

A.I. and Our Economic Future

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A.I. and Our Economic Future

- A.I. is likely to be the most transformative technology in our lifetime
 - Latest in a line: electricity, semiconductors, the internet
- What if machines — A.I. for cognitive work and A.I. plus robots for physical work — can perform every task a human can do?
- Two scenarios:
 - A.I. accelerates economic growth
 - A.I. is “business as usual”

Scenario 1: A.I. dramatically accelerates economic growth

- Near-term productivity boosts from A.I.
 - **Software:** Claude Opus 4.5 performs better than any human on Anthropic's two hour coding exam
 - In the next decade: A.I. agents that can automate most coding?
 - Virtuous circle: better algorithms and A.I. agents = virtual remote workers

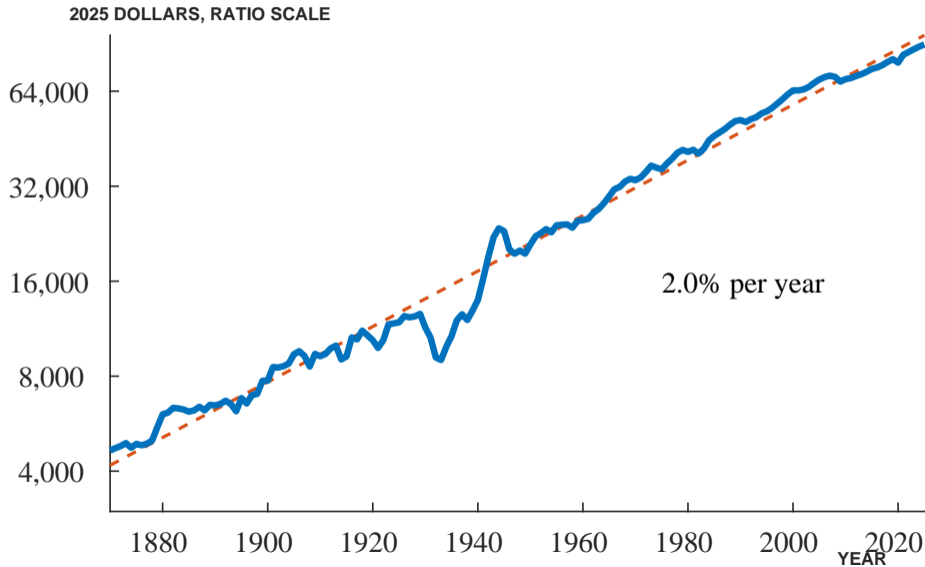
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 - Virtuous circle: better algorithms and A.I. agents = virtual remote workers
- Billions of **virtual research assistants**, running 100x faster than us — a “country of geniuses in a data center” (Dario Amodei)
 - Automate most cognitive tasks \Rightarrow invent new ideas
 - E.g. better chips, robots, medical technologies, etc.
 - A.I. + robots \Rightarrow automate physical tasks
- Potential to raise growth rates substantially over the next 25 years?

Scenario 2: A.I. as “Business as Usual”

- Automation has been going on for 150 years with no speed up in growth
 - Electricity, engines, semiconductors, the internet, smartphones
 - Yet growth always 2% per year
- Maybe those great ideas are what *kept* growth from slowing
 - Perhaps A.I. = latest great idea letting us maintain 2% growth for a while longer.
(pessimistic view, but possible)
- Economic history \Rightarrow may take longer than we expect
 - Electricity and computers changed the economy over 50 years

Average income per person in the U.S.



