How to Feed the World in 2050

Insights from an expert meeting at FAO, 24-26 June 2009

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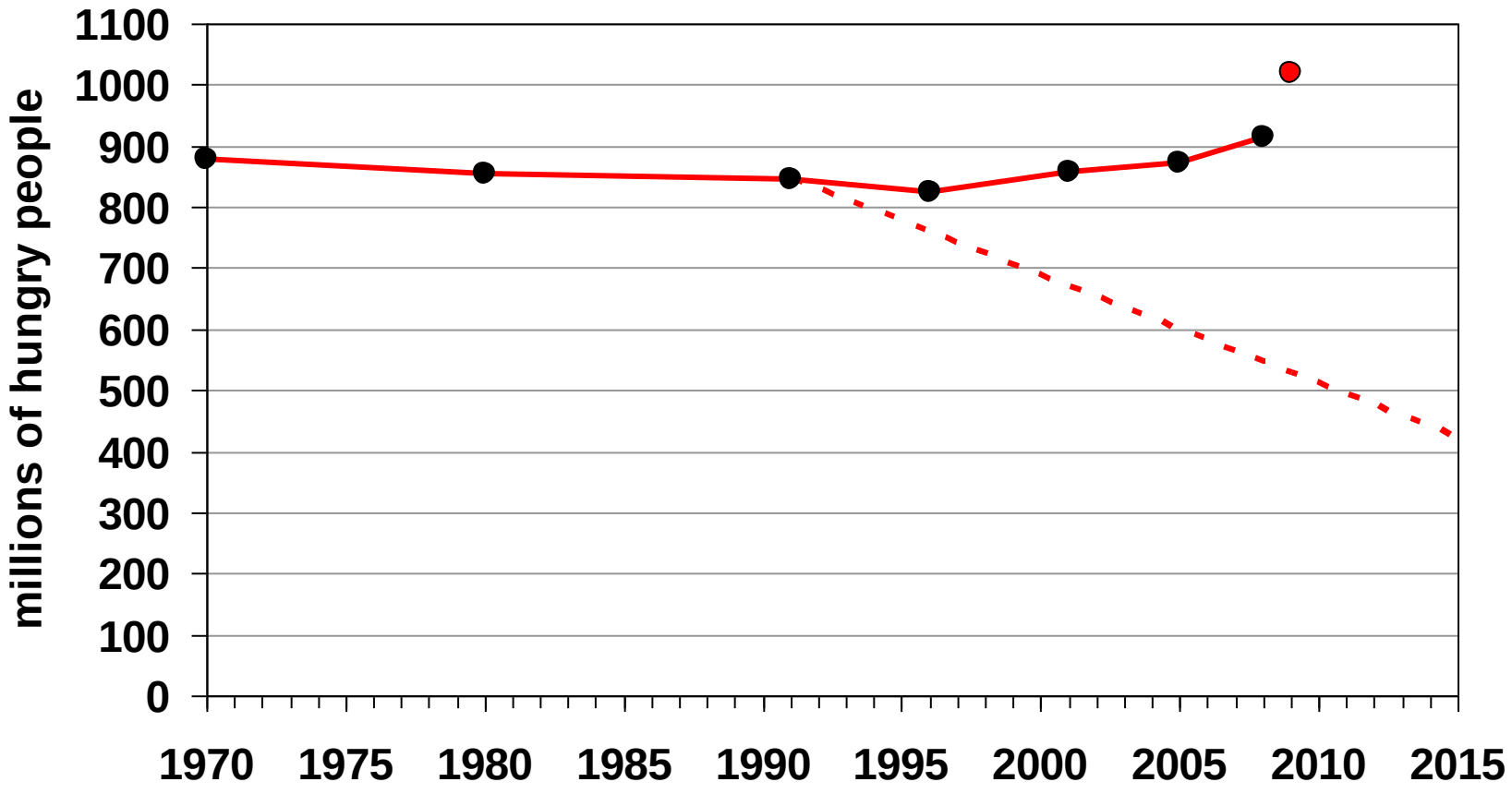
1.02 billion hungry people in 2009



Source: FAO 2009

Why look to 2050?

- Food prices and the economic crisis have increased the number of hungry to 1.02 billion in 2009, but the number has exceeded 800 million for decades
- Sustainable reduction in poverty and food insecurity remain long-term challenges
- Long-standing pressures will continue (e.g. population, income growth, urbanization)
- Some new pressures are likely to remain or return in the long run (e.g. biofuels)
- Some short-run shocks are likely to become more frequent in the long run (e.g. due to climate change)
- The structure of agriculture is changing
- Challenges are long-term and wide-ranging, but policy responses are needed now

