Digital Innovation and the Distribution of Income

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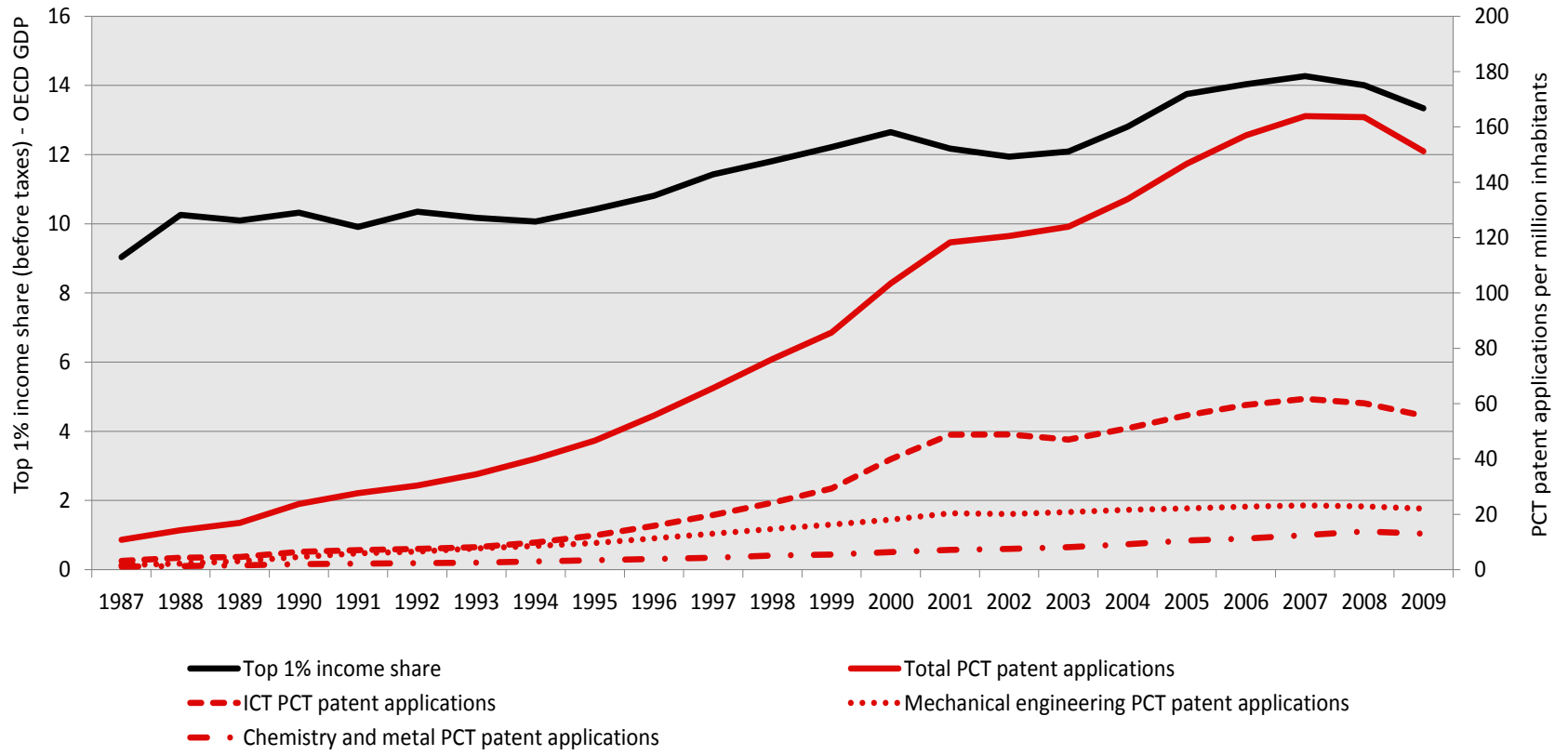
Inequalities have risen

- In the United States, the top 1% income share:
  - has risen from 27 times in 1980s to 81 times more than the bottom 1% in 2014
  - is almost twice as large as the bottom 50% share
- Close to zero growth for working-age adults in the bottom 50% since 1980 (Piketty et al., 2016).
- Similar trends across OECD countries over the past three decades

