Forthcoming Essay

- 600-words
- Topics available Friday 18 March midday
- Due date 8 April
- need to be submitted through the LMS site as 'Turnitin' assignments.
- Purpose
  - demonstrate understanding of key topics we have discussed in lectures and tutorials
  - demonstrate writing and research skills
    - find academic sources (~6) and incorporate into an argument
    - clear and concise response to the assigned questions

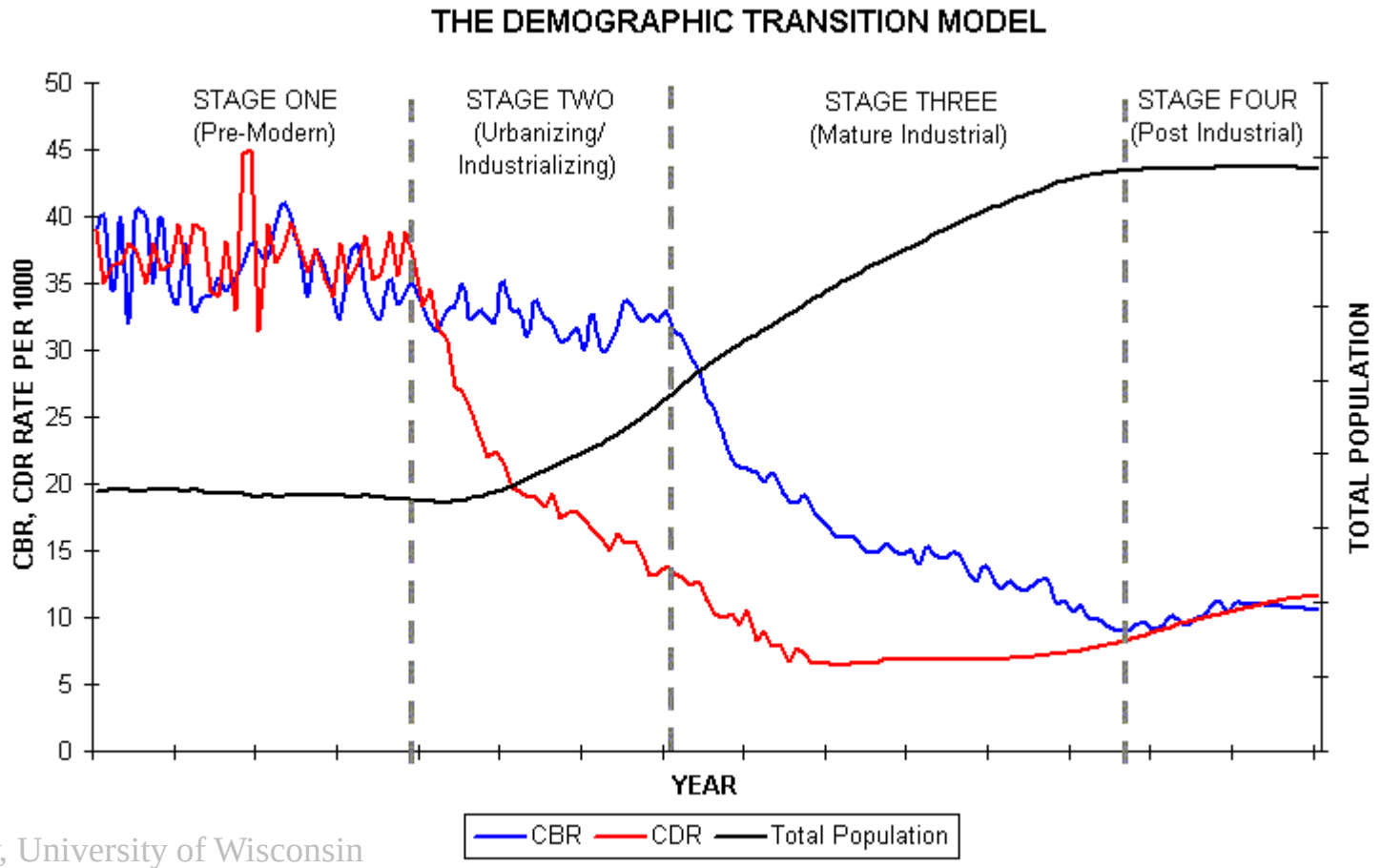
Technology, Innovation and Food Supply

Geog 10001: The Geography of Scarcity

Interdependence: Poverty, fertility and consumption

Demographic Transition

Demographic transition: the **transition** from high birth and death rates to low birth and death rates as a country develops from a pre-industrial to an industrialised economic system

