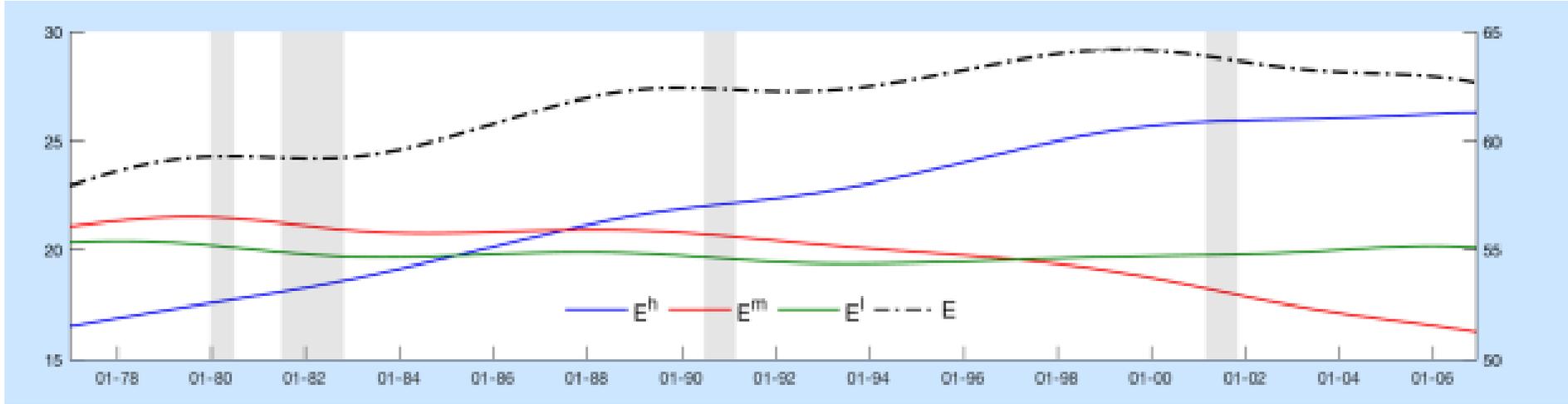


The educated class and the fragility of consumer society

Gilles Saint-Paul, SCOR, April 22 2024



Evolution of employment by skill groups, Source: CPS, Ounnas 2020

Tableau 1. *Salaires réels moyens à temps plein des hommes à 5 ans (1997-2015)*

Diplôme	1997	2003	2009	2015	Δ_{1997}^{2015}	Δ_{2003}^{2015}
Non-diplômés	1 318	1 393	1 463	1 393	+ 5,69 %	+ 0,00 %
CAP-BEP	1 315	1 407	1 564	1 499	+ 13,99 %	+ 6,54 %
Bac pro	1 465	1 503	1 639	1 589	+ 8,46 %	+ 5,72 %
Bac techno	1 466	1 446	1 679	1 500	+ 2,32 %	+ 3,73 %
Bac général	1 593	1 622	1 772	1 621	+ 1,75 %	- 0,00 %
BTS-DUT	1 719	1 797	1 835	1 737	- 1,04 %	- 3,33 %
L3	1 853	1 975	1 811	1 813	- 2,16 %	- 8,20 %
M1	2 106	2 059	2 174	1 938	- 7,97 %	- 5,87 %
M2	-	2 586	2 507	2 321	-	- 10,24 %
M2 et plus	2 493	2 714	2 686	2 425	- 2,80 %	- 10,64 %
Doctorat	-	3 080	3 306	2 855	-	- 7,30 %
École de commerce	2 806	3 260	3 061	2 714	- 3,28 %	- 16,75 %
École d'ingénieurs	2 793	2 867	2 736	2 672	- 4,33 %	- 6,80 %

Salaires moyens par diplôme. Source: Argan et Gary-Bobo (2023), CEREQ

The model's ingredients

- *Increasing returns technology*: Use of the modern technology depends on *market size* for the product
- *Hierarchy of needs preferences*: People consume one unit of each good, in a given order: Market size depends on income distribution
- *Fixed overhead cost in terms of skills*: The size of the middle class depends on the range of goods that use the modern technology

Increasing returns

- An old, traditional technology uses raw labor, paid $w = 1$ and has constant returns: any good can be produced and sold at constant labor cost and price c_O
- For each good, modern technology allows to produce at a lower marginal cost c_N , with a fixed overhead cost of skilled workers m , paid ω
- Modern technology is owned by a single « capitalist » or « oligarch »
- If in place, capitalist gets the whole market and charges at limit price c_O , earning $\pi(y) = (c_O - c_N)y - m\omega$

Hierarchy of needs and income distribution

- Agent of skill s has an income equal to $1 + \omega s$
- Each agent consumes n goods, paid at c_0
- Therefore, $n = \frac{1 + \omega s}{c_0}$
- Market size for good j is proportional to the number of people who are rich enough to buy it
- That is, those that are richer than $c_0 n$
- It depends on the returns to skills and on the distribution of s

Industrialization and the demand for skills

- The more highly ranked a good, the lower its market size
- There is a cutoff rank j^* such that goods are industrialized iff $j \leq j^*$
- The demand for skills, and therefore the size of the middle class, depends on j^* :

$$S = mj^*$$

- Skill acquisition depends on the returns to skills

$$S = S(\omega)$$

Equilibrium determination

- The demand for skills must equal the supply of skills:

$$S(\omega) = mj^*$$

- The profits of the critical good j^* must be equal to zero

$$(c_O - c_N)y(j^*) - m\omega = 0$$

Complementarities

- The size of the middle class depends on the number of goods that are industrialized
- In turn, a larger middle class raises the breadth of goods that have a critical market size
- Thus, the middle class is self-sustaining

When do complementarities prevail?