Weak Links

- Firm production requires the successful completion of a number of **tasks**
 - **iPhone**: Design/Innovation - Manufacturing - Marketing - Retail - Customer Mgt
 - Failing at any step can reduce value considerably
 - Examples: the space shuttle Challenger's O-ring or Covid-19 supply chain issues
- “A chain is only as strong as its weakest link”
 - Making 17/20 links infinitely strong can have modest effects — bottlenecked by remaining weak links
 - 100m × more transistors in my pocket than in the early 1970s...
- Weak links are the **source of scarcity** ⇒ **earn high returns**

Weak Links in Production

- Production requires N tasks: $Y = F(Y_1, Y_2, \dots, Y_N)$
- Example: Harmonic mean

$$\frac{1}{Y} = \frac{1}{Y_{easy}} + \frac{1}{Y_{hard}}$$

- Key properties of this **Weak Link** production function
 - Infinite values for some inputs leave Y finite
 - Y is less than the **smallest** Y_i (the **weakest link**)

What are the consequences of infinite automation of some tasks (e.g. software)?

- Let s be some input's initial share of total cost and σ the elasticity of substitution
- Having an infinite amount of that input raises Y by the factor:

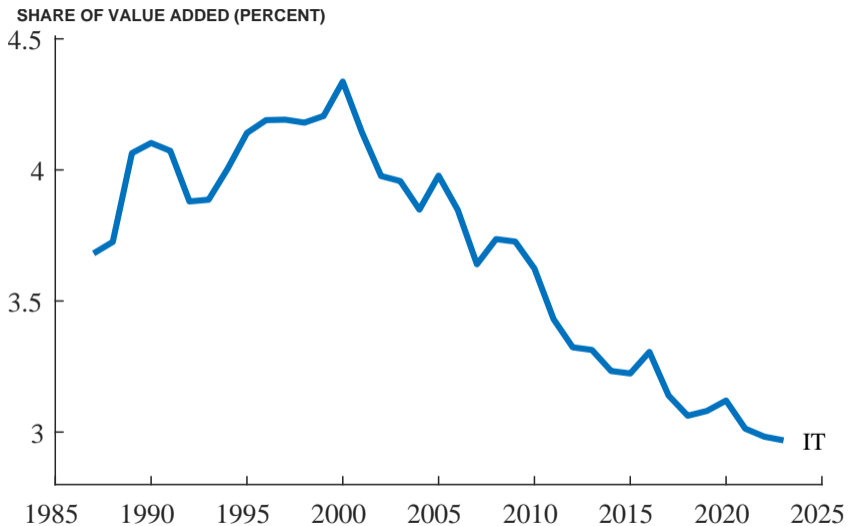
$$\left(\frac{1}{1-s}\right)^{\frac{\sigma}{1-\sigma}} \approx 1 + \frac{\sigma}{1-\sigma} s \quad \text{for } s \text{ small} \quad (1)$$

- Key insight:
 - $s \approx 2\%$ for software \Rightarrow about 2% increase in GDP from complete-automation of the software industry with infinite productivity! (for $\sigma = 1/2$ — sensitive!)

The remaining weak links constrain output

What has happened to the “computer income” share of GDP?

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Computers are everywhere, but rapid price declines dominate — weak links

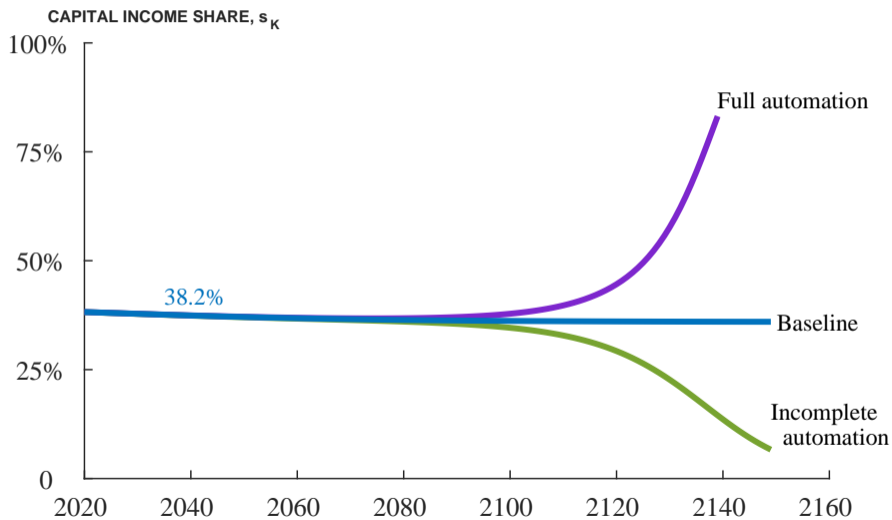
Simulations of a Model (Jones and Tonetti, 2026)

