Merger Activity and Industry Dynamics

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Outline

- Overview of current research on mergers and acquisitions (M&As) in corporate finance

- Focus on two main questions at the intersection with industrial organization:
  - ▶ Effect of M&As on industry dynamics and productivity
  - ▶ Competition for takeover targets and acquisition prices

- Highlight recent contributions and methodologies
  - ▶ Developments in structural estimation

- Let's start with some empirical evidence on M&As...

Worldwide M&A Activity
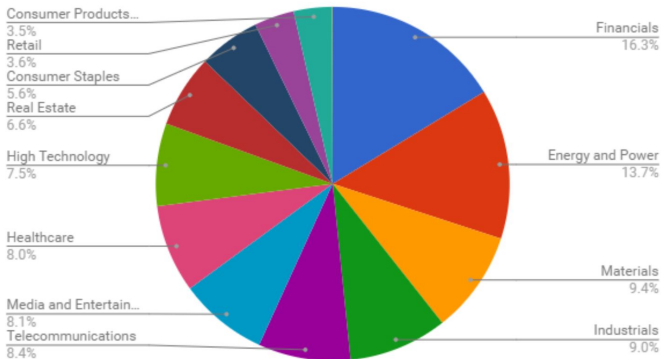
Number of deals and transaction value

Mergers & Acquisitions Worldwide
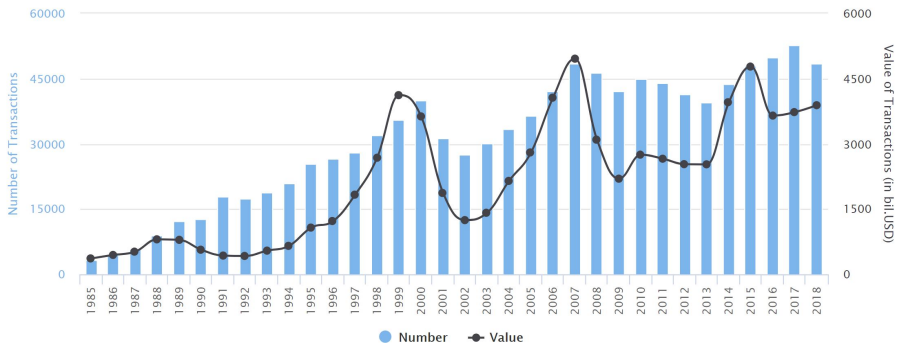
Source: IMAA analysis; imaa-institute.org

Worldwide M&A Value by Industry

M&A by Industries in Value (since 1985)

- Consumer Products... 3.5%
- Retail 3.6%
- Consumer Staples 5.6%
- Real Estate 6.6%
- High Technology 7.5%
- Healthcare 8.0%
- Media and Entertain... 8.1%
- Telecommunications 8.4%
- Financials 16.3%
- Energy and Power 13.7%
- Materials 9.4%
- Industrials 9.0%

Recent Trends
JP Morgan 2019 Global M&A outlook

Main current drivers of M&A activity:

- Macro factors: Global economic growth and low cost of debt
- U.S. tax reform and repatriation of foreign earnings by companies
- Innovation and technological disruption
  - ▶ Technology sector went from 6% to 17% of overall M&A market between 2007 and 2018
- Cross-border mergers accounted for 30% of overall M&A market in 2018
- Continued role of activist investors and hedge funds

Largest Transactions Worldwide
Megadeals are back!

Rank	Year	Acquirer Name	Target Name	Value of Transaction (in bil. USD)	Value of Transaction (in bil. EUR)
1	1999	Vodafone AirTouch PLC	Mannesmann AG	202,7	204.7
2	2000	America Online Inc	Time Warner	164,7	160,7
3	2013	Verizon Communications Inc	Verizon Wireless Inc	130.2	100.5
4	2007	Shareholders (Spin out)	Philip Morris Intl Inc	107.6	68.1
5	2015	Anheuser-Busch Inbev SA/NV	SABMiller PLC	101.5	92,3
6	2007	RFS Holdings BV	ABN-AMRO Holding NV	98.2	71,3
7	1999	Pfizer Inc	Warner-Lambert Co	89.6	85.3
8	2017	Walt Disney Co	21st Century Fox Inc	84.2	72.5
9	2016	AT&T Inc	Time Warner Inc	79,4	72.9
10	2019	Bristol-Myers Squibb Co	Celgene Corp	79.4	69,7

Withdrawn Deals

Not all matches are meant to be...

