

What is the impact of rising concentration, rising intangibles, and other changes among firms in the age of the new economy?

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Background

In recent decades, US businesses experienced

T1 Declining rates of investment

T2 Rising returns to capital

T3 Rising concentration

These trends have attracted attention

Productivity growth slowdown

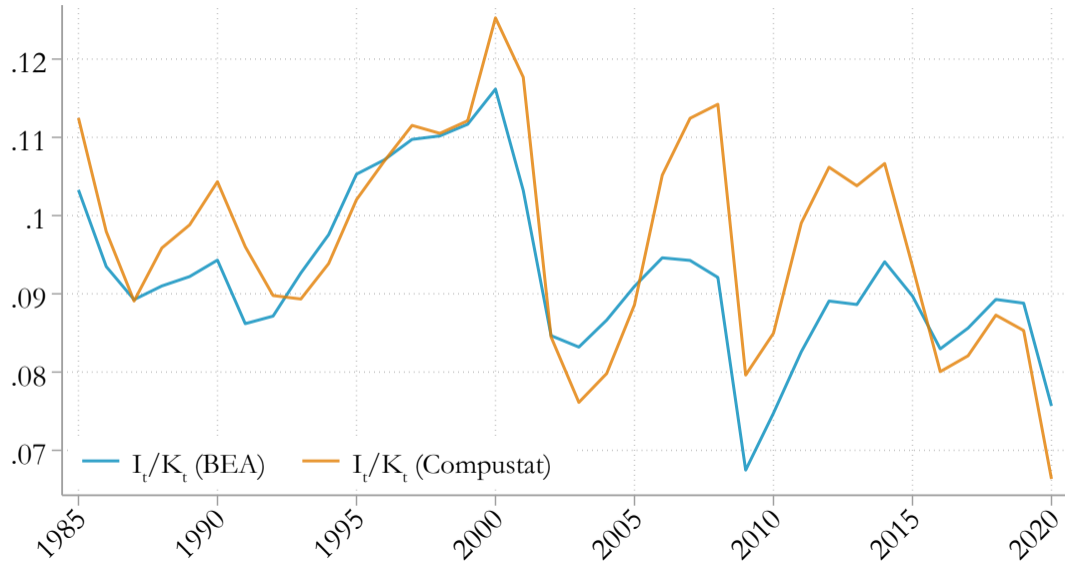
Distribution of income across factors

Roadmap

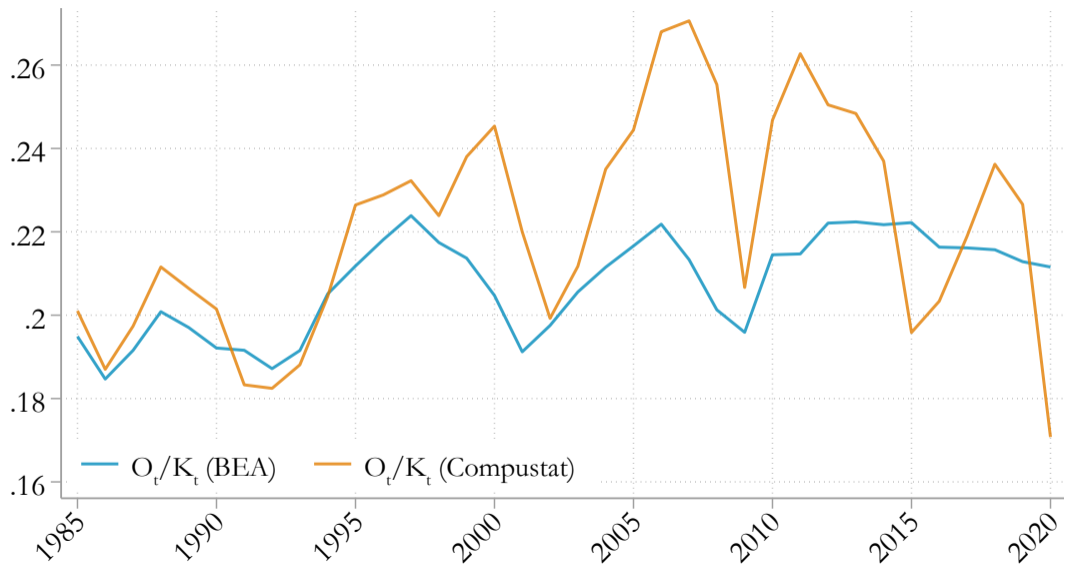
1. What are the facts?
2. What are the explanations?
3. What's missing from the explanations?

