

*'Rapid population growth continues and food production may decline with global warming: A realistic perspective?'*

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# **Presidential addresses are published each year in Demography**

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## **How the World Survived the Population Bomb: Lessons From 50 Years of Extraordinary Demographic History**

**David Lam**

Prof. Lam showed how, over the previous 50 years:

Food production kept up with population growth

Percentage of population in poverty declined

Literacy increased

Fertility declined

Mortality declined

i.e. Lots of positive trends/good news

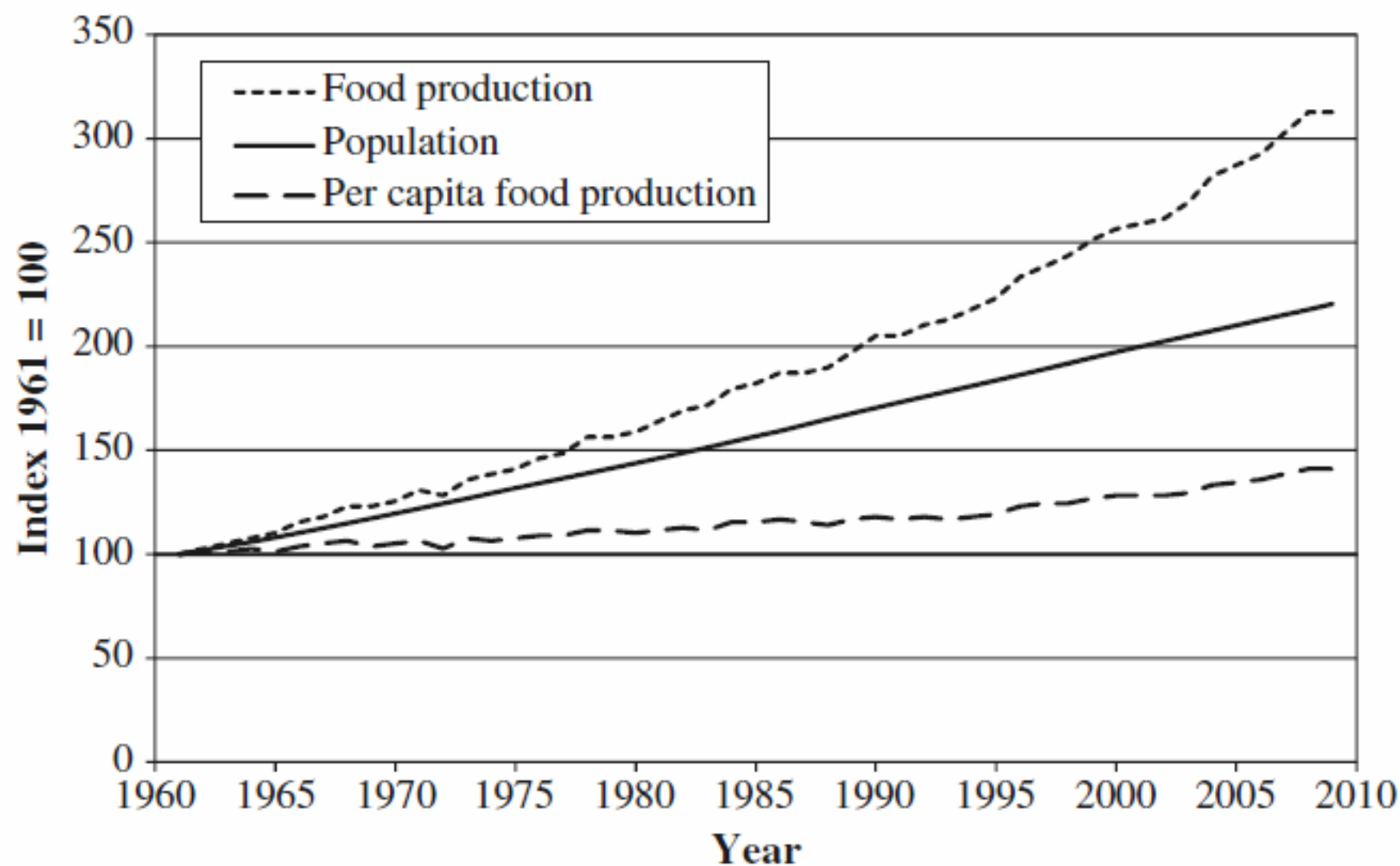


Fig. 4 World food production, 1961 to 2009. Data are from FAO (2011)

“How the World Survived the Population Bomb”

NOT REALLY

Because the focus of article is on *Homo Sapiens*;

Virtually ignoring the rest of the ‘world’ and its ecosystems

AND in 28 pages of his article he only devotes 1.4 pages to warnings for the future. The section is entitled: “Have we really survived?”

