Rents and Intangible Capital: A Q+ Framework

Nicolas Crouzet[1] Janice Eberly[2]

[1]Kellogg and Chicago Fed

[2]Kellogg and NBER

Question

Why is PPE investment weak ?

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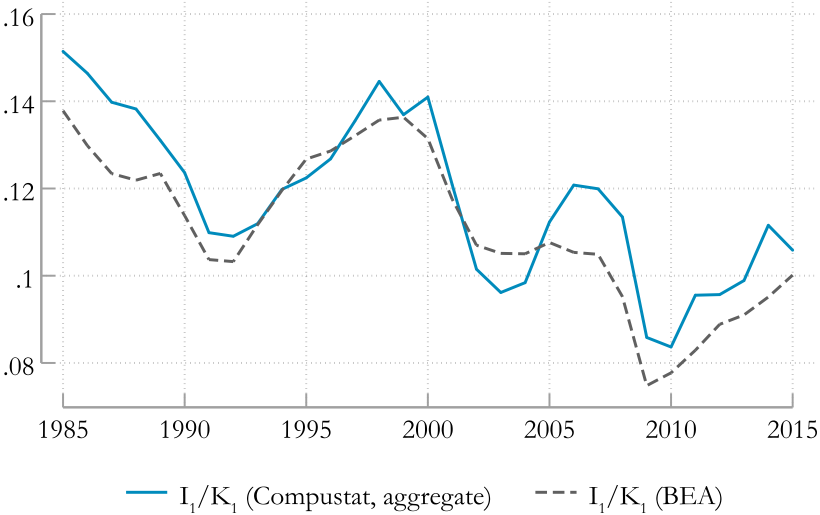
PPE investment is weak



Sectoral data

Question

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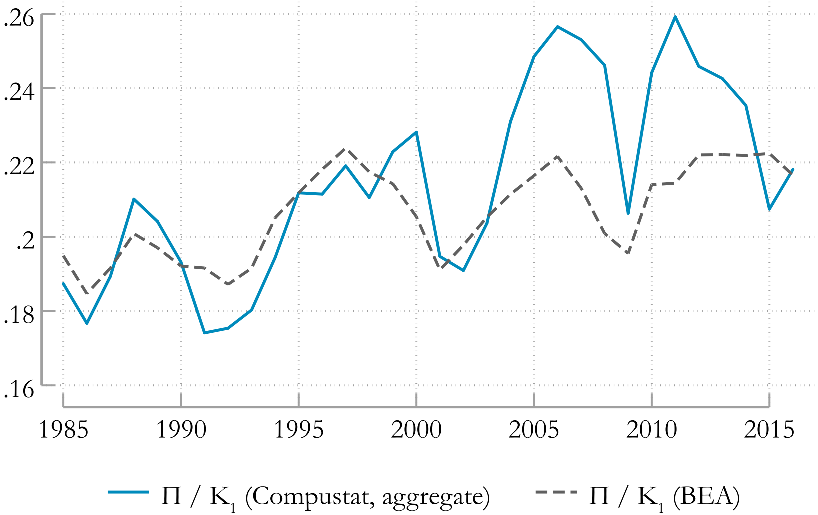
- ... ***despite*** high returns ?

PPE investment is weak despite high returns



Sectoral data Investment-Q

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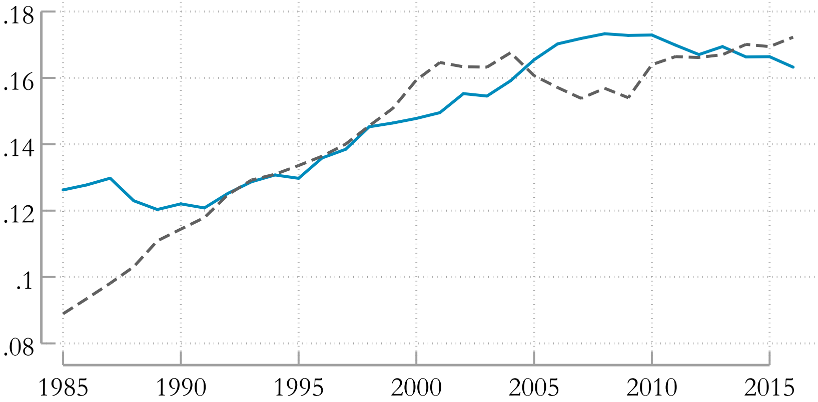
Explanation 2: **intangibles** (Crouzet and Eberly, 2018, 2019)

The growing importance of intangible capital



K_1 = PPE and K_2 = R&D capital.

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Why care? Explanation 1 has strong **policy** implications

This paper

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What we do:

- Neo-classical investment model with rents + intangibles

  "Q+": Lindenberg and Ross (1981) + Hayashi and Inoue (1991)

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Related literature

1. Aggregate implications of rising rents:

    - **Gutierrez and Philippon (2017, 2018), Farhi and Gourio (2018), Barkai (2019), Karabarbounis and Neiman (2019)**, Autor et al. (2019), Caballero, Farhi, and Gourinchas (2017), Caballero and Farhi (2018), Eggertsson, Robbins and Wold (2018), Hall (2018), De Loecker and Eeckhout (2019), Basu (2019)

    This paper : investment-Q; new approach for estimating of rents; sectoral heterogeneity

2. Q theory and firm value:

    - Lindenberg and Ross (1981), Hayashi and Inoue (1991), Chirinko (1993), Abel and Eberly (1994), Cooper and Ejarque (2003), Hansen, Heanton and Li (2005), Abel and Eberly (2011), Eisfeldt and Papanikolaou (2013), Ai, Croce and Li (2013), Andrei, Mann and Moyen (2019), **Hall (2001), Prescott and McGrattan (2010), Peters and Taylor (2017), Belo, Gala, Salomao, Vitorino (2019)**

    This paper : general decomposition of $Q - q$, including market power

1. Theory

A (fairly) general Q-theory model

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A firm chooses investment according to:

$$
\begin{aligned}
V_t^c\left(\mathbf{K}_t\right) = \quad & \max_{\mathbf{K}_{t+1}} \quad \Pi_t(K_t) - \tilde{\Phi}_t\left(\mathbf{K}_t, \mathbf{K}_{t+1}\right) \quad + \quad \mathbb{E}_t\Big[M_{t,t+1} V_{t+1}^c\left(\mathbf{K}_{t+1}\right)\Big] \\
& \text{s.t.} \quad K_t = F_t\left(\mathbf{K}_t\right), \quad \mathbf{K}_t = \Big\{K_{n,t}\Big\}_{n=1}^{N}
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How general is this model?

The value of the firm

Lemma (Firm value decomposition)

$$V_t^e = \sum_{n=1}^{N} q_{n,t} K_{n,t+1} + \sum_{n=1}^{N} \sum_{k \geq 1} \mathbb{E}_t \left[M_{t,t+k} (\mu - 1) \Pi_{n,t+k} K_{n,t+k} \right]$$

where:

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- $\mu = 1$: $\quad V_t^e = \sum_n q_{n,t} K_{n,t+1}$ (Hayashi and Inoue, 1991)

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- $\mu > 1$: $\quad V_t^e = \sum_n q_{n,t} K_{n,t+1}$ + **rents** (Lindenberg and Ross, 1981)

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$$(\mu - 1)\Pi_{n,t} = \underbrace{\left(\frac{\Pi_t}{K_t} - \frac{\partial \Pi_t}{\partial K_t} \right)}_{\text{gap btw. average and marginal product}} \times \frac{\partial K_t}{\partial K_{n,t}}$$

The investment gap

- The **investment gap** is the gap between average Q and marginal q:

$$G_{n,t} \equiv Q_{n,t} - q_{n,t},$$

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General adjustment cost functions | Total Q

A decomposition of the investment gap

Lemma

$$G_{n,t} = 0$$

$N = 1, \quad \mu = 1$: no investment gap, $Q = q$ (Hayashi, 1982)

A decomposition of the investment gap

Lemma

$$G_{n,t} \quad = \quad (\mu - 1) \sum_{k \geq 1} \mathbb{E}_t \left[M_{t,t+k} \Pi_{n,t+k} (1 + g_{n,t+k}) \right]$$

where: $\quad g_{n,t+k} = \dfrac{K_{n,t+k}}{K_{n,t+1}},$

$N = 1, \quad \mu > 1$: investment gap due to **rents** (Lindenberg and Ross, 1981)

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$$G_{n,t} = \sum_{m \neq n} q_{m,t} S_{m,n,t+1}$$

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$N > 1$, $\mu = 1$: investment gap due to **omitted capital** (Hayashi, 1991)

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$N > 1, \quad \mu > 1$: additional term: **rents** $\times$ **omitted capital**

Analytical example (1/2)

Assumption 1: Adjustment costs are given by:

$$\Phi_{n,t}\left(\frac{K_{n,t+1}}{K_{n,t}}\right)K_{n,t} = K_{n,t+1} - (1-\delta_n)K_{n,t} + \gamma_n \Gamma\left(\frac{K_{n,t+1}}{K_{n,t}}\right)K_{n,t},$$
$$\Gamma(1) = 0, \quad \Gamma'(1) = 0, \quad \Gamma''(1) = 1.$$

$n = 1:$ physical capital

$n = 2:$ intangible capital

Assumption 2: The profit function is:

$$\Pi_t = A_t^{1-\frac{1}{\mu}} K_t^{\frac{1}{\mu}}, \qquad \frac{A_{t+1}}{A_t} = 1 + g.$$

Additionally, $M_{t,t+1} = (1+r)^{-1}$ for some $r > g$.