Select deals greater than US$10bn transaction value (withdrawn 2017)								
Ann. date	Withdrawn date	Value (US$bn)	Target	Acquiror	Target country	Acquiror country	Sector	Reason for termination
Feb 17, 2017	Feb 19, 2017	155.1	Unilever	Kraft Heinz	United Kingdom	United States	Consumer / retail	Proposal rejected by Unilever
Jun 20, 2015	May 12, 2017	51.9	Cigna	Anthem	United States	United States	Insurance	Blocked for antitrust reasons
Jul 3, 2015	Feb 14, 2017	35.0	Humana	Aetna	United States	United States	Insurance	Blocked for antitrust reasons
Aug 2, 2017	Nov 28, 2017	28.9	Rockwell Automation	Emerson Electric	United States	United States	Industrial machinery	Lack of support from Rockwell's Board
Mar 9, 2017	Jun 1, 2017	27.1	Akzo Nobel	PPG Industries	Netherlands	United States	Chemicals	Antitrust and Dutch political concerns
Jan 24, 2017	Feb 24, 2017	23.9	Assicurazioni Generali	Intesa Sanpaolo	Italy	Italy	Insurance	Potential antitrust concerns; timing not right

Source: JP Morgan 2018 Global M&A Outlook

M&A Activity in Italy

Number of deals and transaction value

Mergers & Acquisitions Italy
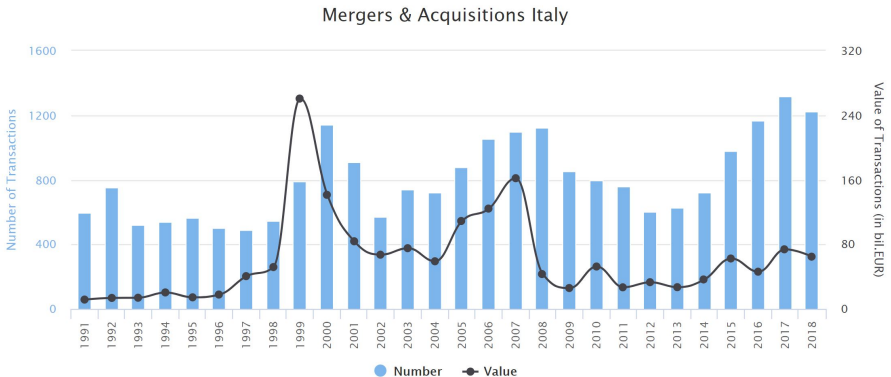
Source: IMAA analysis; imaa–institute.org

Merger Activity and Firm Productivity

- What is the effect of M&As on firm productivity?

- Q-Theory: M&As reallocate capital from low-performing (low Tobin's Q) to high-performing (high Q) firms
  - Gort (1969), Jovanovic and Rousseau (2002, 2008), Yang (2008)

- Empirical evidence from plant-level data support a positive effect of M&As on productivity (direct effect)
  - Li (2013): acquirers...
    - ⋆ increase target productivity with more efficient use of labor and capital
    - ⋆ reduce CAPEX, wages, and employment in targets, but output is unchanged
  - See also Maksimovic and Phillips (1998, 2001, 2002), Schoar (2002), Maksimovic, Phillips and Yang (2013)

Merger Activity and Firm Turnover

- M&As account for a large fraction of firm turnover:
    - 4.5% of U.S. public firms merge on average in a given year (CRSP)
    - Exit rate due to poor performance is 3.7%

- Repeated acquisitions as a growth strategy:
    - Microsoft: 223 acquisitions since 1987
    - Google: 220 acquisitions since 2001
    - Cisco Systems: 196 acquisitions since 1993

- Interactions of M&As with entry and exit:
    - Majority of venture-capital–backed firms end up being acquired (Metrick and Yasuda, 2010)
    - Distressed firms often avoid exit through an acquisition (Hotchkiss and Mooradian, 1998)

Merger Activity in Industry Equilibrium

Dimopoulos and Sacchetto, *Journal of Financial Economics*, 2017

- How does M&A activity interact with entry/exit to shape industry dynamics?

