

Course Evaluations

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Thanks!



Session 16: Wrap-Up

Chad Jones
Stanford GSB

Outline: Wrap Up

- Things to read?
- Future of U.S. and world growth?
- Q & A Session

Things to Read

- My “Not a Blog”

● My Latest Not-a-Blog Listings (**complete list**): Things I've read and enjoyed...

My Diigo

- It's not just a fiscal fiasco: greying economies also innovate less | The Economist
- Why Inflation Erupted: Two Top Economists Have the Answer - WSJ
- Inflation Is Still High. What's Driving It Has Changed. - The New York Times
- The electric grid is about to be transformed | The Economist
- Is Big Tech's R&D Spending Actually Hurting Innovation in the U.S.? - WSJ

`http://web.stanford.edu/~chadj/#diigo`

- The Economist, FT, WSJ, NYT of course



Discussion Questions:

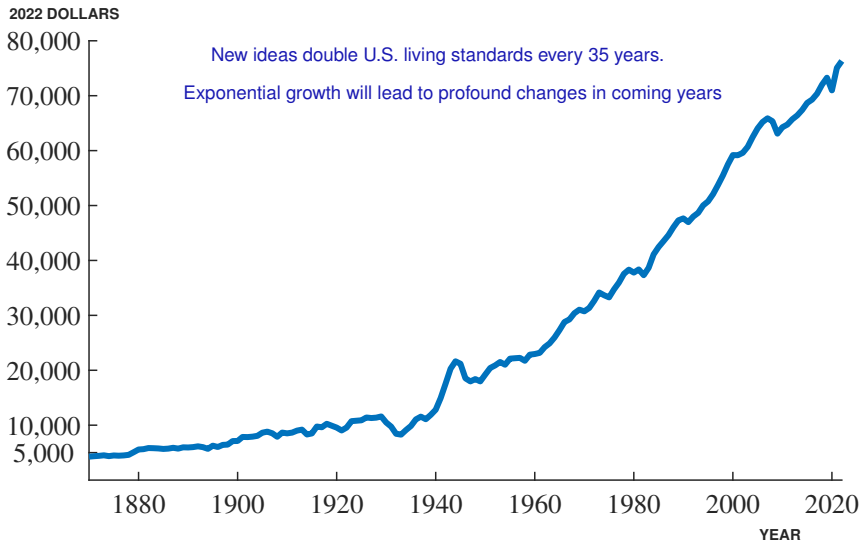
LR: What considerations impact U.S. and global growth over the next two decades? What's your forecast for the future growth rate?

SR: What does the recovery from the Covid pandemic look like over the next few years?

Five Touch Points

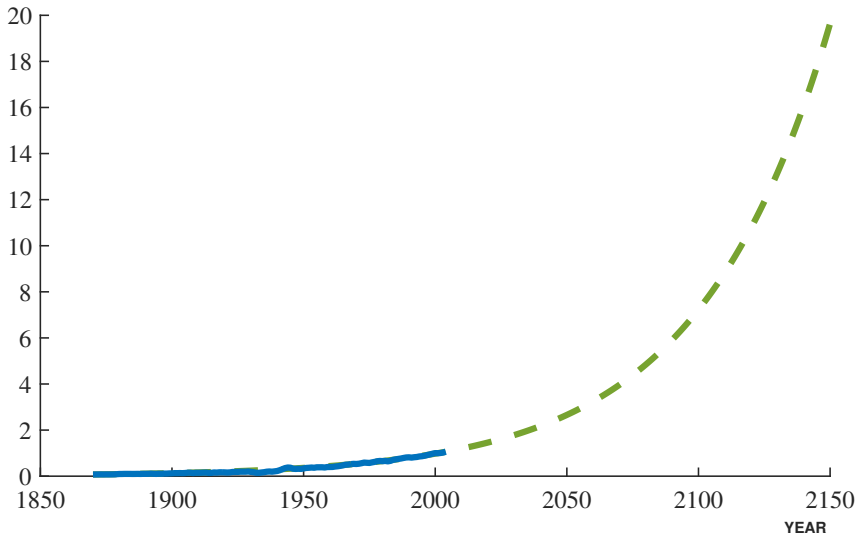
- ① New ideas double U.S. living standards every 35 years
- ② China and India
- ③ Budget constraints must be respected
- ④ Recovering from the Covid-19 pandemic: inflation? recession?
- ⑤ The seeds of the next “golden era”...

