



EERN



THE ECONOMICS OF TRANSFORMATIVE AI

EERN VIRTUAL SEMINAR

APRIL 2025

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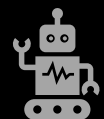
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PART I: INTRODUCTION AND CONTEXT

RECENT AI PARADIGMS



2010s: Deep Learning for specialized AI



2022: LLMs as general-purpose AI



2024: Reasoning models

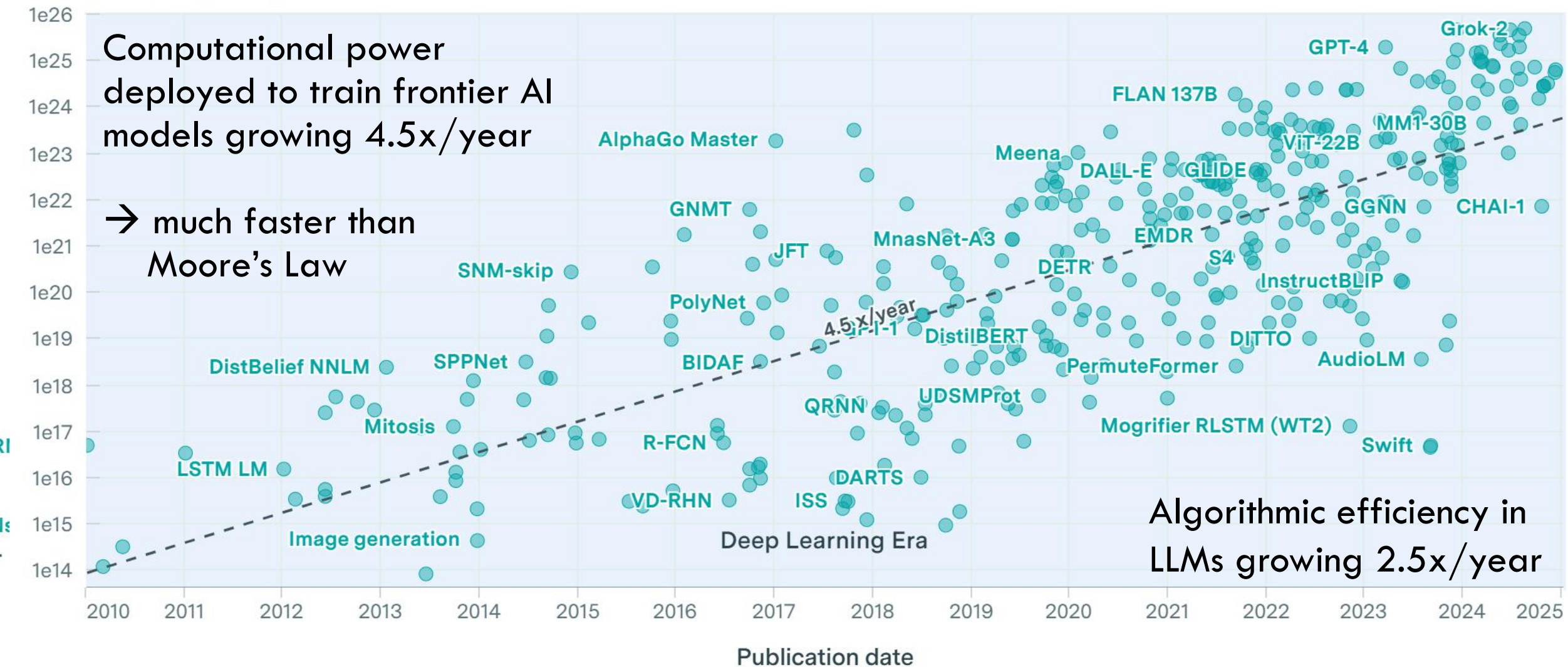


2025: AI agents

Notable AI Models

Training compute (FLOP)