- What is the overall effect of M&As on industry productivity, accounting for the interactions with entry/exit (indirect effects)?

- We develop a dynamic model with heterogeneous firms that choose investment, entry, exit and participate to a merger market

- We quantify the effect of the merger market on firm productivity accounting for the possibility of repeated acquisitions
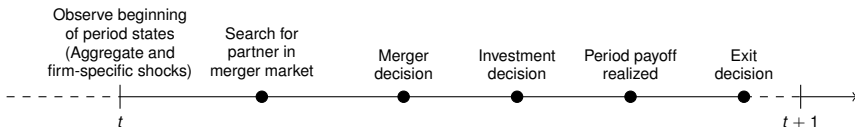
Outline of the Model

- Firms have heterogeneous productivities

- Firms face aggregate and idiosyncratic shocks

- Firms have fixed costs of production

- Decisions of incumbent firms: invest, merge, exit

- Sources of merger synergies:
  - ▶ Improvements in productivity
  - ▶ Savings in fixed costs of production

- Potential entrants can enter by paying a fixed cost

- Infinite horizon, discrete time

Model: Timing

In each period t, two population of firms:

Incumbents

Observe beginning of period states (Aggregate and firm-specific shocks) — Search for partner in merger market — Merger decision — Investment decision — Period payoff realized — Exit decision

t — $t+1$

Potential entrants

Observe beginning of period states — Entry decision (pay entry cost) — Investment decision

t — $t+1$

Sources of Synergies
Fixed cost reductions

Two potential gains when firms merge in the model:

1. A reduction in the fixed costs of production (Gomes and Livdan, 2004)

   ▶ Cost savings may come from lower administrative costs and overhead expenses, or the elimination of redundant activities

   ▶ E.g. Heinz-Kraft *"estimated $1.5 billion in annual cost savings from the increased scale of the new organization, the sharing of best practices and cost reductions by the end of 2017"*

   ▶ The gains in cost efficiency are reduced by a one-off fixed costs of merger implementation and integration

   ▶ Examples: expenses incurred to integrate the two firms' IT systems, business processes, and organizational structures (Tafti, 2011)

Sources of Synergies
Increased productivity

2. Increased productivity. Use flexible functional form for productivity gains, which reflects two theories:

   a) Q-theory of mergers in Jovanovic and Rousseau (2002)
   ⇒ The largest improvements occur when firms with very different productivity levels merge

   b) Rhodes-Kropf and Robinson (2008) theory of complementary assets
   ⇒ Merger gains are largest for firms with similar levels of productivity

Results: Effect of Mergers on Productivity

We calibrate the model's parameters using data on U.S. companies

Counterfactual experiment: Generate an economy without mergers

Compared to no-merger economy, with mergers:

- Average firm productivity is 4.8% higher
- This increase in productivity reflects:
  - ▶ Direct effect of realized merger synergies: average 1% increase in productivity per period
  - ▶ Cumulative effect of repeated acquisitions
  - ▶ Effect of merger options on composition of firms through entry/exit behavior
- The cross-sectional dispersion in productivity increases by 4%

Results: Effect of Merger Options on Entry and Exit

Effect of merger options on entry:

- Entry rate increases from 5.8% to 7.9%
- Mean relative productivity of entrants to incumbents decreases by 5.2%
- Overall: Positive effect on industry productivity, as entrants are on average 6% more productive than incumbents

Effect of merger options on exit:

- Exit rate declines from 5.8% to 3.7%
- Mean relative productivity of exiting firms to incumbents decreases by 2.6%
- Overall: Negative effect on industry productivity, as exiting firms are on average 27.7% less productive than incumbents

Results: Effect of Merger Options on Entry and Exit

What is the net effect of merger options on productivity through firms' entry and exit decisions?