- Consider an increase in the skilled wage ω
- Its impact effect is to reduce profits in the modern sector, thus reducing j^*
- At the same time, it raises $y(j)$
- If the latter effect is strong enough, net demand for skills goes up

--- Size of middle class effect
--- Cost effect

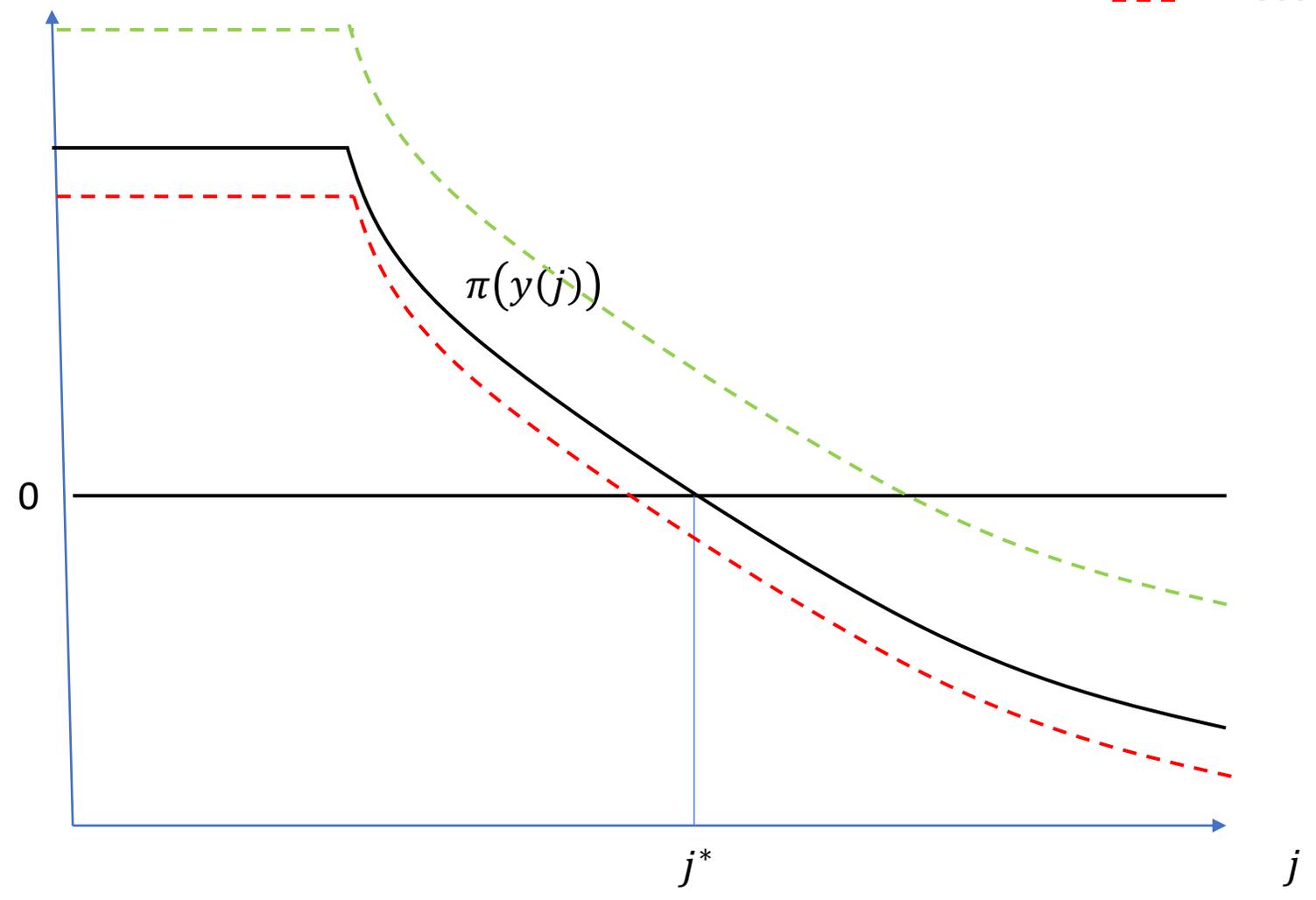
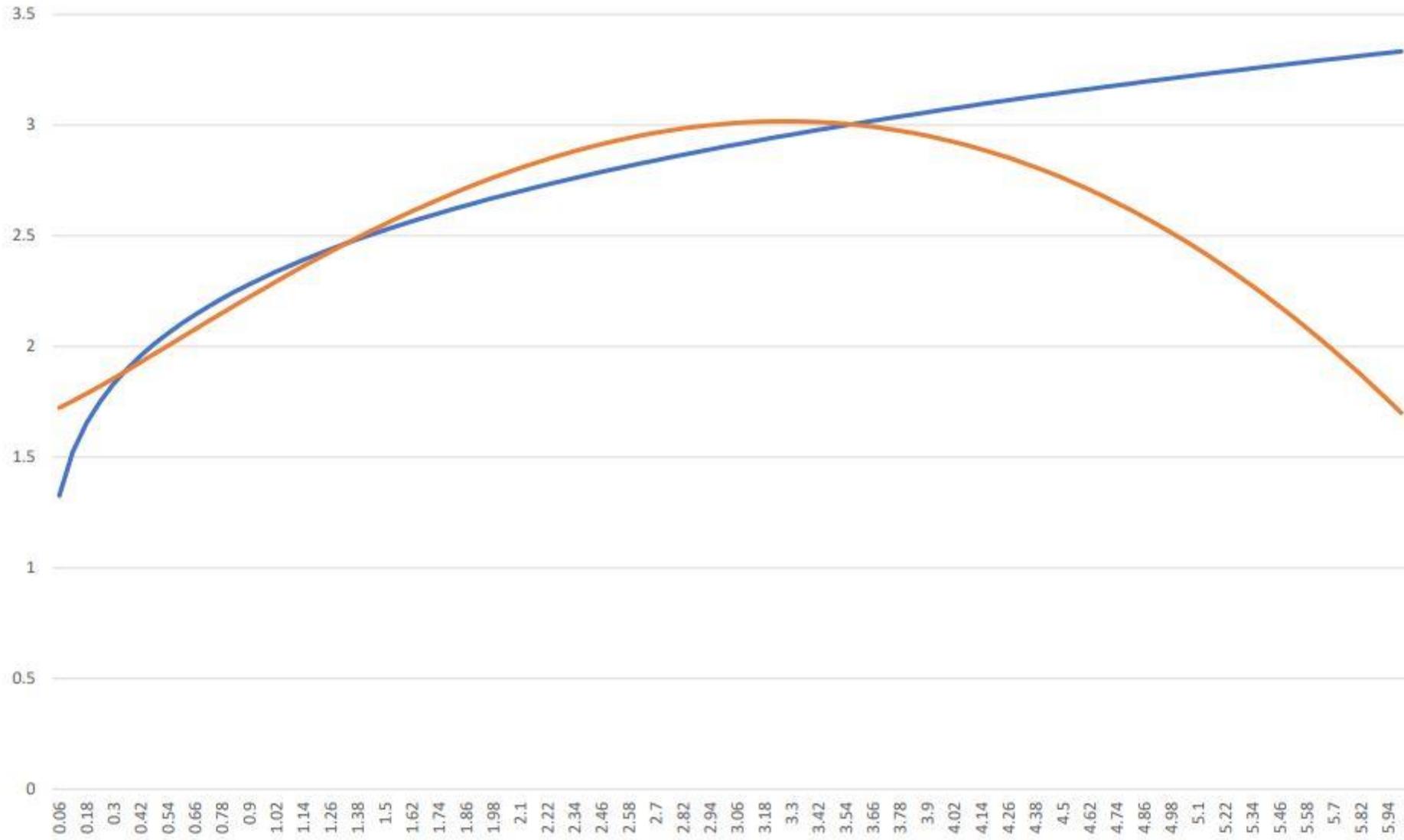