1. Per Capita GDP in the United States



Per Capita GDP in the Future?

NORMALIZED, 2000 = 1

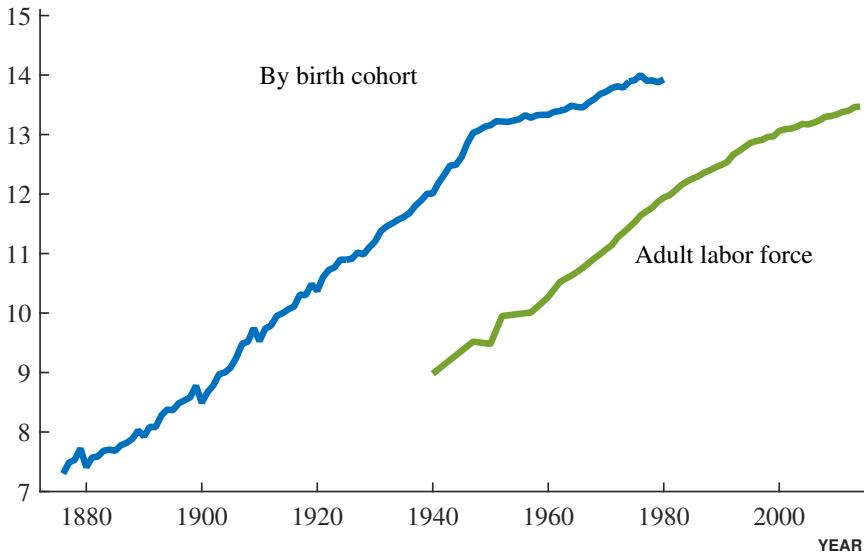


Planning under Exponential Growth

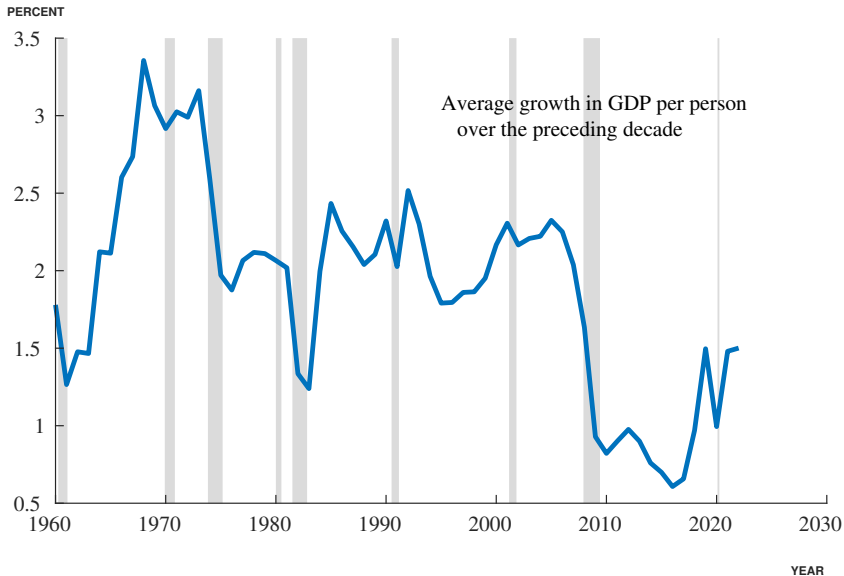
- Doubles every T years
- Any given level gets reached much sooner than you might expect.
Consider world population:
 - A million years to reach 1 billion
 - 100 years to reach 2 billion
 - 50 years to reach 3 billion
 - 15 years to reach 4 billion.
- Imagine a company w/ employment doubling every year.
 - A new office building is 3/4 empty 2 years before it fills
 - Half empty one year before it fills

