Walras-Bowley Lecture, 2018

Oligopoly and Ownership Structure

Speaker: Xavier Vives (IESE)

Chair: Joaquim Silvestre (UC Davis)
Oligopoly and Ownership Structure

Xavier Vives

IESE Business School

Walras-Bowley Lecture, in memoriam of Martine Quinzii

UC Davis, June 2018
Investors in car-booking companies

- Cross-ownership:
  - Uber-Didi
  - Uber-Grab

- Common ownership
  - SoftBank
  - Tiger Global
  - AFSquare
  - Fidelity

CrunchBase; FT research
Question

Do common/cross ownership arrangements aggravate the oligopoly problem?
Research project co-authors

- José Azar
- Albert Banal-Estañol
- Ángel López
- Jo Seldelslachts
Outline

- Trends
  - Oligopoly widespread and on the rise
  - The increase and consolidation of institutional investment and common ownership (CO)
    - Change in ownership patterns of firms
- Corporate governance and overlapping ownership
- Market power or efficiency?
  - The Structure- Conduct- Performance paradigm revisited
- Innovation and spillovers
- General equilibrium and macroeconomic implications
- Conclusion
Oligopoly widespread and on the rise

- Growing product market concentration and market power (Grullon et al. 2016; Autor et al. 2017; Head and Spencer 2017).
- Increase in economic profits and markups (De Loecker and Eeckhout 2017; Hall 2018).
- Declining labor share (Barkai 2016; Autor et al. 2017; Giandrea and Sprague 2017).
- Oligopsony in labor markets (Falch 2010; Ransom and Sims 2010; Staiger et al. 2010; Matsudaira 2013, Azar et al. 2017, 2018; Benmelech et al. 2018).
- General concerns:
  - Perception of lack of dynamism: entry and exit, investment, and innovation on both sides of the Atlantic (CEA 2016 reports).
  - After the Great Recession and the "weak" recovery: potential secular stagnation of advanced economies blamed on increased market power (Summers 2015, Stiglitz 2016).
Product market concentration

Panel A. Manufacturing
- Top 4 concentration
- Top 20 concentration

Panel B. Finance
- Top 4 concentration
- Top 20 concentration

Panel C. Services
- Top 4 concentration
- Top 20 concentration

Panel D. Utilities and transportation
- Top 4 concentration
- Top 20 concentration

Panel E. Retail trade
- Top 4 concentration
- Top 20 concentration

Panel F. Wholesale trade
- Top 4 concentration
- Top 20 concentration

- CR4 with sales
- CR4 with employment
- CR20 with sales
- CR20 with employment

Autor et al., 2017
Increasing markups, dividends and market value

(a) Average Dividends (weighted)

(b) Average Market Value (weighted)

De Loecker and Eeckhout, 2017
Declining labor share (so much for Bowley’s law)

Note: Shaded areas indicate recessions, as determined by the National Bureau of Economic Research.

Gutierrez and Philippon, 2016
Local labor market concentration

Benmelech et al., 2017

HHI averaged across county-three-digit industry-year cells within each of the five-year periods.
The changing ownership structure of firm

1. Institutional stock ownership has increased dramatically in the last 35 years.
   - World of dispersed ownership in US of Berle and Means (1932) no longer applies.

2. The asset management industry has become more concentrated.

3. There has been a shit from active to passive investors.

4. Common ownership patterns on the rise in many industries.

5. Minority cross-ownership shareholdings also widespread in many industries.
Increasing institutional ownership and indexation

Gutierrez and Philippon, 2016
Adjusted ownership concentration (filtered HHI)

Kacperczyk et al. 2017
Filtered HHI of institutional owners of a stock taking out the predicted component in the HHI accounted by the number of investors
Continuous shift from active to passive investment
(and top 3 passive investors’ rank creeps up)

Fraction of top investor value

Fraction of value held by top investors that are (i) active and (ii) passive, respectively, with respect to the overall value held by all the top investors.

Banal-Estanol, Seldeslachts and Vives

The financial crisis’ impact on common ownership and competition
### Top 5 owners of the largest US banks (2Q 2017)

<table>
<thead>
<tr>
<th>JP Morgan Chase</th>
<th>[%]</th>
<th>Bank of America</th>
<th>[%]</th>
<th>Citigroup</th>
<th>[%]</th>
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<tr>
<td>Vanguard</td>
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<td>Fidelity</td>
<td>2.68</td>
<td>Fidelity</td>
<td>3.27</td>
<td>Wellington</td>
<td>1.77</td>
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<table>
<thead>
<tr>
<th>Wells Fargo</th>
<th>[%]</th>
<th>PNC Financial</th>
<th>[%]</th>
<th>U.S. Bancorp</th>
<th>[%]</th>
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<tr>
<td>Berkshire Hathaway</td>
<td>9.85</td>
<td>Wellington</td>
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<td>3.84</td>
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</table>

