

Global Perspectives

Agriculture and Bioenergy

Rome, 22. 02. 2007

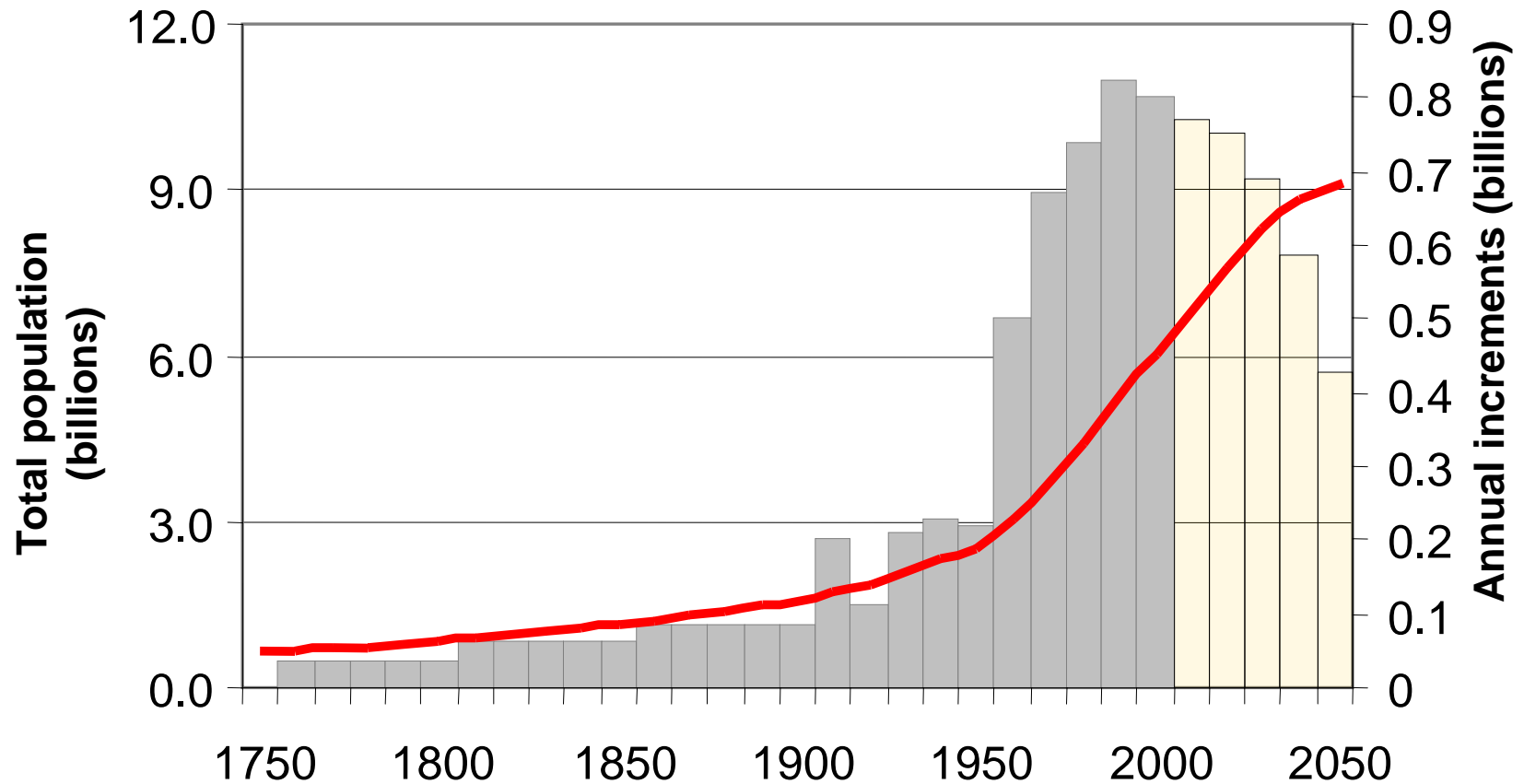
**Alexander Müller
Assistant Director-General**