Counterfactual experiment:

- Simulate an economy with mergers at calibrated parameters
- Fix the entry and exit thresholds to the case of no-mergers
- Hence, firms ignore the effect of merger options on entry/exit

Result: Merger options' effect on entry and exit accounts for 15% of the increase in productivity compared to the no-merger economy

Dynamics of Firm Productivity

Positive shock to aggregate demand (two standard deviations, about 15%).

Effect on average idiosyncratic productivity *opposite* to what predicted in a model with no M&A activity (e.g. Clementi and Palazzo, 2016):
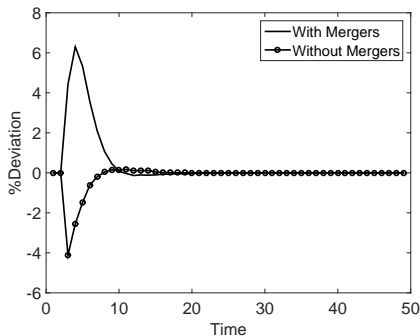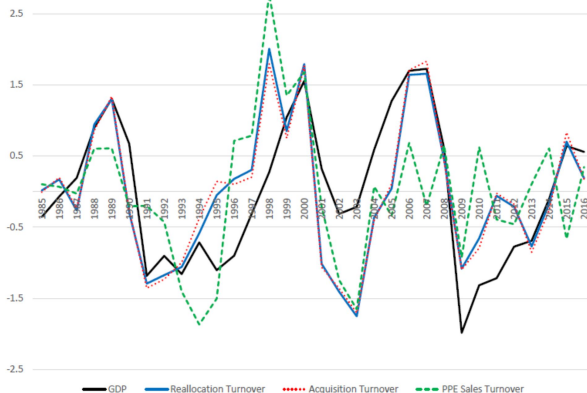

Average log prod. shock
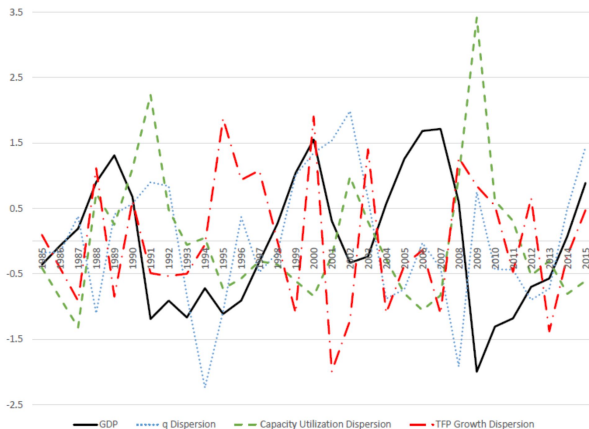
Merger Cyclicality
Eisfeldt and Shi, 2018

Correlation of acquisitions to GDP: 0.5861

Determinants of Mergers
Eisfeldt and Shi, 2018

...but Q-theory–based measures of benefits to capital reallocation are acyclical

Determinants of Merger Cyclicality

- How does M&A cyclicality depend on the sources of synergies?

- Our framework allows for multiple sources of synergies, which have different implications on cyclicality

- We show that:
  - Cost reductions are more relevant during periods of low aggregate demand
  - Productivity gains are more valuable when aggregate demand is high

- At the calibrated parameters, the second effect dominates and aggregate merger activity is procyclical

