How Do Top Acquirers Compare in Technology Mergers? New Evidence from an S&P Taxonomy

Liad Wagman

Illinois Institute of Technology
and Data Catalyst Institute

Joint work with:
Ginger Zhe Jin
University of Maryland & NBER
Mario Leccese
University of Maryland

February 10, 2022

Motivation: How could incumbent-startup M&As harm future innovation and market competition?

- ▶ Killer acquisitions
  - ▶ Cunningham, Ederer and Ma (2021 JPE) on pharmaceuticals
- ▶ Kill zones
  - ▶ Kamepalli, Rajan and Zingales (2020) on acquisitions by Facebook and Google
- ▶ Raise rivals' costs through vertical M&A
  - ▶ Chipty (2001 AER); Bryan and Hovenkamp (2020 RIO)
  - ▶ Argentesi et al. (2021 JCLE) on Facebook/Instagram
- ▶ M&A below the reporting thresholds
  - ▶ Wollmann (2019 AERI) on M&As bef/aft a threshold change
  - ▶ Wollmann (2020) on acquisitions of dialysis centers
  - ▶ Barrios and Wollmann (2022) on M&A disclosure to investors

Motivation: Ongoing policy debates on GAFAM and Technology Acquisitions

- ▶ Policy makers are concerned about digital platforms' size, network effects, data, M&A patterns. Examples include:
  - ▶ France/UK/Australia/EU (2019); LEAR (2019)
  - ▶ Stigler Report (2019); US House staff report (2020)
  - ▶ Scott Morton and Dinielli (2020a, 2020b)
  - ▶ FTC 6(b) platform study (2021)

- ▶ Historical and ongoing antitrust cases v. GAFAM

- ▶ Legislative efforts (EU, US, China, India, etc.)

Motivation: Could incumbent-startup M&A be pro-competitive?

▶ Incumbent acquisition of startups may encourage future entrepreneurship and investment in the same area
  ▶ Rasmusen (1988); Lemley and McCreary (2019); Bryan and Hovenkamp (2020); Prado (2021)
▶ Incumbent acquisition may enhance efficiency of the target
  ▶ Mermelstein et al. (2020)
▶ Incumbent acquisition may be a substitute for in-house R&D
  ▶ Gautier and Lamesch (2020) on 175 GAFAM acquisitions 2015-2017

Research Questions

Compared to other top acquirers:

- ▶ Are large platform firms (such as GAFAM) unique in the number, pace, and concentration of technology mergers?
- ▶ Do GAFAM firms have a unique dynamic pattern of tech acquisitions?

By areas of technology acquisition:

- ▶ Is GAFAM acquiring in a particular area followed by fewer non-GAFAM M&As in that area?
- ▶ Over time, do we observe less competition between acquirers in the areas that involve GAFAM?

In the broader economy:

- ▶ What motivates firms to acquire tech companies?

Data from S&P 451 Research

S&P Taxonomy
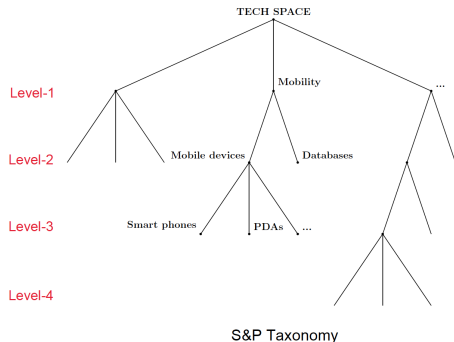
- 2010-2020, global
- obs = completed tech M&A deal with a change in majority control
- Total 41,796 M&A deals involving 15,323 unique acquirers
- All targets are tech, acquirers can be tech or non-tech