Schmalz, 2018
## Top owners of US airlines (2Q 2017)

<table>
<thead>
<tr>
<th>Delta Air Lines</th>
<th>[%]</th>
<th>Southwest Airlines Co.</th>
<th>[%]</th>
<th>American Airlines</th>
<th>[%]</th>
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<tr>
<td>Berkshire Hathaway</td>
<td>8.25</td>
<td>PRIMECAP</td>
<td>11.78</td>
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<td>13.99</td>
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<td>J.P. Morgan Asset Mgt.</td>
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<td>Lansdowne Partners Limited</td>
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<td>State Street Global Advisors</td>
<td>3.71</td>
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<td>J.P. Morgan Asset Mgt.</td>
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<td>3.30</td>
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<td>AllianceBernstein L.P.</td>
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<td>Fidelity</td>
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<td>BNY Mellon Asset Mgt.</td>
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<td>Morgan Stanley</td>
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<tr>
<td>PAR Capital Mgt.</td>
<td>1.52</td>
<td>Egerton Capital (UK) LLP</td>
<td>1.10</td>
<td>Northern Trust Global Inv</td>
<td>1.02</td>
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</table>

<table>
<thead>
<tr>
<th>United Continental Holdings</th>
<th>[%]</th>
<th>Alaska Air</th>
<th>[%]</th>
<th>JetBlue Airways</th>
<th>[%]</th>
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<td>PAR Capital Mgt.</td>
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<td>PAR Capital Mgt.</td>
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<td>State Street Global Advisors</td>
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<td>J.P. Morgan Asset Mgt.</td>
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<td>Citadel</td>
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<td>Donald Smith Co.</td>
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<td>AQR Capital Management</td>
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<td>Renaissance Techn.</td>
<td>1.93</td>
<td>BarrowHanley</td>
<td>1.52</td>
</tr>
</tbody>
</table>

Azar, Schmalz and Tecu, 2018
What is the objective of the firm?

- Fisher Separation Theorem (Fisher 1930): With price-taking firms shareholders agree on profit maximization objective (Hart 1979 extends result to incomplete markets).

- No simple objective function for the firm otherwise:
  - High prices may harm shareholders as consumers.
  - Firms large in factor and product markets care about price impact.
  - With overlapping ownership, manager of a firm should account also for profits and external effects on other firms.
  - Common owners in an industry may have the ability and incentive to influence management (Posner et al. 2016).

- Parsimonious assumption: Manager of a firm maximizes weighted average of shareholders’ utilities (Rotemberg 1984).
  - Rationalized by voting on management strategies/power indexes of shareholders (Azar 2017, Brito et al. 2017)
    - Managers maximize support from shareholders (Pelzman 1976).

- Ownership structure affects incentives to compete:
  - Common/cross ownership may lead to relaxed competition (Rubinstein et al. 1983).
Common ownership
(Salop and O’Brien 2000)

- Industry with \( J \) firms and \( I \) owners:
  - Ownership share (cash flow rights) of firm \( j \) accruing to investor \( i \): \( \upsilon_{ij} \)
  - Control rights of firm \( j \) held by owner \( i \): \( \gamma_{ij} \)

- Total portfolio profits of investor \( i \): \( \sum_{k=1}^{J} \upsilon_{ik} \pi_k \),
  where \( \pi_k \) are the profits of portfolio firm \( k \).

- Manager of firm \( j \) maximizes a weighted average of its shareholders’ portfolio profits (weights given by the control rights \( \gamma_{ij} \)): \( \sum_{i=1}^{I} \gamma_{ij} \sum_{k=1}^{J} \upsilon_{ik} \pi_k \), or
  \[
  \pi_j + \sum_{k \neq j} \lambda_{jk} \pi_k
  \]
  where
  \[
  \lambda_{jk} \equiv \frac{\sum_i \gamma_{ij} \upsilon_{ik}}{\sum_i \gamma_{ij} \upsilon_{ij}}
  \]
  is the degree of internalization (Edgeworth’s coefficient of effective sympathy in the contract curve) of the manager of firm \( j \) for firm \( k \).
Overlapping ownership
(López and Vives forth)

- Allowing for common and cross ownership with symmetric stakes and control \((v_{ij} = v, \gamma_{ij} = \gamma)\).
- Manager of firm \(j\) maximizes

\[
\varphi_j = \pi_j + \lambda \sum_{k \neq j} \pi_k
\]

where the value of \(\lambda\) depends on the type of overlapping ownership.
- Each firm has a reference shareholder and each investor acquires a share \(\alpha\) of the firms which are not under his control:

<table>
<thead>
<tr>
<th>(\lambda)</th>
<th>Common Ownership, (v_{ik} = \alpha, \gamma_{ik} = 0)</th>
<th>Common Ownership, (v_{ij} = \gamma_{ij})</th>
<th>Cross-ownership (by firms, PCO)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{\alpha}{(1-(I-1)\alpha)})</td>
<td>(\frac{2\alpha[1-(I-1)\alpha]+(I-2)\alpha^2}{[1-(I-1)\alpha]^2+(I-2)\alpha^2})</td>
<td>(\frac{\alpha}{1-(J-2)\alpha})</td>
<td></td>
</tr>
</tbody>
</table>

- In the three cases \(\lambda\) increases with the investment stake \(\alpha\) (with control rights only in case PC).
- For given number of investors \(I\) (= \(J\)) and \(\alpha\): \(\lambda^{PC} > \lambda^{SFI} > \lambda^{PCO}\).
Common ownership: Active and passive investors
(Banal et. al 2018)

- **Symmetric model**
  - Each firm has a set of (identical) active "major" shareholders and a distinct set of (identical) passive "major" shareholders, which are in turn a "minority" shareholder in the other firms.
  - If active have more control than passive, then $\gamma_{ij} > \upsilon_{ij}$ for $i$ active and $\gamma_{ij} < \upsilon_{ij}$ for $i$ passive.
  - May decompose $\lambda_{jk}$ into lambda active and lambda passive.

**Result:** If passive investors are more diversified than active ones, $\lambda_{jk}$

- (i) increases in the fraction of holdings of passive investors,
- (ii) increases (decreases) in the level of concentration of passive (active) investors, and
- (iii) increases in the degree of control of passive shareholders.

**Empirical analysis (time frame 2004-2012)**

- Ownership data: Thomson Reuters Global One
- Firm data: Compustat US (publicly listed firms excluding utilities and financials)
- Industries: NAICS-3
Lambda, lambda active and lambda passive
(Banal et. al 2018)
Market power or efficiency?

1. Does increase in common ownership aggravates oligopoly/market power problem?

2. If so, is there an efficiency defense?

- The Structure-Conduct-Performance paradigm revisited
1960s, Market power hypothesis (Bain):

- Firms in concentrated markets protected by barriers to entry earn high price/cost margins and profits.

Cross section studies of industries:

- Relation between concentration (HHI) and profitability is statistically weak and estimated concentration effect usually small (Schmalensee)

Conduct is not modeled.

Efficiency hypothesis (Demsetz, Chicago):

- Large firms are more efficient, command larger price/cost margins and earn higher profits (therefore concentration and industry profitability go together).
Question

Does overlapping ownership augment the effect of relevant market concentration on prices and fees for customers?
Cournot with common ownership
(Reynolds & Snapp 1986, Bresnahan & Salop 1986)

- Lerner index of firm $j$:

$$L_j = \frac{p - C_j'}{p} = \sum_k \lambda_{jk} s_k \eta,$$

where $\eta$ is the elasticity of demand and $s_k$ the market share of firm $k$.

- In equilibrium, the market share-weighted industry Lerner index is

$$\sum_j s_j \left[ p - C_j' \right] / p = \frac{MHHI}{\eta},$$

where $MHHI$ is the modified $HHI$:

$$MHHI \equiv \sum_j \sum_k \lambda_{jk} s_j s_k = HHI + \sum_j \sum_{k \neq j} \lambda_{jk} s_j s_k = HHI + \Delta$$

- $\Delta$ is a measure of the unilateral anti-competitive incentives due to common ownership.

- The matrix $\Lambda$ can accommodate both common and cross-ownership patterns to yield a $GHHI = s' \Lambda s$. 
US county-level bank concentration, 2002-2013

Schmalz, 2018
Aggregate Lerner index and Modified Herfindahl

Gutierrez and Philippon, 2017
Structure- Conduct- Performance (II)

- **Market power hypothesis (revised, augmented):**
  - Firms in markets with high levels of overlapping ownership, controlling for concentration, earn high price/cost margins and profits.

- **Evidence**
  - **US:** Airlines (2001-14) and banking (2004-13) (using MHHI, Azar, Schmalz and co-authors)
    - Caveat: MHHI is endogenous.
  - Cross section of industries: increases in intra-industry common-ownership density predict industry margins (Azar 2012) and firm margins (Banal et al. 2018).
  - Underinvestment (relative to standard valuation measures such as Tobin’s Q) in the US since early 2000s (Gutiérrez and Philippon 2016, 2017):
    - Firms owned by quasi-indexers and belonging to industries that have high concentration and high common ownership drive the investment gap.
Product market concentration: Delta passive and Delta increase

Firm concentration and top common ownership (median, across industries)

HHI is calculated on the basis of firm sales in each industry. Delta, Delta_{Active} and Delta_{Passive} are computed on the basis of the holdings of the top investors in each industry.

Graph includes median of all industries in a given year. Test includes median of all industries in all the pre- and post-crisis years.

