

# The Bright Side of Patents

Joan Farre-Mensa *Harvard Business School*

Deepak Hegde *NYU Stern\**

Alexander Ljungqvist *NYU Stern & NBER*

The research was conducted while Hegde was Edison Scholar at the United States Patent and Trademark Office (USPTO). However, the views and comments expressed herein are solely the opinion of the authors, do not reflect the performance of duties in the authors' official capacities, and are not endorsed by, nor should be construed as, any viewpoint official or unofficial of the USPTO.

# Do patent rights help or harm inventors?

- Patents award their holders the right to exclude
  - Patents increase imitation costs
  - Patents facilitate licensing
  - Patents facilitate access to capital
- But patents may not help their holders if....
  - Too costly to enforce patents (patent litigation costs > \$20 billion)
  - Awarded for trivial inventions

# The Beerbrella

US006637447B2

(12) **United States Patent**  
McMullin et al.

(10) **Patent No.:** US 6,637,447 B2  
(45) **Date of Patent:** Oct. 28, 2003

(54) **BEERBRELLA**

(76) Inventors: **Mason Schott McMullin**, #7 Ridgeway  
St., St. Louis, MO (US) 63117; **Robert**  
**Platt Bell**, 8033 Washington Rd.,

5,058,757	A	*	10/1991	Proa	.....	220/739
5,086,712	A	*	2/1992	Clark	.....	108/50.12
5,115,939	A	*	5/1992	Porter	.....	220/705
5,186,196	A	*	2/1993	Gorka et al.	.....	135/16
5,365,966	A	*	11/1994	McLaren	.....	135/16
5,206,015	A	*	2/1995	De...	.....	125/16

(57)

## ABSTRACT

The present invention provides a small umbrella (“Beerbrella”) which may be removably attached to a beverage container in order to shade the beverage container from the direct rays of the sun. The apparatus comprises a



# Do patent rights help or harm inventors?

- Patents award their holders the right to exclude
  - Patents increase imitation costs
  - Patents facilitate licensing
  - Patents facilitate access to capital
- But patents may not help their holders if....
  - Too costly to enforce patents (patent litigation costs > \$20 billion)
  - Awarded for trivial inventions
  - Take too long to process (average patent takes > 3 years to issue)

# How important are patents for startups – and why?

## QUESTIONS

- I. How much do patent rights benefit startups?
- II. How badly do patent *grant delays* affect patents' benefits?
- III. What are the *mechanisms* through which patents benefit startups?

# Measuring the causal effect of patent rights on startups is challenging

## EMPIRICAL CHALLENGES

1. Complete data on rejected patent applications are not publicly available
2. Data on firm outcomes for privately-held startups are not easily available
3. Large sample correlations between firm success and patenting do not imply causality
  - Better firms/inventions may be more likely to win patents and be successful