1. What are the facts?

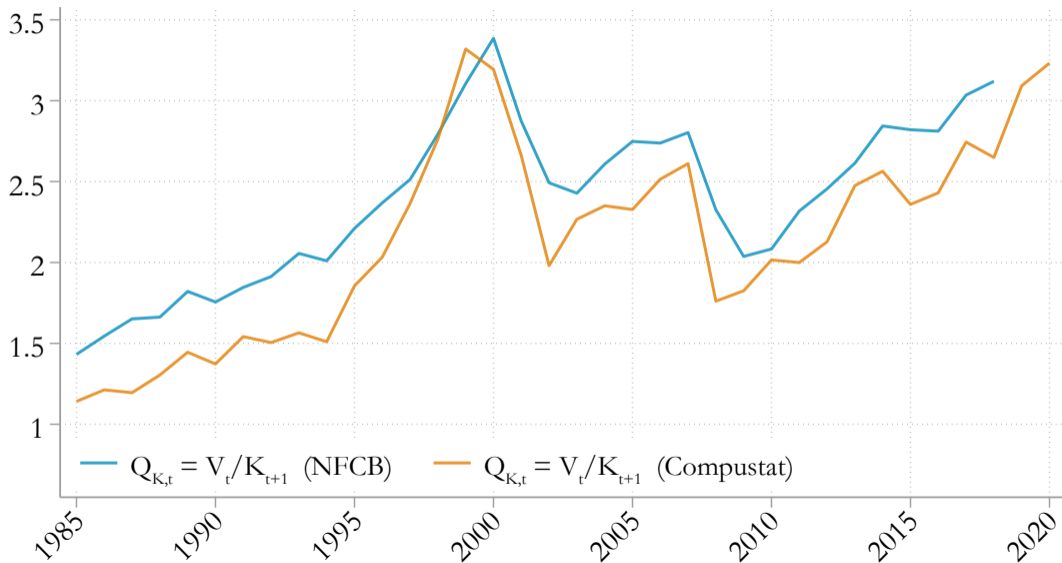
Fact 1: Declining PPE investment rates



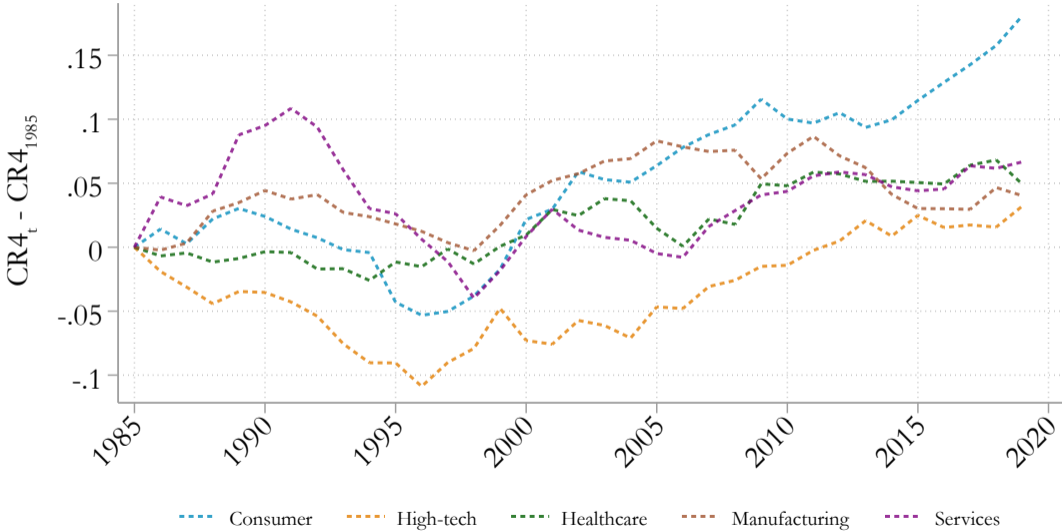
Fact 2a: Stable or rising returns to capital