Banal-Estanol, Seldeslachts and Vives

The financial crisis’ impact on common ownership and competition
Margins and lambdas
(Banal et. al 2018)

- Firm-level specification to explain margins with lambdas using cost of goods sold (proxy for labor) and plant property and equipment (proxy for capital) as controls (De Loecker and Warzynski 2012; De Loecker 2013).
- Observe per-period firm-level sales, capital and total variable cost of production.
- Estimate industry-specific Cobb-Douglas production function.
- Assume proportional control.

Results:

1. Lambdas have a strongly significant positive effect on markups.
2. Both active and passive lambdas have a strongly significant positive effect on markups.
3. Quantitatively, the impact of lambda passive is about double the impact of lambda active.
### Impact of lambdas on margins

(Banal et. al 2018)

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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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<tbody>
<tr>
<td>Ln (markup)</td>
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<tr>
<td>Firm-level Lambda</td>
<td>0.173***</td>
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<td>0.291***</td>
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<tr>
<td></td>
<td>(6.97)</td>
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<td>(6.33)</td>
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<tr>
<td>Firm-level Lambda Active</td>
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<td>0.118***</td>
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<td>0.218**</td>
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<td></td>
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<td>(3.47)</td>
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<td>(3.29)</td>
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<tr>
<td>Firm-level Lambda Passive</td>
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<td>0.283***</td>
<td></td>
<td>0.488***</td>
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<tr>
<td></td>
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<td>(8.76)</td>
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<td>(7.99)</td>
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<tr>
<td>Cost of goods sold</td>
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<tr>
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<td>(-57.66)</td>
<td>(-57.66)</td>
<td>(-46.79)</td>
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<tr>
<td>Plant property and eqpt</td>
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<td>0.309***</td>
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<td>(53.11)</td>
<td>(53.10)</td>
<td>(44.09)</td>
<td>(44.10)</td>
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<td>Observations</td>
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<td>35361</td>
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T statistics in parentheses

\* p<0.05
Structure-Conduct-Performance (III)
Efficiency hypothesis (revised)

- High levels of CO and efficiency are associated because CO improves information sharing, internalization of horizontal and vertical external effects, corporate governance, and induces managers to reduce cost/improve performance.
- Large firms have more CO links, better corporate governance, are more efficient, and command larger price/cost margins, earn higher profits.
- Therefore, CO and high p/c margins and industry profits go together.
  - He and Huang (2017): US cross-held public firms (1980-2010) have higher market share growth and profitability due to efficiency gains and enhanced innovation productivity (patents per $ spend in R&D).
  - Geng et al. (2016): vertical CO links improve internalization of patent complementarities.
Socially optimal level of R&D is between two and three times as high as the level of observed R&D because of non-internalized technological spillovers (Bloom et al. 2013).

Question: Can overlapping ownership arrangements (OOAs) help to internalize spillovers?

General symmetric model of cost-reducing R&D investments with spillovers in Cournot oligopoly and with overlapping ownership.

Central scenario: Each firm $j = 1, \ldots, J$ chooses simultaneously R&D $(x_j)$ and output $(q_j)$ and the manager of firm $j$ maximizes

$$\phi_j = \pi_j + \lambda \sum_{k \neq j} \pi_k,$$

where $\lambda$ depends on the type of common/cross-ownership.

Results robust in a two-stage competition model and to Bertrand competition with product differentiation.
Framework
(López and Vives forth.)

- Homogeneous good with smooth downward sloping inverse demand function \( f(Q) \)
  - with constant relative degree of convexity \( \delta \) (allows for log-concave and log-convex demands; e.g., linear, constant elasticity).
- Marginal production cost \( c(\cdot) \) (innovation function) with R&D effort \( x_j \):
  \[
  c(x_j + \beta \sum_{k \neq j} x_k) \text{ with } c' < 0, c'' \geq 0 \ (j \neq k).
  \]

where \( \beta \in [0, 1] \) is the spillover coefficient of the R&D activity.

- Bloom et al. (2013) find an average sensitivity of .4 to .5 of the stock of knowledge of a firm in relation to the R&D investment of another firm.
- The cost of investment is \( \Gamma(x_j) \) with \( \Gamma' > 0 \) and \( \Gamma'' \geq 0 \).
- The profit of firm \( j \) is given by
  \[
  \pi_j = f(Q)q_j - c(x_j + \beta \sum_{k \neq j} x_k)q_i - \Gamma(x_j).
  \]
Assume that there is a unique regular symmetric interior equilibrium \((Q^*, x^*)\). Then for demand not too convex and a mild condition on the effectiveness of R&D:

\[
\begin{align*}
R_i: & \quad \frac{\partial x^*}{\partial \lambda} \leq 0, \quad \frac{\partial q^*}{\partial \lambda} < 0 \\
R_{i1}: & \quad \frac{\partial q^*}{\partial \lambda} \leq 0, \quad \frac{\partial x^*}{\partial \lambda} > 0 \\
R_{iii}: & \quad \frac{\partial q^*}{\partial \lambda} > 0, \quad \frac{\partial x^*}{\partial \lambda} > 0
\end{align*}
\]