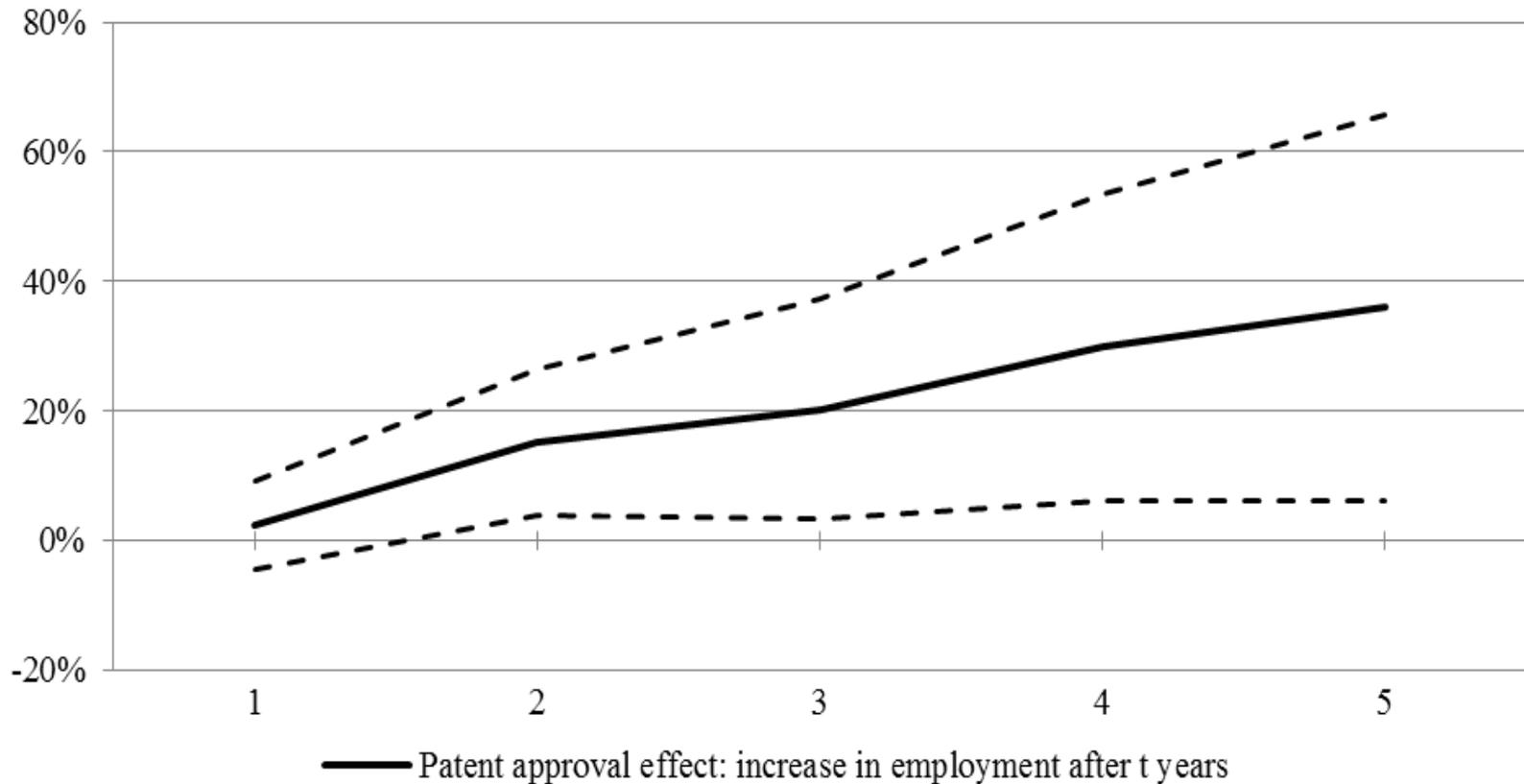
# We use unique data to estimate the effect of patents on startups

- USPTO data on 45,817 US startups that filed for their first patent application after 2001 and received a final decision by 2014
  - Population of first-time US-based applicants that claimed small-entity status
  - 66% approved, 34% rejected
- NETS (Dun & Bradstreet) data on sales, employment, financial indicators and demographics for public and private US firms
  - Coverage comparable to Census' LBD
  - 65% match rate
  - USPTO data on subsequent patent applications and grants
  - VentureXpert data on VC funding
- We use econometric techniques (IV regressions) to estimate the **causal effect** of patent grants on startups' success

# Sample statistics – At first patent application

		Firms whose first patent application is ...	
		approved	rejected
No. firms		30,121	15,698
% of firms		65.7%	34.3%
Age at first patent filing (years)	median	2	2
Employees at filing date	mean	28.7	27.7
	median	8.0	8.0
Sales at filing date (\$ million)	mean	4.4	4.3
	median	1.0	0.8
Pre-patent-filing employment growth	mean	17.1%	15.8%
Pre-patent-filing sales growth	mean	18.7%	16.7%