Link to standard macro models

Analytical example (2/2)

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G_{1,t} = & \quad (\mu - 1) \sum_{k \geq 1} \mathbb{E}_t \left[M_{t,t+k} \Pi_{1,t+k} (1 + g_{1,t+k}) \right] && \text{(Rents} \rightarrow \text{physical capital)} \\
& + \quad q_{2,t} S_{t+1} && \text{(Ommitted capital effect)} \\
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when adjustment costs are linear ($\gamma_n = 0$.)

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&+ \quad (\mu - 1) \textstyle\sum_{k \geq 1} \mathbb{E}_t \left[M_{t,t+k} \Pi_{2,t+k} (1 + g_{2,t+k}) \right] S_{t+1} && \text{(Rents} \rightarrow \text{intangibles)} \times \\
& && \text{(Ommitted capital effect)}
\end{aligned}
$$

The envelope condition of the firm requires that:

$$
\Pi_{n,t+k} = r + \delta_n \equiv R_n, \quad n = 1, 2,
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i.e. marginal revenue product = user cost.

Analytical example (2/2)

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+\;& S_{t+1} && \text{(Ommitted capital effect)} \\
+\;& (\mu - 1) \textstyle\sum_{k\geq 1} \mathbb{E}_t \left[M_{t,t+k} R_2 (1 + g_{2,t+k}) \right] S_{t+1} && \text{(Rents} \rightarrow \text{intangibles)} \times \\
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$$\begin{aligned} G_1 &= \frac{(\mu-1)}{r-g}R_1 && \text{(Rents} \rightarrow \text{physical capital)} \\ &+ \quad S && \text{(Ommitted capital effect)} \\ &+ \frac{(\mu-1)}{r-g}R_2 S && \text{(Rents} \rightarrow \text{intangibles)} \times \text{(Ommitted capital effect)} \end{aligned}$$

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$$\gamma_n > 0.$$

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$$q_2 = 1 + \gamma_2 (i_2 - \delta_2) > 1.$$

.

Analytical example (2/2)

$$G_1 = \frac{(\mu - 1)}{r - g}(R_1 + \gamma_1 rg)$$ (Rents $\rightarrow$ physical capital)

$$+ \quad q_2 S$$ (Ommitted capital effect)

$$+ \quad \frac{(\mu - 1)}{r - g}(R_2 + \gamma_2 rg)\, S$$ (Rents $\rightarrow$ intangibles)$\times$
(Ommitted capital effect)

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$$\text{MRPK}_n = \Pi_{n,t} = r + \delta_n + \gamma_n rg = R_n + \gamma_n rg = \text{“adjusted” user cost}$$

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Stochastic growth.

Theory: recap

In general,

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\begin{aligned}
\text{Investment gap} &= Q - q \\
&= \text{Rents} \rightarrow \text{physical capital} \\
&+ \text{Omitted capital effect} \\
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$$

Simple formulas for specific cases:

$$
\text{Rents} \rightarrow K_n \quad \propto \quad \frac{\mu - 1}{r - g} \times \textit{user cost}_n
$$

2. The investment gap in aggregate data

Constructing the investment gap

$$Q_1 - q_1 \quad = \quad \frac{\mu - 1}{r - g} R_1 \quad + \quad q_2 S \quad + \quad \frac{\mu - 1}{r - g} R_2 S$$

Which moments do we need to construct this decomposition?

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Ratio of intangible to physical capital

$$S = \frac{K_{2,t+1}}{K_{1,t+1}}$$

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$\{S, ROA_1,$

"Markup" μ

$$\mu = \frac{ROA_1}{R_1 + SR_2}$$

$$ROA_1 = \frac{\Pi_t}{K_{1,t}}$$

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$\{S, ROA_1, i_1, i_2,$

User costs $\quad R_1, R_2$

$$\begin{aligned} R_n &= r + \delta_n + \gamma_n r g \\ &= r - g + g + \delta_n + \gamma_n r g \\ &= r - g + i_n + \gamma_n r g \end{aligned}$$

i_n: gross investment rate for capital of type n.

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Which moments do we need to construct this decomposition?

$\{S, ROA_1, i_1, i_2, Q_1, g\}$

Gordon growth term $r - g$:

$$r - g = \frac{ROA_1 - (i_1 + S i_2)}{Q_1} - \frac{\gamma_1 + S\gamma_2}{Q_1} g^2$$

Constructing the investment gap

$$Q_1 - q_1 \quad = \quad \frac{\mu - 1}{r - g} R_1 \quad + \quad q_2 S \quad + \quad \frac{\mu - 1}{r - g} R_2 S$$

Which moments do we need to construct this decomposition?

$\{S, ROA_1, i_1, i_2, Q_1, g\}$

When adjustment costs are positive:

$$q_2 = 1 + \gamma_2 g$$

Data sources

Scope: non-financial corporate business (NFCB) sector, 1947-2017

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Obtain moments from six time series in levels: $\{K_{1,t}, K_{2,t}, I_{1,t}, I_{2,t}, \Pi_t, V_t\}$.

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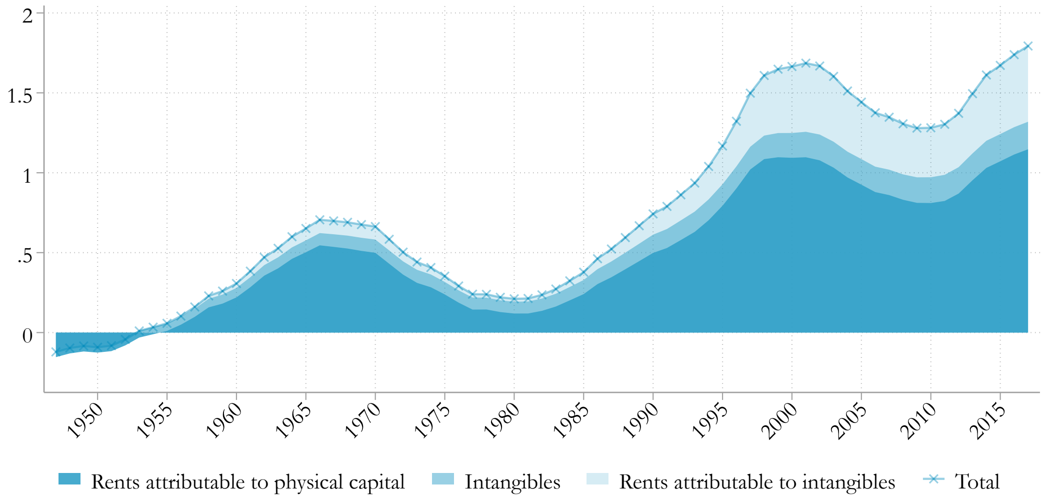
Time series graphs

The investment gap in the non-financial sector (adj. costs = 0)



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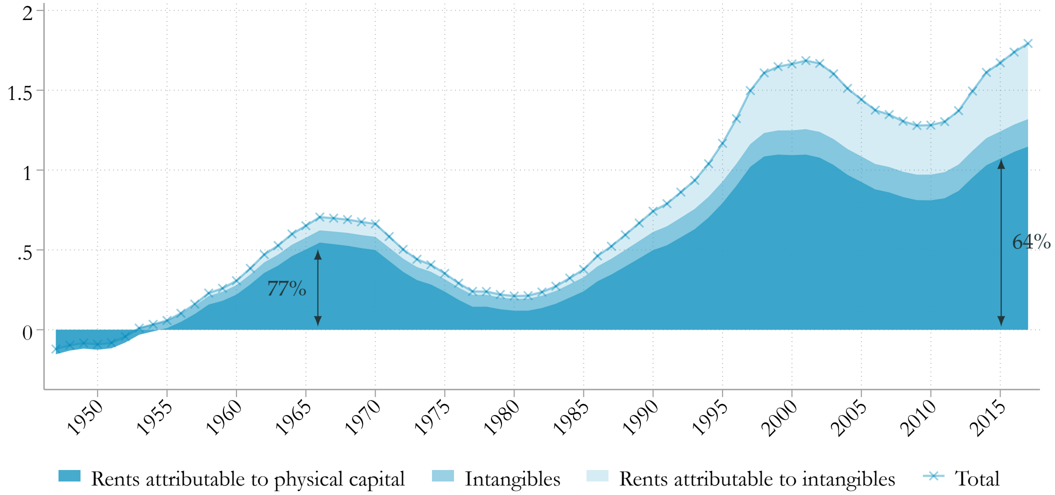

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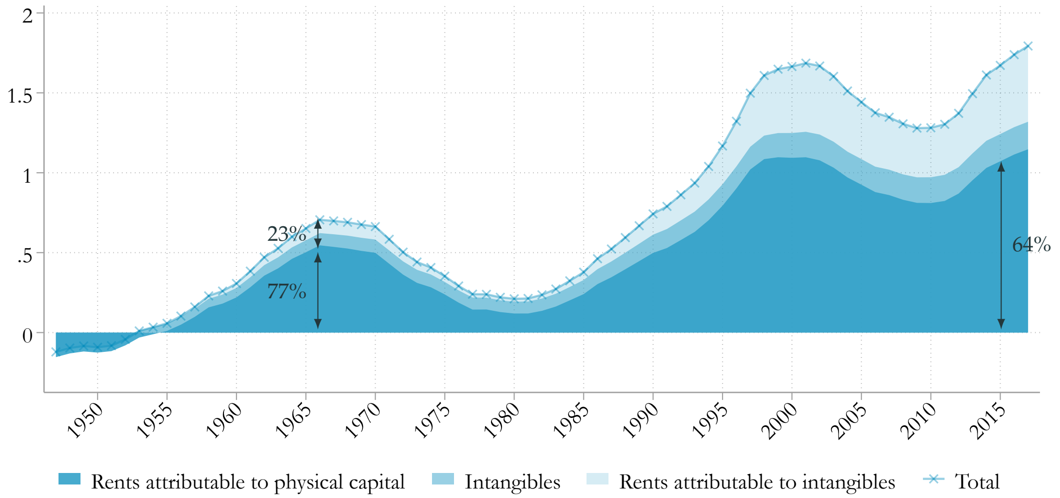

