The power of creative destruction

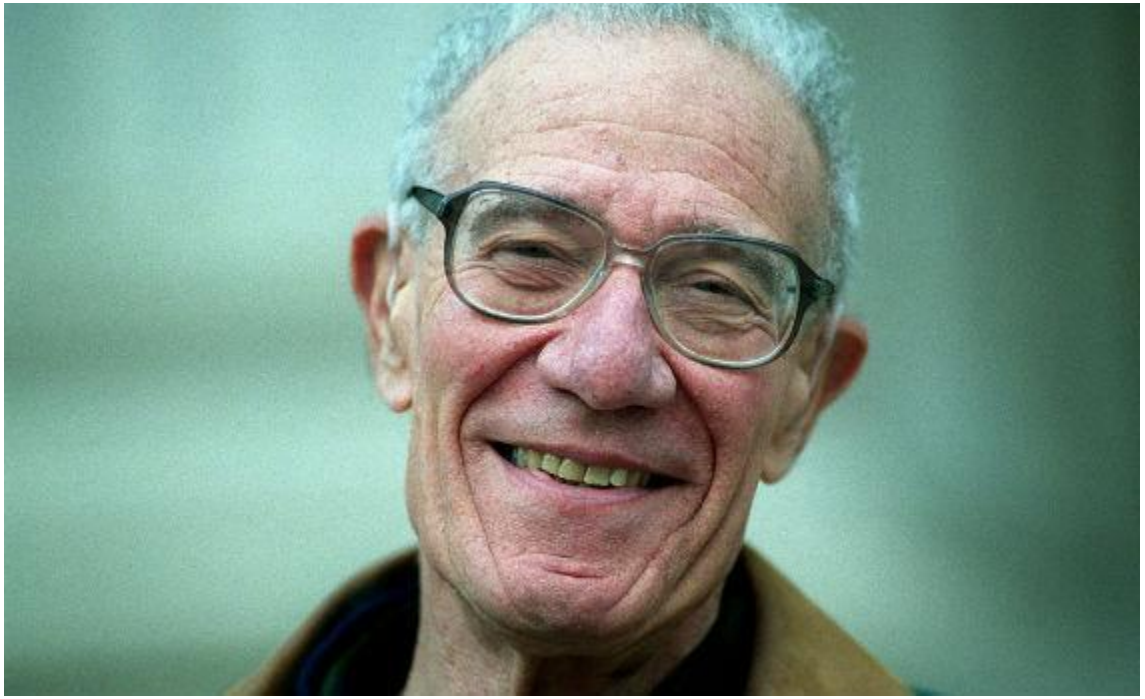
Philippe Aghion

March 2025

CREATIVE DESTRUCTION…

- Process whereby new innovations displace old technologies
  - Joseph Schumpeter in *Capitalism, Socialism et Democracy (1942)*

ROBERT SOLOW



A CONTRIBUTION TO THE THEORY OF ECONOMIC GROWTH

By Robert M. Solow

I. Introduction

All theory depends on assumptions which are not quite true. That is what makes it theory. The art of successful theorizing is to make the inevitable simplifying assumptions in such a way that the final results are not very sensitive.[1] A "crucial" assumption is one on which the conclusions do depend sensitively, and it is important that crucial assumptions be reasonably realistic. When the results of a theory seem to flow specifically from a special crucial assumption, then if the assumption is dubious, the results are suspect.

PETER HOWITT

BASIC "SCHUMPETERIAN GROWTH" PARADIGM

- Long-run growth driven by cumulative process of innovation
- Innovations result from entrepreneurial activities motivated by prospect of innovation rents
- Creative destruction: new innovations displace old technologies

AT THE HEART OF THE PARADIGM

- Contradiction :
  - The innovator is motivated by prospect of monopoly rents
  - But those rents can be used ex post to prevent future innovations and to block new entry

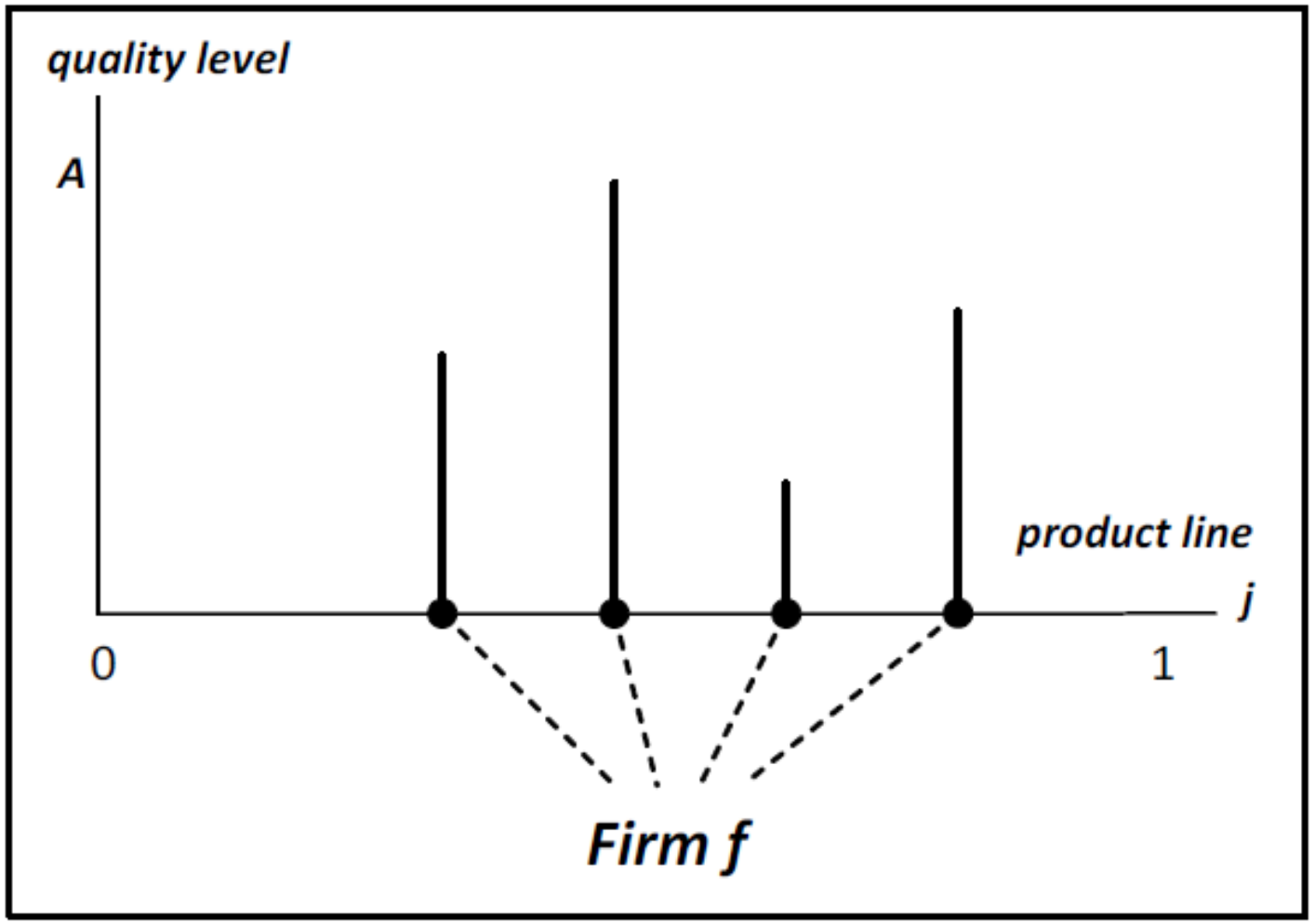
- Regulating capitalism is largely about how to manage this contradiction

WHY THIS PARADIGM CHANGES THE LANDSCAPE

- It gives centerstage to cross-firm heterogeneity
  - Between incumbents and entrants
  - Between leaders and followers
  - Between small and large firms

WHY THIS PARADIGM CHANGES THE LANDSCAPE

- It gives centerstage to firm dynamics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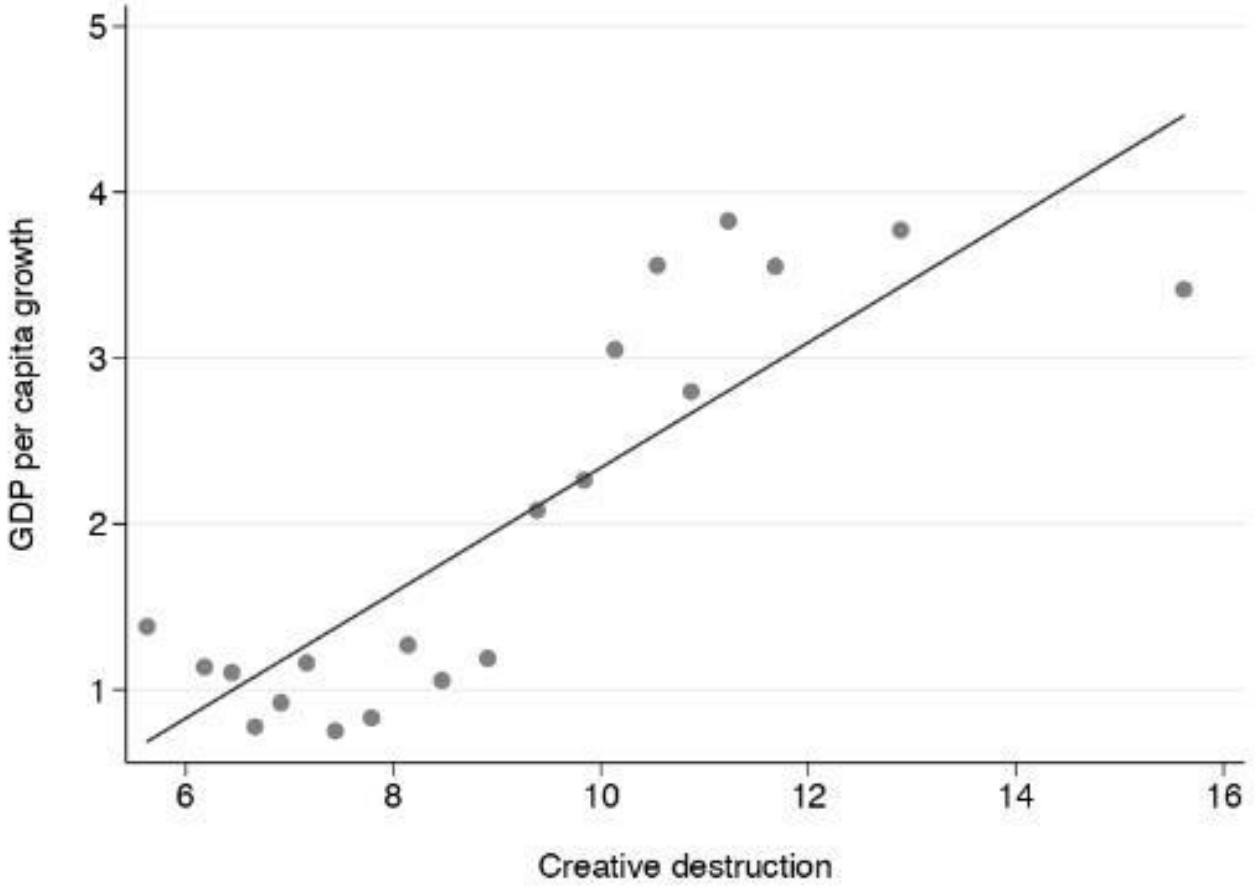
TWO DISTINCTIVE PREDICTIONS

SOME DISTINCTIVE PREDICTIONS

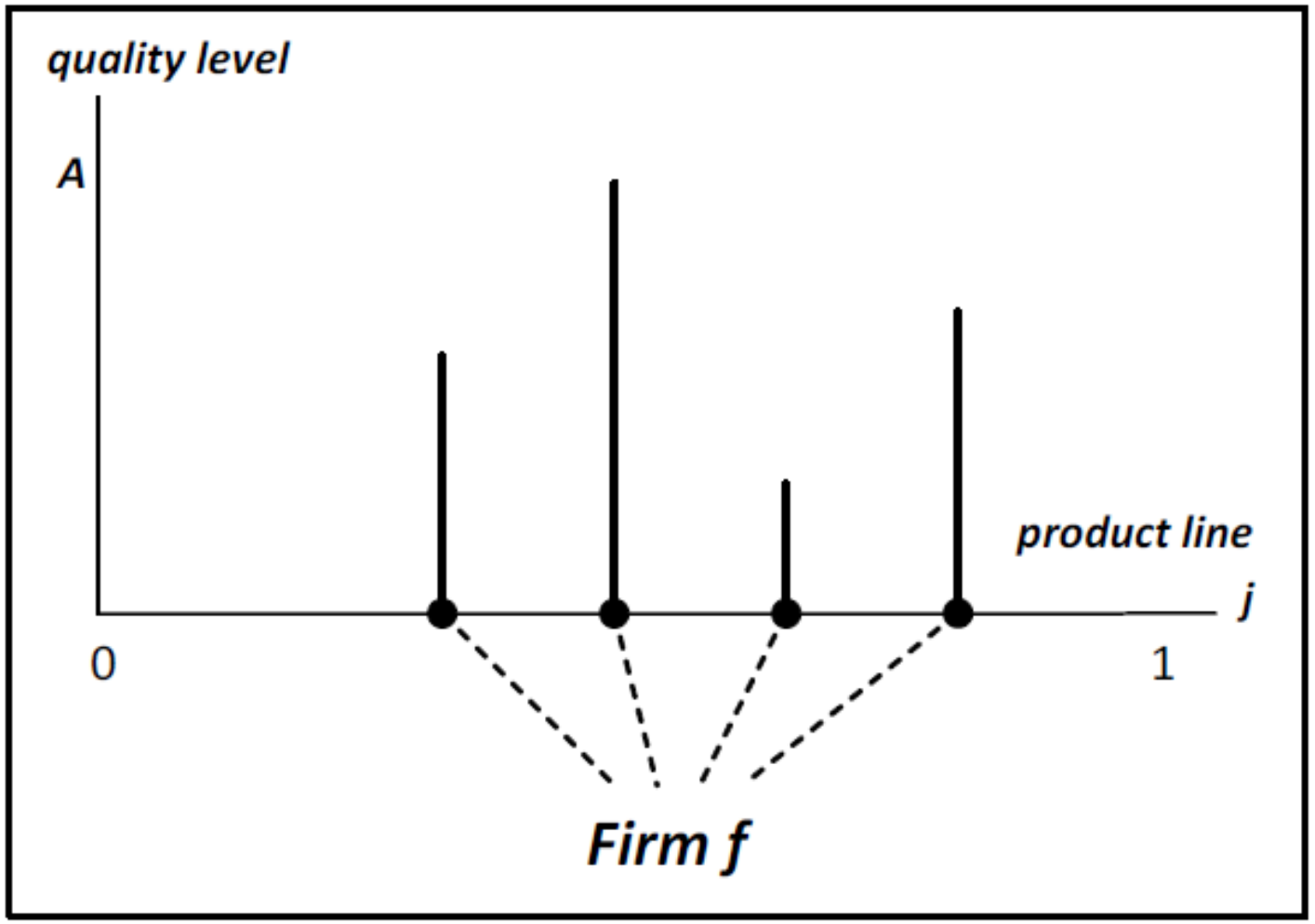
- **Growth is positively correlated with firm turnover**
- More intense competition enhances innovation in « frontier » firms but discourages it in « non-frontier » firms

GROWTH AND TURNOVER

- Firm and job turnover



Positive correlation between GDP per capita growth and the rate of creative destruction.
Source: Eurostat.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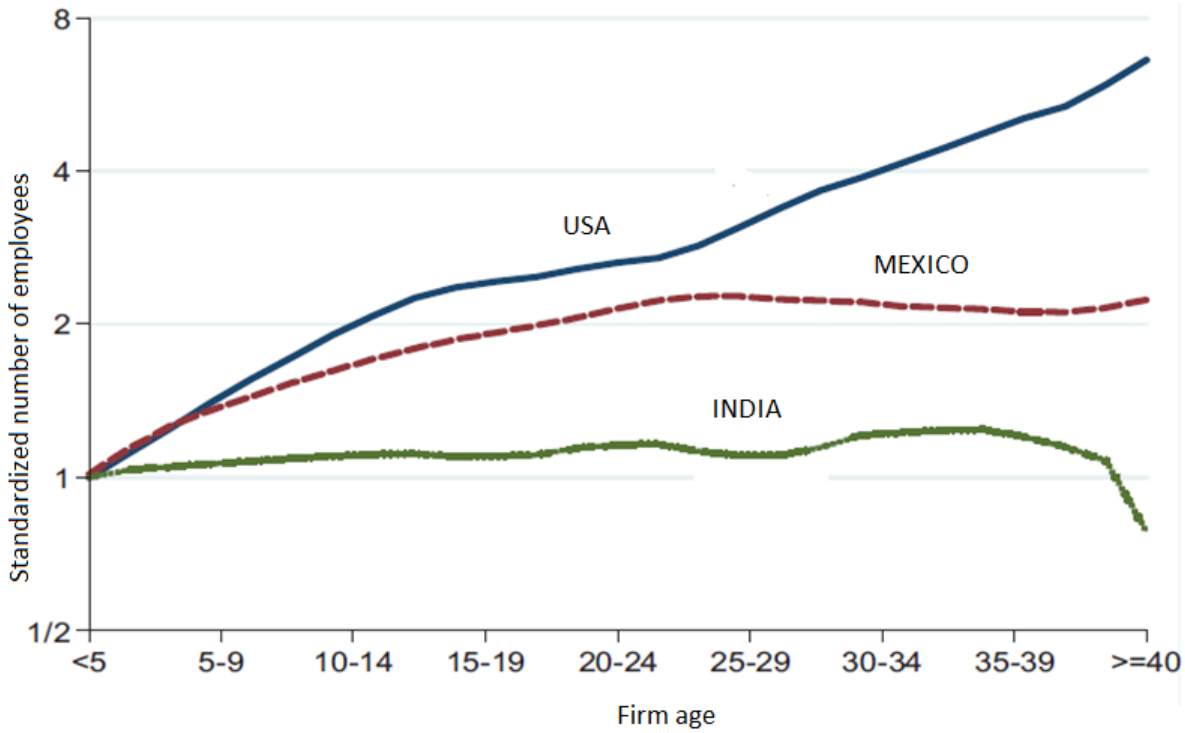
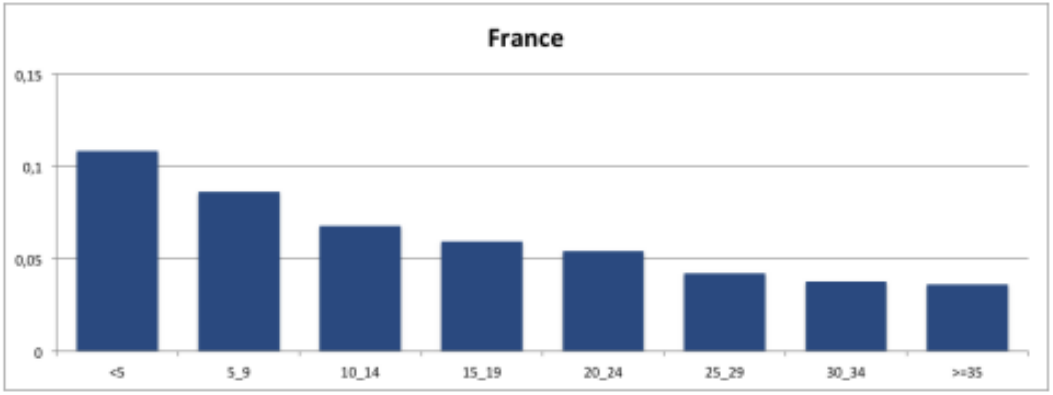
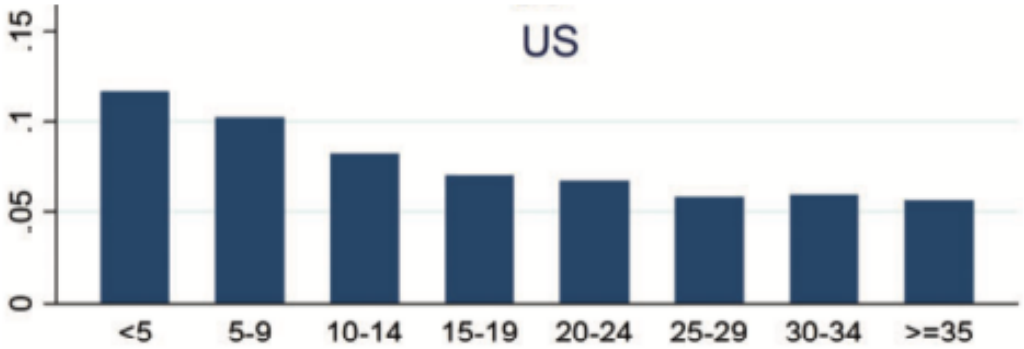
LINK BETWEEN THE AGE AND THE SIZE OF FIRMS



