

Feeding the world: insurmountable obstacles or a prospect of plenty?

**Government intervention, private sector initiatives and the
contribution of mathematical economic models**

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Overview

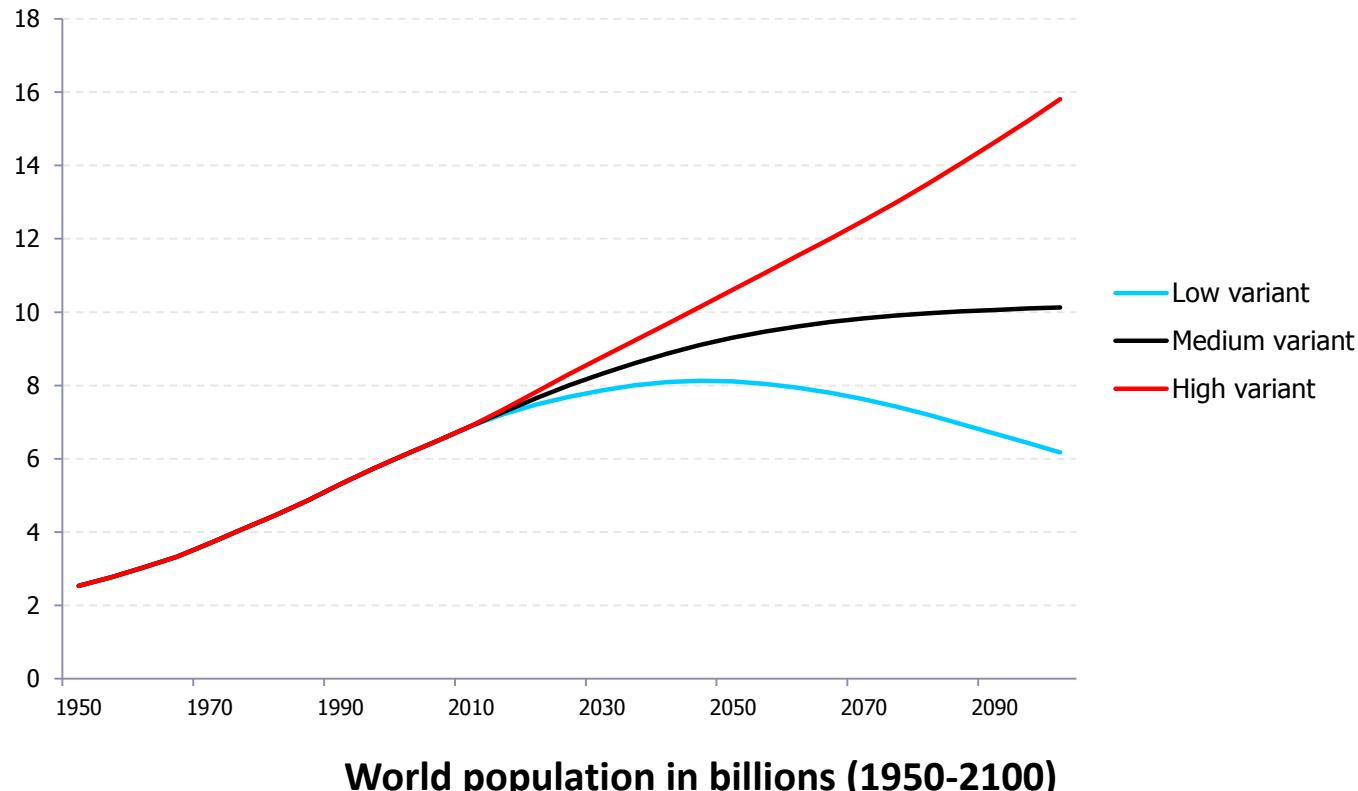
Four questions

1. How are we doing today as far as food security is concerned?
2. What are main challenges ahead?
3. Is there ground for hope?
4. How does mathematical economics contribute?