Figure 1: multiple equilibria

Equilibrium i^* as a function of ω according to each equilibrium condition



Comparing equilibria

Proposition 2 – A. Wage inequality is higher in the high equilibrium, compared to the low equilibrium

B. All workers are better-off in the high equilibrium

C. Profits are either higher or lower in the high equilibrium

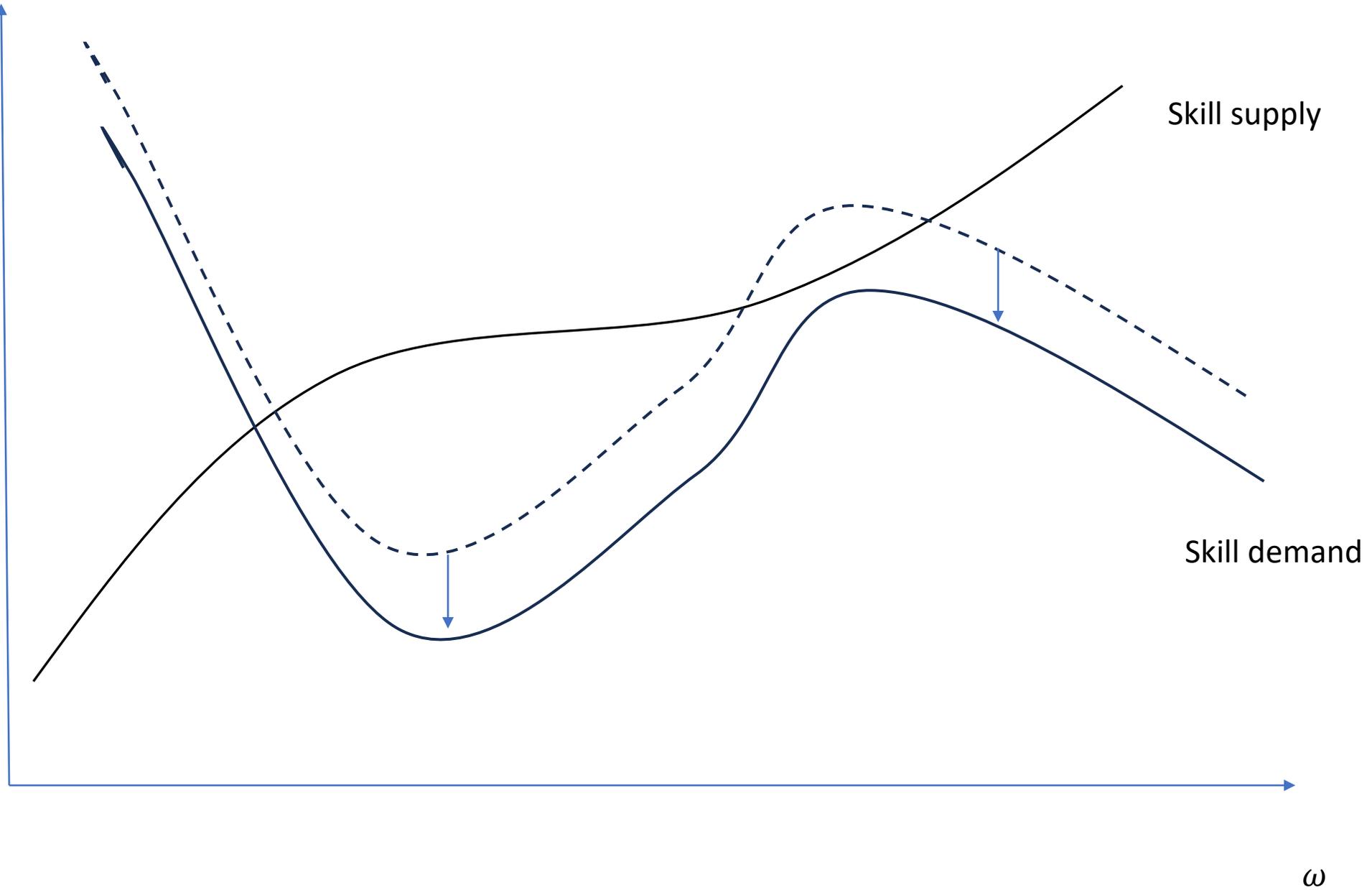
D. If profits are higher, the high equilibrium Pareto dominates the low equilibrium, and has greater overall inequality, provided the capitalist class is small enough.

E. The total number of goods consumed by workers is higher in the high equilibrium

*F. The **proportion** of industrialized goods among the total number of goods consumed by workers is **higher** in the **low equilibrium***

Risk of collapse

- Under multiple equilibria, beliefs that the returns to skill and the middle class will collapse are self-fulfilling
- A small change in parameter values may destroy an equilibrium
- This may trigger a large, catastrophic change in the returns to skills, the size of the middle class, and the size of the individual sector.



The stability of bureaucracy

Proposition 4 – A. An increase in m unambiguously reduces i^ .*

B. An increase in m raises ω (resp. reduces ω) if in equilibrium

$$\omega < (\text{resp. } >) \omega_c = \frac{1}{m} \sqrt{\frac{c_O(c_O - c_N)}{2}}$$

C. If there are multiple equilibria, $\omega_L < \omega_c$. Consequently, an increase in m raises ω in the low equilibrium.

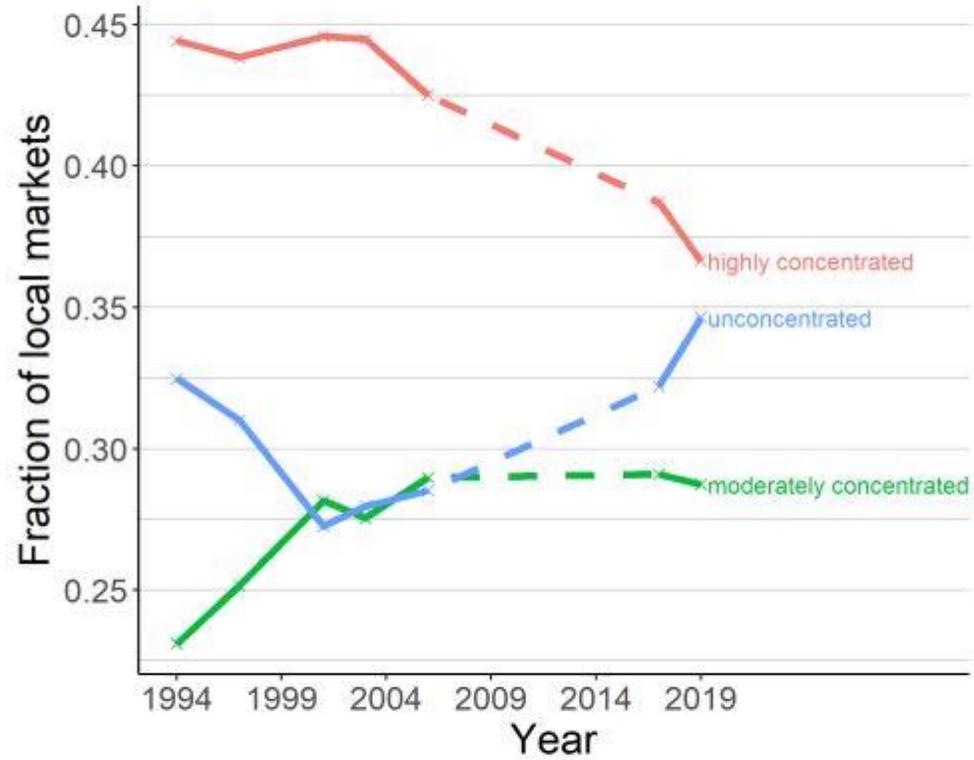
D. As m goes up there exists a critical m such that the low equilibrium ceases to exist as m raises above that level.