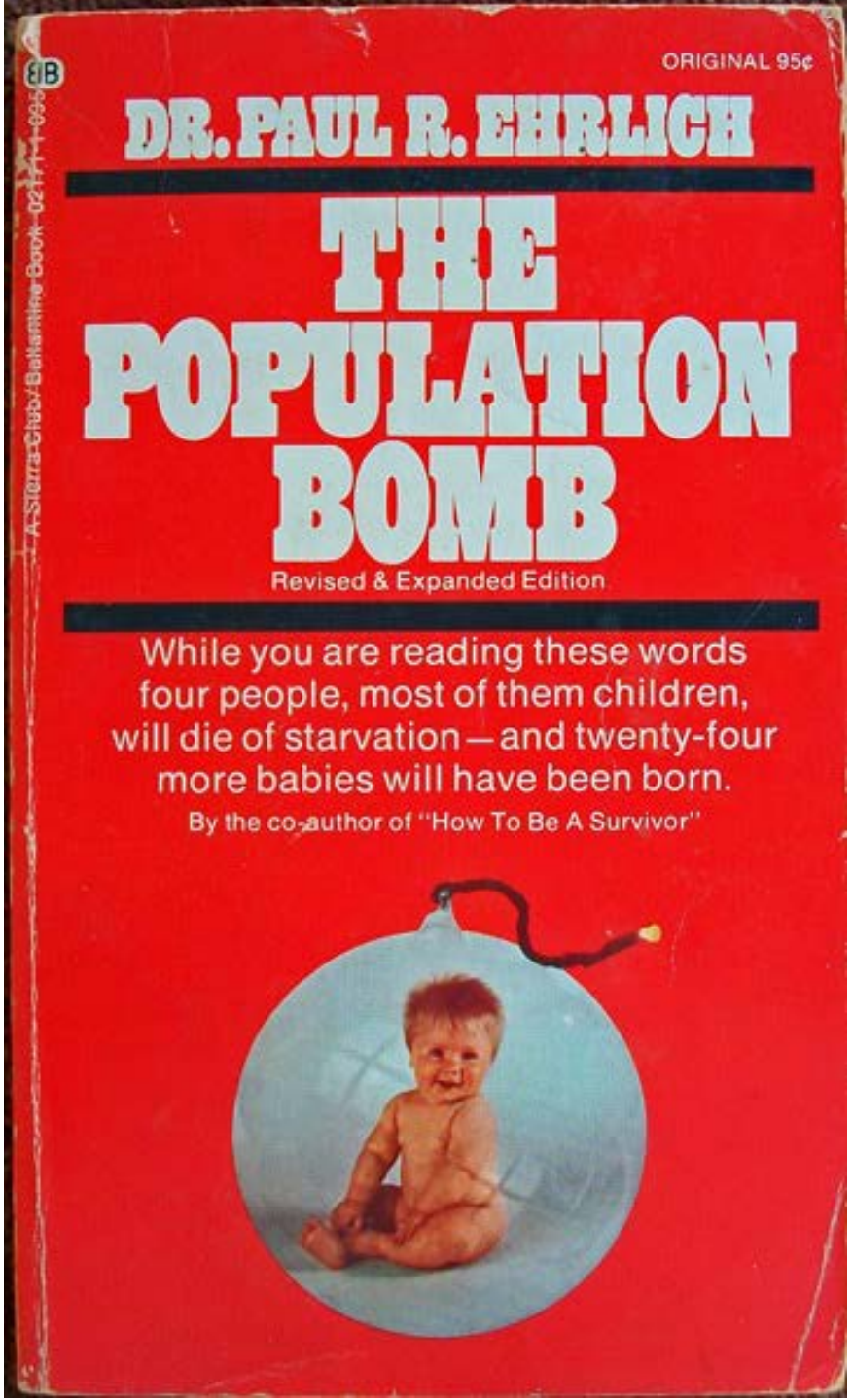


Today we will cover…

- Today's lecture
  - Technology and Innovation
    - Esther Boserup
    - Green Revolution
  - Benefits of Population Growth
  - Intro to Amartya Sen and the Bengal Famine