1. Present state of food security

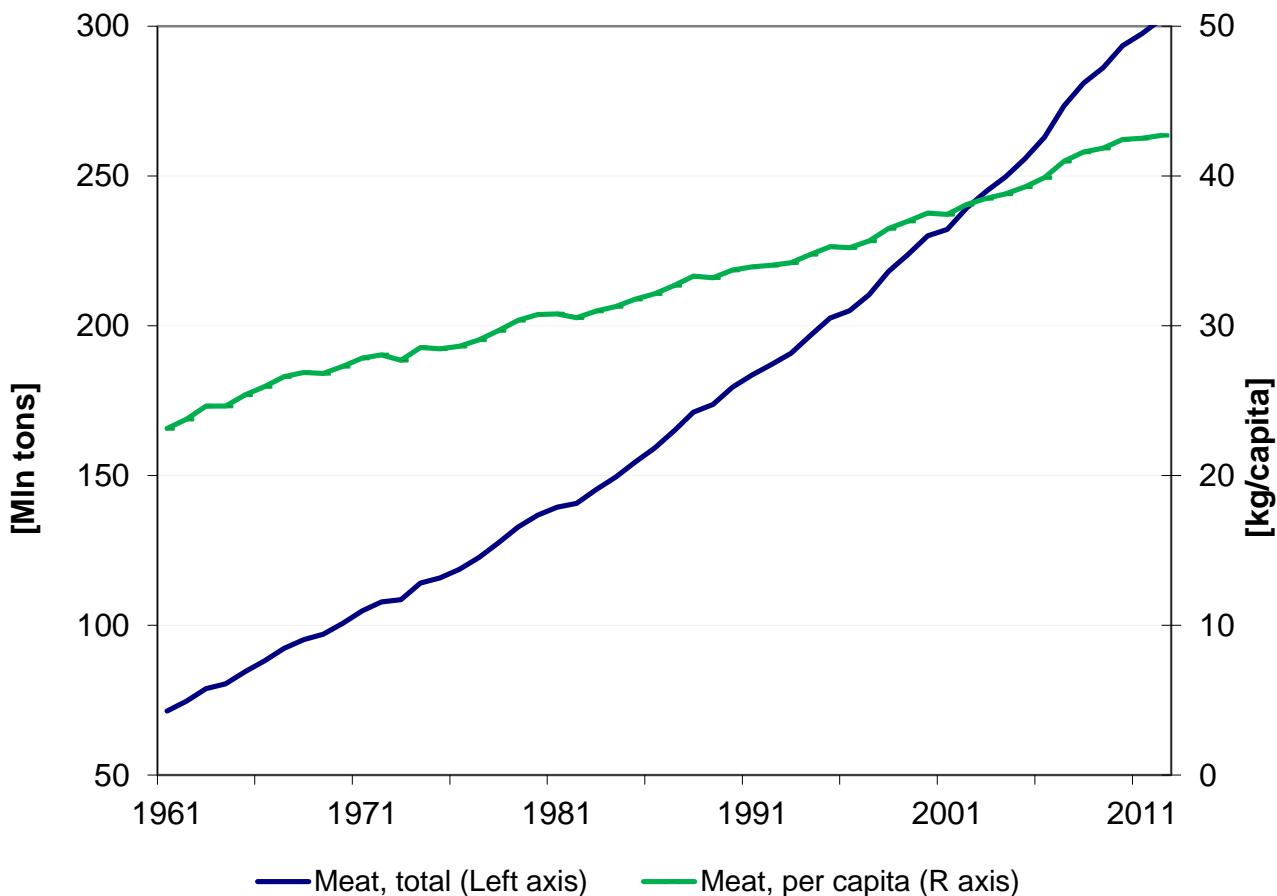
(All recent statistics courtesy of SOW-VU)

- Population from 7 billion now to around 9.3 billion in 2050 and 6, 10, or 16 by 2100



