Innovation and the Enforceability of Noncompete Agreements

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*The views expressed in this presentation are those of the authors, and do not necessarily reflect the views of the Federal Trade Commission or any individual Commissioners.

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  - "Silicon Valley vs. Route 128:" "High" NCA enforceability limits flows of ideas across firms $\Rightarrow$ lowers innovation (Gilson 1994; Fallick et al. 2008).

  - "Hold Up Solution:" ... but it enhances firms' incentives to invest in R&D, general training $\Rightarrow$ increases innovation (Grossman and Hart 1986; Jeffers 2022)

FEDERAL TRADE COMMISSION
PROTECTING AMERICA'S CONSUMERS

FTC Proposes Rule to Ban Noncompete Clauses

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- Despite much prior research, there is little direct comprehensive evidence of how NCA enforceability affects innovation!

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   - NCA laws in one state do not simply **reallocate** innovation across state lines

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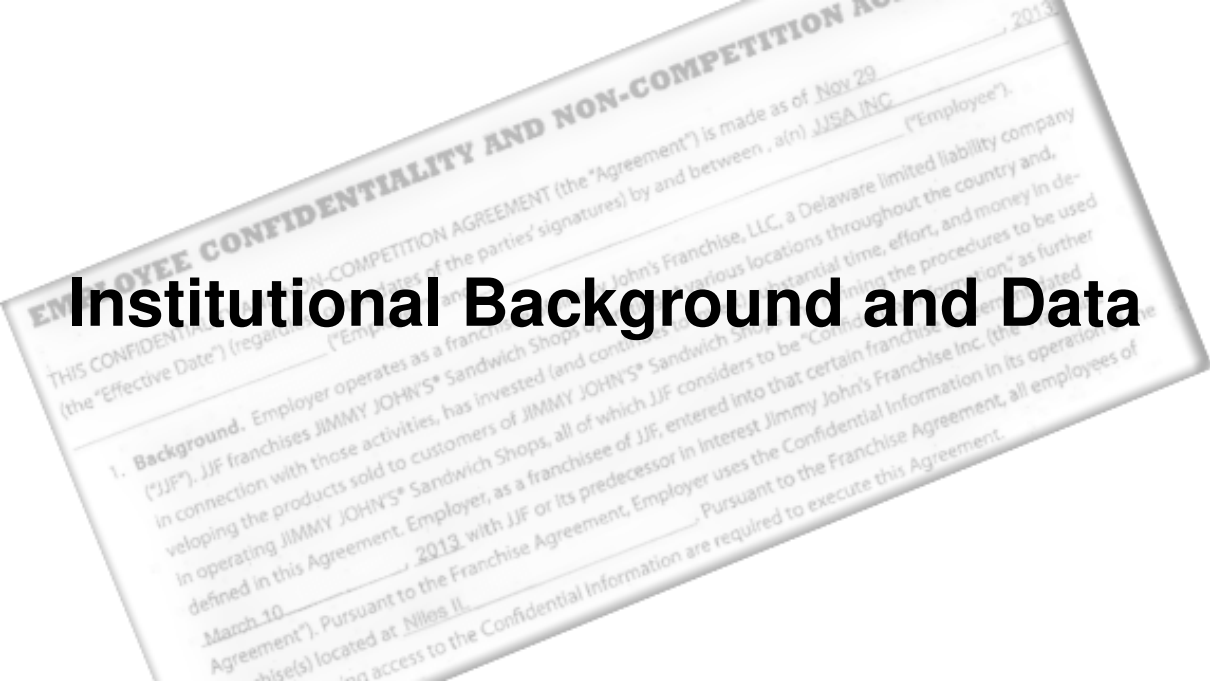
2. Do changes in state-level patenting reflect actual changes in innovation?
   - Results are not driven by useless or **strategic** patents
   - NCA laws in one state do not simply **reallocate** innovation across state lines
3. **Reconcile contrasting theoretical predictions** with additional analyses
   - Higher NCA enforceability reduces job mobility, entrepreneurship, startup patenting
   - In publicly-traded firms, enforceability increases investment, *still* leads to fewer patents