Fact 2b: Rising valuations



Fact 3: Rising concentration



Compustat; NAICS-3D sectors weighted by sales.

Why do we puzzle over these facts?

$$O_t \equiv \max_{L_t} P_t (A_t K_t^\alpha L_t^{1-\alpha}) - W_t L_t = Z_t K_t \quad [\text{Neo-classical growth model}]$$

$$\frac{O_t}{K_t} \underset{(+)}{=} \frac{\partial O_t}{\partial K_t} = r_t + \delta_K \underset{(-)}{}$$

$$V_t \equiv \text{NPV} [O_t - \Phi(I_t/K_t)K_t] = Q_{K,t} K_t \quad [\text{Q theory}]$$

$$\frac{V_t}{K_{t+1}} \underset{(+)}{=} \frac{\overset{(Q_{K,t})}{\partial V_t}}{\partial K_{t+1}} = \Phi'(I_t/K_t) \underset{(-)}{}$$

(Almost) two sides of the same coin

Five (relatively) open questions about the facts

[Related facts]

1. When did the trends start? [Karabarbounis, Neiman, 2019]
2. Are the trends the same across countries? [Döttling, Gutierrez, Philippon, 2017]
3. Are the trends the same across sectors? [Crouzet, Eberly, 2019]
4. Are PPE investment rates really that low? [Gourio, 2019]
5. Within-firm changes vs. reallocation? [Autor, Dorn, Katz, Patterson, Van Reenen, 2020]

2. What are the existing explanations?

Explanation 1: rising rents

$$\frac{O_t}{K_t} = \mu \frac{\partial O_t}{\partial K_t}, \quad \mu > 1$$

$$\frac{O_t}{K_t} \underset{(+)}{=} \mu \frac{\partial O_t}{\partial K_t} = \underset{(++)}{\mu} (r_t + \underset{(-)}{\delta_K})$$

[Neo-classical growth model]

Explanation 1: rising rents

$$\frac{O_t}{K_t} = \mu \frac{\partial O_t}{\partial K_t}, \quad \mu > 1$$

$$Q_{K,t} = q_{K,t} + \mathbb{E}_t \left[\sum_{j \geq 1} M_{t,t+j} \left(\frac{O_{t+j}}{K_{t+j}} - \frac{\partial O_{t+j}}{\partial K_{t+j}} \right) \right]$$

[Q-theory]

$$= q_{K,t} + (\mu - 1) \mathbb{E}_t \left[\sum_{j \geq 1} M_{t,t+j} \frac{\partial O_{t+j}}{\partial K_{t+j}} \right]$$

$$> q_{K,t} = \Phi' \left(\frac{I_t}{K_t} \right)$$

Explanation 1: rising rents

$$\frac{O_t}{K_t} = \mu \frac{\partial O_t}{\partial K_t}, \quad \mu > 1$$

Mechanisms for $\mu \uparrow$

Oligopoly + rising entry costs [Gutiérrez, Philippon, 2017; Corhay, Kung, Schmid, 2020]

Oligopsony in labor markets [Krueger, 2018; Benmelech, Bergman, Kim, 2020]

Does Explanation 1 work in the data?