Source: United Nations Population Division, 2014

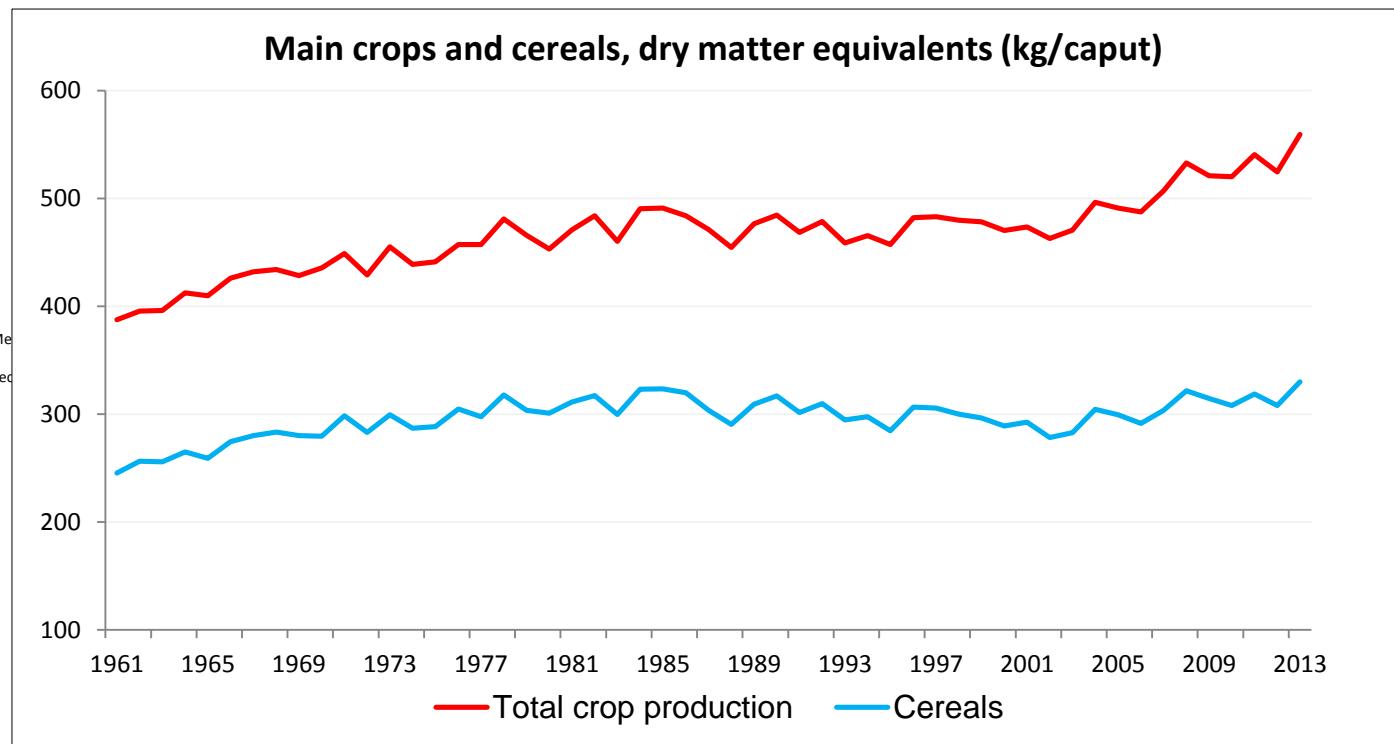
Fast rising meat production



Meat production, total and per capita