Digital innovation has also risen

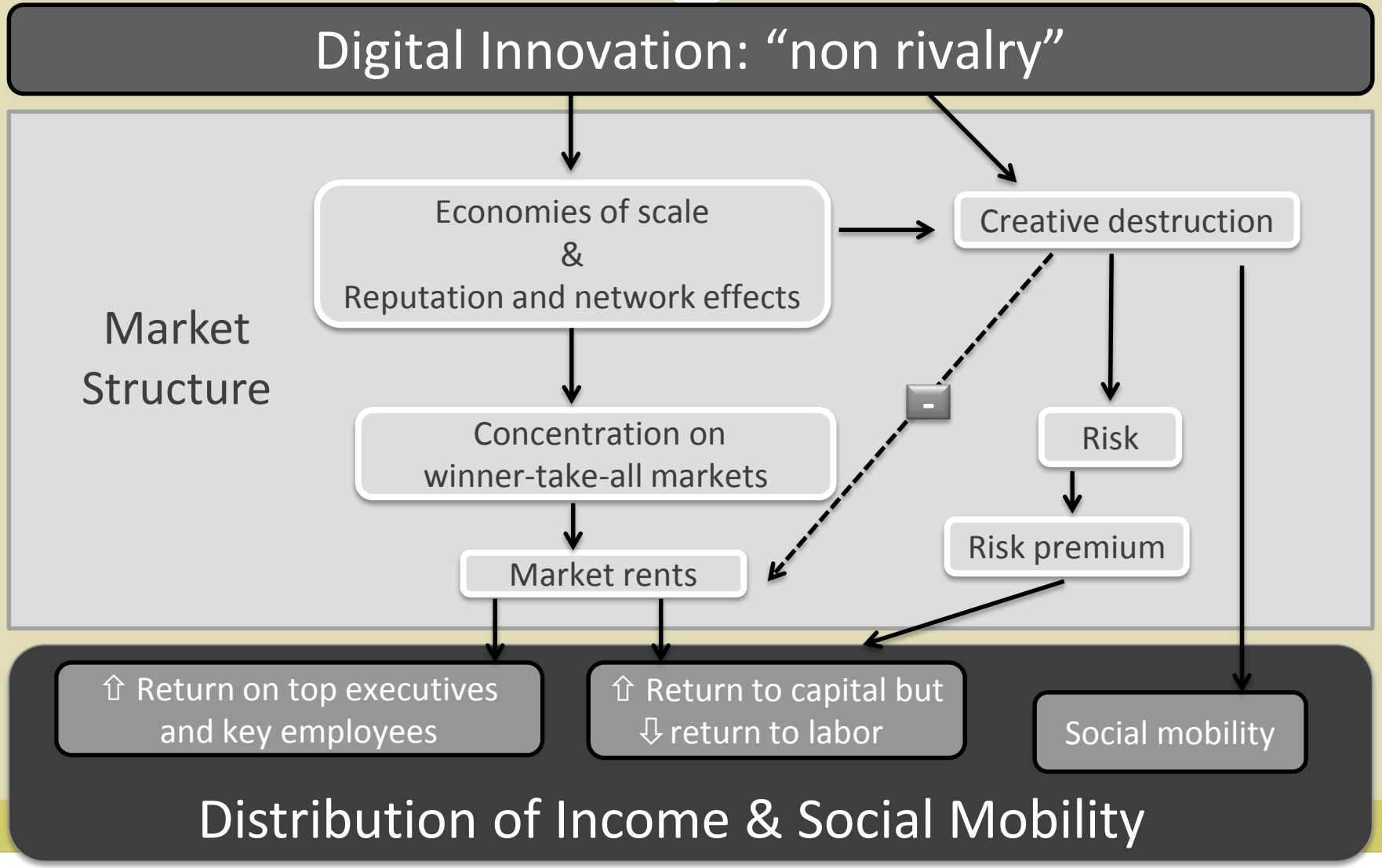
Top 1% income share and PCT patent applications for selected OECD countries, 1987-2009



Source: *The World Top Incomes Da*tabase, http://topincomes.g-mond.parisschoolofeconomics.eu/ (accessed on 15 July 2015) for the 1% income share data; *OECD Patents Statistics* for PCT patent applications.

Note: The statistics are based on a GDP-weighted average for the following 13 OECD countries: Australia, Canada, Denmark, France, Germany, Japan, Netherlands, New Zealand, Norway, Sweden, Switzerland, the United Kingdom and the United States. The selection is based on data availability over the 1987-2009 data period. The data annex provides further information.