There is one paragraph on global warming and one on consumption levels (out of 80 paragraphs in the paper)

He described the Ehrlich (biologist)-  
Simon(business economics) bet about metal  
prices for the decade 1980 to 1990.

Prices actually declined (partly due to  
substitution of plastics for some metals). So  
Simon won the bet!

Prof. Lam then challenged anyone in the audience for a similar wager later. I responded and he and I worked out the details of the wager to be presented shortly.



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**Has the *World* Really Survived the Population Bomb? (Commentary on “How the World Survived the Population Bomb: Lessons From 50 Years of Extraordinary Demographic History”)**

**Stan Becker**

There are **many problems** with traditional economics/economists  
(Prof. Lam is not one but does represent the discipline in his analyses):

- a) they think **market forces** will take care of most things
- b) they seem to **take natural resources for granted** (until they start to run out, then see a)
- c) they have failed to take account of or plan for **externalities** (e.g. CO2 pollution)
- d) they think **continued growth** (e.g. of population) is good and necessary
- e) related to b) and c) they **fail to recognize that the Earth is finite**

These errors in economics (e.g. ignoring the externality of carbon dioxide emissions) can lead to food insecurity

Five climate impacts affecting food production **now**

1. More extreme weather can harm livestock and crops
2. Water scarcity across the U.S. Southwest
3. Seasons aren't what they used to be
4. Wildfire can devastate farms – even when the flames don't actually reach them
5. Warmer weather and rising CO2 levels adversely affect food supply, safety and quality.

Source: A brief guide to the impacts of climate change on food production. Daisy Simmons, September 18, 2019

Thank you  
We now return to the  
wager

# Stan Becker; Part 2

The increase in food prices is only one indicator of the trouble we are in. The whole biosphere as we know it is in trouble

69% of fish stocks are fully exploited or are over-exploited (FAO)

We have brought on a **massive extinction** of other species

e.g. All large primate species (except humans) are endangered

Also consider the **massive decline of bee pollinators** crucial for agriculture (40% decline in honeybee populations—ABC News; July 9, 2019)