U.S. Educational Attainment by Birth Cohort

YEARS OF SCHOOLING

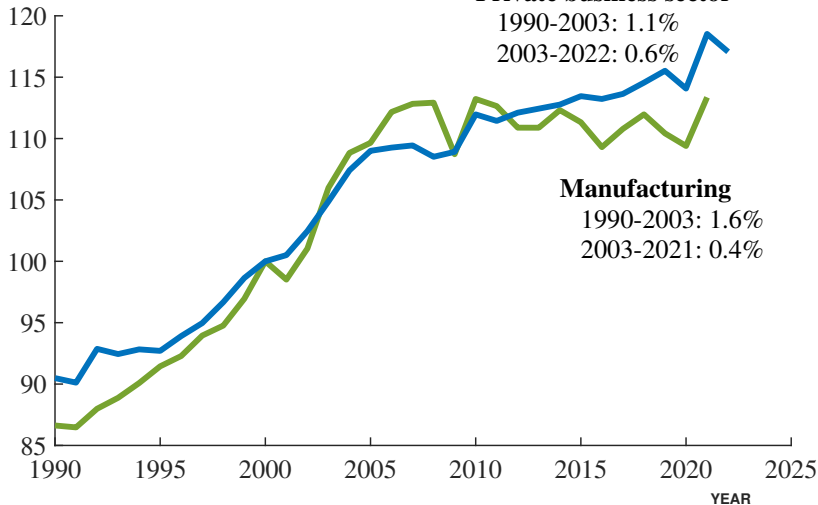


Recently, growth has slowed!

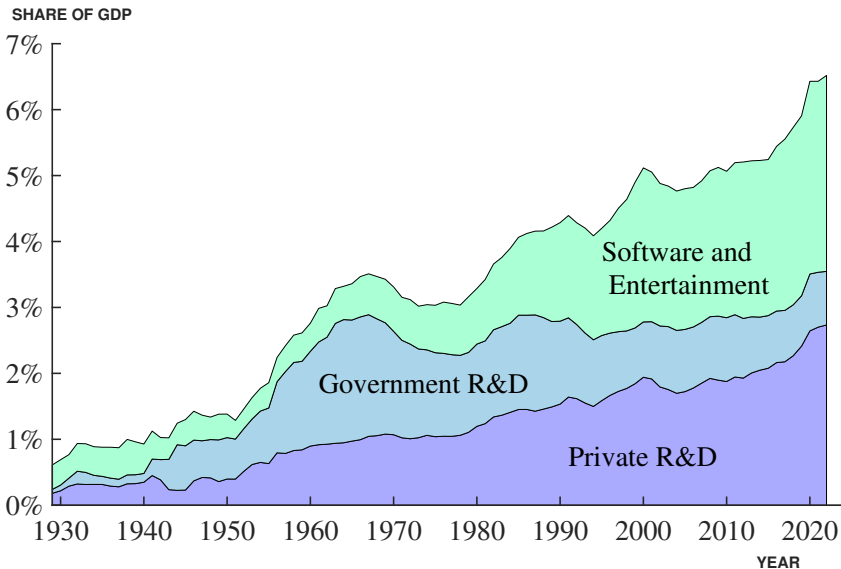


U.S. Total Factor Productivity

TOTAL FACTOR PRODUCTIVITY (2000=100)



Public vs Private R&D?

