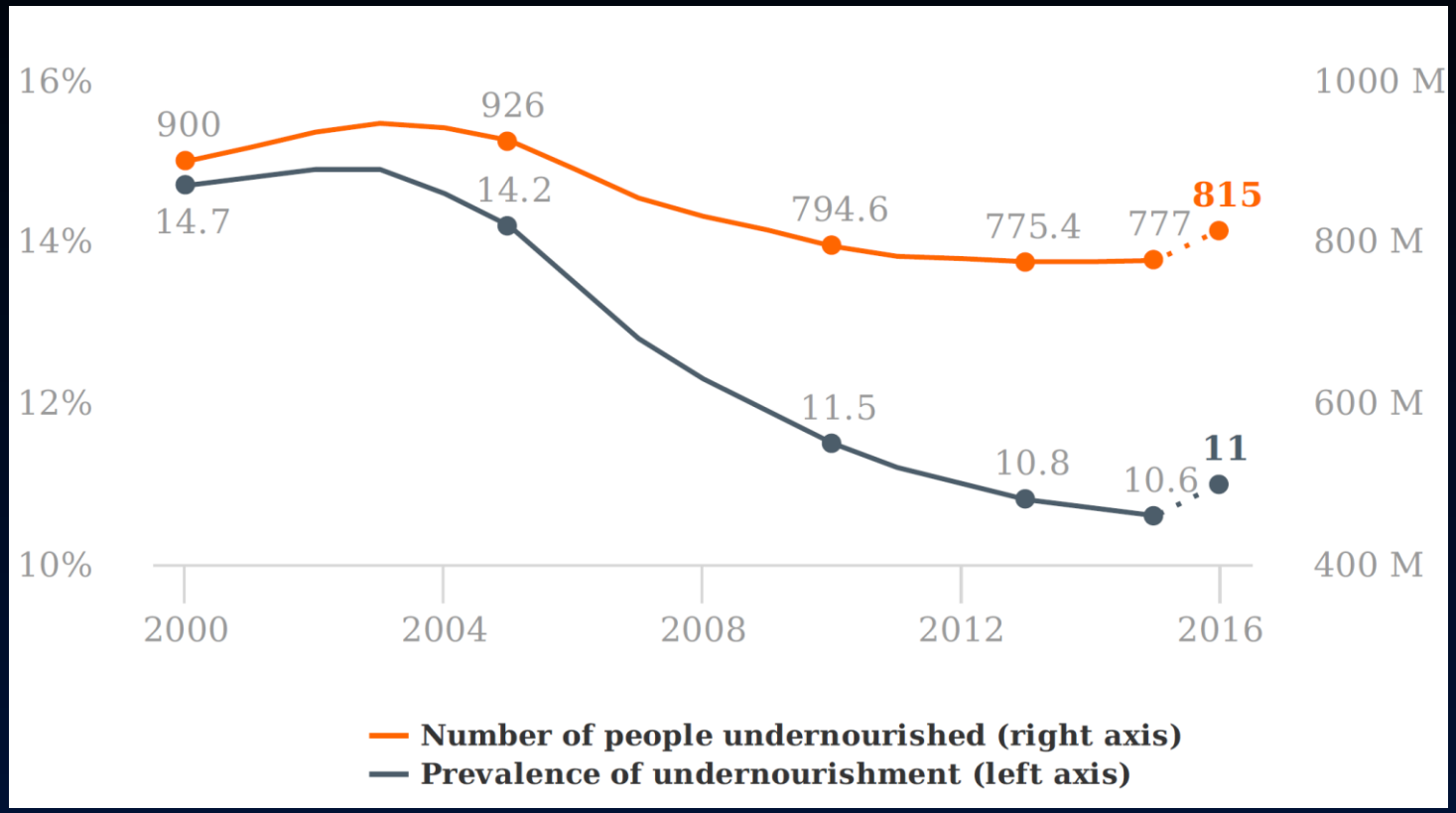
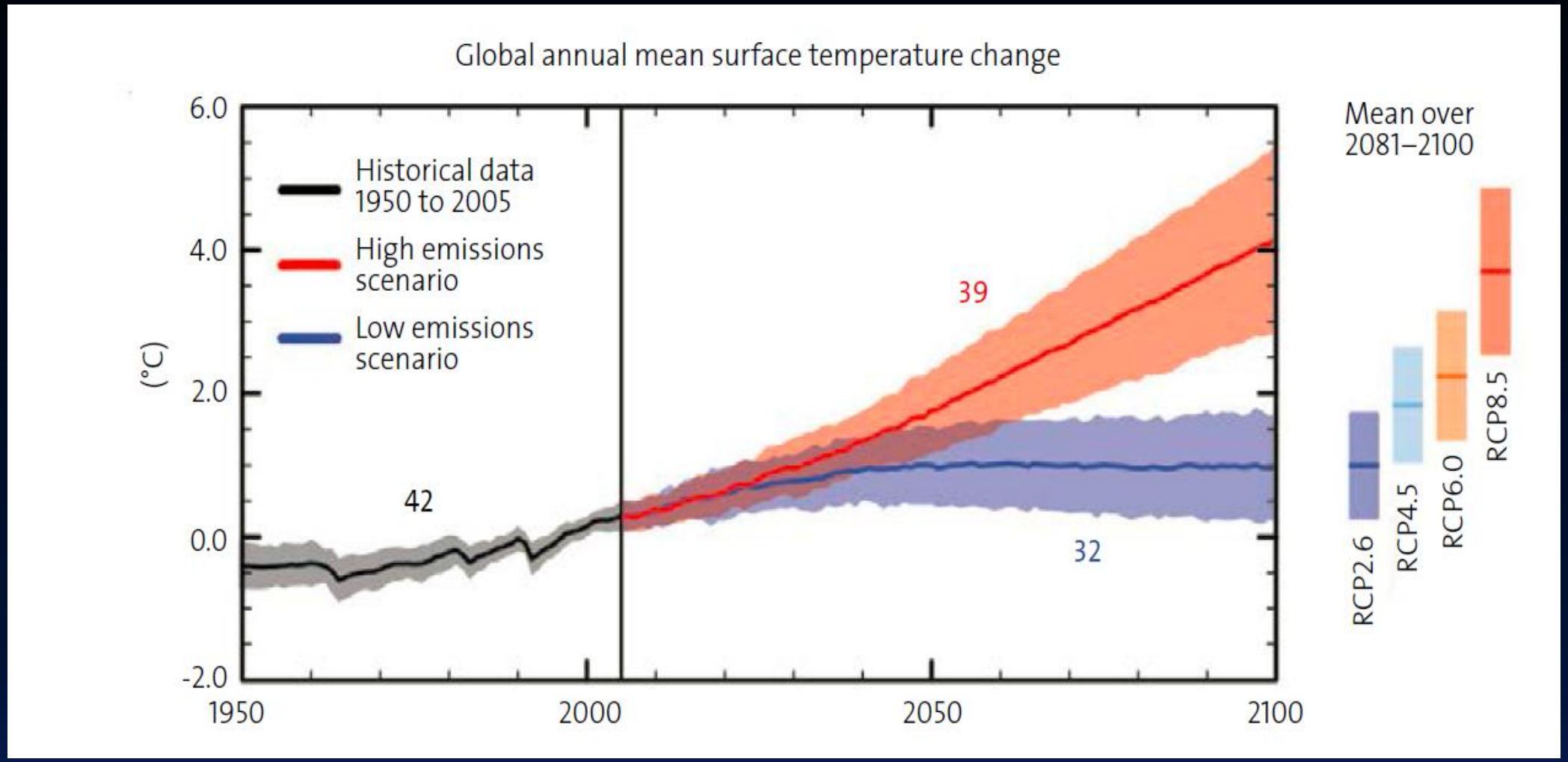
The Setting

