



Food prices, Biofuels, and Climate Change

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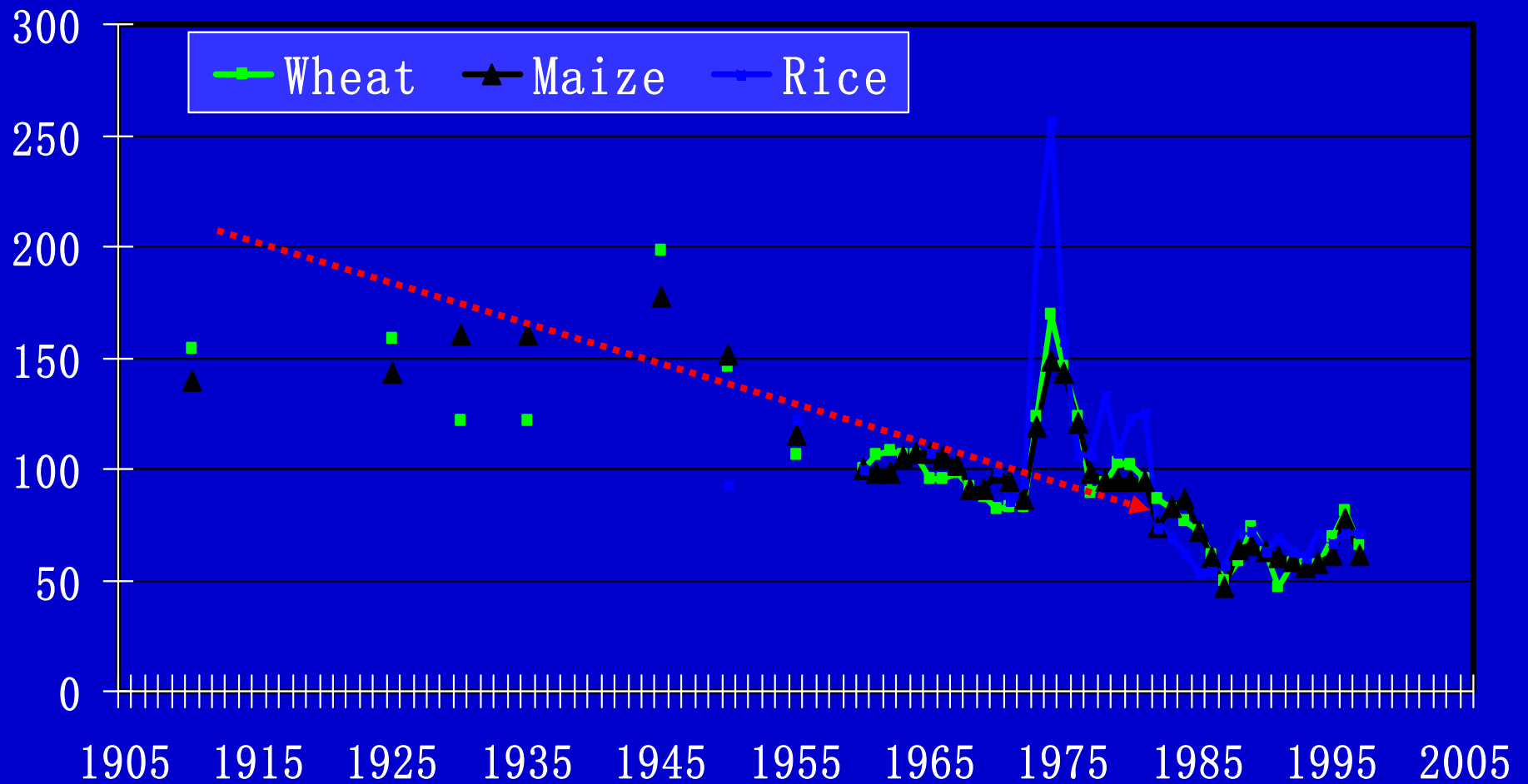
February 2008

Overview

- 1. The new world food equation**
- 2. Energy - biofuels - food security**
- 3. Climate change - biomass – agriculture**
- 4. Pro-poor policy and program actions**

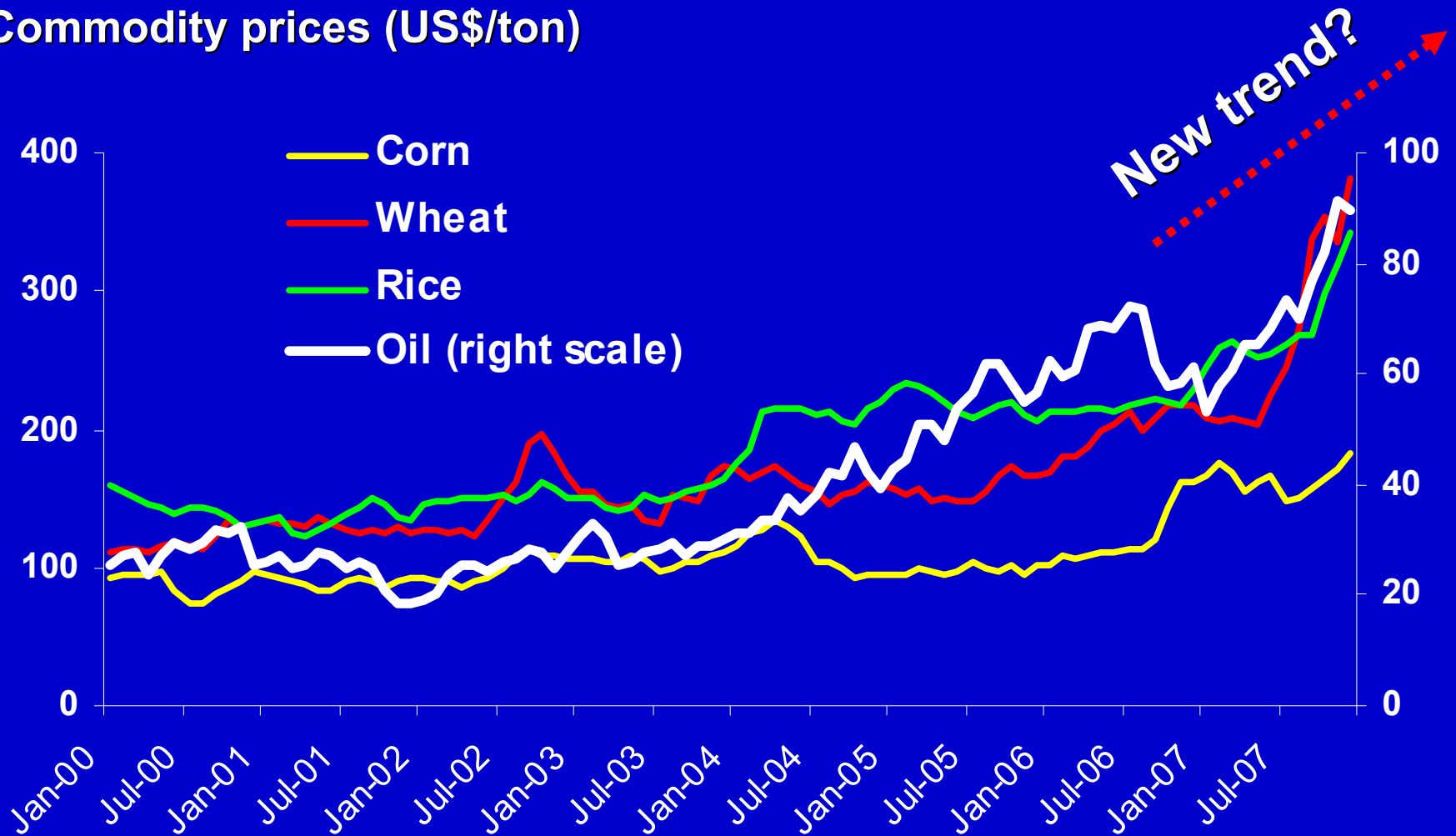
Cereal Price - Index 1905 - 2000

(All prices = 100 in 1960)