Digitalisation and Inequalities may be connected



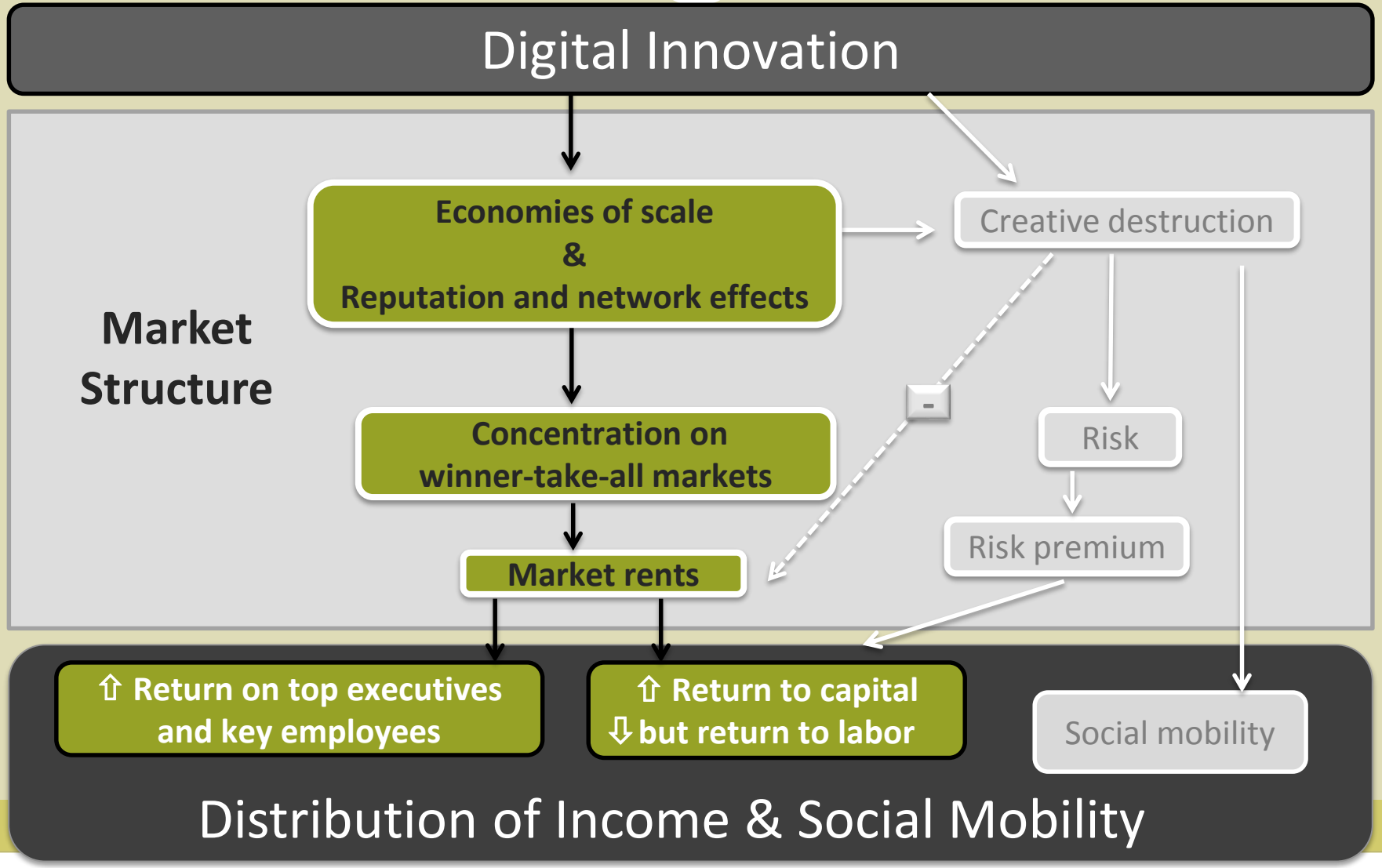
The explanation in short

- The increasing importance of digital innovation **magnifies innovation-based market rents**

- These rents contribute **to increasing the income share of top income groups**

This explanation complements others: globalization, the financialisation of the economy, unskilled-labor-displacing technologies, the weakening of trade unions

Winner-take-all markets: Market concentration



Market concentration and digital innovation

- Digital innovation => New products and processes based on software code and data

- *Non-rivalry* of knowledge makes the market production different from the tangible goods

  ⇒ knowledge production is subject to massive economies of scale: the more products sold, the lower the average cost

  => "winner-take-all" markets

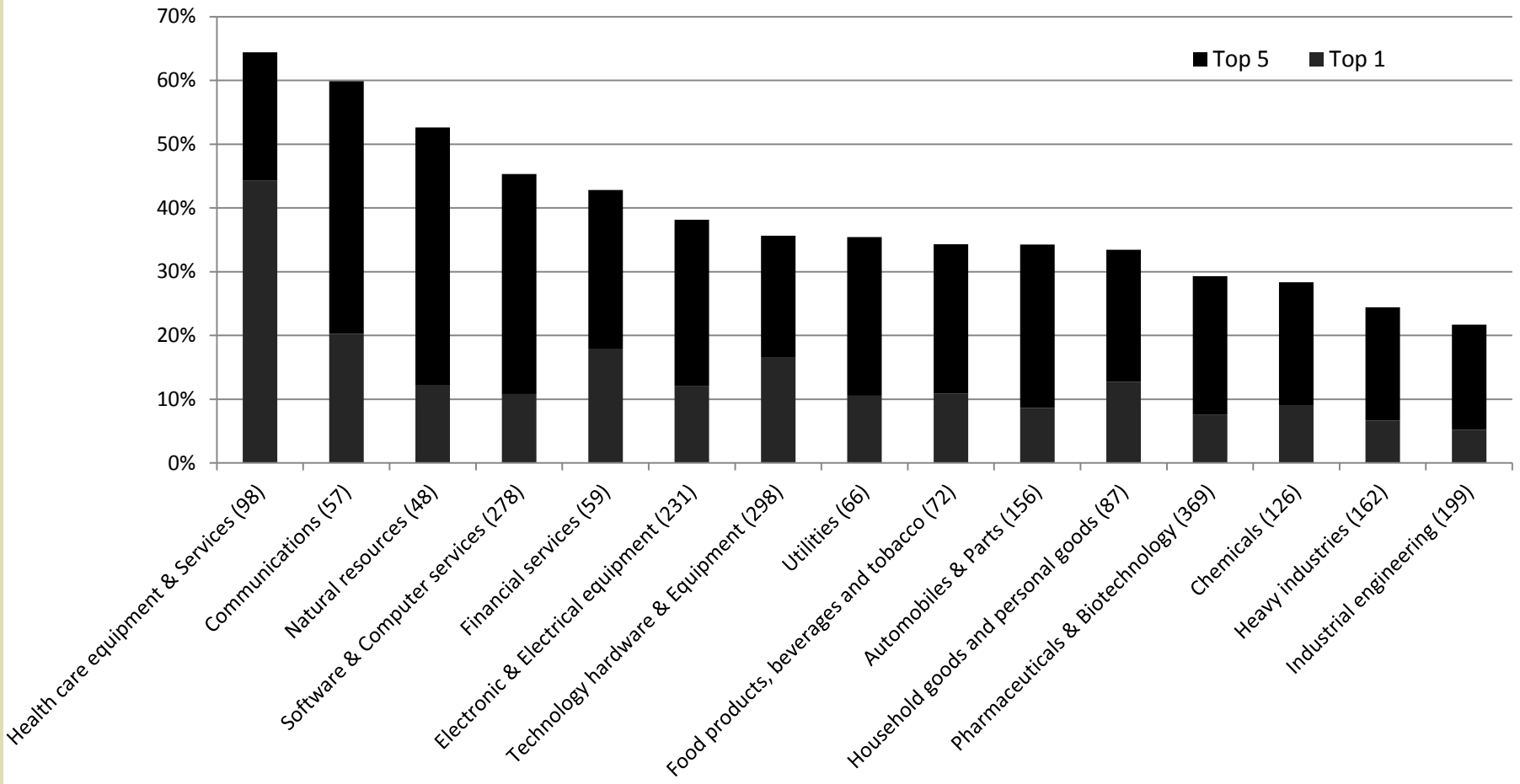
  (e.g. evidence in Autor et al., 2017)