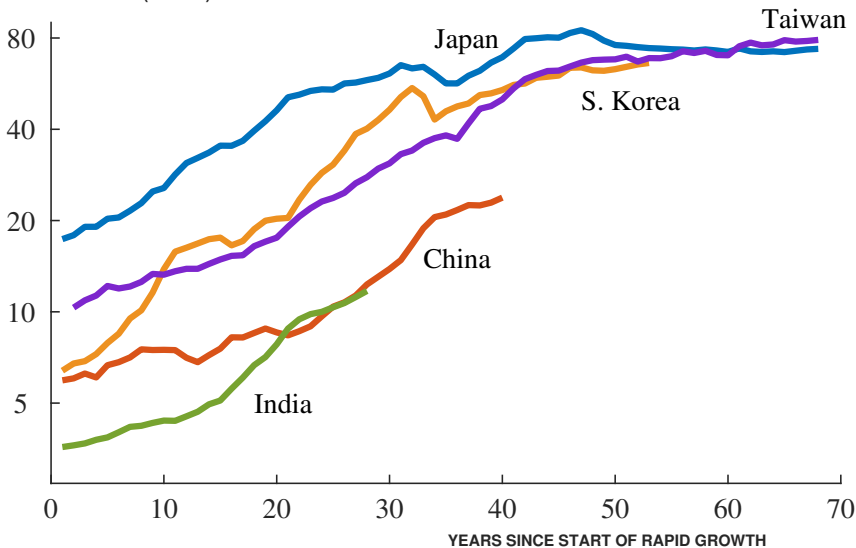


2. China, India, and Beyond

- **China:** Extremely rapid “catch-up” growth is possible
 - Growth rate (per capita) since 1980: 8% per year
 - 10 times richer today than in 1980!
 - 1 generation, more than 1 billion people
- **Openness:** Competing in world markets and engaging the world of ideas is the best development strategy.
 - Competition is good.
- **Finding Missing Edisons and Doudnas**
 - China and India: More people each than US/Euro/Japan
 - Only 12 percent of U.S. patents are filed by women
 - Double the world's number of entrepreneurs and researchers in 50 years?

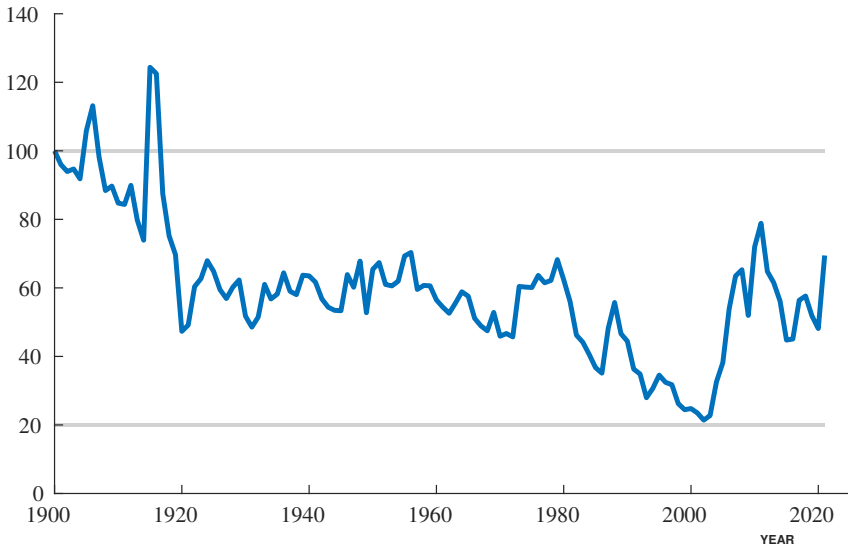
The Dynamics of Catch-Up Growth

GDP PER PERSON (US=100)



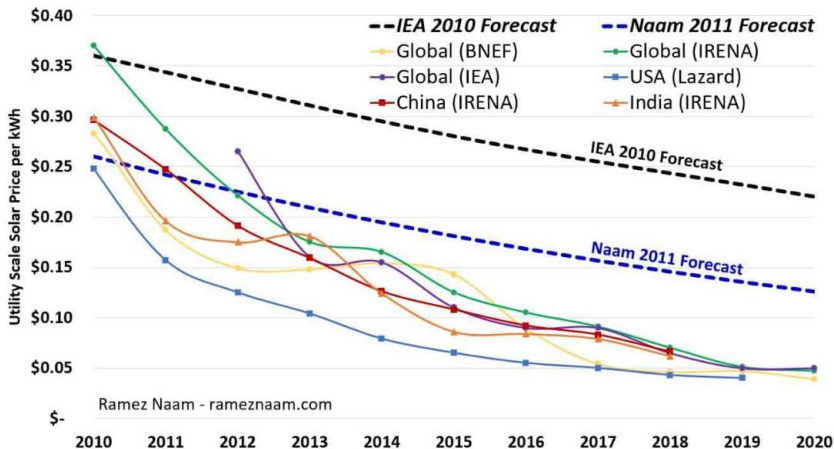
Commodity Prices over the Long Run

EQUALLY-WEIGHTED PRICE INDEX (INITIAL VALUE IS 100)