List of Non-GAFAM Top Acquirers

Rank	Top 25 Tech	Top 25 PE	Top 25 S&P
1	Samsung	The Blackstone Group	Constellation Software
2	AT&T	The Carlyle Group	WPP plc
3	Verizon	KKR & Co.	TA Associates
4	China Mobile	TPG Capital	J2 Global
5	Walt Disney	Warburg Pincus	Marlin Equity Partners
6	Alibaba	Neuberger Berman	Providence Equity
7	Intel	CVC Capital Partners	HG Capital
8	Softbank	EQT Partners	The Riverside Company
9	IBM	Advent International	Abry Partners
10	Tencent	Vista Equity Partners	Genstar capital
11	Nippon Telegraph	Leonard Green & Partners	Apax Partners
12	Cisco	Cinven	Dentsu
13	Oracle	Bain Capital	H.I.G. Capital
14	Deutsche Telekom	Apollo Global Management	GTCR
15	Taiwan Semiconductor	Thoma Bravo	Trimble
16	KDDI	Insight Partners	Hexagon
17	SAP	Blackrock	New Mountain Capital
18	Telefónica	General Atlantic	Battery Ventures
19	América Móvil	Permira	Publicis Groupe
20	Hon Hai Precision	Brookfield Asset Management	Salesforce.com
21	Dell	EnCap	Audax Group
22	Orange	Francisco Partners	GI partners
23	China Telecom	Platinum Equity	EMC
24	SK Hynix	Hillhouse Capital Group	Deloitte
25	Accenture	Partners Group	Yahoo!

Summary of Top Acquirers' M&A Activity

	GAFAM	Top 25 Tech	Top 25 PE	Top 25 S&P	All Other
Number of Acquisitions	595	1,033	1,964	2,360	35,844
Average Acquisitions per Firm	119.00	41.32	78.56	94.40	2.31
Percent of Data-intensive Targets	22.35%	25.60%	22.20%	24.15%	17.97%
Percent of B2C Targets	26.55%	8.37%	3.05%	3.18%	11.28%
Average Target Age (Years)	8.36	13.16	18.82	17.01	15.03
Normalized Average Target Age	0.66	0.85	1.27	1.15	0.98

▶ Overall # (GAFAM ahead; Top 25 S&P close) obscure trends

▶ More B2C targets → more attention?

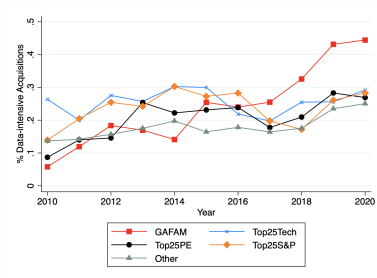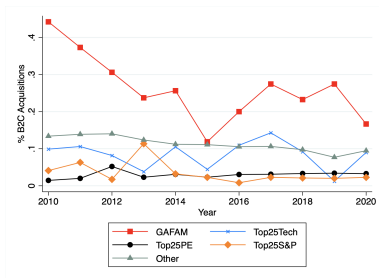▶ Normalized avg GAFAM targets age similar to Top 25 Tech

Pace of Acquisitions across Groups of Top Acquirers
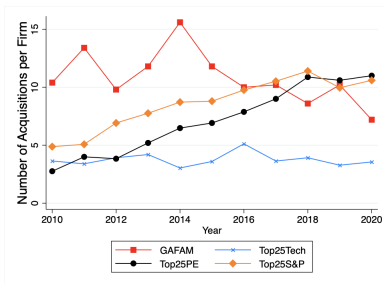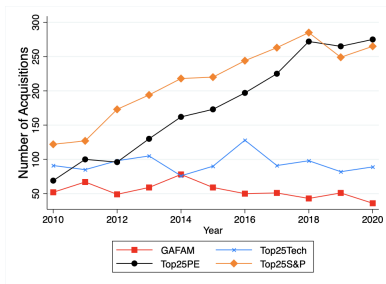
- ▶ GAFAM's overall pace of tech control M&A has slowed
- ▶ Paces of Top 25 S&P and Top 25 PE have increased
- ▶ Overtaken GAFAM since 2018