Virtually all the best agricultural land is already under cultivation

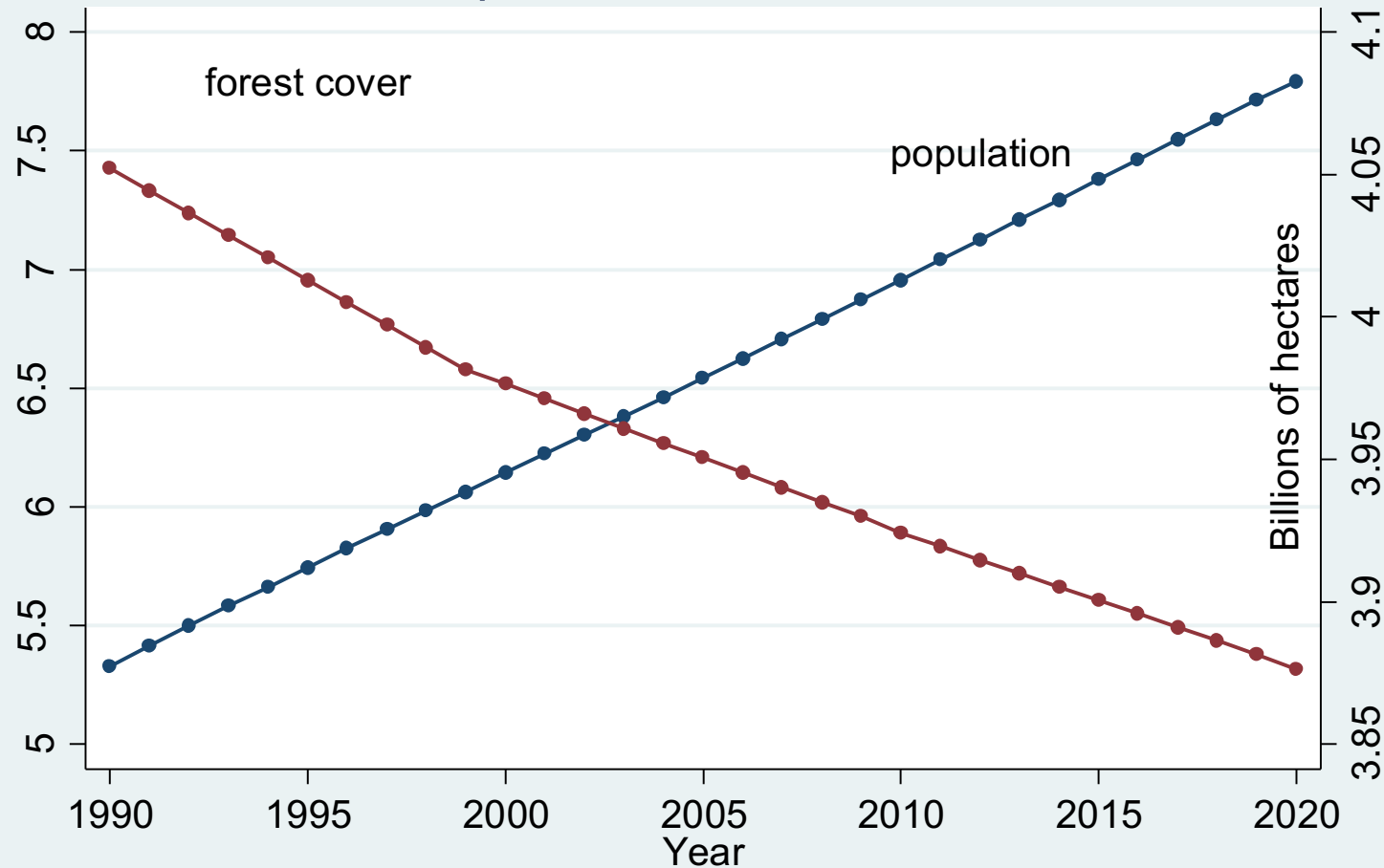
Tropical forests are being destroyed at an alarming rate to make room for the production of more soy, palm oil, beef cattle to feed an increasingly meat-eating world.

Water drawn from aquifers (for irrigating crops) is depleting the aquifers very rapidly

World **population grows by about 200,000 per day** (at least in 2019; 2020 data not yet available)

# An example: Deforestation

Population and forest cover 1990 to 2020  
in billions of persons and billions of hectares



Sources: FAO and UNPD

As our population grew from 5.5 billion in 1992 to 7.5 billion in 2017, net forest area declined by 145 million hectares.

That is about the area of France, Germany and Spain combined!





Note that palm  
oil is used in  
many products

Forest that's been cleared for an **oil palm** plantation in Boven Digoel district, in the eastern Indonesian province of Papua. Image by Ulet Ifansasti/Greenpeace.



# How many people can the earth support sustainably?

Author/yr	"Model"	Estimate (billions)	Possible reason(s) estimate could be wrong
Daily et al. 1994	Sustainable energy consumption (6 TW)	2	new energy sources (fusion, fission...)
Ferguson 2005	Max gigatons of CO <sub>2</sub> that can be absorbed	2.1	Negative emissions technologies
Pimentel et al. 2010	land needed to provide food (0.5 ha. per capita)	2	hydroponics, more intensive cultivation, vegetarian diets?
Lianos & Pseiridis 2016	ecological footprint- biocapacity ratio	3	uses per capita product of \$11,000; world production (maximum sustainable) is ROUGH estimate

How can we go from 8 billion persons today to 2-3 billion (sustainable population) without a population 'crash'?