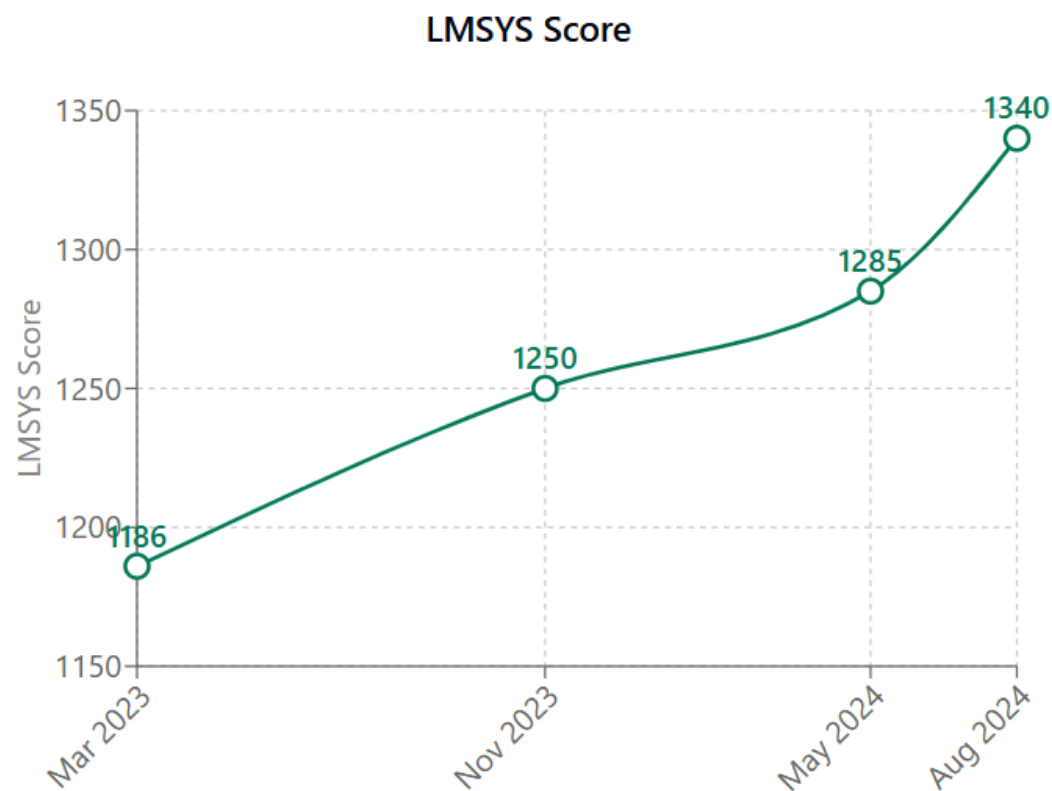
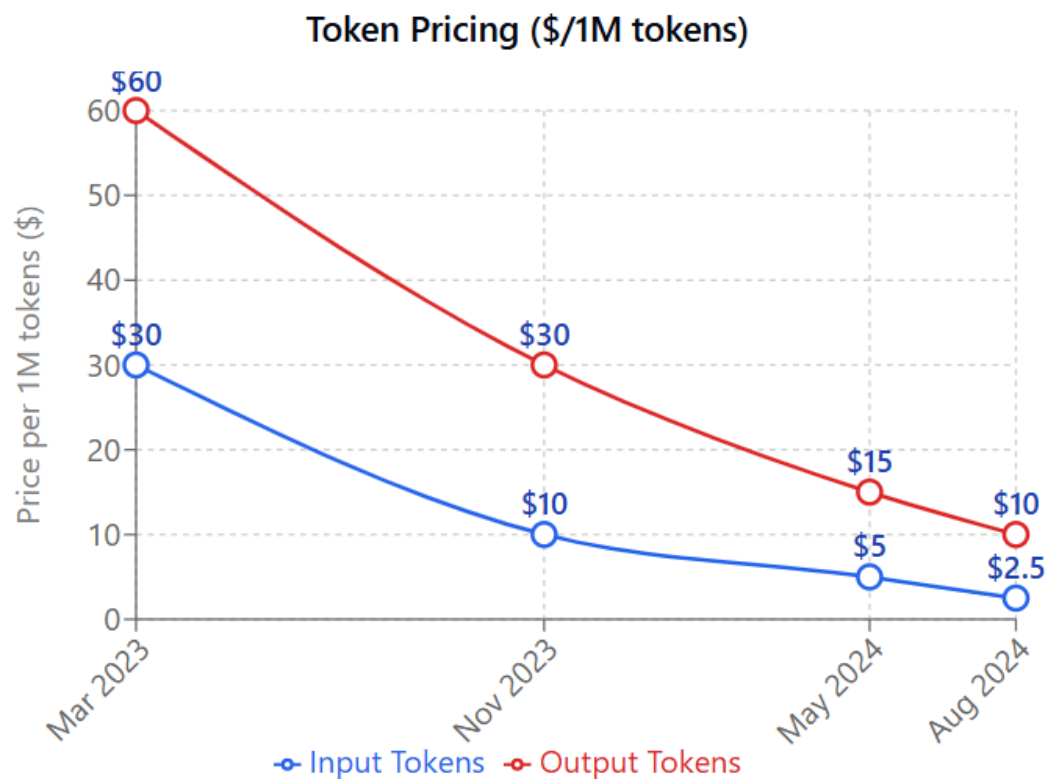
443 Results