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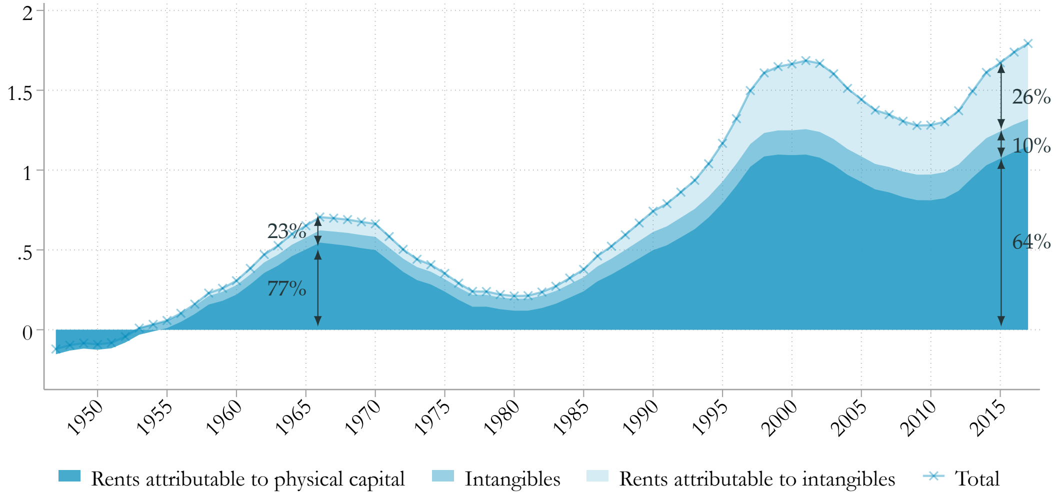
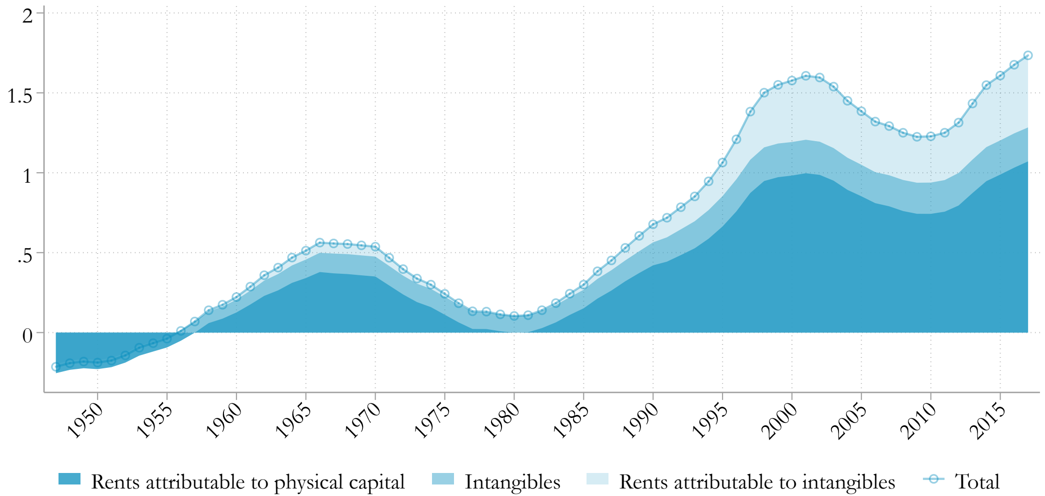


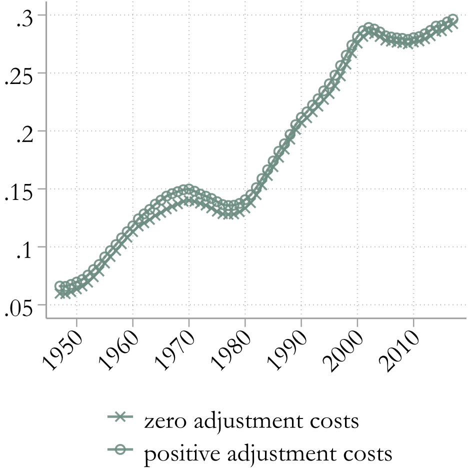
The investment gap in the non-financial sector (adj. costs > 0)



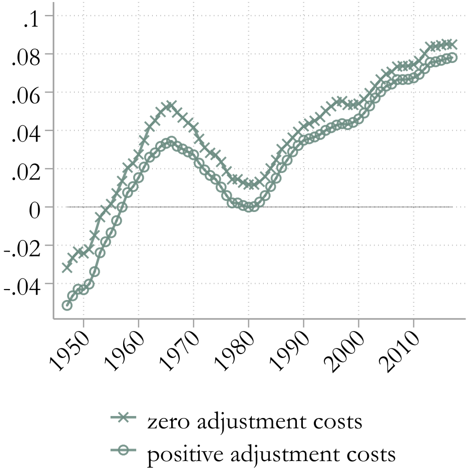
$\gamma_1 = 3, \quad \gamma_2 = 12$ (Belo et al., 2019)

Underlying structural changes

Cobb-Douglas intan share $K_t = K_{1,t}^{1-\eta} K_{2,t}^{\eta}$



Rents/v.a. $s = (1 - WL/PY)(1 - \frac{1}{\mu})$



Relation to existing estimates of the profit share

	Barkai (2019)	KN (2019) case π	DLE (2017)	Hall (2018)	This paper (R&D)
Rents (% v.a.)	-5 $\rightarrow$ 7.5	0 $\rightarrow$ 13	17 $\rightarrow$ 38	26 $\rightarrow$ 57	1.5 $\rightarrow$ 7.5
Markup	0.95 $\rightarrow$ 1.08	1 $\rightarrow$ 1.15	1.21 $\rightarrow$ 1.61	1.35 $\rightarrow$ 2.33	1.01 $\rightarrow$ 1.08

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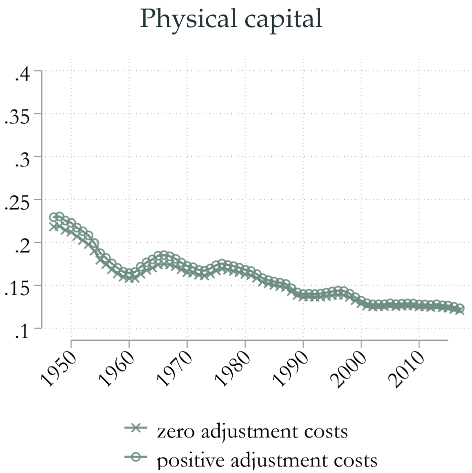
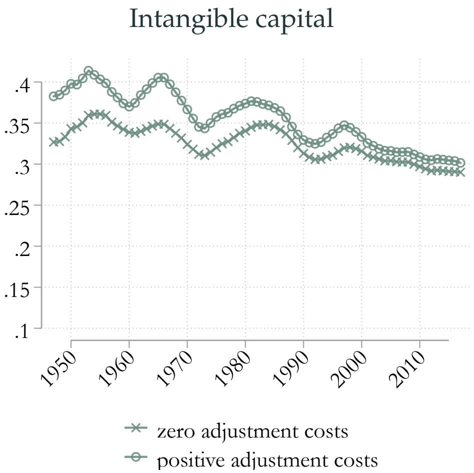
- Due to smaller decline in **user costs**, particularly after 1985

User costs $\color{blue}{R_n} = r + \delta_n + \gamma_n r g$





Implied δ_1, δ_2, discount rate, and PD ratio

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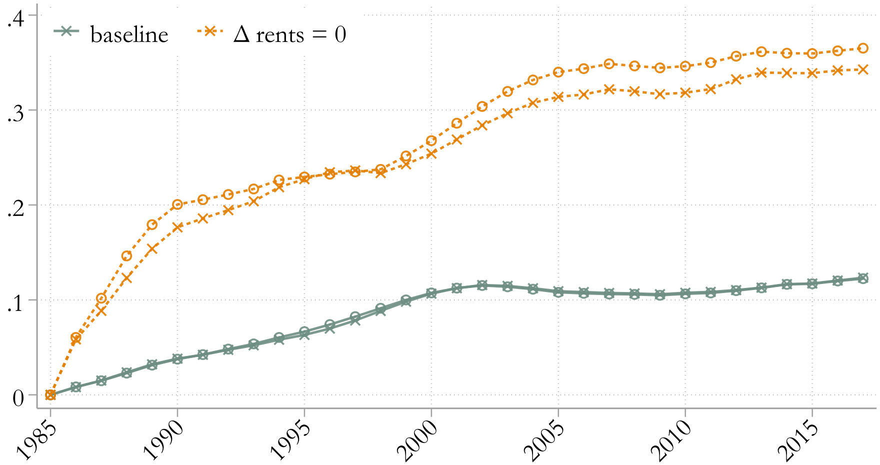
- Due to smaller decline in **user costs**, particularly after 1985
- Mild discount rate decline ($7.9\% \rightarrow 5.6\%$), consisent with rising risk premia

  Caballero, Gourinchas and Farhi (2017), Farhi and Gourio (2018)
- Rise in *relative* user cost of intan $\implies$ higher contribution of intan $\times$ rents to $Q_1 - q_1$