Merger Cyclicality

Positive shock to aggregate demand (two standard deviations, about 15%).
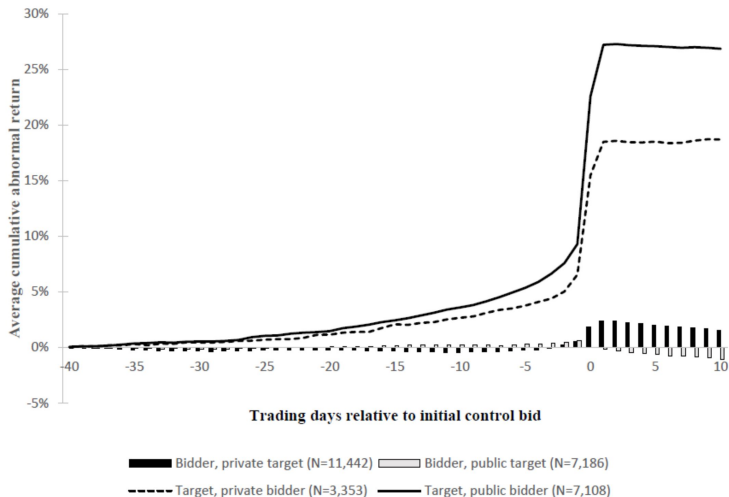
Effect on merger rate:
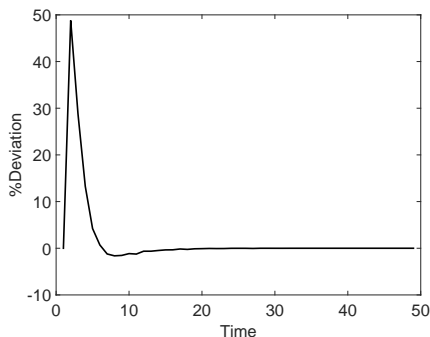
Merger rate

Related Contributions

- Levine (2017) shows that, in the presence of asset complementarities, mergers can lead to a drop in profitability despite being value-increasing for the acquirer

- David (2017) finds that M&As has a significant beneficial impact on aggregate outcomes (output and consumption)

- Wang (2018): announcement returns puzzle

Announcement Returns
Eckbo, 2014

Trading days relative to initial control bid

Bidder, private target (N=11,442)   Bidder, public target (N=7,186)
----- Target, private bidder (N=3,353)   —— Target, public bidder (N=7,108)

Related Contributions

Wang (2018)

- Average announcement returns for acquirers are zero, or even negative (Eckbo, 2014)
- Puzzle: why do acquirers engage in M&As if they don't benefit?
- "Revelation effect": takeover announcements induce acquirers to reassess acquirer's standalone value (not just synergies)
- Following a negative shock to its growth prospects, a firm will endogenously choose to pursue takeovers to catch up with competitors
- Structural estimation results:
  ▶ Acquirers gain 4% on average in M&As...
  ▶ ...but negative revelation effect of -5%
  ▶ Overall announcement return is -1%
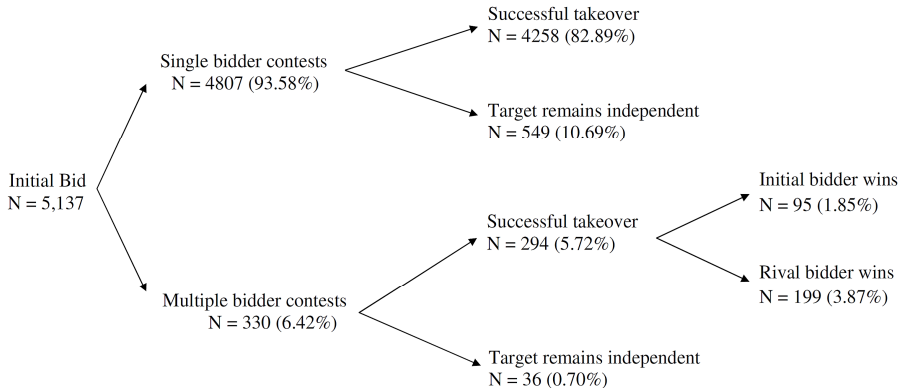
Takeover Premia

Average premium over pre-acquisition target stock price, U.S.
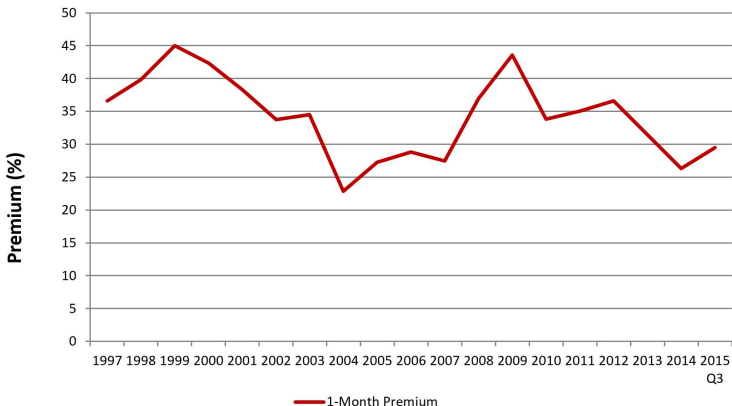
Source: SDC Platinum, Thomson Reuters