Food and Agriculture Organization of the United Nations



World population: 1750 – 2050

Further growth, but at drastically declining rates

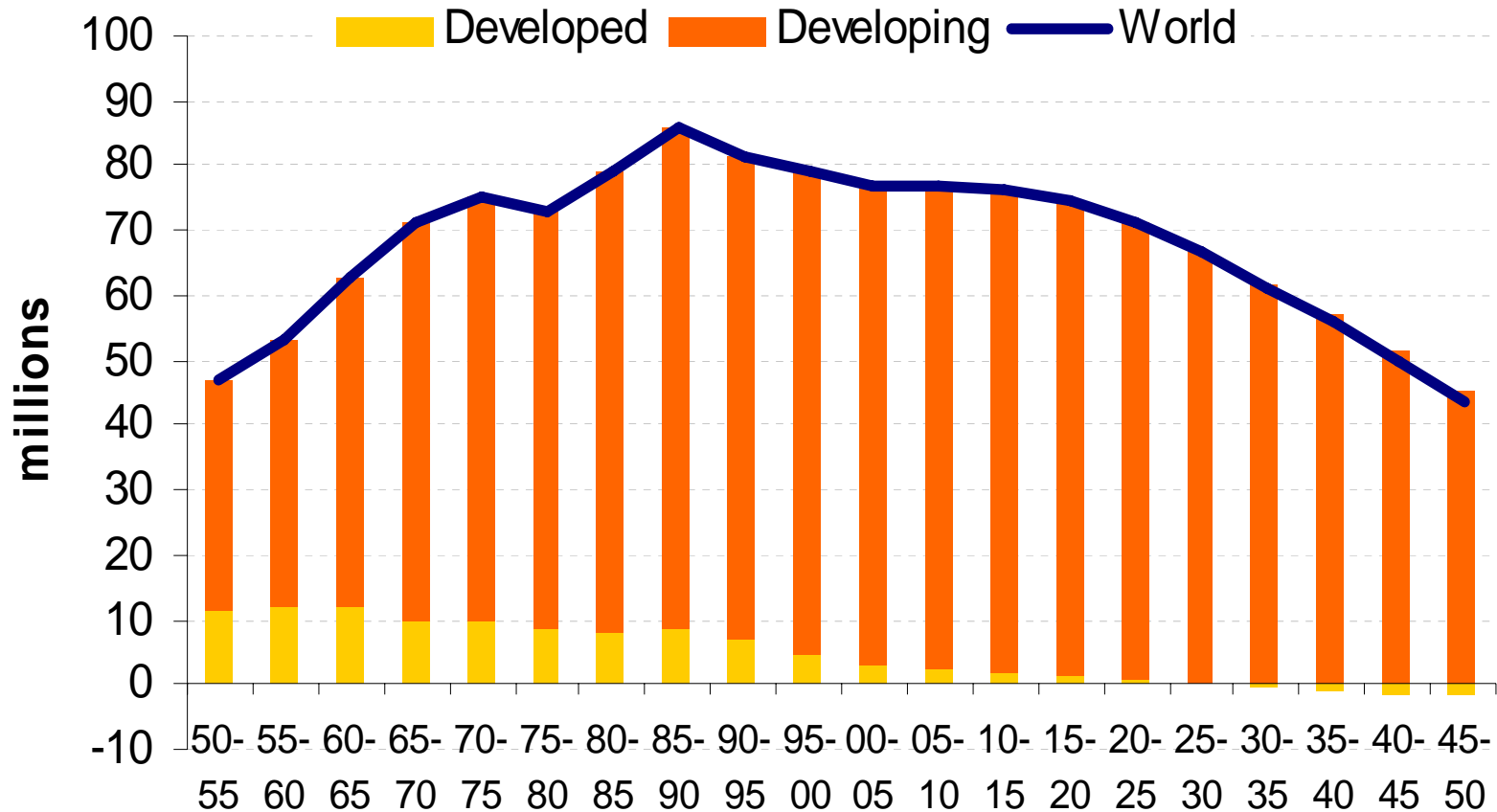


Source: UN, 2003



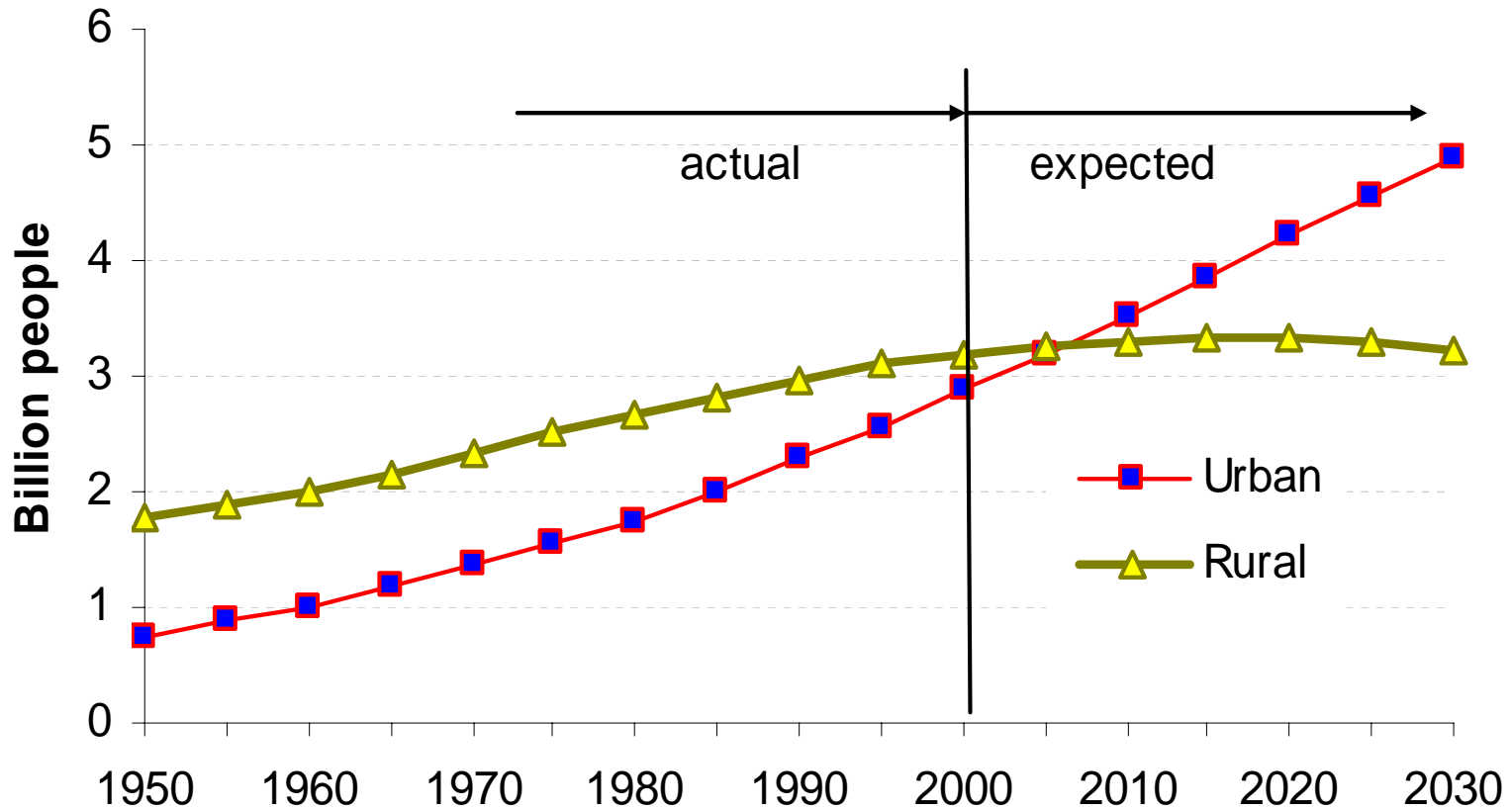
Population growth is concentrated in developing countries

Population growth: absolute increments



Urban and Rural Population – 1950-2030

Urbanization to accelerate



Source: UN, World Population Assessment 2002



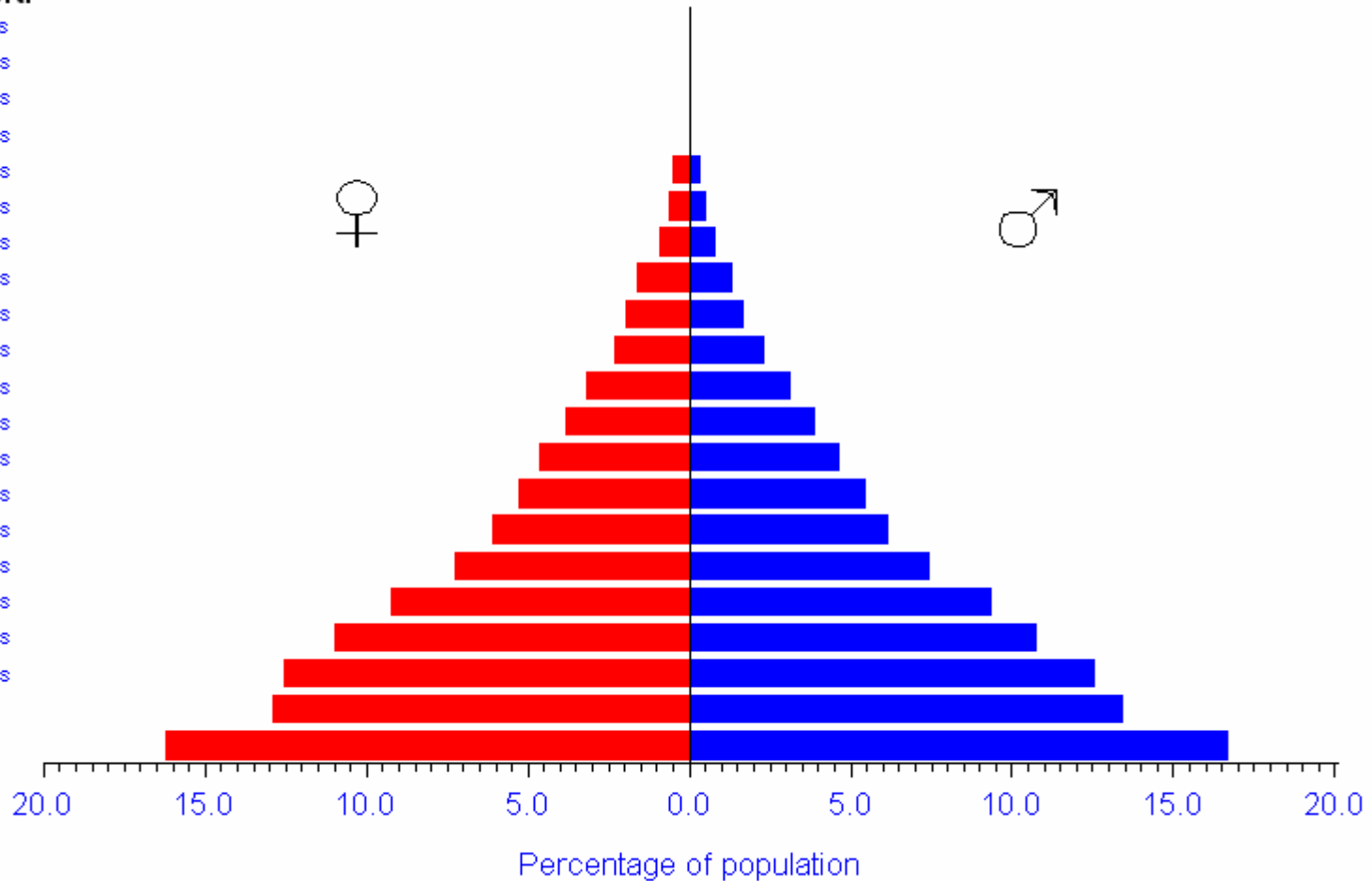
Ageing and population dividend of an Asian Tiger