E. As m goes down there exists a critical m such that the high equilibrium ceases to exist as m falls below that level.

Relationship with market concentration

- Recent literature documents an upward trend in concentration
- Taken literally, a fall in j^* , reduces the *number* of concentrated sectors
- However, to the extent that the richest workers may be poorer, the *share* of concentrated sectors need not go up
 - But richest workers haven't suffered from polarization/fall in skill returns
- Furthermore, evidence on greater concentration has been challenged recently

Figure 3: Fraction of local markets by concentration



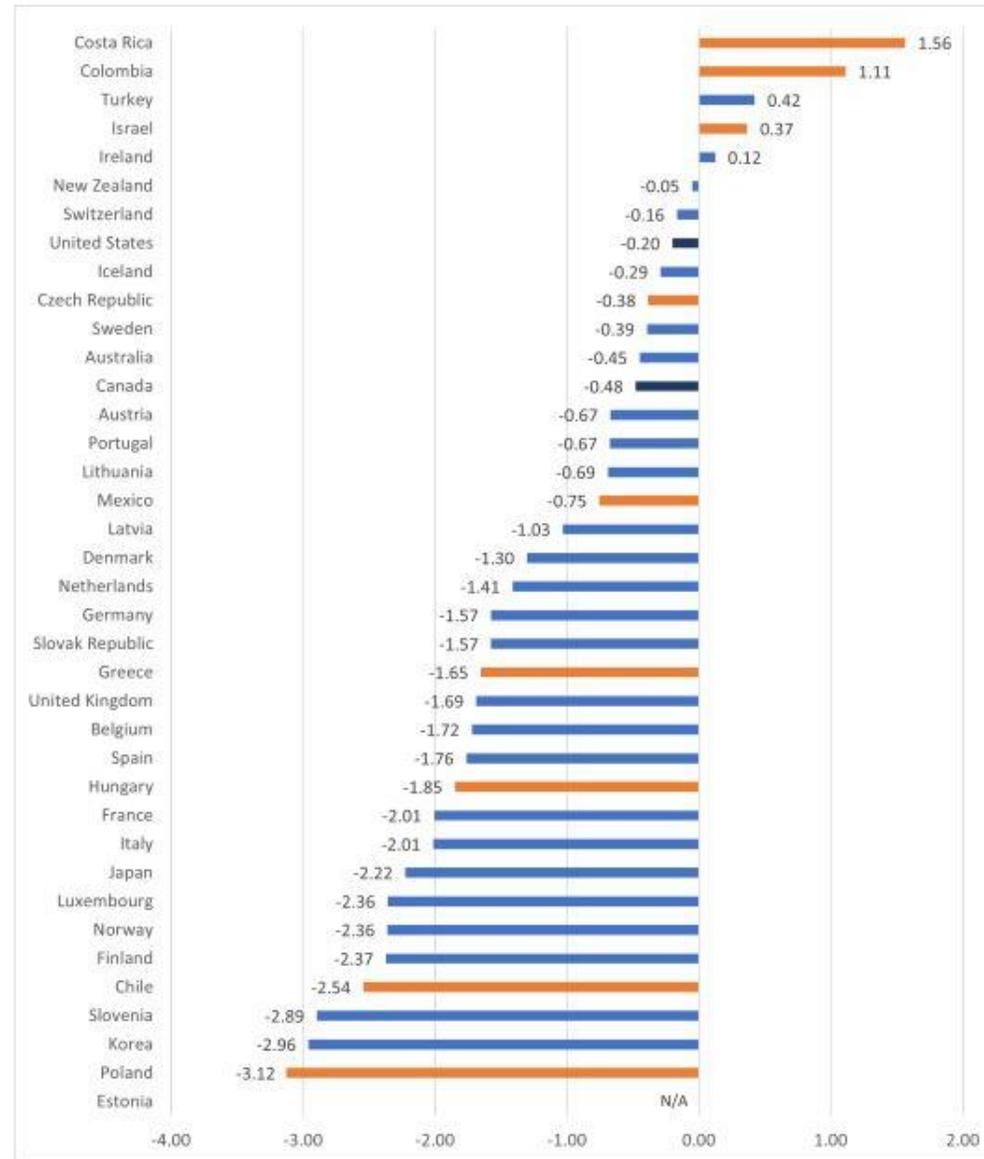
Notes. The fraction of local markets by their level of concentration: highly concentrated (HHI higher than 2500), moderately concentrated (HHI between 1500 and 2500), and unconcentrated (HHI lower than 1500).