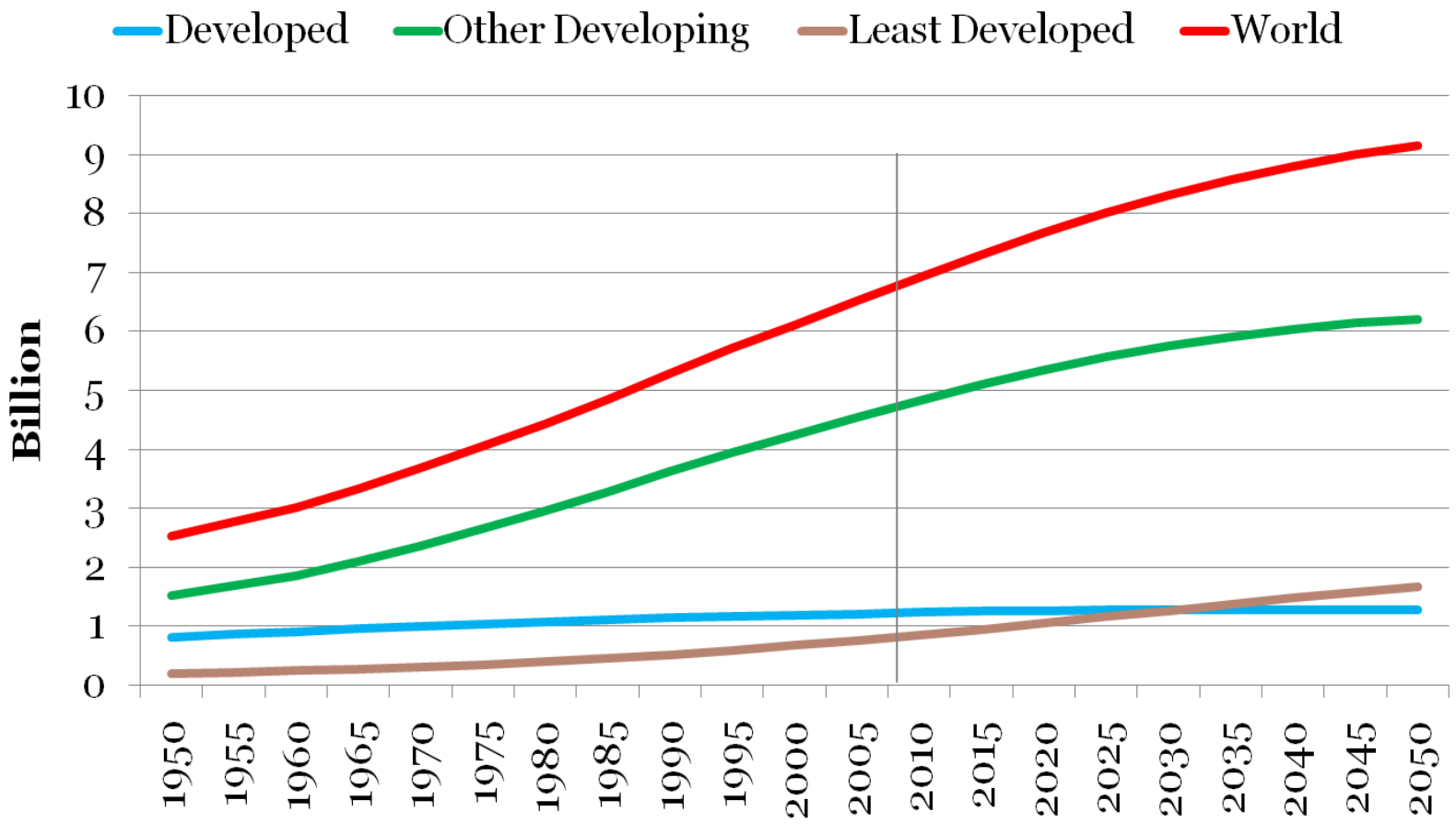
Main messages

- Generally optimistic on global supply prospects, *but*...
- need increased investment to sustain productivity growth
  - in technology, infrastructure and institutions
  - also environmental services, sustainable resource management
- need to increase access to food, not just supply
  - and not just in the aggregate, but for all people
- need to improve ability to adapt and respond to new pressures and uncertainties
  - not just on average, but at all times
- need to increase incomes not just in agriculture, but in other sectors as well