- Model of our economic future
 - Ideas are the source of long-run economic growth
 - Production of goods and ideas involves **weak links**
 - Automation of both goods and idea production occurs endogenously over time
 - Calibrate to historical data
- Features both of the key ingredients from the two scenarios
 - **Positive feedback**: automation → new ideas → more automation
 - **Weak links** limit the effect of automation

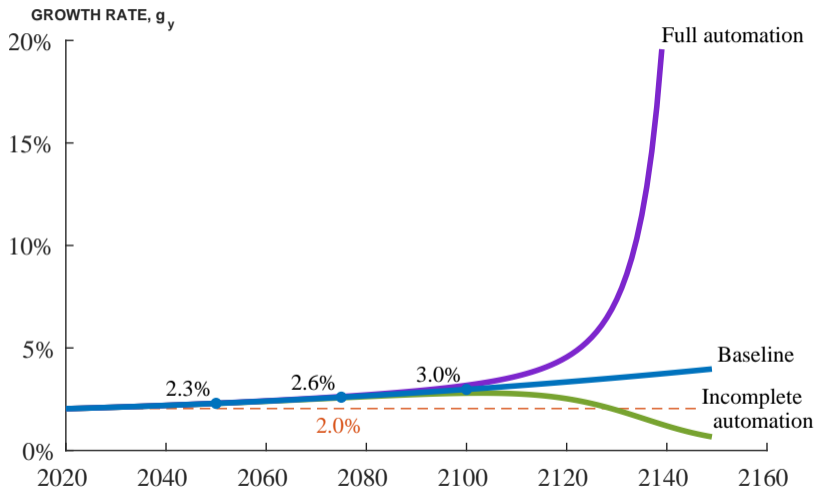
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- Two sets of simulations
 1. **A.I. as a continuation of historical automation** throughout the economy
 2. **A.I. as a break with past**: Moore's Law applies **everywhere**

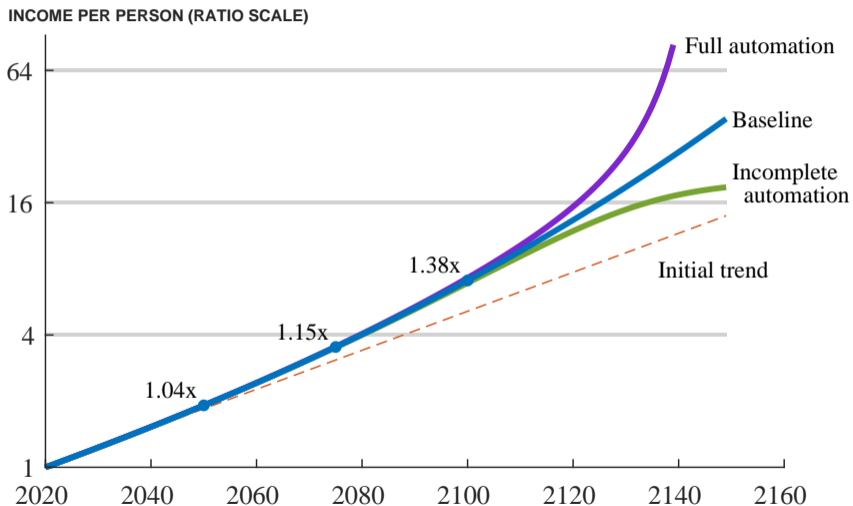
The Future if AI = Continuing the Past: Capital Share