Number and prevalence of food insecure increased in 2016

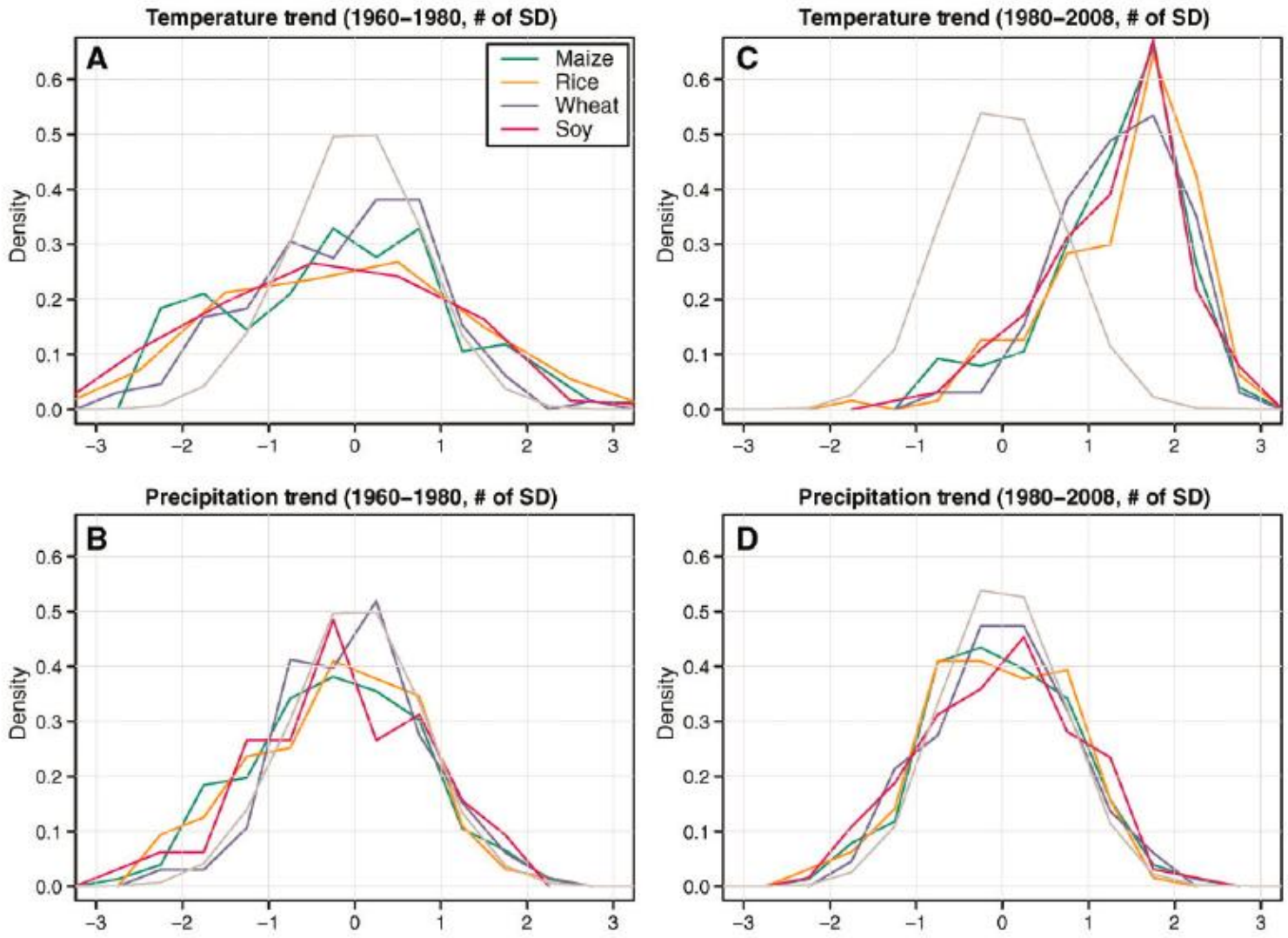


Source: FAO 2017

Climate extremes are likely to become more common