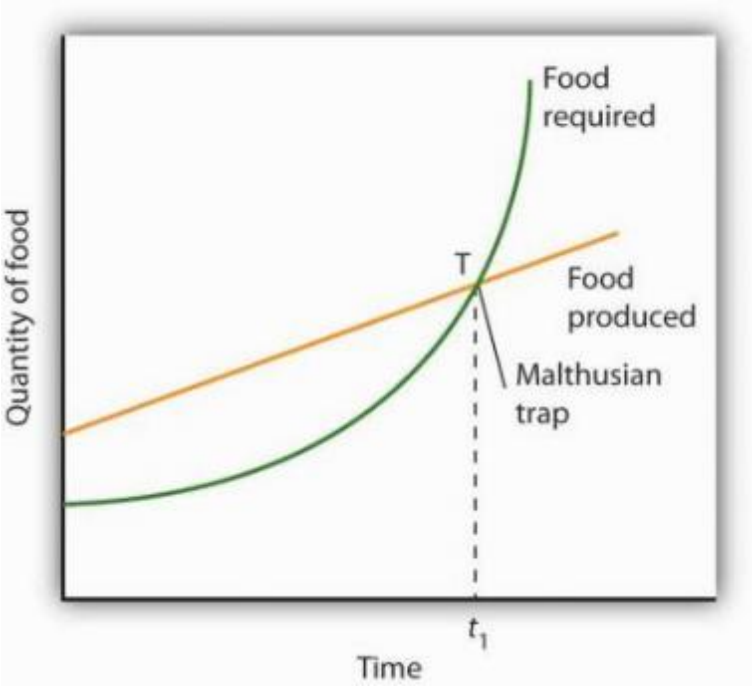
Technology and Population

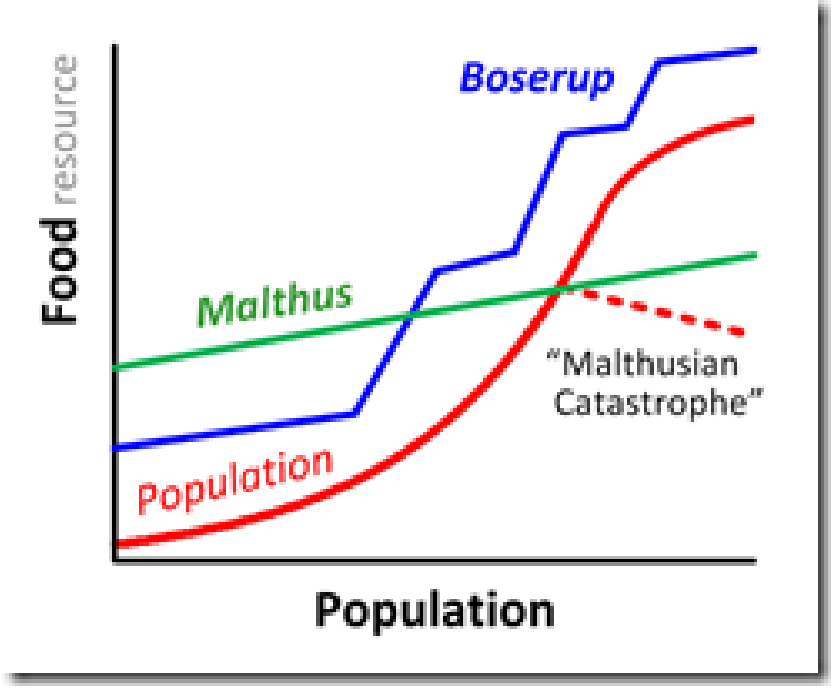

POPULATION
WELL, IT APPEARS TO HAVE LANDED...
BUT IT DIDN'T EXPLODE!


ORIGINAL 95¢
DR. PAUL R. EHRLICH
THE POPULATION BOMB
Revised & Expanded Edition
While you are reading these words four people, most of them children, will die of starvation—and twenty-four more babies will have been born.
By the co-author of "How To Be A Survivor"

Two contrasting views

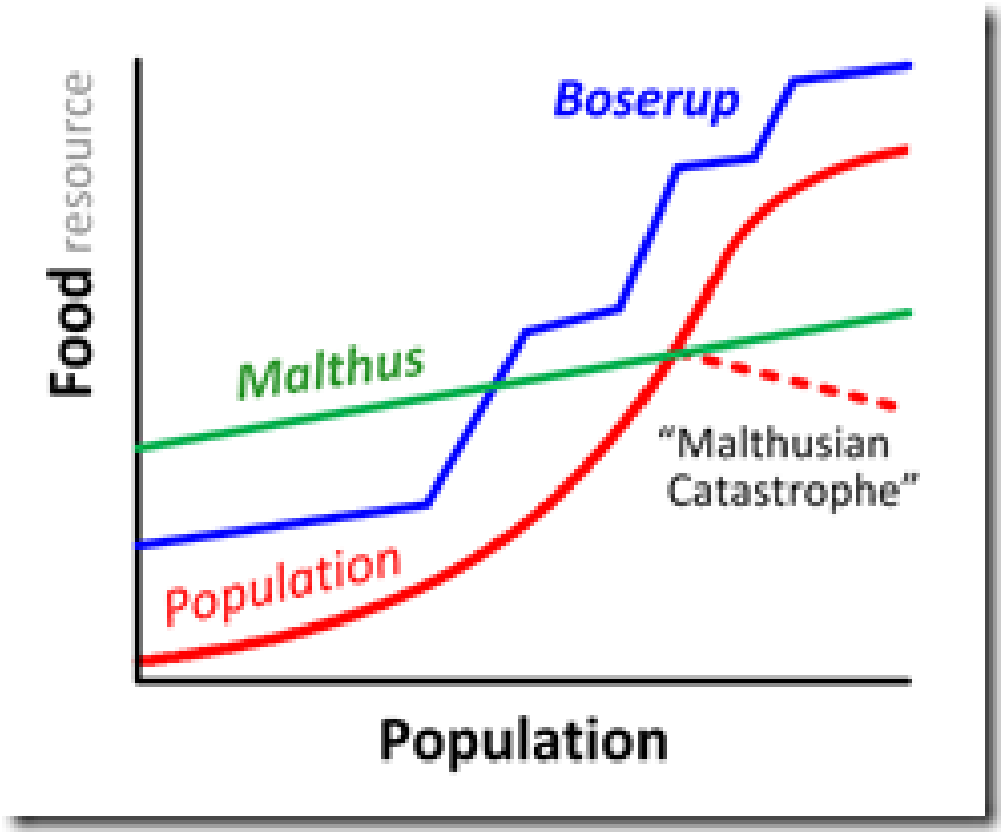
- Malthus (1798): food production cannot keep up
  - Boserup (1965): people will innovate when needed.