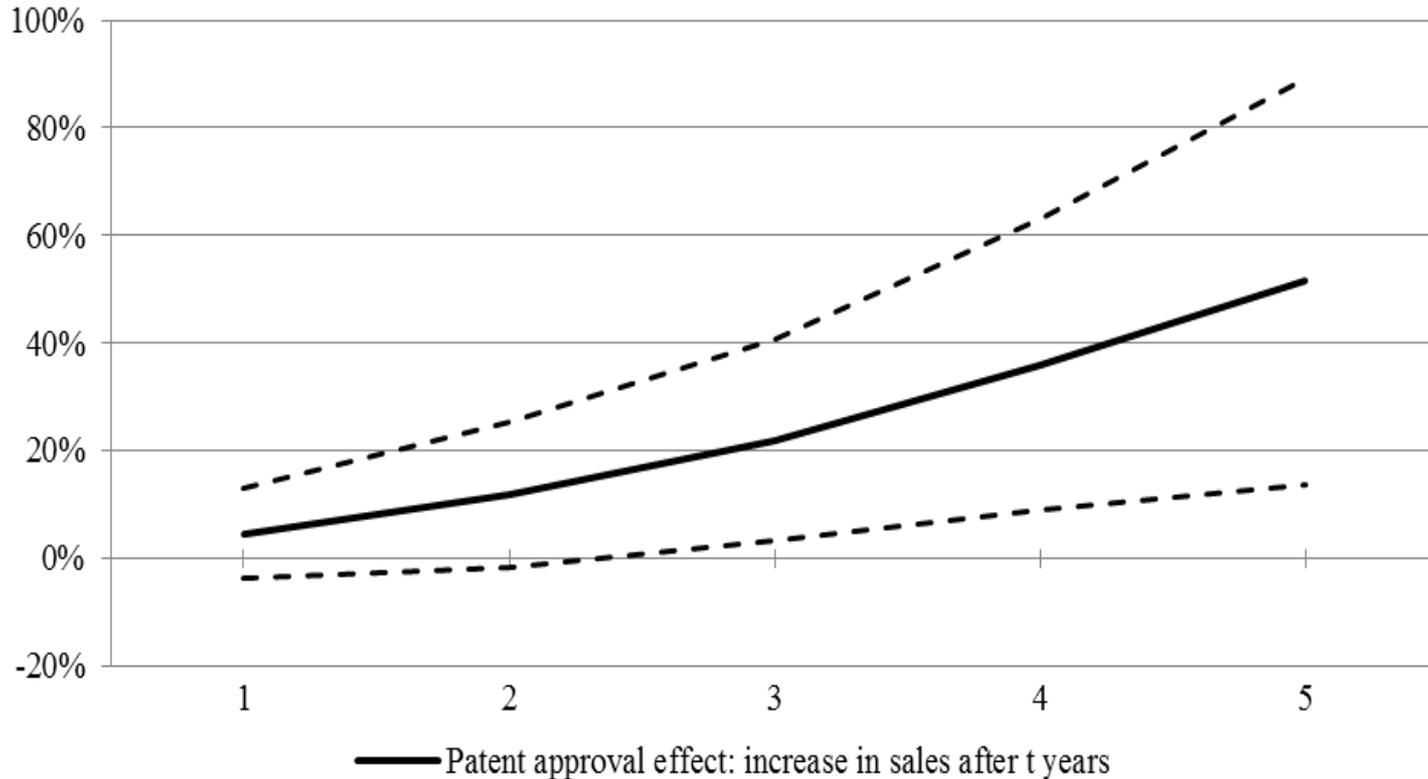
# Approval of first patent application leads to persistent employment growth



## IV Estimates

Median firm has 8 employees at first-action → Approval of its first patent application leads to 3 more employees 5 years later on average.

# Approval of first patent application leads to persistent sales growth



## IV Estimates

Median firm has \$4.3M in revenues at first-action → Approval of its first patent application leads to \$2.3M higher sales 5 years later on average.