(Source: Benkard et al. (2021))

Relationship with productivity slowdown

- The relative shrinkage of the industrial sector should lead to an overall productivity slowdown
- This is consistent with recent evidence
- Despite the reduction in number of sectors with monopoly rents, aggregate profits need not fall
- Model is not inconsistent with upward trend in the profit share

Chart 2: Period-to-Period Change in Average Annual Labour Productivity Growth Rate from 1973-2000 to 2000-2022 (percentage points)



Source: Haun and Sargent (2023)

Source: https://stats.oecd.org/Index.aspx?DataSetCode=PDB_G_R

Note: Orange highlights indicate countries for which data is not available for the entire 1973-2000 period. Data before 2000 is unavailable for Estonia. Some country series feature data breaks and estimated or provisional values instead of official statistics for some observations. For full detail on the countries and observations affected, please see the linked database.

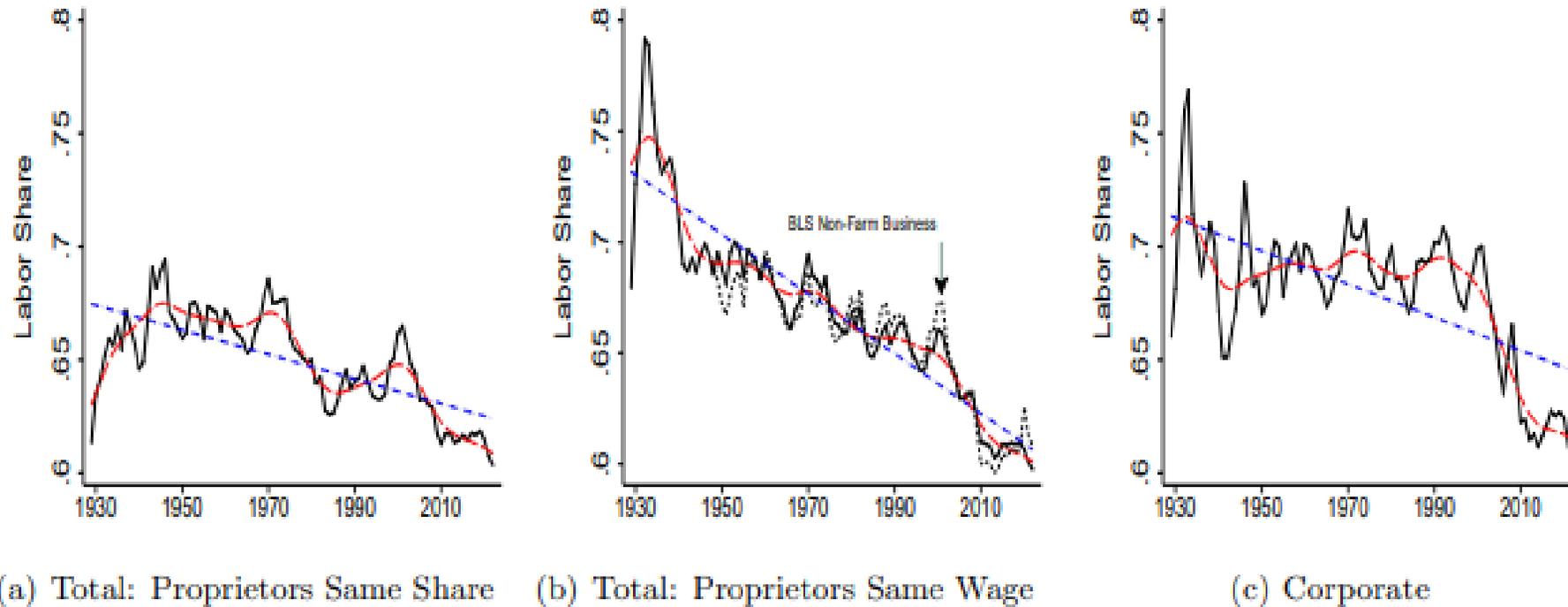


Figure 1: Labor Share in the United States, 1929–2022

Notes: Solid black line is the labor share measure, dotted blue line is the linear trend of each measure, and red long-dashed line is the Hodrick-Prescott trend of each measure with a smoothing parameter of 100. The short-dashed black line is the BLS measure of the labor share for the non-farm business sector, scaled to equal “Total: Proprietors Same Wage” in the first year of its observation.

Source: Karabarounis (2023)