Thailand: Population Structure, Changes from 1950 to 2050

1950

Age cohort:

- 100+ years
- 95-99 years
- 90-94 years
- 85-89 years
- 80-84 years
- 75-79 years
- 70-74 years
- 65-69 years
- 60-64 years
- 55-59 years
- 50-54 years
- 45-49 years
- 40-44 years
- 35-39 years
- 30-34 years
- 25-29 years
- 20-24 years
- 15-19 years
- 10-14 years
- 5-9 years
- 0-4 years



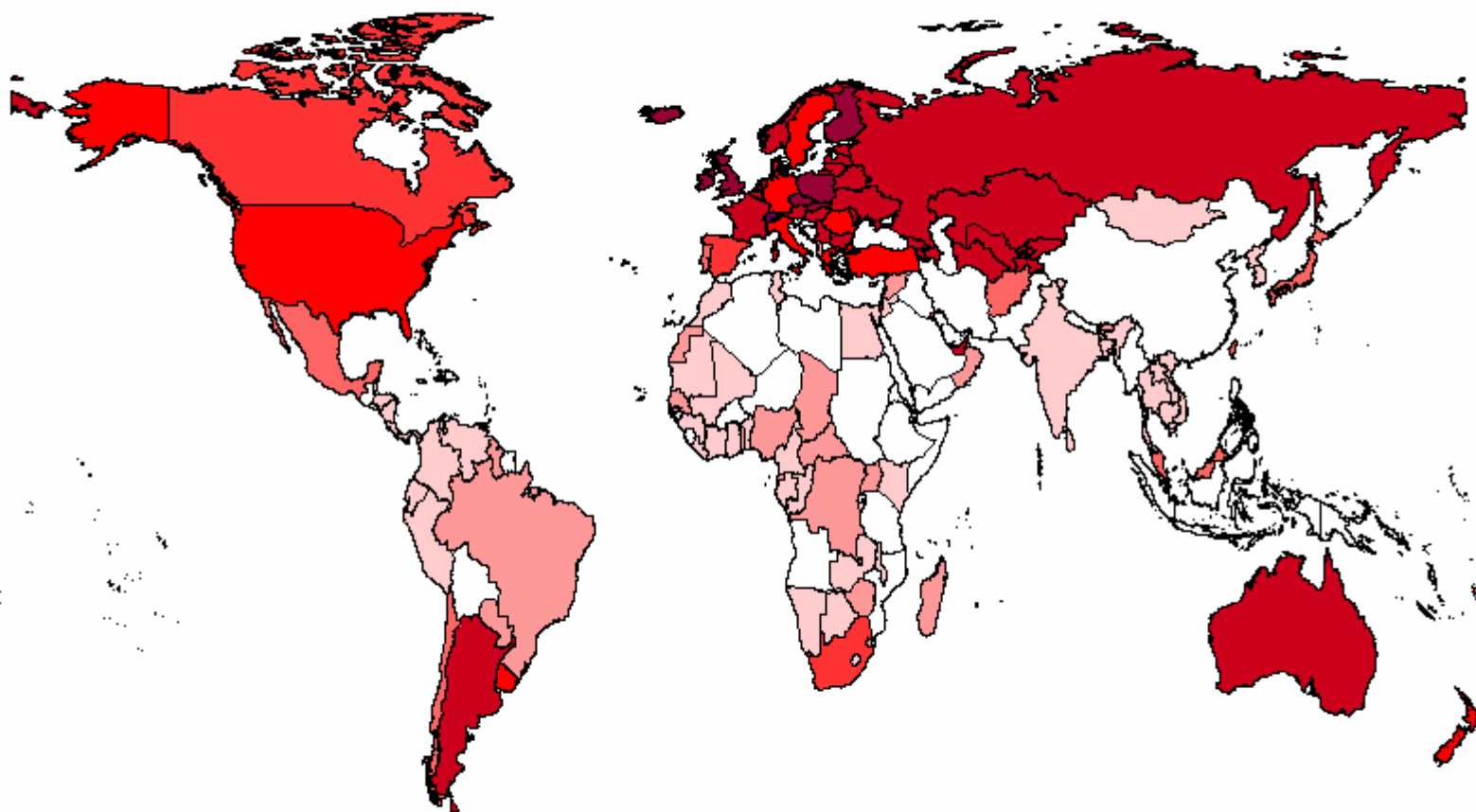
Based on: UN 2004 (<http://www.un.org/esa/population/unpop.htm>)
Josef Schmidhuber (2006)



From widespread hunger towards a double burden of malnutrition in developing countries

Dietary Energy Supply (DES)