EXIT RATE BY AGE

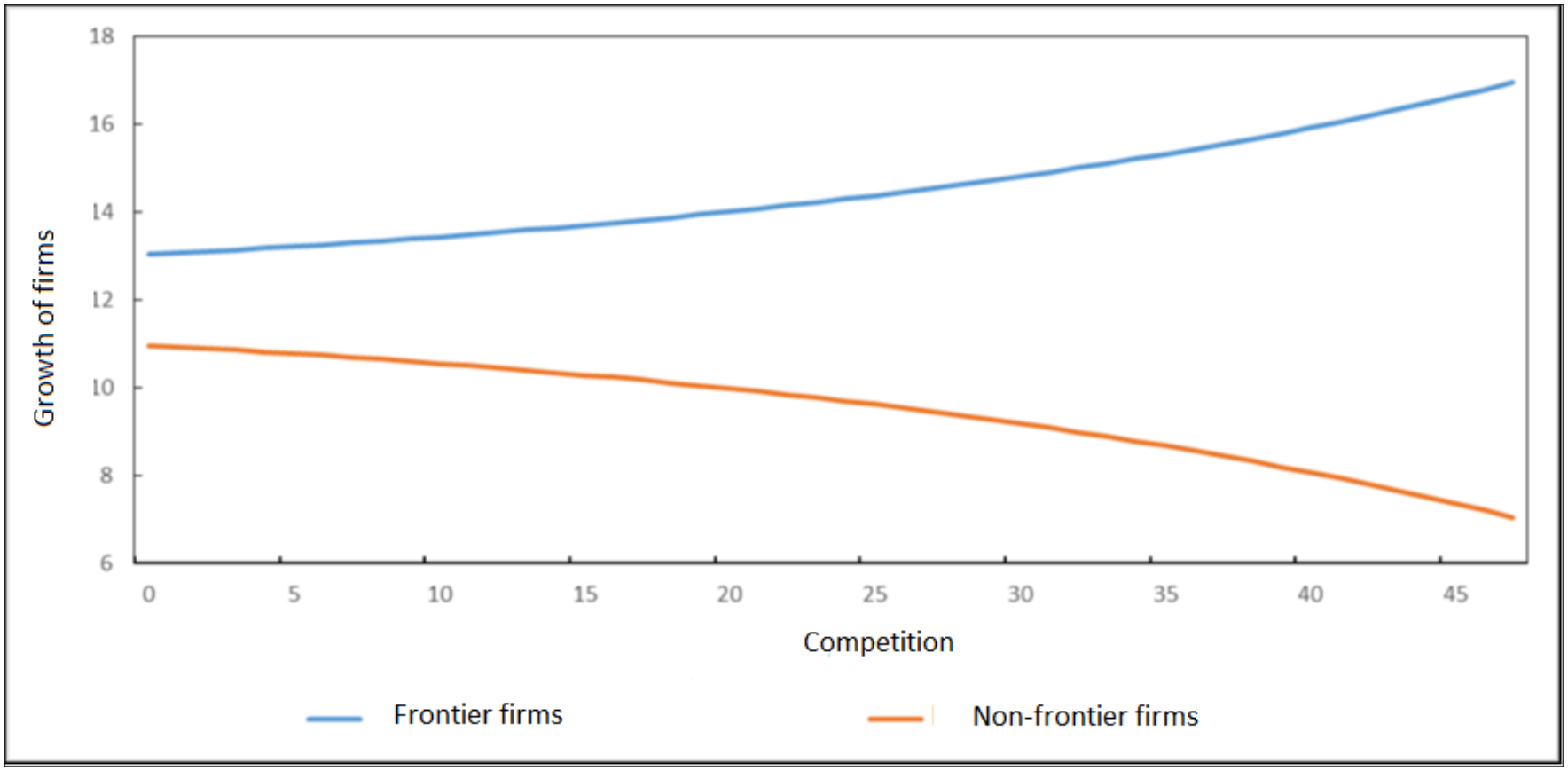




SOME DISTINCTIVE PREDICTIONS

- Growth is positively correlated with firm turnover
- **More intense competition enhances innovation in « frontier » firms but discourages it in « non-frontier » firms**

COMPETITION, GROWTH AND DISTANCE TO FRONTIER



IN THIS LECTURE, WE USE THE LENS OF CREATIVE DESTRUCTION TO…

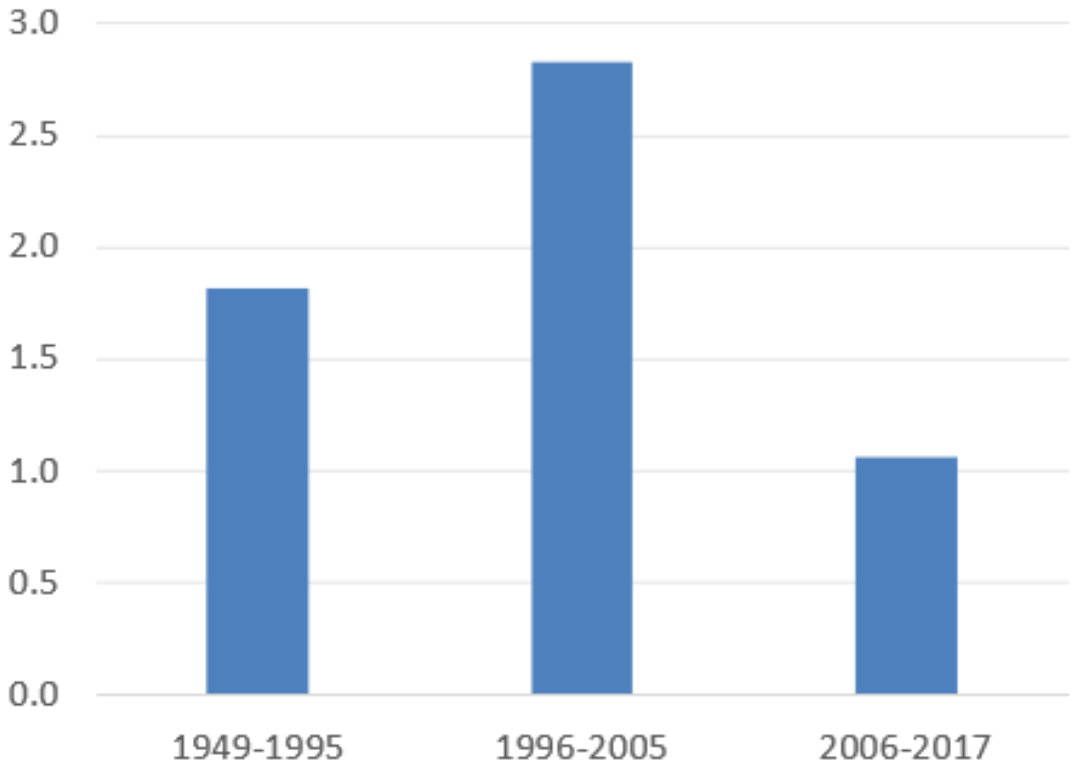
- Revisit some main ***enigmas in economic history***
- Question some ***common wisdoms***
- Rethink ***the future of capitalism***

SOME HISTORICAL ENIGMA

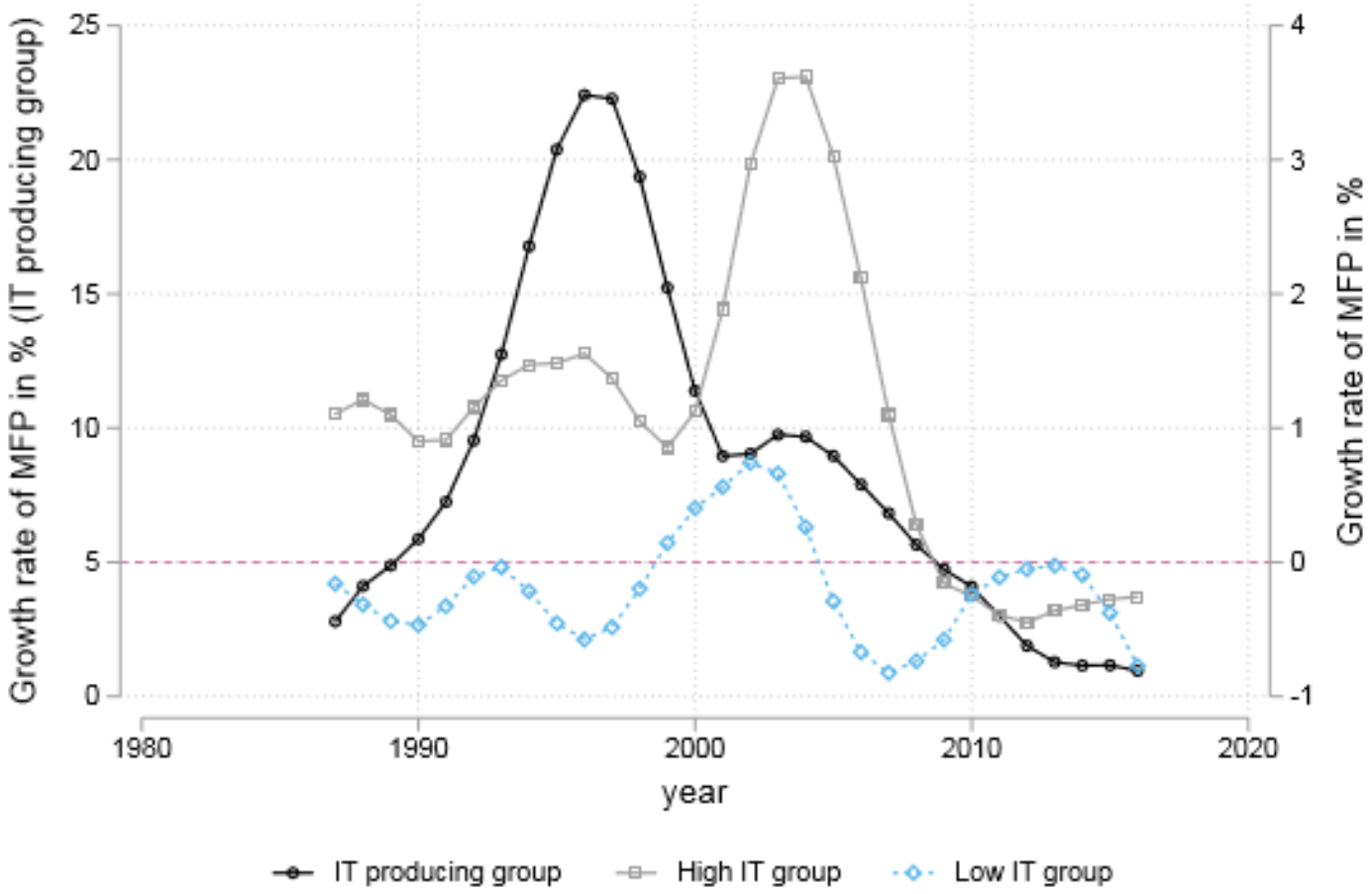
SOME HISTORICAL ENIGMA

- **Secular stagnation**
- Sources and dynamics of inequality

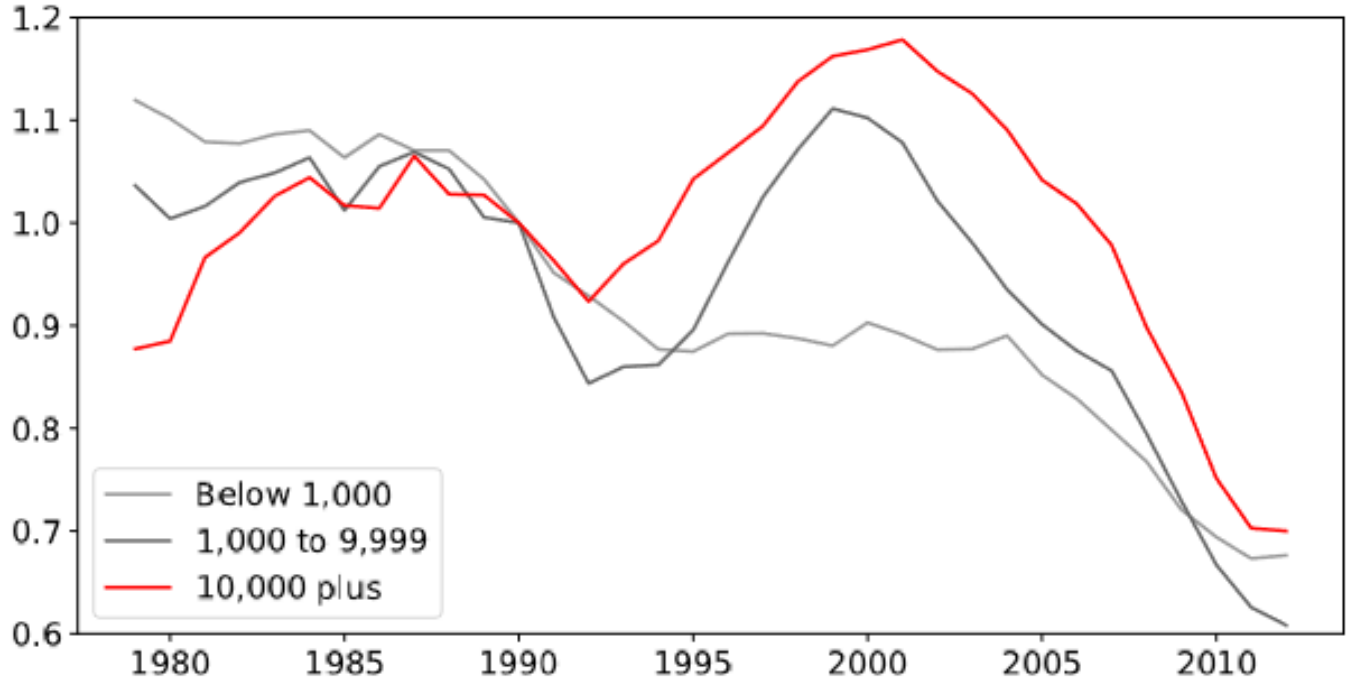
Rise and Decline in TFP Growth



TFP Growth by IT intensity

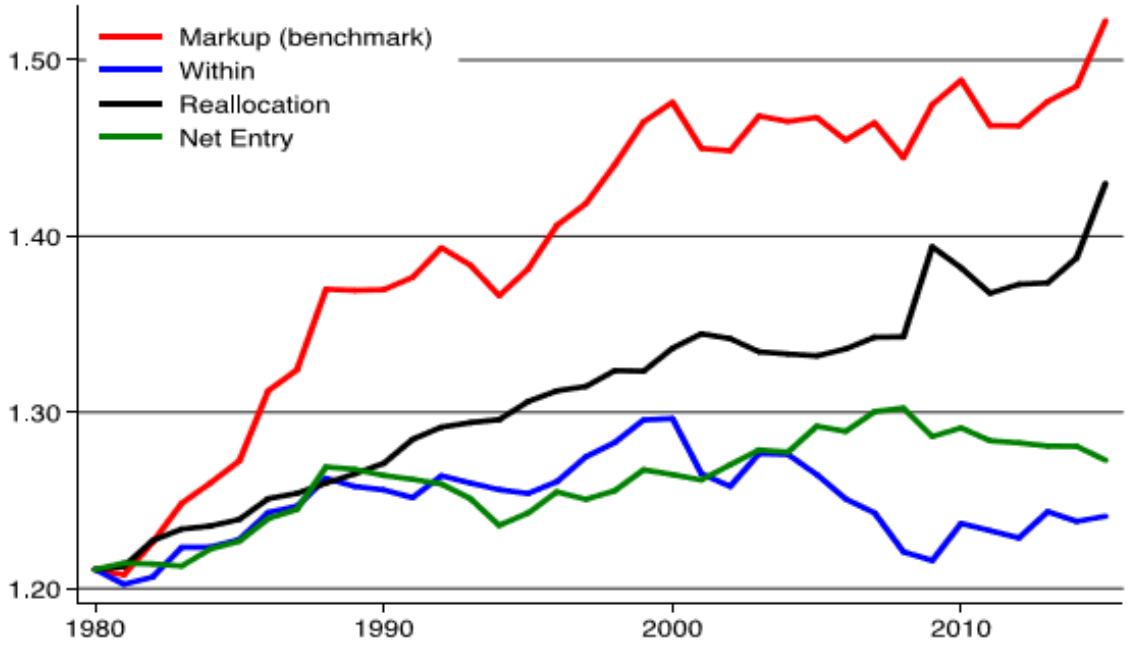


Rise and decline in employment-weighted plant entry rate



Source: U.S. Census Bureau's *Business Dynamics Statistics*. Job creation by birth over total employment by firm size bins. 5-year centered moving average.

Within firm markups



Source: De Loecker, Eeckhout and Unger (2018).

AI AND GROWTH

AI should boost productivity growth as it automates both, the production of goods and services and the production of ideas (Aghion, Jones and Jones)

AI AND GROWTH: EXTRAPOLATING FROM PREVIOUS GPTS

- Extrapolating from previous GPTs lead to anticipating an increase in productivity growth between 1.3 percentage points (electricity revolution) and 0.8 percentage points (It revolution) over the next ten years.