Characteristics of winner-take-all markets

- Superstar economy akin to top sports stars and entertainers (Rosen, 1981)
  - The winner of the tournament gets most if not all of the market …
  - but the runner-up gets hardly anything (*even if the idea was only marginally better*)
- Scale without mass; network effects; reduction in barriers across markets (Internet).
- Dynamics of knowledge magnified by globalisation that allows for global – hence bigger – markets

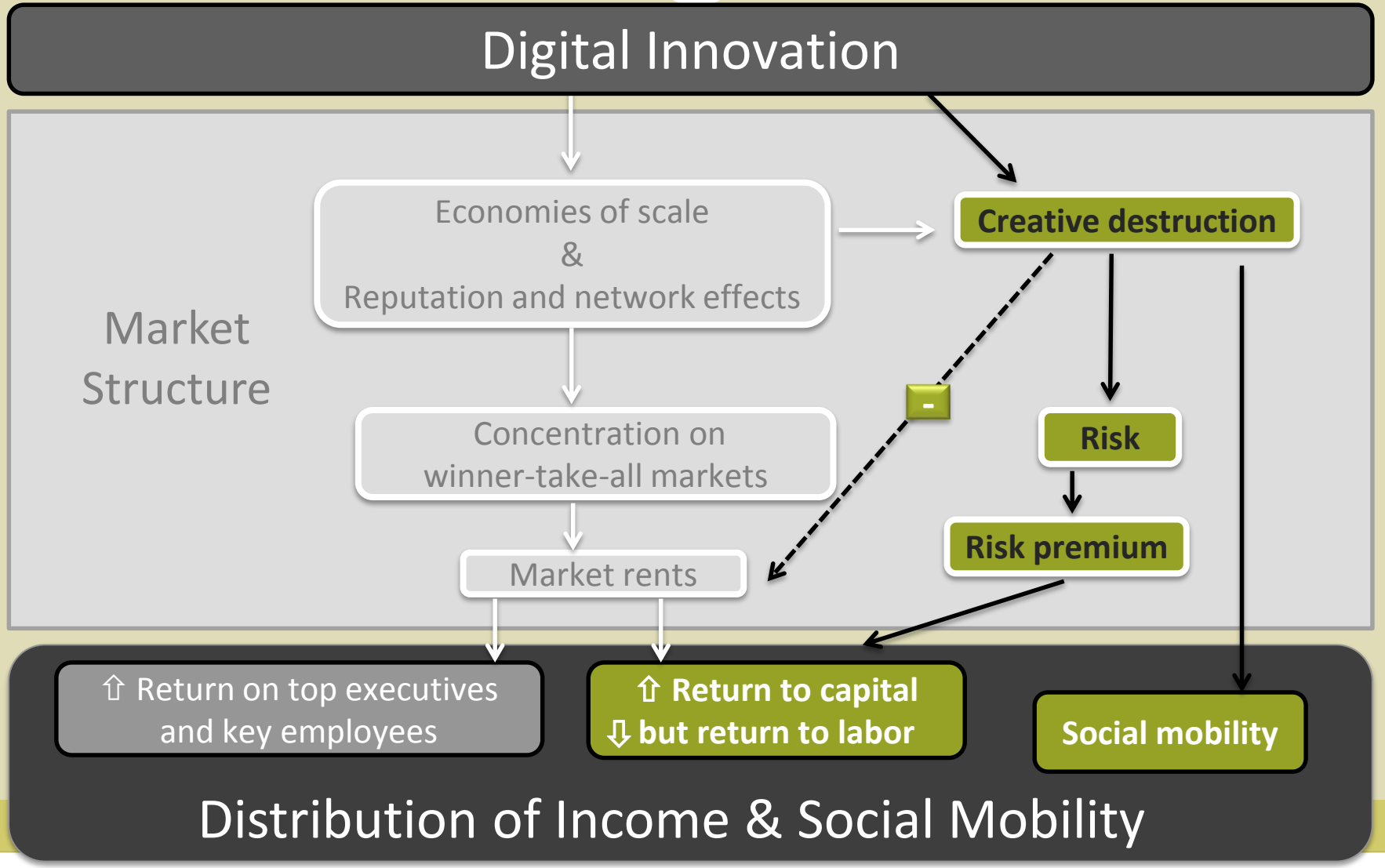
Market shares of the top global R&D investors

Share of the top 1 and 5 companies in total sales of leading R&D firms in 2015



Source: EU (2016), EU R&D Scoreboard 2016. The shares are computed as the sales share of the top 5 firms within the total number of firms of the 2 500 R&D most intensive firms of the EU R&D Scoreboard. The number of firms included in the total for each sector is included in brackets.