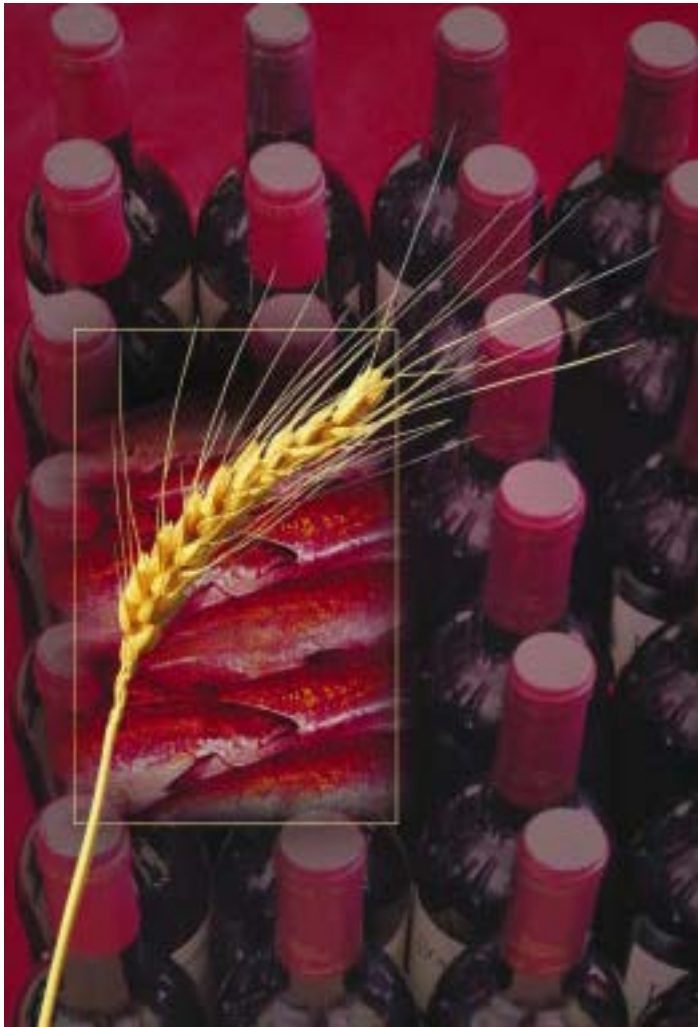


Boserup

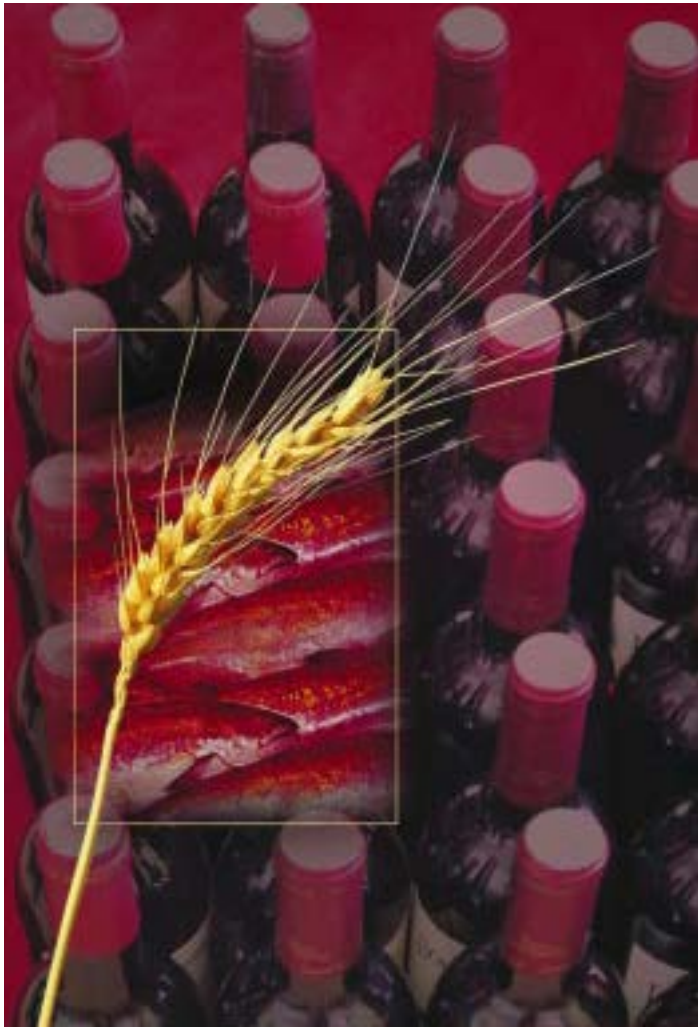
- Malthus (1798): two incompatible trends.
  - Boserup (1965): people will innovate when needed.
- Perhaps this has happened…



Technological innovation and the Green Revolution



Technological innovation and the Green Revolution



Not simply a technological innovation

- Government investment in research
- State-enabled market creation
- "Modernisation" of the countryside
- The rise of international agribusiness

Why the Green Revolution?