AI AND GROWTH: TASK-BASED APPROACH

- Acemoglu (2024) relies on a task-based model (Acemoglu and Restrepo, 2018) to estimate the effects of AI on TFP and concludes to an increase of 0.07 percentage point in annual TFP growth over the coming decade

$$\begin{aligned}\text{TFP gains over 10 years} = {} & \text{GDP share of tasks that are exposed to AI} \\ & \text{x Share of exposed tasks for which AI would be profitable} \\ & \text{x Labor cost savings enabled by AI} \\ & \text{x Labor Share adjusted for AI exposure}\end{aligned}$$

$$\text{Annual TFP gains} = \underbrace{ExpAI}_{0.199} \text{ x } \underbrace{ProfitableAI}_{0.23} \text{ x } \underbrace{LaborCostSavingsAI}_{0.27} \text{ x } \underbrace{LaborShareAI}_{0.57} \text{ x10} = 0.07\%$$

TFP GAINS OVER 10 YEARS

- Given the existing literature, we conclude that annual productivity growth should be in the **interval [0.08pp; 1.24pp] over 10 years**

Median scenario:

- **Increase in productivity growth of 0.68pp/year over 10 years**, an effect of the same magnitude as what the extrapolation from previous GPTs would predict

AI AND GROWTH

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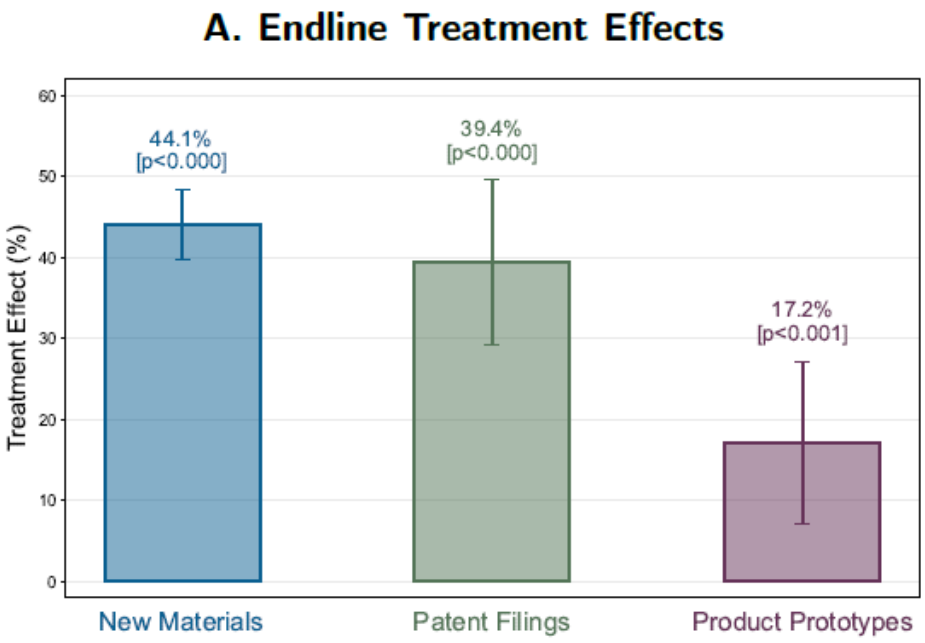
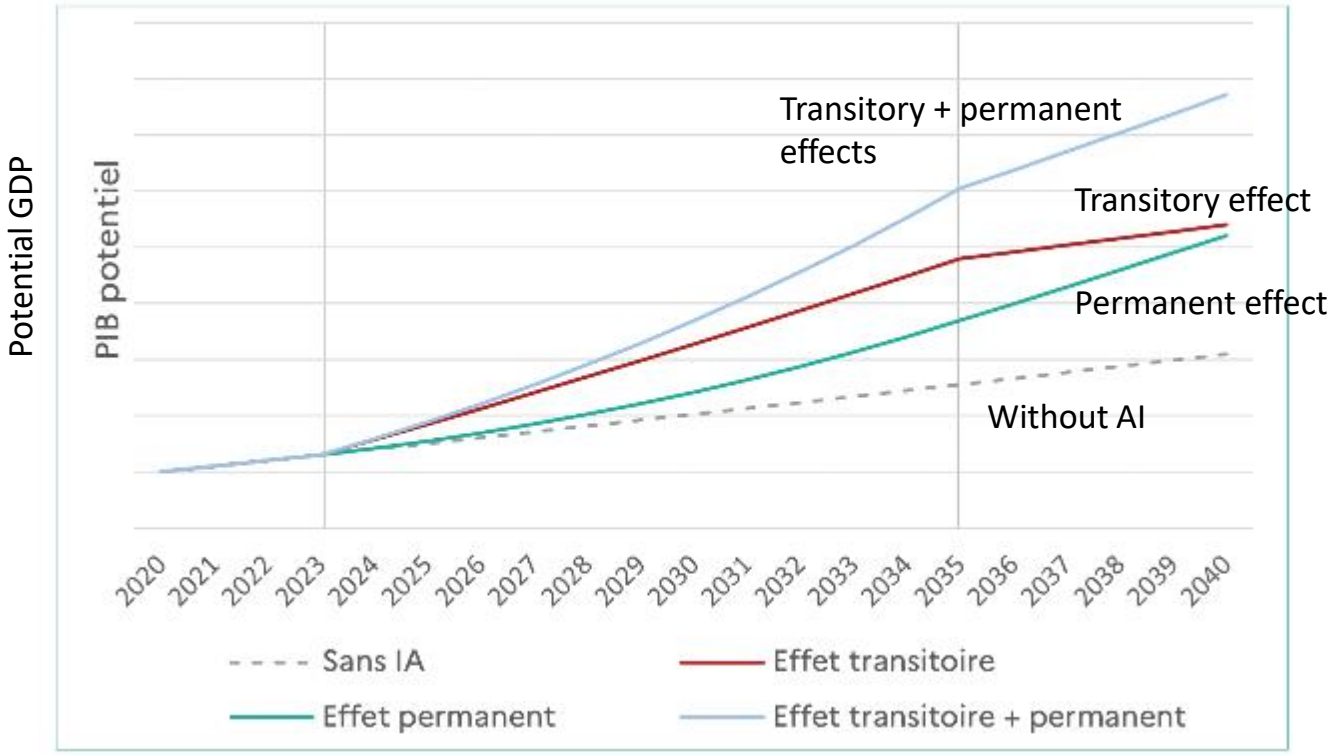

A. Endline Treatment Effects
Treatment Effect (%)
60
50
40
30
20
10
0
44.1%
[p<0.000]
39.4%
[p<0.000]
17.2%
[p<0.001]
New Materials
Patent Filings
Product Prototypes

AI AND GROWTH: AI MAKES IDEAS EASIER TO FIND

Total expected effects of AI adoption on growth

(Report of Ministry of Economics, Finance and Industrial and Digital Sovereignty)



Graphique 3 : Effets totaux attendus de l'adoption de l'IA sur la croissance.

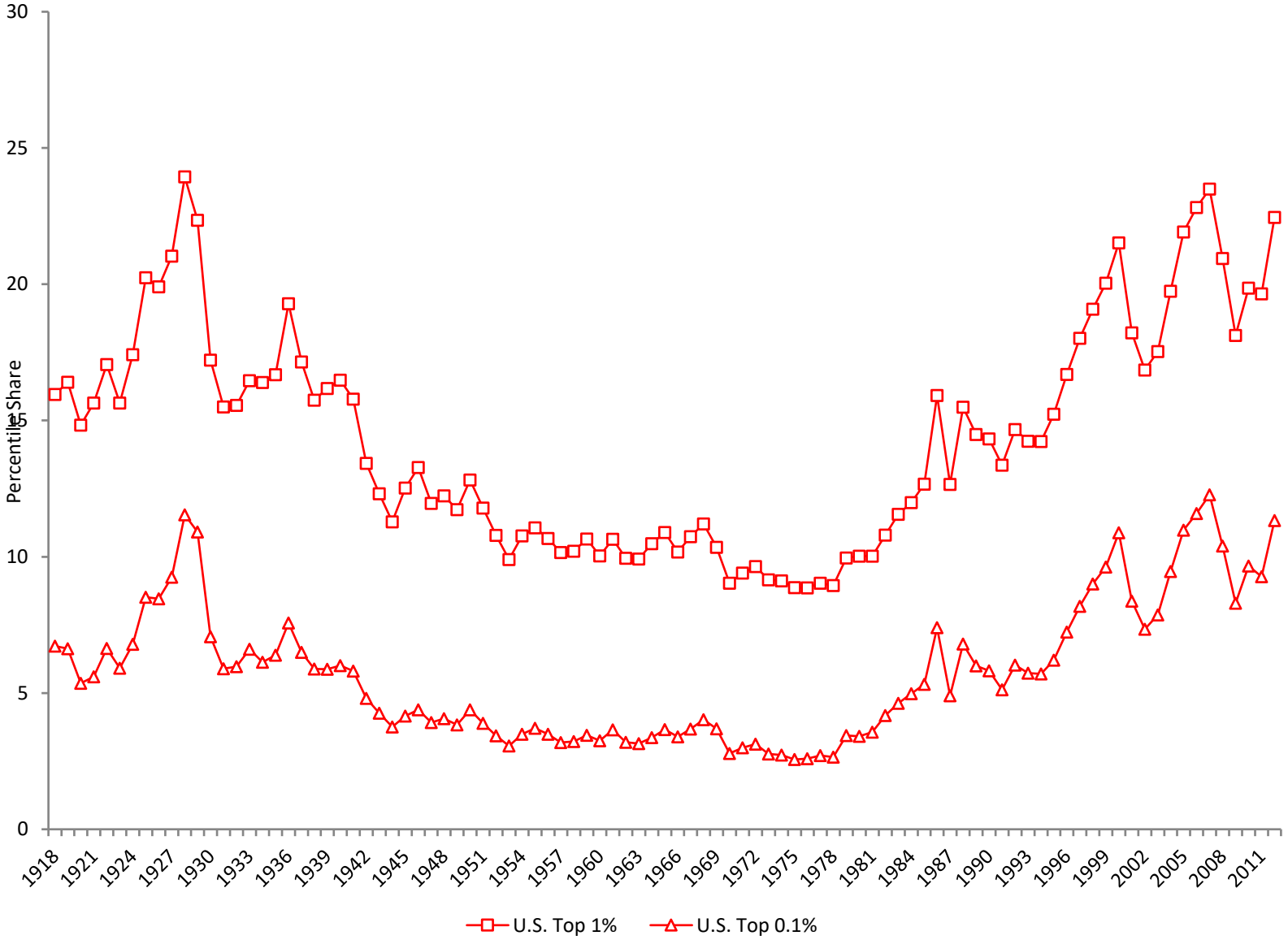
AI AND GROWTH

- AI has a high growth potential
- But inappropriate competition policy may hamper it
  - In particular the Cloud is dominated by three superstar firms: Amazon, Google, Microsoft
  - Only one big actor (GPU) on the market for graphic processes

SOME HISTORICAL ENIGMA

- Secular stagnation
- **Sources and dynamics of inequality**

Income shares at the very top over last 100 years: US top 1% increases from 9% in 1978 to 22% in 2012



Source: Atkinson, Piketty & Saez; High Income Database

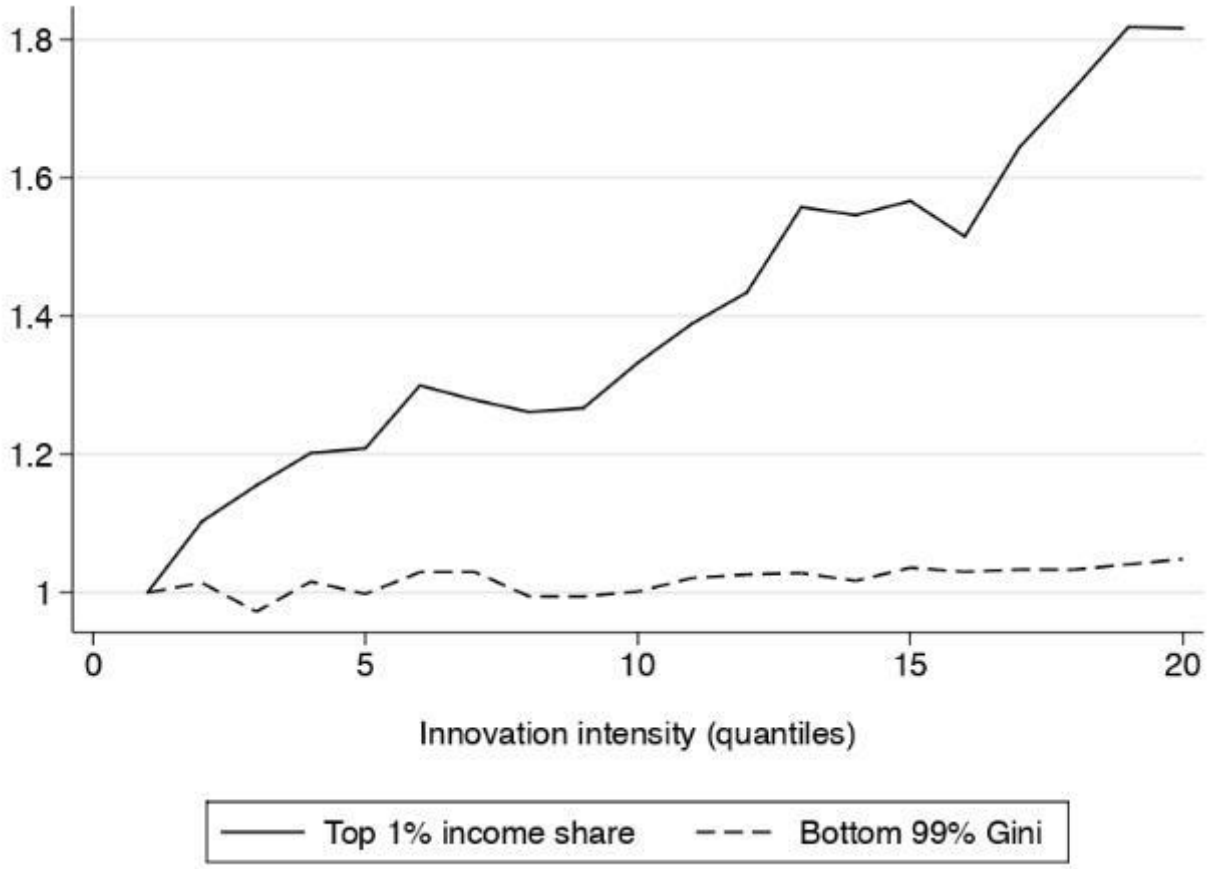
INNOVATION:

Innovation increases top income inequality

(Entrant) Innovation increases social mobility

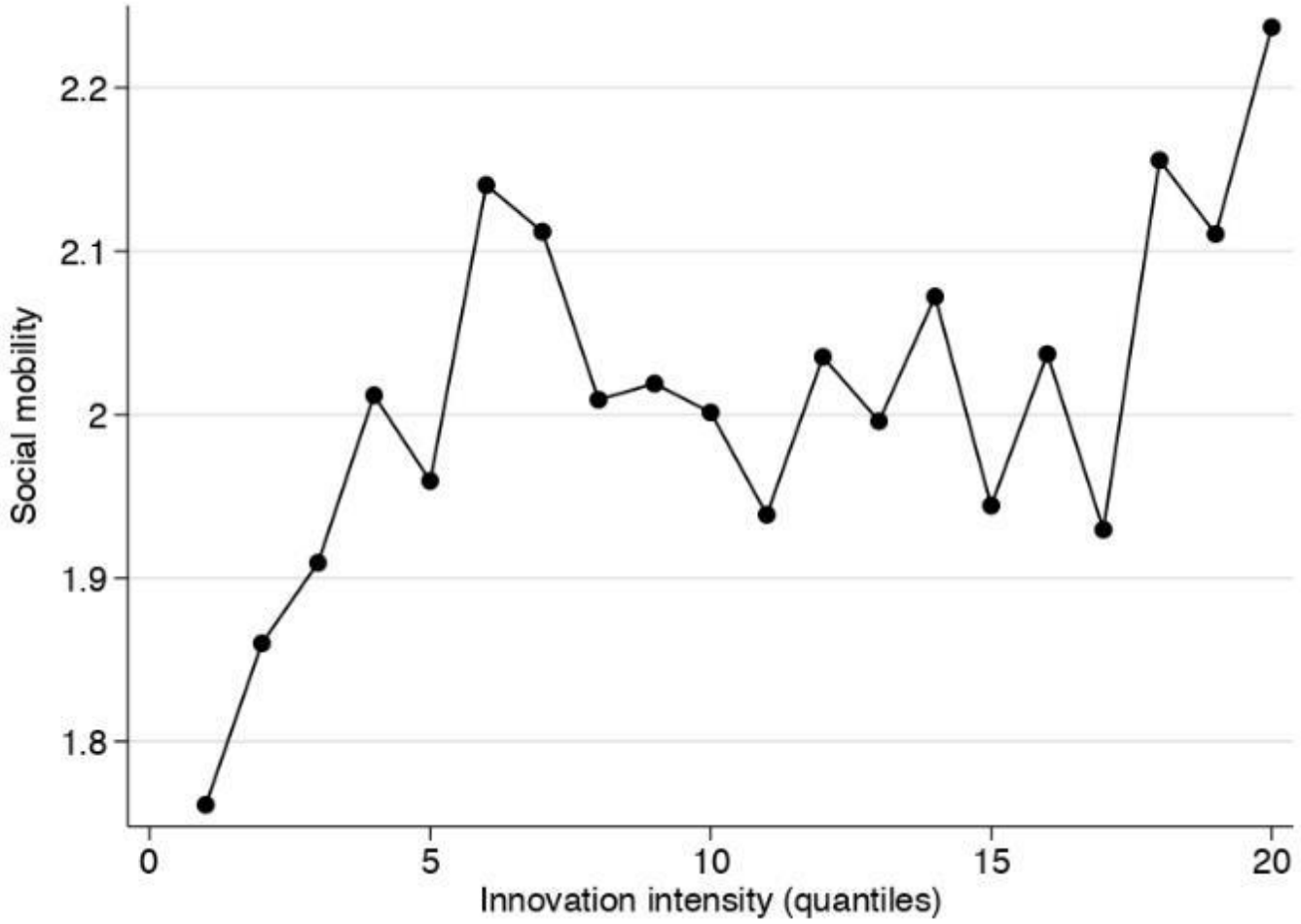
Innovation does not increase broad inequality

INNOVATION AND INEQUALITY



Innovation, top 1% income share and Gini coefficient.
Source: Aghion, Akcigit, Bergeaud, Blundell, Hemous (2018)

INNOVATION AND SOCIAL MOBILITY



Innovation and Social Mobility
Source: Aghion, Akcigit, Bergeaud, Blundell, Hemous (2018)

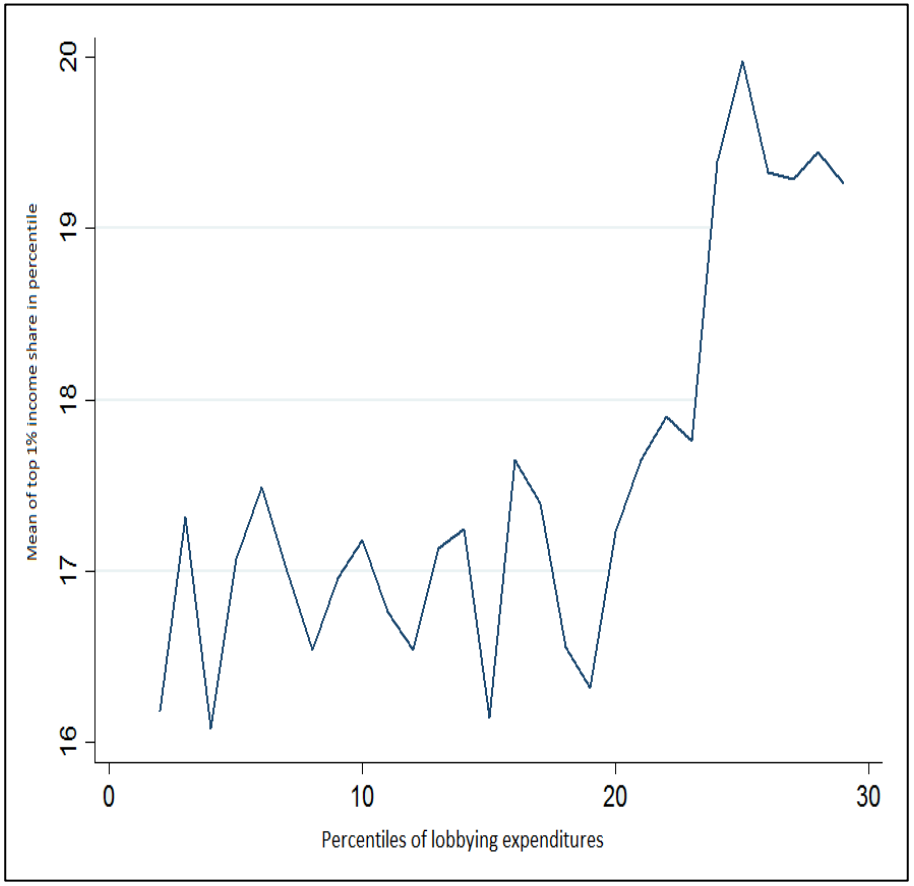
BY CONTRAST, LOBBYING..