PACE OF ADVANCES IN AI

Frontier AI models are rapidly becoming better and more efficient

GPT-4 Price and Performance Trends



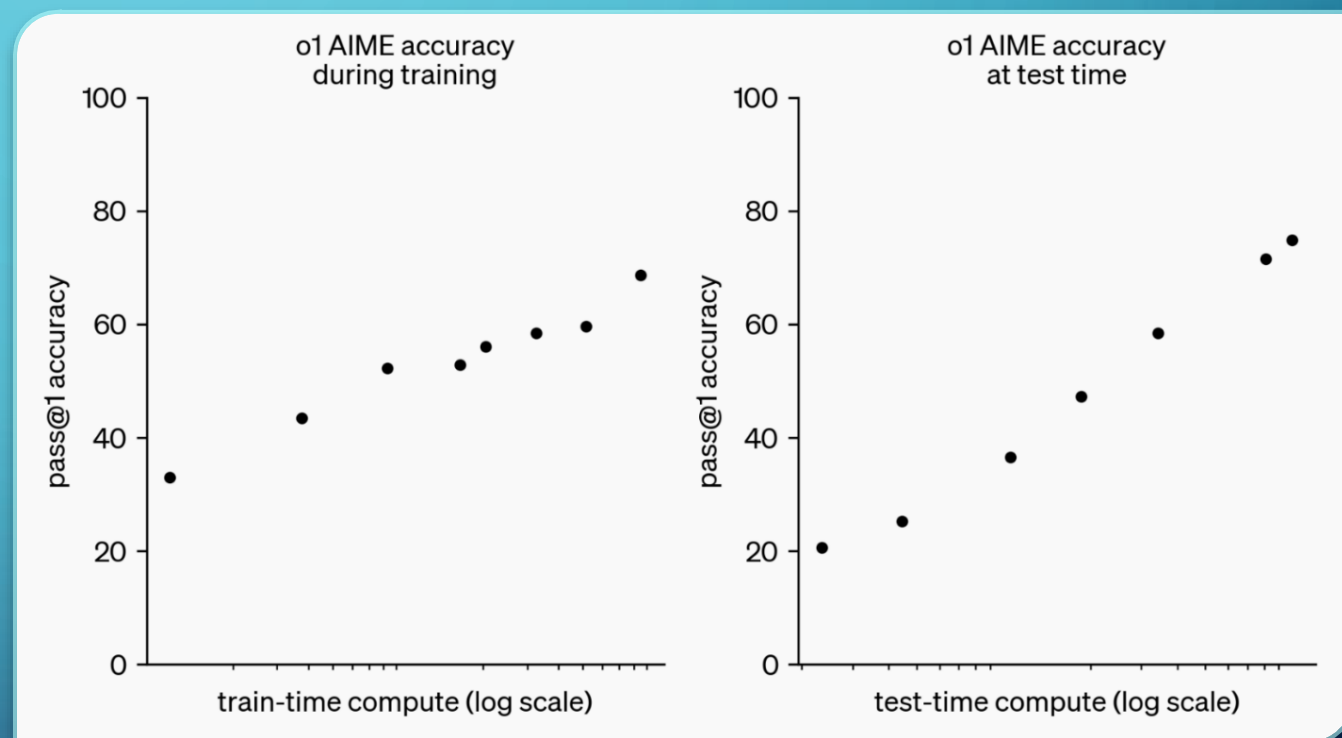
THE PARADIGM OF REASONING MODELS

Two new scaling laws:

from spending compute on:

1. longer thinking
2. optimizing the reasoning process

→ currently rapid progress



STARK IMPROVEMENTS IN ANALYTIC BENCHMARKS

Reasoning models particularly good at math:

- solved 96.7% of 2024 AIME questions (top 100-200 humans)
- creation of new benchmarks: 25% of FrontierMath
 - but: a single solution may require hundreds of books of reasoning

Similarly rapid progress in coding:

- SWE-bench
- rise of “vibe coding”
- Anthropic predicts “last line of code” in 2026



AI AGENTS

AI Agents are systems that autonomously pursue goals via

- Strategic planning
- Using long-term memory
- Employing external tools

build on greater LLM reliability, longer context windows, faster speed

also have growing use cases in economics



COMPARATIVE ADVANTAGE OF HUMAN/AI

(APRIL 2025)

Leading AI systems:

- broad general world knowledge
- superhuman performance in processing information within context window
- “AGI subject to context window limits”

Humans:

- narrower world knowledge but specialization means we can be deeper
- our knowledge persists

Comparative advantage:

- Bottleneck: information exchange human/AI

PART 2: GENERATIVE AI FOR ECONOMIC RESEARCH

Witnessing the
productivity gains
from AI from a
front row seat

Semi-annual update:



Journal of Economic Literature 2023, 61(4), 1281–1317
<https://doi.org/10.1257/jel.20231736>

Generative AI for Economic Research: Use Cases and Implications for Economists†