“Degrowth is a planned reduction of energy and resource throughput designed to bring the economy back into balance with the living world in a way that reduces inequality and improves human well-being” (Hickel, J. 2020)

A search for “degrowth” as title word and “economic\*” in source title (Scopus)

108 articles (or book chapters) since 2010

82 were in the Ecological Economics journal

26 in other (e.g. Feminist Economics)

**NONE** in traditional economics journals

American Economic Review: (Economic Policy and Applied Econ.)

American Economics Journal (Macro and Micro)

Note: Also a search for “carbon tax” and “Econom\*” in the last 3 years yielded 120 articles but only two in these traditional journals (but 20 in Ecological Economics)

IPCC reports that food security is threatened!

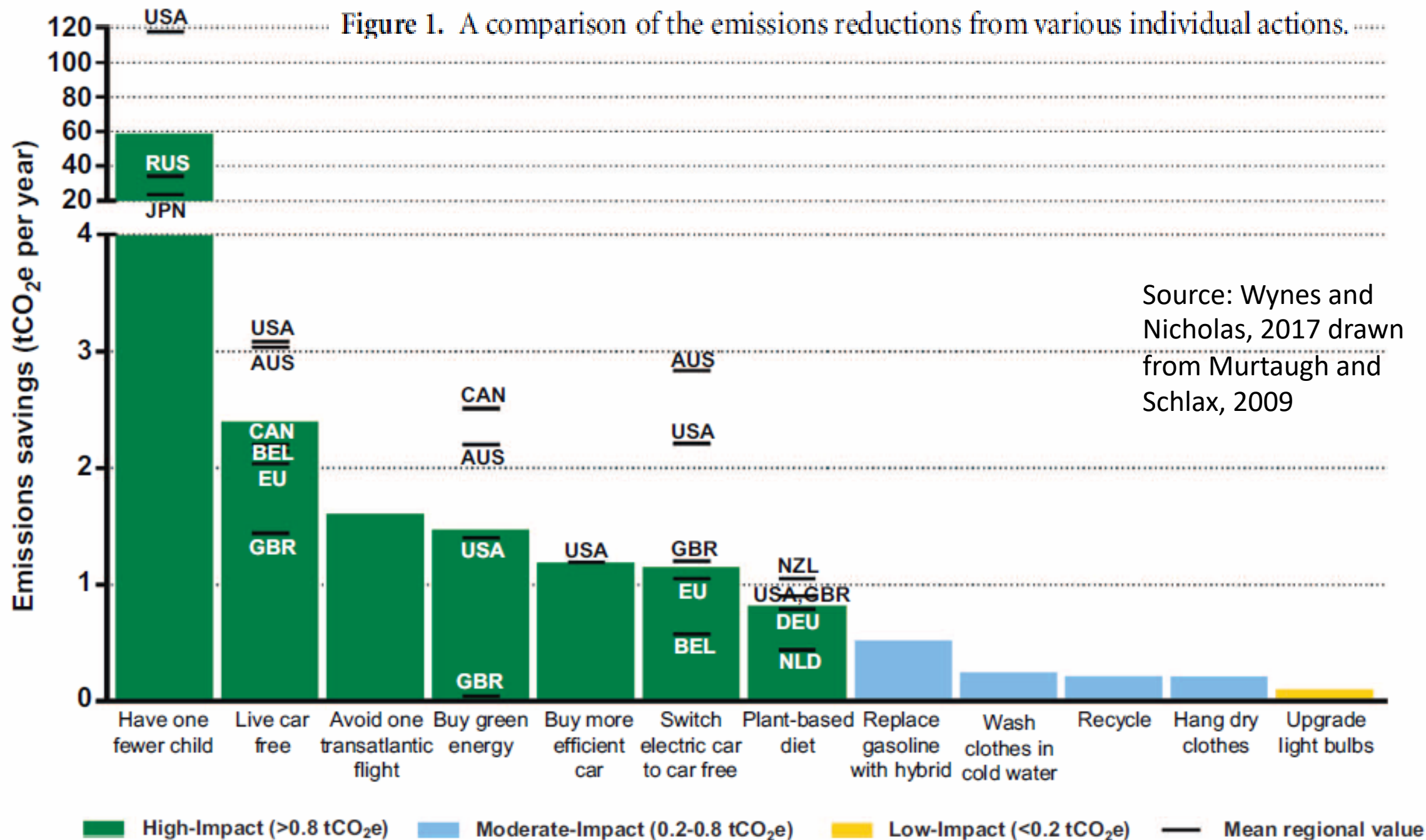
“...global crop and economic models projected a 1-29% cereal price increase in 2050 due to climate change.... Low-income consumers are particularly at risk, with models projecting increases of 1-183 million additional people at risk of hunger ...(high confidence). Given increasing extreme events.... risks of food system disruptions are growing (high confidence).”