Macro trends and long-term drivers

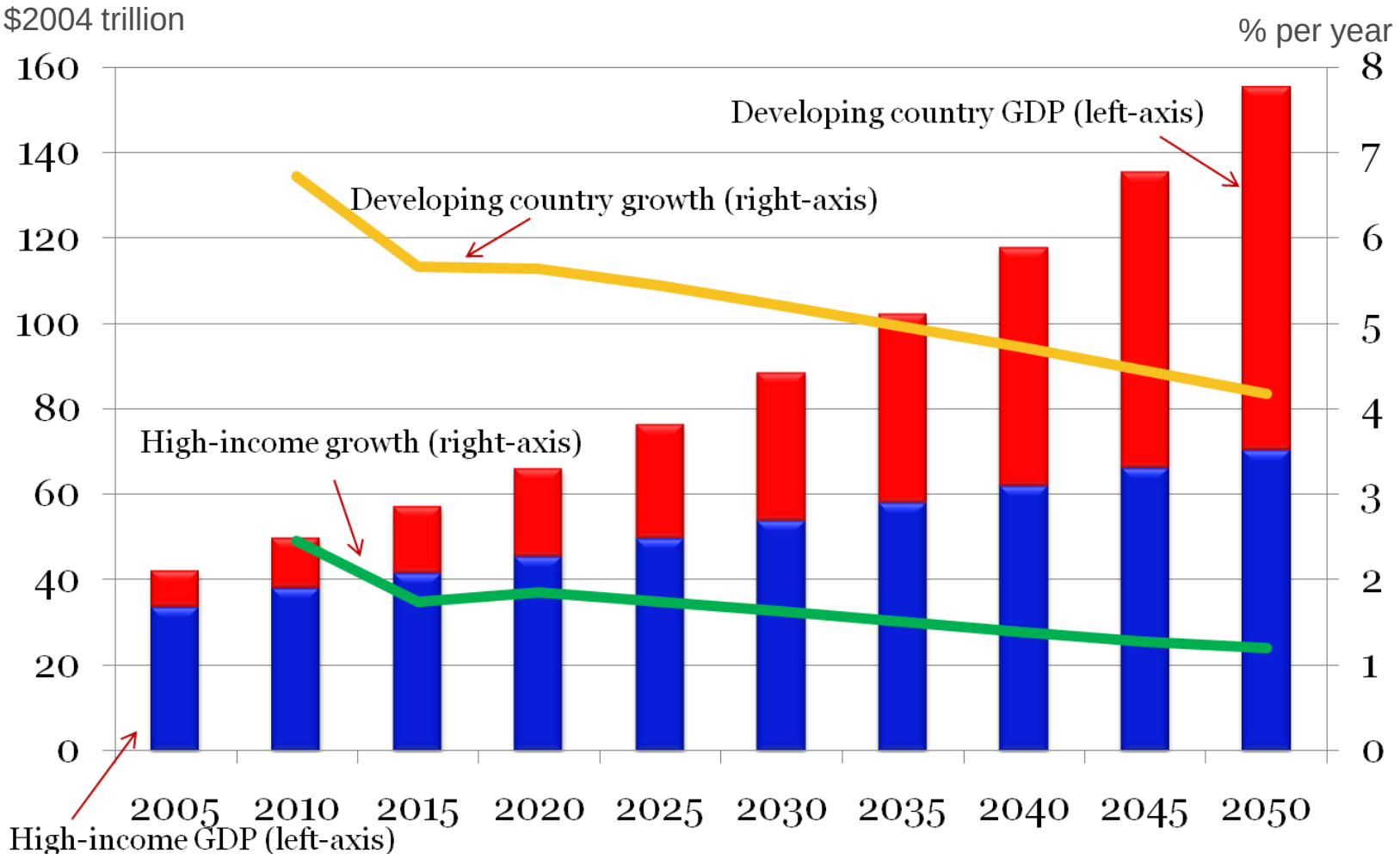
- Population
  - still growing, but more slowly
- Urbanization
  - changing dietary preferences, but also sources of income and vulnerability
- Structural transition
  - also happening within rural areas
- Income growth
  - uneven across and within countries
- Energy
  - linked ever more strongly with agriculture
- Climate change
  - impacts are varied and uncertain

Population growth



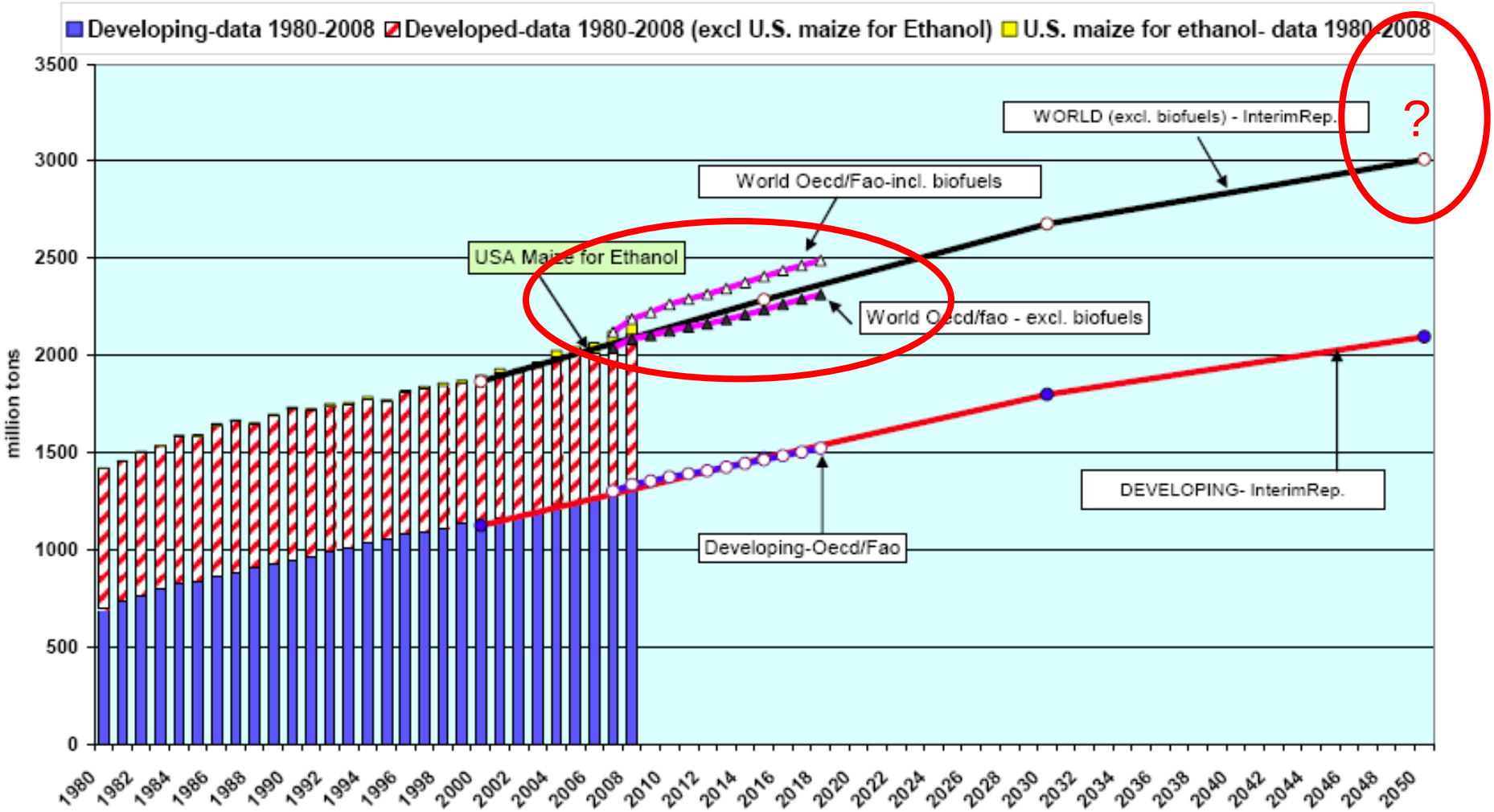
Source: UN Population Division, from van der Mensbrugghe et al. 2009