- Thresholds are increasing in the level of market concentration.
- \(\beta'\) is decreasing in the effectiveness of R&D.
- Testable predictions:
  - a positive relationship between overlapping ownership and R&D should be found in industries with high enough spillovers, low enough concentration and demand not too convex;
  - the positive association should extend to output in industries with high effectiveness of R&D.
Welfare Analysis
(López and Vives forth)

Proposition. If $\delta > -2$, R&D effectiveness weakly decreasing in $\lambda$, and total welfare single peaked in $\lambda$ (assumptions hold in the literature models) then there are threshold values $\bar{\beta} < \beta'(0)$ such that

In all cases, CS standard is more stringent: $\lambda_{TS}^0 \geq \lambda_{CS}^0$.

Whenever $\lambda_{TS}^0 \in (0, 1)$ or $\lambda_{CS}^0 \in (0, 1)$, then

- $\lambda_{TS}^0, \lambda_{CS}^0$ are strictly increasing in $\beta$;
- $\lambda_{TS}^0$ is positively associated with R&D effectiveness;
- $\lambda_{TS}^0$ increases with $J$, the elasticity of demand and of the innovation function (simulations).

Both $\bar{\beta}$ and $\beta'(0)$ are decreasing in $J$ for a given effectiveness of R&D.
Welfare Analysis

Socially optimal level of overlapping ownership (d’Aspremont-Jacquemin model; Lópe and Vives forth.)

\[ J = 6 \]

\[ \beta = 0.8 \]
Effect of product differentiation with Bertrand competition
(López and Vives forth)

\[
\beta = 0.9, \ J = 8
\]
General equilibrium with oligopoly: difficulties

- Gabszewicz and Vial (1972) propose Cournot-Walras equilibrium concept with firms maximizing profit in general equilibrium oligopoly but then equilibrium depends on the choice of numeraire.

- Problem has been side-stepped by assuming that
  - there is only one good (an outside good or numeraire) that owners of the firm care about (e.g., Mas-Colell, 1982); or that
  - firms are small relative to the economy, be it in monopolistic competition (Hart, 1982) or oligopoly (Neary, 2003).

- However, this does not account for monopsony power, and common ownership amplifies the effect of large firms on product and factor prices.

- Literature:
  - Macroeconomic effects of market power in two class economy: Kalecki (1938, 1954).
  - General equilibrium with oligopoly in trade: Neary (2003, 2010).
General equilibrium framework
(Azar and Vives 2018)

- Macroeconomic model in which firms are large and have market power in both product and factor markets.
- Each firm maximizes a share-weighted average of shareholder utilities, which makes the equilibrium independent of price normalization.
- Ownership structure allowing common ownership.
- Questions:
  - How does output, labor demand, prices and wages depend on market concentration and common ownership?
  - Can common ownership be pro-competitive in general equilibrium?
  - Is competition policy complementary or substitutable with other government policies to boost employment?
A one-sector macroeconomic model with large firms
(Azar and Vives 2018)

- Finite number $J$ of firms, continuum of agents.
- Two goods: consumer good (price $p$) and leisure/labor (price $w$).
- Two types of consumers (both of unit mass):
  - Worker $i \in I_W$ has utility depending on consumption and labor supply $U(C_i, L_i)$
    - with marginal utility of consumption decreasing in labor supply.
  - Owner $i \in I_O$ has utility $C_i$ and holds shares in the firms.
- Owners are divided into $J$ groups, one per firm. Owners in group $j$ own $1 - \phi + \phi/J$ in firm $j$, and $\phi/J$ of the other firms.
- Each firm has a production function $F(L)$, with $F' > 0$ and $F(0) \geq 0$. 
Firm objective
(Azar and Vives 2018)

- Profits of firm $j$: $\pi_j = pF(L_j) - wL_j$.
- Assume proportional control.
- Objective of the manager of firm $j$ is to maximize a weighted average of the indirect utilities (real wealth) of its owners:

$$
\left(1 - \phi + \frac{\phi}{J}\right) \left(1 - \phi + \frac{\phi}{J}\right) \pi_j + \frac{\phi}{J} \sum_{k \neq j} \pi_k + \frac{\phi}{J} \sum_{s \neq k} \pi_s
\frac{1 - \phi + \frac{\phi}{J}}{p} \sum_{k \neq j} \pi_k + \frac{\phi}{J} \sum_{s \neq k} \pi_s
$$

control share of group $j$ in firm $j$

indirect utility of shareholder group $j$

control share of group $k$ in firm $j$

indirect utility of shareholder group $k$
Objective of firm $j$ is proportional to

$$\frac{\pi_j}{p} + \lambda \sum_{k \neq j} \frac{\pi_k}{p},$$

where

$$\lambda = \frac{(2 - \phi)\phi}{J(1-\phi)^2 + (2 - \phi)\phi}.$$

Remark 1: $\lambda$ is decreasing $J$ and increasing in $\phi$;

- $\phi = 0 \implies \lambda = 0$,
- $\phi = 1 \implies \lambda = 1$. I.e., complete portfolio diversification implies monopoly/cartel.