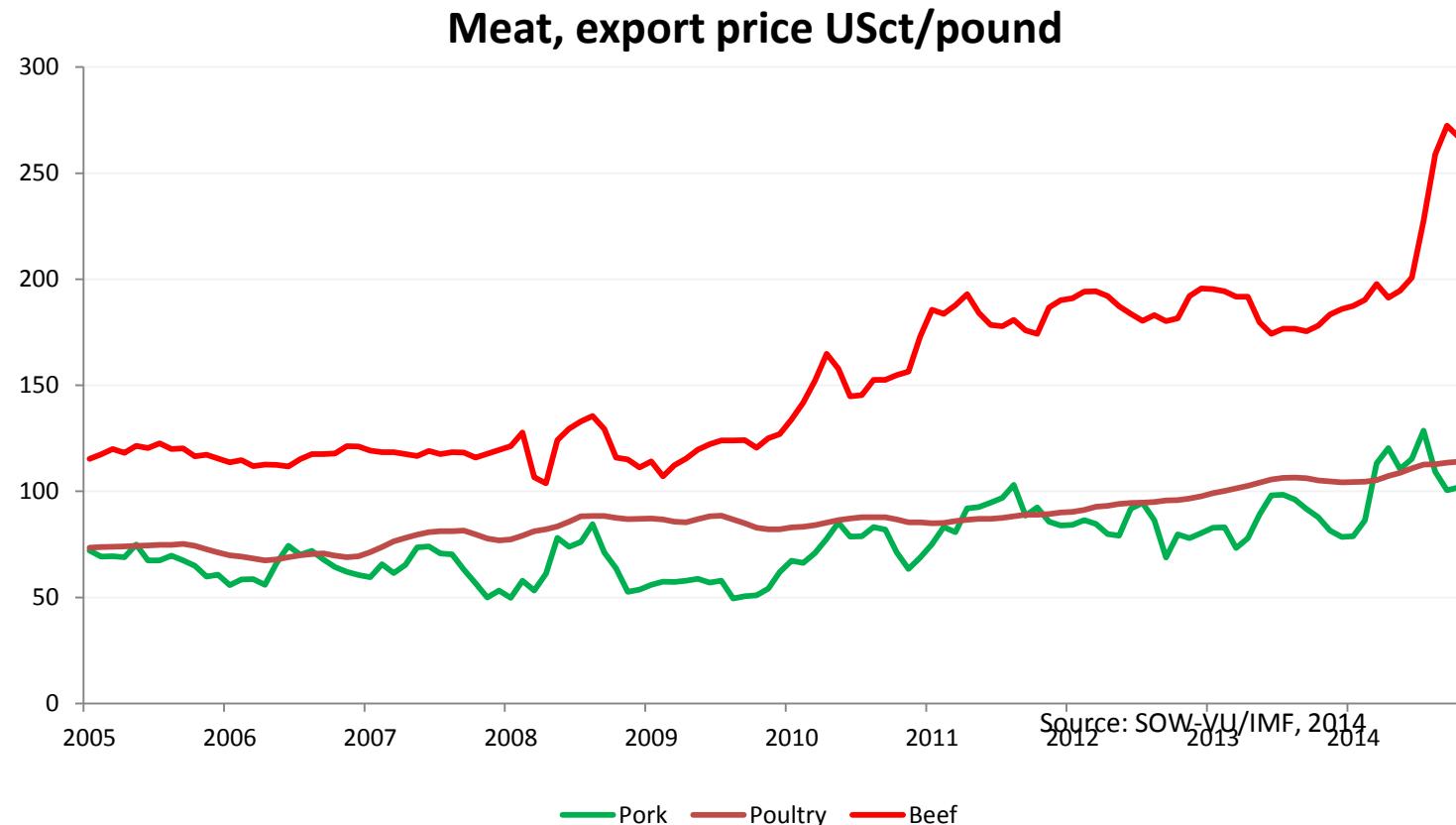
Source: SOW-VU/FAO, 2014

Yet the human footprint seems to have remained remarkably stable (counter to common perceptions!)



