Macroeconomics of AI

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The Impact of Artificial Intelligence on the Macroeconomy and Monetary Policy
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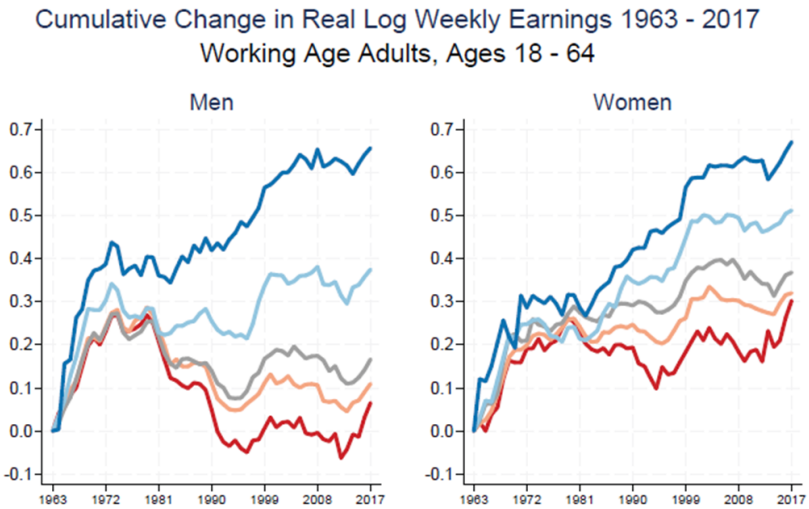
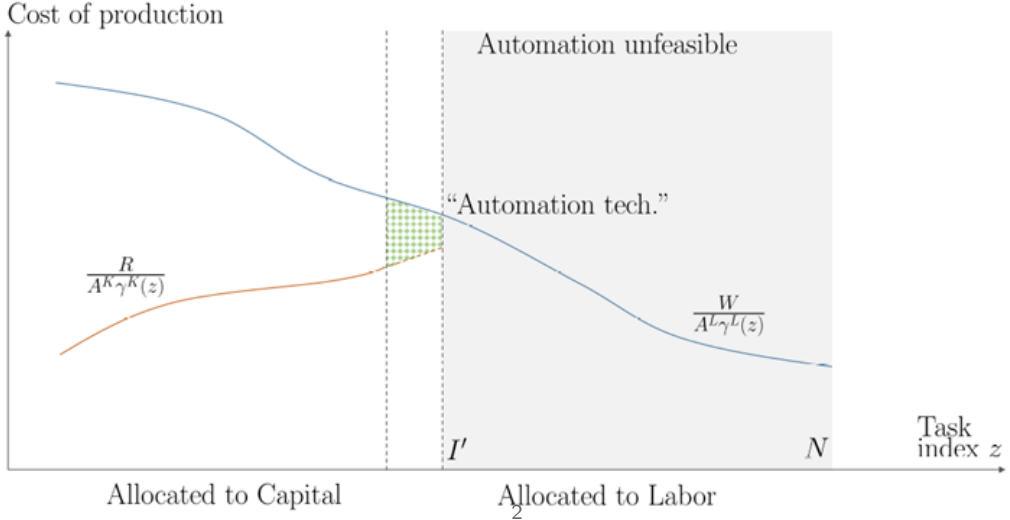
Is AI like automation? Daron Acemoglu: yes



Task framework: Acemoglu and Restrepo

Automation: An Increase from I to I'



Task framework applied to AI

Four possible effects

1. "Automation" , which involves AI taking over and redugin the cost of text summarizing, data classification, etc.
2. "Task complementarity" can increase the productivity in tasks that are not fully automated and may even raise the marginal product of labor—you can write your essay faster thanks to the LLM. ects of their job.
3. "Deepening of automation" which means that already automated tasks can be done better.
4. "Creation of new tasks"

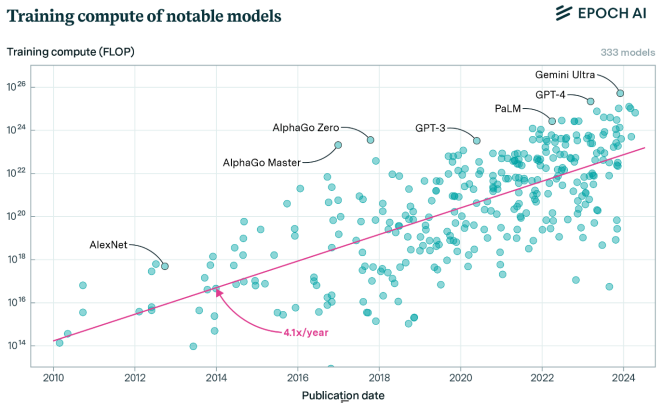
Task framework applied to AI

In practice:

1. Under conditions of perfect competition and constant returns to scale (no fixed costs!), GDP and aggregate productivity gains can be estimated by what fraction of tasks are impacted and average task-level cost savings.
2. 1/5 (19.9!) of US labor tasks are exposed to AI.
3. Among all exposed tasks, 23% can be probably performed by AI.
4. Average total cost savings of 15.4%.
5. This calculation implies that total factor productivity (TFP) within the next 10 years should be no more than 0.71% in total.