Institutional Background and Data

Quantifying NCA Enforceability

- NCA enforceability set by state employment law
- Bishara (2011) quantified states' treatment of each dimension for 1991 and 2009
  - Legal experts identified 7 dimensions of enforceability Bishara metrics

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  - Legal experts identified 7 dimensions of enforceability Bishara metrics
- Johnson, Lavetti and Lipsitz (2021) extend Bishara's scoring each year 1991–2014
  - Normalize score to be between 0 and 1
- 73 NCA law changes during our sample period
  - 91% through precedent-setting court decisions; remaining through statutory changes
  - Mean law change shifts NCA score by ~ 0.08 (out of 1)
  - Within-state standard deviation $=$ 17% of overall standard deviation

Measuring Innovation Outcomes With Patent Data

- **Source: US Patent and Trademark Office (USPTO)**
  - Universe of pre-granted (applications) and granted U.S. patents 1976–present.
  - We assign patents to states based on inventor(s)' residential addresses
  - Each patent assigned to a technology class (Cooperative Patent Classification (CPC))

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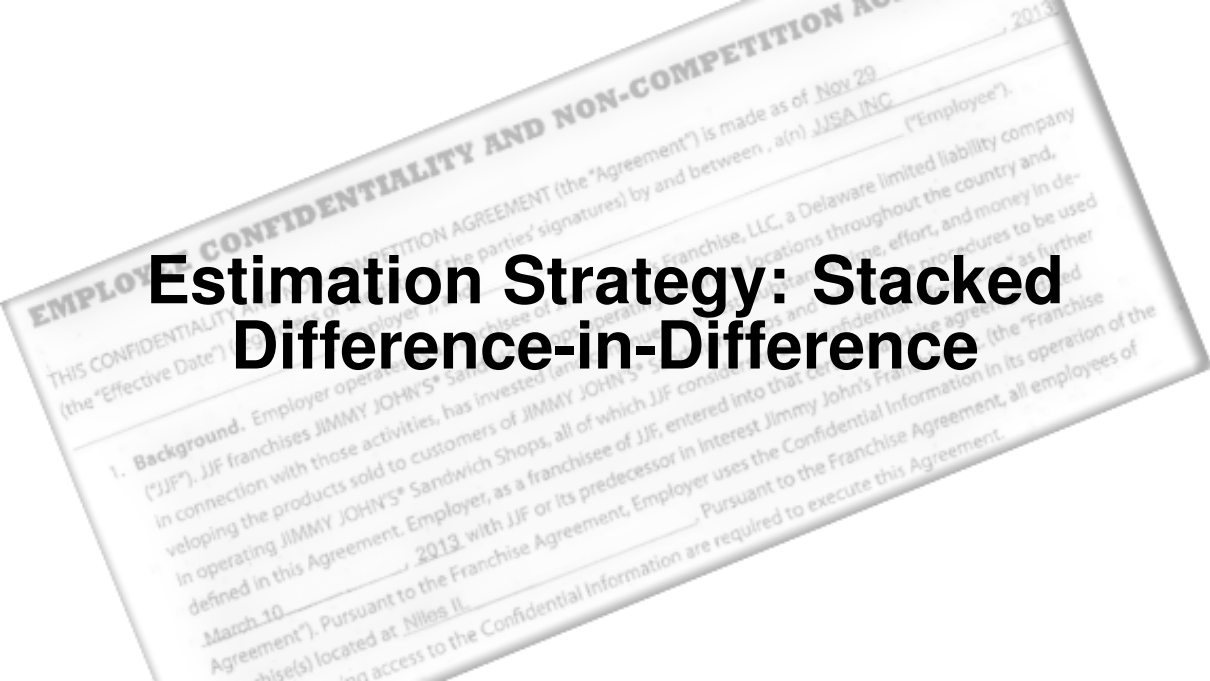
  - We assign patents to states based on inventor(s)' residential addresses
  - Each patent assigned to a technology class (Cooperative Patent Classification (CPC))
- Primary measure: **patent count weighted by forward citations**
  - Forward citations reflects a patent's quality/significance (Hall, Jaffe and Trajtenberg 2011)
  - We re-weight citations by removing all year, field effects
  - Also consider (raw) patent counts as alternative measure