Reduces social mobility

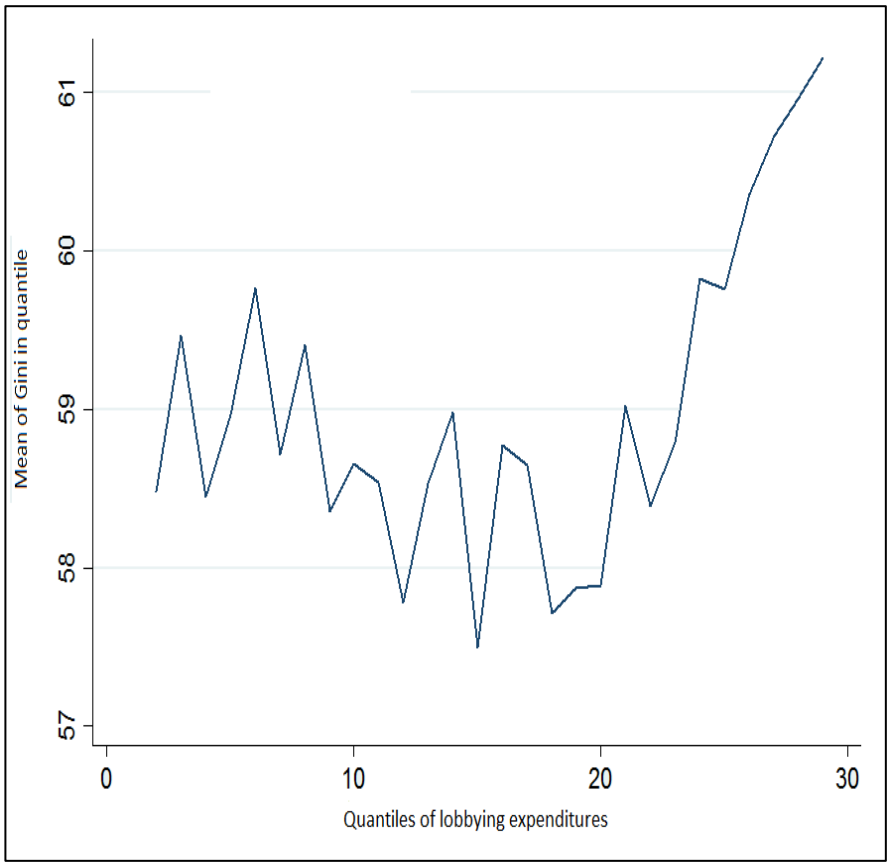
Increases broad inequality

Steve Jobs versus Carlos Slim

Lobbying VS Top1% (USA)



Lobbying VS GINI (USA)



QUESTIONING COMMON WISDOMS

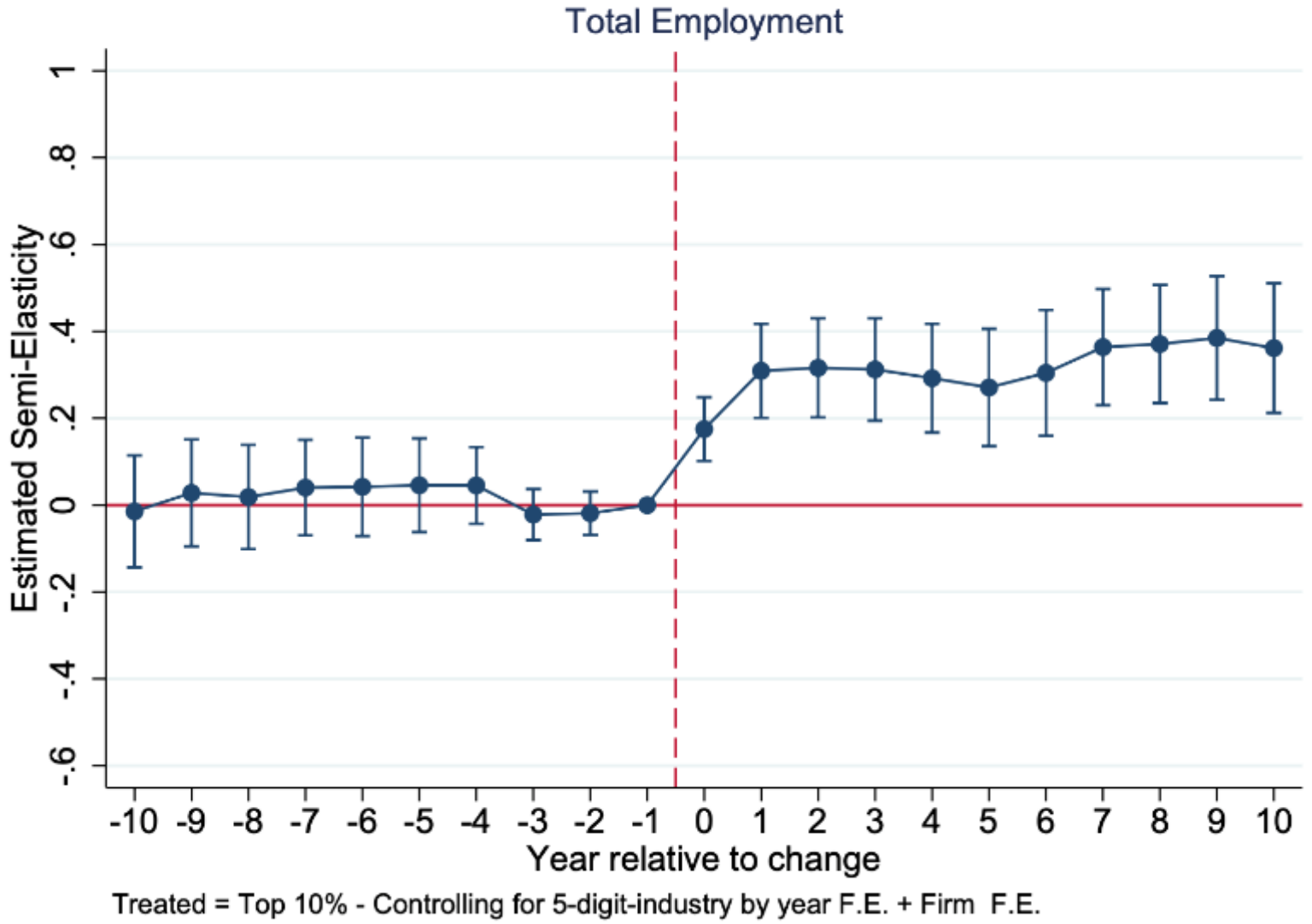
QUESTIONING COMMON WISDOMS

- **Taxing robots protects employment**

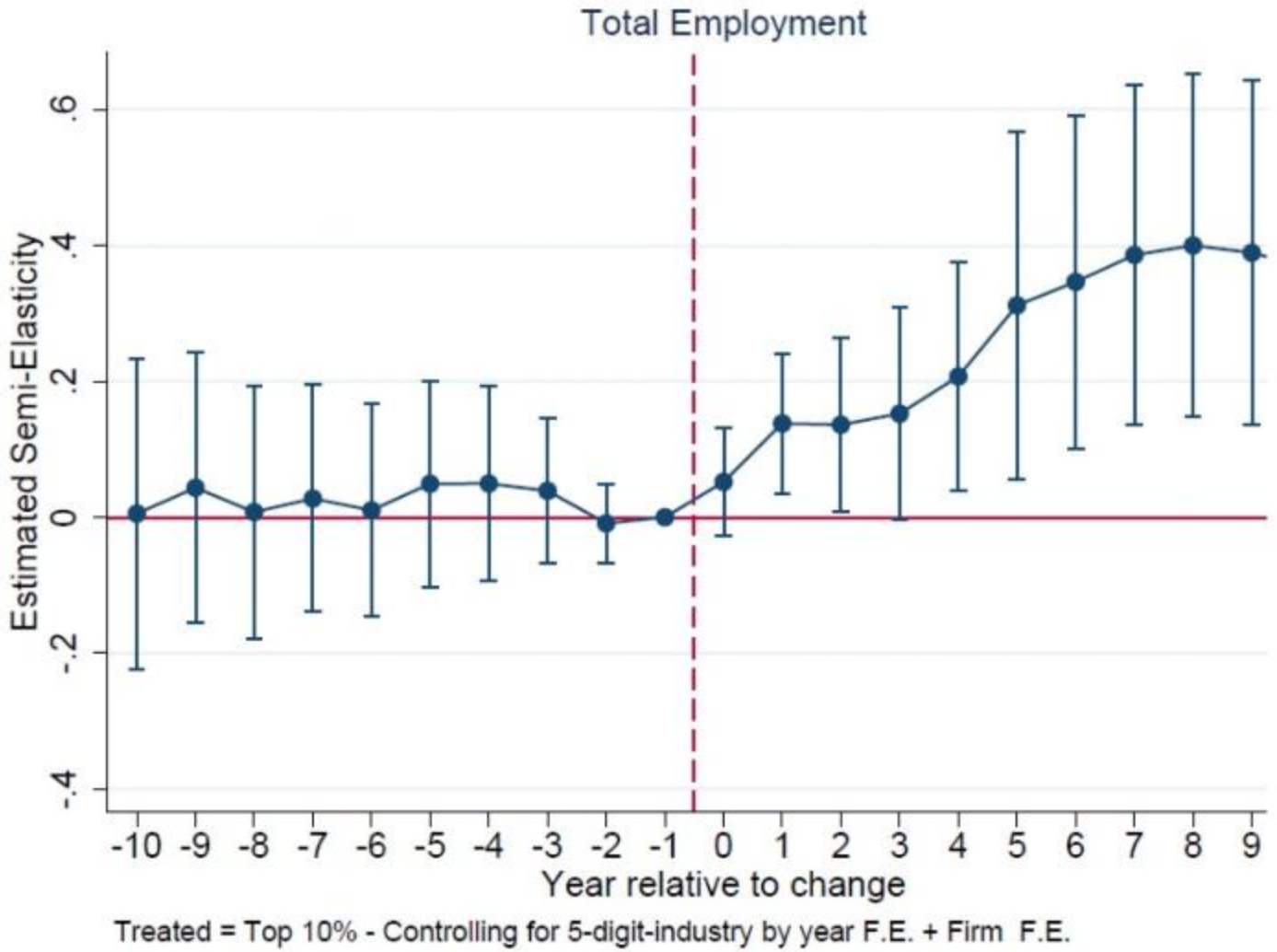
AUTOMATION AND EMPLOYMENT

- Aghion, Antonin, Bunel and Jaravel (2021)

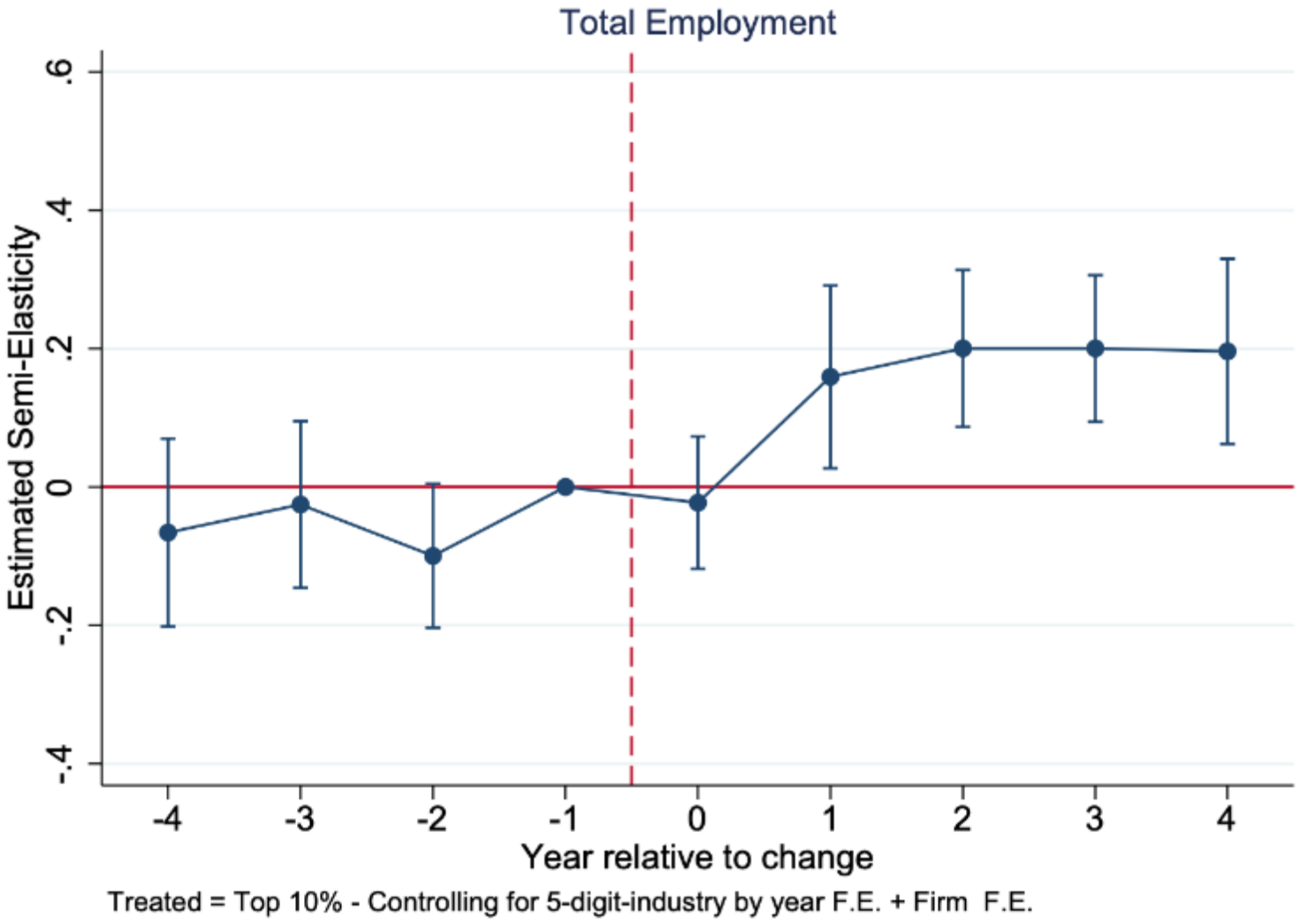
A. 90th percentile of investment in industrial equipment



Panel A: Acemoglu and Restrepo (2022)'s Automation Measure

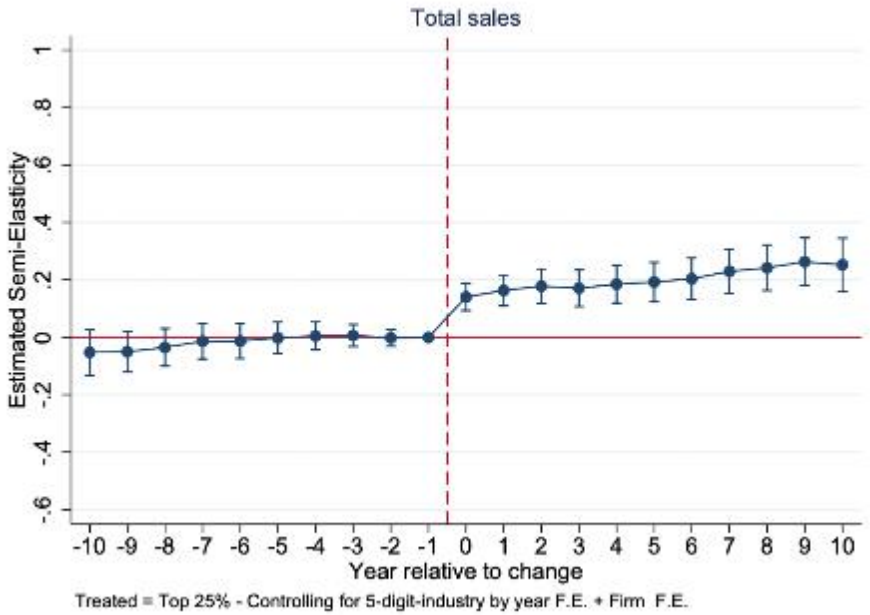


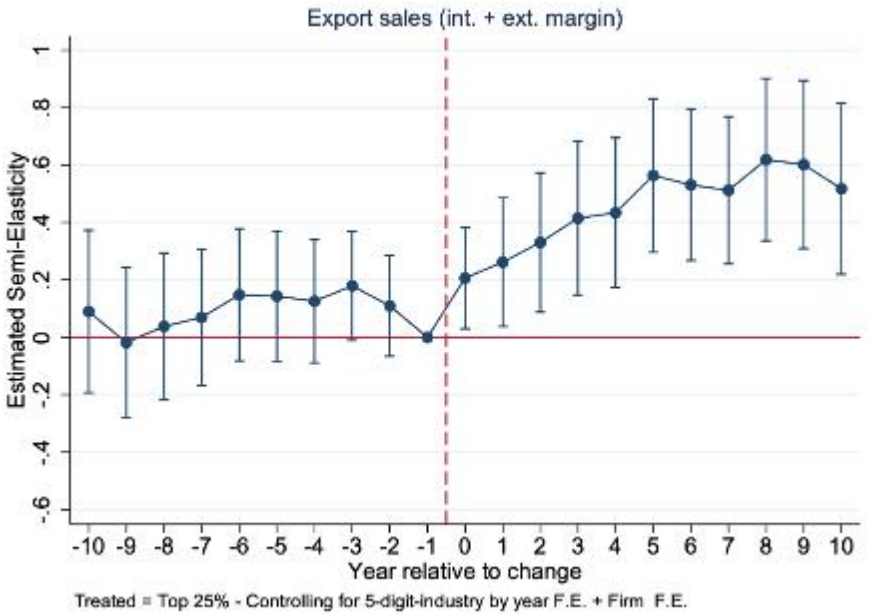
Panel B: Robots



Treated = Top 10% - Controlling for 5-digit-industry by year F.E. + Firm F.E.