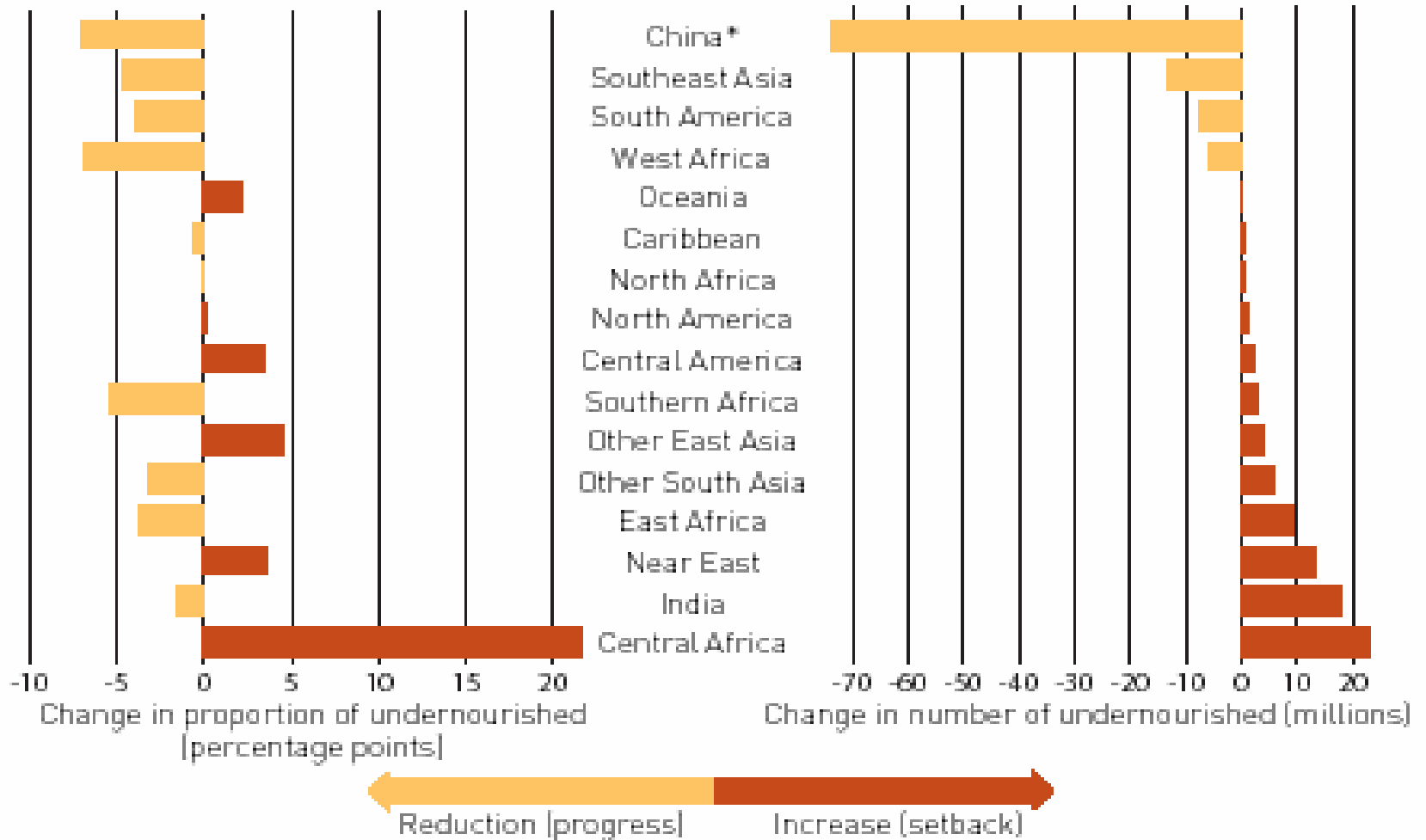
1961



Source: FAOSTAT and World agriculture: towards 2015/30
Josef Schmidhuber (2006)