Competition in M&A Market

Dimopoulos and Sacchetto, *Journal of Financial Economics*, 2014

Initial Bid
N = 5,137

Single bidder contests
N = 4807 (93.58%)

Successful takeover
N = 4258 (82.89%)

Target remains independent
N = 549 (10.69%)

Multiple bidder contests
N = 330 (6.42%)

Successful takeover
N = 294 (5.72%)

Initial bidder wins
N = 95 (1.85%)

Rival bidder wins
N = 199 (3.87%)

Target remains independent
N = 36 (0.70%)

U.S. public targets, 1988-2006
Source: SDC Platinum, Thomson Reuters

Research Question

- More than 90% of takeover contests are single bidder
- Average price paid in single bidder takeovers is 50% above the pre-acquisition stock price of the target

  Two main explanations in the literature:

1. Target resistance
2. Preemption of potential competitors

  Aim: Evaluate impact of target resistance and preemptive bidding on takeover premia

Target Resistance

1) Target resistance may be caused by:
  - Private benefits of control by blockholders
  - Job security of employee shareholders
  - Post-bidding initiation information flows

Microsoft - Yahoo! case: "After careful evaluation, the Board believes that Microsoft's proposal substantially undervalues Yahoo! including our global brand, large worldwide audience, significant recent investments in advertising platforms and future growth prospects." Source: Yahoo! Inc.

Preemption

2) Preemption of potential competitors by an initial bidder

   Fishman (1988)

   Idea: High initial bid discourages competitors from paying entry costs

   - Search and investigation costs
   - Legal and advisory fees

   Investor Carl Icahn on BEA / Oracle takeover: "I strongly suggest that you use the momentum afforded by the Oracle proposal to seek to sell the company either (a) in an auction process in an expeditious manner to the highest credible bidder or (b) by accepting a preemptive bid at a compelling valuation"

Empirical Challenges

1. Unobservable characteristics of deterred bidders and costs of entry

   Omitted variables

2. Endogenous entry decisions

   Sample selectivity

3. Premium offered and takeover outcome are jointly determined

   Simultaneity

Approach: structural estimation of an auction model of takeover competition

Approach

1. Model:
   - Auction model of takeover contests with endogenous entry
   - Equilibrium conditions $\iff$ Observable takeover outcomes

2. Data:
   - target characteristics
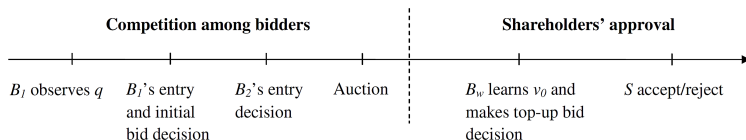   - takeover bids
   - takeover outcomes

3. Structural estimation
   - Estimate distribution of bidders' valuations and costs of entry
   - Evaluate contribution of preemptive bidding and target resistance on takeover premia

Takeover Contests and Auctions

- Strategic interactions and information structure in takeover contests comparable to English auctions
- Auction aspects in takeover regulation:
  - Supreme Court of Delaware: "the board's primary duty is that of an auctioneer responsible for selling the company to the highest bidder" (Revlon v. MacAndrews & Forbes, 173)
  - Fiduciary out rule in mergers
  - Williams Act (1968): tender offer bid open for at least 20 days
- Main differences compared to standard auctions:
  - Search and investigation costs act as barriers to entry
  - Sequential information acquisition can give rise to preemption
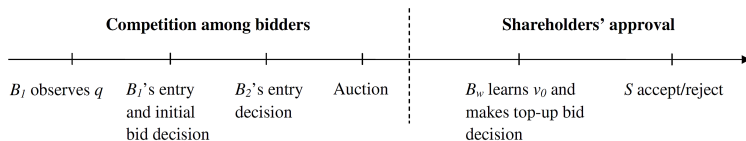 - Shareholders' vote on merger proposals