Remark 2: the objective function of firm $j$ only depend on the real wage $\omega = w/p$, which is invariant to normalizations that keep relative prices constant.
Cournot-Walras equilibrium with shareholder representation
(Azar and Vives 2018)

Definition

A Cournot-Walras equilibrium with shareholder representation is a price function \((W(\cdot), P(\cdot))\), an allocation \((\{C_i^*, L_i\}_{i \in I_W}, \{C_i^*\}_{i \in I_O})\), and a set of production plans \(L^* = (L_1^*, \ldots, L_J^*)\), such that:

1. \([W(L^*), P(L^*); \{C_i^*, L_i\}_{i \in I_W}, \{C_i^*\}_{i \in I_O}]\) is a competitive equilibrium relative to \(L^*\).

2. \(L^*\) is a pure-strategy Nash equilibrium of the game where the players are the \(J\) firms, and firm’s \(j\) payoff function is

\[
\frac{\pi_j}{p} + \lambda \sum_{k \neq j} \frac{\pi_k}{p}
\]

here \(p = P(L)\), \(w = W(L)\) and \(\pi_j = pF(L_j) - wL_j\), for \(j = 1, \ldots, J\).
Characterization of Cournot-Walras equilibrium
(Azar and Vives 2018)

Proposition 1 Let $\omega(L)$ be the competitive equilibrium real wage and $E_{\omega'} \equiv -\omega'' L / \omega' < 1$. Then

1. The game among firms is one of strategic substitutes and an equilibrium exists.
2. If returns are non-increasing (i.e., if $F'' \leq 0$), then the equilibrium is unique, symmetric, and locally stable (unless $F'' = 0$ and $\lambda = 1$).
3. In an interior symmetric equilibrium with $L^*$:

   (a) The markdown of real wages is given by:

   $$\mu \equiv \frac{F'(L^*/J) - \omega(L^*)}{\omega(L^*)} = \frac{H}{\eta(L^*)}$$

   where $H = (1 + \lambda(J - 1)) / J$ is the MHHI of the labor market and $\eta$ the elasticity of labor supply.

   - The markdown does not depend on market power in the product market because ownership is proportional to consumption: effect on profits from increasing prices cancels out exactly with effect on purchasing power of those profits.
(b) The total employment level $L^*$ and the real wage $\omega^*$ are each increasing in $J$ and decreasing in $\phi$.

(c) The share of income going to workers, $\frac{\omega(L^*)L^*}{JF(L^*/J)}$, decreases with $\phi$.

- Model can help make sense of stylized facts: persistently low output, employment, and real wages, high corporate profits and financial wealth, as a response to a permanent increase in effective concentration (either from lower $J$ or higher $\phi$).

- We can extend the model to include capital and a class of savers:
  - Then for a high enough elasticity of substitution between present and future consumption, an increase in effective concentration can also explain lower real interest rates and capital stock.
Effective market concentration and labour market equilibrium in Cobb-Douglas/CES model
(Azar and Vives 2018)
Multiple industries  
(Azar and Vives 2018)

- $N$ sectors, each offering a different product with $J$ firms in each.
- Scale the economy by $N$: mass of workers and of owners is $N$.
- The utility function of worker $i$, $U(C_i, L_i)$ is separable in CES composite $C_i$ and leisure, with the elasticity of substitution between products $\theta > 1$, indicating a preference for variety.
- Production function is Cobb-Douglas with non-increasing returns to scale.
- Ownership structure: $J \times N$ groups of shareholders.
  - Group $nj$ owns a fraction $1 - \phi - \bar{\phi} \geq 0$ in firm $nj$ directly; an industry index fund with a fraction $\bar{\phi}/J$ in every firm in sector $n$; and an economy-wide index fund with a fraction $\phi/NJ$ in every firm.
- Indirect utility of owners is $W_i/P$, where $P \equiv \left( \frac{1}{N} \sum_{n=1}^{N} p_n^{1-\theta} \right)^{\frac{1}{1-\theta}}$ is the price index.
Multiple industries: objective function
(Azar and Vives 2018)