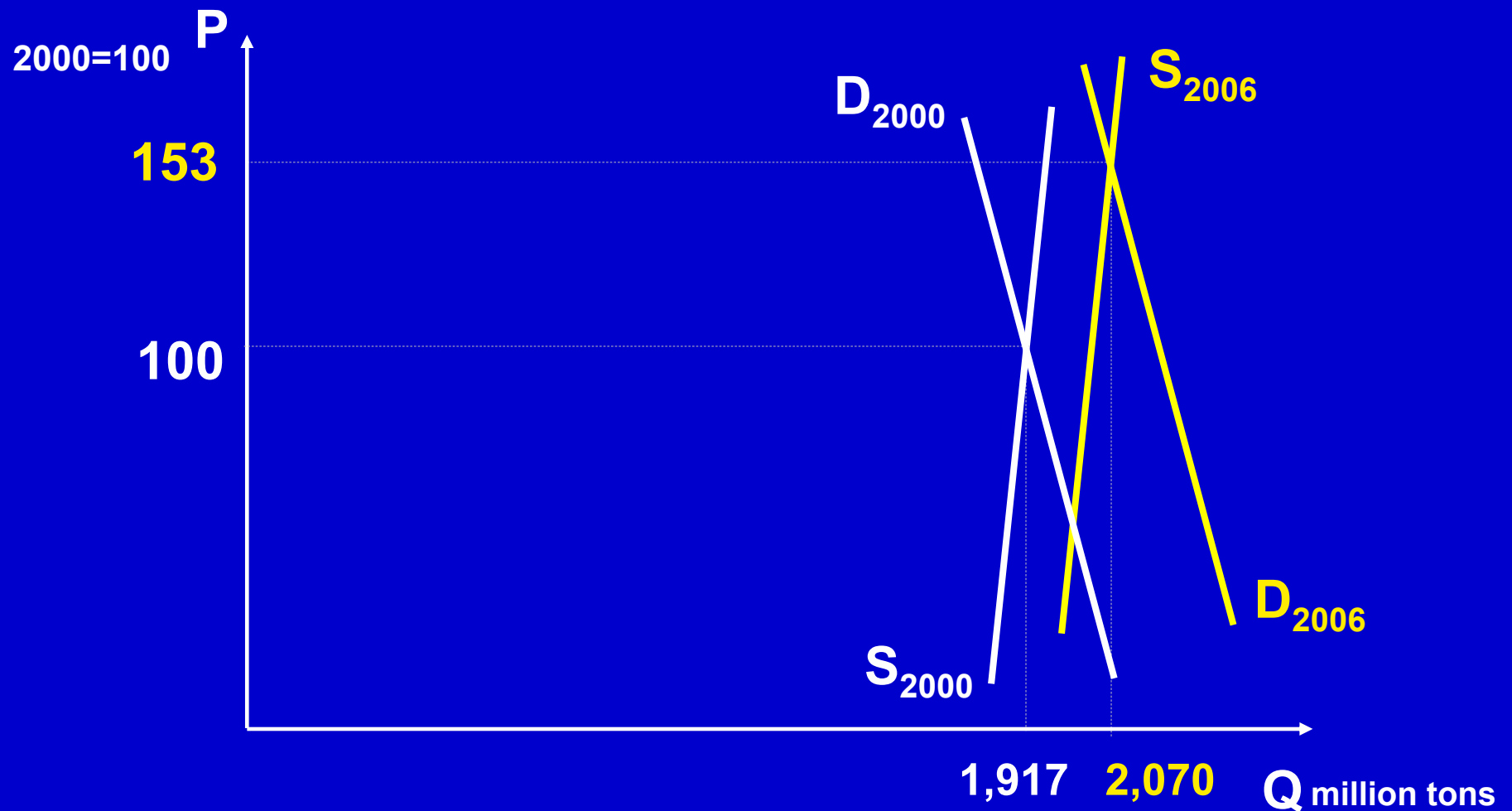


Surge in cereal and oil prices

Commodity prices (US\$/ton)



Changing supply, demand and price for cereals 2000 - 2006



Changes in food and agriculture equation

Production

Demand

Trade and processing

Changes in food and agriculture equation

Production

Demand

Income growth

Poverty and inequality

Consumer behavior

Bioenergy

Biomass (CO₂)

...and Policies

Trade and processing

Changes in food and agriculture equation

Production

Land

Water

Inputs & Transport costs

Workforce

Climate change

Agrarian structure

Technology

...and Policies

Demand

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Trade and Markets

-Information & Standards

-Supermarkets

...and Policies

Drivers of change: Income growth

Growth (2004-06 per annum)

- 9% in Asia
- 6% in Africa
- 2% in industrialized countries

India: 2000 – 2025

- Meat ▲ 176%
- Milk and vegetables ▲ 70%
- Grain ▲ 27%

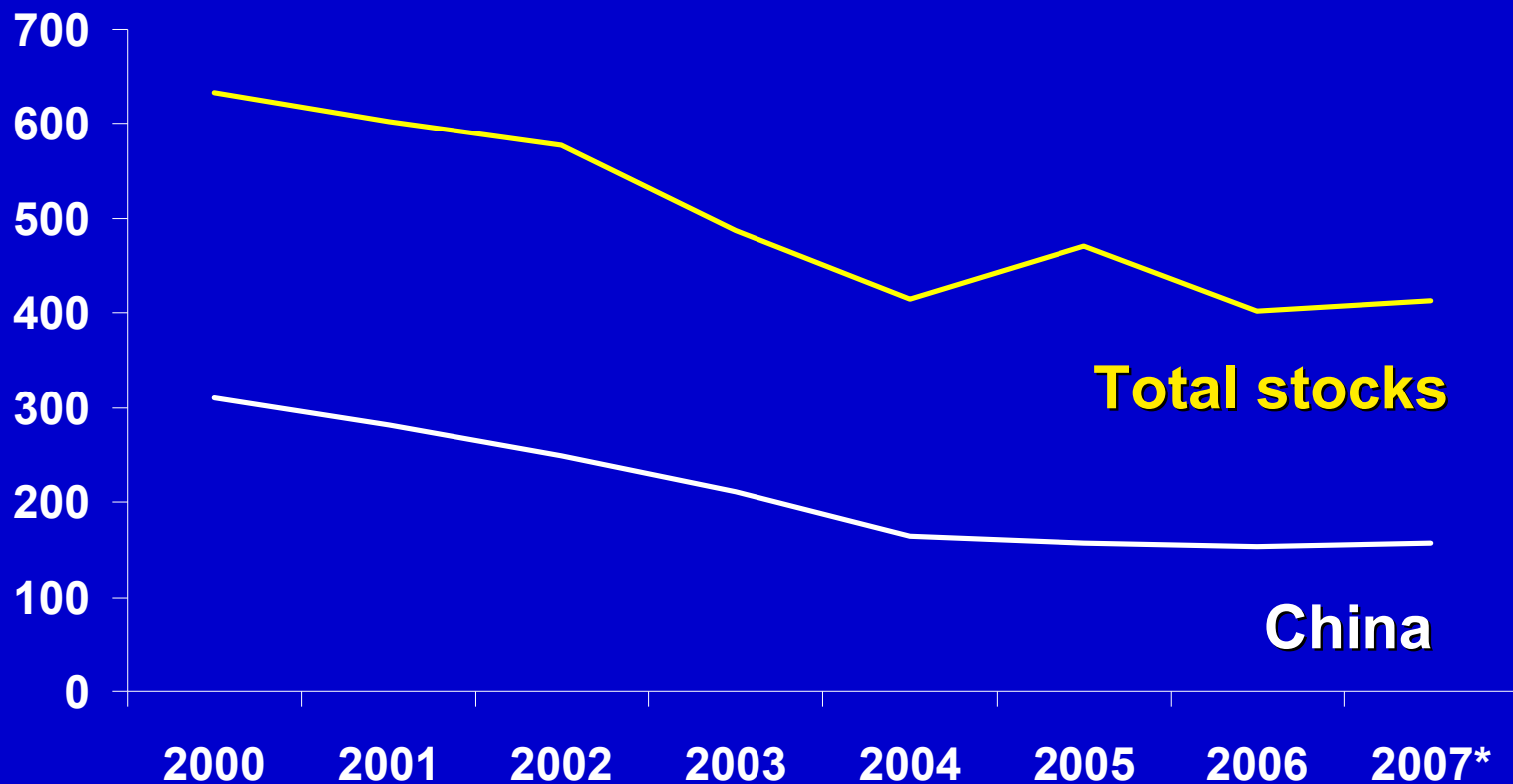
Consumption: 2005/1990 ratios of per capita consumption