Estimation Strategy: Stacked Difference-in-Difference

Estimating the Effects of NCA Enforceability

- NCA law changes . . .
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  - . . . are continuous (not binary)
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  - . . . Make diff-in-diff hard.
- We use a "stacked design" (e.g. Cengiz et al., 2019) around a state's **first** NCA law change (De Chaisemartin and D'Haultfoeuille 2022)
  - Construct sub-experiments ("blocks") with "clean" treatments and controls"
  - "Clean" controls: 11 states that never experience an NCA law change
  - "Clean" treatments: state's first law change not followed by countervailing change

Map Score Distribution

Stacked DiD - Regression Specification

$$\underbrace{Y_{stb}}_{\text{e.g. Patent counts}} = \alpha + \beta * \textit{Enforceability}_{stb} + \rho_{sb} + \delta_{tb} + \varepsilon_{stb},$$

- Y_{stb}: Outcome of interest of in state s in year t in sub-experiment block b
- ρ_{sb}: State $\times$ Block fixed effect
- δ_{tb}: Year $\times$ Block fixed effect
- Cluster standard errors by sub-experiment block $\times$ state (Cengiz et al., 2019)
- Use Poisson regression for count dependent variables (Cohn, Liu, and Wardlaw 2022)
- In some specifications: refine unit of analysis to state s, **CPC** c, t, b

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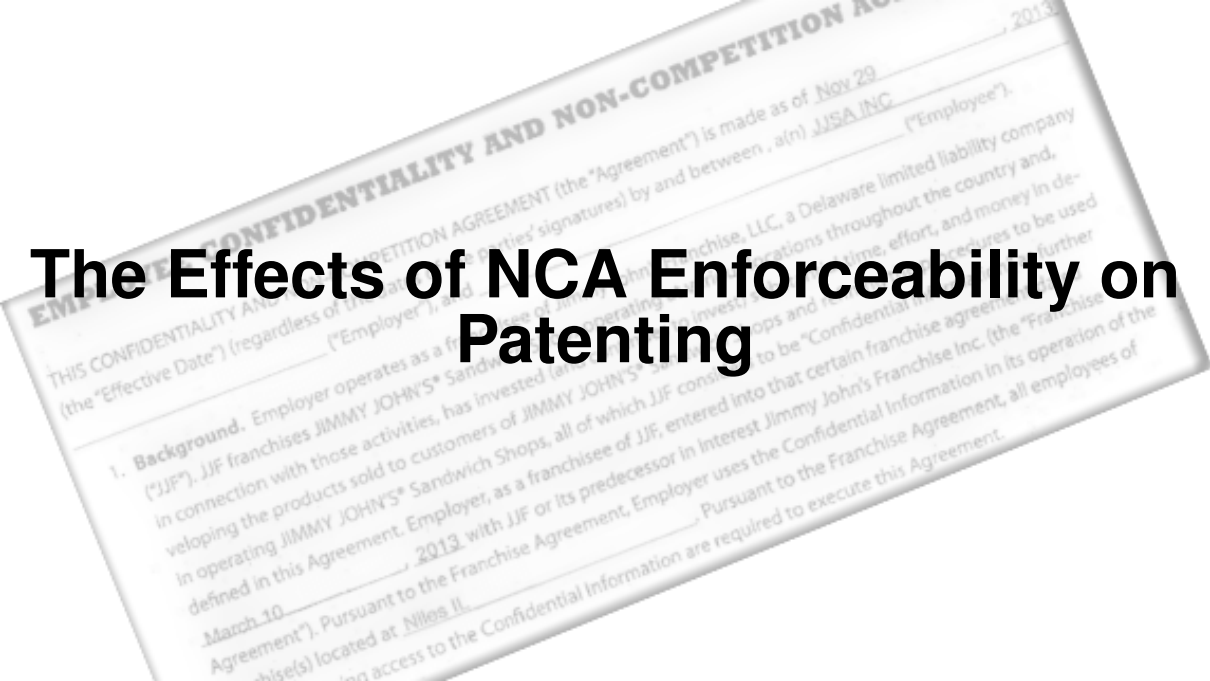
Final issue: patent count trends are 1) prone to outliers, 2) distributed unevenly across states