Solar Innovation

Solar Costs A Fraction of 2010-2011 Forecasts



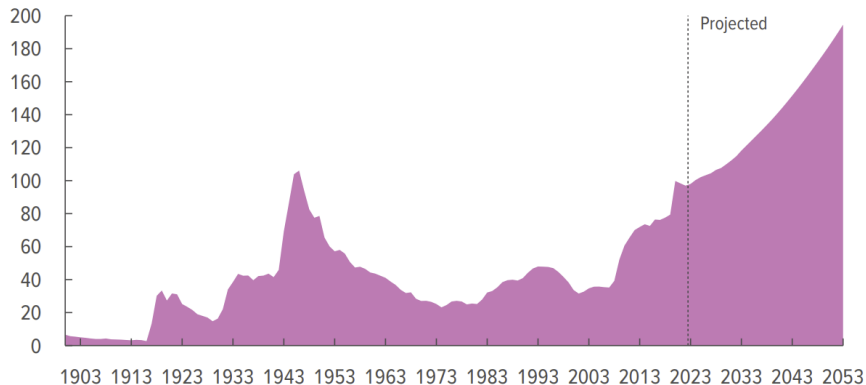
3. Budget constraints must be respected

- Problems with government budget constraints (or net foreign asset position) are the cause of hyperinflation, defaults, and financial crises.
- European debt crisis
 - Banks / Government / Competitiveness
- U.S. (and world) financing of rising health spending.
- Could the COVID-19 crisis + Expanding Fed balance sheet + entitlement spending problems be the seed for an even more severe financial crisis in the future?