LARGE IMPACT ON SALES AND EXPORTS





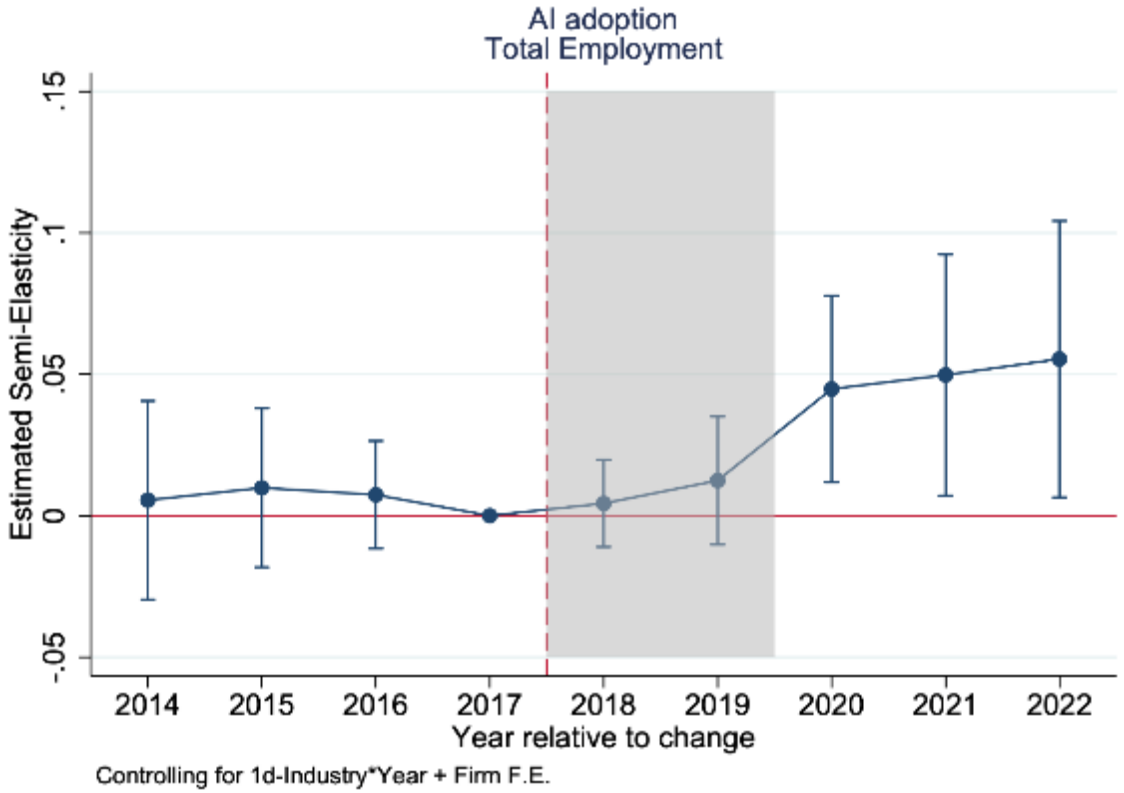
AI AND EMPLOYMENT

Are things different for AI ?

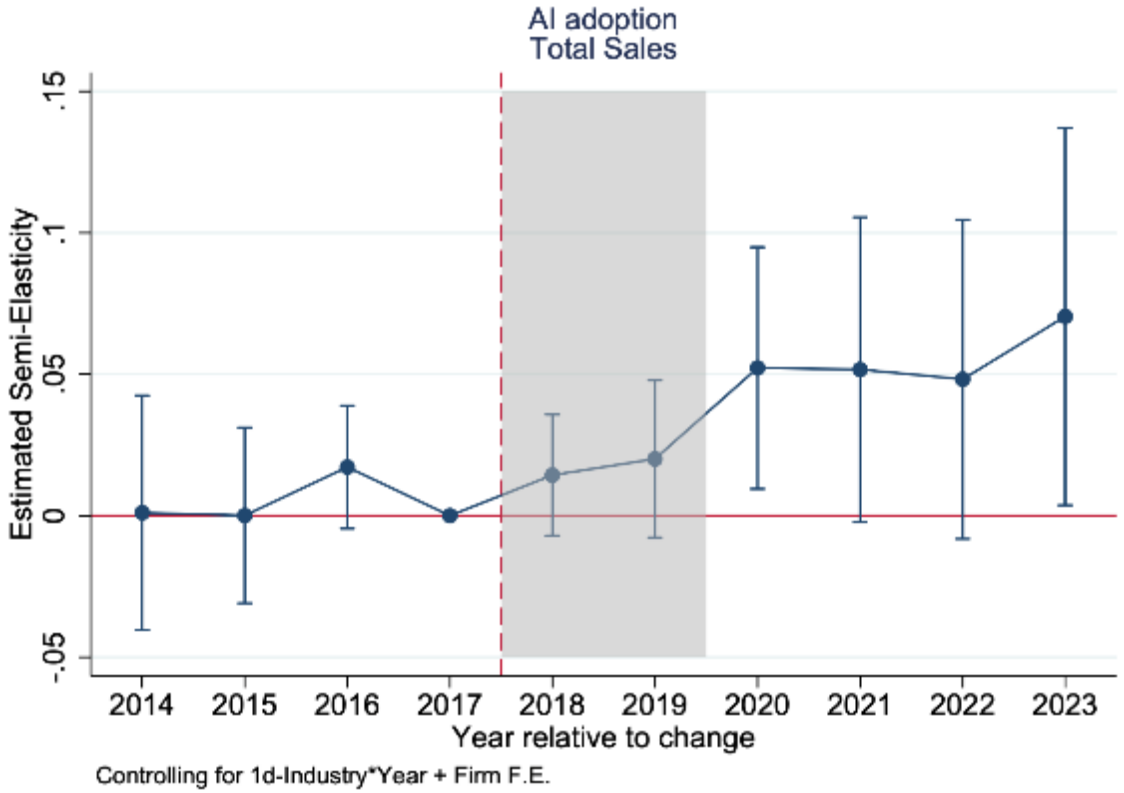
AI AND EMPLOYMENT

- French « Information and Communication Technologies in business » survey
- Specific questions on AI adoption in 2018 and 2021 surveys
- Random survey covering 9000 representative firms with more than 50 employees
- Event studies comparing between firms that adopt « some » AI between 2017 and 2020, and similar firms that do not adopt AI at all before 2020
- 232 firms in treatment group: adopt AI between 2017 and 2020
- 636 firms in control group: do not adopt AI before 2020

AI AND EMPLOYMENT

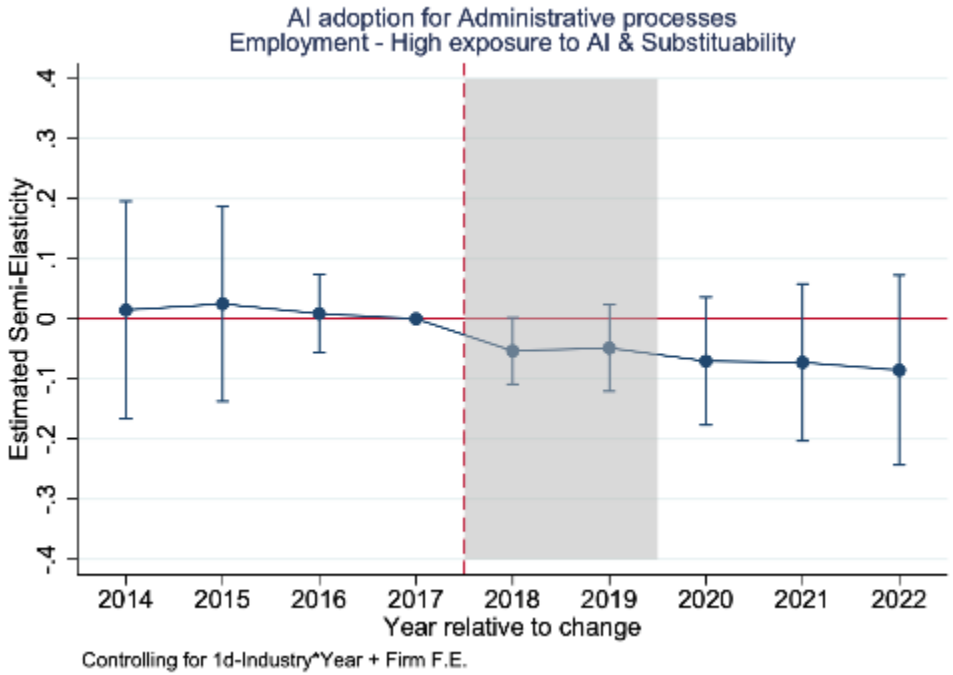


AI AND SALES


AI adoption
Total Sales
Estimated Semi-Elasticity
.15
.1
.05
0
-.05
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
Year relative to change
Controlling for 1d-Industry*Year + Firm F.E.

AI AND EMPLOYMENT

- Effect of AI adoption for administrative purposes on highly exposed & *a priori* substitutable employment (executive secretary, administrative service, etc.)



AI AND EMPLOYMENT: THE « TASKS » APPROACH (ILO)

- *Generative AI and jobs: A global analysis of potential effects on job quantity and quality,* Paweł Gmyrek, Janine Berg, David Bescond, ILO Working Paper 96, 2023

Idea :

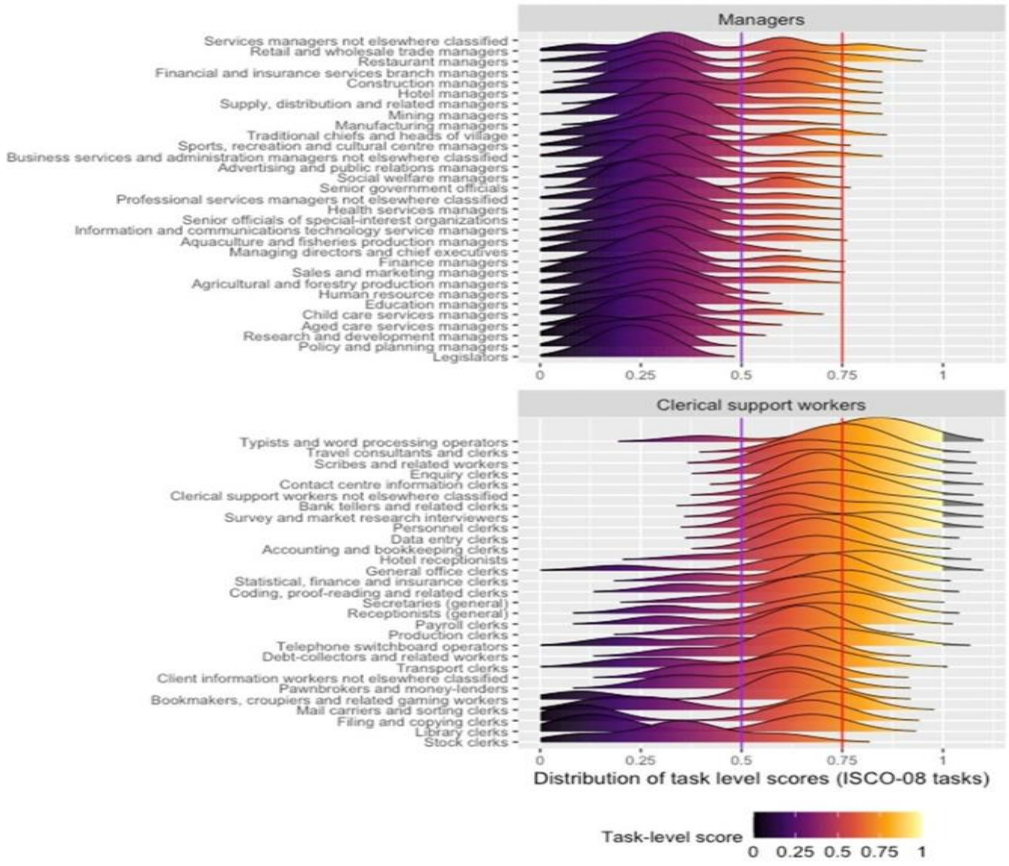
- Analyze the exposure of various tasks and jobs to *generative AI*, more precisely to *Generative Pre-Trained Transformers* (GPTs)

REPLACEMENT SCORE

- For each task :
  - Score less than 0.5 : small replacement risk
  - Score between 0.5 and 0.75 : medium replacement risk
  - Score above 0.75 : high replacement risk

AI AND EMPLOYMENT: THE « TASKS » APPROACH (ILO)