Income growth



Source: Simulation results with World Bank's ENVISAGE model, from van der Mensbrugghe et al. 2009

World cereal consumption

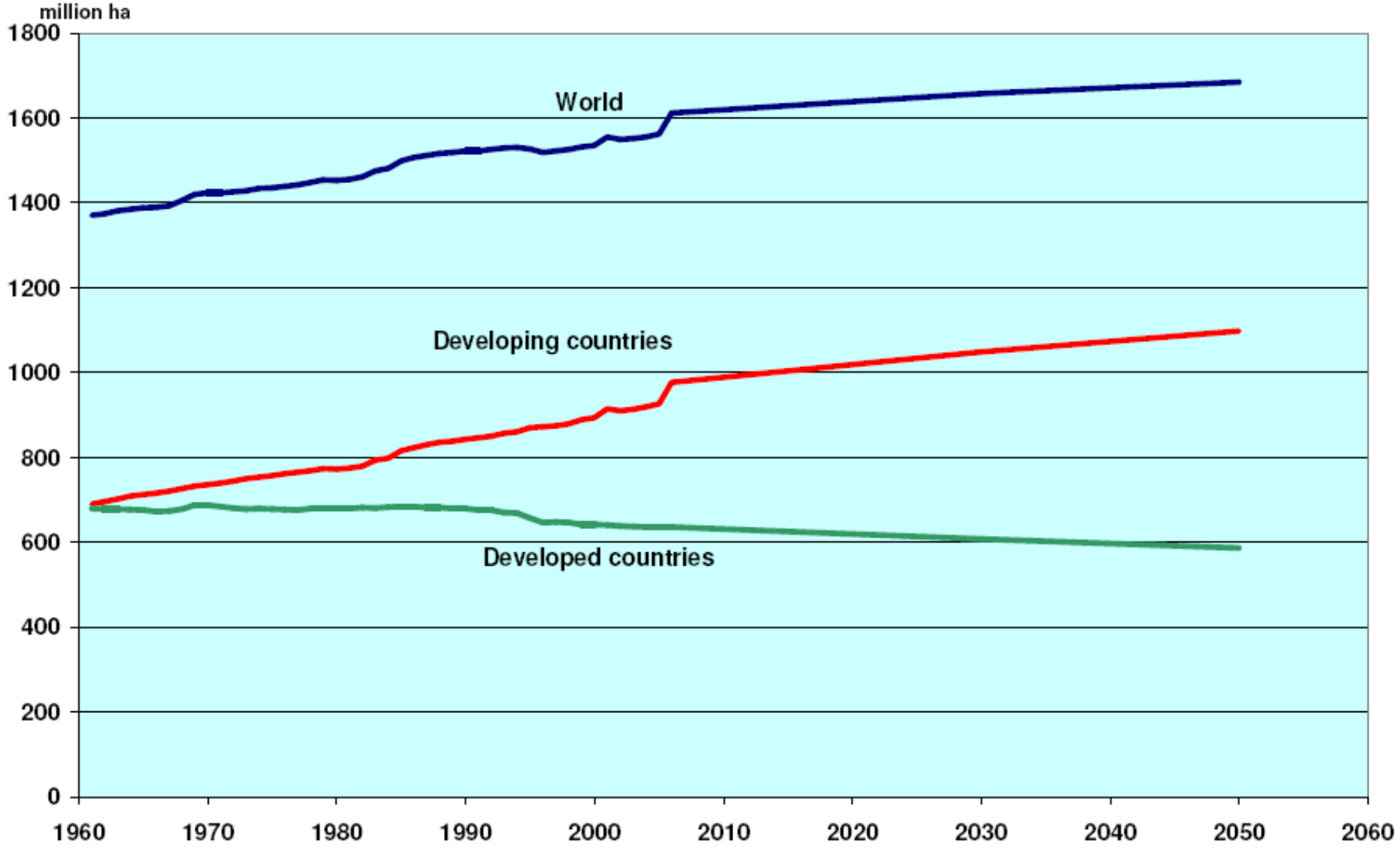


Source: Alexandratos 2009

Where will it come from?

