Good rents versus bad rents: R&D misallocation and growth
by Aghion, Bergeaud, Boppart, Klenow, and Li

Discussion by Nicolas Crouzet
Kellogg
Recent trends in profit shares, markups, and concentration point to rising rents with welfare implications. "Good rents" are marked by improvements in product quality → growth. "Bad rents" are marked by fixed differences in process efficiency → misallocation.

In French manufacturing data, high incremental product quality firms have too low a market share in decentralized (73%) vs. planner (100%) scenarios. High process efficiency firms have too high a market share in decentralized (36%) vs. planner (13%) scenarios.
Recent trends profit shares, markups, concentration point to rising rents
Overview

Recent trends profit shares, markups, concentration point to rising rents

welfare implications?
## Rents and innovative investment

[Crouzet and Eberly, 2018]

<table>
<thead>
<tr>
<th></th>
<th>Consumer</th>
<th>Manufacturing</th>
<th>High-tech</th>
<th>Healthcare</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent variable</strong>: markup (log)</td>
<td></td>
<td></td>
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<tr>
<td>Compustat intangible share $s_t$ (OLS)</td>
<td>$-0.132^{***}$</td>
<td>$0.044^*$</td>
<td>$0.452^{***}$</td>
<td>$0.709^{***}$</td>
</tr>
<tr>
<td></td>
<td>(-6.32)</td>
<td>(1.62)</td>
<td>(5.90)</td>
<td>(6.01)</td>
</tr>
<tr>
<td>Compustat intangible share $s_t$ (IV)</td>
<td>$-0.157^{***}$</td>
<td>$0.879^{***}$</td>
<td>$0.498^{***}$</td>
<td>$1.424^{***}$</td>
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<td></td>
<td>(-8.75)</td>
<td>(2.98)</td>
<td>(2.81)</td>
<td>(18.17)</td>
</tr>
<tr>
<td>First-stage F-stat</td>
<td>802.12</td>
<td>10.47</td>
<td>89.31</td>
<td>617.89</td>
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<tr>
<td>Observations</td>
<td>56</td>
<td>504</td>
<td>168</td>
<td>112</td>
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<tr>
<td>Industry f.e.</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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</tbody>
</table>
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Recent trends profit shares, markups, concentration point to rising rents

welfare implications?
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"Good rents":

"Good rents": markups from improvements in product quality → growth

"Bad rents": markups from fixed differences in process efficiency → misallocation.

In French manufacturing data high incremental product quality firms have too low a market share

Decentralized: 73% vs. Planner: 100%

High process efficiency firms have too high a market share

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"Good rents" : markups from improvements in product quality \[\rightarrow\] growth

"Bad rents" :
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Recent trends in profit shares, markups, and concentration point to rising rents. What are the welfare implications?

"Good rents": markups from improvements in product quality $\rightarrow$ growth

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Roadmap

1. Facts
2. Theory
1. Facts
Summary

\[ TFPR_{j,t} = \frac{VA_{j,t}}{K_{j,t}^\alpha L_{j,t}^{1-\alpha}} \]

\[ P_{j,t} = \text{weighted average product price} \quad [\approx \text{Product quality}] \]

\[ A_{j,t} = \frac{TFPR_{j,t}}{P_{j,t}} = TFPQ_{i,t} \quad [\approx \text{Process efficiency}] \]
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**Fact 1:**

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A_{j,t} = A_j
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\[ \log(L_{j,t}) = \gamma + \delta_P \log(P_{j,t}) + \delta_A \log(A_{j,t}) + \varepsilon_{j,t} \]
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Firm size increases with both product quality and process efficiency
Fact 1: TFPQ/process efficiency is constant within firm
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Learning by doing: [Arrow (1962), Lucas (1988), ...]
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Learning by doing:

unit costs fall with cumulative production

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Organizational capital:
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**Learning by doing:**

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**Organizational capital:**

firms make deliberate investments to improve process efficiency
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Organizational capital:

firms make deliberate investments to improve process efficiency

[Tomer (1987), Atkeson and Kehoe (2005), ...]