► **Figure 3. Box plot of task-level scores by ISCO 4d, grouped by ISCO 1d**



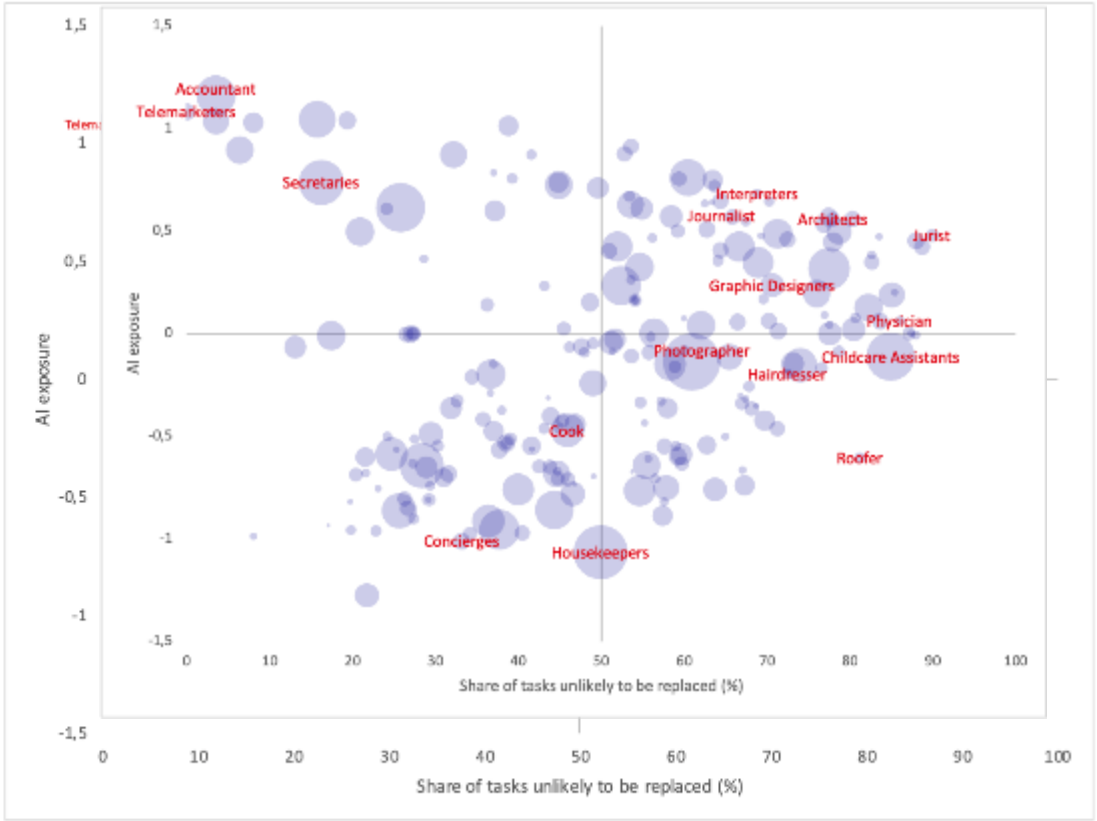
- Managers
- Clerks

AI AND EMPLOYMENT: THE « TASKS » APPROACH IN FRANCE

High exposure

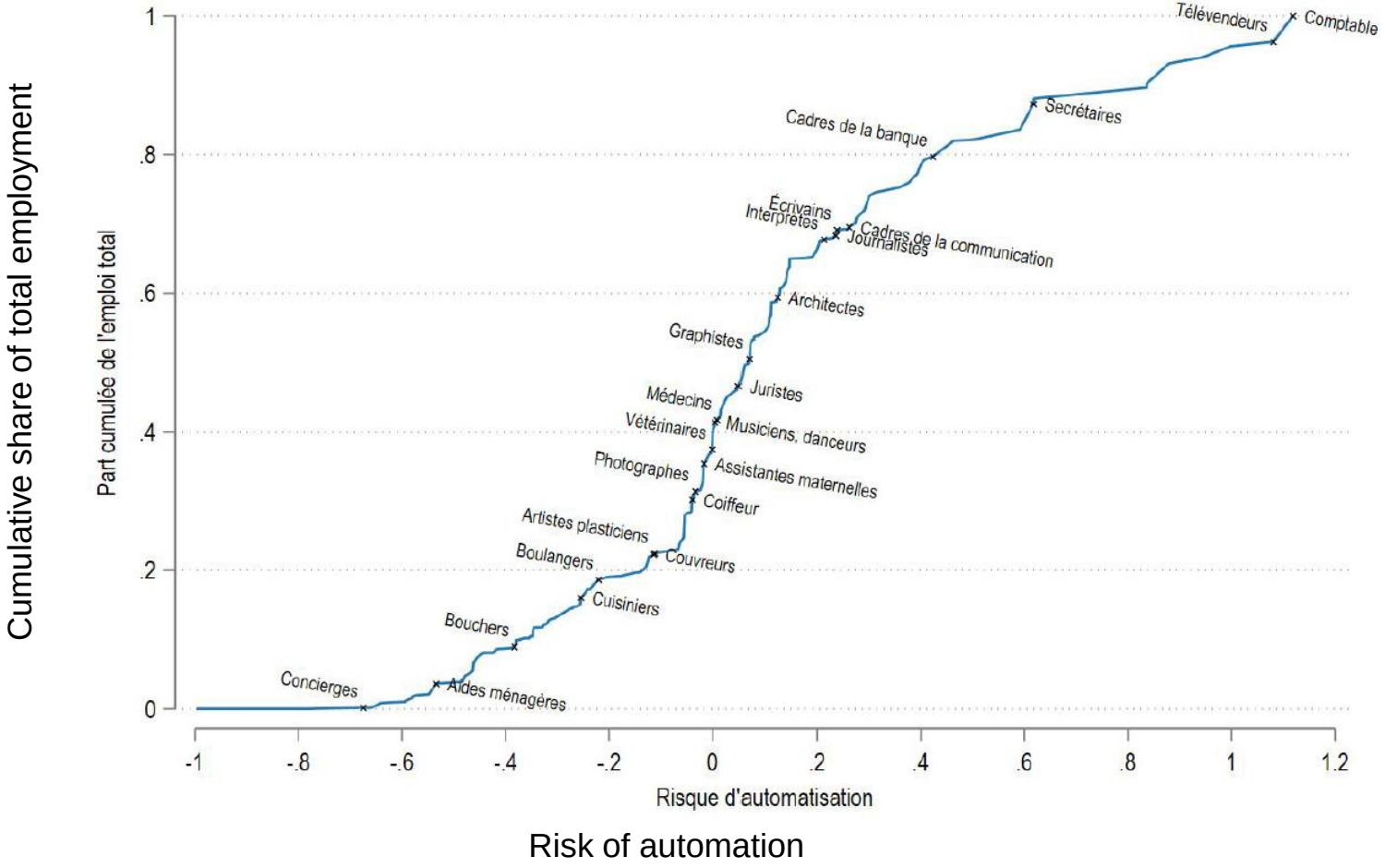
↑

Low exposure

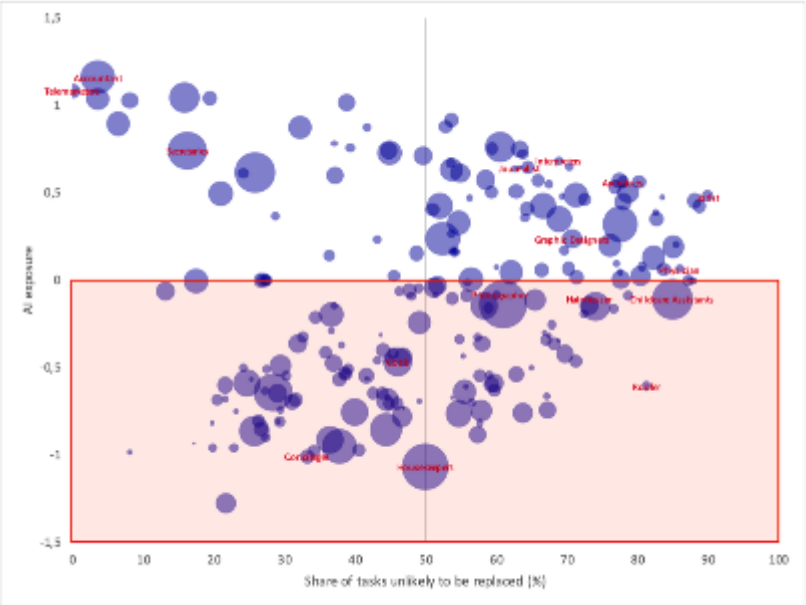


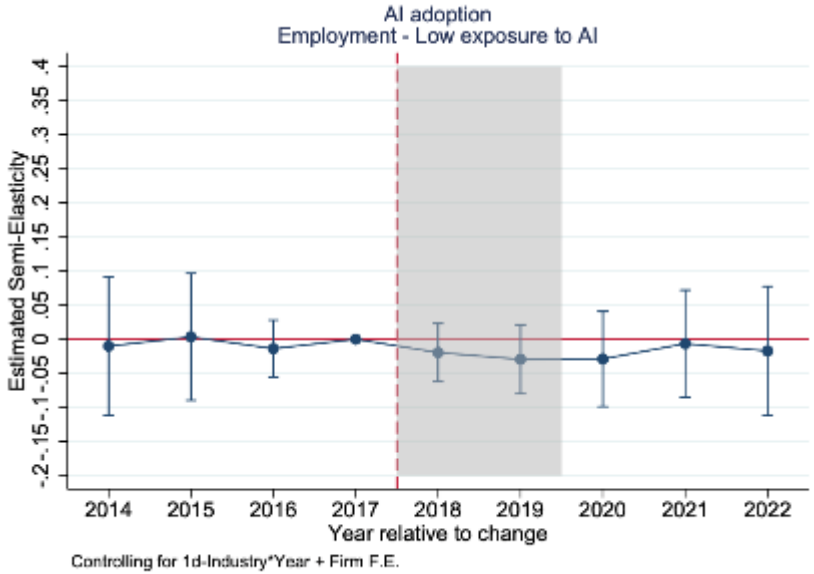
Substitutability → Complementarity

AI AND EMPLOYMENT



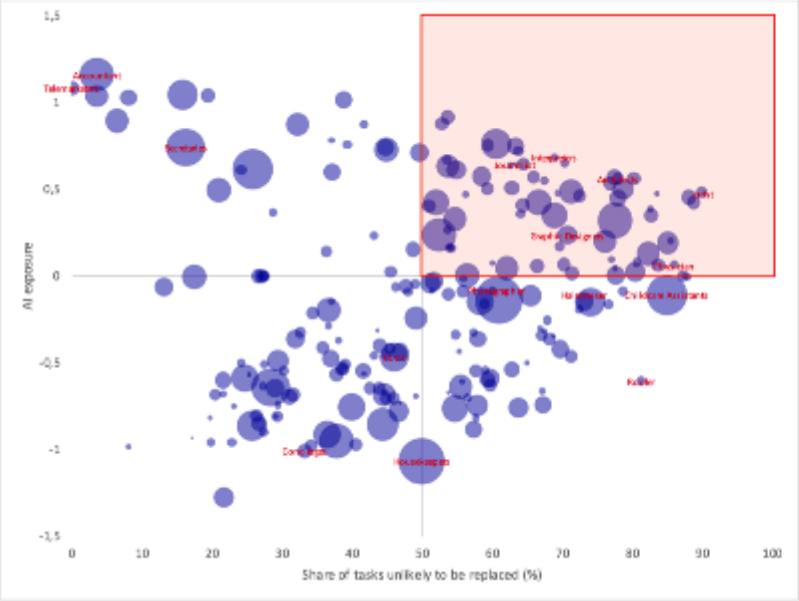
AI AND LOW EXPOSED OCCUPATIONS

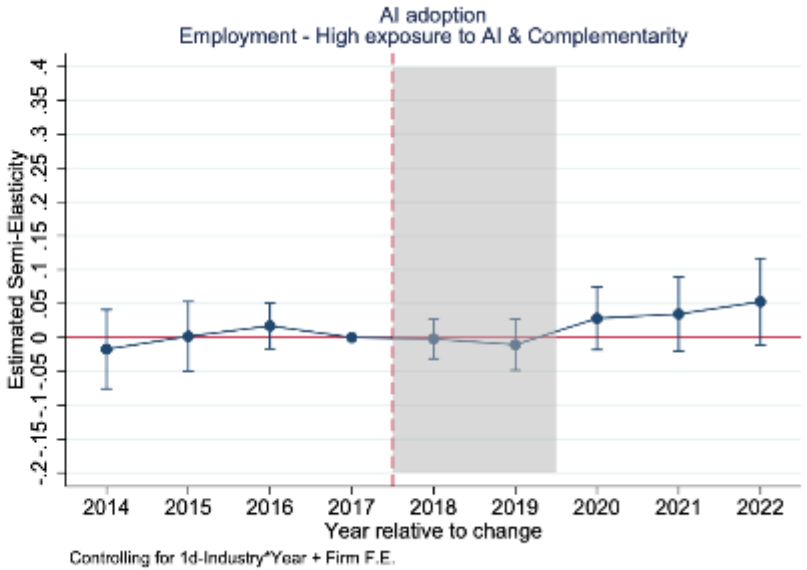




- No effect

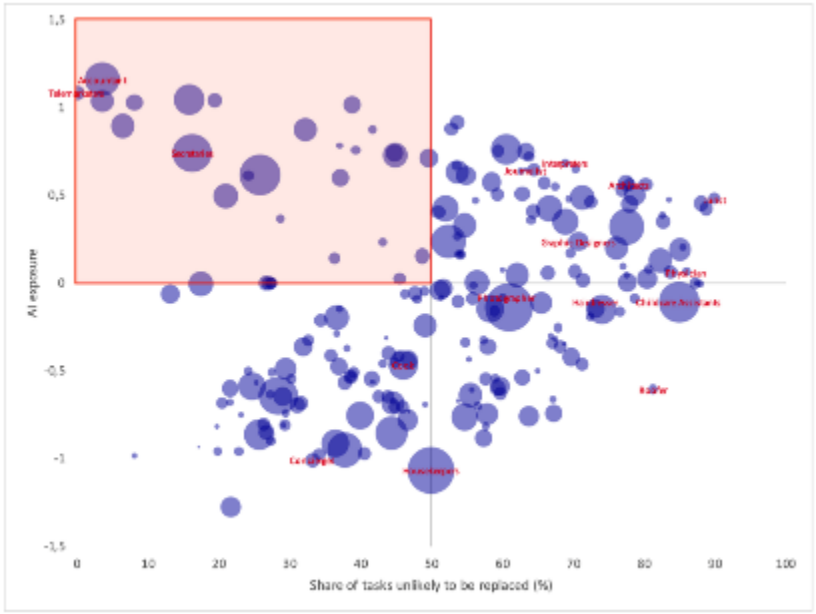
AI AND HIGHLY EXPOSED & COMPLEMENTARY OCCUPATIONS

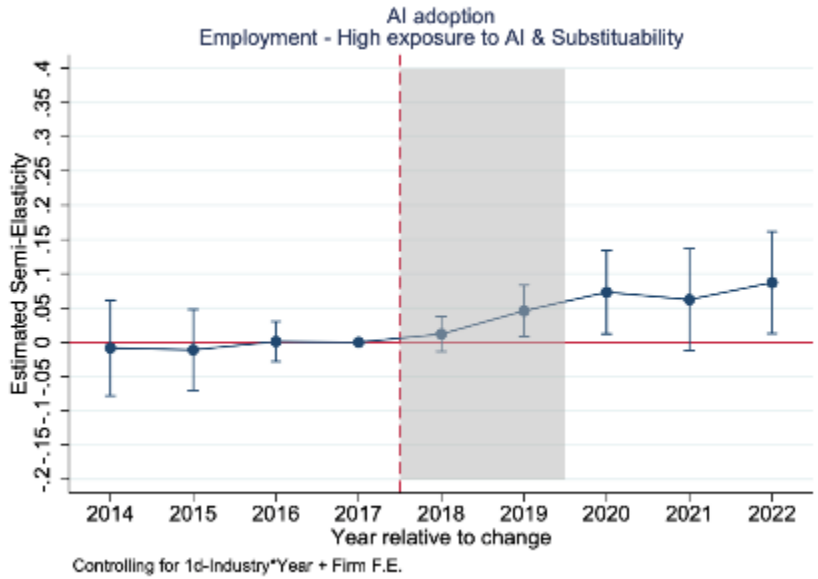




- Slightly positive effect

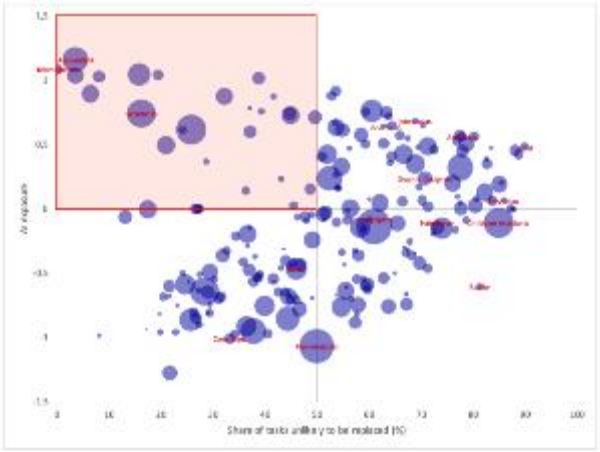
AI AND HIGHLY EXPOSED & SUBSTITUABLE OCCUPATIONS

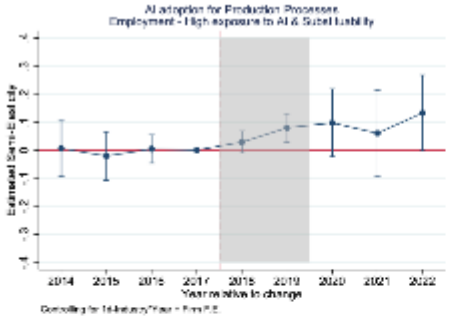


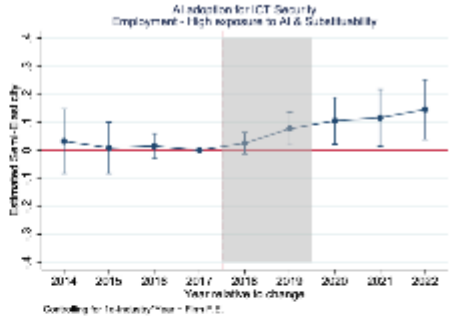


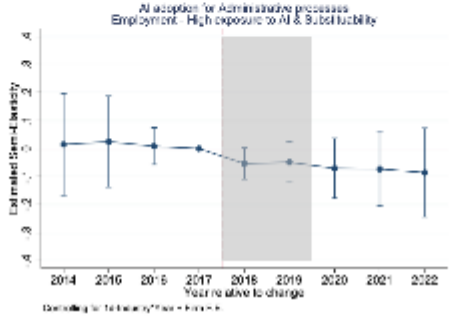
Positive effect (!)

AI AND HIGHLY EXPOSED & SUBSTITUABLE OCCUPATIONS – BY AI USE









The overall positive effect breaks down into:

- A positive effect when AI is used for production processes or ICT Security
- A slightly negative effect when AI is used for administration processes

CONCLUSION ON AI AND EMPLOYMENT

- No existential risk of AI
  - AI should not generate mass unemployment!

- Yet, need appropriate institutions and policies
  - Adequate education system
  - Adequate labor market policies

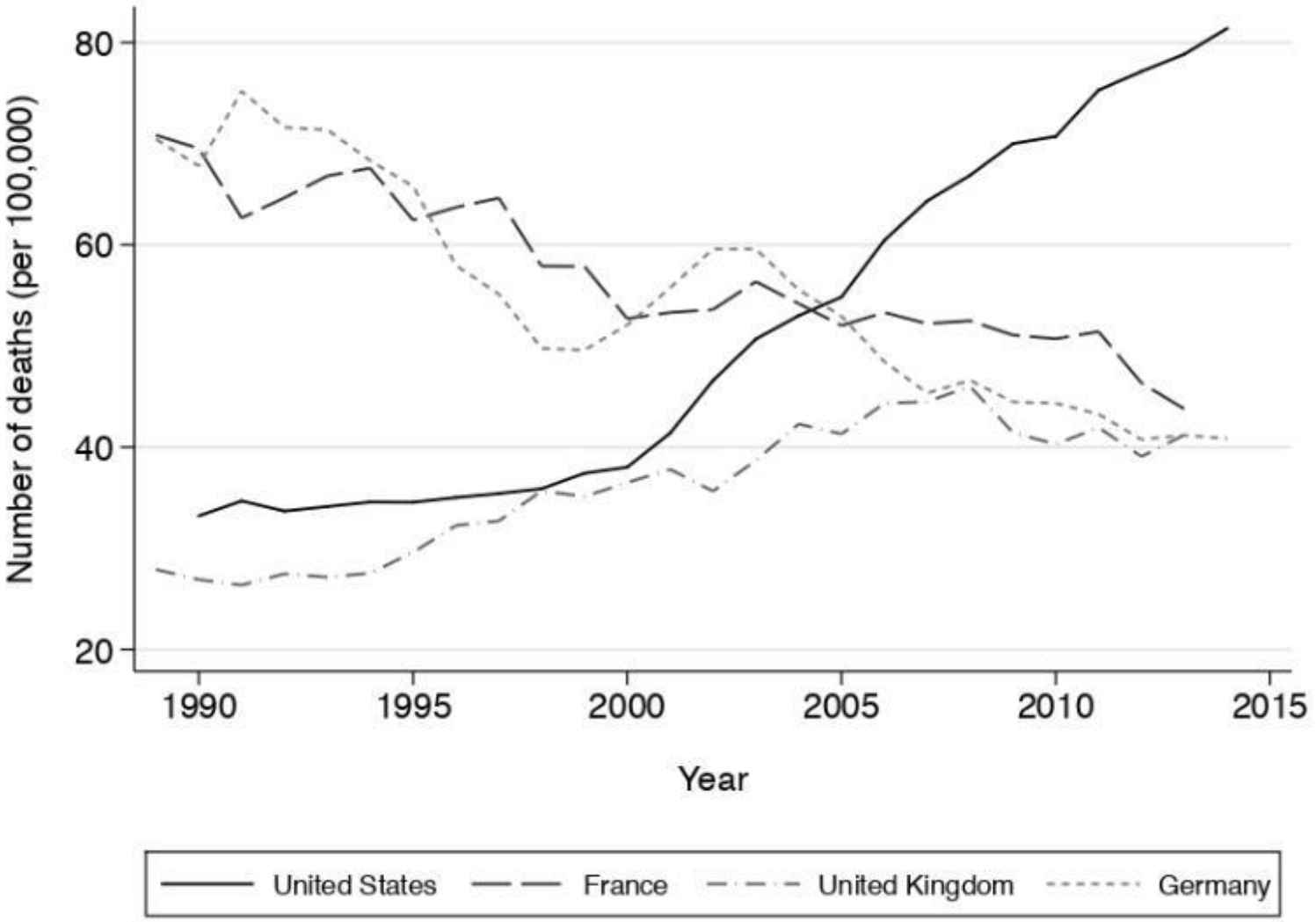
RETHINKING CAPITALISM

US VERSUS EUROPE

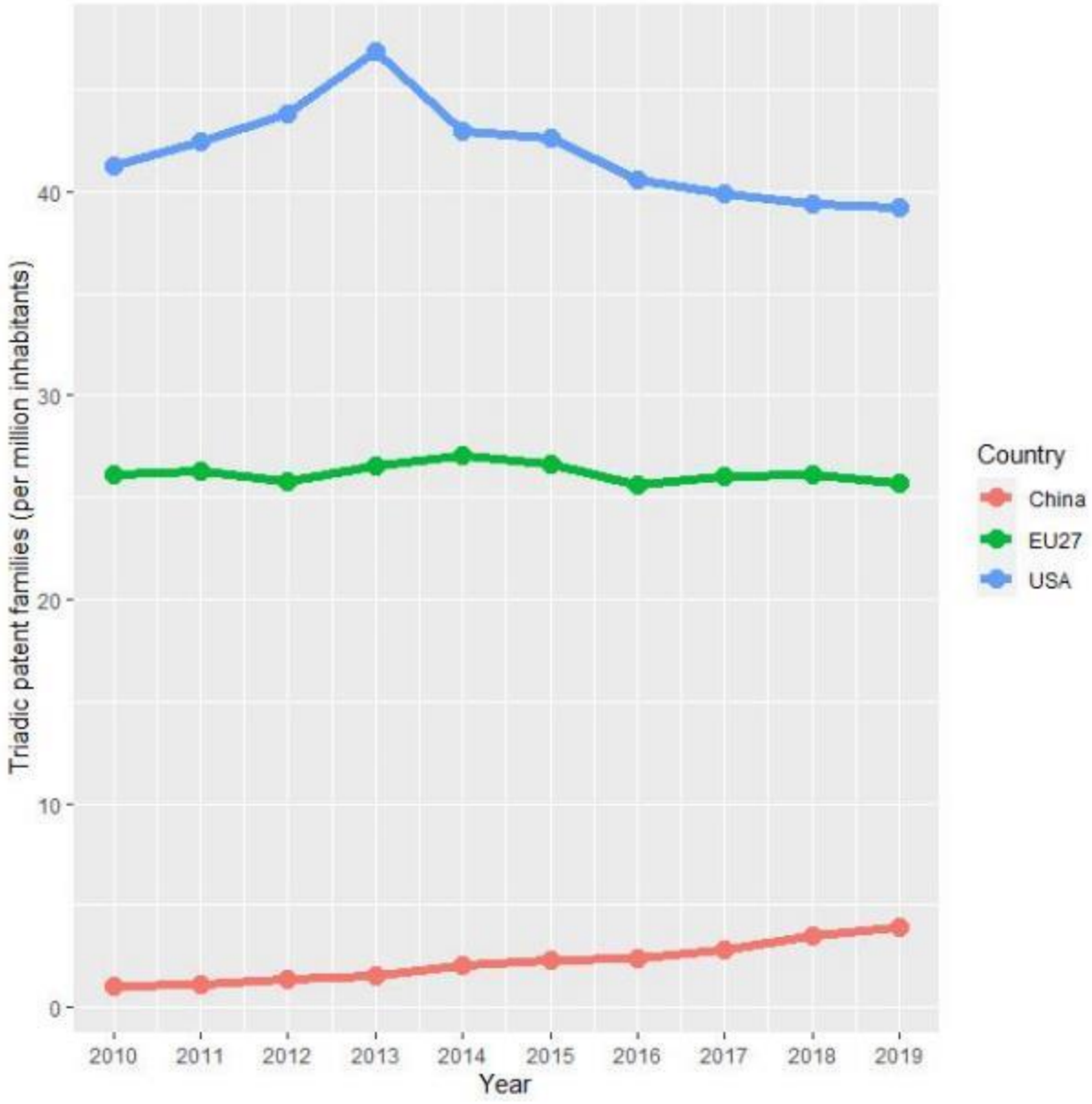
- US does poorly on inequality and social protection
- Europe does poorly on innovation