- **Land Reform** - Radical transformation in feudal/semi-feudal agrarian relations as a precondition for economic development and agricultural productivity
- **Technological Change** – technical improvements in agriculture that do not involve fundamental changes in land relations

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- **Land Reform** - Radical transformation in feudal/semi-feudal agrarian relations as a precondition for economic development and agricultural productivity
- **Technological Change** – technical improvements in agriculture that do not involve fundamental changes in land relations
    - Bypass land reform
    - 'Scale neutral'

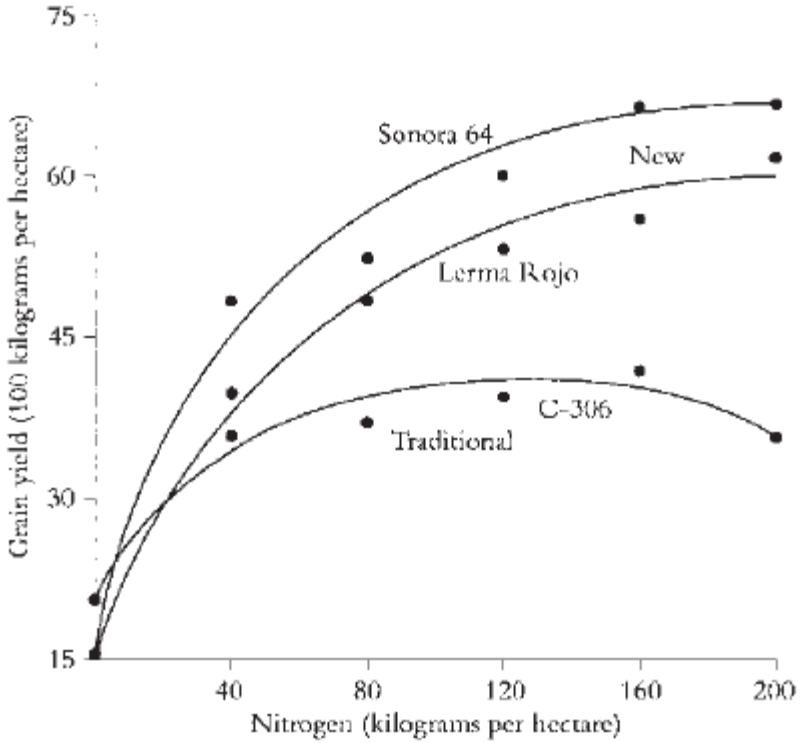


Figure 3.1 Responses of new and traditional wheats to fertilizers.[12]

Conway, Gordon. *One billion hungry: can we feed the world?*. Cornell University Press, 2012.