Measured rents are rising

[Barkai, 2020]

$$\hat{\Pi}_t = O_t - (\widehat{r_t + \delta_K})K_t = \frac{\mu - 1}{\mu}O_t$$

[Estimated rents]

Measured markups are rising

[De Loecker, Eeckhout, Unger, 2020]

$$\mu = 1 + \frac{\widehat{\mu_S} - 1}{\alpha}, \quad \widehat{\mu_S} = (1 - \alpha) \frac{P_t Y_t}{W_t L_t}$$

[Measurement problems]

Investment correlates with measured markups

[Gutiérrez, Philippon, 2017]

Explanation 2: rising intangibles

$$O_t = O_t(K_t, B_t) \Leftrightarrow \frac{O_t}{K_t} = \frac{\partial O_t}{\partial K_t} + \frac{B_t}{K_t} \frac{\partial O_t}{\partial B_t}$$

$$\frac{O_t}{K_t} \underset{(+)}{=} r_t + \underset{(-)}{\delta_K} + \underset{(+)}{\frac{B_t}{K_t} \frac{\partial O_t}{\partial K_t}} \quad \text{[Neo-classical growth model]}$$

$$> r_t + \underset{(-)}{\delta_K}$$

$$Q_{K,t} \underset{(+)}{=} q_{K,t} + \underset{(+)}{\frac{B_t}{K_t} q_{B,t}} \quad \text{[Q-theory]}$$

$$> q_{K,t} = \underset{(-)}{\Phi'(I_t/K_t)}$$

What are intangibles?

[Corrado, Hulten, Sichel, 2009, 2005]

Productive capital, but does not have a physical presence

IT capital

R&D capital

Organization capital

An example from Amazon's 2017 10-K

20% of operating expenses under "Marketing" and "Technology and content"

R&D payroll,

website maintenance costs

software development costs for AWS

*"Collectively, these costs reflect the **investments** we make in order to offer a wide variety of products and services to our customers."*

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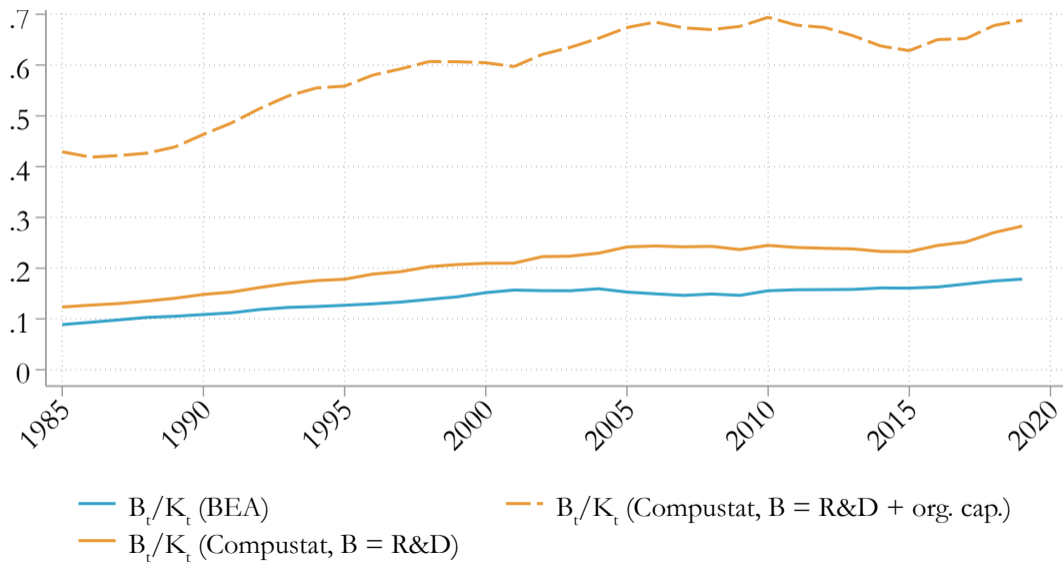
IT capital

R&D capital

Organization capital

Not exogenous — requires investment

The ratio B_t/K_t



What are intangibles?

