

Start-up Acquisitions, Venture Capital and Innovation: A Comparative Study of Google, Apple, Facebook, Amazon and Microsoft

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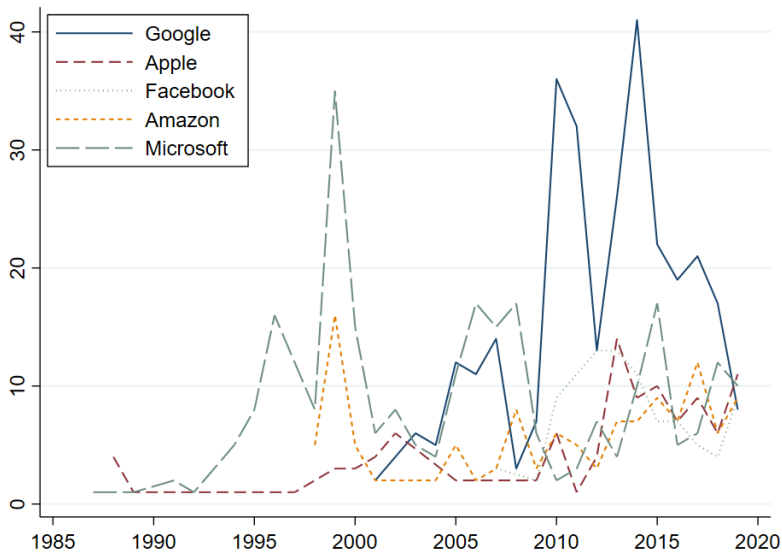
Big-tech acquisitions

- Increased regulatory attention to big-tech M&A
 - More than 900 total acquisitions by GAFAM
 - Most below notification threshold, few antitrust interventions
 - Median deal value only ~35m USD
- What is the goal of these M&A?
 1. strategic acquisition of complementary tech-portfolios OR
 2. elimination of potential future competitors?
- We study the impact of GAFAM deals on investment and innovation
 - We link 678 GAFAM targets to venture capital data and analyze impact on VC markets
 - We link 355 GAFAM targets to patents and study impact on affected technology classes

What do we find?

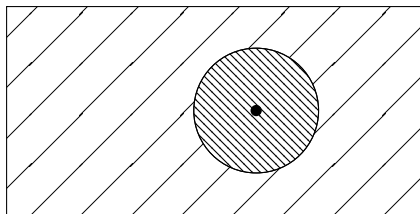
- Investment is negatively affected
 - drops by ~30% in affected markets
 - less negative after 2010
 - similar for all acquirers
- ATE on patents is insignificant
 - effect changes sign: negative before, positive after 2010
 - depends on the identity of the acquirer
- Current and future competition (measured by product and patent similarity) matter

Number of acquisitions by GAFAM firms



Constructing venture capital markets

- To analyze investment, we link GAFAM targets to Crunchbase
- We use the business description of targets and ~1.4m other firms to construct VC markets
 1. Natural language processing to assess semantic similarity of business descriptions
 2. Define a caliper around targets, the treatment group (median of 645 firms)
 3. Remainder of the 'broader industry' (e.g. cloud computing) is counterfactual (median 7.8k firms)

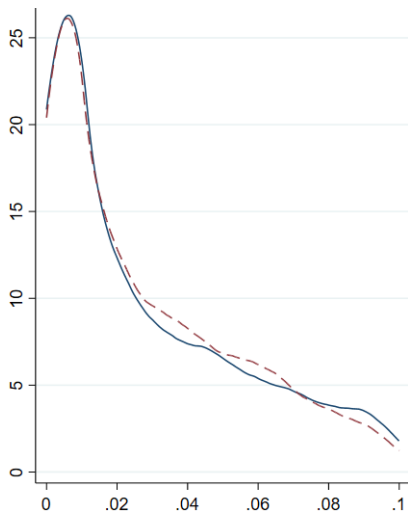


- Control (Industry i)
- Target
- ⊙ Treated firms

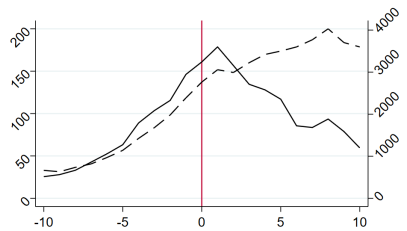
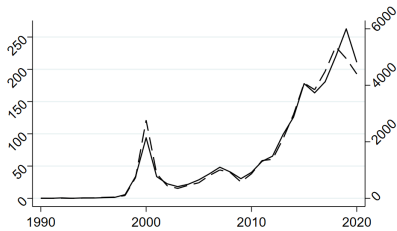
Matching technology classes