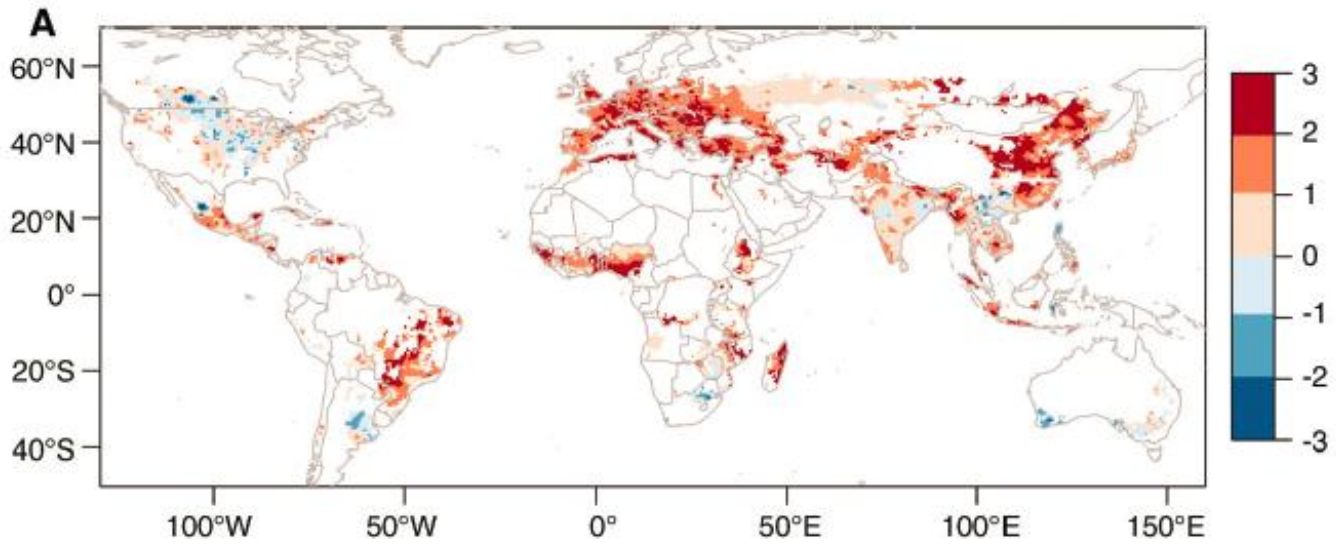
Temperature distributions since 1980 have shifted to the right.



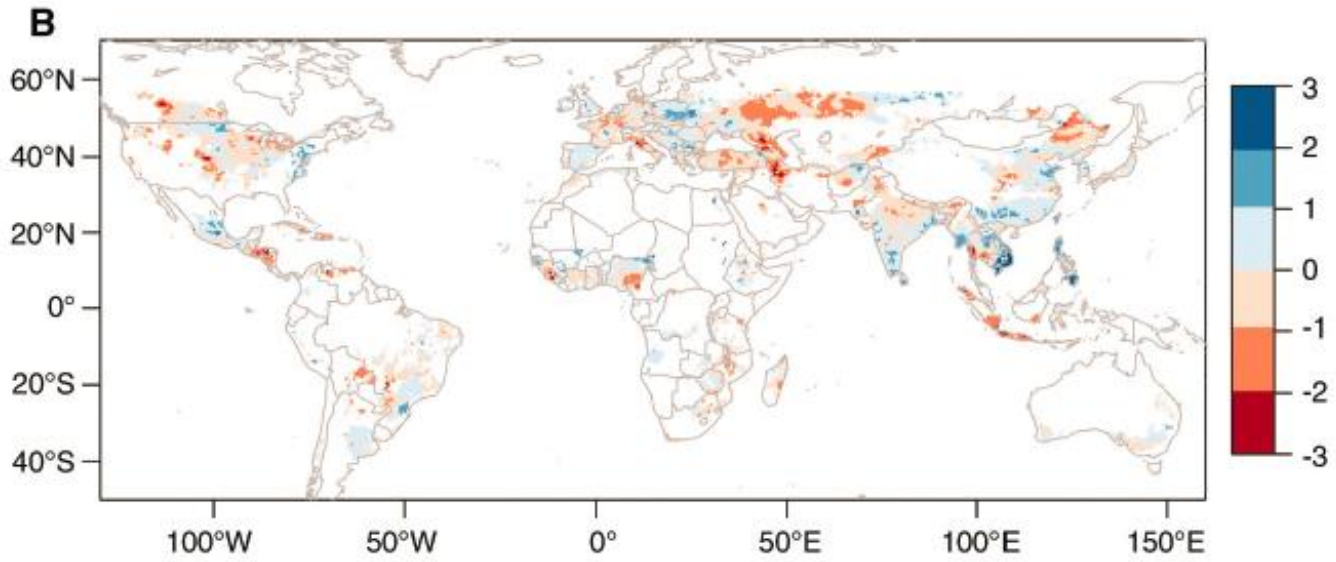
Source: Lobell, Schlenker, Costa-Roberts, 2011

