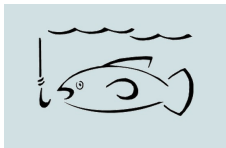




How I Work and Other Random Points

Chad Jones
Stanford GSB

NBER Innovation Bootcamp, July 2022



As for myself, I only like basic problems and could characterize my own research by telling you that when I settled in Woods Hole and took up fishing, I always used an enormous hook. I was convinced that I would catch nothing anyway, and I thought it much more exciting not to catch a big fish than not to catch a small one.

— Albert Szent-Gyorgi, 1893-1986

Nobel Prize, 1937 (discovered Vitamin C)

How I Work

- Find a question that excites you (and others)
- Document the basic facts
- Build a model to try to generate those facts (Lucas, Feynman)
- See what else pops out

The Role of Models

If we understand the process of economic growth — or of anything else — we ought to be capable of demonstrating this knowledge by creating it in these pen and paper (and computer-equipped) laboratories of ours. If we know what an economic miracle is, we ought to be able to make one.

— Robert E. Lucas, Jr.

What I cannot create, I do not understand.

— Richard P. Feynman

Thoughts on Research

- PPF for economics (macro vs. micro)
- Motivate research by simple, indisputable facts. (cf estimation)
- Build models to explain the facts.
- Keep a “notebook”
- On reading papers
- Try to have research be the thing you think about when sleeping/bathing/etc.

On Writing Papers with Models

- Start as simple as possible (or at least get there eventually!)
- Show entire economic environment (preferences + technology) in one slide and in Table 1 of paper
- Allocating resources: always count equations and unknowns
 - Rule of thumb easiest (Solow)
 - Optimal allocation / social planner: pretty easy and where we'd like to begin
 - Equilibrium: most complicated, and details matter (is there an NSF?). Define it fully and carefully.

Research Questions

- How do we understand economic growth?
- Why is health spending / GDP rising everywhere?
- A Schumpeterian Model of Top Income Inequality
- The Allocation of Talent and U.S. Economic Growth
- Artificial Intelligence and Economic Growth
- Taxing Top Incomes in a World of Ideas

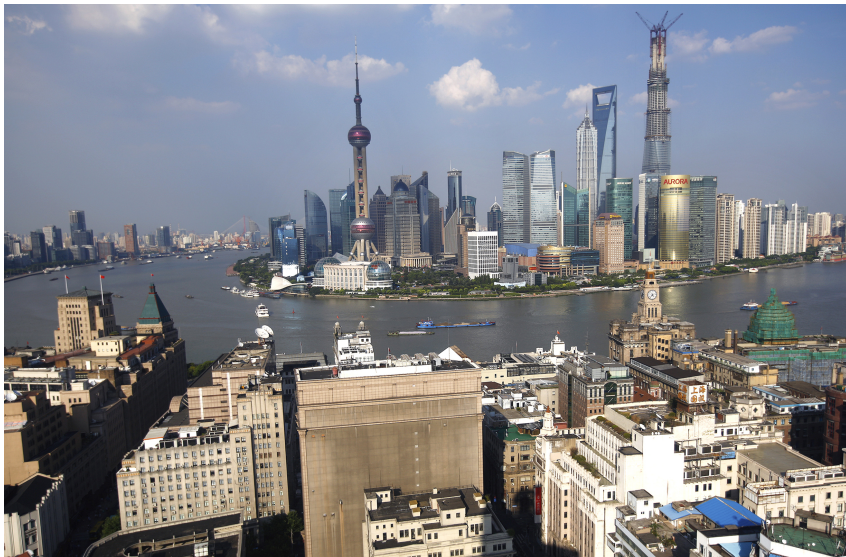


Other Specific Points

Shanghai 1987



Shanghai 2013



Growth Theory

- Conclusion of any growth theory:

$$\frac{\dot{y}_t}{y_t} = g \quad \text{and a story about } g$$

- Key to this result is (essentially) a linear differential equation somewhere in the model:

$$\dot{X}_t = ______ X_t$$

- Growth models differ according to what they call the X_t variable and how they fill in the blank.

Catalog of Growth Models: What is X_t ?