- Main estimates remove CA and WA from sample (no valid comparison group)



The Effects of NCA Enforceability on Patenting

Event Study Estimates: NCA Enforceability and State-level Patenting

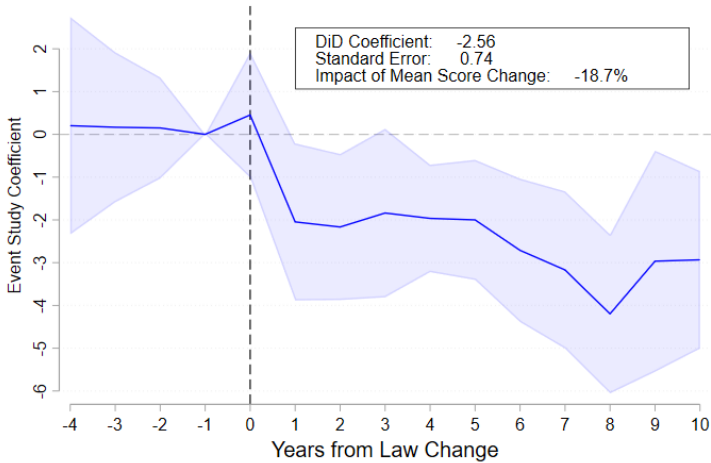


Figure: Normalized Forward-Citation-Weighted Patent Counts - State CPC Year

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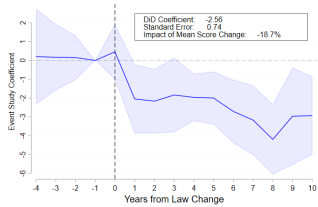
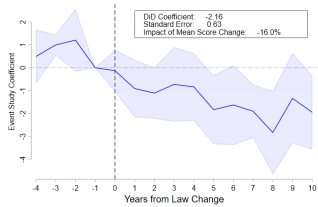
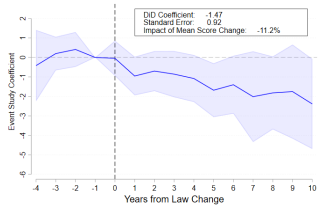


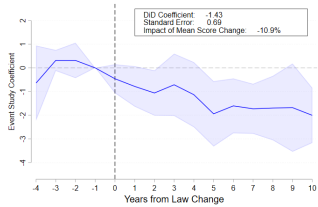
(a) Citation-Weighted Patents - State CPC Year



(b) Citation-Weighted Patent - State Year



(c) Raw Patent Count - State CPC Year



(d) Raw Patent Count - State Year

Interpretation of Stacked DiD Results

- An average–sized increase of NCA enforceability score in our sample (0.081) . . .
  - $\rightarrow$ **reduces** state-level citation-weighted patenting (within technology classes) by **18%**
  - $\rightarrow$ **reduces** state-level unweighted patenting (within technology classes) by **11%**

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- As comparison, this effect size is roughly the same as . . .
  - Moving an inventor from a tech cluster at the median size to one at the 75th percentile (Moretti 2021)
  - A 10% decrease in the tax price of R&D (Bloom, Van Reenan, and Williams 2019)
  - A one SD increase in a firm's exposure to Chinese imports (Autor et al. 2020)

Robustness Checks

Does a Reduction in State-level Patenting Reflect a True Loss in Innovation?

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Maybe not if the “averted” patents due to NCA enforceability. . .