Generative artificial intelligence (AI) can help economists analyze how large language models (LLMs) can be used by describing documents, generating new documents, and following general instructions. This paper provides a series of these, classifying them into categories that economists can use to guide the use of generative AI to automate parts of their research. The paper also discusses the implications of AI-powered cognitive tools for the future of economic research, and is associated with this paper's latest capabilities.

LLMs Level Up—Better, Faster,
Cheaper: June 2024 Update to Section 3
of “Generative AI for Economic
Research: Use Cases and Implications
for Economists”
Journal of Economic Literature
December 2024 Update of

Generative AI for Economic Research:
LLMs Learn to Collaborate and Reason

1. Introduction

*Applications of
Generative AI to
Economic Research*

The landscape of
economic research is
changing rapidly, and
the use of generative AI
is becoming increasingly
common. This paper
explores the implications
of this technology for
the future of economic
research.

AUTOMATING RESEARCH TASKS

Six categories of capabilities, with several dozen sample use cases:

1. Ideation and feedback
2. Background research
3. Coding
4. Data analysis
5. Math
6. Writing

Category	Task	Usefulness
Ideation & Feedback	Brainstorming	●
	Feedback	◐
	Providing counterarguments	◐
Writing	Synthesizing text	●
	Editing text	●
	Evaluating text	●
	Converting hand-written equations	◐
	Generating titles & headlines	●
Background Research	Summarization	●
	Condensing YouTube videos	●
	Literature Research	◐
	AI-Powered Search	◐
	Formatting References	●
	Translating Text	●
	Explaining Concepts	◐
Coding	Writing code	◐
	Explaining code	◐
	Translating code	●
	Debugging code	◐