	India	China	Brazil	Nigeria
Cereals	1.0	0.8	1.2	1.0
Meat	1.2	2.4	1.7	1.0
Milk	1.2	3.0	1.2	1.3
Fish	1.2	2.3	0.9	0.8
Fruits	1.3	3.5	0.8	1.1
Vegetables	1.3	2.9	1.3	1.3

Future grain consumption is driven by income growth, population growth, and feed for meat and dairy production

The world eats more than it produces: cereal stocks decline

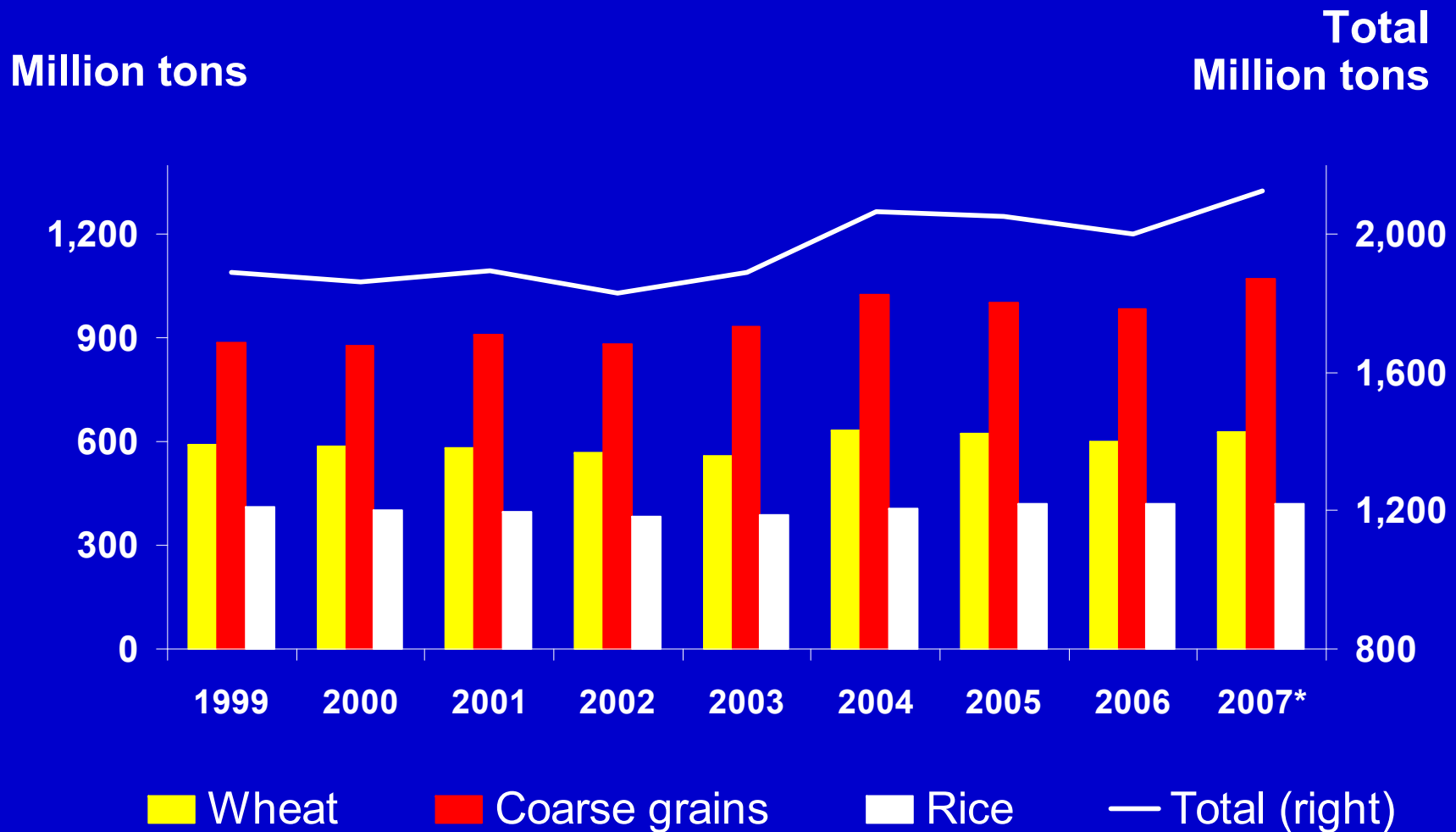
Million tons



Source: Data from FAO 2003, 2005-07.

* Forecast.




World cereal production: not growing enough



Source: Data from FAO 2003, 2005-07.

* Forecast.

Disruptions in production (2004-06)

		Wheat	Coarse grains
US		▼ 16%	▼ 12%
EU		▼ 14%	▼ 16%
Australia		▼ 52%	▼ 33%

*However, coarse grain output ▲12% in China
and rice output ▲9% in India.*

“corporate” world food system

Sales of top 10 companies (billion \$US)

2004

37

363

777

2006

40

409

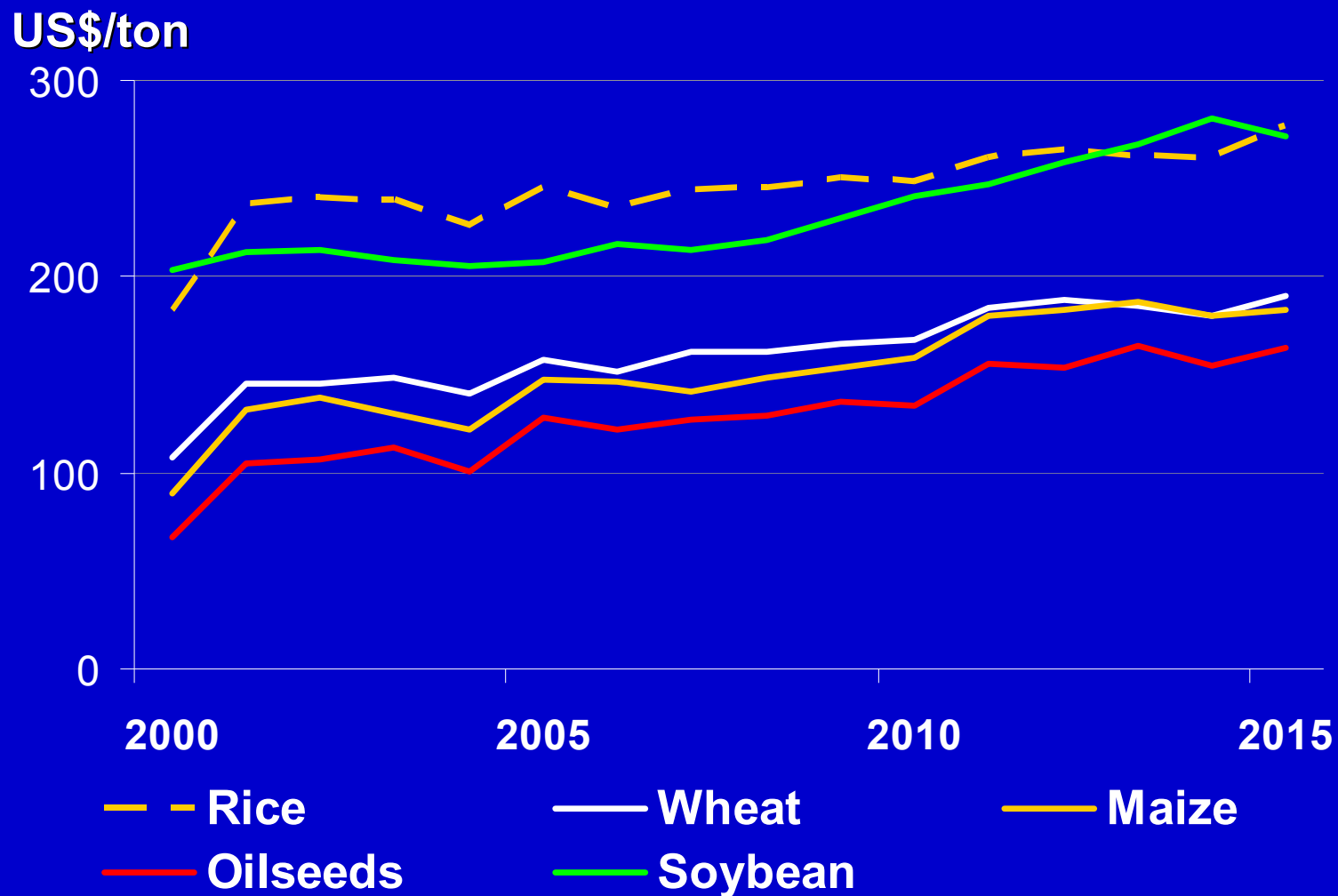
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 Agricultural input industry

 Food processors and traders

 Food retailers

IFPRI's modeling of cereals price changes (2000-05 and 2006-15)



US\$ and EURO prices and ... so what?