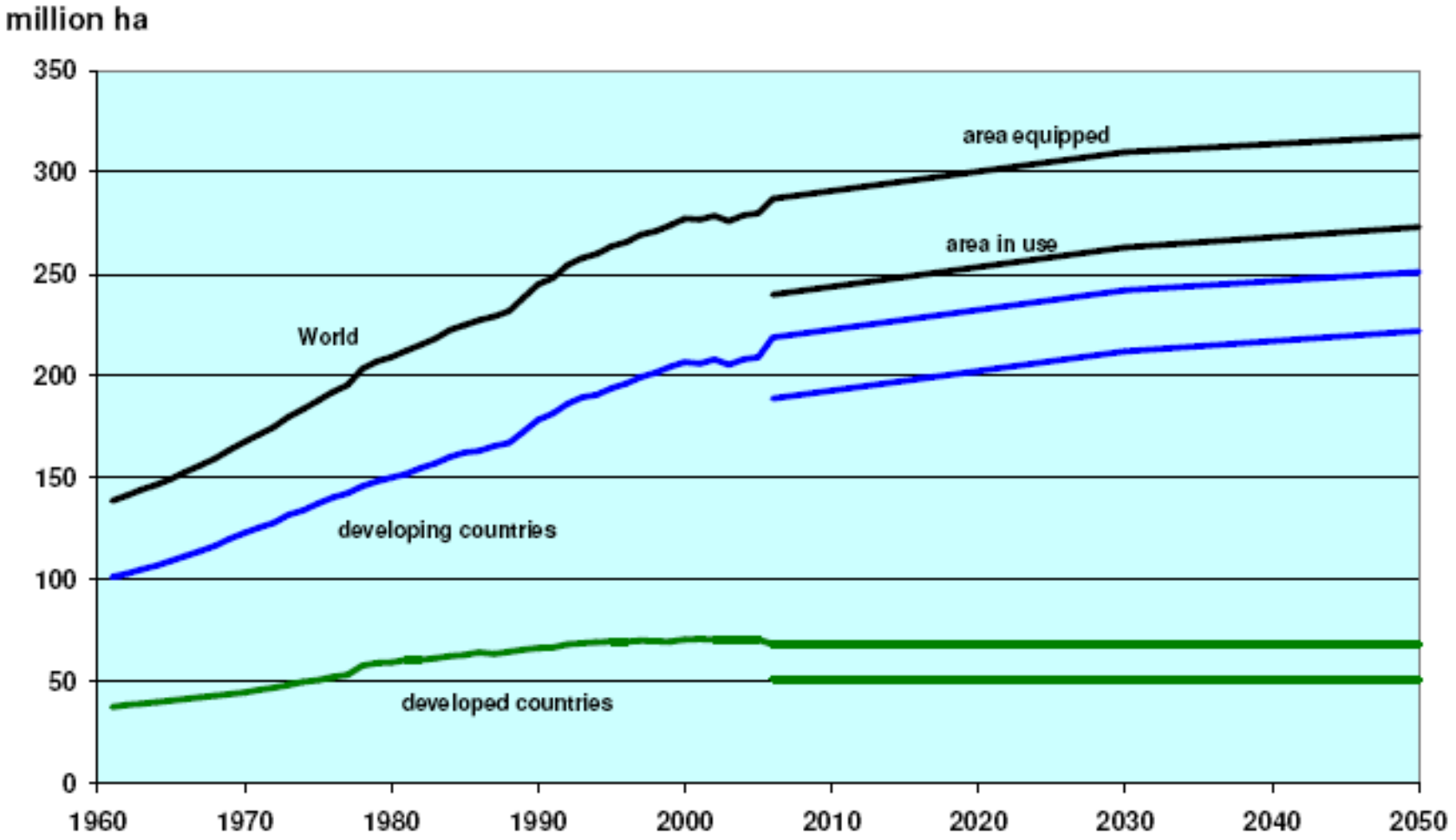
- Area expansion?
  - 1.6 billion hectares currently used for crop production, another 2.7 billion with production potential, mostly in SSA and LAC
  - but concerns about biodiversity loss, carbon emissions, erosion
  - also economic feasibility, but that is changing with prices
- Climate change will affect land suitability and yields, but unevenly
  - initially adversely in SSA and LAC, positively elsewhere
  - eventually adversely in all regions, especially SSA and LAC
- Yield increases have accounted for the majority of production growth in recent decades, and will continue to do so in the future
  - about half from improved seeds
  - about half from increased inputs (esp. water and fertilizer)