Counterfactual: intan share η with no change in rents



$S_t^{cf} = (K_{2,t}/K_{1,t})^{cf}$: 9% → 39%, vs. 9% → 17% in the R&D data

Robustness

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- Adjustment costs $\gamma_1 \in [0, 10]$ and $\gamma_2 \in [0, 20]$

Ajdustment costs

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- Implications for the labor share Labor share

  implied labor share $0.69 \to 0.64$, but earlier than in the data

Aggregate data: recap

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1. Two periods with large investment gap: 1960-1975, and post-1985.
2. Post-1985: about 1/3 due to intangibles
   - rise in rents, though smaller than other existing estimates
   - rise of intan share
   - rise of relative intan user costs

   $\Longrightarrow$ larger contribution of intan to the investment gap

3. The investment gap using firm-level data

Data

Scope: publicly traded, non-financial corporations, 1975-2017

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- Π_t (income statement)

  operating income before depreciation **+** intangible investment

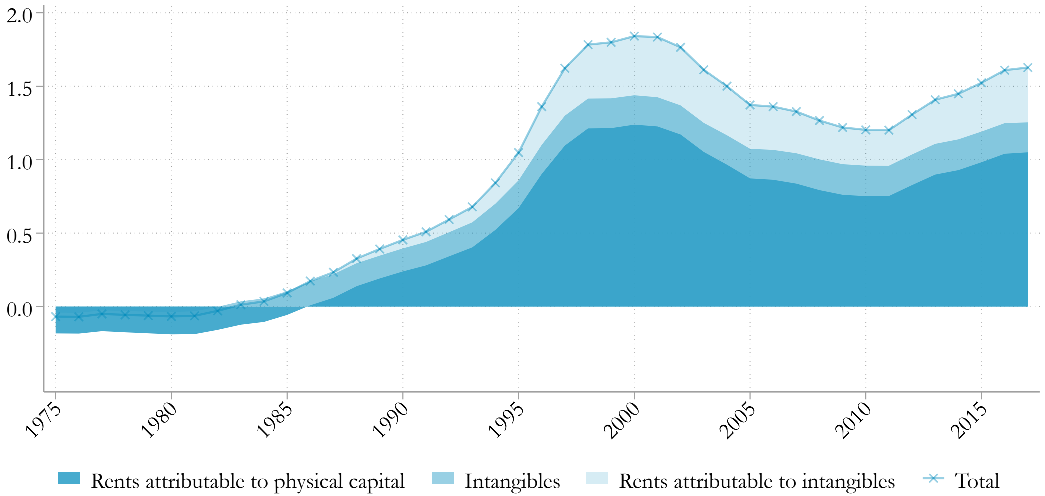
- V_t (balance sheet)

  MV equity + BV debt − liquid financial assets

Time series moments

The investment gap in Compustat

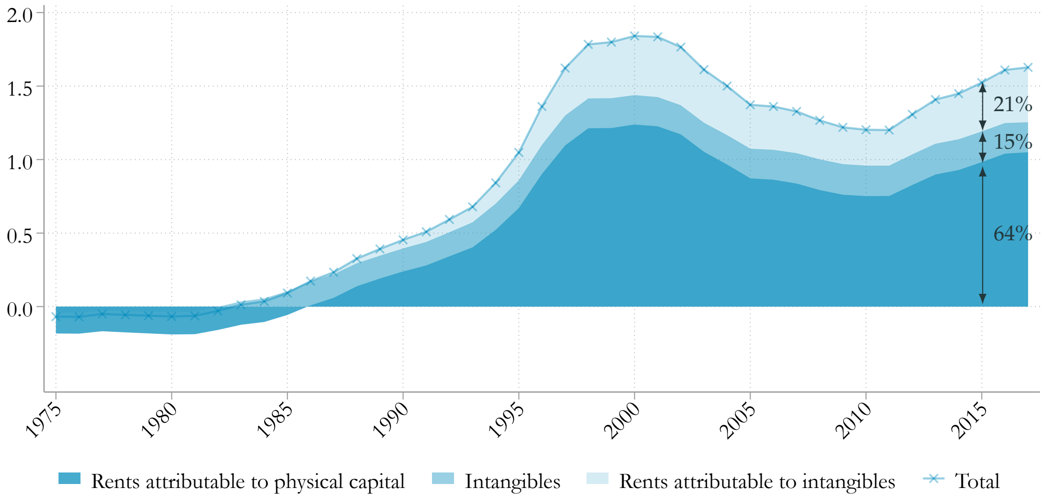
(intan = R&D)



Structural changes

The investment gap in Compustat

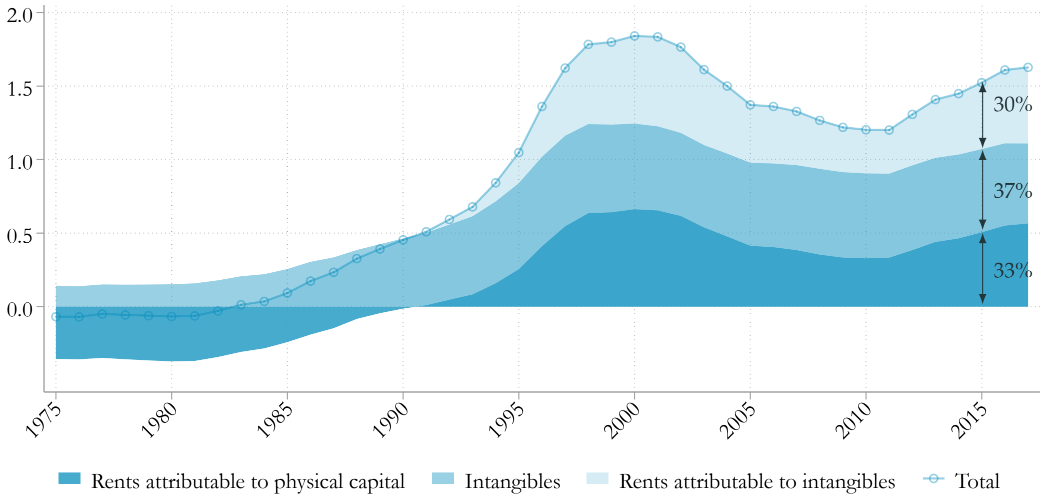
(intan = R&D)



Structural changes

The investment gap in Compustat

(intan = R&D + org. cap.)



Structural changes

Sectoral heterogeneity

1. High-tech sector — software, IT

   high ROA_1, rising Q_1, declining i_1, rising S data

2. Healthcare sector — medical devices, drug companies, healthcare services

   similar to High-tech data

3. Consumer sector — retail and wholesale trade

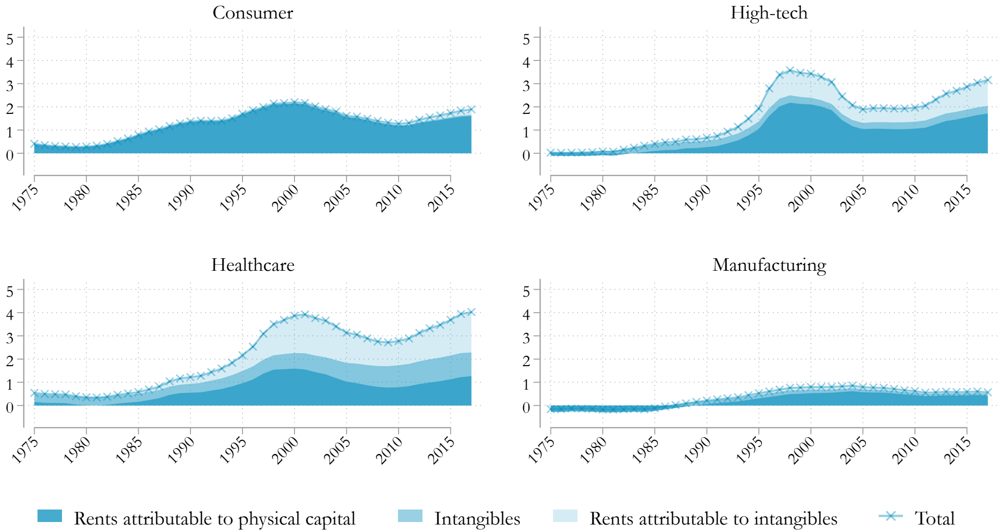
   high ROA_1, rising Q_1, declining i_1, but stable S data

4. Manufacturing sector — consumer durables, business equipment

   declining ROA_1, Q_1, i_1, S data

The investment gap across sectors

(intan = R&D)



Rents vs. intangibles by sector

	Consumer	High-tech	Healthcare	Manufacturing
Intan share (η; 2015)	0.11	0.39	0.57	0.12
Rents/v.a. (s; 2015)	0.14	0.13	0.12	0.02