December 2000- December 2007 change

Wheat US\$/ton nominal : +244 %

Wheat US\$/ton “real” : +176 %

Wheat EURO/ton : + 139 %

What matters really for the poor?

Purchasing power! - *How to measure?*

PPP; Bigmac (urban bias)

Egg-onomics: 1US\$ buys 6 in US, 7 in Ethiopia,
14 in Bangladesh, 20 in China;

Change in the ratio of [poor peoples' food
prices / unskilled wages] !

Looking beneath the \$1 a day line



Poor

(\$.75 cents – \$1)

485 million people



Medial poor

(\$.50 cents – \$.75 cents)

323 million people



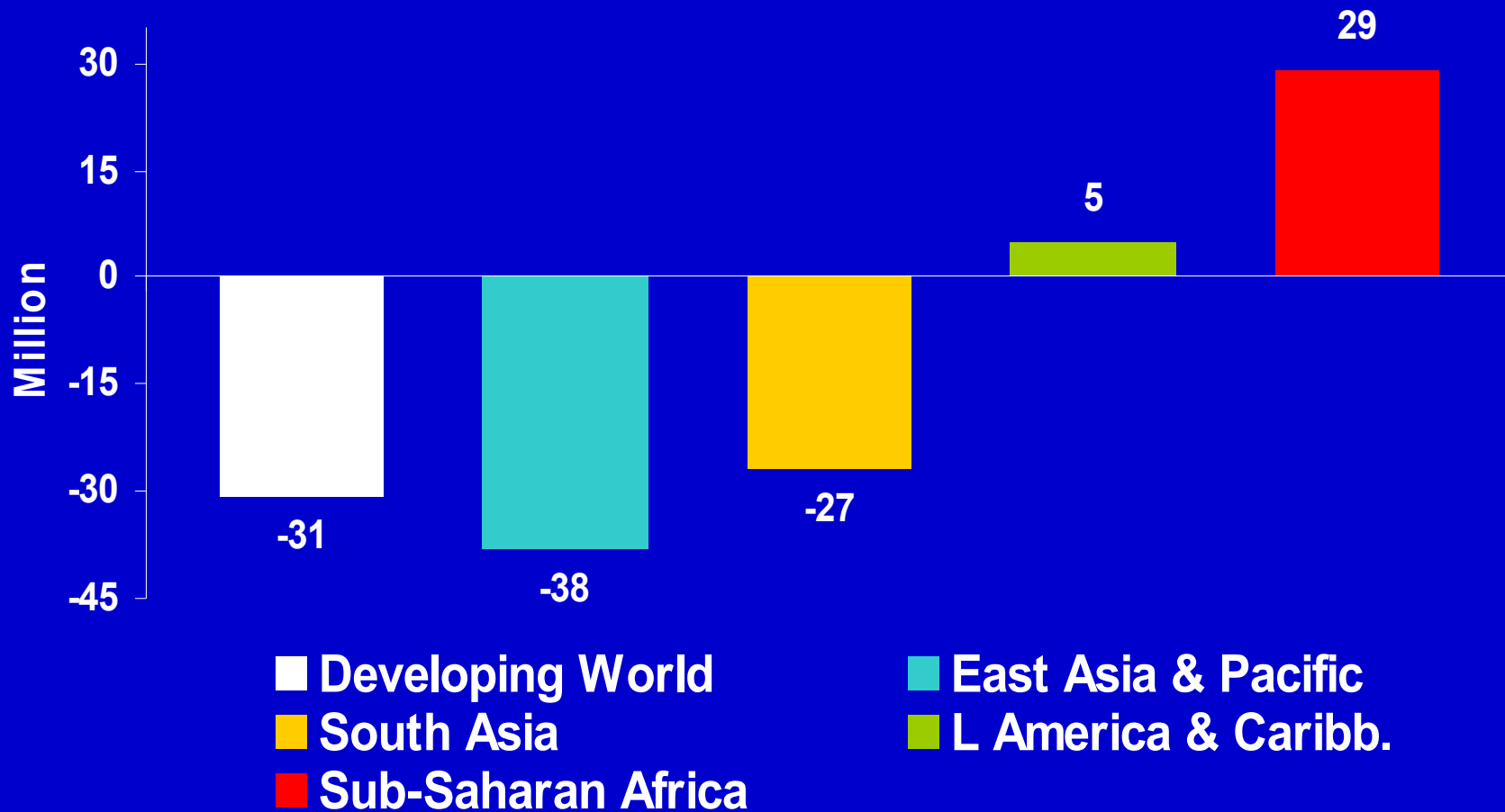
Ultra poor

(less than \$.50 cents)

162 million people

The growing number of the poorest in SSA

Living below US\$.50/day (1990-2004)

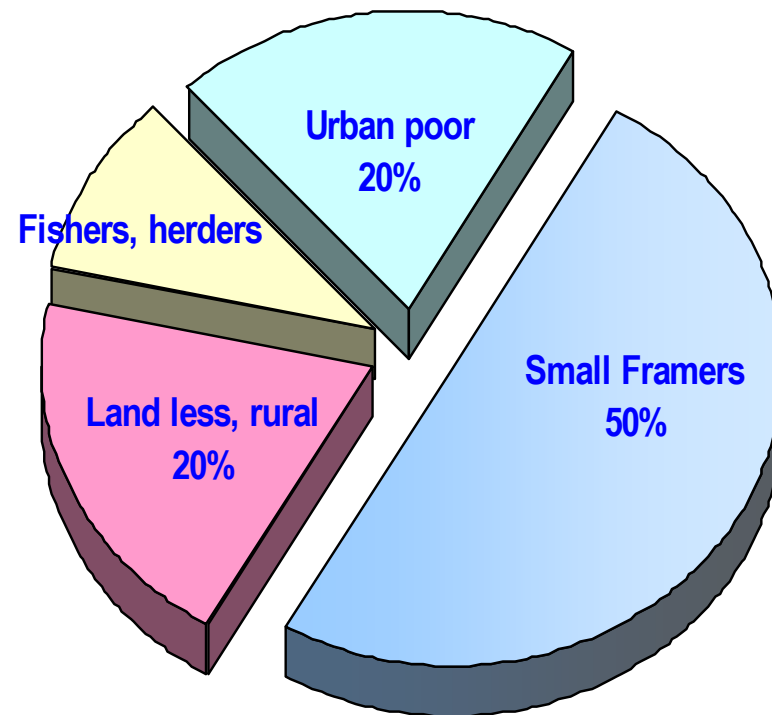


Old and new global food and nutrition problems

Type	Causes	People affected
Hunger	Deficiency of calories and protein	0.9 billion
Children underweight	Inadequate food intake and care, and frequent disease	143 million
Micro-nutrient deficiency	Low diet diversity, infections, inadequate care	More than 2 billion
Overweight to chronic disease	Unhealthy diets; Sedentary Lifestyle	1.6 billion overweight 400 million obese

Source: Based on data from FAO 2006, Micronutrient Initiative and UNICEF 2005, UNICEF 2007, WHO 2006.

Who is affected by hunger?



Source: UN Millennium Project, Hunger Task Force, 2005.