Model: Timing

Competition among bidders   **Shareholders' approval**

B_l observes q B_l's entry B_2's entry   Auction B_w learns v_0 and S accept/reject
                and initial   decision   makes top-up bid
                bid decision   decision

Stage 1: Competition among bidders

- B_1 privately observes a signal about takeover opportunity (q)
- B_1 decides whether to pay c_1 and make an initial bid b^l
- B_2 observes b^l and then decides whether to pay c_2
- Participant bidders compete in an English auction for the target

Model: Timing

Competition among bidders	Shareholders' approval

B_l observes q | B_l's entry and initial bid decision | B_2's entry decision | Auction | B_w learns v_0 and makes top-up bid decision | S accept/reject
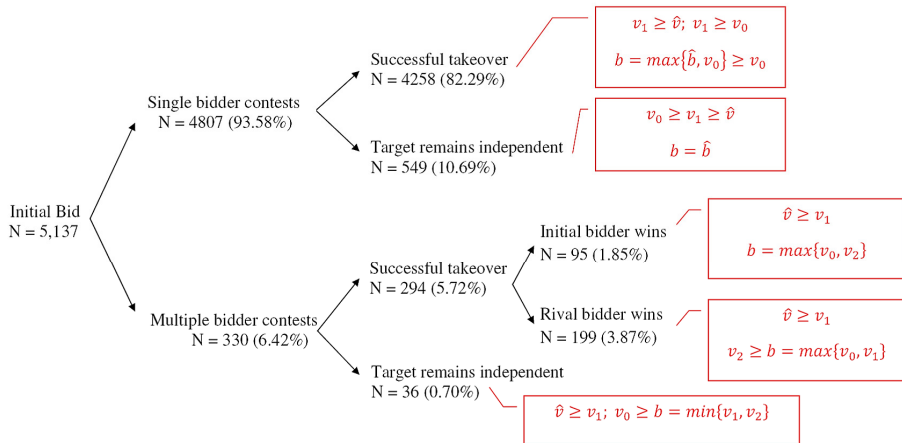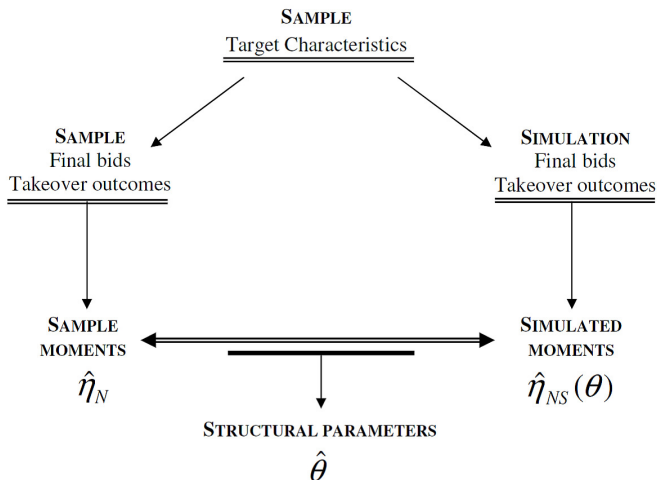
Stage 2: Shareholder Approval

  - The winner of the auction B_w learns minimum offer acceptable by target shareholders (v_0)
  - B_w can top up the winning bid in the auction b_w to v_0
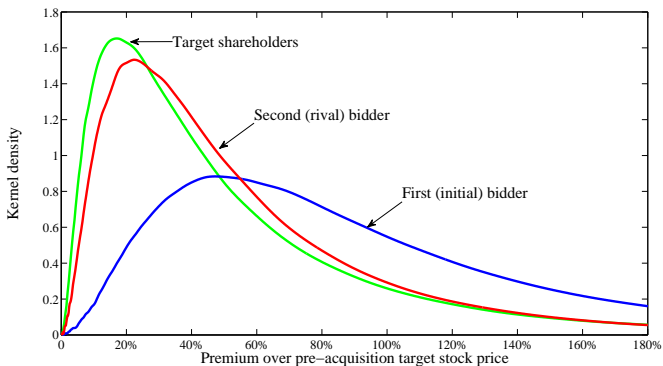 - S decide whether to accept or reject the highest standing offer