Winner-take-all markets: Creative destruction

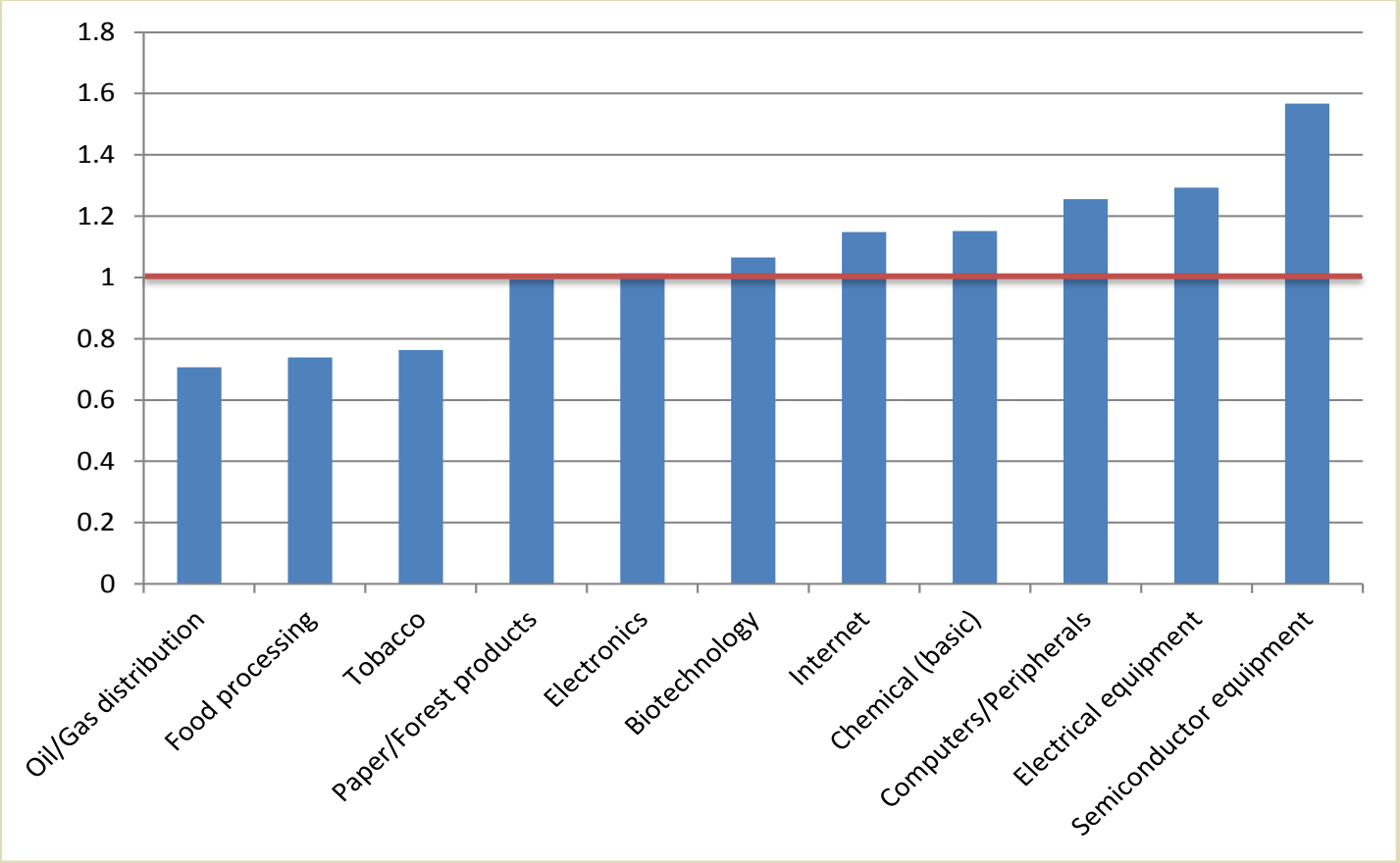


More opportunities for creative destruction

- Entry barriers have been reduced with lower costs of producing, managing and communicating knowledge
  - “scale without mass” / “cloud computing” /platforms
- Radical innovations can challenge incumbents bringing disruptive change => Schumpeter’ creative destruction

Risk in the digital economy

Estimates of selected sectors' betas relative to the entire financial market for US firms over 2008-12



