

Competition and the Value of Innovation

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Highlights

- Investigates how product market competition affects the economic gain shareholders can enjoy from successful innovation
- Measures innovation value using stock market valuations of patents
- Adopts a quasi-natural experiment to address potential endogeneity problems
- Patent value is 1% lower in industries with 1% higher competition intensity
- Patent value \uparrow 2.7% (1.2m USD) after horizontal M&A announcements

Introduction

The economic gain a firm obtains from innovation is the primary motivation for corporate R&D investment but we know little about how different factors might influence this value. The competition-innovation value relationship is a priori unclear. The available empirical evidence is further limited because the commercial value of innovation is not directly observable, and competition and the value of innovation simultaneously affect each other.

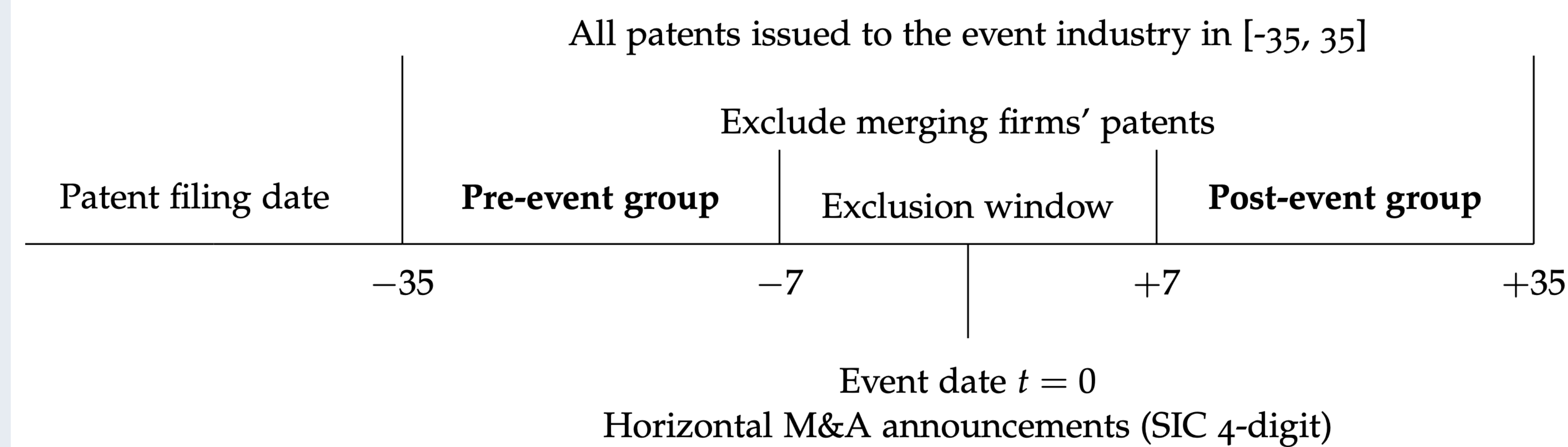
I address this gap by studying the impact of product market competition on the economic value of innovation. I measure the value of a patent following Kogan et al. (2017). This measure is based on the change in stock market valuation around the patent issuance date and captures the present value of expected incremental future cash flows associated with the underlying innovation.

To establish causality, I propose a quasi-experimental design to compare the value of patents issued immediately before and after competition-altering events. I use horizontal M&A announcements as anti-competitive events. On average, patents issued immediately after horizontal merger announcements have a 2.7% higher market value than patents issued before those announcements. On the contrary, patents' value is lower after events that are expected to intensify competition.

Identification

- **Quasi-natural Experiment:** compare the value of patents that were issued immediately before and after competition altering events.

Timeline of the quasi-natural experimental design



- Post-merger group: non-merging firms' patents granted in the [8, 35] window
- Pre-merger group: non-merging firms' patents granted in the [-35, -8] window

Assumption

- Random assignments into the two groups
 - 1 The patent issuance decision is made by the USPTO
 - 2 Long patent examination time (mean = 2.7 years)
 - 3 Long M&A initiation/negotiation process
 - 4 No systematic differences between the two groups

- Balance test:

	(1) #Backward Citations	(2) #Forward Citations	(3) Examination Time	(4) #Patent Grants
Post-merger	-0.014 (0.020)	-0.002 (0.019)	-0.000 (0.000)	0.073 (0.124)
Observations	124,235	124,235	124,235	15,154
Adjusted R-squared	0.099	0.152	0.210	0.705

Main Results

- Regression model:

$$Patent\ value_{i,j,s,t} = \beta Post\ merger_{j,s,t} + \gamma X_{i,t-1} + \delta Z_{j,t} + FE_s + \varepsilon_{i,j,s,t}$$

	Single Patent Grants			All Patent Grants
	(1)	(2)	(3)	(4)
Post-merger	0.028** (0.012)	0.027*** (0.009)	0.027*** (0.009)	0.024** (0.010)
Observations	14,501	14,501	14,501	124,235
Adjusted R-squared	0.872	0.917	0.917	0.881
Firm Controls	No	Yes	Yes	Yes
Patent Controls	No	No	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Patent Class FE	Yes	Yes	Yes	Yes

Summary of Findings

- Patent value is higher in less competitive industries
- Anti-competitive events lead to increases in patent value
 - \uparrow 2.7% after horizontal M&A announcements
 - No significant change after non-horizontal M&A announcements
 - Reversal of the positive effect following merger withdrawal

Robustness

Alternative explanations ruled out:

- No systematic differences btw other observables
- M&As are not driven by sample patents
- M&As do not change patent value through other channels

Further robustness checks:

- Alternative patent value estimations
- Alternative industry classifications
- Alternative competition altering events
- Alternative event windows
- Additional controls and fixed effects

Summary of other evidence:

- Adjustment in patent value for the pre-merger sample
- Firm-level analysis (correlation)

Conclusion

Competition limits the eco. value of innovation:

- Patent value is higher in less competitive industries
- An expected increase in competition \downarrow patent value
- An expected decrease in competition \uparrow patent value

Contribution:

- How competition affects firms' innovation incentive
- Distinction btw. patents' scientific vs. economic value
- Potential effect of modifying competition in an economy

Author Information

Muhan Hu is a fifth-year PhD Candidate from the Department of Finance of the University of Melbourne. Her research interests are corporate innovation and technology spillovers. The complete paper will be updated on the author's [SSRN page](#).



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