Agricultural areas on average are warmer and drier

Temperature

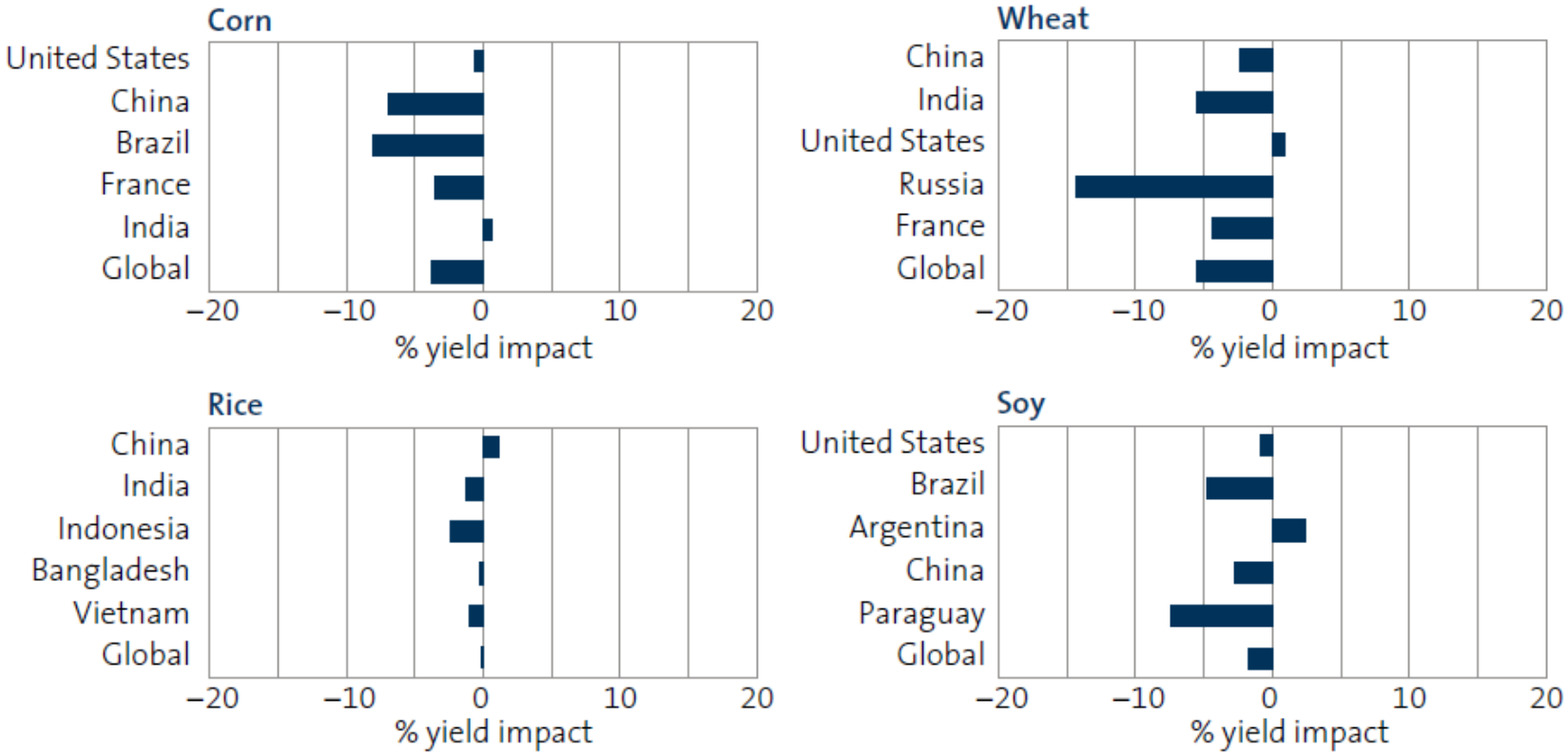


Precipitation



Source: Lobell, Schlenker, Costa-Roberts, 2011

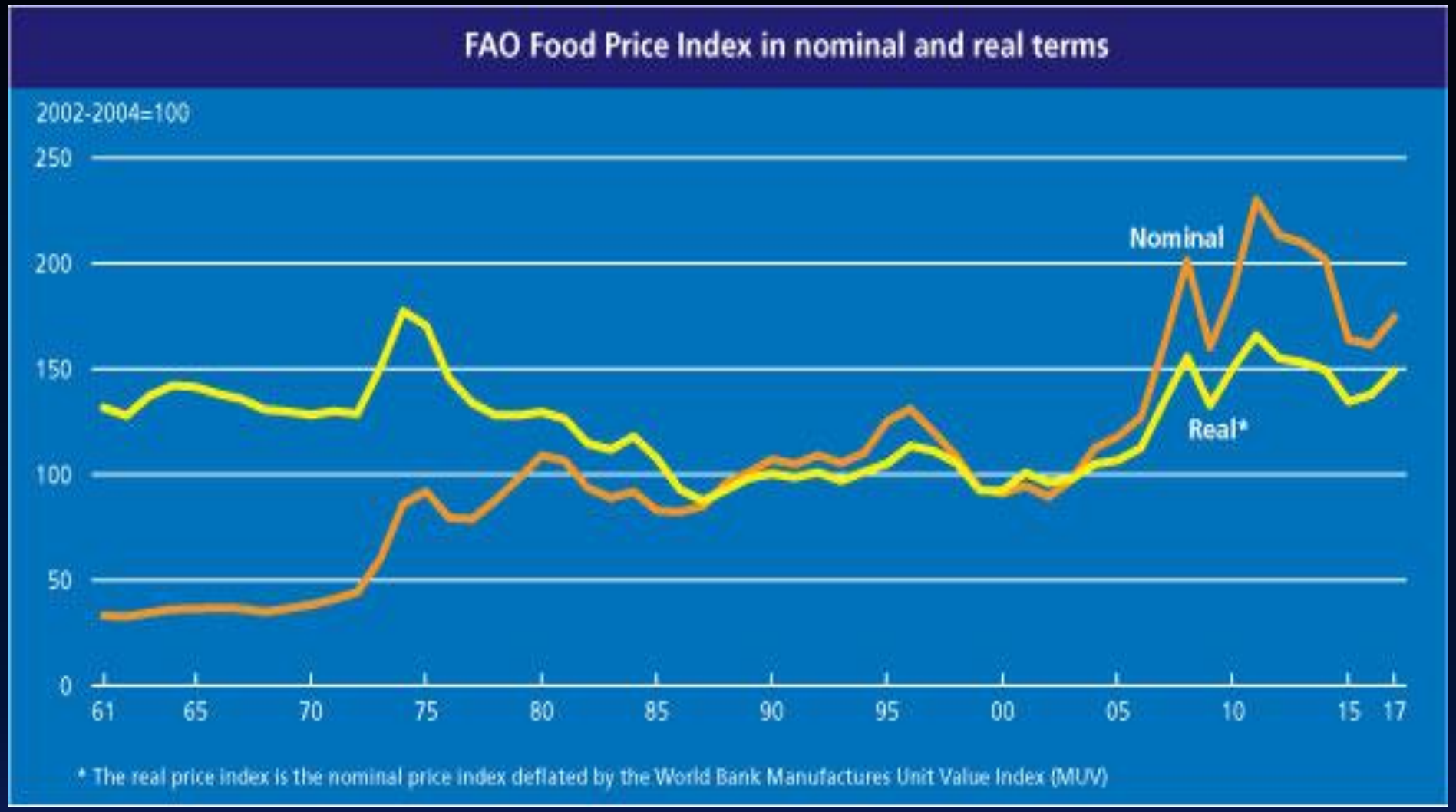
… and that's already affecting yields (1980-2008)