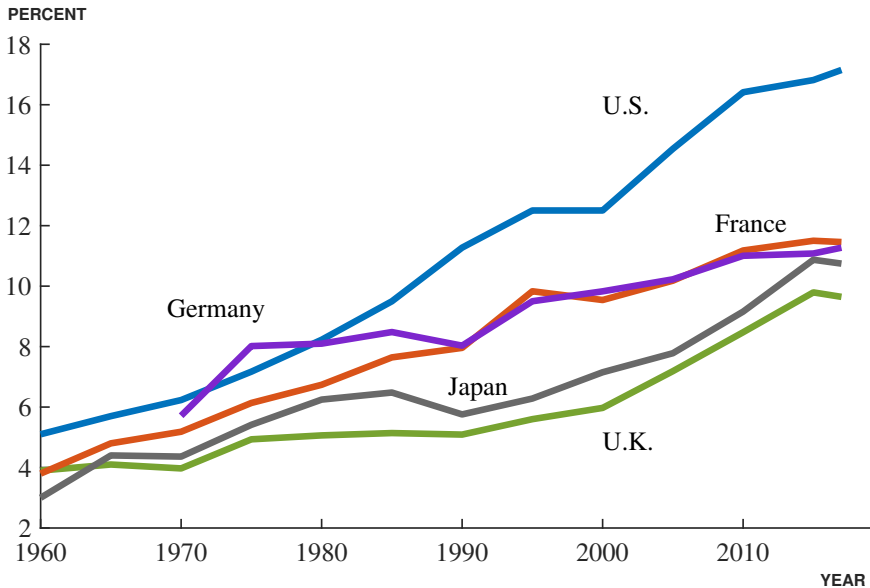
U.S. Debt-GDP Ratio

Already $\approx 100\%$ for 2023

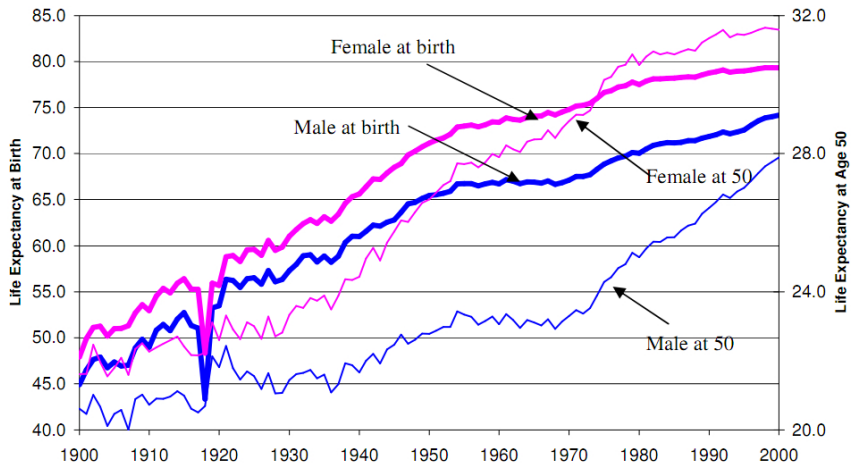
Percentage of Gross Domestic Product



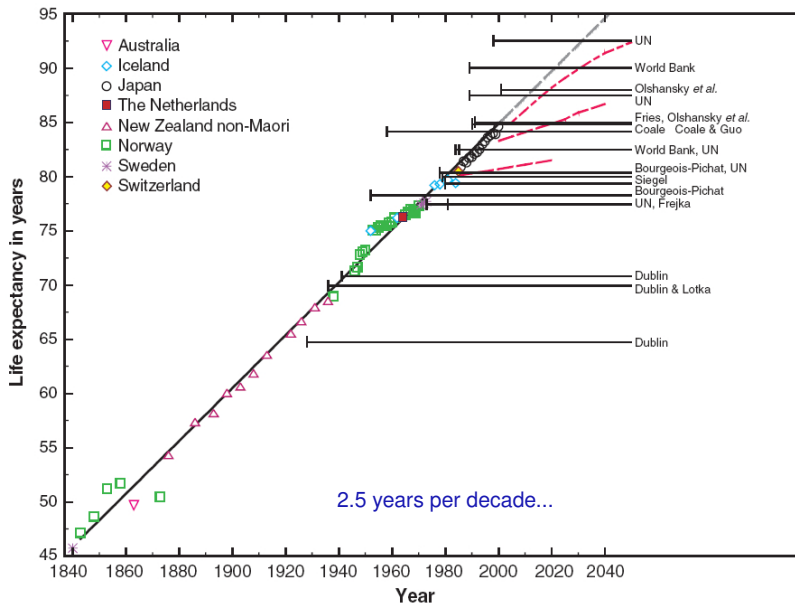
Health Spending as a Share of GDP



U.S. Life Expectancy



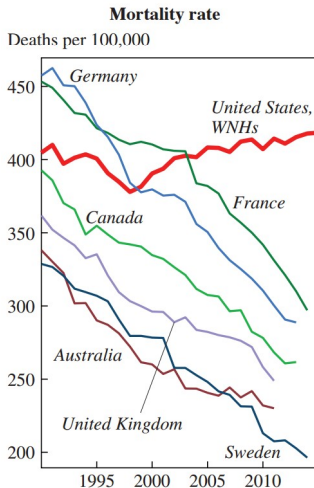
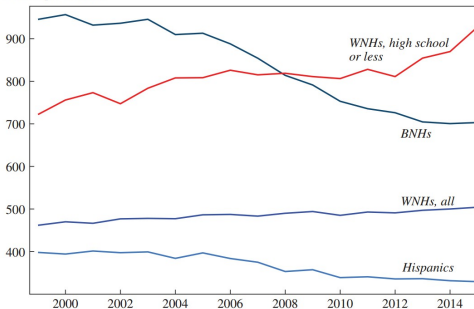
Record Life Expectancy (Oeppen and Vaupel, 2002)



The Opioid Crisis (Case and Deaton, 2017)

Figure 1. All-Cause Mortality by Race and Ethnicity for Age 50–54, 1999–2015

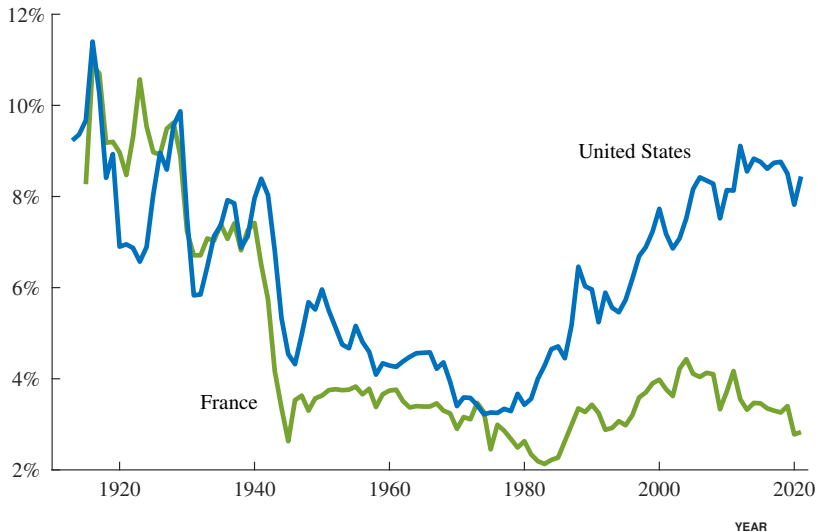
Deaths per 100,000



Source: <https://www.brookings.edu/wp-content/uploads/2017/08/casetextsp17bpea.pdf>