Objective function for firm $j$ in sector $n$:

$$\frac{\pi_{nj}}{P} + \lambda_{\text{intra}} \left( \sum_{k \neq j} \frac{\pi_{nk}}{P} \right) + \lambda_{\text{inter}} \left( \sum_{m \neq n} \sum_{k=1}^{J} \frac{\pi_{mk}}{P} \right),$$

where the lambdas are a function of $(\phi, \tilde{\phi}, J, N)$ valued in $[0, 1]$:

- $\lambda_{\text{inter}}$ and $\lambda_{\text{intra}}$ increase in $\phi$ and $\tilde{\phi}$ and decrease in $J$ and in $N$.
  - When $\tilde{\phi} = 1$ (and thus $\phi = 0$) or $\phi + \tilde{\phi} = 1$, $\lambda_{\text{intra}} = 1$.
  - When $\phi = 0$ (only industry index funds), $\lambda_{\text{inter}} = 0$ and $\lambda_{\text{intra}} (\tilde{\phi}, J)$.
  - When $\tilde{\phi} = 0$ (only economy-wide index fund),
    $\lambda_{\text{intra}} = \lambda_{\text{inter}} = \lambda (\phi, NJ)$.
    - $\lambda_{\text{intra}} = \lambda_{\text{inter}} = 1$ for $\phi = 1$. 

Multiple industries: competitive equilibrium relative to firm’s plans
(Azar and Vives 2018)

- $\omega(L)$: real wage given aggregate labor demand $L$.
- $\rho_n(L)$: the competitive equilibrium relative price $p_n/P$ of sector $n$ as a function of firms’ plans $L$.
- Effect of firm $nj$ expanding employment on its objective:

$$\rho_n(L) F'(L_{nj}) - \omega(L) - \frac{\partial \omega}{\partial L_{nj}} \left[ L_{nj} + \lambda_{intra} \sum_{k \neq j} L_{nk} + \lambda_{inter} \sum_{m \neq n} \sum_{k=1}^{J} L_{mk} \right]$$

(i) wage effect

$$+ \frac{\partial \rho_n}{\partial L_{nj}} \left[ F(L_{nj}) + \lambda_{intra} \sum_{k \neq j} F(L_{nk}) \right] + \lambda_{inter} \sum_{m \neq n} \frac{\partial \rho_m}{\partial L_{nj}} \left[ \sum_{k=1}^{J} F(L_{mk}) \right]$$

(ii) own-industry relative price effect

(iii) other industries’ relative price effect

(1)
Multiple industries: Cournot-Walras equilibrium
(Azar and Vives 2018)

**Proposition 3.** There exists a unique symmetric equilibrium with markdown of real wage

\[
\mu^* = \frac{1 + H_{NJ} / \eta}{1 - (H_J - \lambda_{inter})(1 - 1/N) / \theta - 1}
\]

- \(H_{NJ} = (1 + \lambda_{intra}(J - 1) + \lambda_{inter}(N - 1)J) / NJ\) is the labor market MHHI,
- \(H_J = (1 + \lambda_{intra}(J - 1)) / J\) is each sector’s product market MHHI.
- The markdown \(\mu^*\) is decreasing in \(\eta, \theta\) and \(J\) (with \(\mu^* \to 0\) as \(J \to \infty\)), increasing in \(\tilde{\phi}\), and nonmonotone in \(\phi\).
- When \(\tilde{\phi} = 0\) (no industry fund, \(\lambda_{intra} = \lambda_{inter} = \lambda\), \(H_J - \lambda = (1 - \lambda) / J\) and

\[
\text{sgn } \left\{ \frac{\partial \mu^*}{\partial \phi} \right\} = \text{sgn } \left\{ \frac{\theta (JN - 1)}{1 + \eta} - (N - 1) \right\}.
\]
Market power can also be expressed in terms of the markup of product prices over effective marginal cost of labor

\[ mc \equiv \frac{w}{F'(L/JN)}, \]

\[ \tilde{\mu} \equiv \frac{p - mc}{p} = \frac{\mu}{1 + \mu}, \]

rather than in terms of the markdown

\[ \mu = (p - mc)/mc. \]

When the sequence of economies is such that \( \lambda_{\text{intra}}(\infty) = 0 \), e.g. \( \tilde{\phi} \to 0 \), then our model converges to Neary’s general oligopolistic equilibrium model \( \tilde{\mu}^*_\infty = 1/\theta J \), and to Dixit-Stiglitz’s monopolistic competition if there is one firm per industry \( (J = 1) \).
In a one-sector economy, if returns to scale are non-increasing, then an increase in “effective” market concentration (which accounts for overlapping ownership) leads to declines in employment, real wages, and the labor share.

- To foster employment: (i) controlling common ownership and reducing concentration are complements and (ii) government jobs are a substitute for either policy.