1. . . . were useless or strategic patents
2. . . . were for ideas eventually discovered in other states (“reallocation”)

Ensuring a Change in State-level Patents Reflects a Change in State-level Innovation

- Many patents generate little to no private or social value (Hall et al., 2005)
  - Use patents in the **top 1%, 5% and 10% of citations** in their "cohort"
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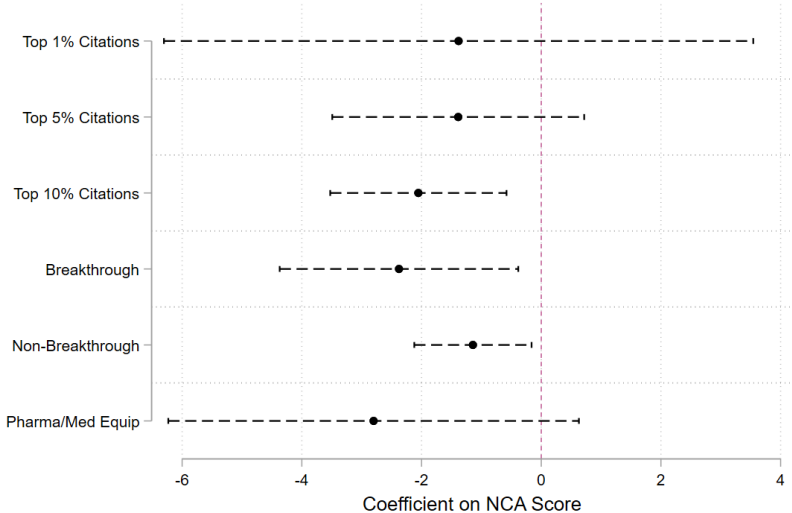
  - Focus on **drug and medical device** sectors: nearly every discovery is patented due to risk of reverse engineering (Cohen et al., 2000)

Effect of NCA Enforceability on Measures of “True” Innovation



Table

Does NCA Enforceability Reduce or Reallocate Innovation?

- Higher NCA enforceability in one state could just change **where** ideas are discovered
  - Anecdotes: Entrepreneurs leaving Route 128 for Silicon Valley
  - Inventors moving across states to “escape” noncompetes (Marx, Singh and Fleming 2015)
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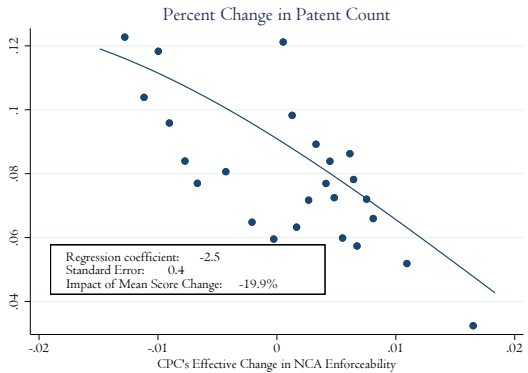
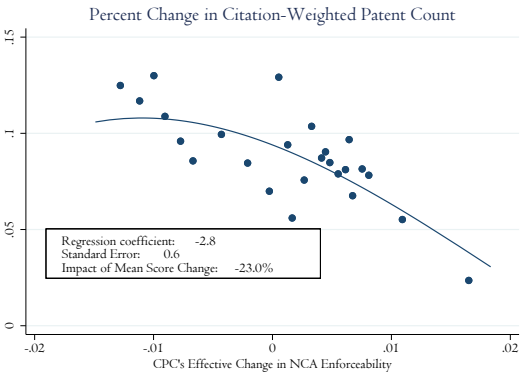
- Our test: do **technology classes** more “exposed” to higher NCA enforceability experience lower patenting?