Pace of Acquisitions of B2C and Data-intensive Targets

- ▶ GAFAM's B2C M&A % decreased over the period
- ▶ GAFAM's focus on data-intensive targets increased (could be due to scale, scope, synergies, but also because more startups)
- ▶ Recent M&A upward trends of data-intensive targets

Concentration in M&A

▶ We define acquirer-level HHI as:

$$\text{HHI}_i = \sum_{j \in \mathcal{J}} \left(\frac{q_{ij}}{q_i} \times 100 \right)^2, \quad \text{where}$$

  ▶ $\mathcal{J}$ is the set of level 1 or level 2 categories
  ▶ q_{ij} is the number of acquisitions completed by firm i in category j between 2010 and 2020
  ▶ q_i is the total number of acquisitions completed by firm i between 2010 and 2020

Concentration in M&A (cont'd)

Levels 1	mean	sd	min	max
GAFAM	1,530.28	92.64	1,390.67	1,625.12
Top 25 Tech	3,257.51	2,521.99	1,093.75	10,000.00
Top 25 PE	2,693.75	1,757.98	1,088.39	10,000.00
Top 25 S&P	3,277.79	1,765.54	1,368.15	7,997.63
Other	8,640.07	2,394.55	1,005.92	10,000.00

Levels 2	mean	sd	min	max
GAFAM	455.27	107.60	336.38	609.12
Top 25 Tech	1,700.09	2,128.85	453.65	10,000.00
Top 25 PE	1,451.70	1,966.04	389.18	10,000.00
Top 25 S&P	1,512.10	1,571.16	311.91	6,406.49
Other	8,142.79	2,861.36	498.61	10,000.00

Within Top Levels 1	GAFAM	Top 25 Tech	Top 25 PE	Top 25 S&P
Application Software	1,517.32	3,871.53	4,139.19	3,498.38
Information Management	4,300.81	6,621.31	6,489.98	6,568.01
Infrastructure Management	5,786.37	7,149.41	6,224.09	5,733.12
Mobility	5,346.39	6,978.89	6,559.34	6,809.32
Systems	3,323.30	7,878.28	6,197.92	6,737.47

▶ GAFAM has lowest concentrations; M&A is dispersed

Acquisitions by Distance

STATIC

Distance	GAFAM	Top25 Tech	Top 25 PE	Top 25 S&P
Adjacent	82 (13.80%)	199 (19.26%)	323 (16.45%)	362 (15.34%)
Same	28 (4.71%)	112 (10.84%)	473 (24.08%)	454 (19.24%)
Unrelated	485 (81.61%)	722 (69.89%)	1,168 (59.47%)	1,544 (65.42%)

DYNAMIC

| Distance	GAFAM	Top25 Tech	Top 25 PE	Top 25 S&P
Adjacent	173 (29.12%)	255 (24.96%)	388 (19.76%)	458 (19.41%)
Same Original	28 (4.71%)	112 (10.84%)	473 (24.08%)	454 (19.24%)
Same New	332 (55.89%)	486 (47.05%)	770 (39.21%)	1,176 (49.83%)
Unrelated	62 (10.42%)	180 (17.42%)	333 (16.96%)	272 (11.53%)

▶ GAFAM's adjacent-then-expand strategy suggests a broadening of product offerings