Category	Task	Usefulness
Data Analysis	Locating data sources	●○
	Creating figures	●○
	Extracting data from text	●●
	Reformatting data	●●
	Classifying and scoring text	●○
	Extracting sentiment	●○
	Simulating human subjects	●○
Math	Setting up models	●○
	Deriving equations	○
	Explaining models	●○
Promotion	Social media posts	●●
	Presentation slides	●●
	Blog posts	●●
	Conducting interviews	●●
	Podcasts	●●

Chat 1 (o1-preview): The following is a no-arbitrage relationship between an interest rate on new long-term debt in period t , $R_{N,t}$, and expected future short-term rates, R_{t+s} :

$$\frac{1}{R_{N,t} + \delta} = E \sum_{i=0}^{\infty} \left[\frac{(1 - \delta)^i}{\prod_{s=0}^i (1 + R_{t+s})} \right] \quad (1)$$

Can you log-linearize this expression around the steady state value of the interest rates, which we denote by R^* , and which is the same for both interest rates? Denote deviations from steady state with lower-case variables.

Thought for 53 seconds [drop-down menu summarizing reasoning steps]

To log-linearize the given no-arbitrage relationship around the steady state R^* , we'll start by rewriting the original equation and then expand it using first-order approximations.

Original Equation:

$$\frac{1}{R_{N,t} + \delta} = E_t \left[\sum_{i=0}^{\infty} \frac{(1 - \delta)^i}{\prod_{s=0}^i (1 + R_{t+s})} \right]$$

Chat 2 (o1-preview): Can you write python code to solve the Ramsey growth model for standard parameter values?

Thought for 34 seconds [drop-down menu summarizing reasoning steps]

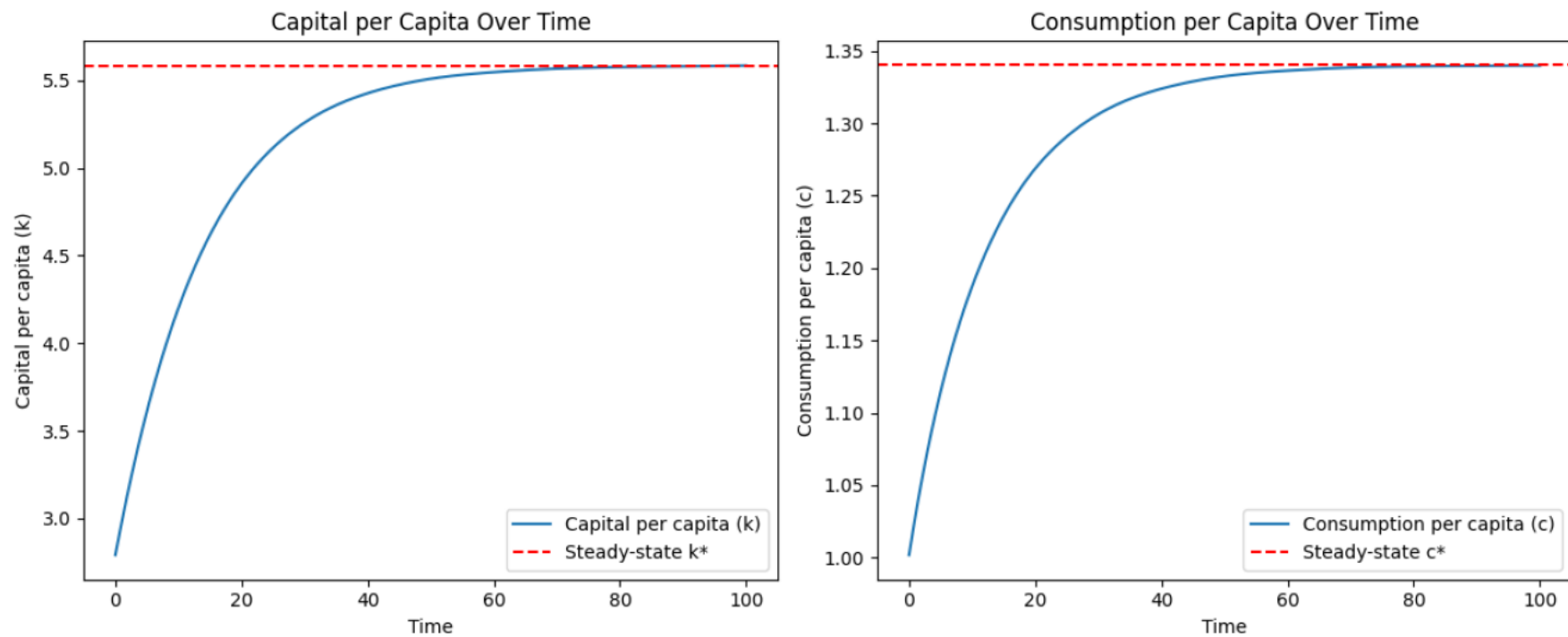
Certainly! Below is Python code that solves the Ramsey growth model using standard parameter values. The code sets up the differential equations representing the Ramsey model, computes the steady-state values, and then uses a shooting method to find the optimal initial consumption that leads to convergence to the steady state. It then simulates the model over time and plots the capital and consumption per capita.

```
1 import numpy as np
2 from scipy.integrate import solve_ivp
3 from scipy.optimize import root_scalar
4 import matplotlib.pyplot as plt
5
6 # Parameters
7 alpha = 0.3      # Output elasticity of capital
8 rho = 0.04       # Time preference rate
9 delta = 0.05     # Depreciation rate
```