Arable land



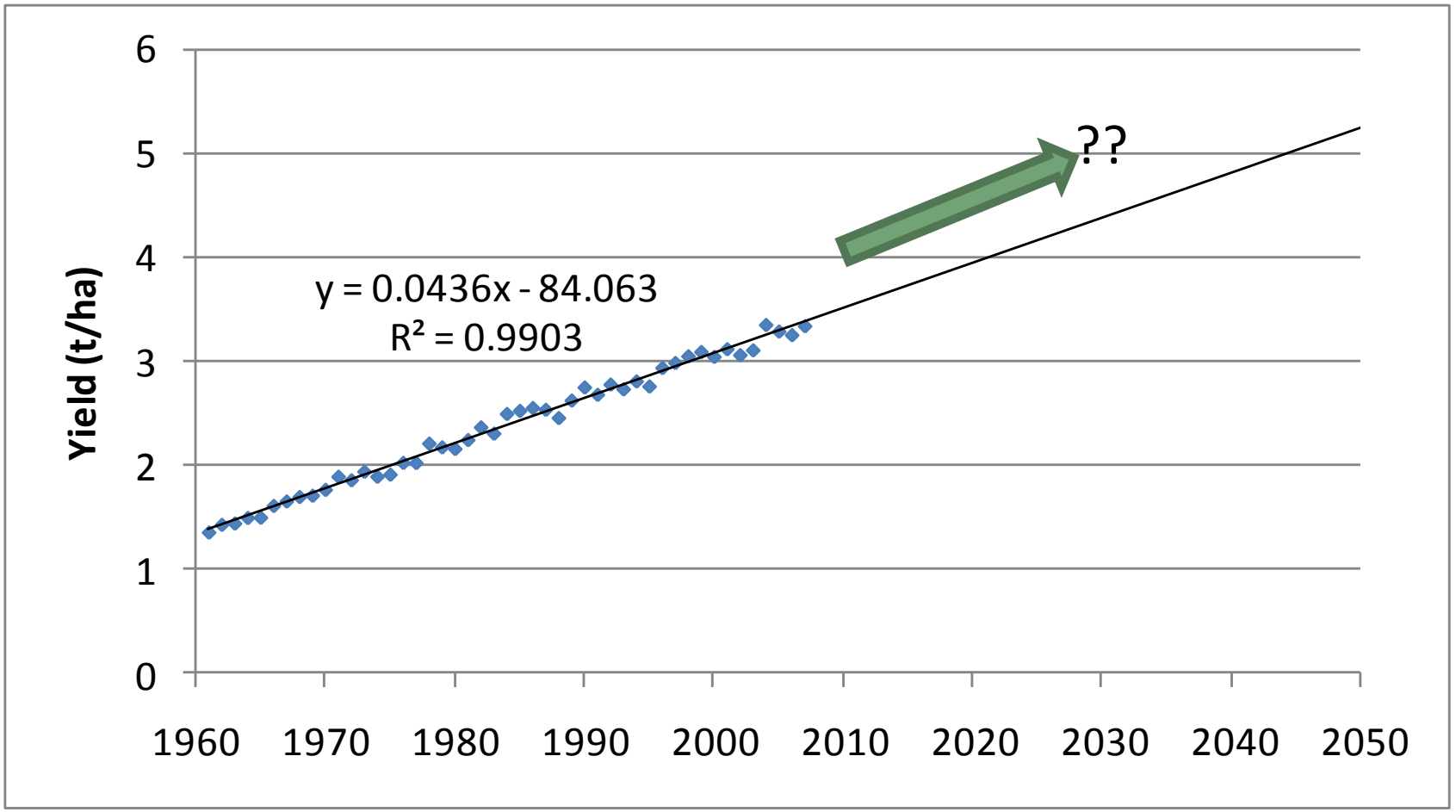
Source: Bruinsma 2009

Arable irrigated area



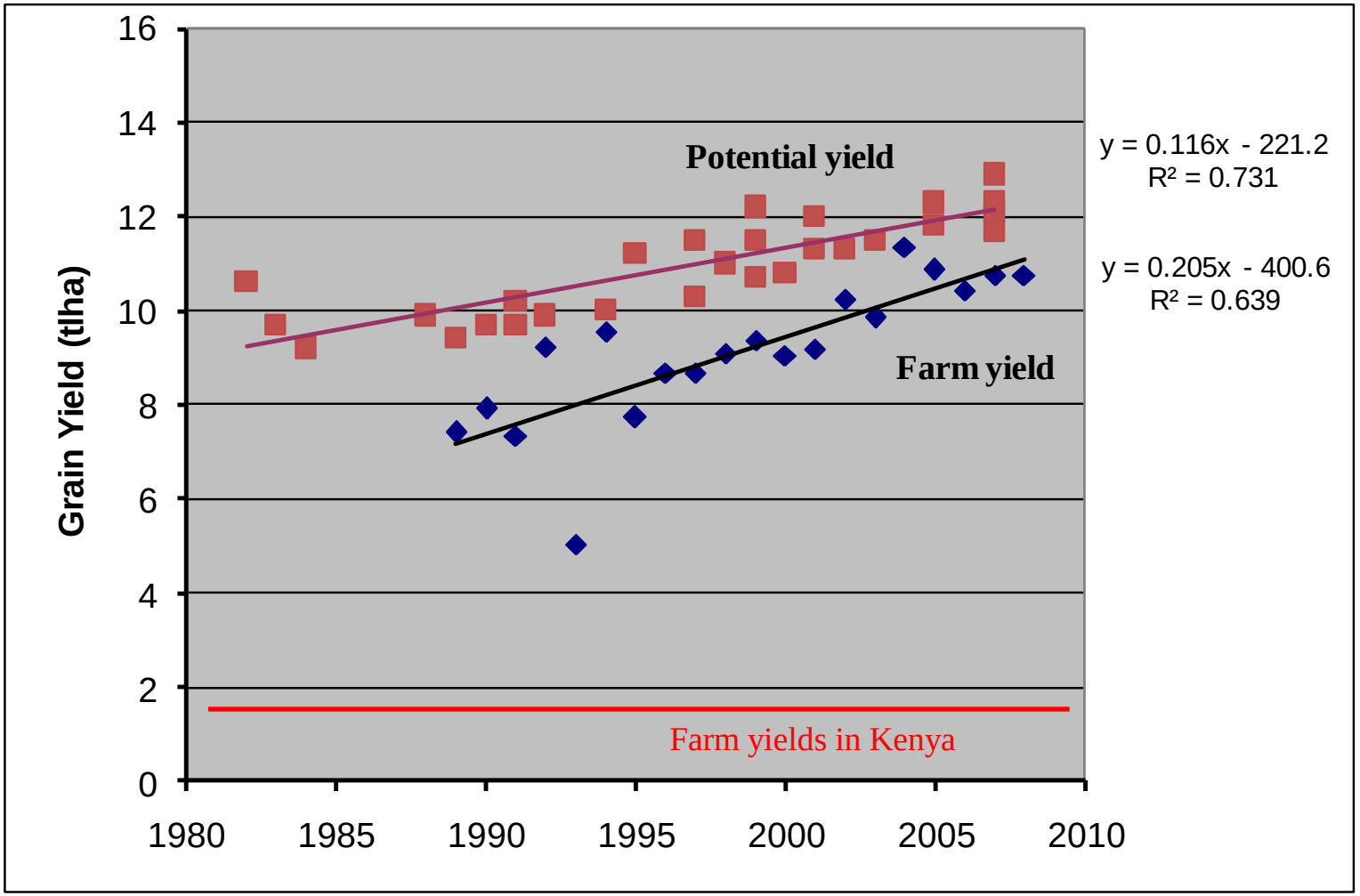
Source: Bruinsma 2009

Global cereal yields



Source: Fischer et al. 2009

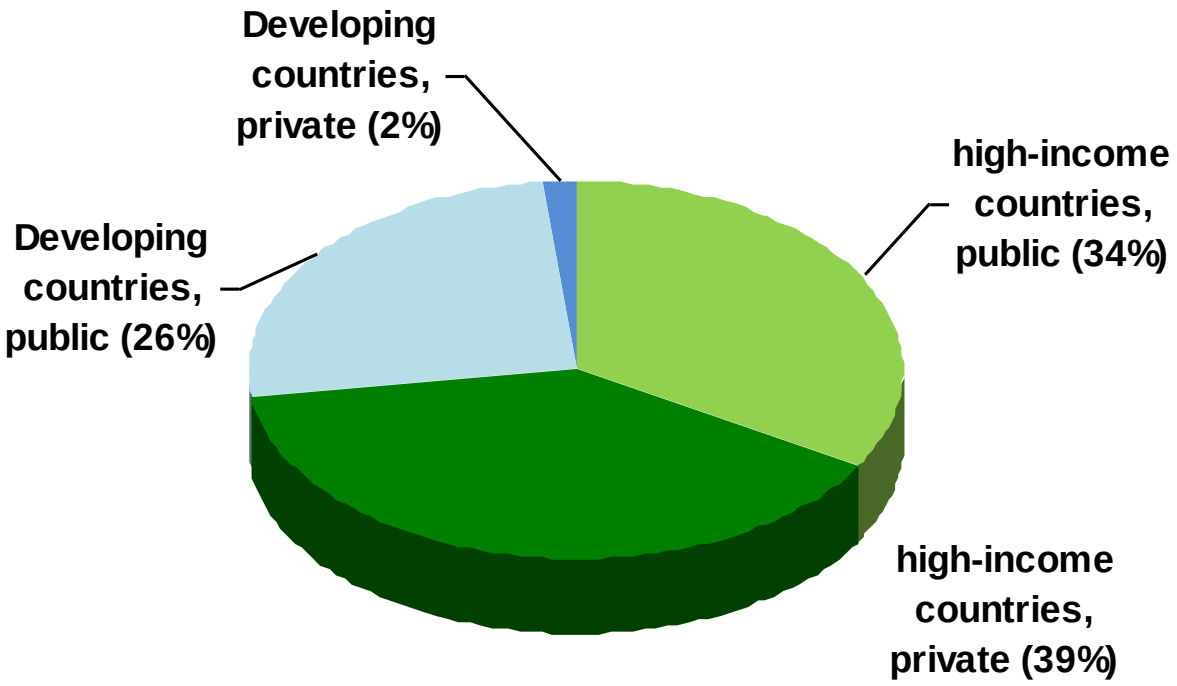
Iowa (USA) maize yields



Source: Fischer et al. 2009

Public and private sector investment in agricultural R&D

circa 2000: 39.6 billion in 2005 international (PPP) dollars



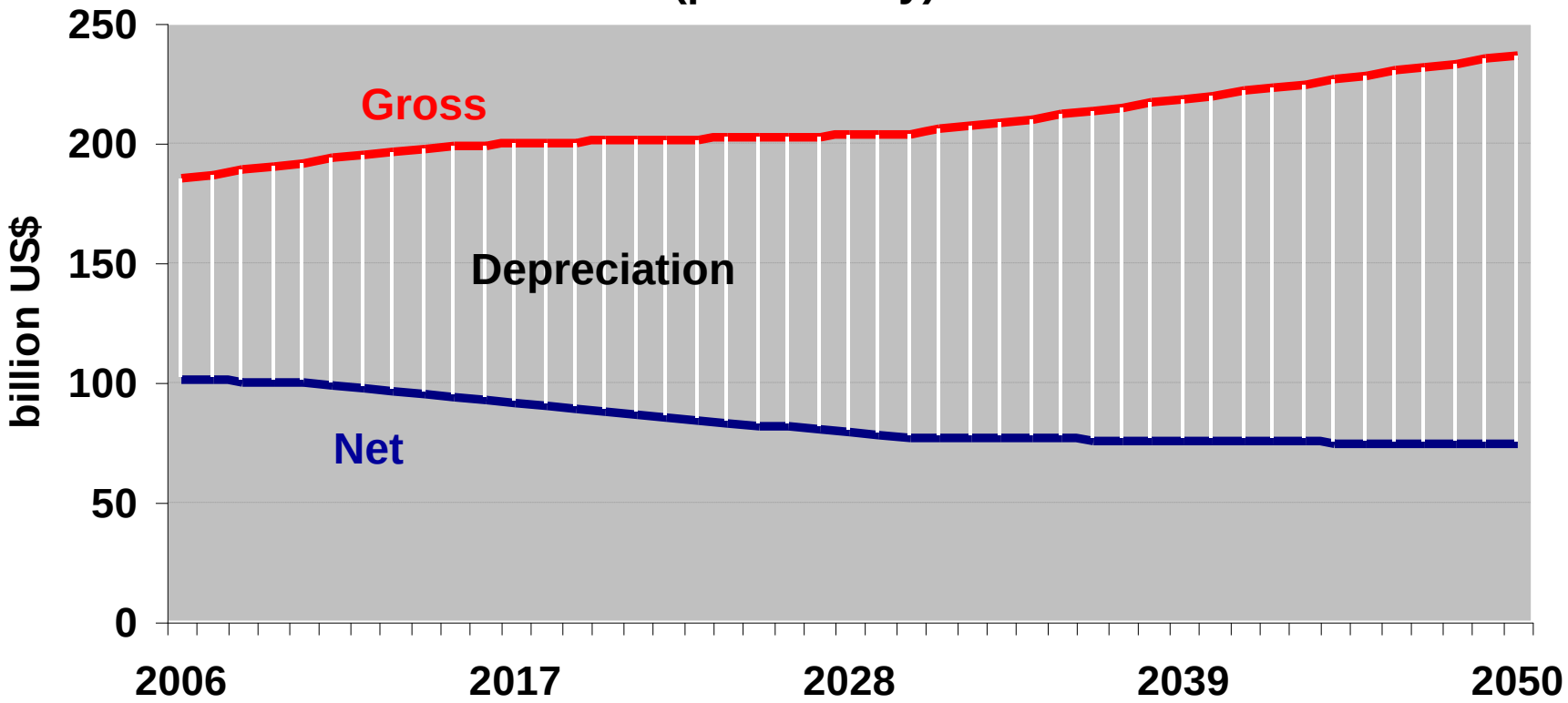
developing = low- and middle-income countries

Source: Beintema and Elliott 2009

Total annual investment requirements in developing countries' agriculture

(in 2009 US$)

(preliminary)



Source: Schmidhuber et al. 2009

Biofuel impacts

- Competition for commodities and also for resources
- Higher cereal prices (but lower protein feed prices)
- Opportunities for producers, but uneven access to markets, and most small producers are net buyers of food
- Increase in hunger with increased biofuel production