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Productive capital, but does not have a physical presence

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Not exogenous — requires investment

Economic properties

Excludable from use by other firms

Non-rival in use within the firm

Does Explanation 2 work in the data?

Rising valuations and falling investment

[Crouzet, Eberly, 2019]

$$Q_{K,t} = q_{K,t} + \frac{B_t}{K_t} q_{B,t} \sim 1 + \frac{B_t}{K_t} < \hat{Q}_{K,t}$$

[Firm-level evidence] [Flow returns to capital]

Concentration

[Crouzet, Eberly, 2019]

Across industries, intangible intensity and HHI are correlated

Across firms, intangible intensity and market share are correlated

[Firm-level evidence]

3. What's missing from the explanations?

[A] The intangibles/rents dichotomy is too simplistic

The two mechanisms are not mutually exclusive

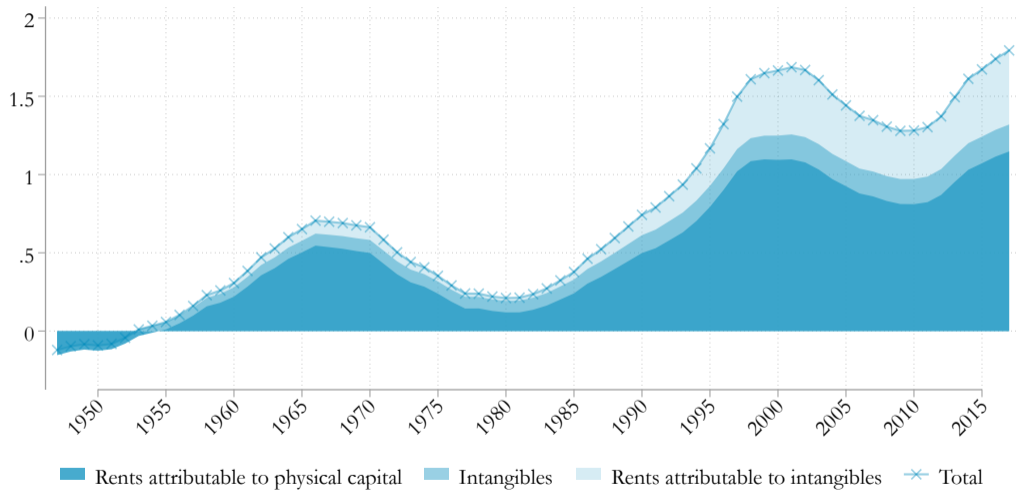
[Crouzet, Eberly, 2021]

Intangibles and rents interact to increase the investment/valuations gap

$$Q_{K,t} - q_{K,t} = (\mu - 1)N_{K,t} + \frac{B_t}{K_t}q_{B,t} + \frac{B_t}{K_t} \times (\mu - 1)N_{B,t}$$

$$N_{X,t} = \text{NPV}(\partial O_t / \partial X_t), \quad X \in \{K, B\}$$

[A] The intangibles/rents dichotomy is too simplistic



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Rents are endogenous — to past intangible investment

Customer capital

[Gourio, Rudanko, 2014]

customer acquisition costs → durable customer base → pricing power

R&D capital

[Klette, Kortum, 2004]

R&D investment → quality differentiation → pricing power

IT capital/Data

[Faboordi, Veldkamp, 2021]

data acquisition costs → demand forecasting → (potentially) pricing power

Challenges for future work:

1. General framework capturing common features of these mechanisms
2. Mapping to data on investment and valuations

[B] Why is concentration rising?

Concentration is an equilibrium outcome, not a measure of market power

[Bain, 1951; Demsetz, 1973; Syverson, 2019]

At the core of several recent models



[Akcigit and Ates, 2019; Autor et al. 2020; Edmond, Midrigan, Xu, 2020; Peters, 2020; De Ridder, 2020]

[B] Why is concentration rising?

Barriers to entry \uparrow ?

But: concentrating sector innovate actively

[Crouzet, Eberly, 2019]

Demand-side factors (market size/globalization)?