Avg # of GAFAM/Top Groups in GAFAM-active Level-2s
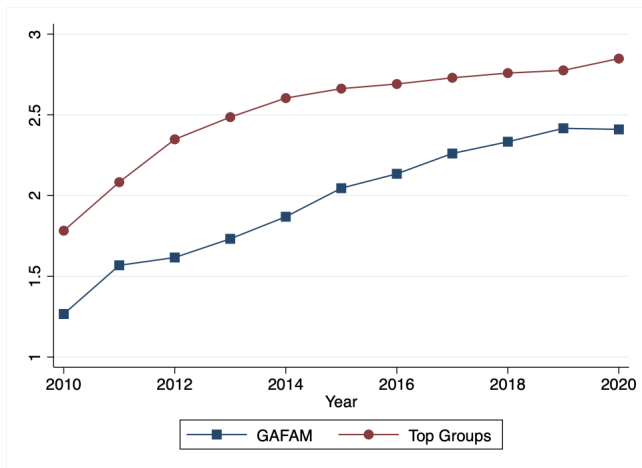
▶ Increasing trends of both across-groups and within-GAFAM competition in categories involving any GAFAM activity

"Treatment" by 1st GAFAM acquisition
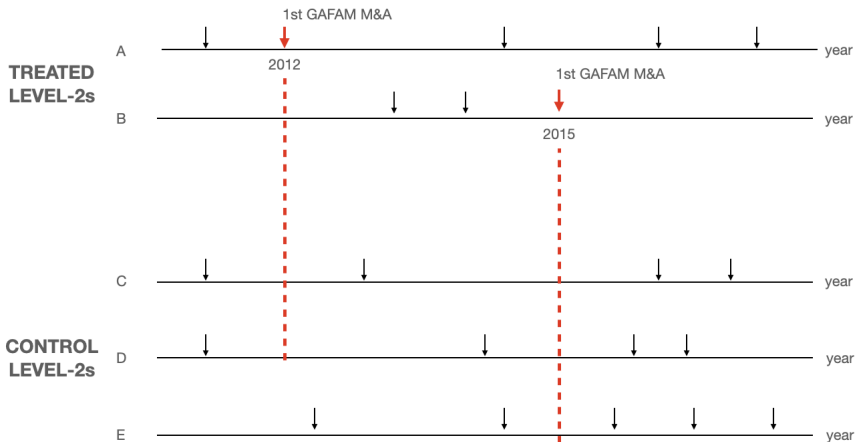
"Treatment" by 1st GAFAM acquisition (cont'd)

▶ We follow Callaway and Sant'Anna (2020) to identify "Average Treatment effect on the Treated" (ATT); interpret ATT as correlation

▶ Address staggered treatment and (dis)similarity between treated and control units

▶ Exclude GAFAM-active categories in 2010

▶ Also examine "intensity" of GAFAM in a category

▶ Can identify ATT by treatment-starting year, calendar year of effect, and years exposed to the treatment

▶ Anticompetitive theories generally suggest negative ATT

Results: ATT with Simple Aggregation

Control Group	ATT	Std. Error	[95% Conf. Int.]	
Not-yet-treated	6.206	2.145	2.001	10.411
Never-treated	6.001	2.146	1.7949	10.2072

Results: Average Effect by Length of Exposure
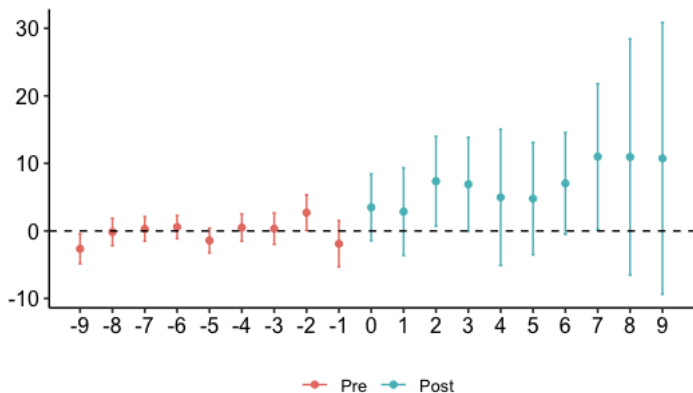
Results: ATTs by Treatment-Starting Year and Calendar Year of Effect