When there are multiple sectors, to foster employment traditional competition policy on market concentration is adequate; common ownership can have a positive or negative effect:

- Negative for intraindustry CO.
- Positive for economy-wide CO when market power in the labor market is less important than in product markets due to an intersectoral pecuniary externality,

Caveats: vertical relations, different pattern of consumption between owners and workers.
Conclusion

- The patterns of firm ownership have changed and the standard profit maximization hypothesis needs to be revised.
- Approach: Integrate oligopoly and ownership structure with the parsimonious Edgeworth’s $\lambda$-model.
- Both theory and preliminary evidence point at potential market power concerns as well as to internalization of external effects associated to the increase in common/overlapping ownership.
- More antitrust scrutiny needed but it is still early to advance and implement major changes in regulation and antitrust enforcement.
  - Traditional competition policy (e.g., controlling market concentration) is still a valid tool in a world of OOAs.
  - Antitrust should take account of general equilibrium effects.
- Key elements to define policy towards OOAs:
  - Extent of intra-industry vs. inter-industry OOAs.
  - Type of OOAs: silent financial interest, degree of control in OOA, partial cross ownership.
  - Extent of externalities (e.g., technological spillovers).
  - Relative level of market power in product and labor markets.
Open issues

- We need to have a better understanding of the channels of transmission of ownership patterns into competitive outcomes, via corporate governance, and more empirical evidence of impact on consumers, innovation, and general equilibrium effects.

- Extensions:
  - Segmented labor markets.
  - Asymmetries, distribution of types.
  - Endogenize the ownership structure.
  - Price formation in stock markets and oligopoly in product and factor markets.
    - Effects of passive investments.
THANK YOU!

http://blog.iese.edu/xvives/
Governance mechanisms (I)

- Diversified shareholders want a policy of portfolio value maximization and induce managers to internalize any externality on commonly owned firms (Hansen and Lott 1996, Gordon 2003).

- Common owners in an industry may have the ability and incentive to influence management (Azar et al. 2018, Posner et al. 2016).

- Countervailing agency problems:
  - Not pushing for aggressiveness in management contracts is a mechanism by which common owners can relax competition.
  - Economies of scale in information production and monitoring by large fund managers may improve corporate governance.

- Caveats:
  - Bebchuk et al. (2017): not obvious that index fund managers have incentives to max wealth of beneficial investors.
  - Hansen and Lott (1996): Larger agency costs associated with more managerial discretion when managers internalize externalities with portfolio value maximization.
Governance mechanisms (II)

- Corporate governance tools: exit (active investors); voice, incentives, voting (active and passive).
  - Passive investment strategy does not mean passive owner.
    - Appel et al. (2016): passive investors are long term, have voice and improve ROA.
- Incentives: Industries with more common ownership have less relative performance manager compensation (Gordon 2003, Anton et al. 2016, Liang 2016).
- Voting: shareholders vote for directors that identify with broad competitive strategies, big decisions.
  - Matvos and Ostrovsky (2008): shareholders take portfolio considerations into account in voting decisions (e.g. mergers).
  - Fos and Tsoutsoura (2014); Aggarwal et al. (2017): shareholder dissent hurts directors; director elections matter because of career concerns.
Investors’ holdings: Passive are more spread than active

Concentration of holdings in each industry of top investors
(median HHI, across investors and industries)

HHI of each top investor in each industry is calculated on the basis of the fraction of its holdings in each firm relative to all its holdings in that industry.

Bental-Estanol, Seldenslachts and Vives

The financial crisis’ impact on common ownership and competition

<table>
<thead>
<tr>
<th></th>
<th>All Investors</th>
<th>Active Investors</th>
<th>Passive Investors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-crisis</td>
<td>3247.64</td>
<td>3522.76</td>
<td>2945</td>
</tr>
<tr>
<td>Post-crisis</td>
<td>3360.31</td>
<td>3630.23</td>
<td>3059.11</td>
</tr>
<tr>
<td>Difference</td>
<td>112.67</td>
<td>107.47</td>
<td>114.11</td>
</tr>
<tr>
<td>p-value</td>
<td>0</td>
<td>0.04</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Difference between Active and Passive investors is significant in each year with p-value < 0.01
Relative holdings: Continuous shift from active to passive (industry level)

Fraction of top investor value held (median, across industries)

Graph includes median of all industries in a given year. Test includes median of all industries in all the pre- and post-crisis years.

<table>
<thead>
<tr>
<th>Year</th>
<th>Active investors</th>
<th>Passive investors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-crisis</td>
<td>0.55</td>
<td>0.29</td>
</tr>
<tr>
<td>Post-crisis</td>
<td>0.5</td>
<td>0.35</td>
</tr>
<tr>
<td>Difference</td>
<td>-0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>p-value</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Median of the fractions of value held by (i) active and (ii) passive top investors (with respect to the overall value held by all the top investors) in each industry.
In Memoriam

Martine Quinzii