Income Share of the Top 0.1 Percent of the Population

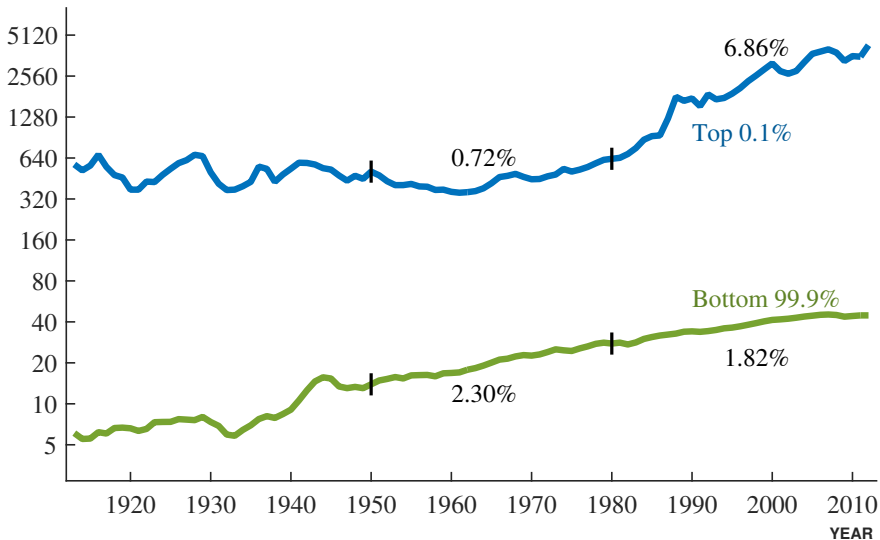
INCOME SHARE OF TOP 0.1 PERCENT



Source: Piketty and Saez, "Income Inequality in the United States, 1913-1998" (updated)

Economic growth by inequality

THOUSANDS OF 2009 CHAINED DOLLARS

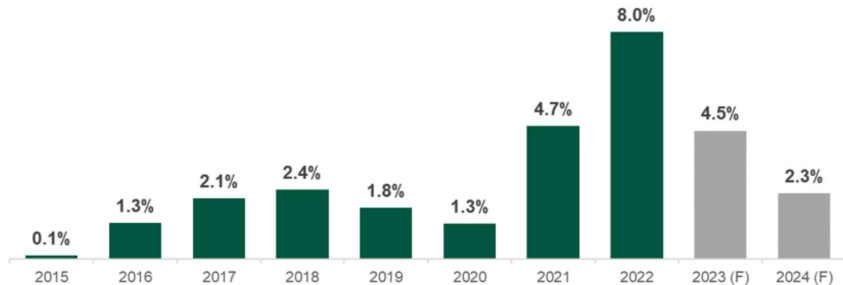


Source: Maddison + BEA + Piketty/Saez

4. Recovering from the COVID-19 Crisis

- 7 million deaths so far
 - Save 1m lives, 10 years each, \$100k per life year = \$1 trillion
 - Vaccination reduces death rate by 5x (source)
 - IMF: \$50b investment saves \$9t in lost lives and GDP! (source)
- Inflation, expectations, stagflation?
 - Will Fed and CB's around the world manage a “soft landing”?
 - Will high inflation become entrenched in expectations and cause problems for several years?
 - Recession?