CPCs More Exposed to NCA Enforceability Experience Lower Patenting



(a) Unweighted Patent Count



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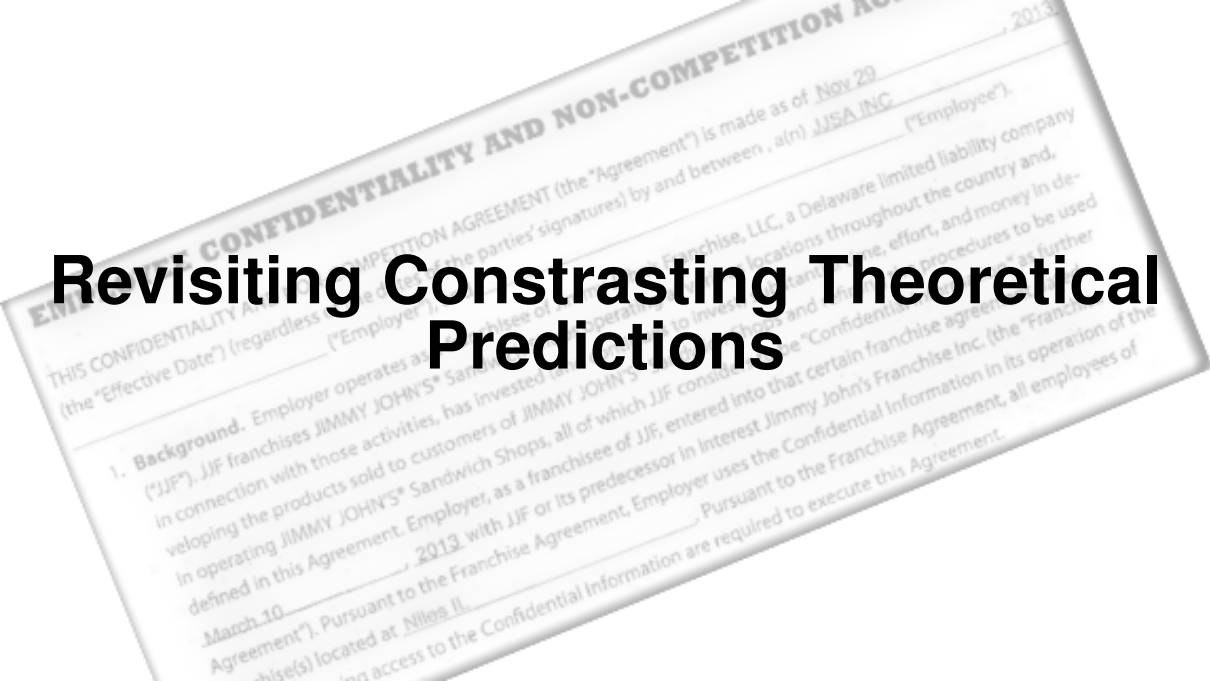

Revisiting Constrasting Theoretical Predictions

Reconciling our Estimates with Contrasting Theoretical Predictions

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- "Hold up solution" argument: enforceable NCAs *increase* innovation by ...
  - Incentivizing firm investment (especially R&D and "intangible") (Grossman and Hart 1984; Rubin and Shedd 1981)
- Our estimates suggest **"Route 128 versus Silicon Valley" dominates**, but ...
  - Do we find intermediate effects consistent with this argument?
  - Is the "holdup" argument nonexistent? Or just swamped by other effects?

Testing Effects on Job Mobility and Entrepreneurship

- Measure **job mobility** at state-quarter-industry using two Census Bureau datasets:
  - J2J: number (and rate) of job-to-job flows
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- For all outcomes: focus sample on **innovative industries** (as defined by NSF)

Higher NCA Enforceability Reduces Job Mobility. . .

	(1) J2J Changes (Rate)	(2) J2J Changes (Count)	(3) Employment (Count)	(4) Separation (Rate)
NCA Score	-.0215*	-.36***	-.236	-.0715***
	(.0124)	(.134)	(.184)	(.0168)
Mean Dep Var	0.062	234.0	4970.2	0.235
N	1.68e+05	1.68e+05	1.68e+05	1.67e+05
Specification	OLS	Poisson	Poisson	OLS

Higher NCA Enforceability Reduces Job Mobility... And Entrepreneurship

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	(5) Establishment Entry Rate	(6) Job Creation Rate	(7) Startups' Citation-Weighted Patents	(8) Non-Startups' Citation-Weighted Patents
NCA Score	-.49*	-.565**	-2.54***	-1.25
	(.256)	(.218)	(.923)	(1.11)
Mean Dep Var	1.3	0.6	65.0	328.7
N	2700	2700	2700	2700
Specification	OLS	OLS	Poisson	Poisson

Testing Effects on Investment and the “Hold Up Problem”

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- For publicly-traded firms, we can observe:
  - Investment (both intangible and physical), scaled by assets (Compustat)
  - Patenting (DISCERN database)

Higher NCA Enforceability Increases Investment in Publicly-traded firms. . .