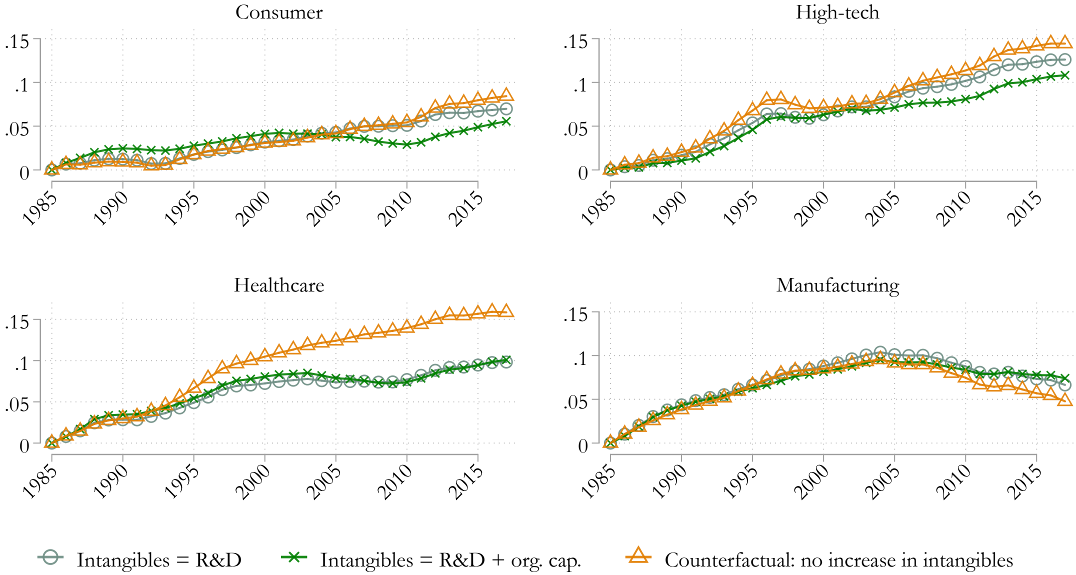
- Intangibles = R&D

Rents vs. intangibles by sector

	Consumer	High-tech	Healthcare	Manufacturing
Intan share (η; 2015)	0.63	0.56	0.69	0.30
Rents/v.a. (s; 2015)	0.03	0.09	0.07	0.02

- Intangibles = R&D + org. cap.

Counterfactual: rents as a fraction of value added



Firm-level data: recap

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1. Expanded definition of intangibles: up 2/3 of investment gap due to intan

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Firm-level data: recap

1. Expanded definition of intangibles: up 2/3 of investment gap due to intan
2. Sectoral gaps are different — aggregate gap driven by composition effects:
   - High-tech, Healthcare: large gap, 2/3 driven by (R&D) intan
   - Manufacturing, Consumer: smaller gaps; larger contribution of rents

   $\implies$ policy remedies, if needed, should probably not be uniform across sectors

Conclusion

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Findings:

1. General decomposition of investment gap:

$$\begin{aligned} Q_1 - q_1 &= \text{Rents} \rightarrow \text{physical capital} \\ &+ \text{Omitted capital effect} \\ &+ (\textbf{Rents} \rightarrow \textbf{intangibles}) \times (\textbf{Omitted capital effect}) \end{aligned}$$

2. Aggregate: intan is 1/3 of $Q_1 - q_1$; implies $\Delta s = 0.06$ instead of 0.12

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Next:

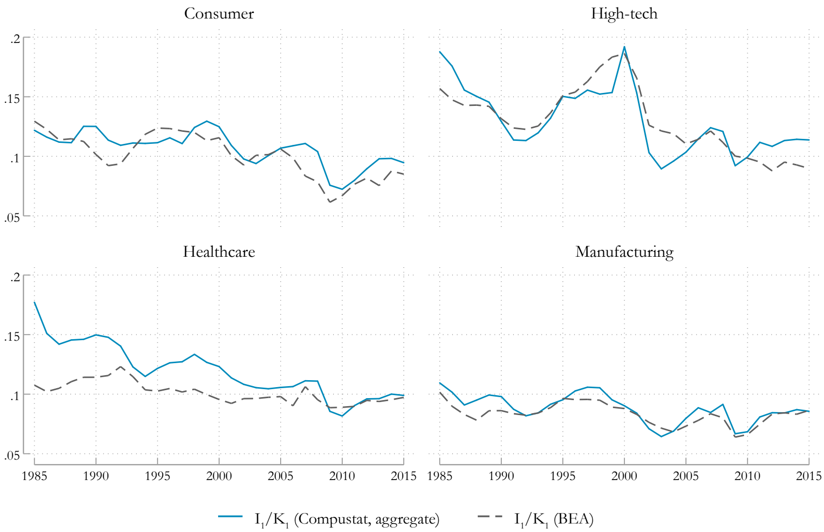
a. Risk premia

b. Within-firm changes of $Q_1 - q_1$ vs. reallocation

c. Intangible investment $\rightarrow \Delta\mu$

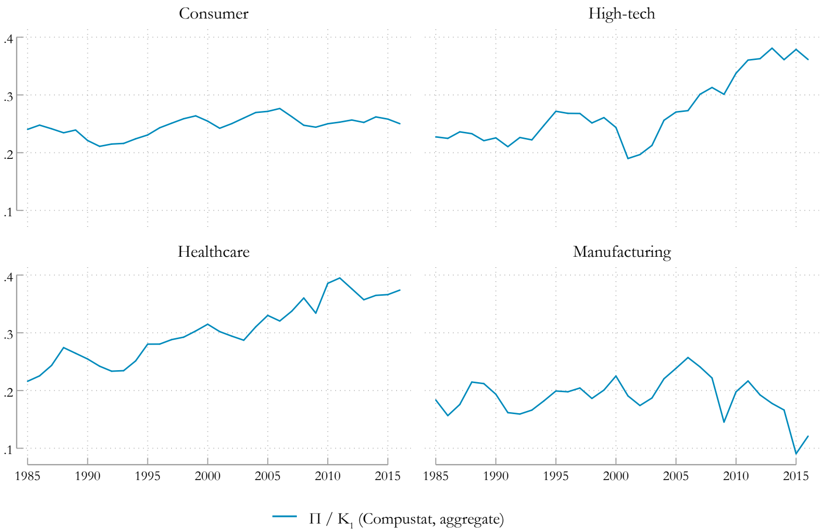
Additional slides

PPE investment is weak: sectoral data



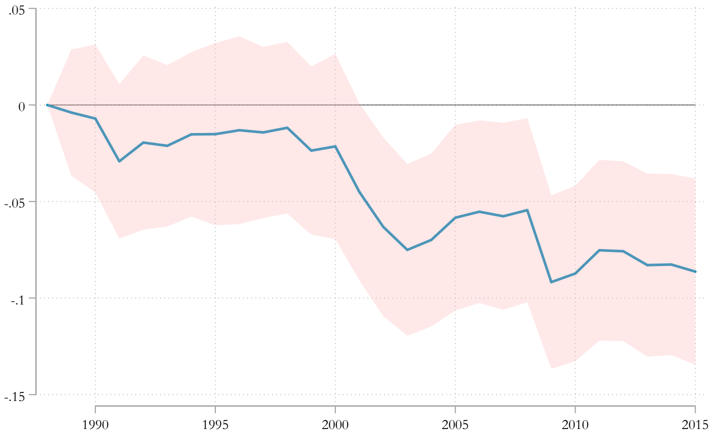
Aggregate data

PPE investment is weak despite high returns: sectoral data



Aggregate data

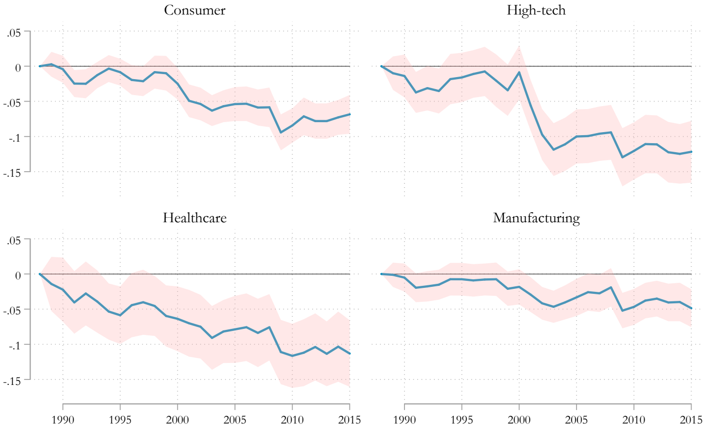
Investment is weak relative to Q



$$i_{j,t} = \alpha_j + \gamma_{\mathbf{t}} + \delta Q_{j,t} + \beta CF_{j,t} + \epsilon_{j,t}$$

Back to returns Sectoral data

Investment is weak relative to Q: sectoral data



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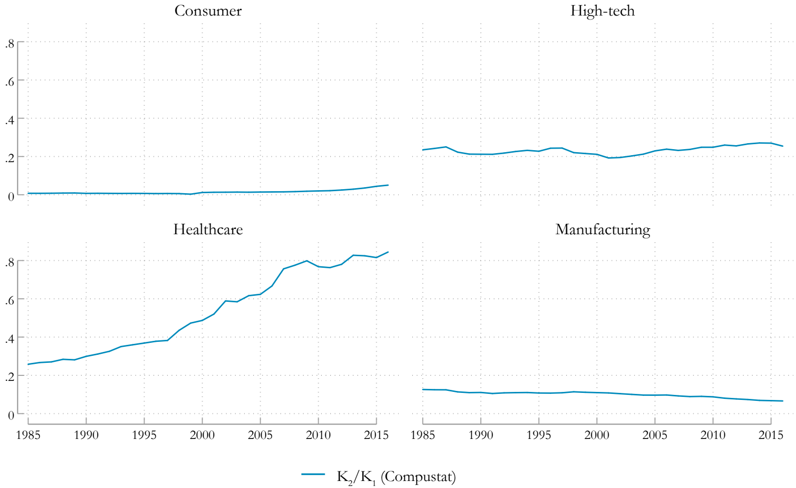
Back to returns

The growing importance of intangibles: sectoral data



K_1 = PPE and K_2 = R&D capital.

Aggregate data

How general is this model?