Success and failure in fighting hunger

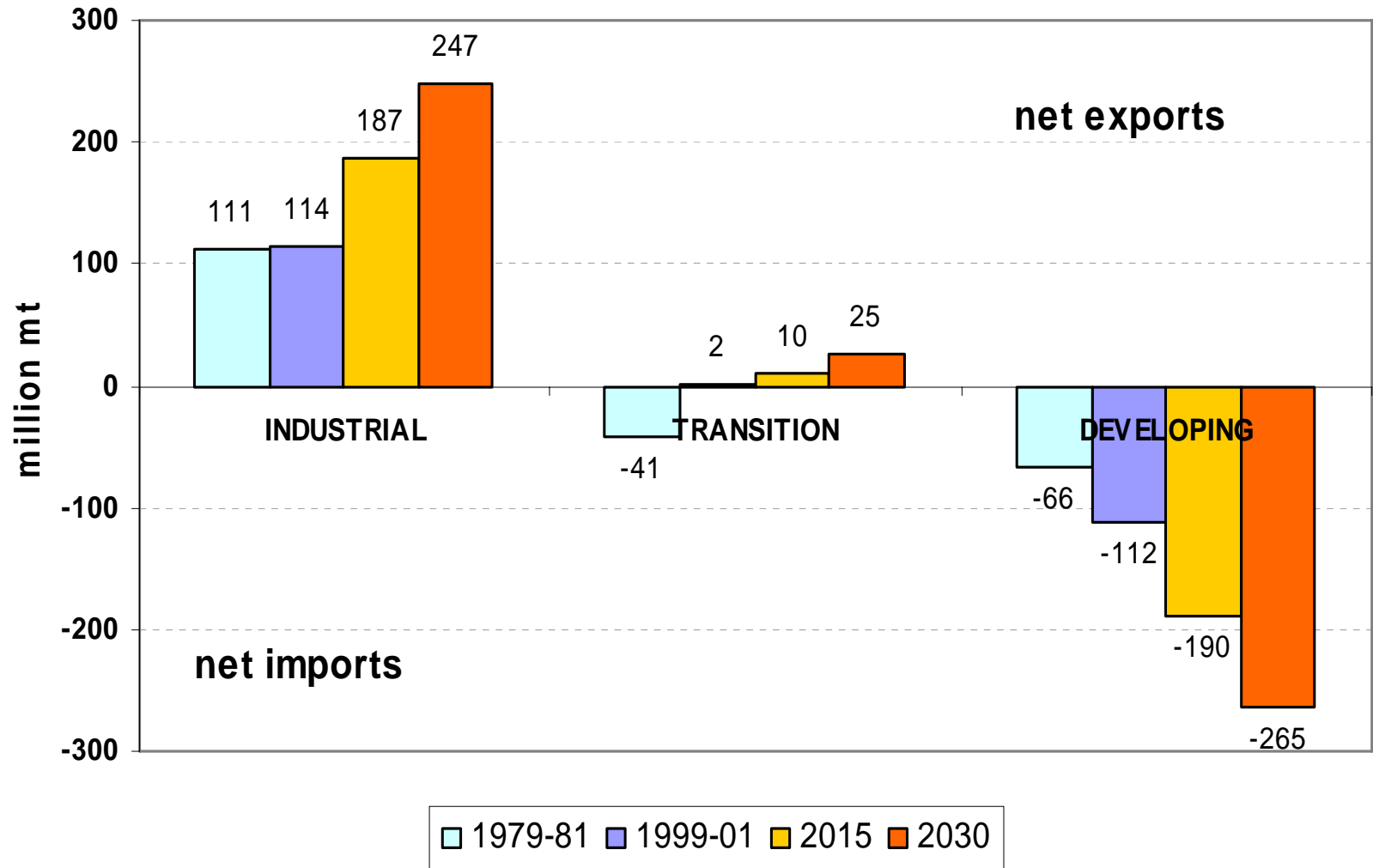


*includes Taiwan Province of China



World markets and export opportunities

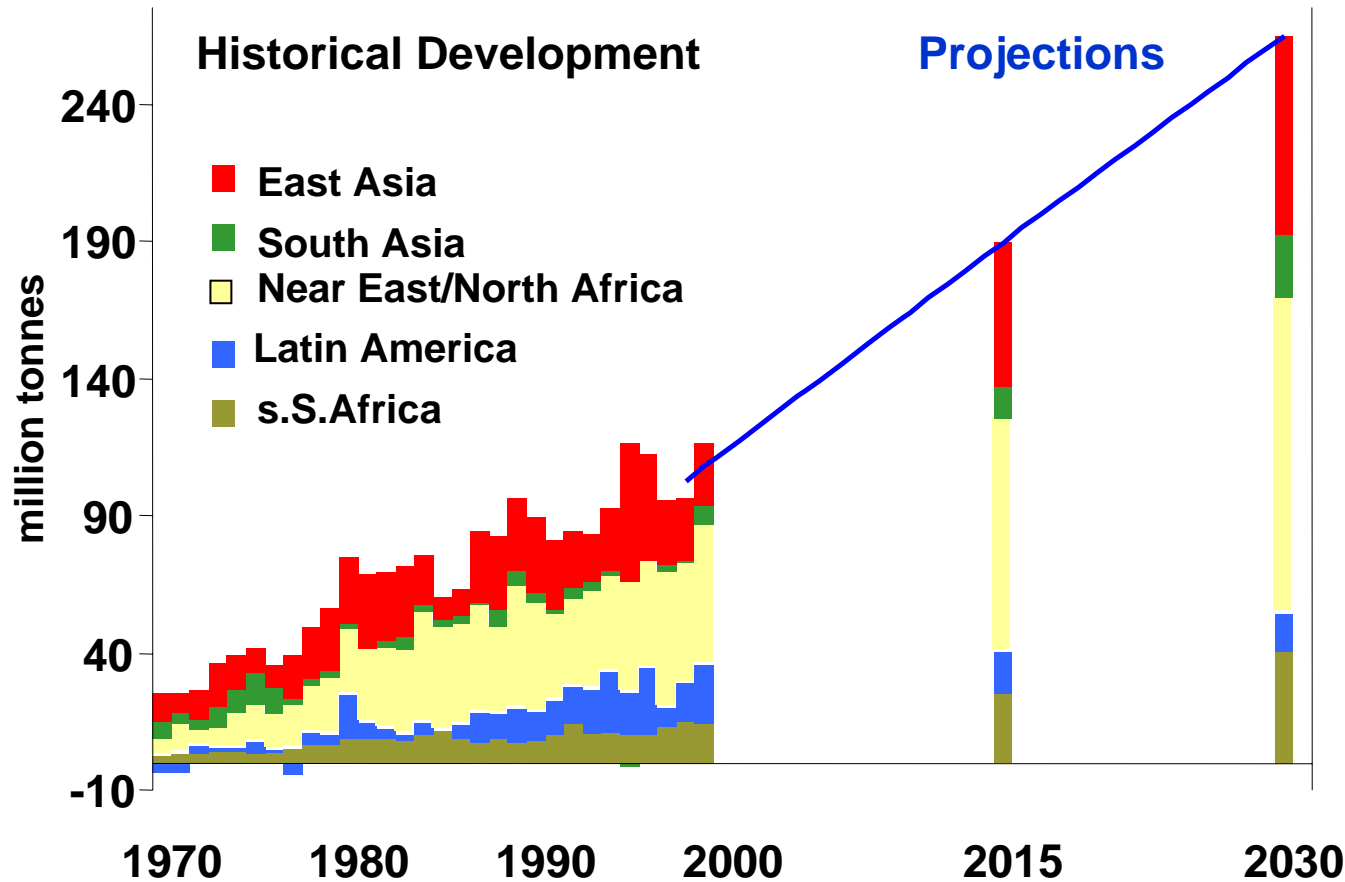
Main import and export regions in world cereal markets