Interpretation of the data

Estimation: Method of Simulated Moments

SAMPLE
Target Characteristics

SAMPLE
Final bids
Takeover outcomes

SIMULATION
Final bids
Takeover outcomes

SAMPLE
MOMENTS

$\hat{\eta}_N$

SIMULATED
MOMENTS

$\hat{\eta}_{NS}(\theta)$

STRUCTURAL PARAMETERS

$\hat{\theta}$

Results: Distribution of Valuations

	v_0	v_1	v_2
Mean	57.22%	97.17%	58.46%

Results: Distribution of Costs of Entry

Cost of entry in the takeover contest, c_i
(% of target pre–acquisition market capitalization)
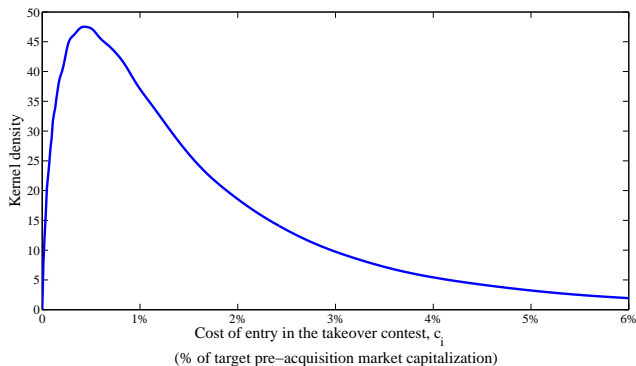
	Mean (%)	Mean (\$ mil)	Median (\$ mil)	25-th per.	75-th per.
c_i	1.96%	10.3	1.43	0.43	5.12

Target Resistance or Preemptive Bidding?

1. B_1 and B_2 asymmetric in valuations
2. B_2 and S have similar valuation distributions

$\Rightarrow$ Even small costs of entry matter for preemption

1. If no entry threat (c_2 very high), expected premium in successful single bidder contests is 48%
2. In the data this premium is 50.55% on average
3. 70% probability that reserve price is higher than preemptive bid in successful single bidder contests

$\Rightarrow$ **Premia in single bidder contests are mainly determined by target resistance**

Additional Results

- Preemption may lead to inefficient allocation of target companies
    - Initial bidder deters a stronger rival in 8.6% of successful single bidder contests
    - Initial bidder would pay more to acquire the target in auction with probability 47% and by 7.3% on average

- Model-implied firm-specific measure of target resistance positively correlated with...
    - empirical measures of managerial entrenchment
    - presence of founder-CEO

Related Contributions

Gorbenko and Malenko (2014): Strategic and financial bidders in takeover auctions

- Average target is valued more by strategic bidders...
- ...but financial bidders have higher valuations for poorly performing companies with low investment opportunities
- Valuations are more dispersed among strategic bidders
- Valuations of financial bidders are more correlated with aggregate economic conditions

Related Contributions

Li, Taylor and Wang (2018): Inefficiencies from opportunistic acquirers

- Opportunistic acquirers can buy targets using overvalued shares
- Inefficiency: the most overvalued rather than the highest-synergy bidder may buy the target
- Structural estimation results: The M&A market allocates resources efficiently on average
- Opportunistic bidders crowd out high-synergy bidders in only 7% of transactions...
- ...with an average synergy loss of 9% of target's value

Conclusions

- Overview of current research on M&As

- Recent methodological developments allow to overcome empirical challenges and answer important questions about M&A market
  - ▶ Calibration of dynamic models of industry equilibrium
  - ▶ Structural estimation of takeover auctions

- Open areas for future research
  - ▶ Effect of financial frictions in shaping industry dynamics
  - ▶ Estimation of matching models (Akkus, Cookson and Hortacsu, 2016)
  - ▶ Machine learning applications (Sacchetto, Routledge, Smith, 2016)
  - ▶ Propagation of M&A activity through industry networks (Ahern and Harford, 2014)