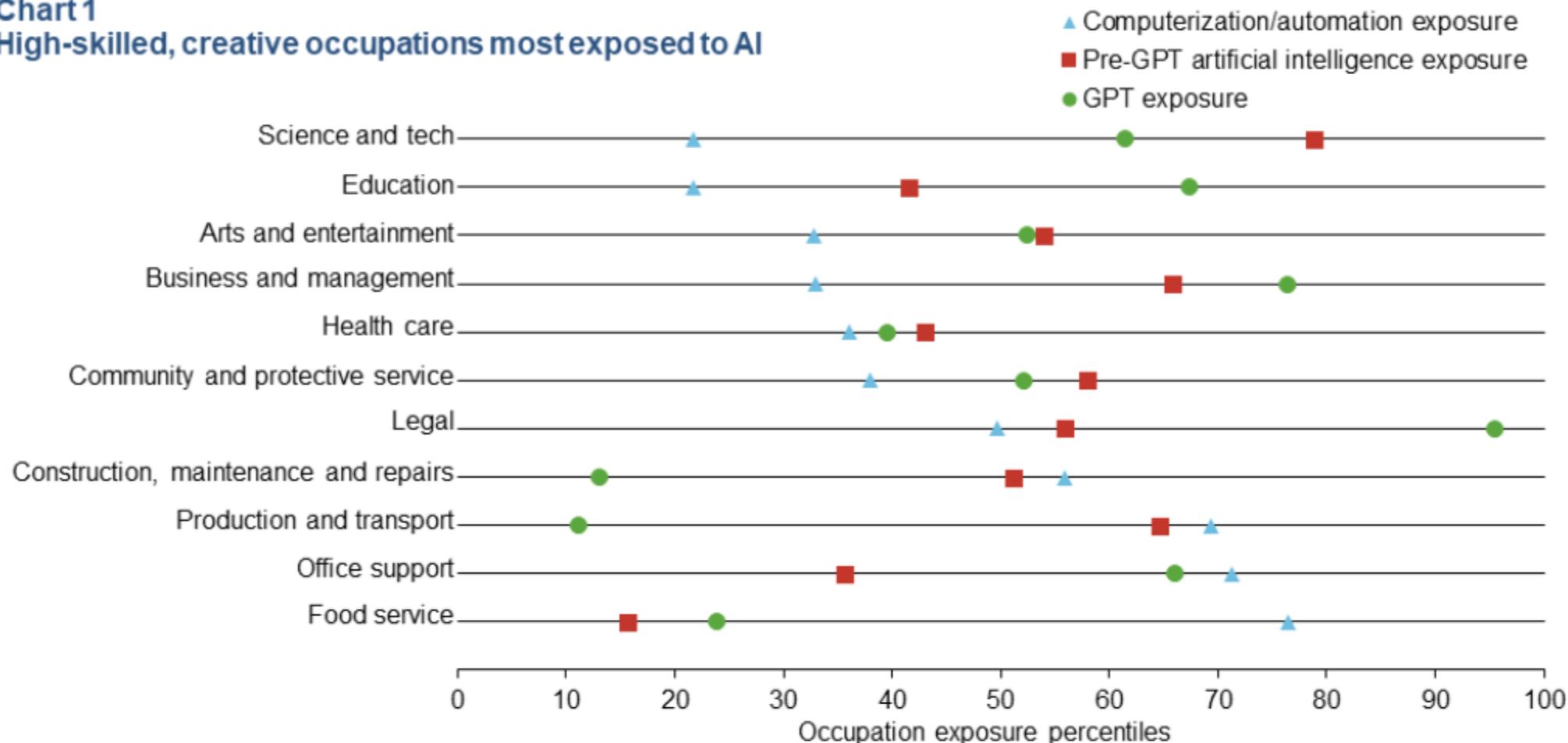
Dynamics of collapse

- Early phases of development: skills are scarce and their returns are high
- Society gradually accumulates skills
- At some point, it may enter a « danger zone » where, due to abundant skills, a low equilibrium arises
- Following a collapse, new entrants no longer accumulate skills
- Returns go up again, igniting a new cycle

Applying the model to AI

- AI may collapse the demand for skills
 - We interpret it as an innovation that reduces m to zero in the model
 - The middle class collapses: only the working class and the oligarchs remain
- This may backfire upon business: No market for many goods mass-produced → The AI society self-destroys
- Two options for « Oligarchs » to sustain consumer society
 - UBI/Redistribution
 - Post-fordism: blocking AI