Source: Executive summary of IPCC Report, Chapter 5.  
[https://www.ipcc.ch/site/assets/uploads/2019/08/2f.-Chapter-5\\_FINAL.pdf](https://www.ipcc.ch/site/assets/uploads/2019/08/2f.-Chapter-5_FINAL.pdf)

# We are in trouble--What can we do?

An example: What can we do as **individuals** to most reduce our carbon emissions?

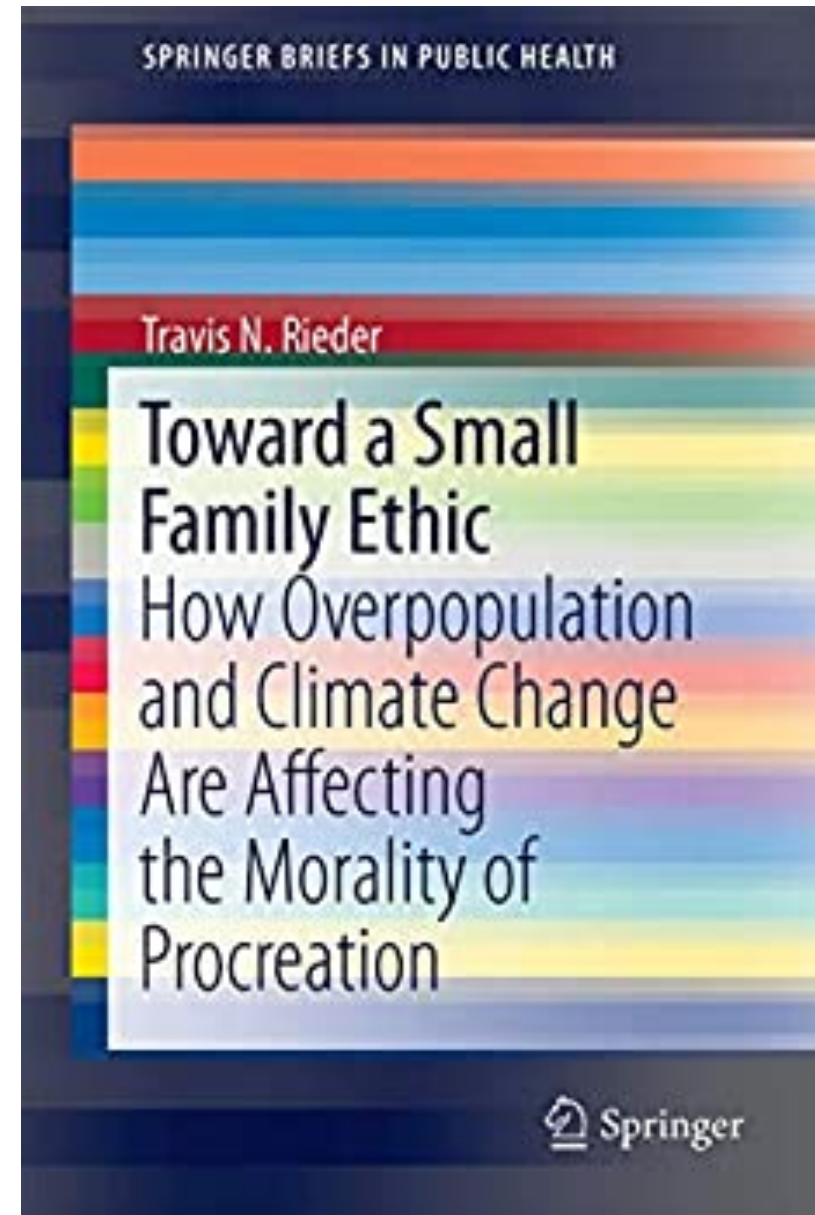
Figure 1. A comparison of the emissions reductions from various individual actions.