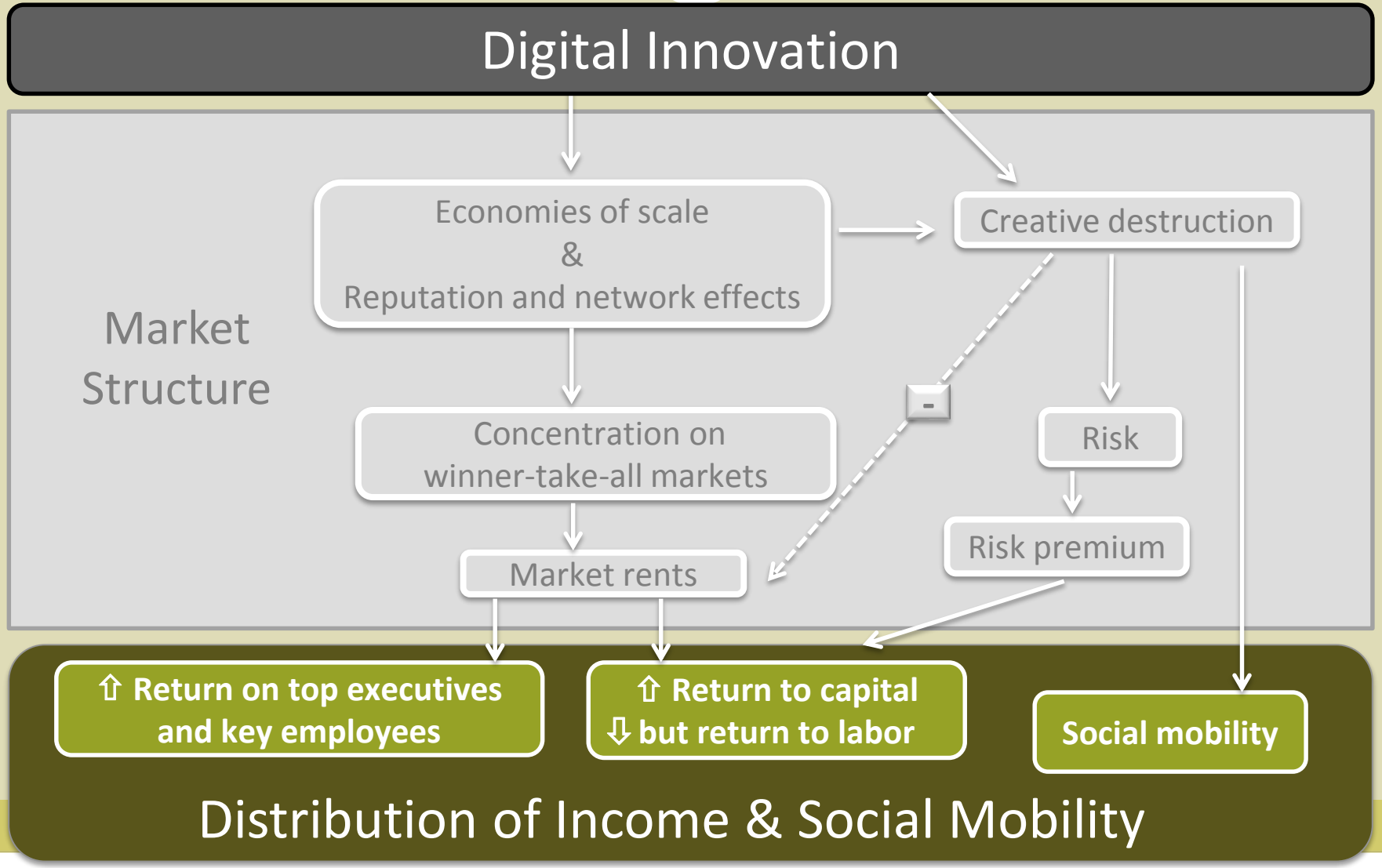
Source: Based on data by Aswath Damodaran (2015), computed from data from Bloomberg, Morningstar, Capital IQ and Compustat.

Creative destruction and market concentration

- Creative destruction does not necessarily mitigate the impact of market concentration on rents: competition is not about prices but about radical product innovations (competition FOR the market)

- Conditions may have changed for entry compared to opportunities Google and Facebook faced, making the position of incumbents less contestable:
  - Acquisition of start-ups of highest potential
  - Positive feedback loops from exploiting large data
  - Advantages from consumer networks and capital