- No restrictions on exogenous shifters to Π_t, F_t, and $\Phi_{n,t}$
- Particular cases of this framework:

  Lindenberg and Ross (1981), Hayashi (1982), Abel (1983), Abel and Blanchard (1986), Hayashi and Inoue (1991), Abel and Eberly (1994, case I), Abel and Eberly (2011), Peters and Taylor (2017), ...
- What about labor?

  The model can accommodate any flexible input: $\mu = \dfrac{\tilde{\mu} - \alpha}{1 - \alpha}$
- Which cases does this model **not** fit?
  - Non-homogeneous and/or non-smooth adjustment costs
  - Endogenous markups
  - Financial frictions

The investment gap in the general case

The first-order condition for investment is:

$$g_{n,t+1} = \Psi_{n,t}\left(q_{n,t} - 1\right)$$

where:

$$\Psi_{n,t}(y) = \left(\Phi'_{n,t}\right)^{-1}(1+y) - 1.$$

Since $\Phi_{n,t}$ is convex, $\Psi_{n,t}$ is strictly increasing. Therefore:

$$\begin{aligned} g_{n,t+1} &= \Psi_{n,t}\left(q_{n,t} - 1\right) \\ &= \Psi_{n,t}\left(Q_{n,t} - 1 - G_{n,t}\right) \\ &< \Psi_{n,t}\left(Q_{n,t} - 1\right) \qquad \text{iff} \qquad G_{n,t} > 0 \end{aligned}$$

Total Q

Define the total investment rate as: $i_t^{(tot)} = \frac{\sum_{n=1}^N I_{n,t}}{\sum_{n=1}^N K_{n,t}} = \sum_{n=1}^N w_{n,t} i_{n,t}.$

In the quadratic adj. cost case:

$$i_t^{(tot)} = \tilde{\delta}_t + \sum_{n=1}^N \frac{w_{n,t}}{\gamma_n} \left(q_{n,t} - 1\right), \quad \tilde{\delta}_t = \sum_{n=1}^N w_{n,t} \delta_n.$$

Let $Q_t^{(tot)} \equiv \frac{V_t^e}{\sum_{n=1}^N K_{n,t+1}}$. Then:

$$i_t^{(tot)} = \tilde{\delta}_t + \frac{1}{\gamma} \left(Q_t^{(tot)} - 1 \right)$$

if and only if $\mu = 1$, and:

- $\gamma_n = \gamma$ for all n;
- or, $q_{n,t} = q_t$ for all n.

Stochastic growth

Suppose A_t follows the "regime-switching process":

$$\frac{A_{t+1}}{A_t} = 1 + g_t = \begin{cases} 1 + g_{t-1} & \text{w.p. } (1-\lambda) \\ 1 + \tilde{g} & \text{w.p. } \lambda \end{cases}, \qquad \tilde{g} \sim F(.).$$

Then:

$$\begin{aligned} G_{1,t} = \quad & \frac{(\mu-1)}{r - \nu(g_t)} R_1 & & \text{(Rents} \rightarrow \text{physical capital)} \\ + \quad & S & & \text{(Ommitted capital effect)} \\ + \quad & \frac{(\mu-1)}{r - \nu(g_t)} R_2 S & & \text{(Rents} \rightarrow \text{intangibles)} \end{aligned}$$

where: $$\frac{1}{r - \nu(g_t)} = \frac{1}{r - \mathbb{E}(\tilde{g})} \left(1 + \frac{g_t - \mathbb{E}(\tilde{g})}{1 + r} \right) \quad \text{if} \quad \lambda = 1.$$

Complete expression for $\nu(.)$ Analytical example

Stochastic growth

The expression for $\nu(.)$ is:

$$\nu(g_t) = g_t + \lambda(1+g_t)\frac{(r-g_t)\zeta^* - (1+r)}{(1+r)+\lambda(1+g_t)\zeta^*}$$

where ζ^* is a constant that only depends on $F(.)$,, λ and r.

Analytical example

A microfoundation for Example 1 (1/2)

Representative household:

$$U_t = \max \frac{C_t^{1-\sigma}}{1-\sigma} + \beta U_{t+1}, \tag{1}$$

implying $M_{t,t+1} = \beta \left(\frac{C_{t+1}}{C_t}\right)^{-\sigma}$.

Final goods producer

$$Y_t = \left(\int_0^1 Y_{j,t}^{\frac{1}{\tilde{\mu}}} dj\right)^{\tilde{\mu}}, \quad \tilde{\mu} > 1. \tag{2}$$

Intermediate goods producer: $Y_{j,t} = Z_{j,t} K_{j,t}^{\alpha} L_{j,t}^{1-\alpha}$, implying the profit function:

$$\begin{aligned}
\Pi_{j,t} &= A_{j,t}^{\frac{1}{\mu}-1} K_{j,t}^{\frac{1}{\mu}} \\
\mu &= 1 + \frac{\tilde{\mu}-1}{\alpha}, \\
A_{j,t} &= (\alpha + \tilde{\mu} - 1)^{1+\frac{\alpha}{\tilde{\mu}-1}} \tilde{\mu}^{-\frac{\tilde{\mu}}{\tilde{\mu}-1}} (1-\alpha)^{\frac{1-\alpha}{\tilde{\mu}-1}} D_t W_t^{-\frac{1-\alpha}{\tilde{\mu}-1}} Z_{j,t}^{\frac{1}{\tilde{\mu}-1}}, \\
D_t &\equiv P_t^{\frac{\tilde{\mu}}{\tilde{\mu}-1}} Y_t.
\end{aligned}$$

A microfoundation for Example 1 (2/2)

Rest of the solution to the problem is:

$$
\begin{aligned}
P_{j,t} &= \tilde{\mu} MC_{j,t} \\
L_{j,t} &= \left(\frac{(1-\alpha) MC_{j,t} Z_j}{W_t} \right)^{\frac{1}{\alpha}} K_{j,t} \\
MC_{j,t} &= (1-\alpha)^{-\frac{(1-\alpha)(\tilde{\mu}-1)}{\tilde{\mu}-1+\alpha}} \tilde{\mu}^{-\frac{\alpha\tilde{\mu}}{\tilde{\mu}-1+\alpha}} D_t^{\frac{\alpha(\tilde{\mu}-1)}{\alpha+\tilde{\mu}-1}} W_t^{\frac{(1-\alpha)(\tilde{\mu}-1)}{\tilde{\mu}-1+\alpha}} Z_j^{-\frac{\tilde{\mu}-1}{\tilde{\mu}-1+\alpha}} K_{j,t}^{-\frac{(\tilde{\mu}-1)\alpha}{\tilde{\mu}-1+\alpha}}.
\end{aligned}
$$

This implies:

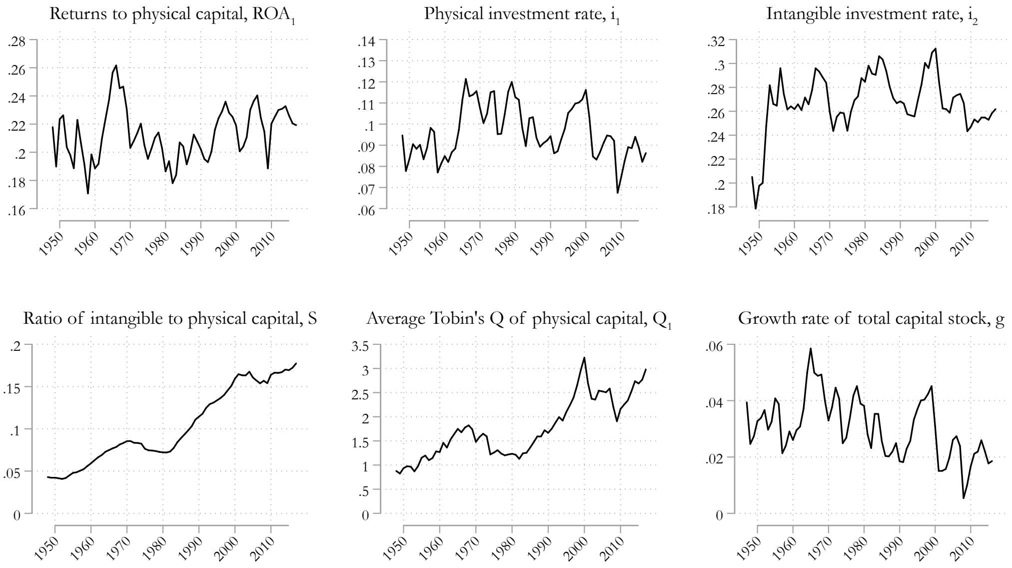
$$
LS_{j,t} \equiv \frac{W_t L_{j,t}}{P_{j,t} Y_t} = \frac{1-\alpha}{\tilde{\mu}}.
$$

We have:

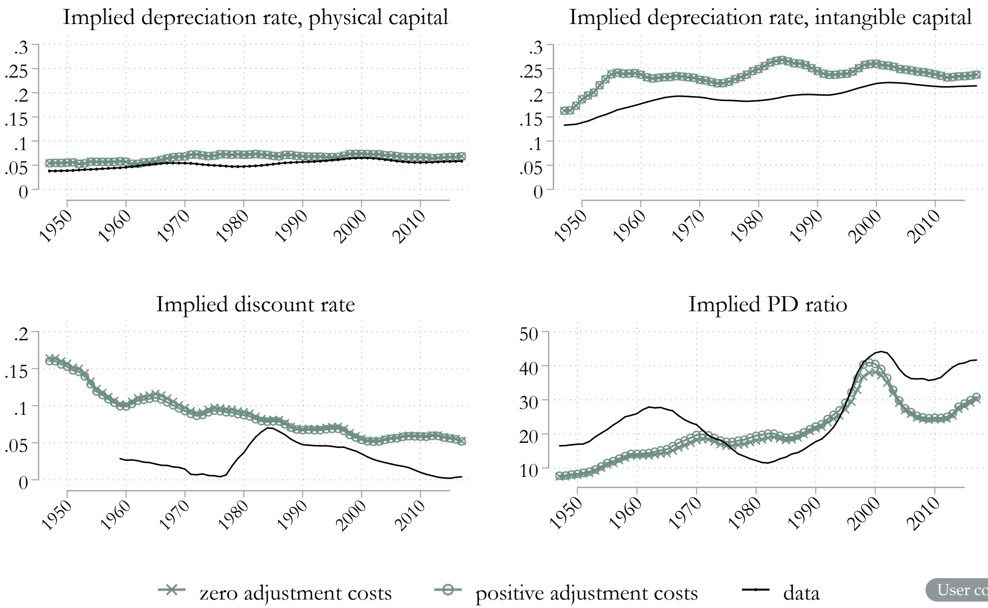
$$
\tilde{\mu} = \alpha(\mu - 1) + 1 = (1 - \tilde{\mu} LS_{j,t})(\mu - 1) + 1,
$$

and so, solving for $\tilde{\mu}$:

$$
\tilde{\mu} = \frac{\mu}{\mu LS_{j,t} + (1 - LS_{j,t})}.
$$



Data sources



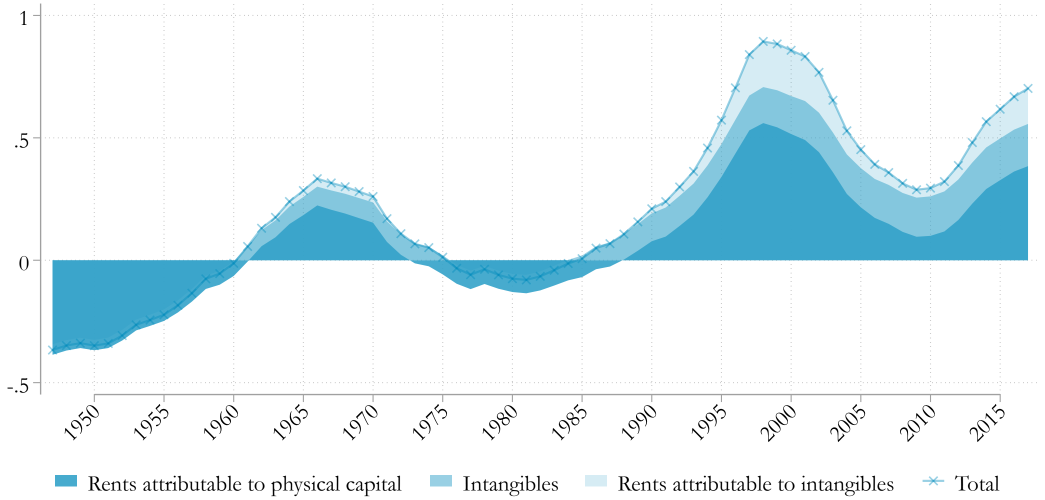
Implied depreciation rate, physical capital
Implied depreciation rate, intangible capital
Implied discount rate
Implied PD ratio
0
.05
.1
.15
.2
.25
.3
10
20
30
40
50
1950
1960
1970
1980
1990
2000
2010
zero adjustment costs
positive adjustment costs
data

User costs


1985-2015 change in Q_1-q1
γ_2
20
15
10
5
0
0
2
4
6
8
10
γ_1
1.34
1.33
1.32
1.31
1.3
1.29
2015 contribution of intangibles to Q_1-q_1
.41
.4
.39
.38
.37
.36
.35
2015 intangible share
.31
.3
.29
.28
.27
2015 rents as a fraction of value added
.085
.08
.075
.07
.065
.06

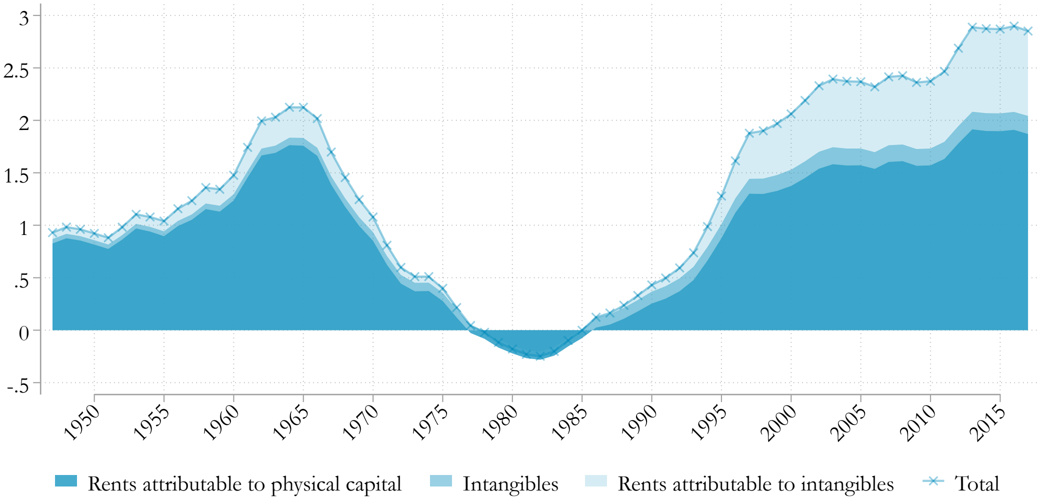
Robustness

Netting out all financial assets (Hall, 2001)



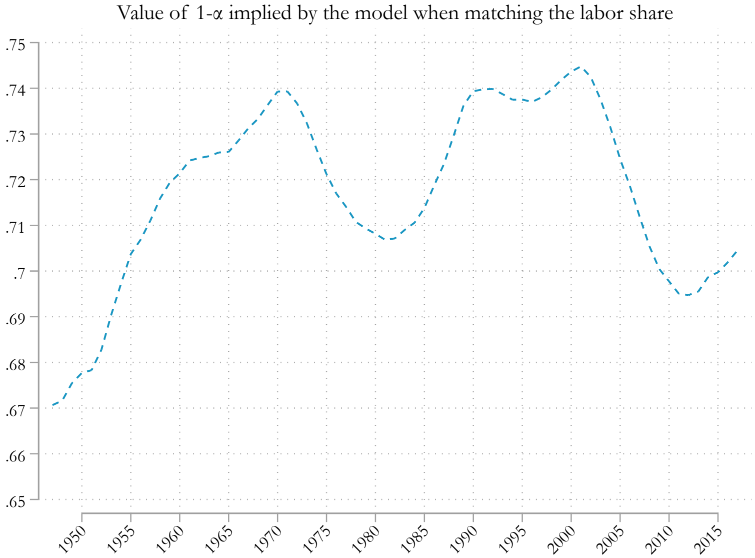
Robustness

Matching the PD ratio



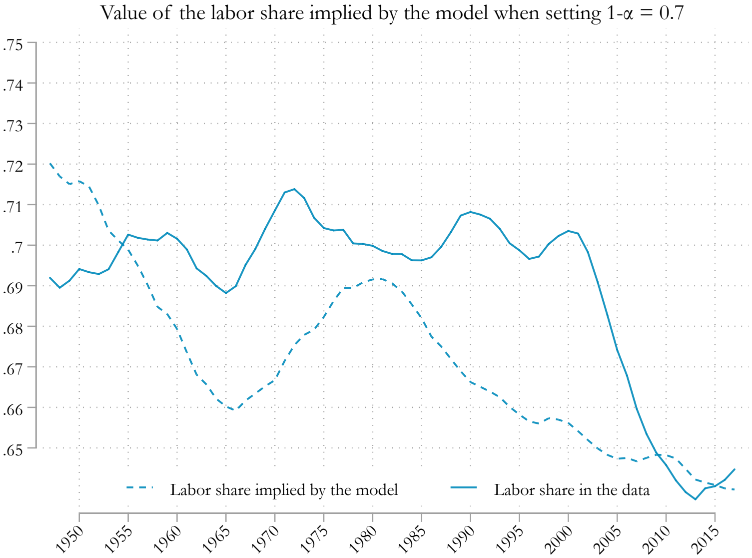
Robustness

Implications for the labor share (1/2)

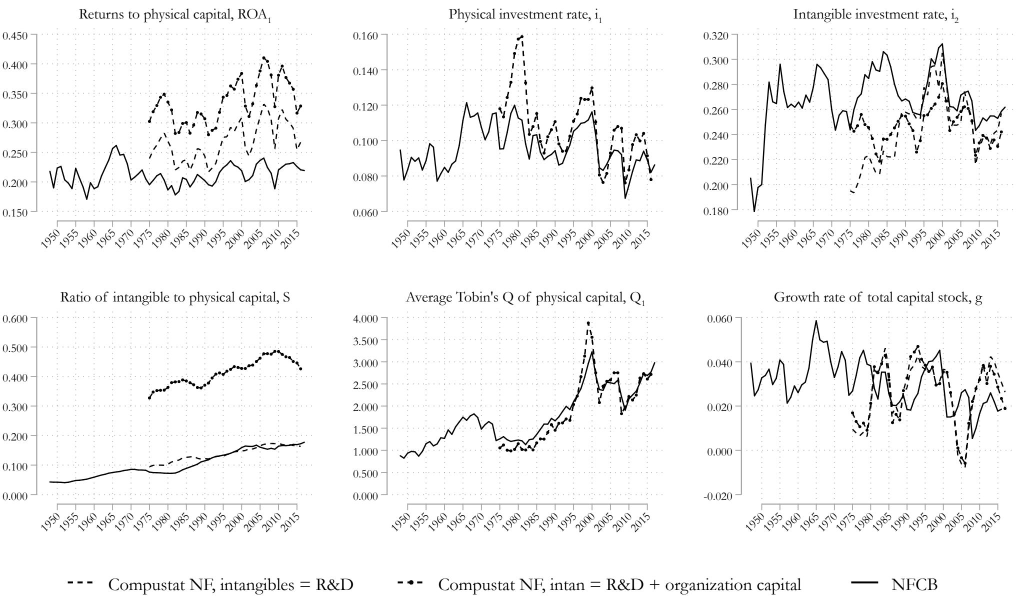


Robustness

Implications for the labor share (2/2)