We need a new ethic:

The small family norm

See this book by a colleague at JHU



World **Scientists' Warning to Humanity**: A Second Notice (Ripple et al. (15,364 scientists from 184 countries); BioScience 2017.)

“Since 1992, with the exception of stabilizing the stratospheric ozone layer, **humanity has failed to make sufficient progress** in generally solving **foreseen** environmental challenges, and alarmingly, **most of them are getting far worse.**”

“We are jeopardizing our future by not reining in our intense but geographically and demographically uneven **material consumption** and **by not perceiving continued rapid population growth as a primary driver behind many ecological and even societal threats.**”

“To prevent widespread misery and catastrophic biodiversity loss, humanity must practice a more environmentally sustainable alternative to business as usual. Soon it will be too late to shift course away from our failing trajectory, and **time is running out.** We must recognize, in our day-to-day lives and in our governing institutions, that **Earth with all its life is our only home.**”



# Ignoring warnings: The Titanic story: April 14, 1912

10:15 First warning of icebergs arrives by telegraph

21:40 Phillips [senior wireless operator] receives the **fifth and final ice warning** of a “**great number**” of large icebergs and field ice just 15 miles ahead of the Titanic.... **Phillips treated it as non-urgent, failed to pass the message on**, and returned to the busy task of sending passengers’ personal telegrams. Meanwhile the Titanic continues at a high speed of 21.5 knots (24 mph).

23:40 The Titanic hits the iceberg

Please take a look at this amazing picture book:

Overdevelopment Overpopulation Overshoot book

<https://info.populationmedia.org/over-book-offer>

For the last session of my undergraduate class (n=65) last fall: An economist spoke on things getting better; An ecologist spoke on things getting worse. The class then voted on the following:

I believe the average person  
in the world in 2050 will be:

- A. Better off than the average person today
- B. Worse off than the average person today

# Results of vote:

- A. Better off than the average person today 33%
- B. Worse off than the average person today 67%



Earth with all its life is our only home.”