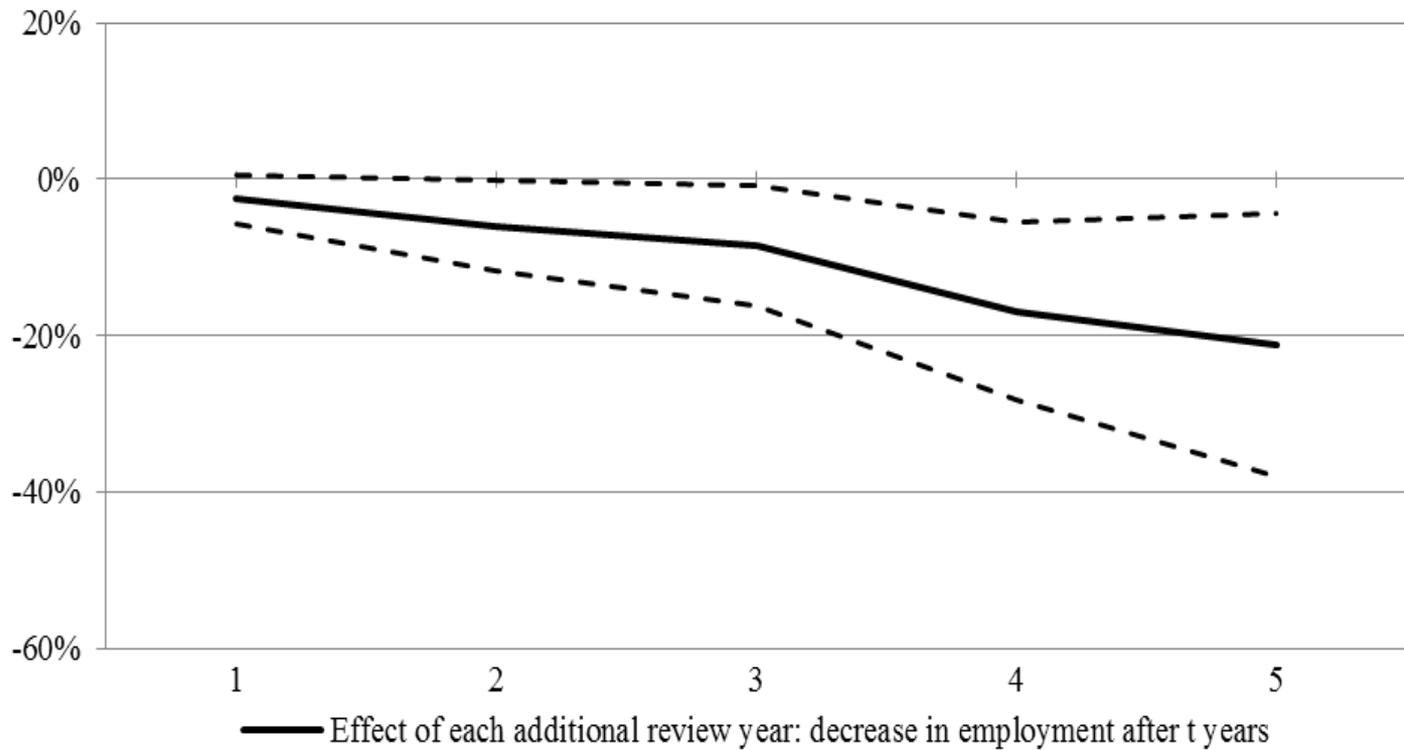
(Average estimated cost of patent application = \$20,000 according to [Lemley 2001](#))

# Approval of first patent application leads to higher rate and quality of subsequent innovation

Approval of first patent application leads to:

- 66.4% increase in no. of subsequent applications, 48.4% in no. of approved patents
- 17.6 p.p. higher approval rate of patent applications
- 68.5% increase in no. of total citations, 26.9% increase in no. of citations per patent

# Delays in patent approval have a persistent negative effect on employment growth



**IV Estimates**

# Delays in patent approval have a persistent negative effect on other measures of startup growth

- Delays in patent approval reduce sales growth
  - Sales growth decreases by 3.6%, 12.8%, 28.4% over 1 year, 3 year and 5 years for each year of delay
  
- Delays reduce the quantity and quality of subsequent innovation
  - 14% decrease in no. of subsequent applications and patents
  - 4 p.p. lower approval rate of applications
  - 8% decrease in no. of citations per patent

# Mechanism: Patents facilitate access to venture capital

- Patent approvals causally increase probability of venture capital (VC) funding by 57%
- Patents' effect on VC funding is higher in settings characterized by information frictions
  - *early* funding rounds
  - *IT* sector, where expropriation concerns are higher
  - markets where *competition* among startups is *high*
  - founders *without* prior entrepreneurial experience
- Patents trigger startup growth by facilitating access to capital

# Timely patent rights substantially benefit startups

- Patents have a long-lasting and large positive effect on startups
  - Patents set startups on a growth path by facilitating access to capital
- Patent grant delays adversely affect startup growth and success
  - Study quantifies the costs of prolonging uncertainty about patent rights
  - Patent reform should prioritize timely examination
- CAVEAT: Study does not suggest patent system is net welfare-enhancing

**Thank you!**

[dhegde@stern.nyu.edu](mailto:dhegde@stern.nyu.edu)