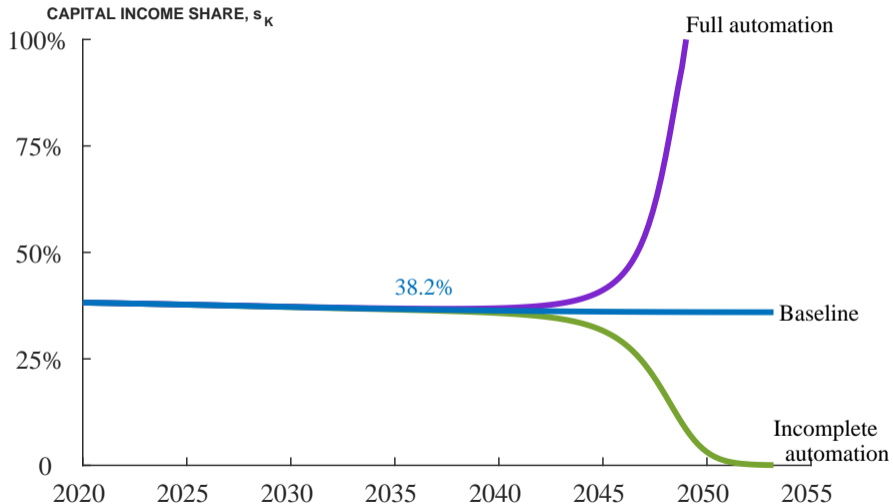
The Future if AI = Continuing the Past: Economic Growth



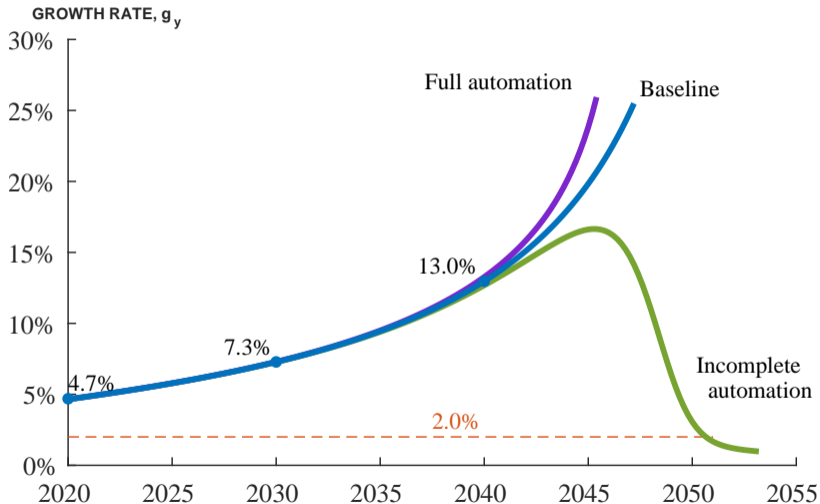
The Future if AI = Continuing the Past: GDP per Person



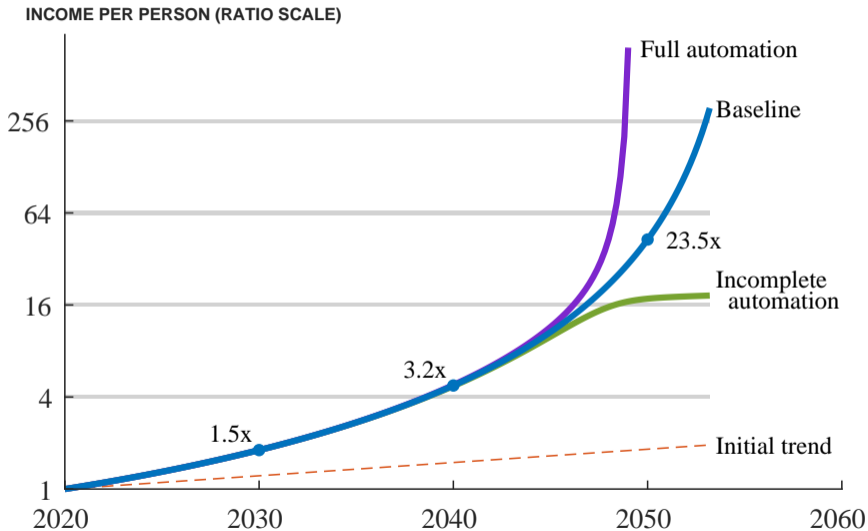
The Future if AI = Moore's Law Everywhere: Capital Share