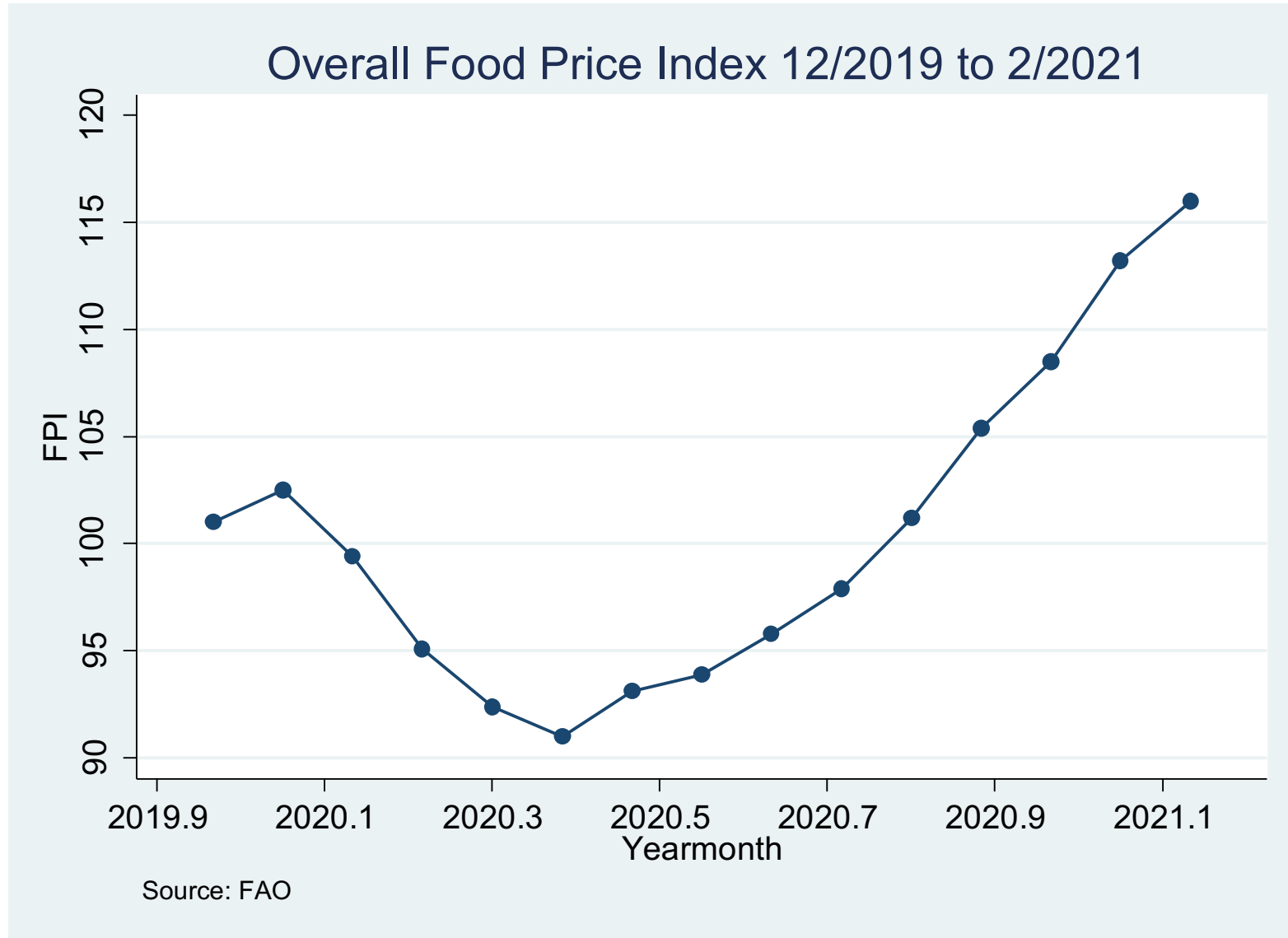
Source: Forest news

Thank you

I look forward to questions

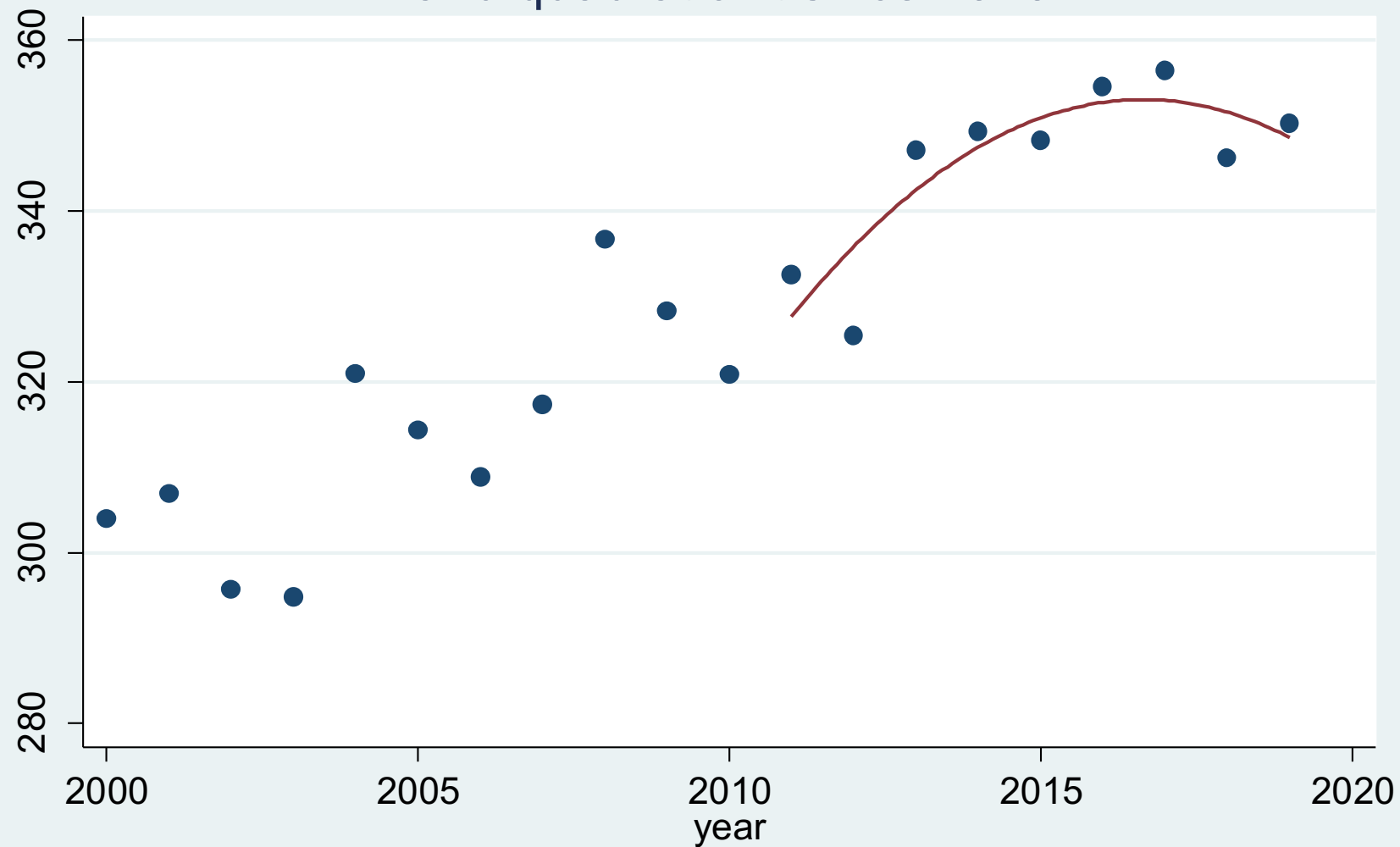
Extras

# Prices continue to go up!





## Cereal production per capita (kg) by year and quadratic fit