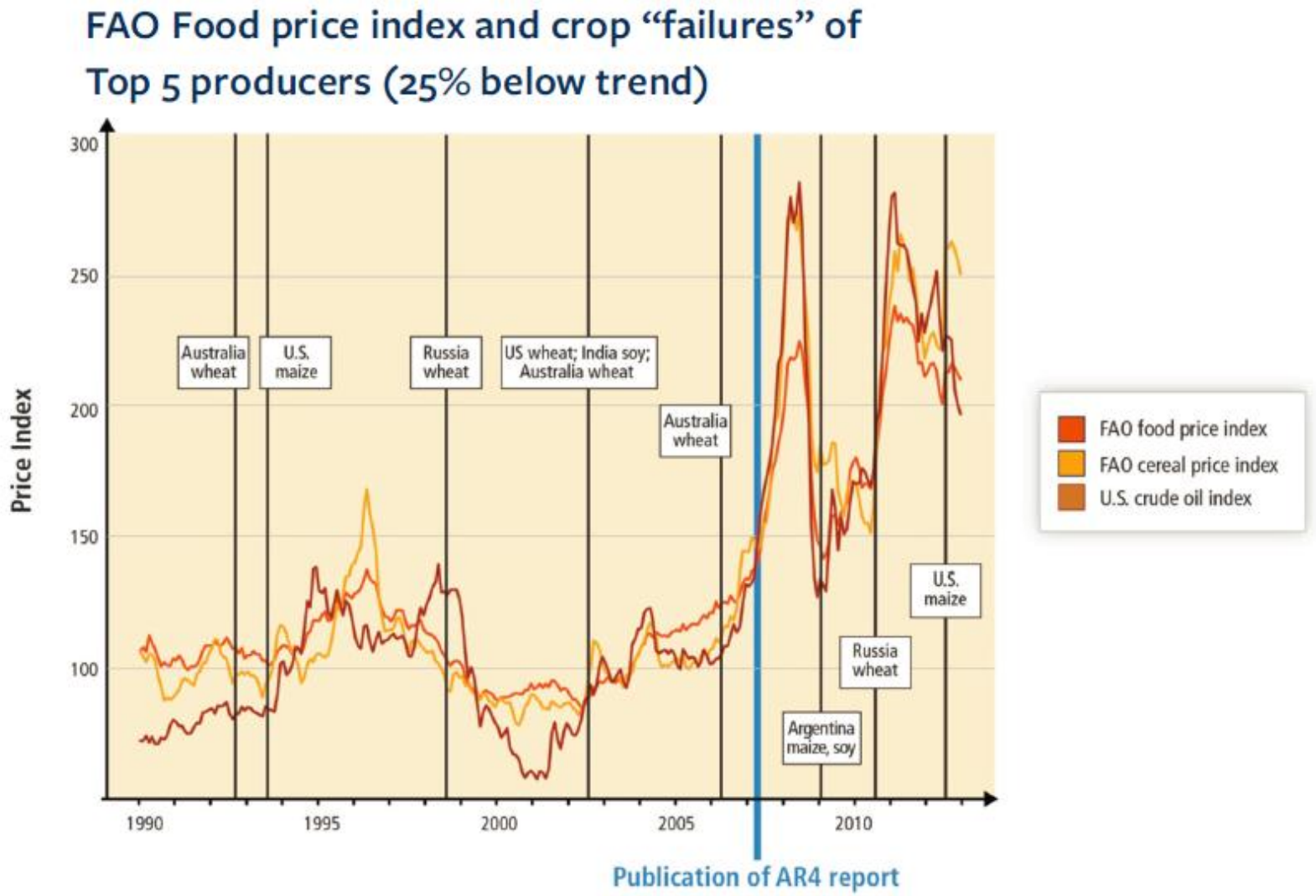
Estimated net impact of climate trends for 1980-2008 on crop yields, divided by the overall yield trend.

Source: Adapted from Figure 3 in Lobell, Schlenker, and Costa-Roberts 2011.