Think in terms of total compute available

- Jensen Huang: marginal cost of computing down by 100,000x over the course of ten years:
  - Moore's law 100 x.
  - The rest: new architectures, algorithmic efficiency, GPUs,



Think in terms of total problem solving capacity available

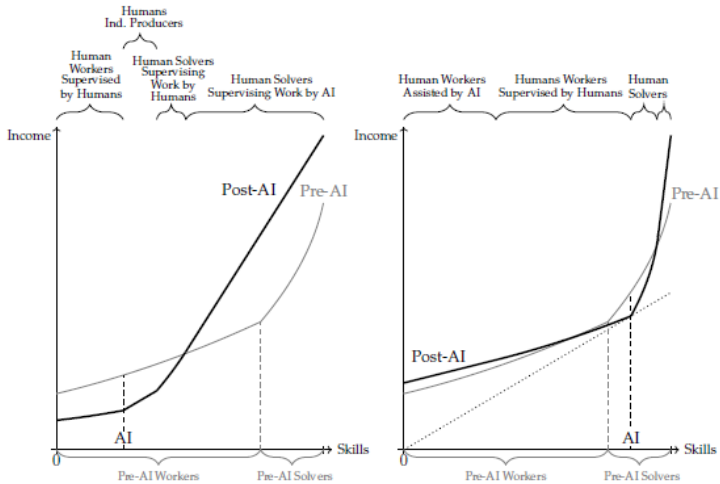
- It is not a surprise the task framework struggles to predict large productivity gains resulting from AI.
  - Improving a portion of existing tasks will not boost productivity unless it transforms the entire economic structure.
- In the modern economy, time and expertise are the main inputs needed to do most jobs.
  - Professionals solve problems requiring specialized knowledge, making it an indispensable input in production.
- Knowledge is embedded in individuals who have limited time.
  - Organizations create "knowledge hierarchies" (Garicano, 2000; Garicano and Rossi-Hasnberg, 2007) to optimize this scarce resource.
  - Less skilled workers handle routine tasks, freeing experts to focus on complex issues.

See my post yesteday in wwww.siliconcontinent.com

AI's Potential Impact on the Knowledge Economy (1): Jobs

- AI can remove time constraints on knowledge utilization.
  - With its ability to solve problems at scale, AI can fundamentally change how the entire economy is organized.
- Key question: How will AI reshape work and the rewards of expertise? (Ide and Talamàs, 2024)
  - Will it augment human capabilities, benefiting all?
  - Or replace certain skill sets, creating both winners and losers?
- Distinction between AI that needs humans and AI that operates autonomously.
  - AI that assists but doesn't replace humans enhances human roles.
  - Autonomous AI could render roles obsolete, especially those whose skills are near the level of AI.
- Economists may underestimate AI's impact by focusing on existing tasks being replaced.
  - AI's true potential lies in reorganizing how we apply knowledge across the economy.
  - Scaling knowledge and overcoming human cognitive limitations can lead to large productivity gains.

Low AI replaces workers, high AI helps them



(a) Basic AI - Capabilities of a Pre-AI Worker

(b) Advanced AI - Capabilities of a Pre-AI Solver

(2) Measured GDP versus Welfare

- AI can increase welfare without increasing GDP, as more individuals solve problems by themselves.
- Imagine we give consumers better problem solving technology — an AI.
- Suppose this is sufficiently better than the consumer needs help
- Then AI is vastly increasing welfare, by solving lots of problems — but GDP is going down

Inflation Consequences (3) Cost reducing –deflationary pressures

- If knowledge is the constraint, there is no question productivity in terms of welfare is increasing– we are solving many more problems.
- Compute is much more freely available than human skill.
- Hence costs of solving problems are reduced – a key part of cost of firms
  - Consider a hospital that can have nurses diagnose and treat with the help of GDP
  - Or a law firm that can do many more wills or divorces per hour with less labor

Moving forward

- Let´s not kid ourselves: we cannot estimate the impact of AI without any input which involves the amount of compute available or the "skill level" of that compute.
- For Ide and Talamàs (2024) to rovide a response we need:
  - The distribution of cognitive/problem solving ability in the population
  - An estimate of how much compute /machine time is going to be deployed in human equivalents
  - How good will AI be — here the crucial parameter in the model is the share of problems that AI can solve on its own.
- With those items we could generate a Welfare/TFP number, and a full distributional impact.
- And we could play with different scenarios.