Levitt, List, Syverson (2013): evidence for an automobile plant

Suggestion:

Does the paper need to take the stance that empirically, growth in $A = 0$? Maybe: existing evidence that TFPQ does not contribute substantially to aggregate growth?
Firms make investments in process efficiency

[Levitt, List, Syverson, 2013]
Fact 1: TFPQ/process efficiency is constant within firm

Learning by doing:

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Organizational capital:

- firms make deliberate investments to improve process efficiency
  - Voigtlander and Garcia-Marin (2019): following export expansion, gains in $A_{i,t}$ driven by technology investments
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- Voigtlander and Garcia-Marin (2019): following export expansion, gains in $A_{i,t}$ driven by technology investments
- Eisfeldt and Papanikolaou (2013), Crouzet and Eberly (2023): impact on firm value
These investments contribute to firm value

Vertical axis = \[
\frac{\text{Enterprise value of public, non-financial US firms}}{\text{PPE replacement cost}} - 1
\]
Fact 1: TFPQ/process efficiency is constant within firm

Learning by doing:  
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**Suggestion:** Does the paper need to take the stance that empirically, growth in $A = 0$?

- maybe: existing evidence that TFPQ does not contribute substantially to aggregate growth?
Fact 2

\[
\log(L_j, t) = \gamma P + \beta P \log(P_j, t) + \varepsilon P, j, t > 0
\]

\[
\log(A_j, t) = \gamma A + \beta A \log(A_j, t) + \varepsilon A, j, t > 0
\]

\[
\log(L_j, t) = \gamma + \delta P \log(P_j, t) + \delta A \log(A_j, t) + \varepsilon_j, t \delta A \approx \delta P > 0 \Rightarrow \delta A \approx -\equiv \zeta P, A
\]

\[
\text{cov} \left( \log(P_i, t), \log(A_i, t) \right) \varpropto \text{var} \left( \log(A_i, t) \right) \times \delta P \Rightarrow \zeta P, A \approx -1 \Rightarrow \text{cov} \left( \log(TPFR_i, t), \log(A_i, t) \right) \approx 0
\]

Prices have unit negative elasticity to A; A and TFPR are uncorrelated [Hsieh and Klenow, 2009]
Fact 2

\[\log(L_{j,t}) = \gamma_P + \beta_P \log(P_{j,t}) + \varepsilon_{p,j,t} \quad \beta_P > 0\]

\[\log(L_{j,t}) = \gamma_A + \beta_A \log(A_{j,t}) + \varepsilon_{A,j,t} \quad \beta_A = 0\]

\[\log(L_{j,t}) = \gamma + \delta_P \log(P_{j,t}) + \delta_A \log(A_{j,t}) + \varepsilon_{j,t} \quad \delta_A \approx \delta_P > 0\]
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Prices have unit negative elasticity to \( A \); \( A \) and \( TPFR \) are uncorrelated

[Hsieh and Klenow, 2009]
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\log(L_{j,t}) = \gamma_P + \beta_P \log(P_{j,t}) + \varepsilon_{p,j,t} \\
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Prices have unit negative elasticity to A; A and TFPR are uncorrelated

[Hsieh and Klenow, 2009]
Fact 2: suggestions

Model:

\[ \zeta_P, \zeta_A = -0.5 \]

Measurement error in prices

\[ \hat{\zeta}_P, \hat{\zeta}_A \approx -1 = (1 - \gamma) \times \zeta_P, \hat{\zeta}_A \approx -1.5 + \gamma \times (1 - \gamma) \]

\[ \gamma \equiv \text{var}(\epsilon_P, t) \]

\[ \text{var}(\log(\hat{A}_j, t)) \]

Need \( \gamma \approx 1 \) (estimate: \( \gamma \approx 95\% \))

Instrument for TFPQ and/or \( P \)?

Can we still make inferences on persistence of TFPQ?

Comparison with existing evidence:

Kulick, Haltiwanger, Syverson (2018):

\[ \zeta_P, \zeta_A = -0.5 \]

Foster, Haltiwanger, Syverson (2008):

\[ \text{cov}(\log(TFPR_i, t), \log(A_i, t)) = 0.75 \]

Welfare implications when model matches 0 > \( \zeta_P, \zeta_A > -1 \)?
Fact 2: suggestions

Model: $\zeta_{P,A} = -1.5$
Fact 2: suggestions

\[
\begin{align*}
\text{Model: } \zeta_{P,A} &= -1.5 = \zeta_{\text{markup},A} + \zeta_{\text{MC},A} \\
&= -0.5 + (-1)
\end{align*}
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Fact 2: suggestions