- Fischer estimates increased biofuel use of cereals comes primarily (2/3) from increased production, ¼ from reduced feed use and 10% from reduced food consumption

Climate change impacts

- Fischer estimates aggregate impacts are relatively small until mid-century, but vary by region, e.g. land suitability down in Africa and Latin America but up (initially) elsewhere
- Msangi estimates 2050 maize prices up 250% over 2000 with climate change (vs 50% in baseline), and smaller reductions in child hunger
- Binswanger argues impacts uncertain, but responses the same: improve general capacity to adapt—technology, markets, risk management

Structural change and Africa

- Binswanger: smallholders are key
  - responding to reduced conflict, improved policies and higher prices, but need improved technology, markets and risk management
- Wiggins: smallholders have potential
  - but not all of them; need support for transition, and safety nets for those left behind
- Collier: agriculture must commercialize
  - to support large urban, industrial, coastal population; need innovation, finance and logistics

Policy priorities identified

- Increase investment in agriculture
  - R&D, infrastructure and institutions
  - also in complementary sectors, e.g. education and health
- Improve access to food
  - equitable growth in incomes (both farm and non-farm)
  - Improve risk management at household and national levels
  - safety nets for vulnerable groups
- Need well-functioning national markets and institutions as well as international trade liberalization, but sequencing is important
  - Improve farmers' access to input and output markets while facilitating the transition out of agriculture for those who leave the sector
  - Reduce subsidies for biofuels
  - Reduce trade barriers and improve regulatory frameworks for new technologies, including GMOs
- Improve resource management
  - best practices, sustainability criteria, payments for environmental services
- Build political will to address challenges that transcend the traditional decision-making horizons of producers, consumers and policymakers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