Solow

$$\dot{k}_t = sk_t^\alpha$$

Solow

$$\dot{A}_t = \bar{g}A_t$$

AK model

$$\dot{K}_t = sAK_t$$

Lucas

$$\dot{h}_t = uh_t$$

Romer/AH

$$\dot{A}_t = RA_t$$

Semi-endogenous growth

$$\dot{L}_t = nL_t$$

Why did I write “Are Ideas Getting Harder to Find?” (BJVW 2020 AER)

- In response to the “scale effects” critique:
 - Howitt (1999), Peretto (1998), Young (1998) and others
 - **Composition bias**: perhaps research productivity *within* every quality ladder is constant, e.g. if number of products N_t grows at the right rate:

$$\frac{\dot{A}_{it}}{A_{it}} = \alpha S_{it} \quad (*)$$

$\Rightarrow S_{it} = \frac{S_t}{N_t}$ invariant to scale, but responds to subsidies

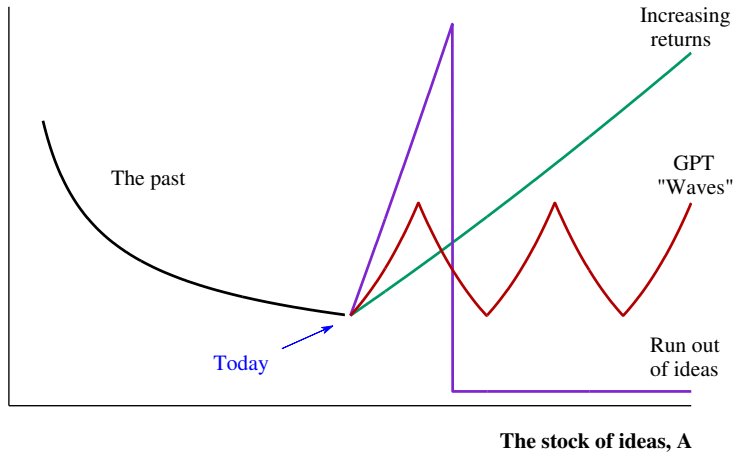
- Aggregate evidence would then be misleading
- Permanent subsidies would still have growth effects.

- Key to addressing this concern:

Study () directly $\Rightarrow$ research productivity within a variety!*

Alternative Futures?

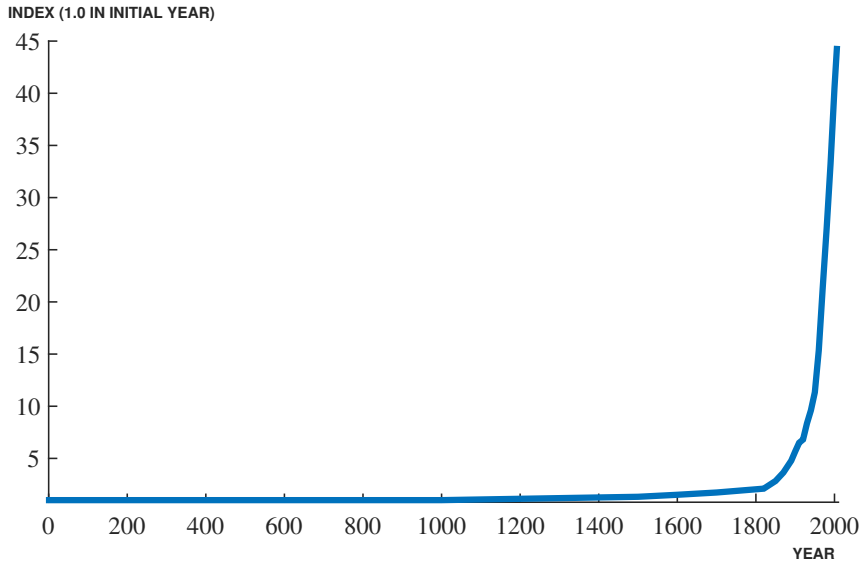
The shape of the idea production function, $f(A)$



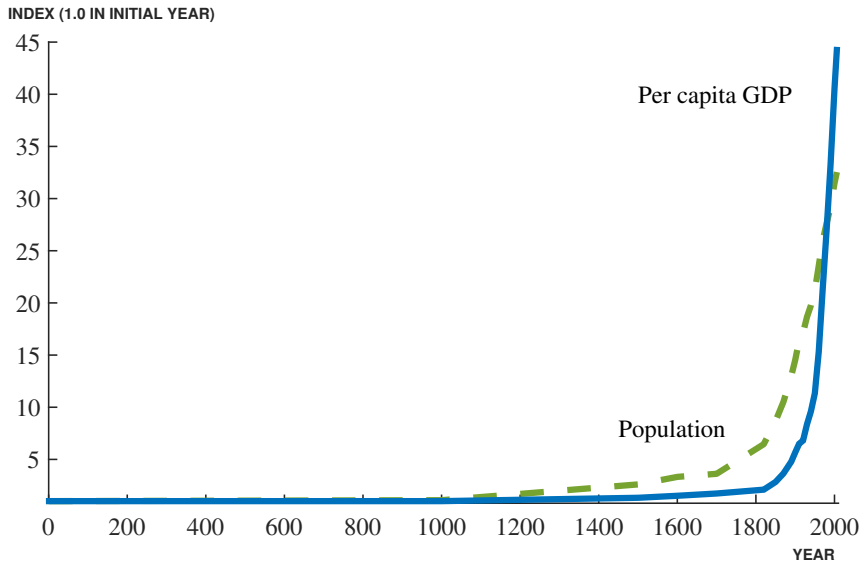
Taxing Top Incomes in a World of Ideas (*JPE* forthcoming)