US MORE UNEQUAL

	Gini Index	Poverty Rate
United States	0.390	0.178
Germany	0.289	0.104
Sweden	0.282	0.093
Norway	0.262	0.084
France	0.292	0.081
Denmark	0.261	0.058



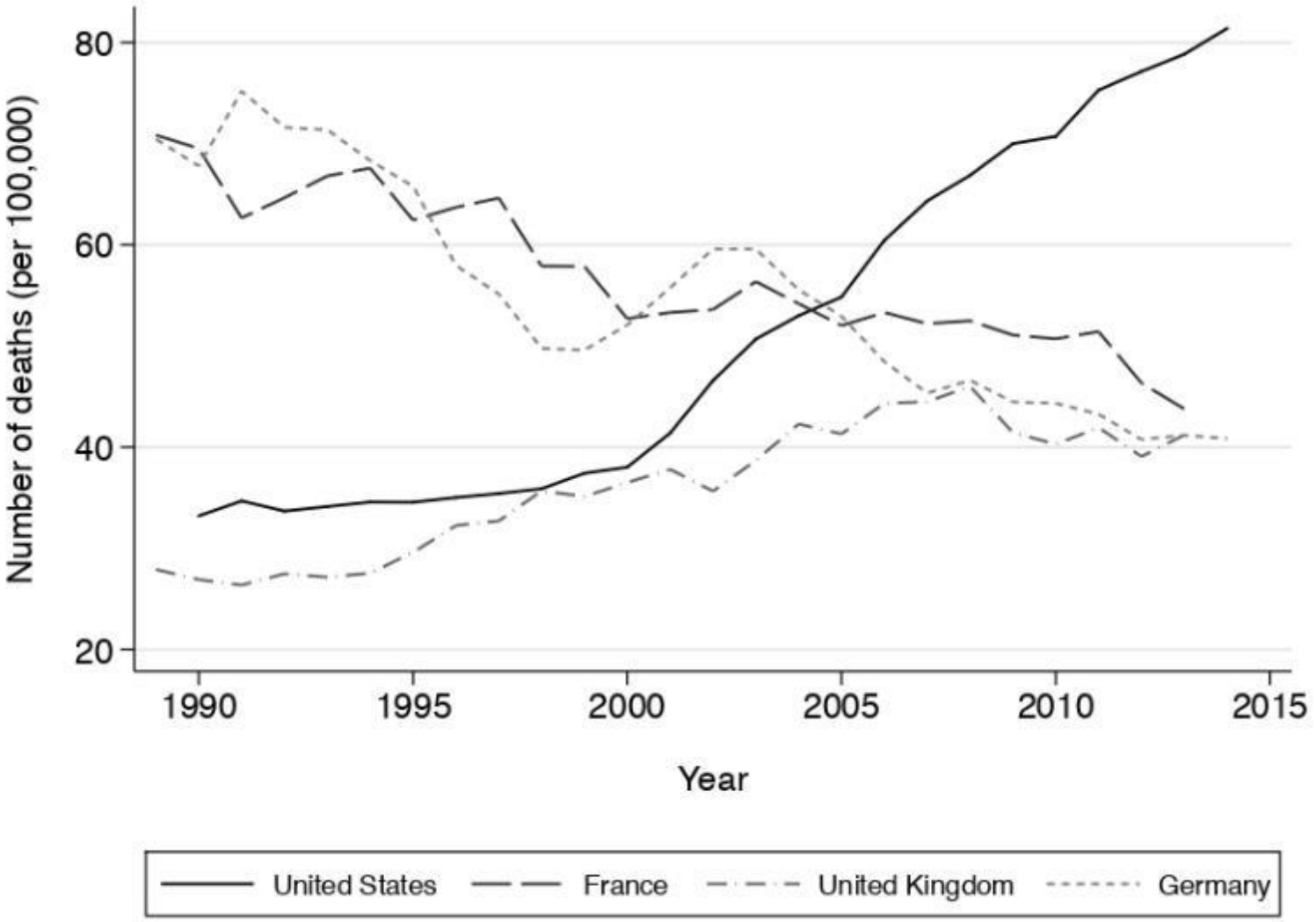
Source: Case and Deaton (2017).



Triadic patents (per million inhabitants)

RETHINK CAPITALISM

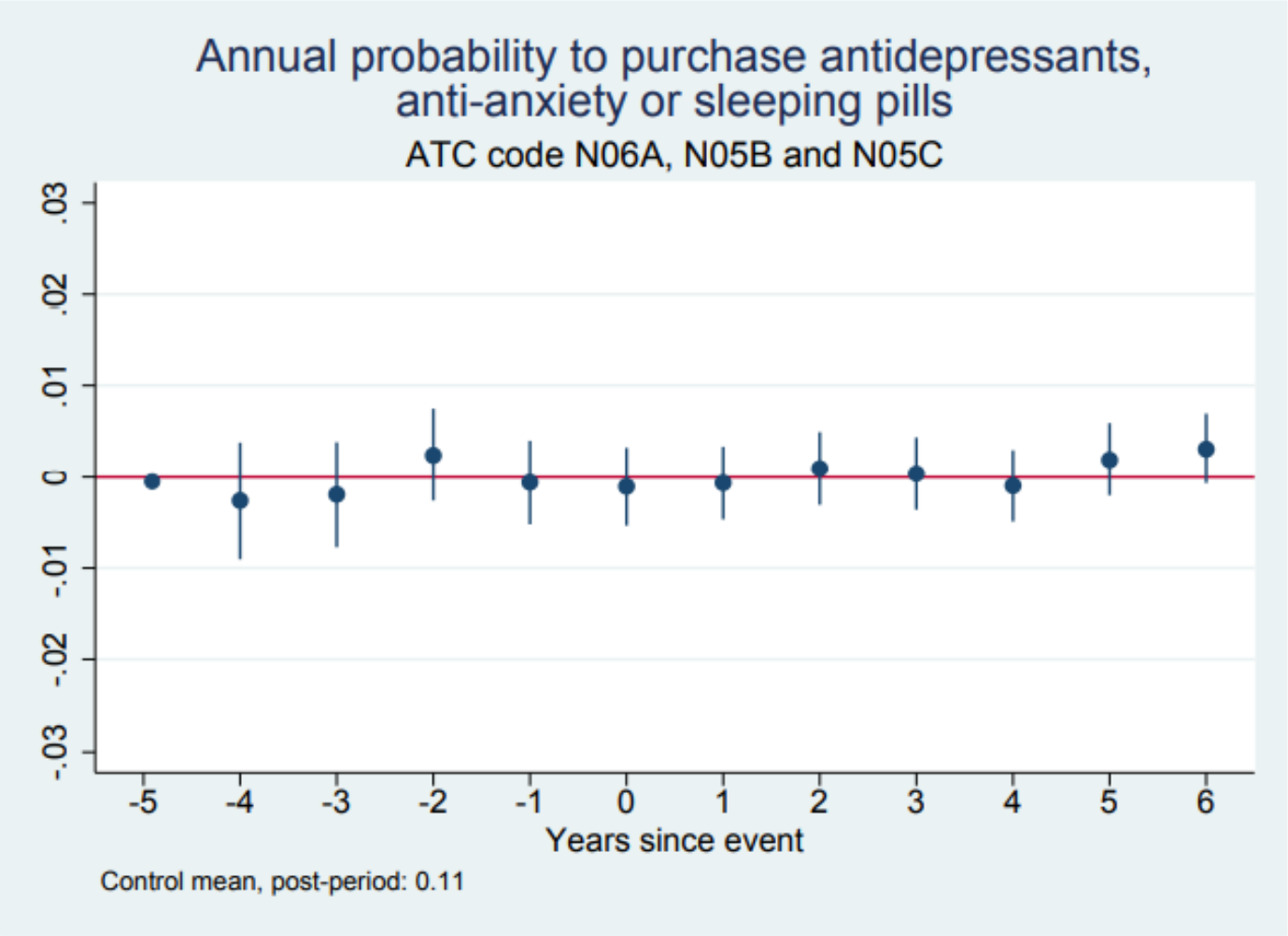
- Combine good side of American model (innovation) with good side of European model (protection)
- No trade off, rather, complementarity!!
  - Flexsecurity
  - Education and lost Einsteins
  - Competition



Source: Case and Deaton (2017).