Prices are going up

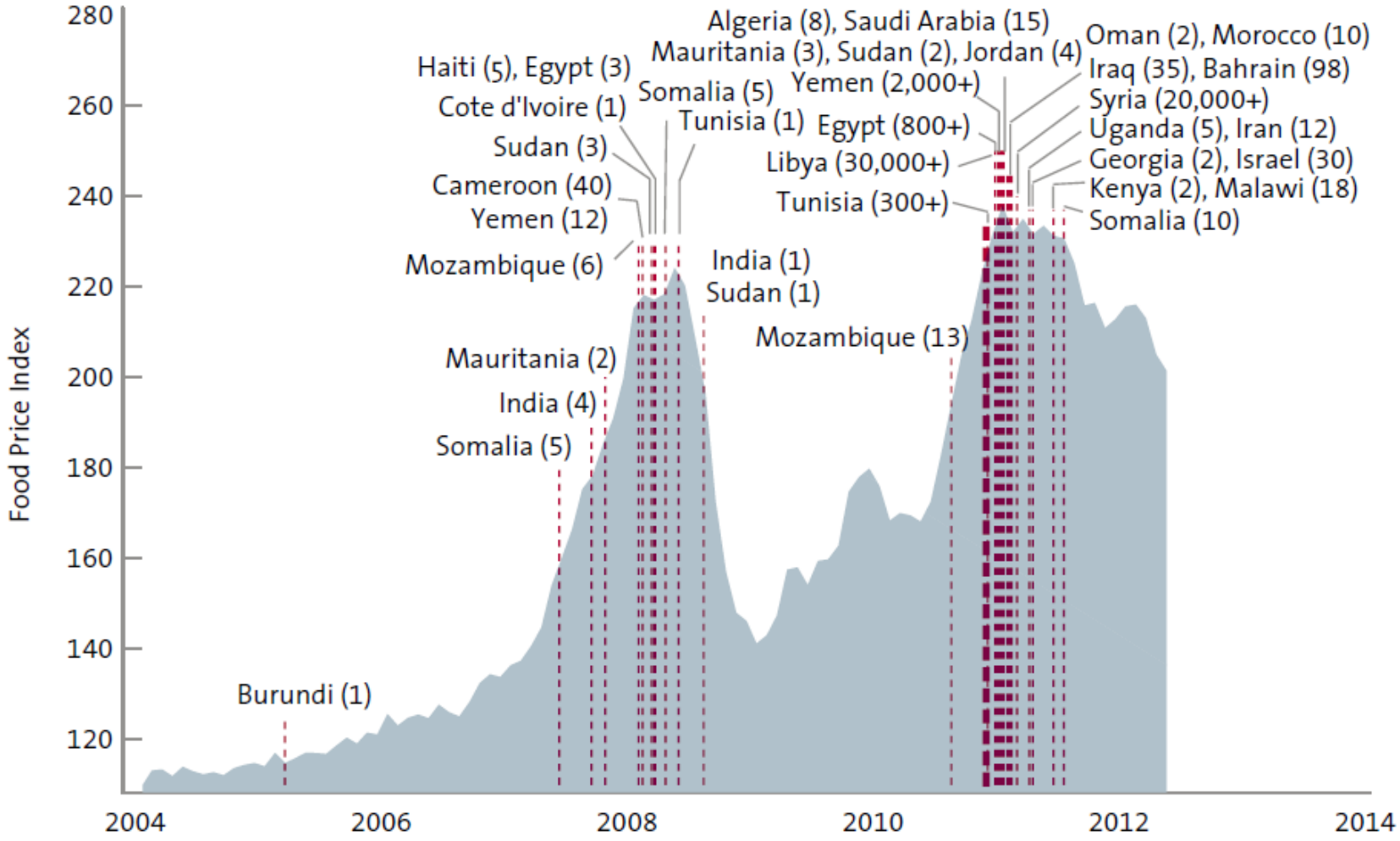


Weather events often precede price spikes



Source: IPCC WG2, Chapter 7.

…and price spikes can cause unrest



Red dashed lines correspond to the beginning dates of "food riots" and protests in North Africa and the Middle East between 2004 and 2011. The overall death toll is indicated in parentheses next to each country.

Source: Lagi, Bertand, Bar-Yam 2011.

Photo Source: Lesley Wroughton, Washington, and Jewel Topsfield, Canberra, April 15, 2008

Food Security Policy Responses: Implications for Trade

Stockholding and Export Restrictions

- 32 countries restricted exports
- Many major exporters of grains, including

  Argentina (for wheat, maize, soybeans and sunflower seeds),
  Cambodia (rice),
  China (rice, wheat, maize, flour),
  Egypt (rice),
  India (rice, wheat),
  Kazakhstan (wheat, soybeans, sunflower seeds),
  Pakistan (rice, wheat),
  Russia (wheat, maize, barley, flour, rapeseed),
  Ukraine (wheat, maize, barley) and
  Viet Nam (rice)

Why do we care from a trade perspective?

Estimates export restrictions further increased world prices

- Rice: almost ½ of its 128% increase due to trade restrictions
- Wheat: 29% of 112%

Estimates that it may have increased poverty by 8 million people

(Martin and Anderson 2012; Gotz, Glauben and Brummer 2010; Abbott 2010; Liefert et al 2012; Welton 2011; Djuric 2009 and 2011)