Model: \( \zeta_{P,A} = -1.5 = \zeta_{\text{markup},A} + \zeta_{\text{MC},A} \) and \( \text{cov} (\log(A_{j,t}), \log(TFPR_{j,t})) < 0 \)
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Measurement error in prices \( \rightarrow \)
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Measurement error in prices \( \Rightarrow \)

\[
\hat{\zeta}_{P,A} \approx -1 = (1 - \gamma) \times \zeta_{P,A} + \gamma \times (-1)
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Fact 2: suggestions

Model: \[ \zeta_{P,A} = -1.5 = \zeta_{\text{markup},A} + \zeta_{\text{MC},A} \] and \[ \text{cov} \left( \log(A_{j,t}), \log(TFPR_{j,t}) \right) < 0 \]

Measurement error in prices →

\[ \zeta_{P,A} \hat{=} -1 \approx (1 - \gamma) \times \zeta_{P,A} + \gamma \times (-1) \]

\[ \gamma \equiv \frac{\text{var}(e_{j,t}^P)}{\text{var}(\log(\hat{A}_{j,t}))} \]
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Measurement error in prices \( \rightarrow \)

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Need \( \gamma \approx 1 \) (estimate: \( \gamma \approx 95\% \))
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Model: $\zeta_{P,A} = -1.5 = \zeta_{\text{markup}, A} + \zeta_{\text{MC}, A} = -0.5 + (-1)$ and $\text{cov}(\log(A_{j,t}), \log(TFPR_{j,t})) < 0$

Measurement error in prices $\rightarrow$

$$\hat{\zeta}_{P,A} \approx -1 \approx (1 - \gamma) \times \zeta_{P,A} + \gamma \times (-1) \quad \gamma \equiv \frac{\text{var}(e^P_{j,t})}{\text{var}(\log(\hat{A}_{j,t}))}$$

Need $\gamma \approx 1$ (estimate: $\gamma \approx 95\%$)

Instrument for TFPQ and/or $P$?
**Fact 2: suggestions**

**Model:** \[ \zeta_{P,A} = -1.5 = \zeta_{\text{markup},A} + \zeta_{\text{MC},A} \text{ and } \text{cov} \left( \log(A_{j,t}), \log(TFPR_{j,t}) \right) < 0 \]

Measurement error in prices \( \to \)

\[ \hat{\zeta}_{P,A} \approx -1 \]

\( \approx (1 - \gamma) \times \zeta_{P,A} + \gamma \times (-1) \)

\( \gamma \equiv \frac{\text{var}(e_{j,t}^P)}{\text{var}(\log(\hat{A}_{j,t}))} \)

Need \( \gamma \approx 1 \) (estimate: \( \gamma \approx 95\% \))

Instrument for TFPQ and/or \( P \)? Can we still make inferences on persistence of TFPQ?
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**Model:** \( \zeta_{P,A} = -1.5 = \zeta_{\text{markup},A} + \zeta_{\text{MC},A} \) and \( \text{cov}(\log(A_{j,t}), \log(TFPR_{j,t})) < 0 \)

Measurement error in prices →

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**Comparison with existing evidence:**

Kulick, Haltiwanger, Syverson (2018): \( \zeta_{P,A} = -0.5 \)

Foster, Haltiwanger, Syverson (2008): \( \text{cov}(\log(TFPR_{i,t}), \log(A_{i,t})) = 0.75 \)

Welfare implications when model matches 0? > \( \zeta_{P,A} > -1? \)
Fact 2: suggestions

**Model:** $\zeta_{P,A} = -1.5 = \zeta_{\text{markup},A} + \zeta_{MC,A}$ and $\text{cov}(\log(A_{j,t}), \log(TFPR_{j,t})) < 0$

Measurement error in prices $\rightarrow$

$$\hat{\zeta}_{P,A} \approx (1 - \gamma) \times \zeta_{P,A} + \gamma \times (-1) \qquad \gamma \equiv \frac{\text{var}(\epsilon_{j,t}^P)}{\text{var}(\log(\hat{A}_{j,t}))}$$

Need $\gamma \approx 1$ (estimate: $\gamma \approx 95\%$)

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**Model:** \[ \zeta_{P,A} = -1.5 = \zeta_{\text{markup},A} + \zeta_{\text{MC},A} \text{ and } \text{cov} \left( \log(A_{j,t}), \log(\text{TFPR}_{j,t}) \right) < 0 \]

Measurement error in prices →

\[ \hat{\zeta}_{P,A} \approx -1 = (1 - \gamma) \times \hat{\zeta}_{P,A} \approx -1.5 + \gamma \times (-1) \quad \gamma \equiv \frac{\text{var}(e_{j,t}^P)}{\text{var}(\log(\hat{A}_{j,t}))} \]

Need \( \gamma \approx 1 \) (estimate: \( \gamma \approx 95\% \))

Instrument for TFPQ and/or \( P \)? Can we still make inferences on persistence of TFPQ?