Impact of price increase: the poor are mostly net buyers

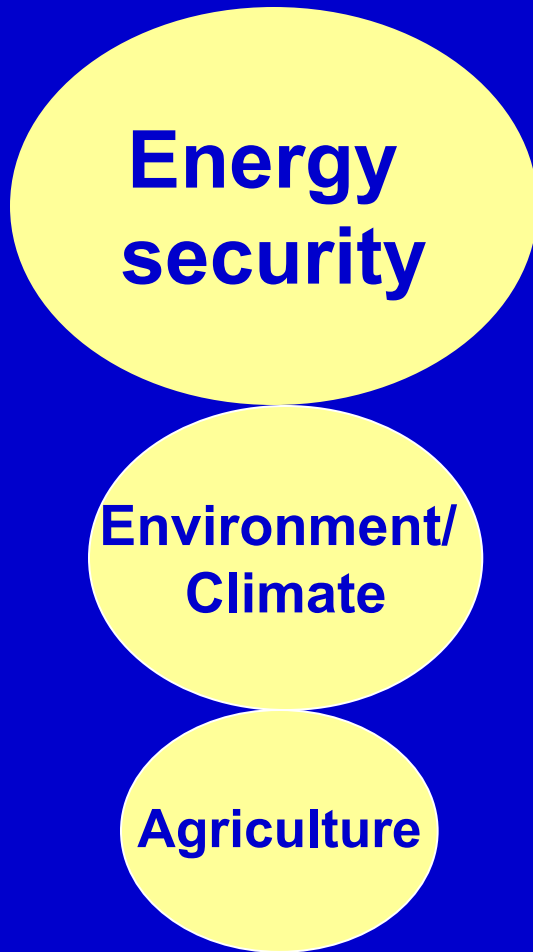
Staple foods	Bolivia 2002	Ethiopia 2000	Bangladesh 2001	Zambia 1998
	% of total expenditure of all poor			
Purchases by all poor net buyers	11.3	10.2	22.0	10.3
Sales by all poor net sellers	1.4	2.8	4.0	2.3

Country- and crop-specific outcomes

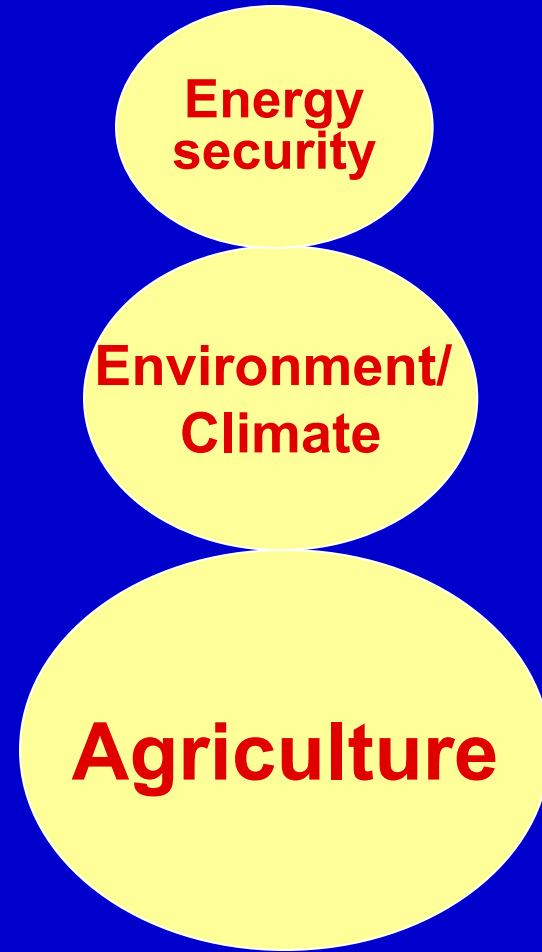
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Political forces of biofuels



Actual welfare effects

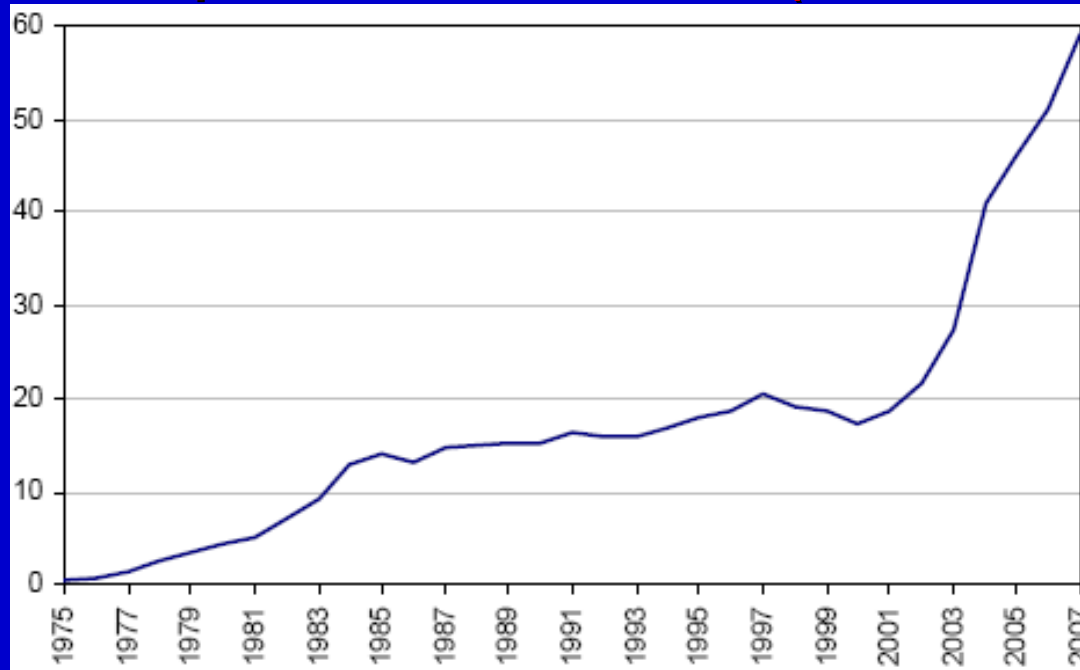


Biofuels will hardly contribute to energy security

The share of biofuels in road transport: ca. 3-4% in 2030

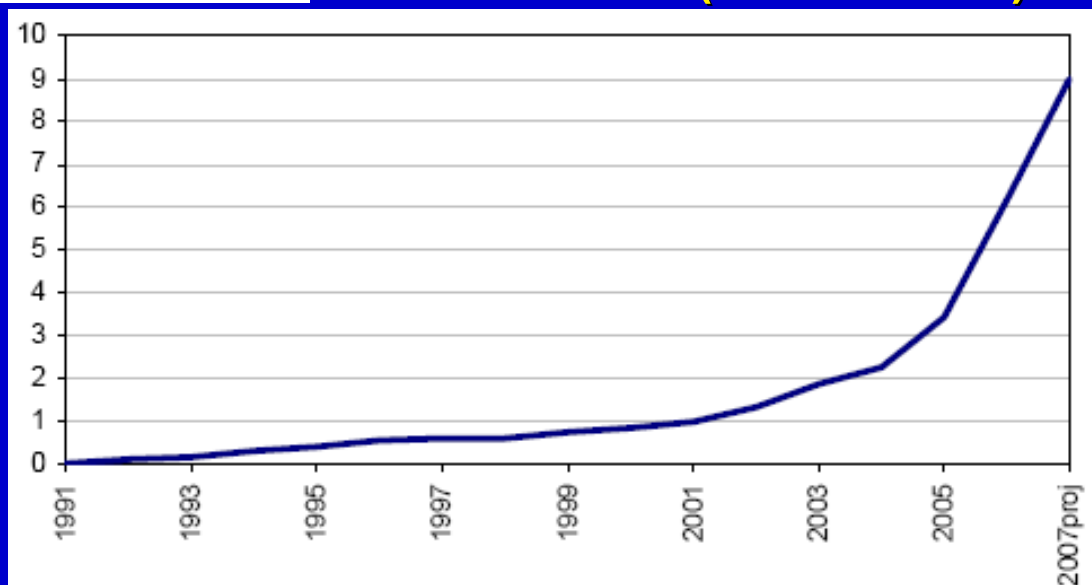
The biofuels boom

Ethanol production 1975 - 2007 (billion liters)



Ethanol > 90% of biofuel production; Brazil and US dominate the market

Biodiesel production 1991 - 2007 (billion liters)