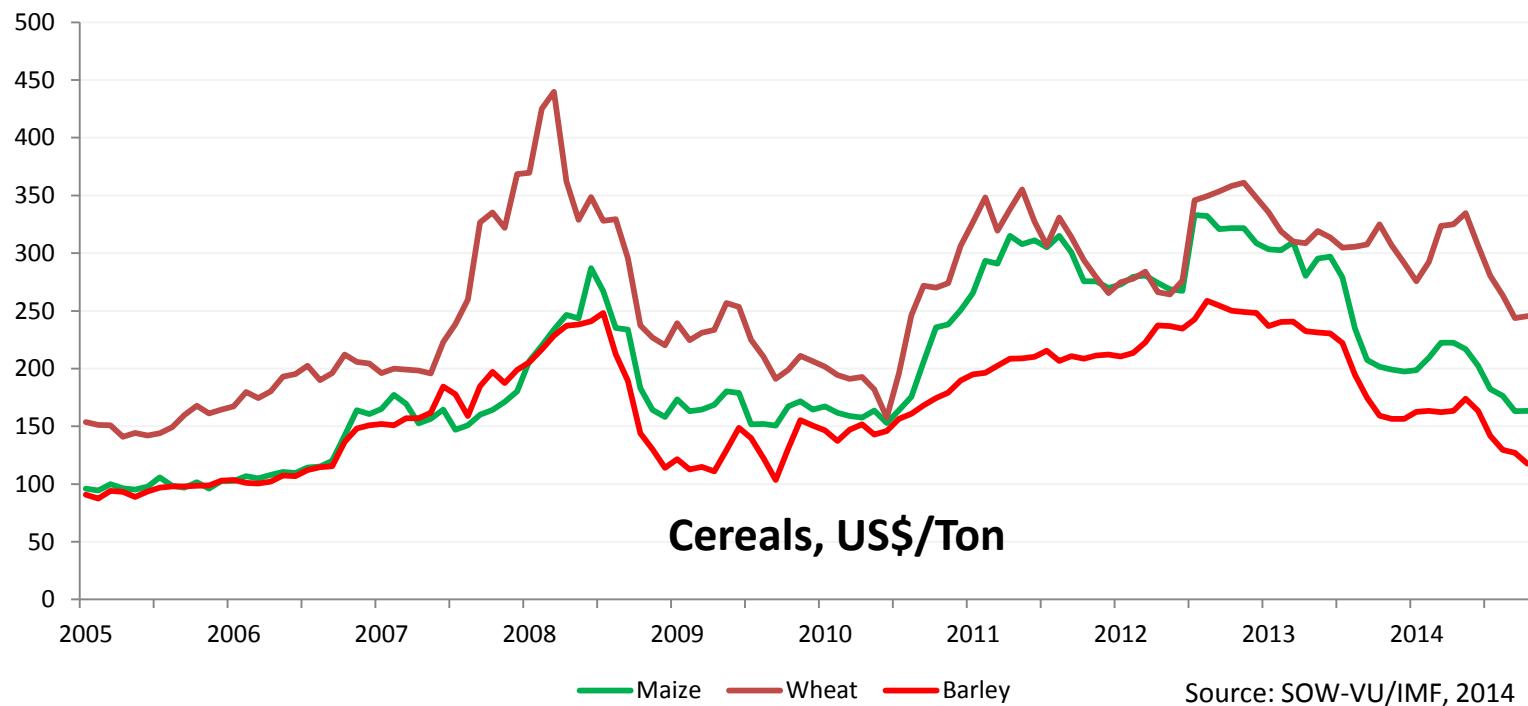
- Measured in dry matter equivalents, only very slow increase in per capita production of main crops, including all feed crops (but excluding grass etc.) over the last 30 years
- Animal welfare is an issue: short, confined lives need less feed
- Recent rise is primarily due to biofuels