- IPC classes with GAFAM acquisitions are quite active
- We use matching to obtain an unbiased comparison
- Selection model includes # patents, citations, inventors, trends etc.
- Matching loop pairs ~4000 IPCs with/without acquisitions 1:1

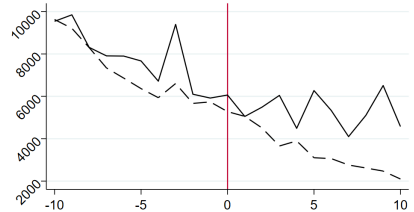
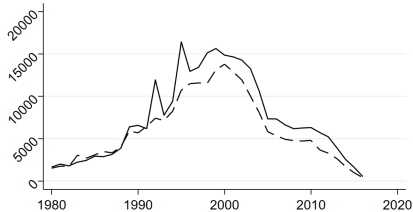
Propensity scores after matching



VC investment



Patent citations



———— GAFAM acquisitions

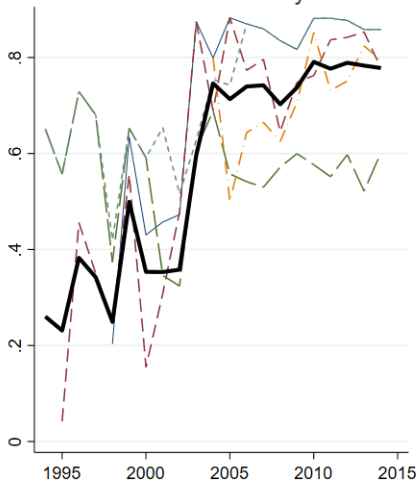
- - - - - No GAFAM acquisitions

ATE of GAFAM deals on VC and patents

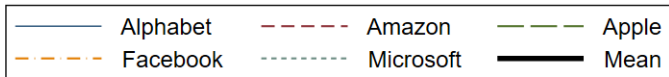
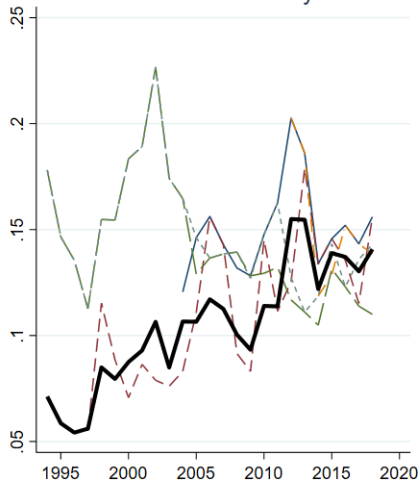
	VC investment		Patent Citations	
	(1)	(2)	(4)	(5)
M&A	-0.307*** (0.052)		0.064 (0.047)	
M&A 2010		-0.463*** (0.096)		-0.151* (0.084)
M&A 2020		-0.236*** (0.061)		0.305*** (0.060)
Observations	10169	10169	261721	261721
R^2	0.894	0.894	0.672	0.673

- Impact improves over time - increase in competition?
- We measure future (current) competition among GAFAM by patent (product) similarity

Patent similarity



Product similarity



	VC investment		Patent Citations	
M&A	-0.822***		-0.179***	
M&A × patsim	0.088		0.261***	
M&A × prodsim	2.883*		0.390	
M&A 2010		-1.013**		-0.101
M&A 2020		-1.063***		-0.037
M&A 2010 × patsim		0.373		0.038
M&A 2020 × patsim		0.247		0.275***
M&A 2010 × prodsim		1.530		-0.769
M&A 2020 × prodsim		4.632**		1.025**
Observations	8639	8639	261721	261721
R^2	0.894	0.894	0.672	0.673

- Patent and product similarity (future and current competition) mitigate negative effects
- No ATE-dynamics, once similarity is controlled for

Deal-specific ATEs

	Patents +	Patents -
Investment +	58	11
Investment -	91	16

Determinants of the -/- cluster

	LPM	Probit	Logit
Acquisition before 2010	-0.037	-0.462	-0.826
Number of funding rounds	0.019	0.174	0.293
Common IPC target	-0.154**	-0.861**	-1.473**
Transaction price public	-0.072	-0.695*	-1.269*
Patent similarity	-0.016	-0.064	0.056
Product similarity	-0.615	-6.721	-12.702
Observations	163	163	163
R^2	0.071		

Conclusions

- We study close to 700 start-up acquisitions by GAFAM
- Investment decreases
 - VC drops by ~30% in affected markets
 - less negative after 2010
- Impact on innovation positive after 2010
- Similarity of products and patents (proxy for competition) might be a relevant channel
- Policy implications
 - Mandatory notification of big-tech deals, public transaction prices
 - Forward-looking outcomes such as patents and VC can measure future competition