- Large literature but interaction with ideas underappreciated.
- Consider raising the top marginal income tax rate from 50% to 75%
 - $\approx 10\%$ of GDP faces the top rate, so mechanically +2.5% GDP in revenue
 - Halving the “keep rate” from 50% to 25% $\Rightarrow$ entrepreneurs may create fewer ideas
 - Akcigit et al (2022 QJE) suggest a behavioral elasticity η of ideas wrt $1 - \tau \geq 0.2$
 - Suppose degree of IRS is $\gamma = 1/2$
 - Then lower effort reduces GDP by a factor of $2^{\gamma\eta} = 2^{0.5 \times 0.2} = 2^{0.1} \approx 1.07$
- Everyone's income falls by 7%, while tax raises 2.5% of GDP in revenue. Not worth it!
- **Question:** Is the 7% number large or small?

What is graphed here?



Population and Per Capita GDP: the Very Long Run



Growth over the Very Long Run

- Malthus: $c = y = AL^\alpha$, $\alpha < 1$
 - Fixed supply of land: $\uparrow L \Rightarrow \downarrow c$ holding A fixed
- Story:
 - 100,000 BC: small population $\Rightarrow$ ideas come very slowly
 - New ideas $\Rightarrow$ temporary blip in consumption, but permanently higher population
 - This means ideas come more frequently
 - Eventually, ideas arrive faster than Malthus can reduce consumption!
- People produce ideas and Ideas produce people
 - If nonrivalry $>$ Malthus, this leads to the hockey stick

What is this?



North versus South Korea: Institutions Matter!



Misallocation and TFP: A Simple Example

Production: $X_{steel} = L_{steel}, \quad X_{latte} = L_{latte}$

Resource constraint: $L_{steel} + L_{latte} = \bar{L}$

GDP (aggregation): $Y = X_{steel}^{1/2} X_{latte}^{1/2}$

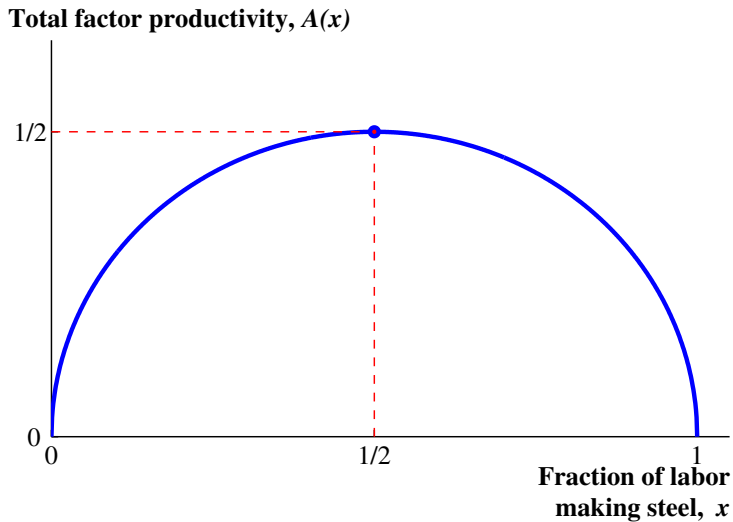
$x \equiv L_{steel}/\bar{L}$ denotes the allocation
(markets, distortions, central planner, etc).

Then GDP and TFP are

$$Y = A(x)\bar{L}$$

$$A(x) = \sqrt{x(1-x)}$$

Misallocation Reduces TFP



Misallocation in the United States (HHJK 2019 ECMA)

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- Consider white men in U.S. business:
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 - 1960: **94%** of doctors, lawyers, and managers
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- Over the past 50 years, the U.S. allocation of talent has improved!
Accounts for
 - **40%** of growth in GDP per person, and
 - **20%** of growth in GDP per worker