But: tradable and non-tradable sectors both concentrating

[Autor et al., 2020]

$var(z_i) \uparrow$?

[Andrews, Criscuolo, Gal, 2016]

Challenges for future work:

1. What explains $var(z_i) \uparrow$? Does intangible investment play a role? [De Ridder, 2020]
2. Is there really a one-size-fits all (sectors) story?

[C] Firm boundaries

To what extent is rising concentration due to changing firm boundaries?

M&A activity among incumbents

Start-up acquisitions

Intangibles and rents can both shape firm boundaries

Intangibles create economies of scope across incumbents

Dominant incumbents allow potential entrants to "scale" [Kamepalli, Rajan, Zingales, 2021]

Challenges for future work:

Pretty wide open!

Conclusion

Take-aways

In recent decades, US businesses experienced

T1 Declining rates of investment

T2 Rising returns to capital

T3 Rising concentration

T1/T2 can be accounted for by jointly rising rents and rising intangibles

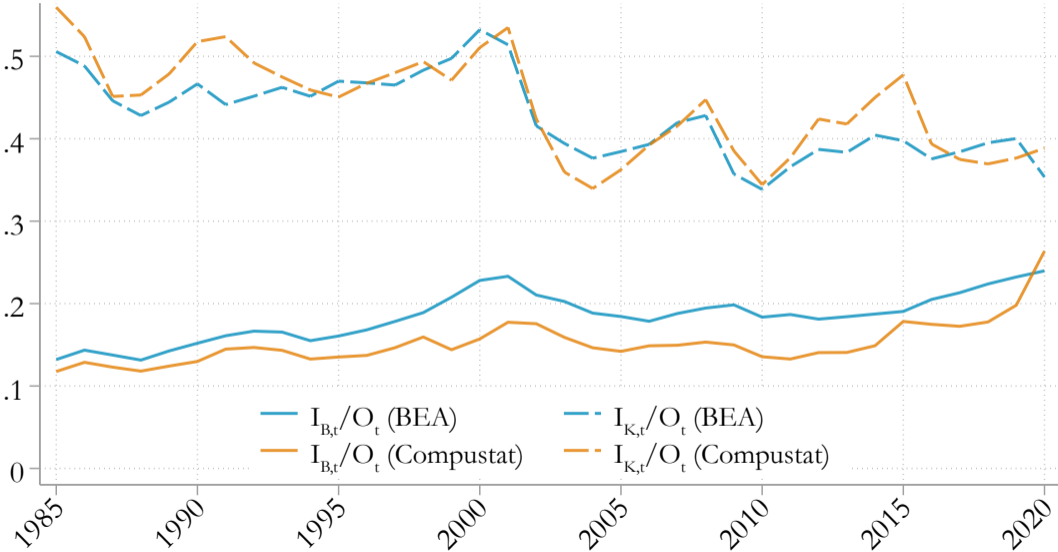
general, quantifiable model of intan → rents

Causes and implications of T3 are more elusive

drivers of productivity gaps; sectoral heterogeneity; role of firm boundaries

More

Intangible vs. physical investment flows



Measured markups are rising

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Are magnitudes plausible?

[Basu, 2019]

De Loecker, Eeckhout, Unger, 2020: $\mu_S \sim 1.60$

Rents are $\sim 35\%$ of sales, $\sim 70\%$ of value added

Can we hope to use income statements to recover variable costs?

$$\mu_S \sim \frac{\text{sales}}{\text{cogs} + 0.7 \times (\text{sg\&a} - \text{r\&d})}$$

Walmart: *all* wages are in sg&a; $\mu_{S,\text{Walmart}} = 1.12$ in 2015

Costco: *only some* wages in sg&a; $\mu_{S,\text{Costco}} = 1.06$ in 2015

$\mu_{S,\text{Walmart}} > \mu_{S,\text{Costco}}$? Or $0.7 \times (\text{sg\&a} - \text{r\&d})$ too low for Walmart?