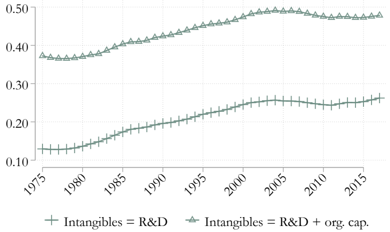


Robustness

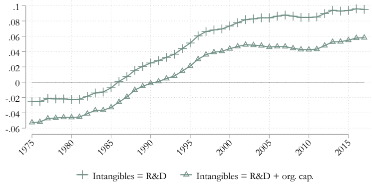


Data sources

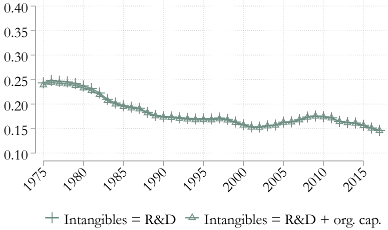
Intangible share



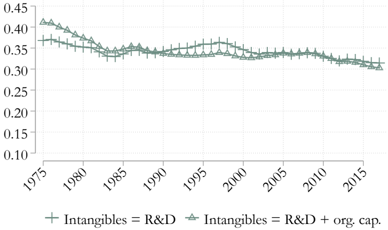
Rents as a fraction of value added



User cost of physical capital

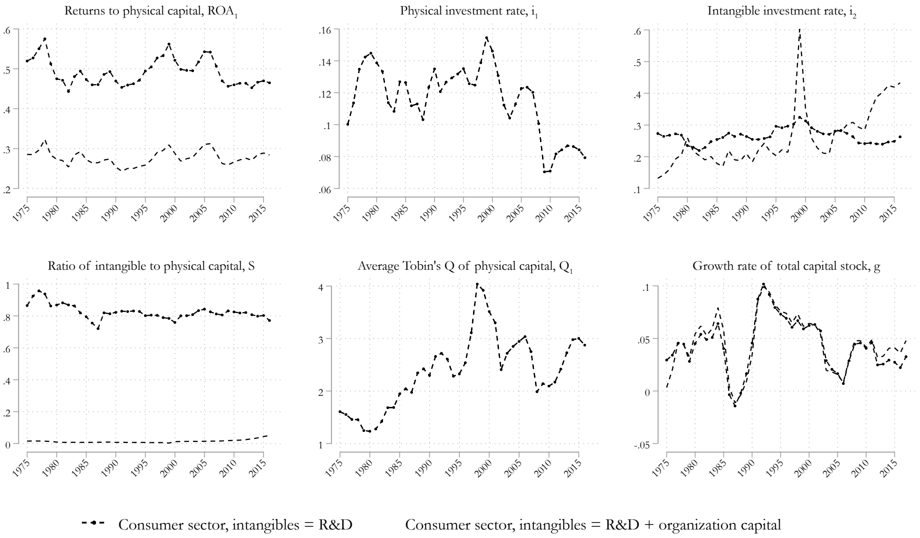


User cost of intangible capital

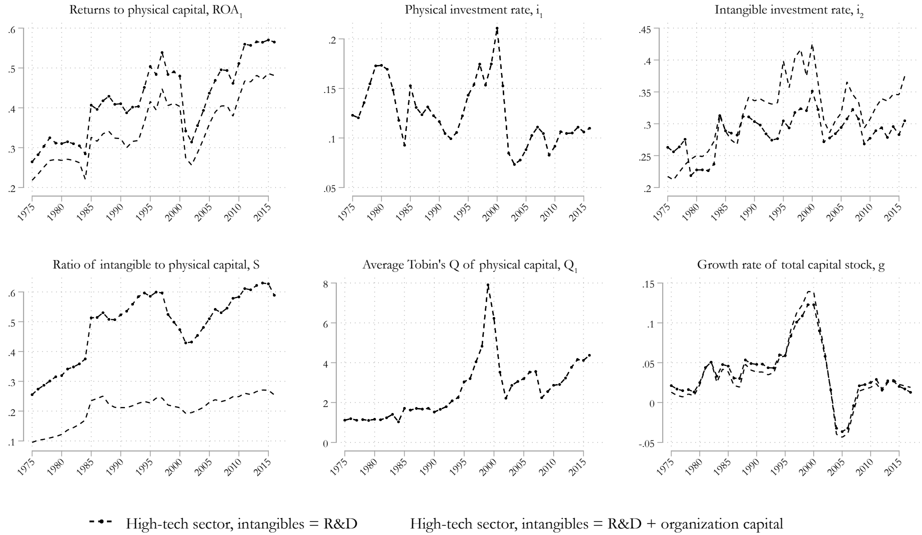


Investment gap in Compustat

Consumer sector

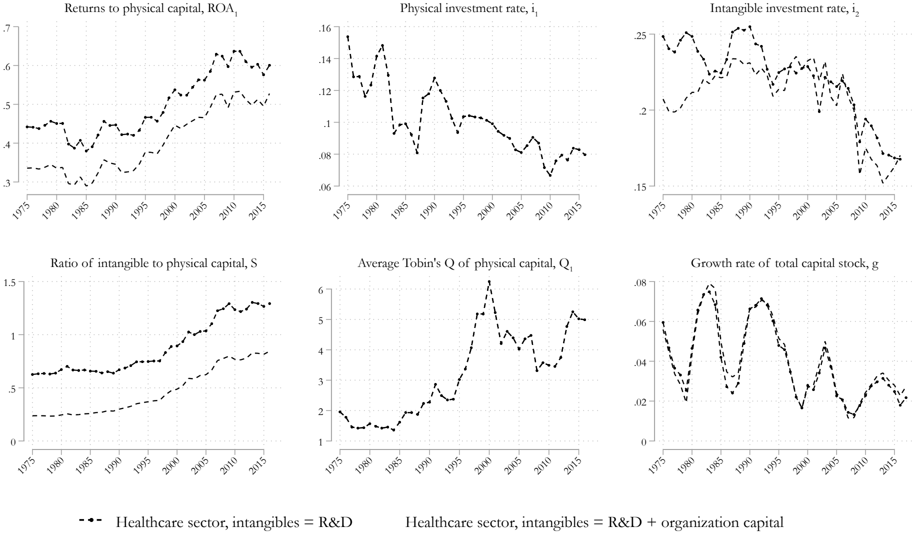


High-tech sector

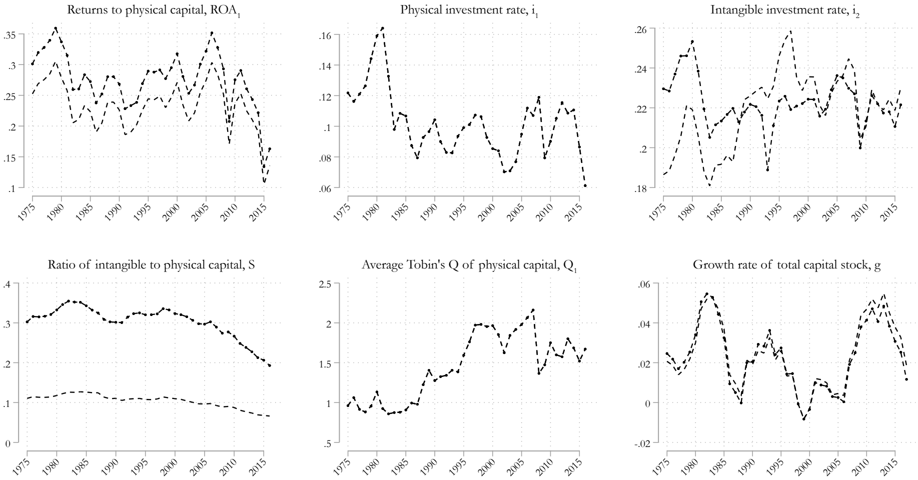


Sectoral heterogeneity

Healthcare sector

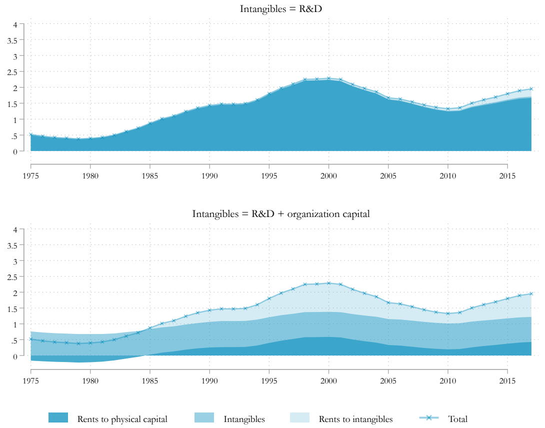


Manufacturing sector



Manufacturing sector, intangibles = R&D   Manufacturing sector, intangibles = R&D + organization capital

The consumer sector: intangibles or rents?



- organization capital: no discernible ***trend***, but high ***level***
- still, including organization capital $\implies$ smaller markup trend after 1985

Sectoral trends