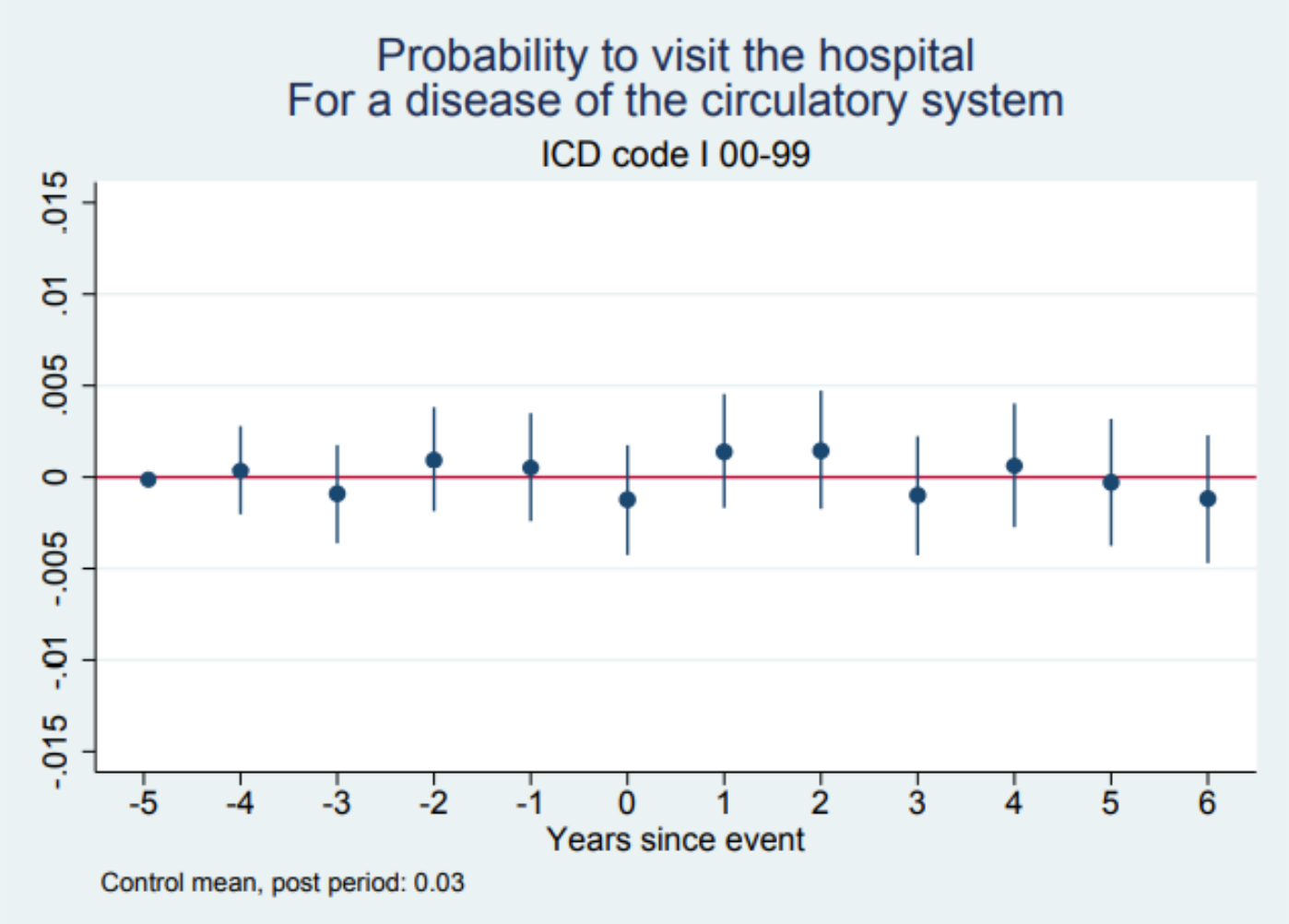
FLEXSECURITY: DENMARK

Moving to health: Antidepressants and related drugs

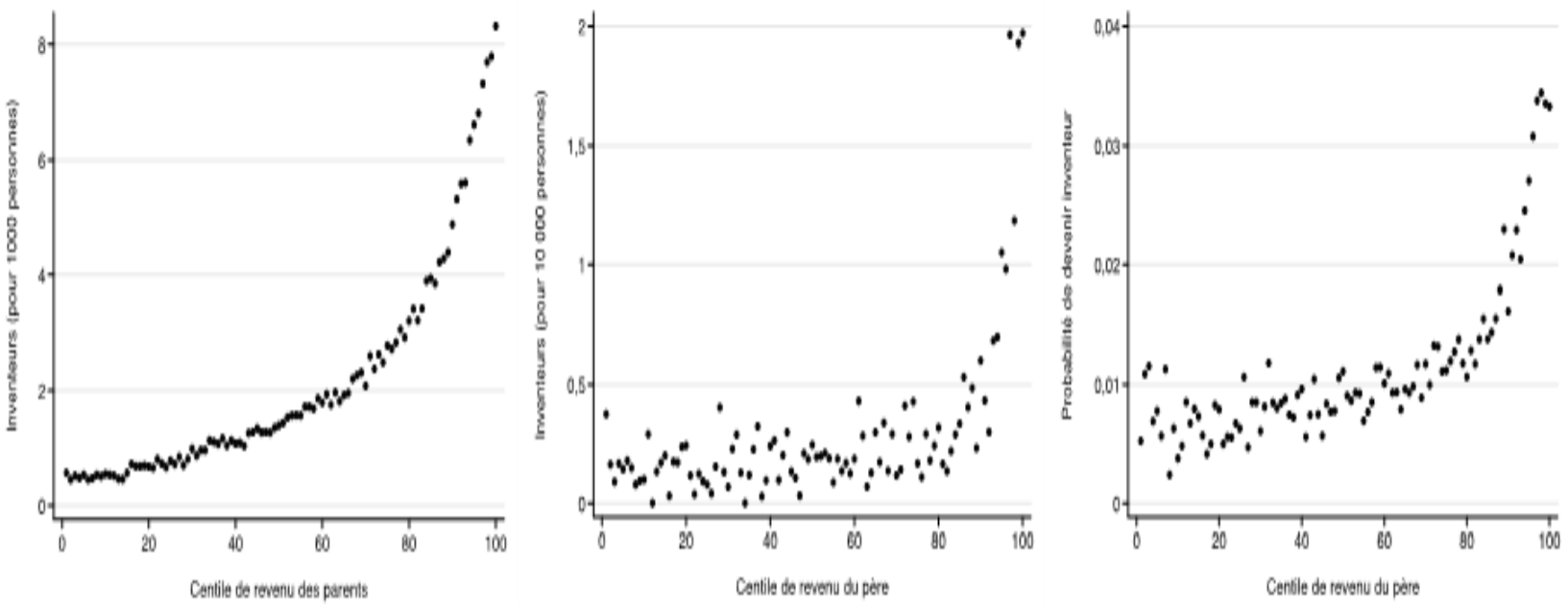


FLEXSECURITY: DENMARK

Heart attacks

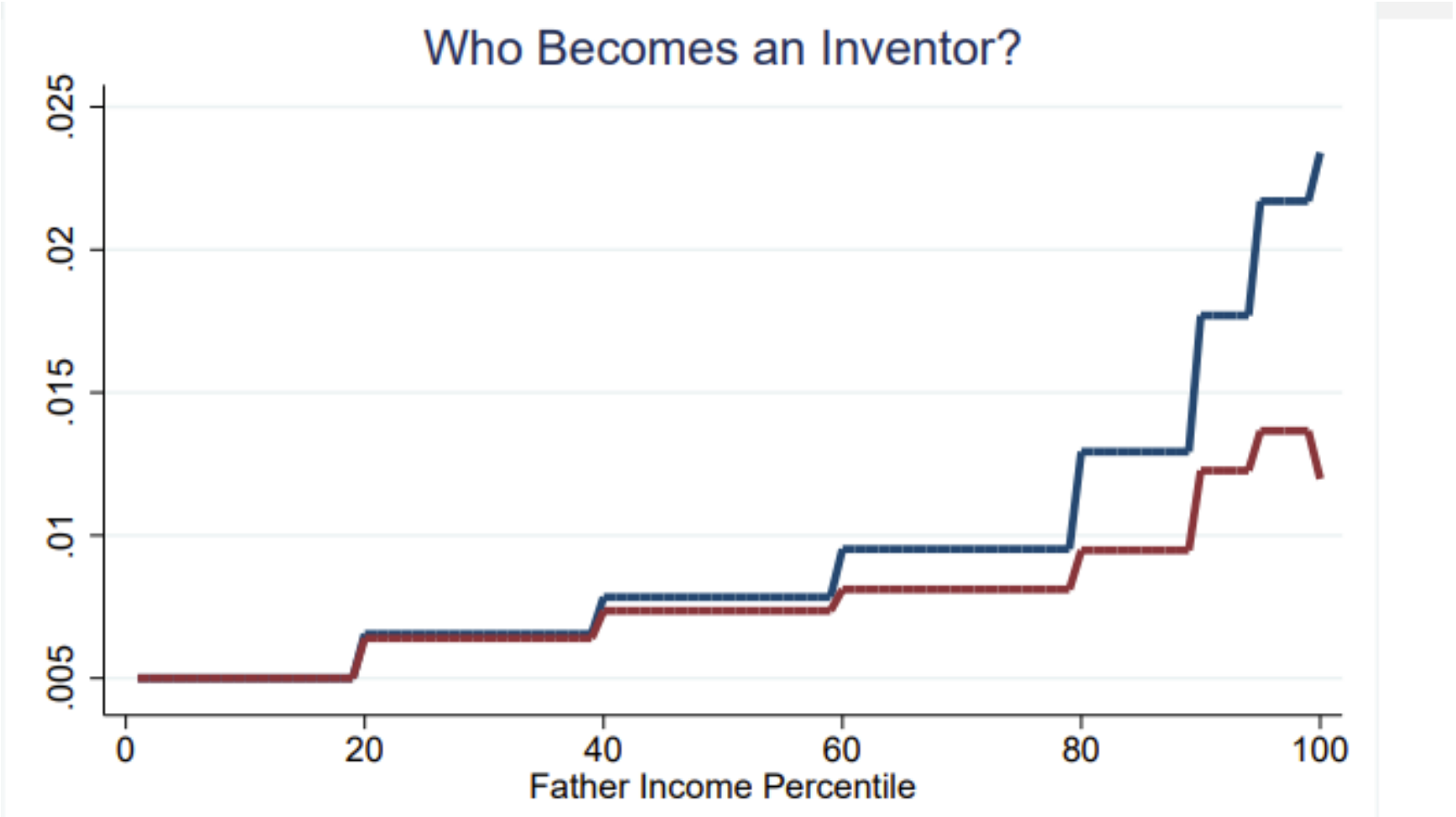


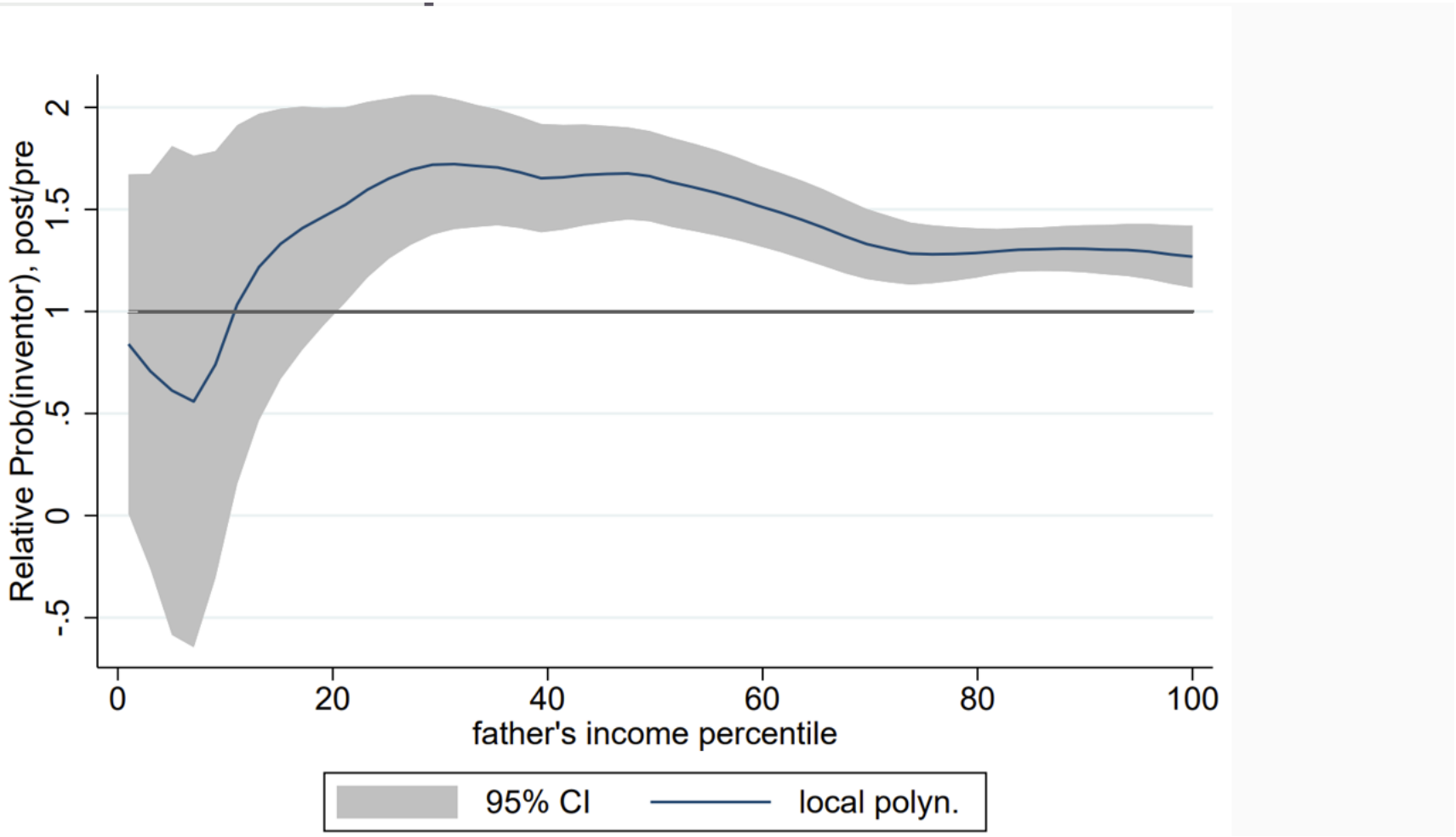
EDUCATION



Sources : Bell, Chetty, Jaravel, Petkova et Van Reenen (2019) ; Akcigit, Grigsby et Nicholas (2017) ; Aghion, Akcigit, Hyytinen et Toivanen (2017).

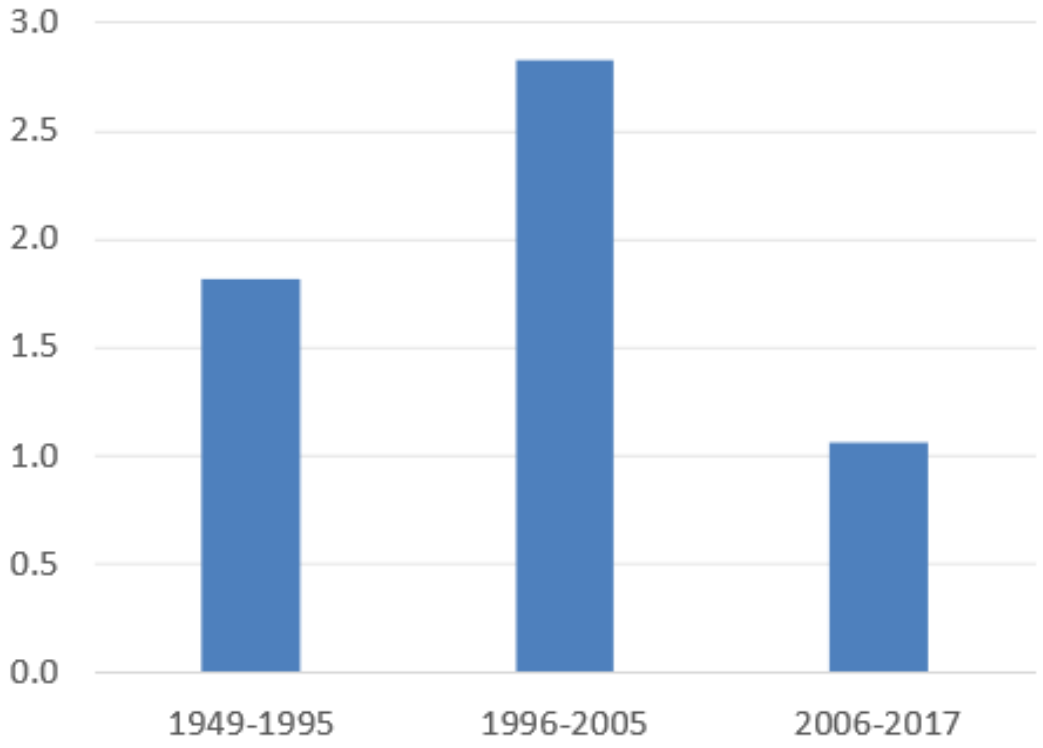
EDUCATION


Who Becomes an Inventor?
.025
.02
.015
.01
.005
0
20
40
60
80
100
Father Income Percentile


Relative Prob(inventor), post/pre
-.5
0
.5
1
1.5
2
0
20
40
60
80
100
father's income percentile
95% CI
local polyn.

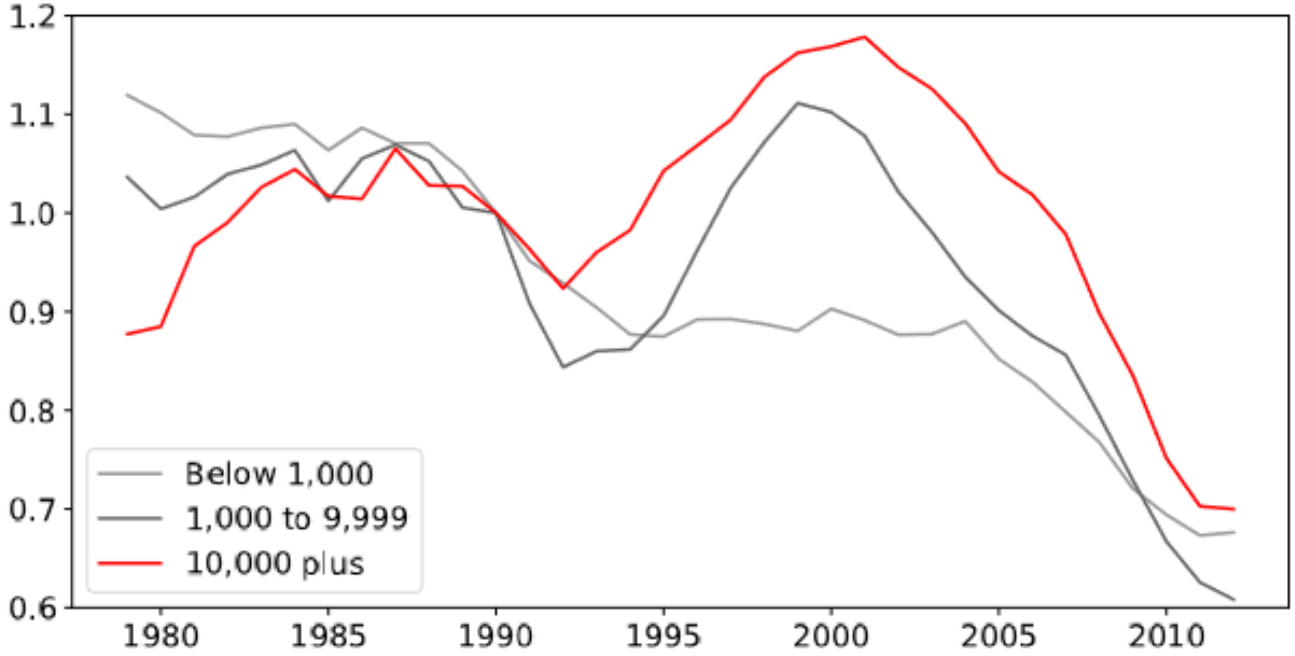
COMPETITION

Rise and Decline in TFP Growth



COMPETITION

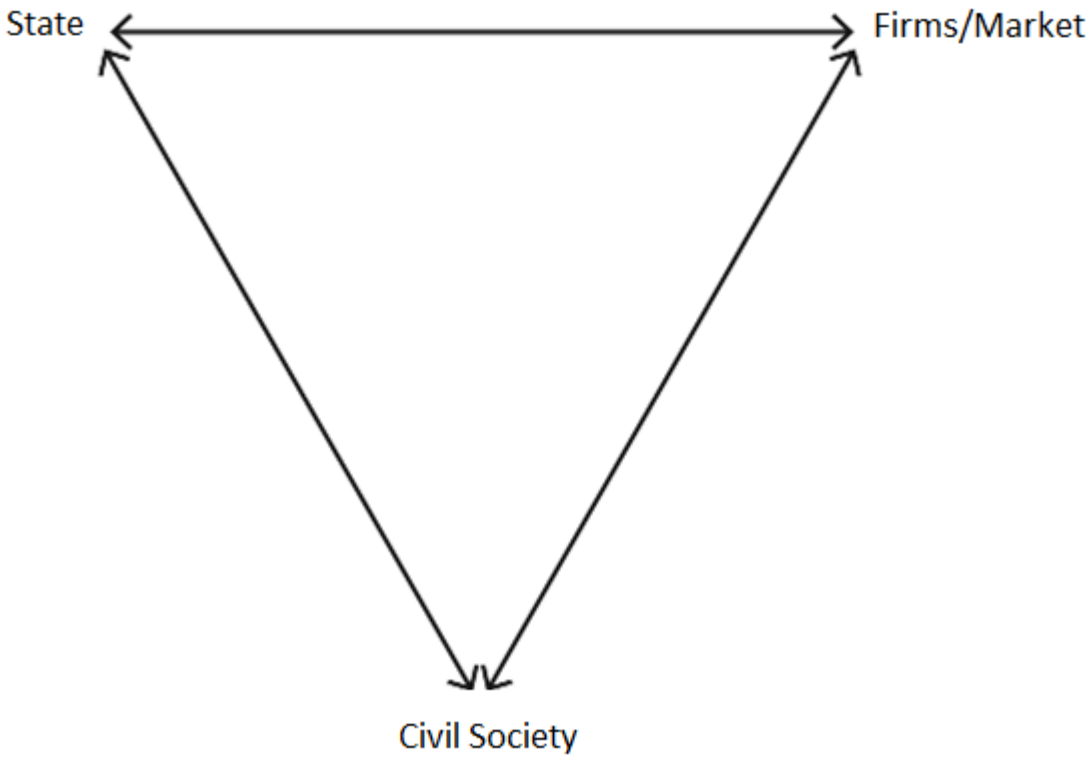
Rise and decline in employment-weighted plant entry rate

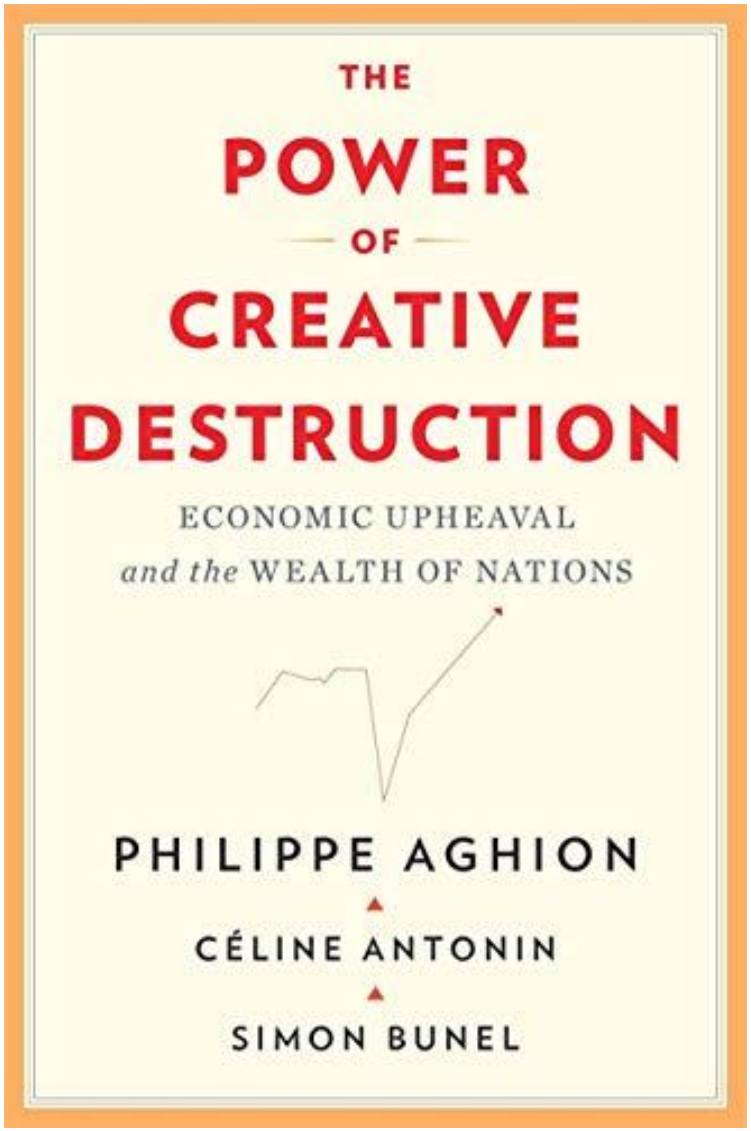


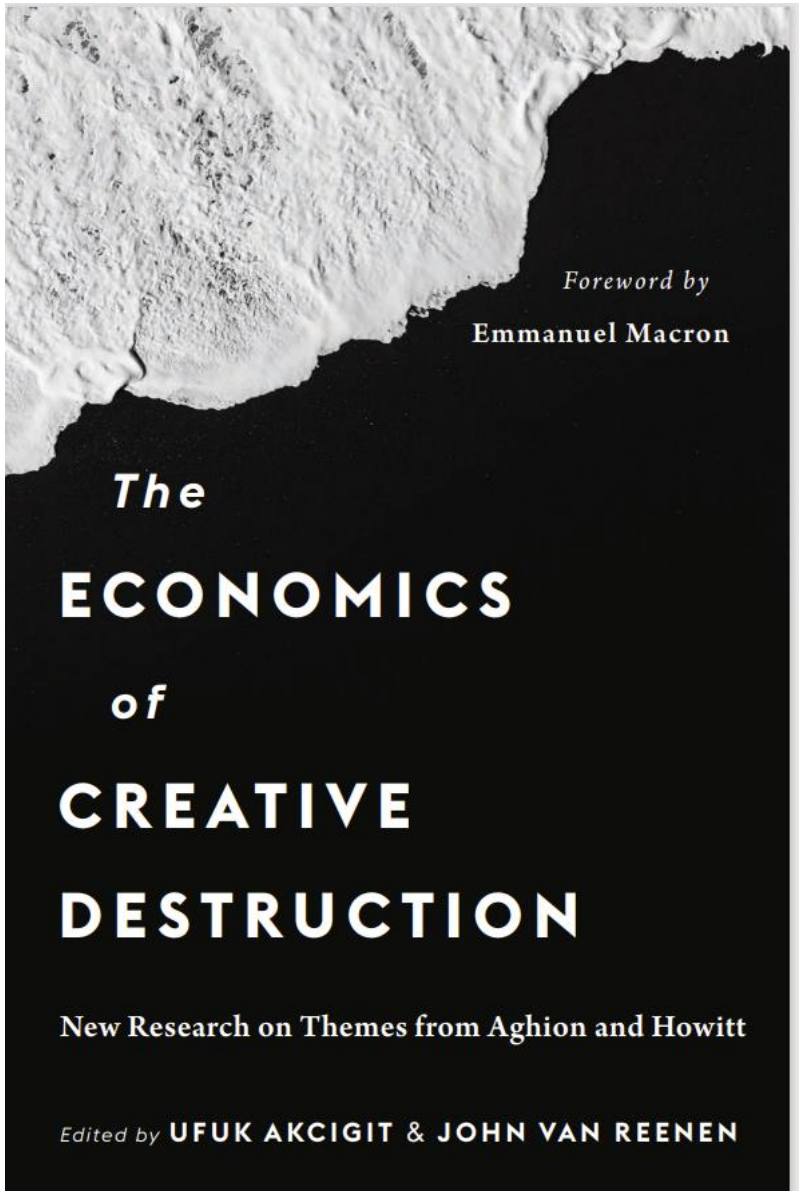
Source: U.S. Census Bureau's *Business Dynamics Statistics*. Job creation by birth over total employment by firm size bins. 5-year centered moving average.

RETHINK CAPITALISM

- Magic triangle: Firms/Market – State – Civil Society (Bowles and Carlin)




THE
POWER
OF
CREATIVE
DESTRUCTION
ECONOMIC UPHEAVAL
and the WEALTH OF NATIONS
PHILIPPE AGHION
CÉLINE ANTONIN
SIMON BUNEL


Foreword by
Emmanuel Macron
The
ECONOMICS
of
CREATIVE
DESTRUCTION
New Research on Themes from Aghion and Howitt
Edited by UFUK AKCIGIT & JOHN VAN REENEN

Thank you!