**Comparison with existing evidence:**

Kulick, Haltiwanger, Syverson (2018): \( \zeta_{P,A} = -0.5 \)

Foster, Haltiwanger, Syverson (2008): \( \text{cov} \left( \log(\text{TPFR}_{i,t}), \log(A_{i,t}) \right) = 0.75 \)

Welfare implications when model matches \( 0 > \zeta_{P,A} > -1 \)?
2. Theory
Key equations

\[ C_t = (1 + g)^t C_0 \]
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\[ \log(1 + g) \propto \sum_k S_k \log(\gamma_k) \]
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\[ C_t = (1 + g)^t C_0 \]

\[ \log(1 + g) \propto \sum_k S_k \log(\gamma_k) \]

\[ C_0 \propto \left(1 - \frac{1}{J} \sum_k \frac{S_k^2}{\phi_k}\right) \times \left(\frac{a_H}{a_L}\right)^{S_1+S_2} \times \mathcal{M} \]

(1) = Overhead costs

(2) = Process efficiency

(3) = Markup dispersion
$M = 1$. 

Then:

$\gamma_B = \gamma_S, a_H = a_L$: convex costs of concentration $\Rightarrow$ equal market shares across firms, $S_k = \phi_k$.

$2\gamma_B > \gamma_S, a_H > a_L$: trade-off: concentration vs. static efficiency gains.

$3\gamma_B > \gamma_S, a_H > a_L$: trade-off: concentration vs. (static efficiency gains or dynamic quality gains).

Suggestions: $3\gamma_B$ depends on $\{\phi_k\}$; consider edge cases e.g. static and dynamic gains aligned if $\phi_{HB}, \phi_{LS} \gg \phi_{HS}, \phi_{LB}$. 

Planner
\( M = 1 \). Then:

\[ \gamma_B = \gamma_S, \ a_H = a_L : \text{convex costs of concentration} \Rightarrow \text{equal market shares across firms,} \]

\[ \gamma_B > \gamma_S, \ a_H > a_L : \text{trade-off: concentration vs. static efficiency gains} \]

\[ \gamma_B > \gamma_S, \ a_H > a_L : \text{trade-off: concentration vs. (static efficiency gains or dynamic quality gains)} \]

Suggestions:

\( \gamma_B \) depends on \( \{\phi_k\} \); consider edge cases e.g. static and dynamic gains aligned if \( \phi_{HB}, \phi_{LS} \gg \phi_{HS}, \phi_{LB} \)
**Planner**

\[ M = 1. \] Then:

1. \( \gamma_B = \gamma_S, \ a_H = a_L: \) convex costs of concentration \( \implies \) equal market shares across firms, \( S_k = \phi_k \)
Planner

$M = 1$. Then:

1. $\gamma_B = \gamma_S, a_H = a_L$: convex costs of concentration $\implies$ equal market shares across firms, $S_k = \phi_k$

2. $\gamma_B = \gamma_S, a_H > a_L$: trade-off: concentration vs. static efficiency gains

Suggestions: $\gamma_B > \gamma_S$, $a_H > a_L$: trade-off: concentration vs. (static efficiency gains or dynamic quality gains)
\( M = 1 \). Then:

1. \( \gamma_B = \gamma_S, a_H = a_L \): convex costs of concentration \( \implies \) equal market shares across firms, \( S_k = \phi_k \)

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Planner

\( \mathcal{M} = 1 \). Then:

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Suggestions:

3. depends on \( \{\phi_k\} \); consider edge cases
   e.g. static and dynamic gains aligned if \( \phi_{HB}, \phi_{LS} \gg \phi_{HS}, \phi_{LB} \)
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   e.g. static and dynamic gains aligned if \( \phi_{HB}, \phi_{LS} \gg \phi_{HS}, \phi_{LB} \)
Decentralized equilibrium

\[ B = S, \quad H = L: \text{"right" (equalized) market shares} \]

\[ B = S, \quad H > L: \text{"wrong" market shares + static misallocation (} M < 1) \]

\[ B > S, \quad H > L: \text{"wrong" market shares + static misallocation (} M < 1) + \text{dynamic inefficiency} \]