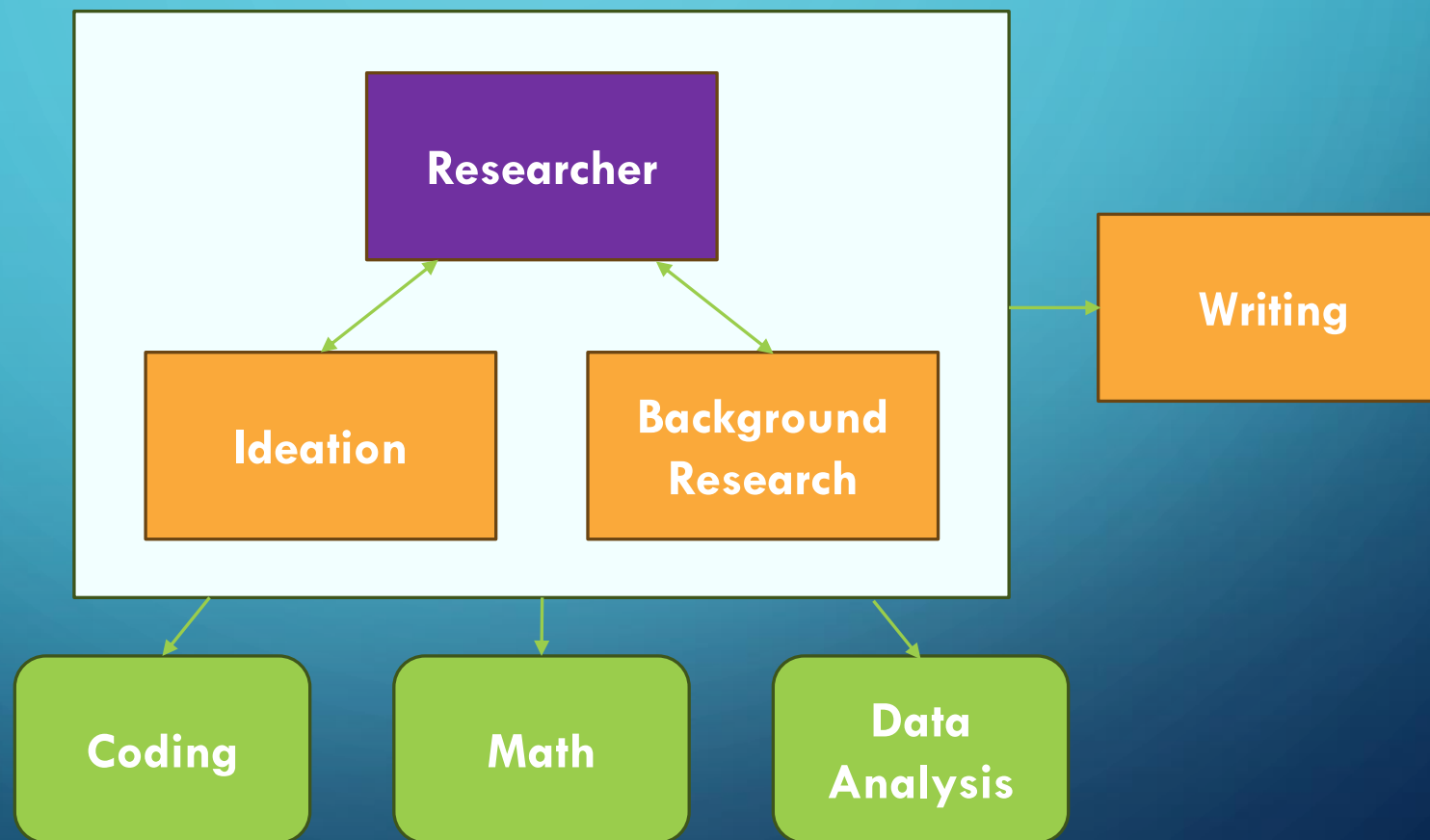
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AUTOMATING RESEARCH WORKFLOWS