Biodiesel: EU is the largest producer and consumer

Source: Global Subsidies Initiative 2007

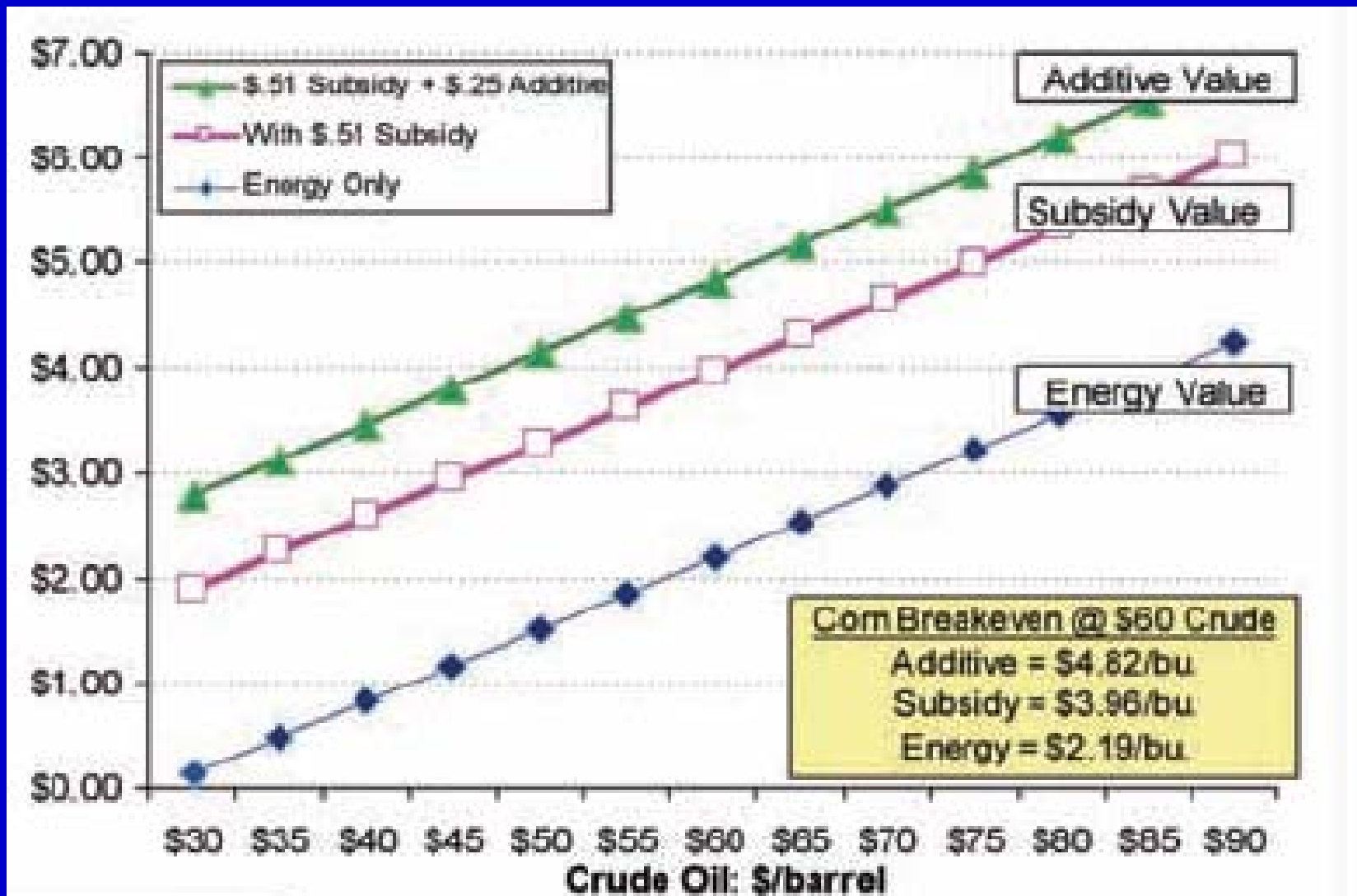
Biofuels: fundamental change in world food price determination

Energy prices always affected agricultural prices through inputs, i.e. P of fertilizer, pesticides, irrigation, transport

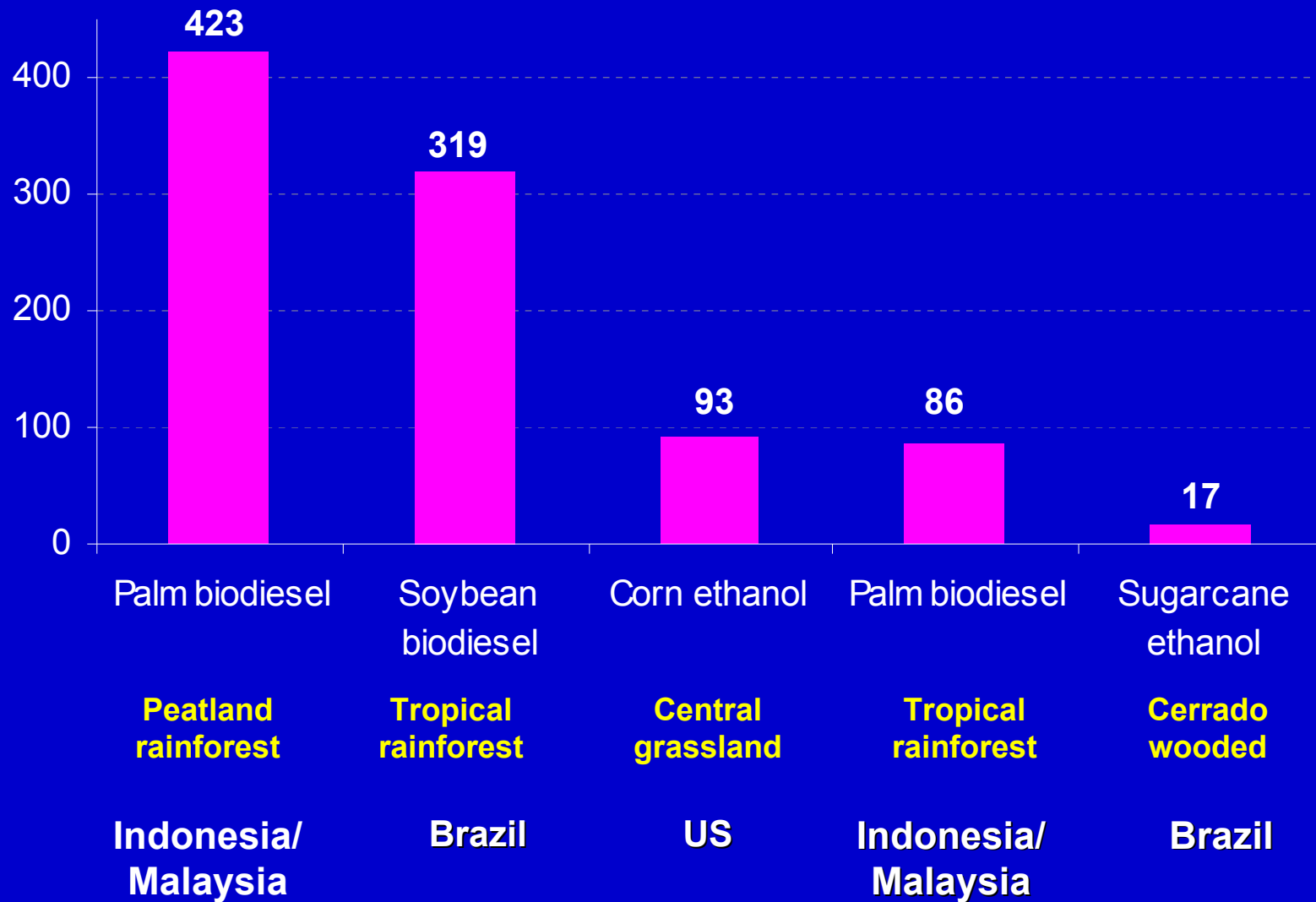
Now, energy prices also affect agricultural output prices strongly via opportunity costs

Large and elastic energy demand creates price floors and price bands for agricultural commodities

Corn breakeven price for ethanol at crude oil price of \$60/barrel (and subsidies)



Land conversion: Payback period for biofuel carbon debt (years)



IFPRI IMPACT-Model: Biofuel scenarios by 2020

Scenario	Biofuel expansion	Price changes (% by 2020)
1	Actual plans & assumed expansions	corn: +26 sugar: +12 oilseeds: +18
2	Doubling of Scenario 1 expansion	corn: +72 sugar: +27 oilseeds: +44