	(1) Intangible Investment	(2) Capital Investment	(3) Patent Count	(4) Citation-Weighted Patents	(5) Value-Weighted Patents
NCA Score	.190**	-.0227			
	(.088)	(.052)			
Mean Dep Var	0.190	0.060			
Effect of Mean Change	8.1%	-3.1%			
N	45,747	41,337			

Standard errors in parentheses

Standard error clustered at state level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Higher NCA Enforceability Increases Investment in Publicly-traded firms. . . But **Still** Lowers Patenting

	(1) Intangible Investment	(2) Capital Investment	(3) Patent Count	(4) Citation-Weighted Patents	(5) Value-Weighted Patents
NCA Score	.190**	-.0227	-4.13***	-4.88**	-4.15**
	(.088)	(.052)	(1.03)	(2.22)	(2.08)
Mean Dep Var	0.190	0.060	20.3	18.4	314.6
Effect of Mean Change	8.1%	-3.1%	-28.4%	-32.6%	-28.6%
N	45,747	41,337	53,987	52,798	49,637

Standard errors in parentheses

Standard error clustered at state level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conclusion

- Making NCAs more easily enforceable leads to a large, persistent drop in patenting that very likely reflects a true loss to innovation.

- Enforceable NCAs may increase firm investment in intangibles, but externalities of reduced labor market dynamism dominate.

- Our results suggest that declining labor market fluidity (Davis and Haltiwanger 2014) could partially explain declining inventor productivity (Bloom et al. 2020) in recent decades.

Thank you!

Seven Dimensions of NCA Enforceability (Bishara 2011)

Question Number	Question
Q1	Is there a state statute that governs the enforceability of covenants not to compete?
Q2	What is an employer's protectable interest and how is that defined?
Q3	What must the plaintiff be able to show to prove the existence of an enforceable covenant not to compete?
Q3a	Does the signing of a covenant not to compete at the inception of the employment relationship provide sufficient consideration to support the covenant?
Q3b/c	b) Will a change in the terms and conditions of employment provide sufficient consideration to support a covenant not to compete entered into after the employment relationship has begun? / c) Will continued employment provide sufficient consideration to support a covenant not to compete entered into after the employment relationship has begun?
Q4	If the restrictions in the covenant not to compete are unenforceable because they are overbroad, are the courts permitted to modify the covenant to make the restrictions more narrow and to make the covenant enforceable? If so, under what circumstances will the courts allow reduction and what form of reduction will the courts permit?
Q8	If the employer terminates the employment relationship, is the covenant enforceable?

Back to main

Do Economic and Political Factors Drive Changes in NCA Enforceability?

Dependent Variable:	NCA Enforceability	
Population (100,000s)	–0.00	(0.00)
Number of Workers Compensation Beneficiaries	–0.00	(0.00)
Democratic Party Governor	–0.00	(0.00)
% of State House from Democratic Party	0.02	(0.05)
% of State Senate from Democratic Party	0.02	(0.03)
State Minimum Wage	–0.01	(0.01)
Number of Medicaid Beneficiaries (100,000s)	0.00	(0.00)
Social Policy Liberalism Score	–0.00	(0.01)
Economic Policy Liberalism Score	–0.02	(0.01)
Social Mass Liberalism Score	–0.01	(0.01)
Economic Mass Liberalism Score	0.03	(0.03)
Democratic Party ID Count	0.04	(0.25)
State House Ideology Score	–0.00	(0.01)
State Senate Ideology Score	0.00	(0.00)
House Democrats Ideology Score	–0.03	(0.03)
House Republicans Ideology Score	0.06	(0.04)
Senate Democrats Ideology Score	–0.03*	(0.02)
Senate Republicans Ideology Score	–0.00	(0.01)
Union Membership	–0.00	(0.00)
N	837	
R^2	0.109	
F-Test p-Value	0.106	

Robust standard errors (in parentheses) clustered by state.

Model includes state and year FE; R^2 calculated after residualizing on state and year FE.