Large stockholding may also decrease exports and act as a production subsidy

India as an example

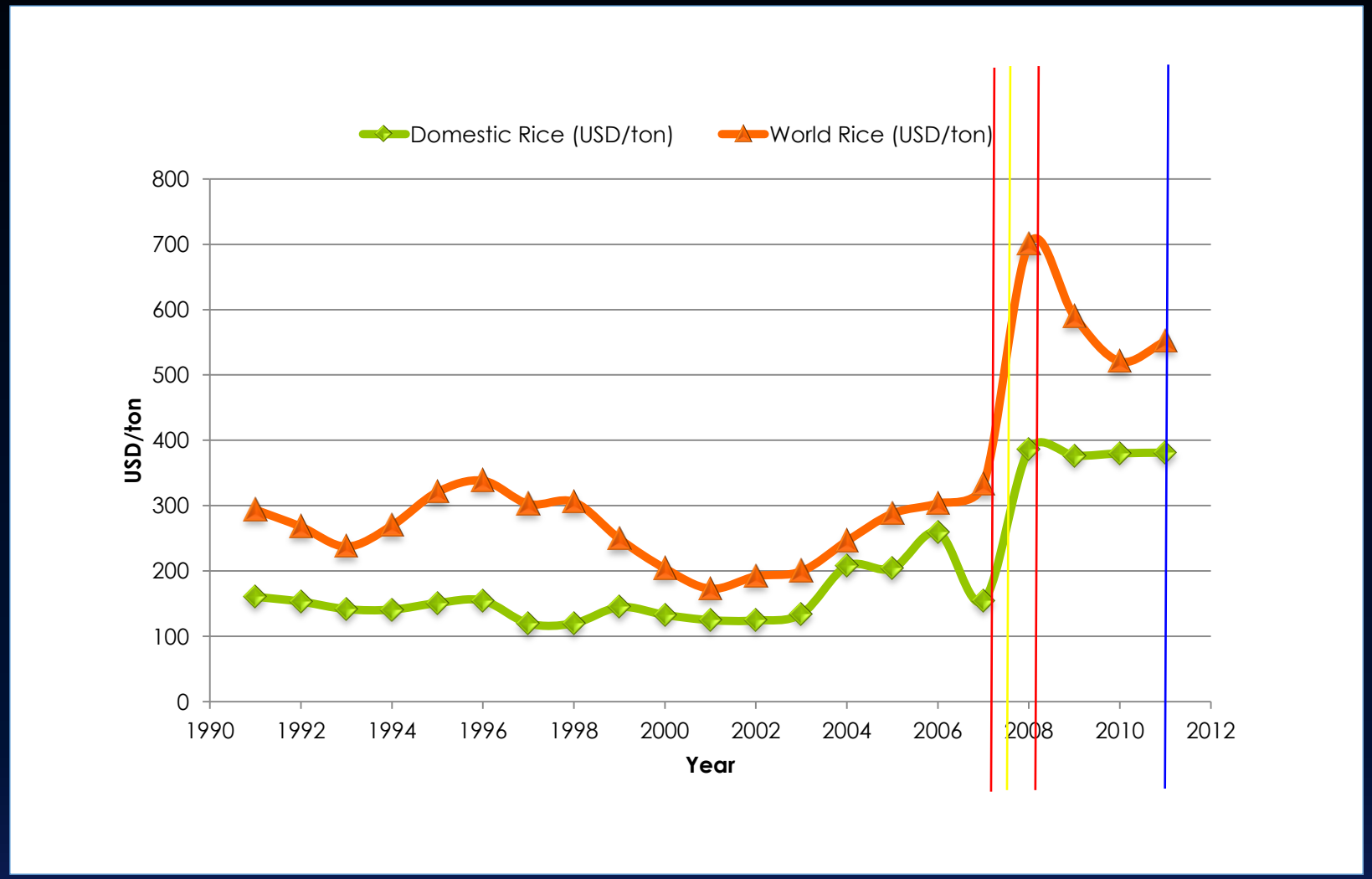
- Production: India is world's 2nd largest producer of rice (20%) and 3rd largest producer of wheat (12.05%)
- Consumption: Rice is the staple for eastern and southern parts of country and wheat is the staple for northern parts of the country.
- Food Security: Home to ¼ of the world's undernourished people.

Baylis, Jolejole and Mallory 2015

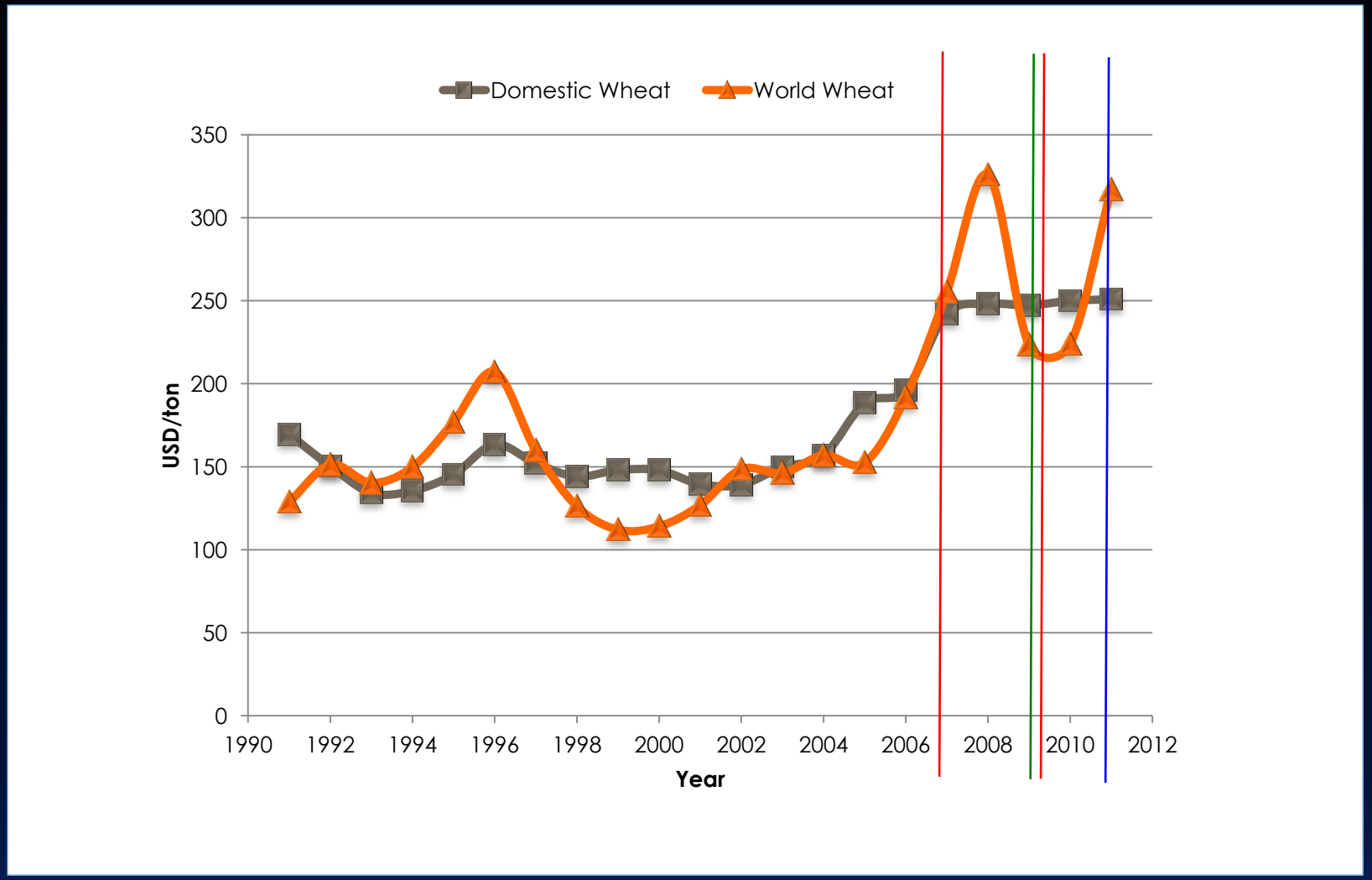
Indian Agricultural Policy

(1) procurement at price floors
(2) Public Distribution System (PDS: consumer subsidies for rice and wheat)
(3) grain stocks
(4) trade restrictions

India’s Rice Trade Restrictions



Wheat export restrictions



Indian Rice and Wheat Export Ban

Export ban may have had unintended consequences

Rice: made domestic markets less integrated (storage?)