CPI Inflation and Forecast (IMF)



Source: IMF (International Monetary Fund) World Economic Outlook (WEO), April 2023 release

Inflation Forecasts

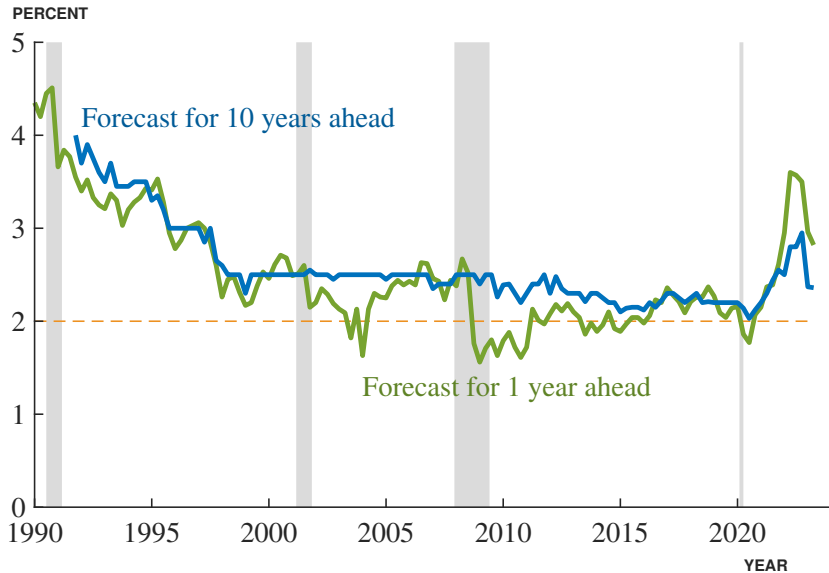


Table 1.1. Overview of the *World Economic Outlook* Projections
(Percent change, unless noted otherwise)

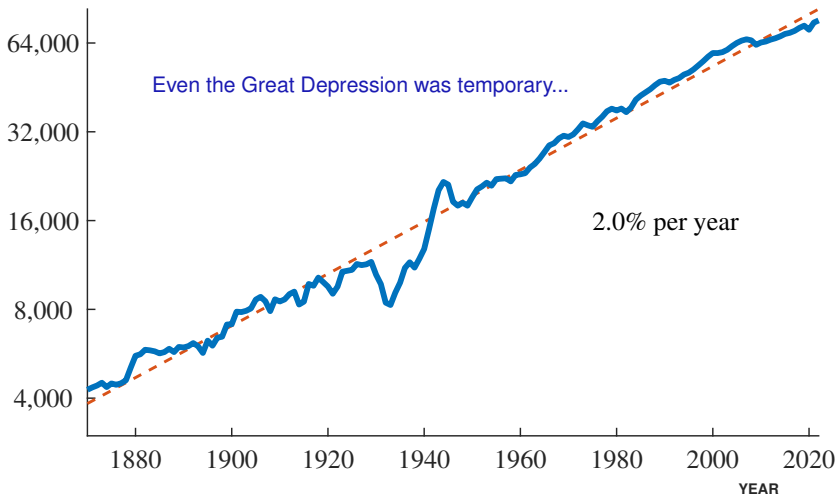
	2022	Projections	
		2023	2024
World Output	3.4	2.8	3.0
Advanced Economies	2.7	1.3	1.4
United States	2.1	1.6	1.1
Euro Area	3.5	0.8	1.4
Germany	1.8	-0.1	1.1
France	2.6	0.7	1.3
Italy	3.7	0.7	0.8
Spain	5.5	1.5	2.0
Japan	1.1	1.3	1.0
United Kingdom	4.0	-0.3	1.0
Canada	3.4	1.5	1.5
Other Advanced Economies ²	2.6	1.8	2.2
Emerging Market and Developing Economies	4.0	3.9	4.2
Emerging and Developing Asia	4.4	5.3	5.1
China	3.0	5.2	4.5
India ³	6.8	5.9	6.3

5. The seeds of the next “golden era”...

- Microsoft was founded at the end of a recession in 1975.
- Apple released the iPod in the recession of 2001.
- AI+ChatGPT at end of the Covid pandemic
- “During the [Great Depression], the U.S. economy was, in fact, experiencing a period of technological and organizational creativity that, in the aggregate, remains as yet unmatched.” — Alexander Field, 2011
 - 1929–1941 featured rapid TFP growth, and numerous innovations
 - Television, nylon, conveyor belts, stainless steel, chrome plating, new plastics, electron microscope, FM radio

U.S. Per Capita GDP

2022 DOLLARS, RATIO SCALE



Q & A