Chart 1
High-skilled, creative occupations most exposed to AI

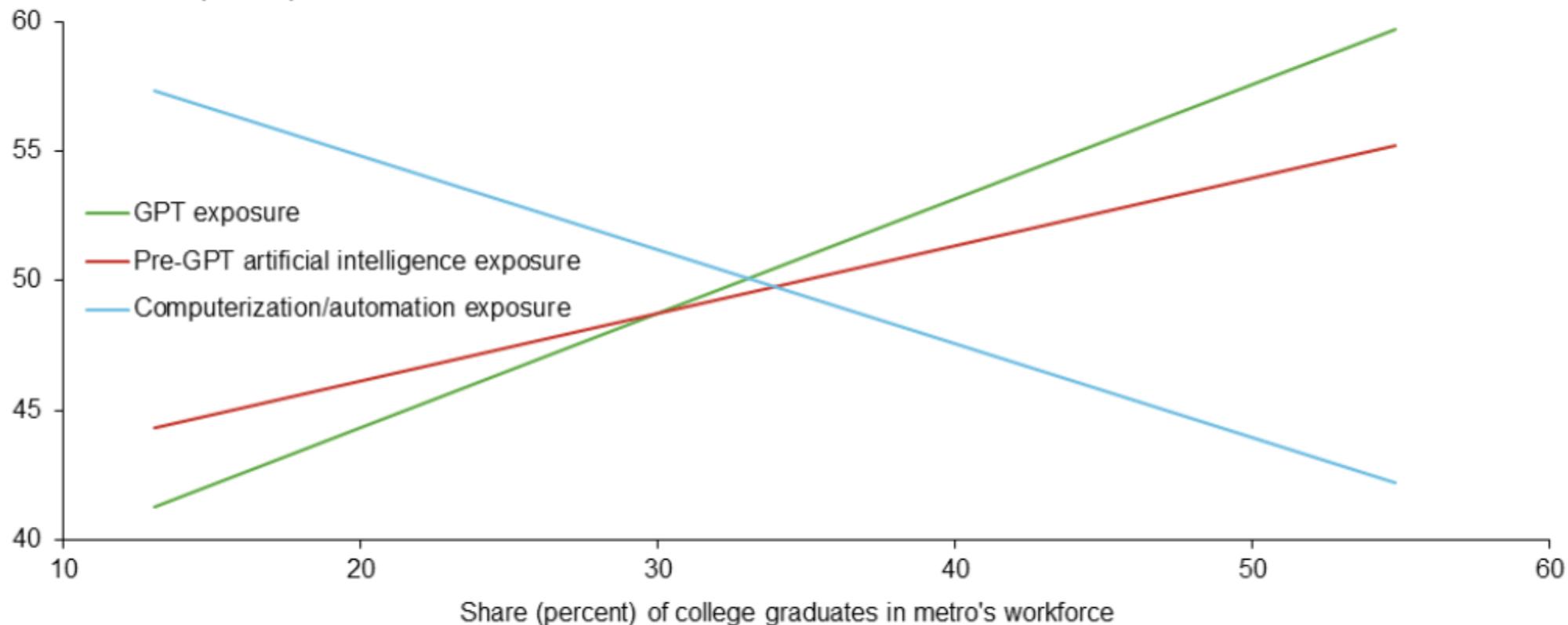


NOTES: Values shown are the averages of the occupations' exposure percentiles for 11 occupation categories. Exposure percentiles are calculated by ranking occupations by their exposure measures.

SOURCES: Lightcast; "The Future of Employment," by Carl Benedikt Frey and Michael Osborne, Oxford Martin School, working paper, 2017; "The Impact of Artificial Intelligence on the Labor Market," by Michael Webb, Stanford University dissertation, 2020; "How will Language Modelers like ChatGPT Affect Occupations and Industries," by Edward W. Felten, Manav Raj and Robert Seamans, available at SSRN, 2023; authors' calculations.

Chart 4
Metro areas with high-skilled workers more exposed to AI shocks

Metro's mean exposure percentile



NOTES: Each of the lines represents the linear fit of the plot between mean exposure percentiles of jobs posted within the metropolitan areas and the metropolitan areas' shares of college graduates in the metros' workforces. The linear fit is weighted by the total number of job postings in each metro. SOURCES: Lightcast; "The Future of Employment," by Carl Benedikt Frey and Michael Osborne, Oxford Martin School, working paper, 2017; "The Impact of Artificial Intelligence on the Labor Market," by Michael Webb, Stanford University dissertation, 2020; "How will Language Modelers like ChatGPT Affect Occupations and Industries," by Edward W. Felten, Manav Raj and Robert Seamans, available at SSRN, 2023; authors' calculations.

Conflicts of interest among oligarchs

- Producers of basic goods will continue to serve the whole market and benefit from replacing overhead skilled workers with AI
- Producers of more sophisticated goods may end up see their market base vanish
- Both UBI and Post-fordism are more likely to benefit the latter.
- Which is preferable?
- It depends on the decision process

The decisive oligarch paradigm

- Decisions coincide with the preferences of a decisive « oligarch »
- If decisive oligarch has a high enough j , it would disappear under AI
- But it could avoid that by setting a high enough tax rate on profits to finance UBI
- Despite such taxation, one can show that it is « typically » preferable to blocking AI (Post-fordism)
- This is due to « rectangular dominance »

Rectangular dominance

- Having some goods with positive overhead costs and less than total market share somewhat entails a profit loss (as well as a utilitarian welfare loss)
- One could save on fixed costs by having the same number of physical units sold but broken down among fewer varieties
- This is somewhat replicated by UBI, since all workers have the same total income
 - Hence, all industrial goods have a total market share

When would the decisive oligarch prefer PF?

- Profits are higher for the DO if he can pick a tax rate such that everybody will buy his good, instead of paying market skilled wage to overhead and have a less than full market share
- For PF to prevail, we need one of two things:
 - There is a limit to the tax rate that can be imposed under AI/UBI (upper or lower)
 - AI changes the balance of power and the identity of the decisive voter
 - Perhaps because the working class is more homogeneous and organized and weighs more in outcomes

The Lobbying paradigm

- Organized interests contribute to policies by offering a « menu auction »
- Policymakers select outcomes that maximize their lobbying revenues
- It is shown that the equilibrium outcome maximizes the aggregate utilitarian payoff of all the organized interests
 - Utilitarian social optimum if *everybody* is organized
- Here, assuming only oligarchs are organized, decision will maximize aggregate profits

Key results

- Under AI, aggregate profits are higher under no UBI
 - Taxing profits so that people purchase more goods cannot raise aggregate profits, only the profits of the « new » oligarchs
 - Hence industrialists who produce basic goods are able to outbid sophisticated ones to ban UBI
- Aggregate profits are higher under AI than under post-fordism
 - This is due again to rectangular dominance
 - Sophisticated ones are outbid by basic ones in their move to preserve the PF society

Outcome under lobbying

- The middle class collapses
- Business blocks redistribution
- A small number of firms sells a small range of basic goods to everybody
- Their profits are large due to an ICT-based technology
- It may be that a minimum level of redistribution remains
- In this case, lobbyists may maintain the PF solution