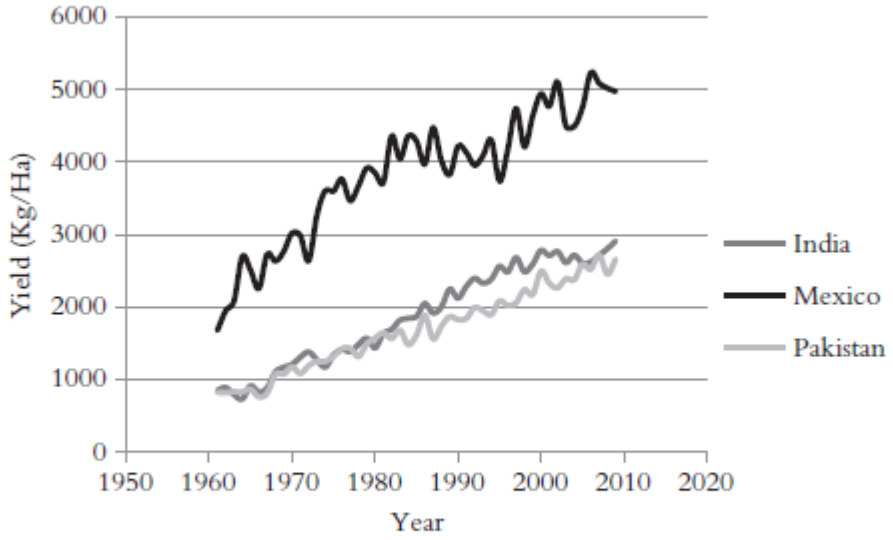
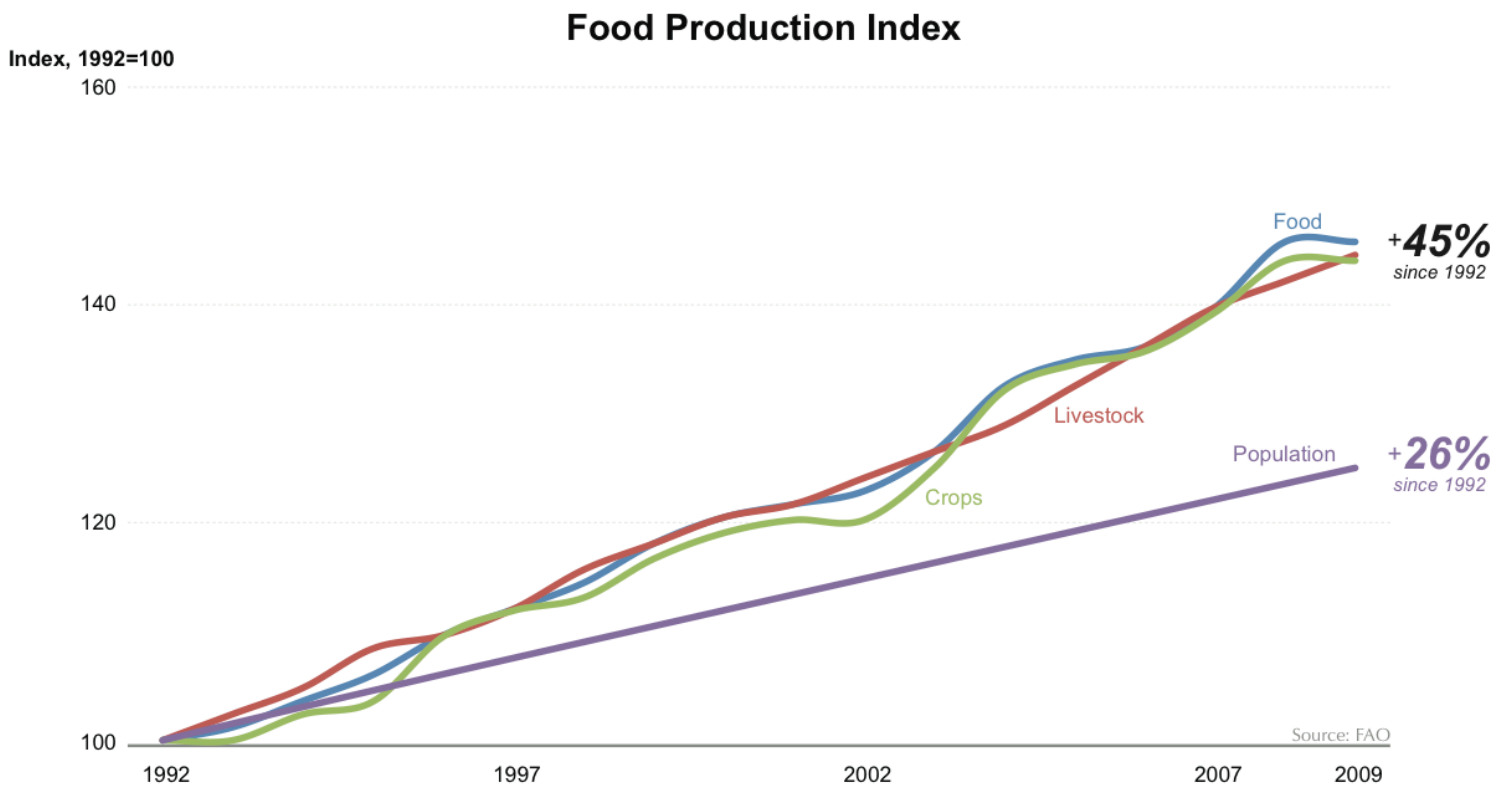


Figure 3.2 Growth in wheat yields in Mexico, India, and Pakistan.[14]