since 2010



Sources: FAO and UNPD data

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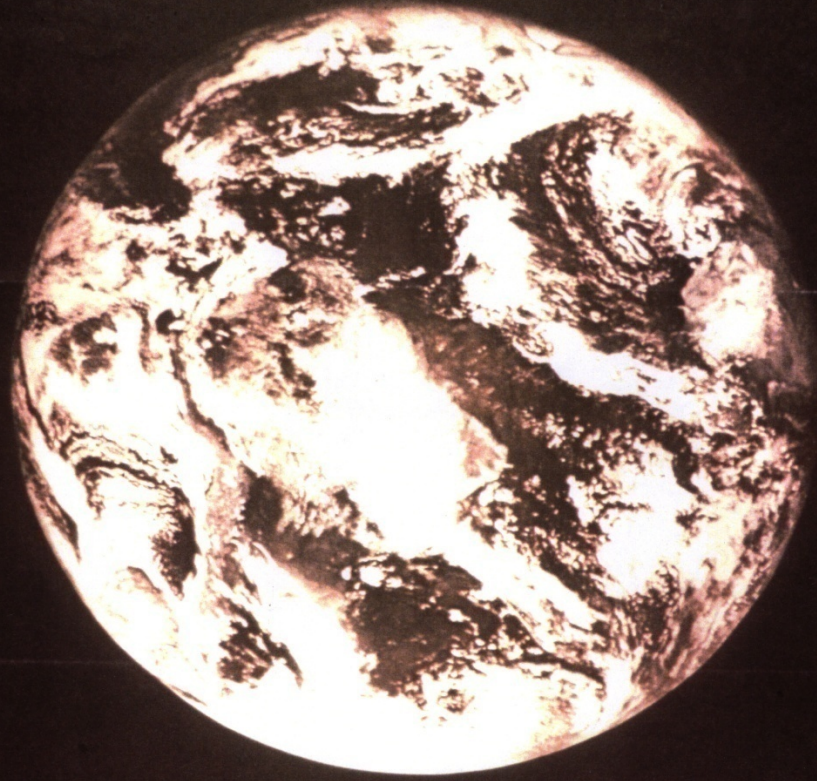
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The future is  
open; We  
can decide!



**LOVE YOUR  
MOTHER**