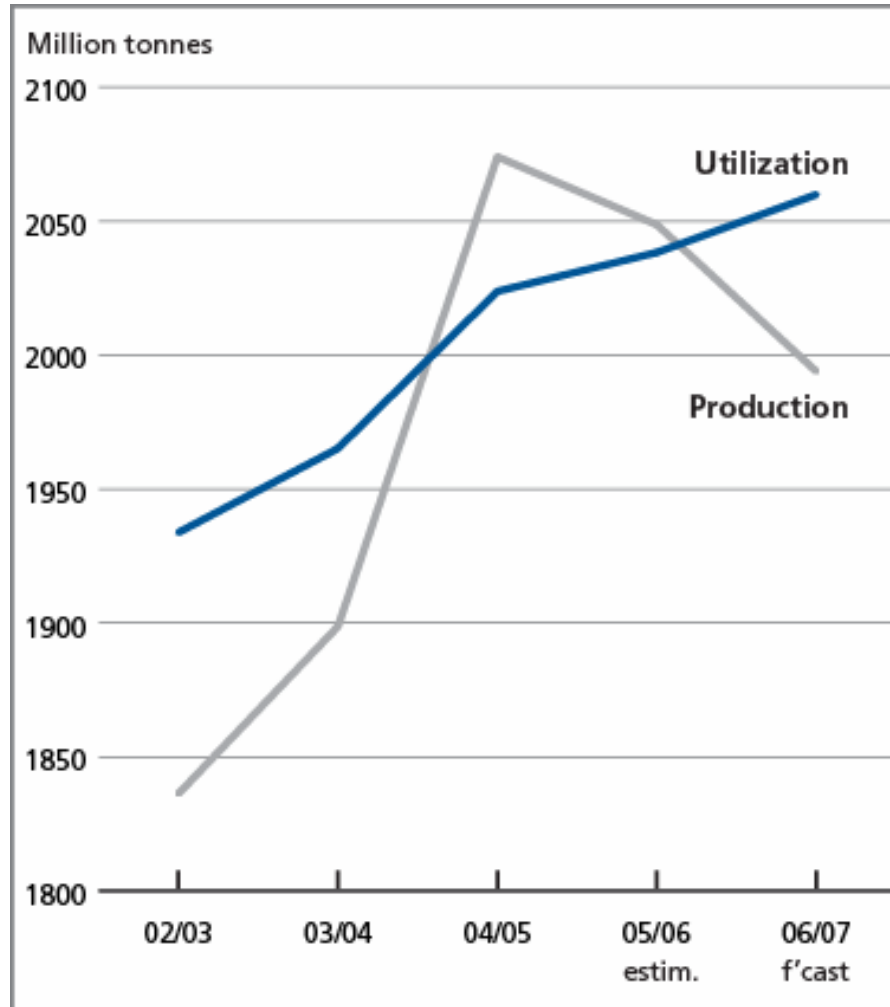
World markets and export opportunities

Cereal imports of developing countries

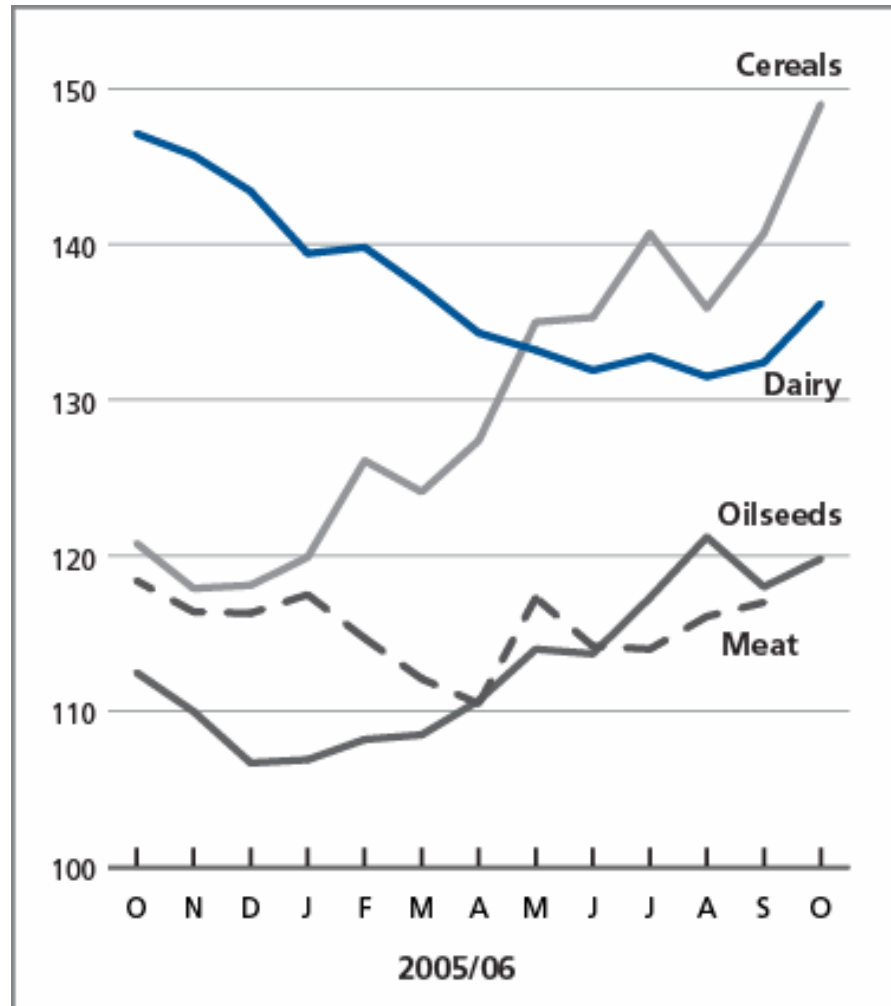
1970-2030



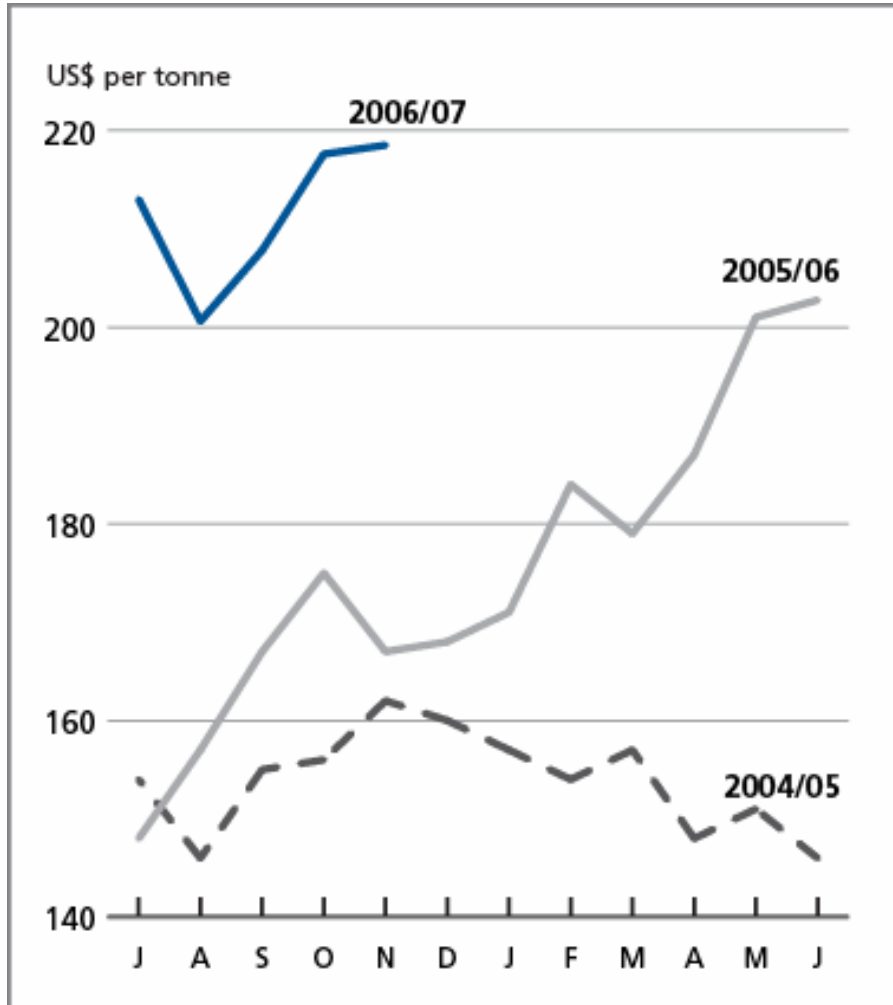
World Cereal Production and Utilization



FAO food price indices



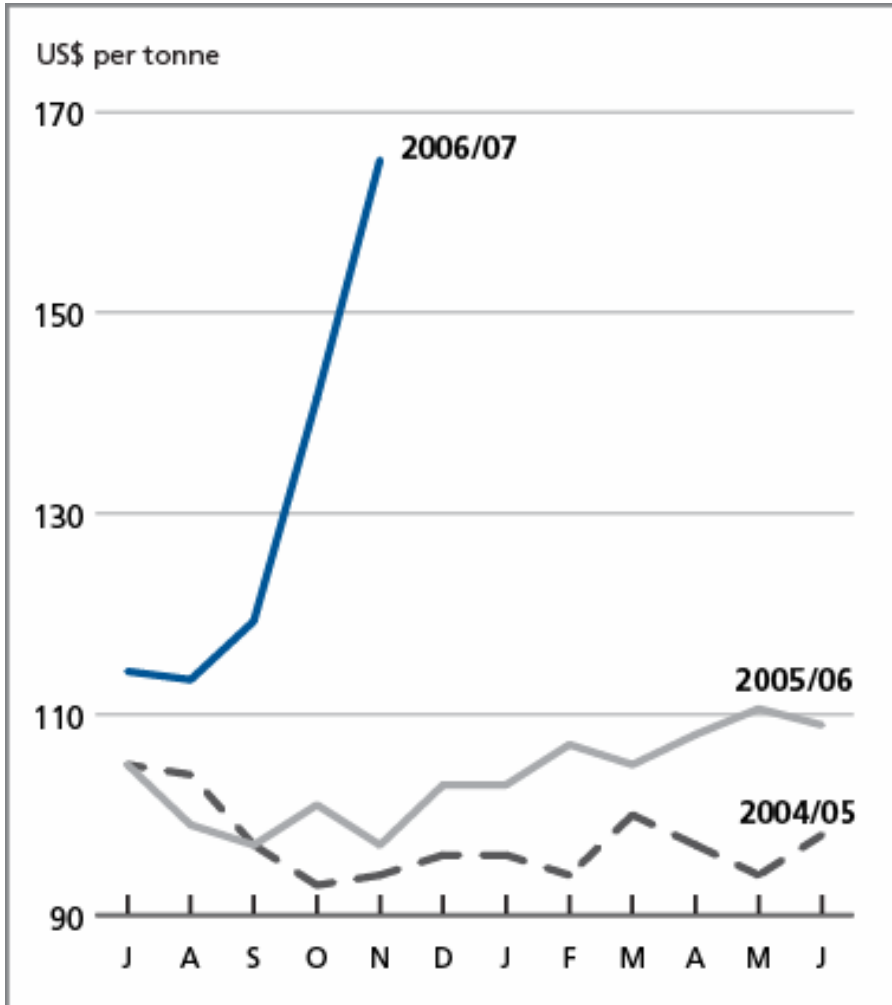
Wheat export price (U.S. No.2 H.W. Gulf)



CBOT wheat futures (March)



Maize export price (U.S. No.2 yellow, Gulf)



CBOT maize futures (March)



How big is the market for biofuels?