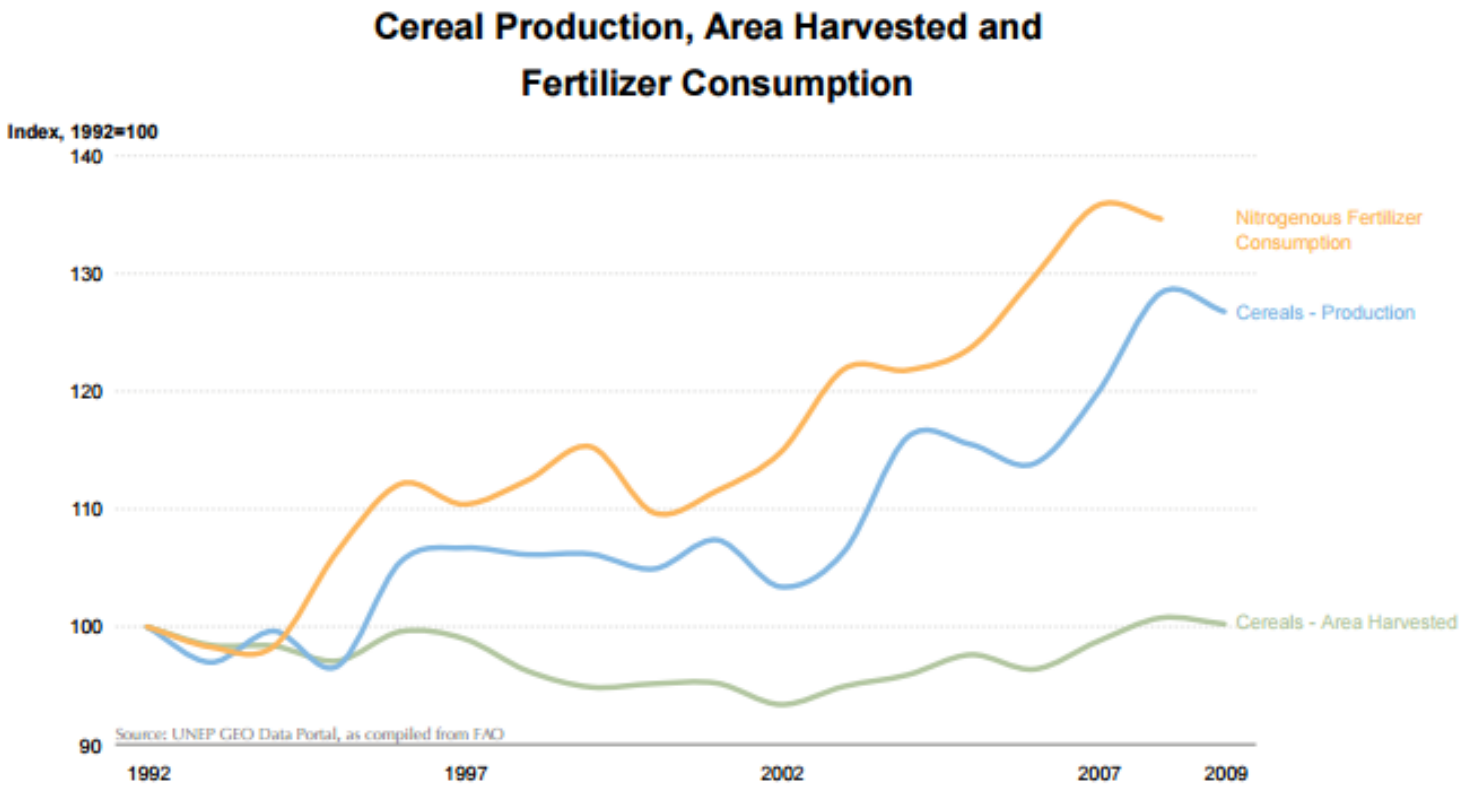
Conway, Gordon. *One billion hungry: can we feed the world?*. Cornell University Press, 2012.

Food production

- Steadily exceeding population growth



Higher agricultural yields depend heavily on the use of fertilizers



Limitations of the Revolution

- Impact on poor less than expected
- Regional benefits highly uneven

Limitations of the Revolution

- Impact on poor less than expected
- Regional benefits highly uneven
- Political impacts
  - Intensified conflict
  - Increased mechanisation and resulting unemployment
  - Increase in rate of urbanisation
  - Acceleration in pace of change
- Encouraged, natural resource degradation and environmental problems

The Economist 2015

Side effects of intensification

Second Green Revolution?

"Three quarters of the world's poorest people get their food and income by farming small plots of land…if we can make smallholder farming more productive and more profitable, we can have a massive impact on hunger and nutrition and poverty…the charge is clear—we have to develop crops that can grow in a drought; that can survive in a flood; that can resist pests and disease…we need higher yields on the same land in harsher weather."