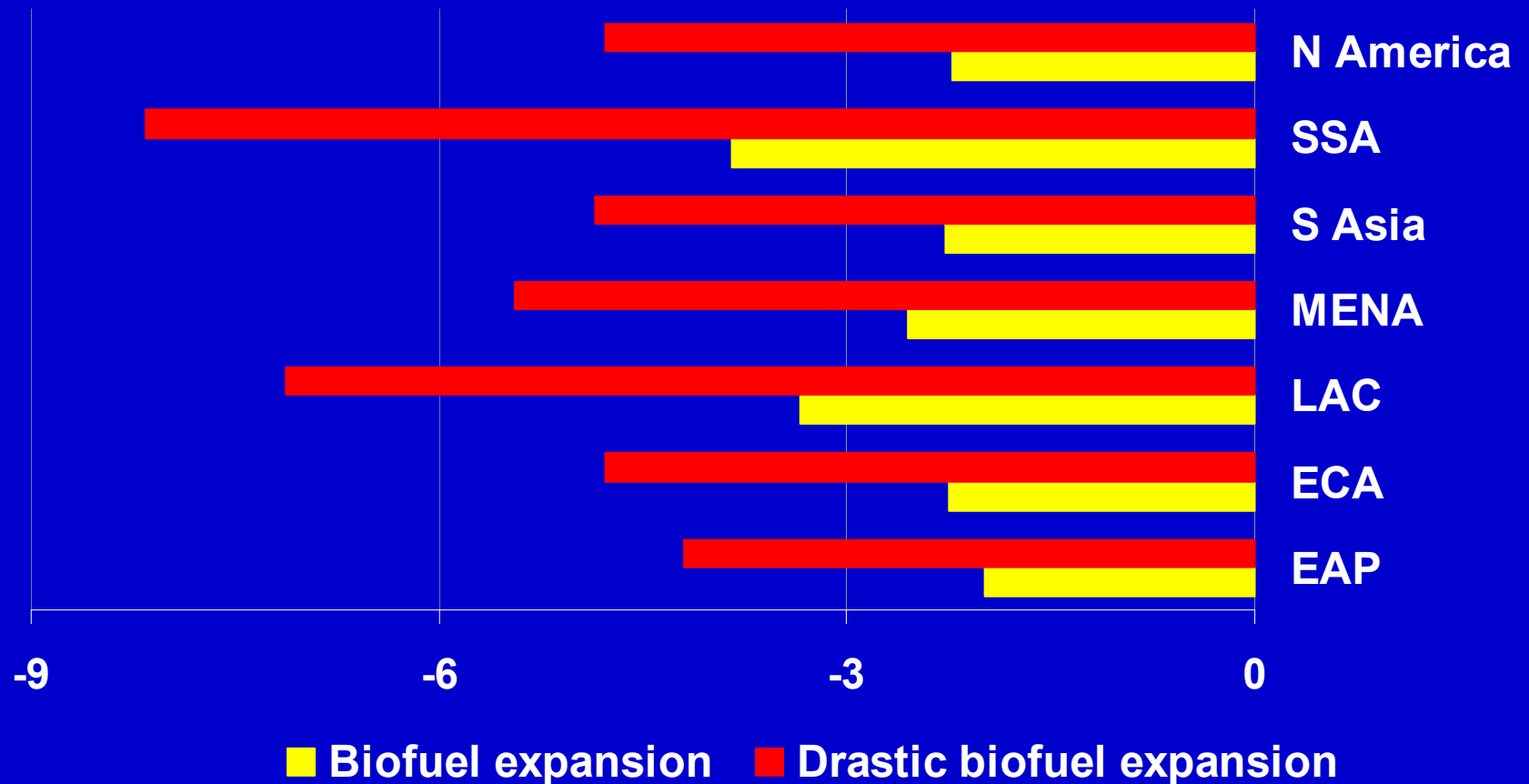
Source: IFPRI IMPACT-model projections; Rosegrant et.al..

Change in agricultural value added, 2020, biofuel expansion (Scenario 1) compared with baseline (%)

Country/ Region	Crops	Livestock	Total
Brazil	9.3	-7.0	6.6
China	5.0	-3.8	2.8
India	5.5	-1.8	4.1
USA	9.2	-7.4	3.7
SSA	4.2	-0.8	3.4
EAP	5.7	-3.7	3.5
ECA	4.5	-6.1	1.3
MENA	3.5	-4.2	1.8

IFPRI IMPACT Model:

Calorie consumption changes in 2020 compared to baseline (%)



Price-effects for Bangladesh five-person household living on one dollar-a-day per person

Spend...their \$5

\$3.00 on food

\$.50 on household energy

\$1.50 on nonfoods

✓ A 50% increase in food and energy prices requires them to *cut* \$1.75 of their expenditures

Cuts will be made most in food expenditures:

- ✓ Reduced diet quality, and
- ✓ Increased micronutrient malnutrition
- ✓ Delay in wage rate adjustments

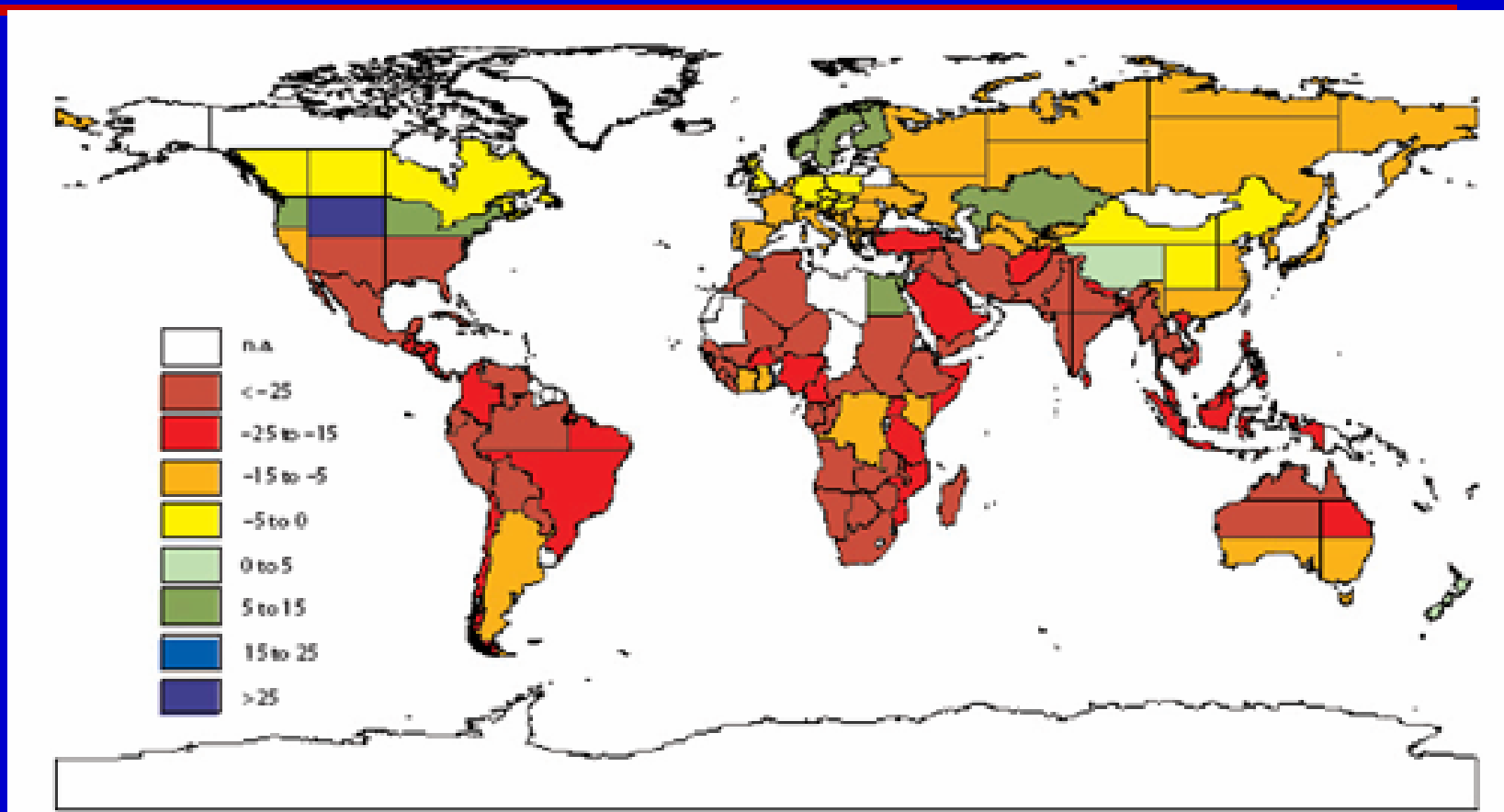
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Impacts and Vulnerability to Climate Change & Variability