The Future if AI = Moore's Law Everywhere: Economic Growth



The Future if AI = Moore's Law Everywhere: GDP per Person



Summing Up

- Growth could indeed explode — but slowly!
 - Weak links make the transformation gradual
 - But as weak links are automated away, flywheel effects dominate

Jobs

- Geoff Hinton in 2016: We should stop training radiologists
 - But **more** radiologists today and **higher pay!**
- How to understand? Weak links!
 - Jobs are collections of complementary tasks — radiologists do more than just read scans
 - “Weak links” ⇒ Automating 75% of tasks can **raise wages** — **radiologists**
 - Some jobs: A.I. automates **all tasks** ⇒ wages go down — **Uber drivers**
- A.I. has nuanced effects on jobs and the labor market

Inequality and Meaningful Work

- Historically, labor is the main asset that many people trade to consume.
 - Could change in the future?
- The world where A.I. “changes everything” is a world where GDP is incredibly high
 - The **size of the pie** available for redistribution is enormous
 - Rich countries already engage in lots of redistribution, but more may be needed?
 - Transition hard?
- As we get richer, we naturally work less — this is a good thing!
- But there is also good, meaningful work
 - We may choose to value experiences involving people (arts, music, sports)
 - **Retirement!**



Catastrophic Risks?

Can we use economic analysis to think about the serious risks?

Two Versions of Existential Risk

- Bad actors:
 - Could use ChatGPT-8 / Opus 7 to cause harm
 - E.g. design a virus that is more lethal than Ebola and takes 3 months for symptoms
 - Nuclear weapons manageable because so rare; if every person had them...
- Alien intelligence:
 - How would we react to a spaceship near Pluto on the way to Earth?
 - “How do we retain power over entities more powerful than us, forever?”
(Stuart Russell)

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- **Better intuition**
 - VSL = \$10 million
 - To avoid a mortality risk of 1% \Rightarrow WTP = 1% \times \$10 million = \$100,000
 - This is more than 100% of a year's per capita GDP
 - Xrisk over two decades \Rightarrow **annual investment of 5% of GDP**
 - Large investments worthwhile, even with no value on future generations

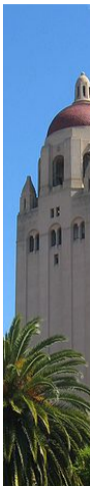
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Incomplete: ignores the “effectiveness” of mitigation, but correct intuition; see paper.

Other Safety Considerations

- Easy to justify spending 1/3 of 1% of US GDP on safety = \$100 billion!
- Weak links and safety
 - Weak links \Rightarrow large upside benefits arrive slowly
 - ... but harms can come quickly!
 - Mythos and automating software engineering
- Externalities and race dynamics: A.I. labs do not internalize the risks to all of us
- Should we tax GPUs and use the revenue to subsidize safety?



Final Thoughts

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- How much did the internet change the world between 1990 and 2020?
 - How much will A.I. change things between 2015 and 2045? More or less?
 - I believe the answer is much more
 - Just because changes take 30 years instead of 5 years does not mean that the ultimate effects will not be large
- Downside risks could come sooner

We should use the intervening years to prepare for the changes

Talk based on material from several papers

- Aghion, B. Jones, and C. Jones (2019) “Artificial Intelligence and Economic Growth”
- Jones (2024 AER Insights) “The A.I. Dilemma: Growth versus Existential Risk”
- Jones (2025) “How much should we spend to reduce A.I.’s existential risk?”
- Jones and Tonetti (2026) “Past Automation and Future A.I.”
- Jones (2026) “A.I. and Our Economic Future” (for *JEP*)