Bill Gates 2009

Boserup

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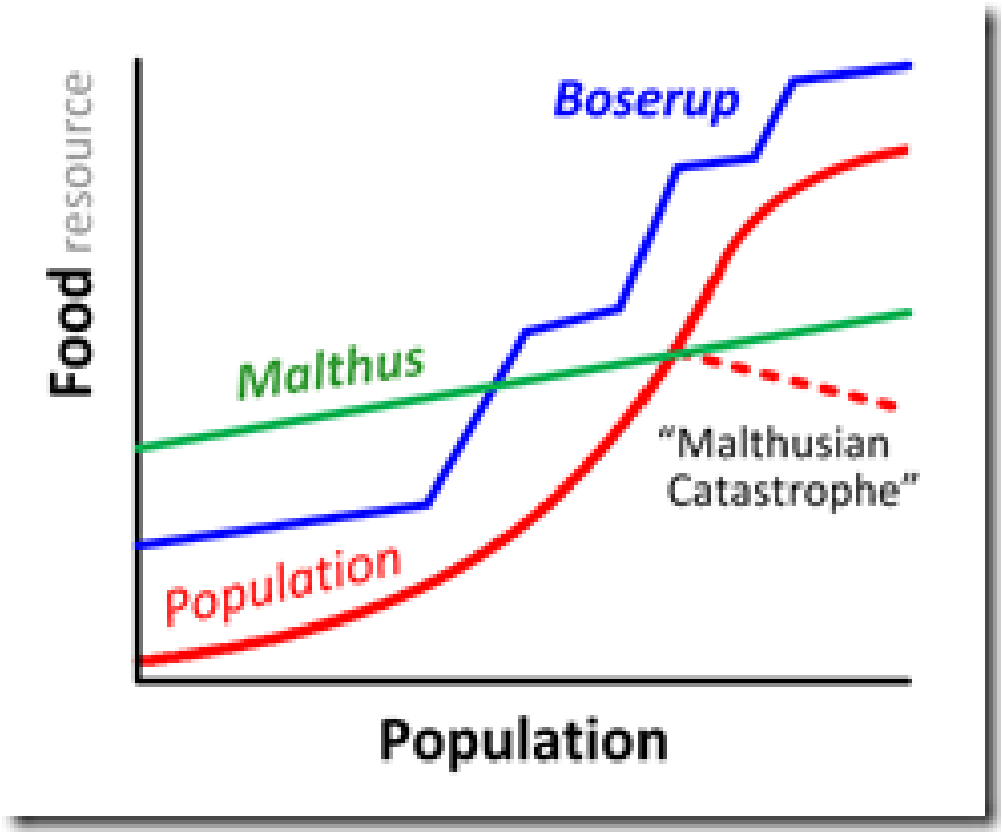
- Perhaps this has happened…



Benefits?

Population Pessimists

- Humanity has walked a fine line
- Can't overcome natural limits, just mine fast enough to stave off collapse

Population Optimists

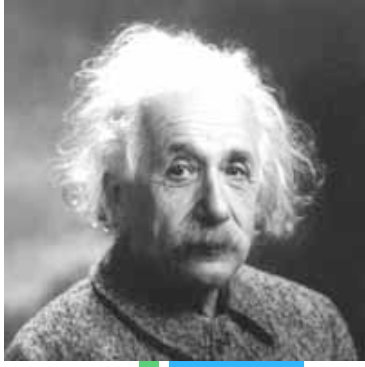
- Technology will keep ahead of curve
- More people = more geniuses

Population not so bad?

- incomes per person have increased
- raised the number of geniuses in similar proportion
- large population is needed to propel progress?

"Successive lurches in population number have driven the development of new agricultural technologies designed to provide food for growing populations" (Trewavas, 2002: 669)

Population = more geniuses?



- Population increase = more genius?
  - 0.05% of a given population are geniuses
  - 2% are possessors of gifts – talented
  - 10% have higher than average capacity for inventions

SO

- Keep the absolute population going up, and absolute numbers of geniuses will rise!
- Get us out of our predicament?

SEPTEMBER 23, 2009, 6:00 AM

The More the Merrier: Population Growth Promotes Innovation

By CASEY B. MULLIGAN

- "Plus, the more people on earth, the larger are the markets for new innovations" (NY Times 2009)
- Incentives depend on size of market, and innovation comes from incentives

"The same genius that allowed us to achieve that dominance now must be harnessed if we are to prevent our very success from sealing our doom."

- Ehrlich and Ehrlich 2009, p 69.

Population problem

- **Population growth is a good thing for the world?**

A. Strongly agree

B. Agree

C. Neutral

D. Disagree

E. Strongly disagree

Outcomes and conclusions

Conclusions

Malthus and Neo-Malthusians

- Famines occur when population growth exceeds food supply
- Population growth puts pressure on the environment, which limits food production
- The solution is to reduce birth rates (or deal with consequences)

Friday and Today

- Are we witnessing a demographic transition? Does this discredit Malthus' theory?
- Have we averted crisis?
- Is it more complex than population growth alone – consumption?
- Can we innovate our way out of this? Are there benefits to growth?

Outcomes

- Population change
  - Key variables
  - history and geography
  - Forecasts of future change
- Controls on food production / distribution
  - Technical
  - Environmental limits
  - Who gets what, and *who gets to decide this?*

More on this next time…

References

- Boserup E. *Conditions of agricultural change*. Earthscan, London. 1965.
- Conway, Gordon. *One billion hungry: can we feed the world?*. Cornell University Press, 2012.
- Ehrlich, Paul R., and Anne H. Ehrlich. "The population bomb revisited." *The electronic journal of sustainable development* 1.3 (2009): 63-71.
- Sachs, J.D., 2008. Are Malthus's Predicted 1798 Food Shortages Coming True? (Extended version): Scientific American. Available at: http://www.scientificamerican.com/article.cfm?id=are-malthus-predicted-1798-food-shortages [Accessed March 8, 2013].
- Trewavas, A., Malthus foiled again and again. *Nature*, 418(6898), (2002): 668–670.
- UNEP *Keeping Track of Our Changing Environment: From Rio to Rio+20* (1992-2012) Division of Early Warning and Assessment (DEWA), United Nations Environment Programme (UNEP), Nairobi, 2011.