ECONOMICS OF SHIFTING AI PARADIGMS

Traditional LLMs: relatively cheap
→ \$20/month

Reasoning models → ChatGPT Pro,
Claude Max at \$200/month

Emerging agents: usefulness of
computation will soon be unlimited

- Sam Altman proclaimed he will soon offer a \$20,000/month “PhD-level scientist”

?

PART 3: ECONOMIC IMPLICATIONS

ECONOMIC PARADIGM SHIFT

Question: What will be different? Let's focus on the long arc of economic history:

The Malthusian Age: Technology A ... stagnant

Land T ... bottleneck

Labor L ... dispensable (reproducible)

The Industrial Age: Technology A ... driving force

Labor L ... bottleneck

Capital K ... reproducible

The Age of AI: Technology A ... accelerating

Capital K ... reproducible

Labor L ... reproducible

→ “Economic Policy Challenges
in the Age of AI,” NBER WP 32980

SCENARIO PLANNING

= best approach to deal with massive uncertainty

Three useful scenarios:

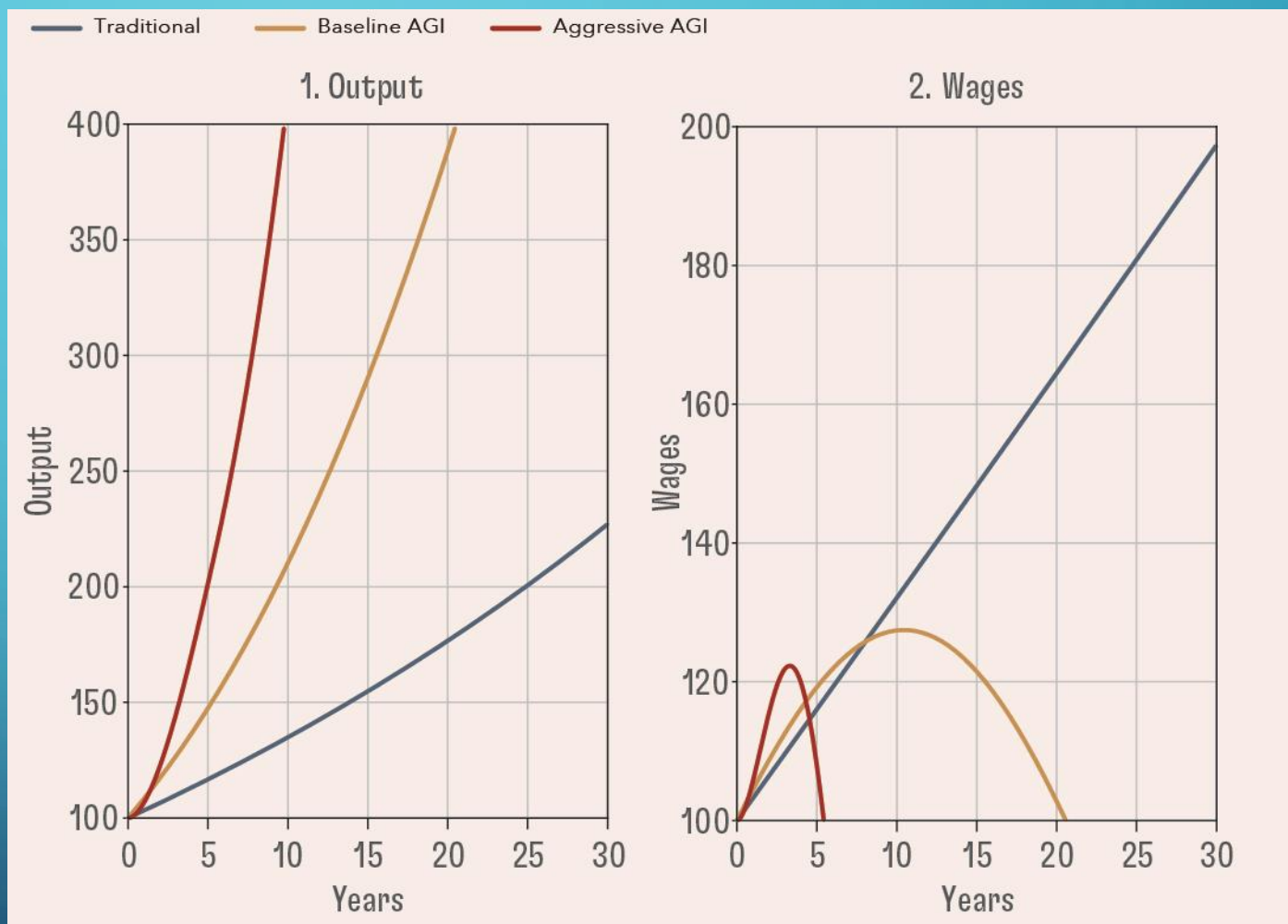
- I) Business as usual: GenAI productivity boost akin to internet boom
- II) AGI within 10-20 years: gradual advancement towards AGI
- III) AGI within 2-5 years: rapid advancement in coming years

→ See [“Scenario Planning for an A\(G\)I Future”](#) (IMF F&D Magazine)

IMPACT OF AGI ON OUTPUT & WAGES

Rapid advances towards AGI would

- turbo-charge growth
- but may depress wages



INCOME DISTRIBUTION

- Potential for unprecedented levels of income concentration