Wheat: little evidence of effective ban. Imports during this time.

Exacerbated effects of domestic supply shocks

Despite evidence the (rice) ban insulated the domestic market, it may have reduced domestic market efficiency

Take-home on Export Bans

Often ineffective (Zambia, India wheat)

In some cases may have stabilized price internally (Ukraine, Zambia)

Often led to less efficient domestic markets (Ukraine, Russia, India)

And more volatile domestic prices (Ukraine, India)

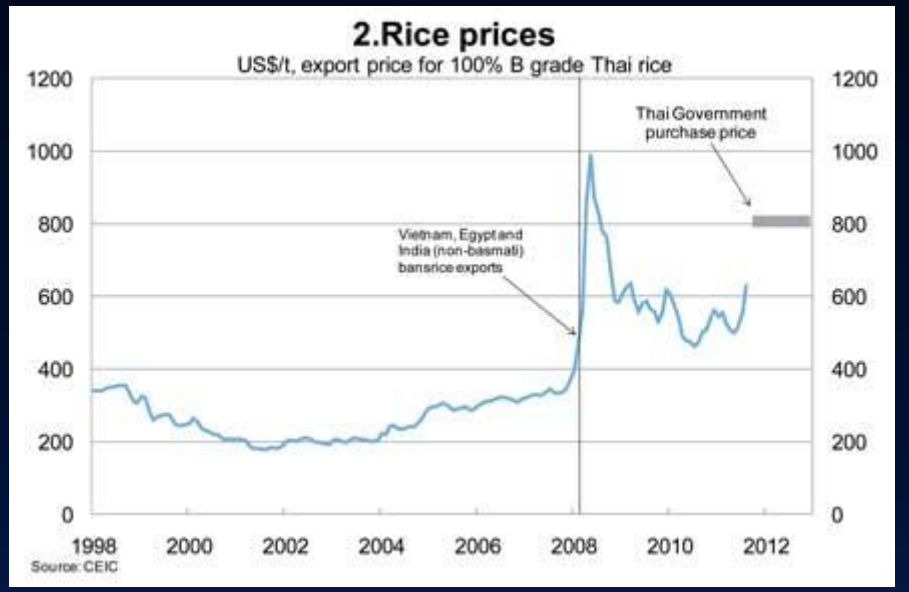
…but need to control for weather shocks when policy is a response (Zambia)

An, Qui and Zheng 2016; Rude and An 2015; Goetz, Glauben and Brummer 2013; Djuric and Goetz 2016; Zhou 2018; Jayne 2012.

Also growth in stock-holding programs

Thai Rice Pledging Program

- Objective: To increase farmers' income with higher prices
- Assuming stockpiling would increase world prices
- Farmers register rice with millers in exchange for cash



Results

- No increase in world prices
- Massive storage losses (mold, moisture, rodents)
- Heavy financial losses
- Comparative advantage loss (to Vietnam, India)

Take-home on domestic food storage policies

- Seemed like a good idea at the time…
- Often associated with high post-harvest loss (Thailand, India) and quality deterioration
- Issues with farmer access to these programs, farmer payments, "transaction costs"
- … and distribution of the grains afterward
- In some cases, arguably had a large effect on household food security (PDS in India)

Mason and Myers 2013; Jayne et al 2011; Von Braun 1992; Benson et al 2008; Jha and Srinivasan 1999; Shrinivas et al 2018.

- Food Security -> policy responses -> trade
- Trade -> Food availability and access

Trade as a safety-valve

… is it?

- Theoretically, should limit price effects of local production shocks (Baldos and Hertel 2015)
- But transmit effect of production shocks elsewhere

What we do

- Consider 104 countries in Africa, Asia and Latin America from 1960-2010
- Regress producer prices for main cereals grown in that country against annual rainfall and temperature deviations
- Consider effect before and after country accession to GATT/WTO
- Control for country averages over time, annual averages across countries, (regional weather patterns)

Baylis, Crost and Zhou (in preparation)

What we find

- We find GATT&WTO accession magnifies the effect of global weather events (el Niño).
- Domestic price effect equivalent to a 100mm reduction in annual rainfall or annual increase in temperature of 0.2-0.4C.

but…

- It dramatically mitigates domestic weather effects (72-100% for temperature, 90-95% for rain).

…and that affects food security

- In Malawi, the household dietary diversity score (HDDS) has a price elasticity of -.4.

Measure dietary quality

- A 10% increase in price decreases the number of categories of goods by 2 (out of a max of 8 in our data).
- The reduced Coping Strategies index (rCSI) has an even larger price elasticity of 1.

Measure dietary quantity

1 C higher ann. ave. temperature, or 400mm drop in rainfall, would increase local prices by 1%, moving 3.4% to 10% of households from being food secure to food insecure without the WTO. With the WTO, almost all of the price effect is mitigated.

Punchline

- Many countries are increasing the use of trade-restrictive policies to promote domestic food security.
- … that can (and do) exacerbate price shocks internationally.
- … and that can also make domestic prices and food security more sensitive to local production shocks.
- Need to develop alternate policies for food security.

Thank you

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