(a) Average Effects by Treatment-starting year   (b) Average Effects by Calendar Year of Effect
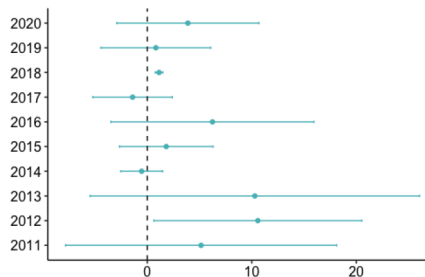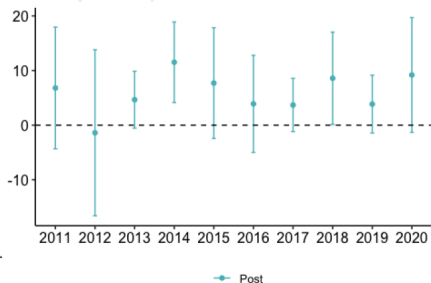
Limitations

- ▶ S&P data, 2010-2020 sample timeframe (2021 extension)
- ▶ Tech acquisitions, majority control
- ▶ Most analysis focuses on S&P level-2 categories, which can be different from antitrust markets
- ▶ Can only measure competition between acquirers via M&As (not account for internal R&D, minority investments, venture funds, arm-length contracts, etc.)

Open Questions:

- ▶ Which sectors of the economy engage in tech M&A?
- ▶ What drives firms to engage in tech M&A?

Zooming Out to the Broader Economy

"M&A and Technological Expansion" (by same authors)

▶ Data from Compustat, CRSP, Refinitiv, and S&P, characterizing tech M&A by all US publicly-listed firms

Tech M&A across Sectors between 2010 and 2020

Sector	Number of Tech Acquisitions	% of Firms with any Tech Acquisition	Average Number of Tech M&As per Public Acquirer
Finance	1,084	4.66	3.79
Information	4,903	45.11	7.27
Services	2,136	19.92	5.76
Supply Chain	3,584	11.18	4.46
Trade	605	13.87	4.12
Private Equity	308	73.53	6.16
Total	12,620	13.10	5.47

Sectors and Tech M&A

Sector	2-digits NAICS Code	Industry	# Firms	# of M&A
Finance	52	Finance and Insurance	6,133	1,084
Information	51	Information	1,494	4,903
Services	53	Real Estate	614	309
	54	Professional and Technical Services	465	1,379
	56	Administrative Services	203	275
	61	Educational Services	82	53
	62	Healthcare and Social Assistance	197	64
	71	Arts and Entertainment	92	42
	72	Accommodation and Food	179	8
	81	Other Services	30	6
Supply Chain	11	Agriculture, Fishing and Hunting	52	2
	21	Mining	2,023	153
	22	Utilities	365	89
	23	Construction	160	38
	31	Manufacturing	347	24
	32	Manufacturing	2,068	332
	33	Manufacturing	2,168	2,946
Trade	42	Wholesale Trade	309	259
	44	Retail Trade	224	70
	45	Retail Trade	183	204
	48	Transportation and Warehousing	331	64
	49	Transportation and Warehousing	13	8
Private Equity			68	308
Total			17,800	12,620

Acquirer Tech Level

Sector	Traditional	Tech-leaning	High-tech	Missing
Finance	386	74	154	470
	(35.61%)	(6.83%)	(14.21%)	(43.36%)
Information	304	255	3,823	521
	(6.20%)	(5.20%)	(77.97%)	(10.63%)
Services	512	84	1,003	537
	(23.97%)	(3.93%)	(46.96%)	(25.14%)
Supply Chain	685	364	1,978	557
	(19.11%)	(10.16%)	(55.19%)	(15.54%)
Trade	205	34	315	51
	(33.88%)	(5.62%)	(52.07%)	(8.43%)
Private Equity	180	2	104	22
	(58.44%)	(0.65%)	(33.77%)	(7.14%)
Total	2,272	813	7,377	2,158
	(18.00%)	(6.44%)	(58.45%)	(17.10%)