For meat products, world market prices are rising for beef only



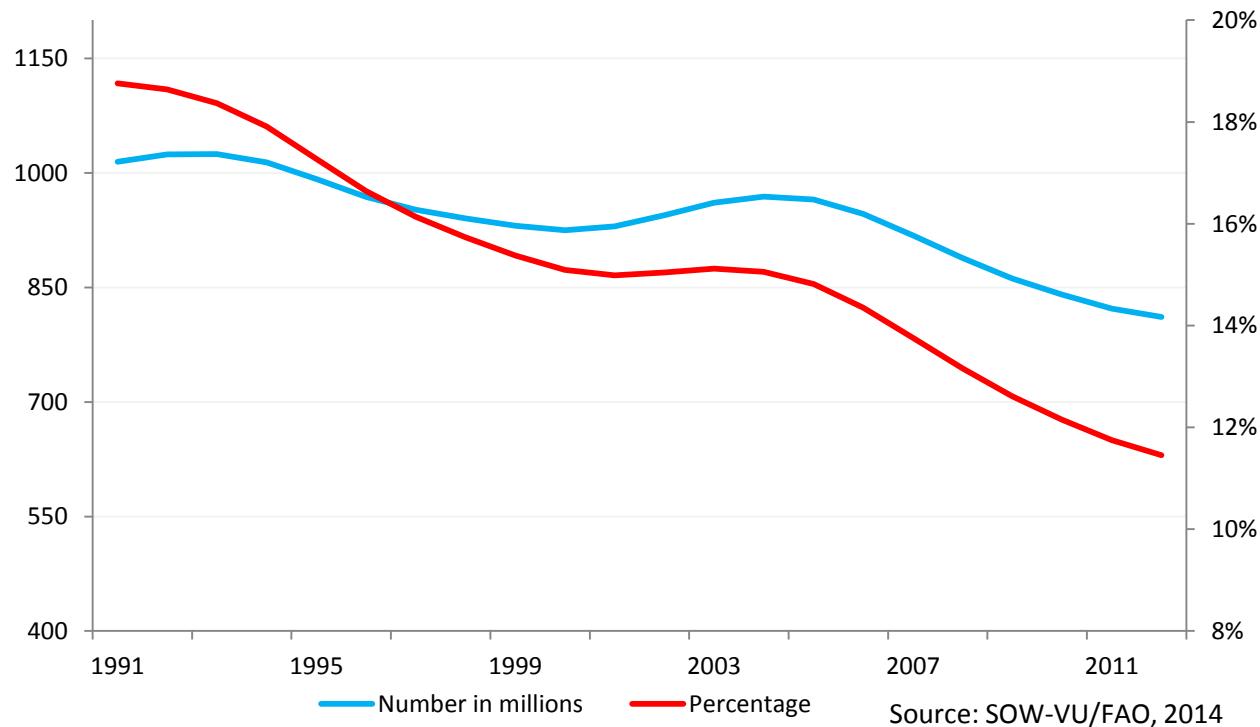
Rise in world market prices of crops larger and price fluctuations more pronounced

- as fewer poor countries buffer weather shocks and biofuels promote volatility
- good harvests of 2013-2014 have led to price fall
- food security lower priority on international agenda than in 2008