Energy production and potential, biofuels and land use

			Exajoule (10 ¹⁸), EJ ⁹			million ha
Energy source		Year	World	OECD	non-OECD	World
All sources (TPES)		2002 ²	428	224	205	
		2030 ²	670			
		2050 ²	850			
Biomass	Actual use	2002 ²	47 ¹¹	14	33	
	Theoretical potential		>>2000	Global photosynthesis: ~ 4000 EJ		
	Technical potential	1990 ¹	225			
		2050 ¹	400			
	Economic potential	1990 ¹	89			
		2050 ¹	158			
Biofuels	Ethanol⁷	2004 ³	0.84	0.34	0.51	9.52 ⁴
	Biodiesel⁷	2003 ³	0.06	0.04	0.02	0.47 ⁴
	Potential¹	2050 ¹	53 ¹⁰			
			million ha			
Agricultural land⁸	Used	1997-99	1506	658	848	850 ^{4/5}
	Total suitable		4188	1406 ⁶	2782 ⁶	(4730)

1.) Potential based on Schratzenholzer and Fischer, IIASA, 2000

2.) Based on IEA: Key energy statistics, 2004

3.) Derived from <http://www.earth-policy.org/Updates/2005/Update49.htm>, Earth Policy Institute

4.) Assuming an average yield per hectare for ethanol of 4200 l (3000 l US maize, 5500 l Brazil cane, 6900 l France sugar beet) and of 3800 l/ha for biodiesel (average). Most recent yields are about 10% higher for cane and 20% higher for maize.

5.) 850 million ha would be required to meet today's transport fuels needs (77 EJ) at current yields (l biofuel/ha), technology, and crop composition.

6.) Area for developing and developed countries, not OECD and non OECD

7.) Assuming an energy content of 34 MJ/l for biodiesel and 21.1 MJ/l for ethanol

8.) Bruinsma (ed), World agriculture: towards 2015/2030, An FAO Perspective, 2003, total suitable land for rainfed agriculture

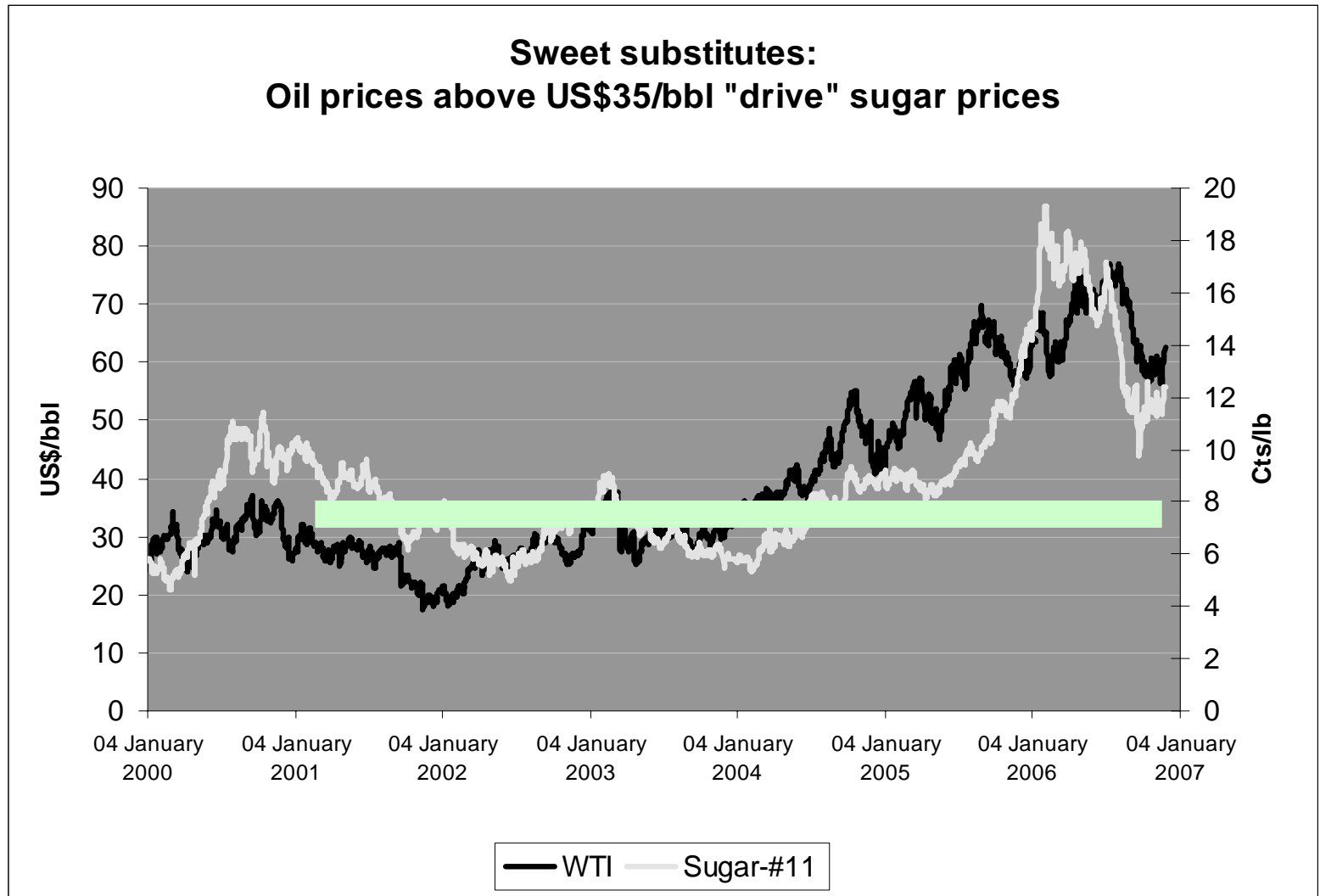
9.) 41.868 Mtoe = 1 EJ

10.) IEA (2003), "Biofuels for Transport", table 6.8.

11.) 15-60 EJ: most biomass fuels are not traded on world markets, estimates of consumption are highly uncertain.