Impacts on the distribution of income

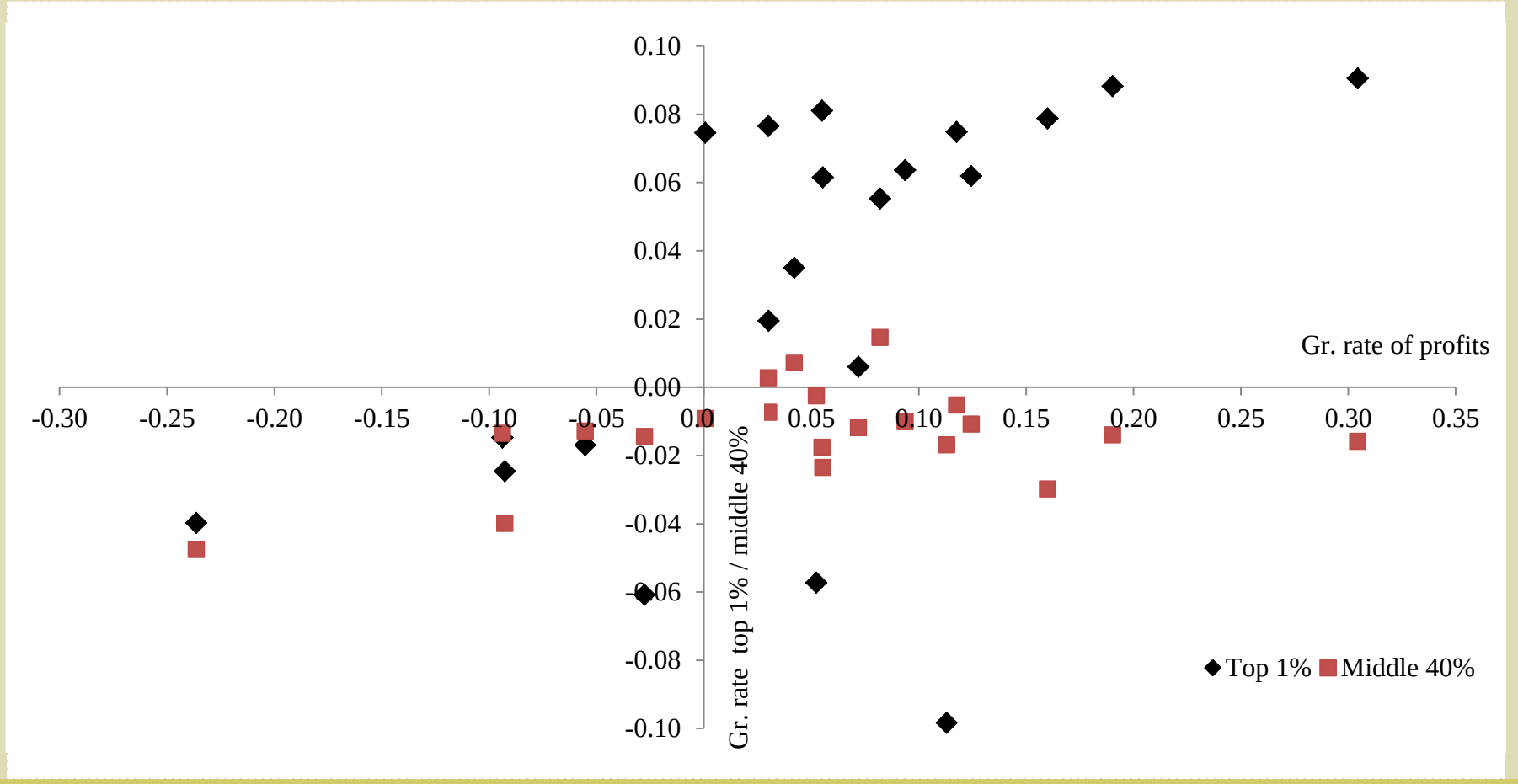


Higher returns for key contributors to winning digital innovations

- Higher returns from digital innovation accrue to residual claimants: investors, managers, top employees
- Rents are not necessarily “excessive”: they provide rewards to those taking risks (as betting on the only marginally worse idea is very costly)
- Consistent with macro-level evidence on innovation & growth on top 1% (Aghion et al., 2015, Forbes, 2000)

The evolution of profits and the top 1%

Correlation of annual growth rates of profits and the top 1% and middle 40% of the US pre-tax income distribution, 1992-2013 : Average



Source: Paunov and Bas (2017) based on data from the Compustat database on profits and Piketty et al. (2016) for pre-tax income of the top 1% and middle 40%.

Rewards for top executives

- Managerial decisions in winner-take-all markets have magnified impact on firm's profit: marginally better or worse decision decide for total success or large losses

- Executives in IT-related services:
  - had the highest exit rates over 2000-2013 (of 20%)
  - are over-represented in top 1% of executives relative to their sectors' size (24.7% relative to 9.6%)
  - had the highest share in compensation relative to net sales (16.4% for the 90th percentile)

  => Similarly for IT- and innovation-related manufacturing as well as finance (=> confirming the role of financialisation)

Winner-take-all markets and executive pay

Dependent variable:	Executive pay				
	Average effects	Volatility of pay	Wage pay	CEO vs. other executives	90th percentile
Herfindahl index $_{t-1}$	**0.593*** **	**1.484*** **	**0.009**		**0.930***
	(0.170)	(0.333)	(0.136)		(0.482)
Creative destruction $_{t-1}$	**0.967***	**4.085*** **	**0.271**		**6.214*** **
	(0.569)	(1.030)	(0.233)		(1.885)
Herfindahl index $_{t-1}$ * CEO				**0.934*** **	
				(0.253)	
Herfindahl index $_{t-1}$ * Other				0.496***	
				(0.184)	
Creative destruction $_{t-1}$ * CEO				**3.377*** **	
				(1.083)	
Creative destruction $_{t-1}$ * Other				0.224	
				(0.542)	
Observations	55,582	45,555	55,582	55,377	55,582
R-squared	0.20	0.04	0.18	0.20	

Note: All regressions include executive-firm fixed effects, year fixed effects, industry, executive and firm controls.

Source: Paunov and Bas (2017), Winner-take-all markets and executive pay.

Labour compensation

- Micro evidence on workers sharing rents in winning firms
  - Dispersion in earnings inequality across firms, within industries and US states points to rent sharing possibilities (Song et al., 2015), also other evidence (e.g. Card et al., 2013)
  - Wage differentials of high-skilled relative to other workers increase with firm size: points to rent sharing for some, not all (Mueller et al., 2015)

+ International trade & investment; skills-biased technical change; and weakening of trade unions.