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

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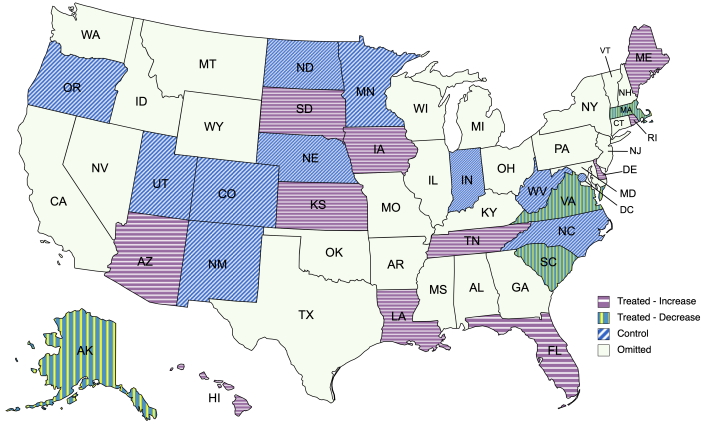
States in Sample for Stacked Design



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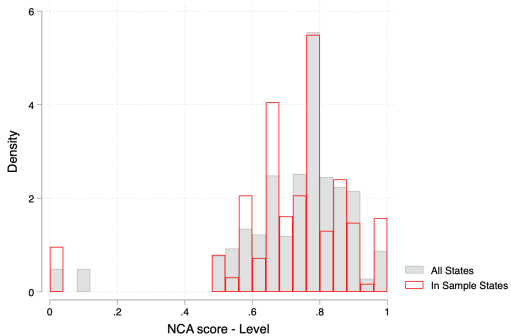
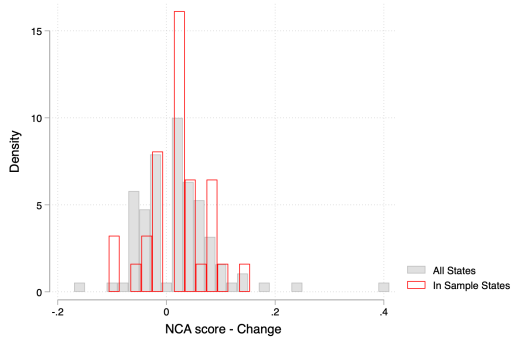
Distribution of NCA Score (Levels and Changes)



(a) NCA score (levels)



(b) NCA Score (changes)

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Robustness Checks on State-Level Estimates

	(1) Baseline	(2) Full Sample	(3) 1991 Weights	(4) Binary Changes	(5) Positive Changes Only
NCA Score	-2.56***	-4.82***	-2.89***		-4.25***
	(.736)	(.944)	(.726)		(.676)
Binary Score				-.104**	
				(.0406)	
Mean DV	10.14	11.49	14.13	10.14	10.02
N	2.47e+05	2.81e+05	1.72e+05	2.47e+05	2.41e+05
	(6) Negative Changes Only	(7) OLS with log(CWP)	(8) Interact Region in FE	(9) TWFE Baseline	(10) TWFE Full Sample
NCA Score	-1.37	-1.45***	-3.18***	-2.00***	-3.50*
	(.95)	(.322)	(.893)	(.276)	(2.01)
Mean DV	10.41	1.19	10.62	13.41	24.44
N	2.32e+05	2.49e+05	2.28e+05	19,787	78,401

Standard errors in parentheses

Standard error clustered at state $\times$ subexperiment level

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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NCA Enforceability and Various Measures of "True" Innovation

	(1) Top 1%	(2) Top 5%	(3) Top 10%
NCA Score	-1.38	-1.39	-2.05***
	(2.51)	(1.07)	(.752)
Mean of DV	9.9	51.6	105.8
N	2700	2700	2700
	(4) Breakthrough	(5) Non-Breakthrough	(6) Pharma/Med Equip
NCA Score	-3.15**	-1.66***	-2.80
	(1.43)	(.448)	(1.75)
Mean of DV	150.2	730.5	64.1
N	1164	1164	5250

Standard error clustered at state $\times$ subexperiment level in parentheses.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

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