▶ Firms from all sectors and from across the spectrum of tech intensities engage in tech M&A

Technological Expansion

Sector	Distance			Target Age (Years)	% Data-intensive Targets
	% Same	% Adjacent	% Unrelated		
Finance	25.51	23.46	51.03	15.72	15.77
Information	22.02	21.46	56.52	12.92	21.42
Services	28.29	19.49	52.23	15.91	22.71
Supply Chain	24.62	21.34	54.04	18.38	17.49
Trade	34.55	22.10	43.35	17.08	18.02
Private Equity	11.07	9.45	79.48	17.00	16.87
Total	21.44	18.55	60.02	15.74	19.76

▶ Even in the aggregate, observe tech M&A as a means to grow, not dissimilar from GAFAM

▶ Target age is generally lower for acquirers in Information

▶ Data-intensive targets have broad, cross-sector appeal

Sector M&A Characteristics

Sector	HHI	Pr(Tech M&A > 1 |Tech M&A)	HHI | Tech M&A > 1	Pr(Sequential Tech M&A)	Average Lag
Finance	5,666.61	57.69%	4,464.00	73.62%	615.84
Information	4,700.70	72.85%	4,089.24	86.25%	418.69
Services	5,497.00	70.08%	4,779.88	82.63%	538.29
Supply Chain	5,287.26	64.13%	4,332.78	77.59%	578.42
Trade	6,264.86	61.22%	5,251.03	75.70%	586.35
Private Equity	3,380.43	47.06%	2,931.93	84.66%	541.85
Total	5,152.26	66.11%	4,331.29	81.56%	524.88

▶ M&A by firms in Information and PE is less concentrated across tech categories

▶ Information and Services: More serial acquirers

▶ M&A likely to be completed by serial acquirers in all sectors

▶ M&A by firms in Information is generally more frequent

Potential Drivers of Tech M&A

VARIABLES	(1) Total Tech M&A	(2) Same Tech M&A	(3) Adjacent Tech M&A	(4) Unrelated Tech M&A
IPO Competition	-0.000184 (0.000293)	-0.000141* (7.41e-05)	1.18e-05 (8.34e-05)	-5.40e-05 (0.000236)
Incumbent Competition	0.00429*** (0.00138)	0.000666 (0.000422)	0.000526 (0.000411)	0.00310*** (0.00108)
Observations	34,287	34,287	34,287	34,287

▶ Little effects to IPO (slightly subdued core area M&A)

▶ Firms that face more incumbent competition are associated with more tech M&A outside their core business areas

→ Healthy competition is associated with more tech M&A

Potential Drivers of Tech M&A – Cont.

VARIABLES	(1) %ΔMarket Value
#TechM&A	0.0208**
	(0.00942)
$\mathbf{1}\{\text{Tech M\&A}\}$	0.429***
	(0.162)
Observations	5,152

▶ Tech acquirers likely to exhibit valuation increases

▶ Firms that complete a higher number of tech M&A are associated with higher valuation increases

Summary of Findings

Some characteristics of GAFAM tech acquisitions:

▶ Higher # per firm, but top 25 PE caught up since 2018

▶ Somewhat younger targets; less so when controlling for average category age; applies to sector

▶ Somewhat more B2C targets, though downward trend

▶ Targets tended not to be data-intensive until recently (2018), but it is an overall trend across top groups and sectors

▶ Acquisitions are less concentrated across categories

Summary of Findings – Cont.

- ▶ Did not find evidence that a category with GAFAM acquisition(s) is followed by fewer deals by other acquirers

    $\rightarrow$ Potentially counter to some theories of anticompetitive harm

- ▶ Positive link b/w more competition and tech M&A

    $\rightarrow$ Tech M&A appears to be a symptom of healthy competition

- ▶ From 2010 to 2020, competition among top tech acquirer groups, as well as within GAFAM, has intensified