Opportunities for investors and workers

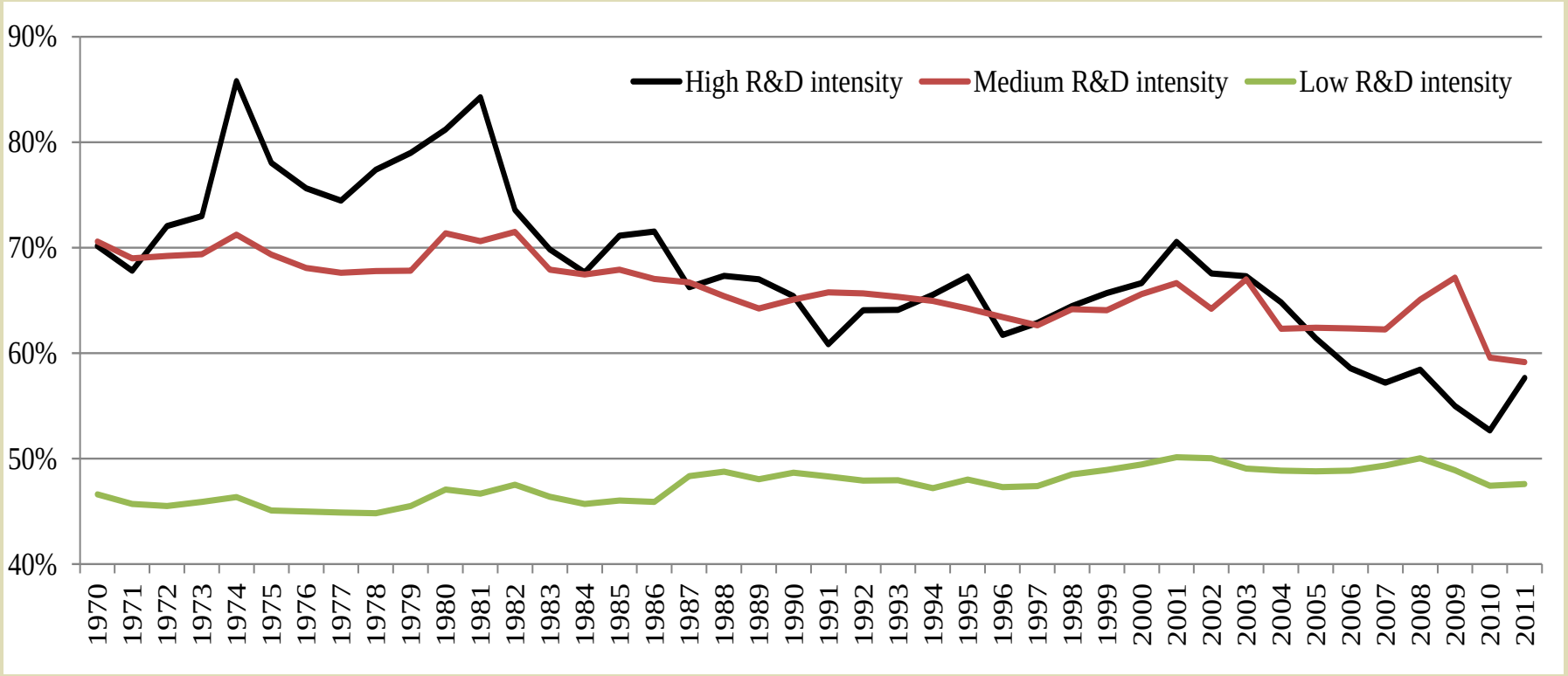
Dependent variables:	Profits	Wages	Profit to wage ratio
Herfindahl index $_{t-1}$	**0.333*****	**-0.026**	**0.477****
	(0.112)	(0.236)	(0.216)
Creative destruction $_{t-1}$	0.345	0.453	0.152
	(0.394)	(0.597)	(0.608)
Observations	11,962	3,993	3,049
R-squared	0.72	0.45	0.31
Number of firms	1,404	435	381

Note: All regressions include executive-firm fixed effects, year fixed effects, industry, executive and firm controls.

Source: Paunov and Bas (2017), Winner-take-all markets and executive pay.

The decreasing labor share

Labor share of industry value added in the United States by sectoral R&D intensity in percentages, 1971-2011



Source: OECD STAN Database.

Declining labour share

- Corollary of higher return to capital is decreasing labour share (Karabarbounis and Neiman, 2014)
- Econometric evidence on industry data for 1995-2011 across 27 OECD countries points to the role of innovation as captured in patent data (Table 1, p. 19)
- "Winner-take-all" market dynamics (Autor et al., 2017) … *rents and efficiency as explanations* => profit share increases (Barkai, 2017)

Policy implications

- **Two core principles:**

1. Rents are needed for innovation and innovation is necessary to growth, innovation-based rents should not be pushed down, but “excess” rents only

2. Many policies are designed for economy in which tangible activities were dominant & innovation-based rents lower => reassessment is needed !

Policy implications

- **Fiscal policy is needed but has its limits**
  - In many countries taxes are not very redistributive
  - Intangibles can relocate across borders
  - Taxation of innovation-based rents may deter investment
- **Innovation and framework policies**

  IPR, standards, competition policies as well as education and skills policies

Policy implications

- **IPR & data**
  - Scope & duration of patents
  - Data ownership
  - Data markets
- **Competition policies**

  Data-based competition is different, competition policy must evolve.

THANK YOU

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http://www.nber.org/confer//2017/CRIWs17/Paunov_Guellec.pdf