- **Rich countries emit majority of GHG**
- **Poor countries are more vulnerable**
 - **Geography (hotter, less rain, more variation)**
 - **Greater dependence on agriculture and natural resources**
 - **Limited infrastructure**
 - **Low income, poverty and malnutrition**
 - **Thus, lower adaptive capacity (also including inadequate complementary services, like health and education)**

Climate change will reduce production growth in many of the poorest countries and regions



Percent change in agricultural production due to climate change, 2080

This will have further price increasing effects

Source: Cline 2007

Much Adaptation is Extension of Good Development Policy

- **Promoting growth and diversification**
- **Investing in research and development, education and health**
- **Creating markets in water and environmental services**
- **Improving international trade system**
- **Enhancing resilience to disasters and improving disaster management**
- **Promoting risk-sharing, including social safety nets, weather insurance**

Effective Adaptation Strategies

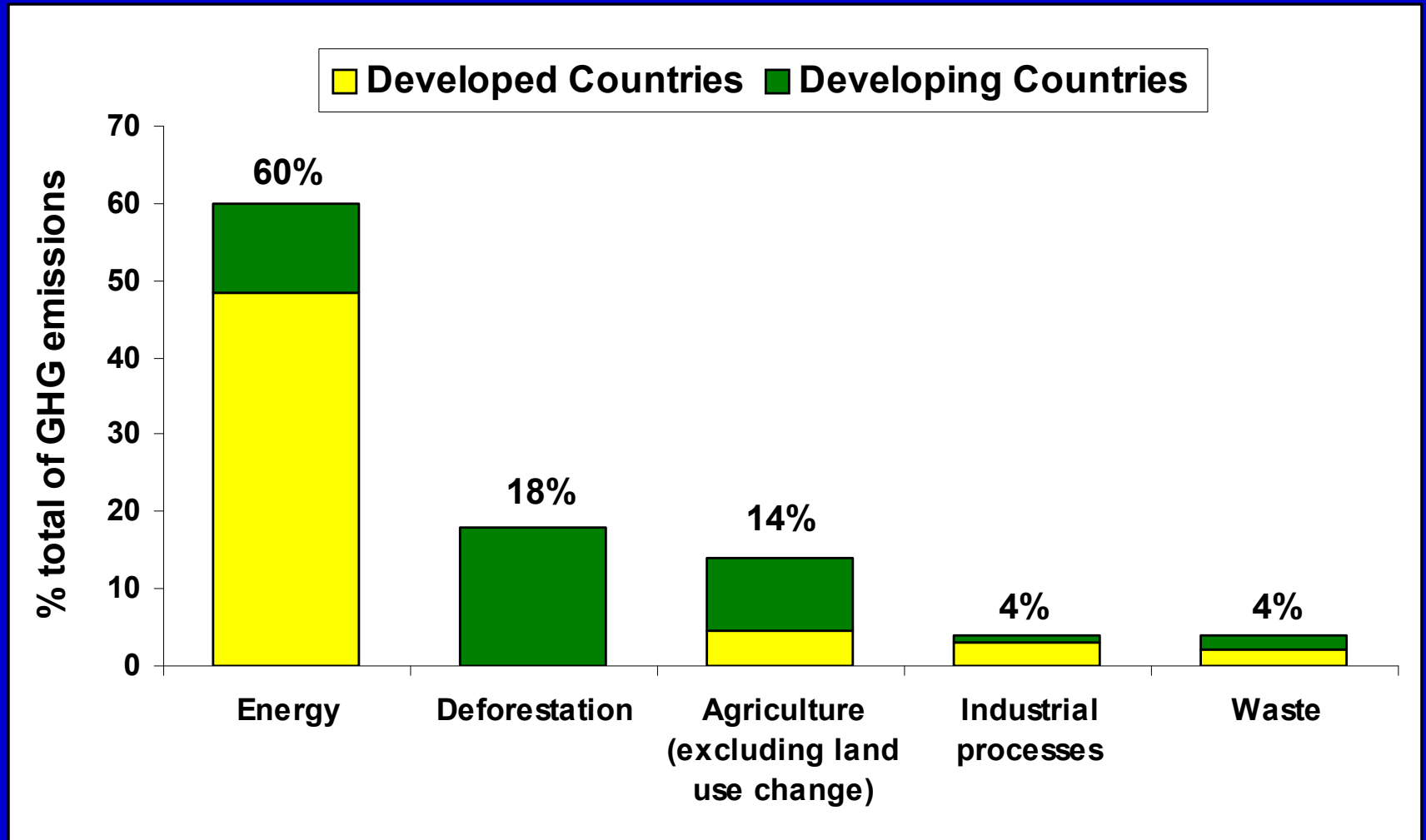
- **Must go beyond good development policy to explicitly target the impacts of climate change, particularly on the poor**
- **Market signals**
 - **essential factor in determining the necessary responses to a changing environment**
 - **but involves potentially expensive time lags and overlooks equity**

Climate change adaptation must therefore be proactive, not merely reactive

Critical Step toward mitigation: Post-Kyoto International Climate Change Regime

- **Emissions targets, rates of convergence, and rates of growth in developing-country emissions**
 - **Level of emission allowances for developing countries**
 - **Level of caps by sector and industry**
 - **Incentives for international carbon trade**
- All influence the regime's impacts on economic growth, agriculture, food security, and poverty in developing countries**

Sources of GHG Emissions



Sources: World Resources Institute 2007; World Development Report 2008, Rosegrant (IFPRI)

Pro-Poor Climate Mitigation Policy

- **Climate change policy can generate income for small farmers and investment flows for rural communities**
- **Requires effective integration**
 - **from global governance of carbon trading,**
 - **to sectoral and micro-level design of markets and contracts, and**
 - **investment in community management**

Estimated Potential Emission Savings and Costs by Sector

Sector	2050 Annual Emissions Savings (GtCO ₂)	Average Annual Cost(\$/tCO ₂) ~2025-2050
Deforestation	3.5-5.0	2-4
Afforestation and Reforestation	1.0-2.0	5-15
Land management practices	1.0-2.0	20-27
Agriculture (methane & nitrous oxide)	1.0	27
Bioenergy	2.0-3.0	25
Waste and fugitive emissions, industrial processes	4.1	3-5
Fossil fuel related, excluding bioenergy	40.0	22-33

Source: Adapted from various estimates, Stern Review, pp. 244-63 by
Rosegrant

So far minimal carbon trades in agriculture in developing countries

- **Only 3-4% of carbon trading is sourced from agriculture, land use, land use change, agroforestry and forestry**
- **Only 3% of carbon trading is sourced from Africa**

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What policy response not to choose to deal with the high prices?

Not:

- **Export stops (starving your neighbor)**
- **Food subsidies for vocal middle class**
- **Slow change in outdated production control policies**
- **Continued public underinvestment in agriculture productivity increases**
- **Exclusion of agriculture from climate change mitigation strategies**

Biofuels: policy implications

Global trade regime with transparent biofuel standards

Criteria to internalize all + & - effects of biofuels

- 1. Slow down on biofuels with inappropriate technology and at the wrong locations (because of environment and the poor)**
- 2. Accelerate agriculture productivity investments and R&D broadly and in appropriate biofuels**

Investing in Climate Change for the Poor

- **Climate change policy to create new value-added for pro-poor investment**
- **Employ advanced ICT to streamline measurement and enforcement of offsets, financial flows, and carbon credits for investors**
- **Enhance global financial facilities and governance to increase and manage funding flows for both mitigation and adaptation**

Pro-poor policy actions to adapt and mitigate food price problem

1. Developed countries

- Eliminate agricultural trade barriers,
- expand / re-visit aid priorities for agriculture and rural services, incl. social protection

2. Developing countries

- Increase investment in agriculture, rural infrastructure and market access for small farmers
- Expand social protection (rural and urban) for the poorest

3. Science and Technology (CGIAR and NARS)

- Facilitate production response by agriculture science- and technology-based solutions (China, India, Africa)