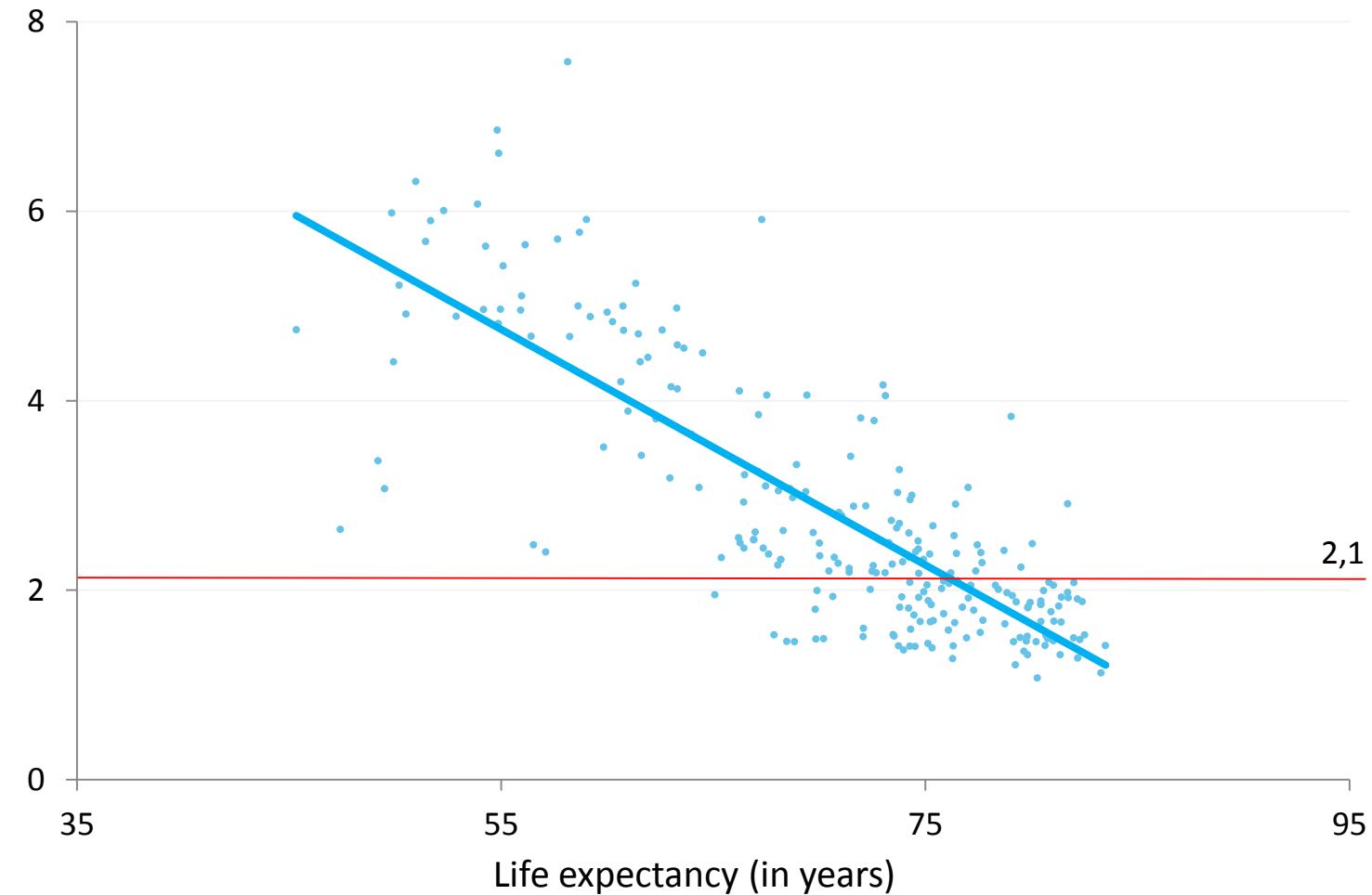
2. Ground for hope

- Yields are very low relative to potential in most of the troubled areas
- Knowledge accumulating and shared ever more widely around the globe
- Dematerialization continues: devices ever smaller and more multifunctional ICT
- Persistent drop in malnutrition: percentagewise and absolute (China!)



Fertility drops as longevity rises

Number of children per woman



Development, therefore, contributes to long term sustainability!

3. Challenges

- Some are technological:
energy, water, climate, yields, plant nutrient supply and recycling
they are important but no need to detail these here in Wageningen
- Yet, scarcity of knowledge, tools or resources not the critical issue
- More severe and stubborn are societal problems in three domains:
nature, culture and commerce,
- All three vital to human existence and hence to food security
- Neglect of any of these for more than 10-20 years takes a heavy toll:
 - Nature: poor harvests and pollution
 - Culture: terrorism, xenophobia, and civil strife
 - Commerce: poverty, unemployment and economic decline
- “history”, or “technological trends” will not solve the hunger problem in any automatic way
- Challenges should be addressed

4. Mathematical economics: a platform for synthesis

- Hunger, like poverty is merely a telling indicator of what is wrong with the system, locally and globally. It is a multidisciplinary problem
- Mathematical economics offers coherent framework to incorporate and synthesize multidisciplinary knowledge
 - connecting facts (statistics) with theoretical notions (e.g. efficiency)
 - sometimes large simulation models, sometimes theoretical discussion with selected data only
- Rigor of mathematical economics maintains consistency between different approaches
 - and does not confuse ideal (e.g. perfect competition), with reality.
- Macroeconomic measures, social interventions and technological innovations will not resolve the issue
 - these are *hard power* policies that will not change individual attitudes and social practices.
 - Elimination of hunger takes more than money, production, new gadgets, or regulation alone
- *Soft power* policies are needed as well that win the hearts and minds, to help maintain balance between nature, culture and commerce

4. Mathematical economics: a platform for synthesis

- Mathematical economics offers consistency of representation across people, sectors and countries
- It fully recognizes the role of various actors: consumers, farmers, food processors etc.
- It offers perspectives as how to conduct socially inclusive policies for growth, combining
 - normative guidance to hard power policy (regulations, public investments)
 - while helping soft power policy: letting upcoming challenges reach policy makers, national dialogues and international negotiations
- The state needs to take the lead in health, nutrition, sanitation, and fundamental research, and for regulation.
 - the private sector does not protect water sources, or the atmosphere or languages, or historical heritage.
- Research should contribute to a sound mix of hard and soft power policies to help restore and maintain the threatened balance between nature, culture and commerce.

Thank you!