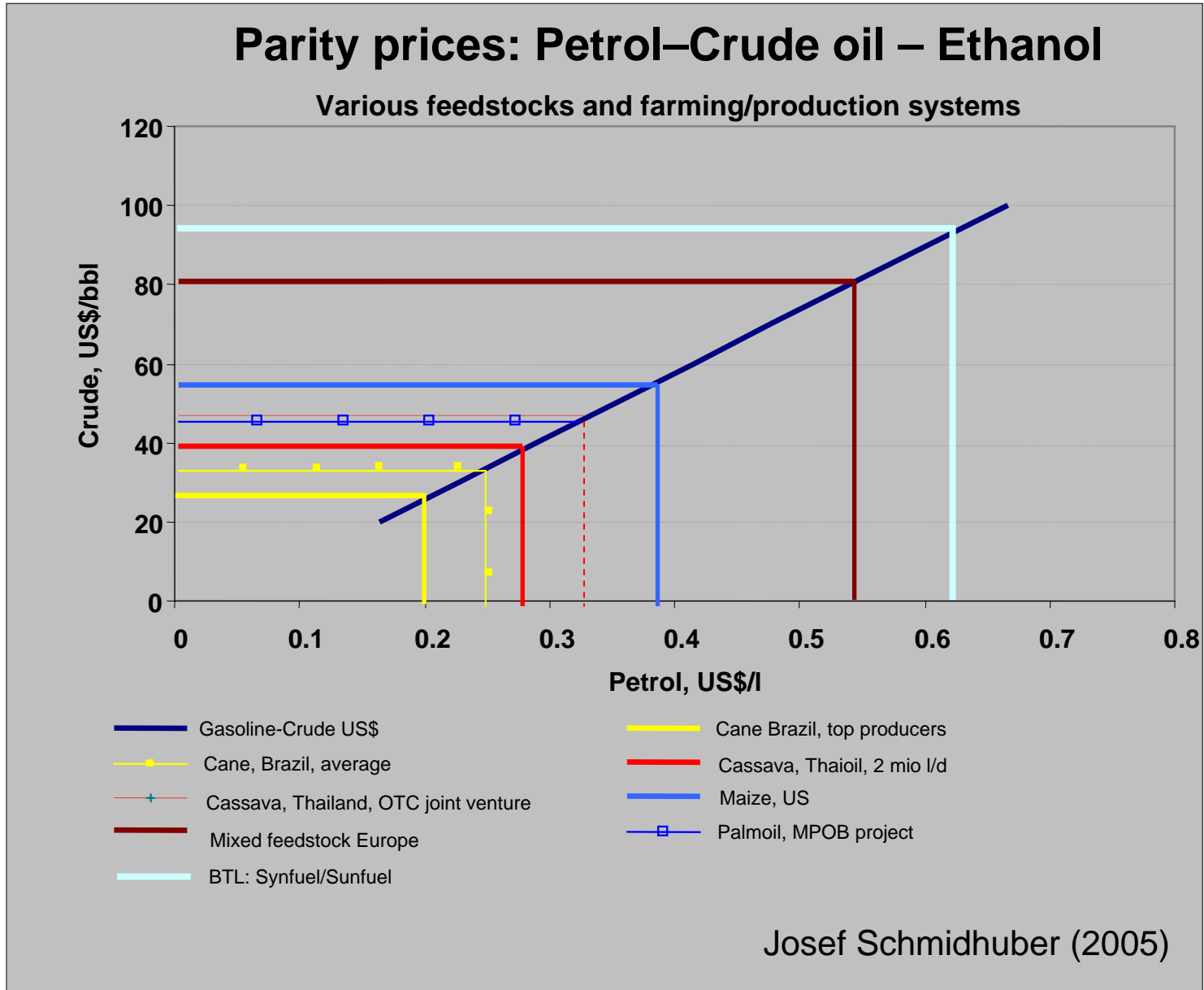
The price links



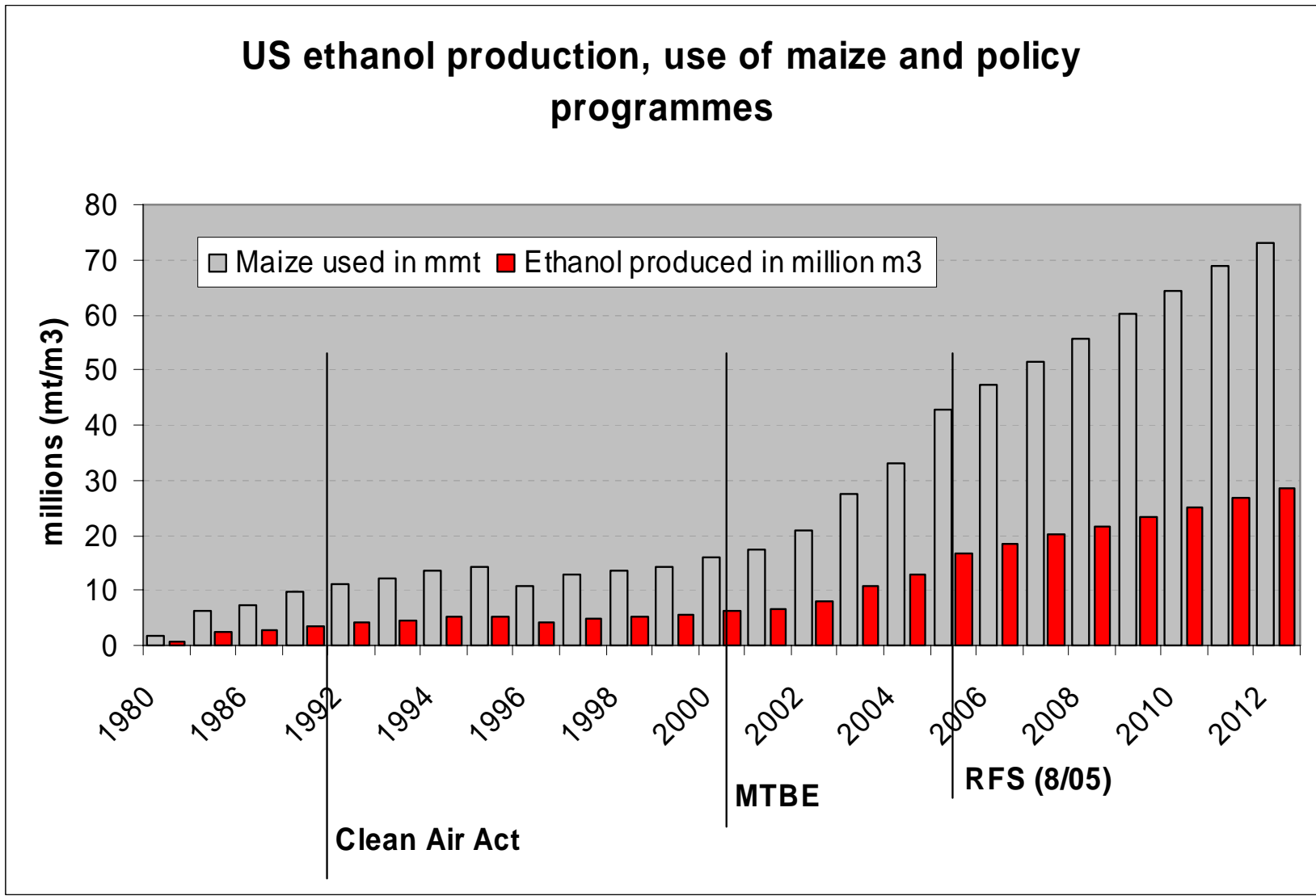
Data: Nymex and EIA, J. Schmidhuber (2007)



Competitiveness by feedstock



US ethanol-some market impacts



Cross links: Impacts on international commodity prices

	An additional 10 million tonnes of ...				
	Sugar	Maize	Sugar and Maize	Soybeans and Maize	Sugar, Maize and Soybeans
Corresponding energy [biofuels]	0.195 EJ	0.087 EJ	0.282 EJ	0.167 EJ	0.349 EJ
Commodity	... used for biofuels would change international prices (percent) in the long-run by :				
Sugar	+9.8	+1.1	+11.3	+2.3	+13.8
Maize	+0.4	+2.8	+3.4	+4.0	+4.2
Vegetable oils	+0.3	+0.2	+0.2	+7.6	+7.8
Protein	+0.4	-1.2	-1.2	-8.1	-7.6
Wheat	+0.4	+0.6	+0.9	+1.8	+2.0
Rice	+0.5	+1.0	+1.2	+1.1	+1.4
Beef	+0.0	+0.2	+0.2	+0.4	+0.4
Poultry	+0.0	-0.4	-0.4	-2.1	-2.0