Suggestions:

Sign of the distortion in 2? 
Calibrate the model to cases 1 and 2, and compare to 3? 
To deal with static misallocation separately, other policy tools than R&D subsidies?
Decentralized equilibrium

① $\gamma_B = \gamma_S, \ a_H = a_L$: “right” (equalized) market shares + equalized markups
Decentralized equilibrium

1. \( \gamma_B = \gamma_S, a_H = a_L \): "right" (equalized) market shares + equalized markups
Decentralized equilibrium

1. $\gamma_B = \gamma_S, a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)
Decentralized equilibrium

1. $\gamma_B = \gamma_S, a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)
Decentralized equilibrium

1. $\gamma_B = \gamma_S$, $a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S$, $a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)

3. $\gamma_B > \gamma_S$, $a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$) + dynamic inefficiency
Decentralized equilibrium

1. $\gamma_B = \gamma_S, a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)

3. $\gamma_B > \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$) + dynamic inefficiency
   ... more complicated!

Sugestions:
Sign of the distortion in 2⃝?
Calibrate the model to cases 1⃝ and 2⃝, and compare to 3⃝?
To deal with static misallocation separately, other policy tools than R&D subsidies?
Decentralized equilibrium

1. $\gamma_B = \gamma_S, a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)

3. $\gamma_B > \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$) + dynamic inefficiency

... more complicated!
Decentralized equilibrium

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... more complicated!

Suggestions:
Decentralized equilibrium

1. $\gamma_B = \gamma_S$, $a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S$, $a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)

3. $\gamma_B > \gamma_S$, $a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$) + dynamic inefficiency

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Suggestions:

Sign of the distortion in 2?
Decentralized equilibrium

1. $\gamma_B = \gamma_S$, $a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S$, $a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)

3. $\gamma_B > \gamma_S$, $a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$) + dynamic inefficiency
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Suggestions:

Sign of the distortion in 2?
Calibrate the model to cases 1 and 2, and compare to 3?
Decentralized equilibrium

1. $\gamma_B = \gamma_S, a_H = a_L$: "right" (equalized) market shares + equalized markups

2. $\gamma_B = \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$)

3. $\gamma_B > \gamma_S, a_H > a_L$: "wrong" market shares + static misallocation ($M < 1$) + dynamic inefficiency
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Suggestions:

Sign of the distortion in 2?
Calibrate the model to cases 1 and 2, and compare to 3?
To deal with static misallocation separately, other policy tools than R&D subsidies?
A different view of good and bad rents

[Crouzet, Eberly, Eisfeldt, Papanikolaou, 2013]
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Model of endogenous growth through intangible investment
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[Crouzet, Eberly, Eisfeldt, Papanikolaou, 2013]

Model of endogenous growth through intangible investment

investment in intangibles $\rightarrow$ reductions in unit cost
A different view of good and bad rents [Crouzet, Eberly, Eisfeldt, Papanikolaou, 2013]

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investment in intangibles → reductions in unit cost

spillovers: future intangible investment builds on the current stock
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Novelty: intangible capital is a (partly) non-rival input, i.e. it can be:
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- deployed by innovators across many markets $\rightarrow$ returns to scale

"good rents" — imitation
"bad rents"
A different view of good and bad rents  

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deployed by innovators across many markets — returns to scale — “good rents”
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- copied by competitors — imitation — "bad rents"

Insight: non-rivalry affects
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investment in intangibles → reductions in unit cost

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Insight: non-rivalry affects total rents
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deployed by innovators across many markets — returns to scale — "good rents"

copied by competitors — imitation — "bad rents"

Insight: non-rivalry affects

total rents

the share of "good" and "bad" rents
Equilibrium growth

Growth rate $g$

Share of initial project value retained by $E$

[Crouzet, Eberly, Eisfeldt, Papanikolaou, 2023]
Conclusion
Conclusion

Welfare implications of rising rents?
Conclusion

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   too much "bad rents", from fixed advantages in process efficiency
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Future research
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Future research

is growth in process efficiency dead?
Conclusion

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Future research

- is growth in process efficiency dead?
- is it about the types of rents, or about how they are shared between firms?