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Are measured returns to capital rising?

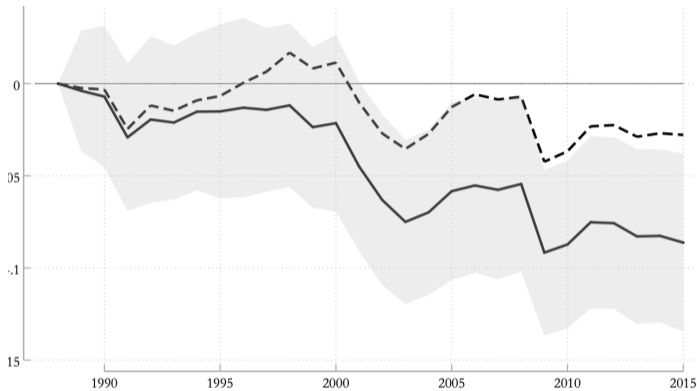
[Koh, Santaepulàlia-Llopis, Zheng, 2020]
[Eisfeldt, Falato, Xiaolan, 2020]

$O_t^{unadj} / (P_t Y_t) = (O_t - P_{B,t} B_t) / (P_t Y_t)$ is trendless

But is $P_{B,t} B_t$ really capital income? Or is it paid to key firm talent?

The investment gap after controlling for intangibles

[Back]



Solid : $(I/K)_{j,t} = \alpha_j + \gamma t + \beta Q_{K,j,t} + \epsilon_{j,t}$

Dashed : $(I/K)_{j,t} = \alpha_j + \gamma t + \beta Q_{K,j,t} + \zeta (B/K)_{j,t} + \epsilon_{j,t}$

[Crouzet, Eberly, 2019]

Intangible intensity and market share

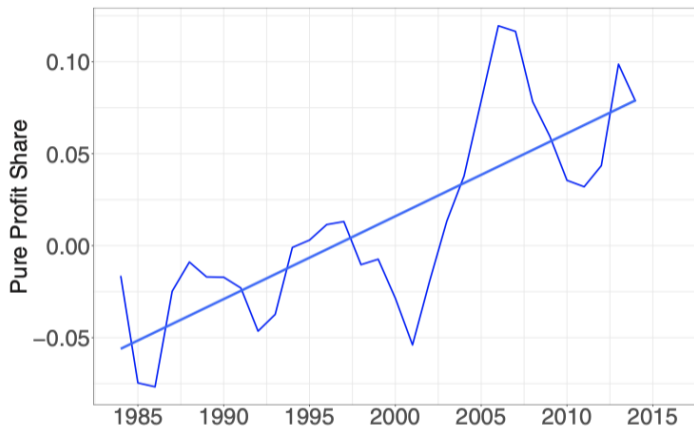
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	Market share		
	(A)	(B)	(C)
Compustat intangible share	0.1308 ^{***} (17.69)	0.0096 ^{***} (5.40)	0.0073 ^{***} (4.91)
Observations	98520	97245	97245
Industry \times year f.e.	Yes	No	No
Firm f.e.	No	Yes	Yes
Year f.e.	No	No	Yes

[Crouzet, Eberly, 2019]

Measured rents are rising

[Barkai, 2020]



$$\hat{\Pi}_t / (P_t Y_t) = \frac{\mu - 1}{\mu} O_t / (P_t Y_t), \quad \text{NFCB sector.}$$

Declining labor share

[Karabarbounis, Neiman, 2014]

$$LS_t = \frac{W_t L_t}{P_t Y_t} = 1 - \frac{O_t}{K_t} \frac{K_t}{P_t Y_t}$$

(-) (+)

Declining “business dynamism”

Falling entry rates

[Gourio, Messer, Siemer, 2016]

Rising productivity gap between leaders and laggards

[Andrews, Criscuolo, Gal, 2016]

Falling rates of job reallocation

[Decker, Haltiwanger, Jarmin, Miranda, 2016]