 - Benefits of AGI may accrue primarily to capital owners
 - The economy will produce what is demanded
- Rethinking income distribution/social insurance not tied to work
- Proposal of a “Seed UBI (Universal Basic Income)”
- Challenge most severe for global income distribution

Fundamental question: Do humans need work if they can't earn a living from it?

RETHINKING MACROECONOMIC FRAMEWORKS

- Rethinking aggregate demand management (eg Phillips curve)
 - human unemployment may matter less for the macroeconomy
 - capacity utilization may matter more
- Adapting monetary policy frameworks
- Shifting fiscal policy and revenue sources
- Redefining economic indicators and measurements

CRUNCH TIME

SCENARIO PLANNING: IT'S CRUNCH TIME

If you knew that AGI will be achieved within 2 - 3 years,

- What do we need to understand better?
- What should you/your organization do now to prepare?
- How would you prepare personally?

BACKGROUND READINGS

Available at <https://www.korinek.com/research>:

- [The Economics of Transformative AI](#), NBER Reporter, Dec. 2024.
- [Economic Policy Challenges for the Age of AI](#), forthcoming, MIT Press, 2025.
Also NBER WP 32980.
- [Scenario Planning for an A\(G\)I Future](#), IMF Finance & Development Magazine, Dec. 2023.
- [Intelligent financial system: how AI is transforming finance](#), BIS Working Paper, June 2024



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