

The Cost of Regulatory Compliance in the United States

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Motivation

- Regulation is frequently regarded as a driver for the declining business dynamism in the U.S. (e.g., Gutiérrez and Philippon (2017, 2019))
- **Unanswered Question:** How does regulatory burden fall on small and large firms?

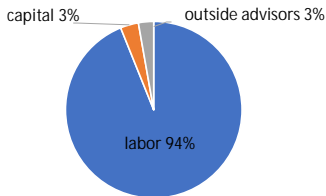
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- **Unanswered Question:** How does regulatory burden fall on small and large firms?
- **Key Challenge:** Regulation is so capillary & heterogeneous and incredibly hard to quantify
 - *“The measurement problems present such a large barrier that one could flatly assert the total amount of regulation to be unmeasurable by direct observation”*—Goff (1996)
 - OIRA (2020) reports that only 9.1 percent of all “significant” regulations in 2019 had clearly quantified costs and benefits
- **Moreover:** How regulations are enforced also affects the de facto regulatory burden for firms

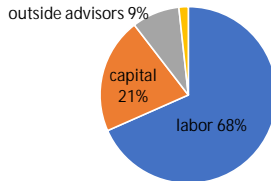
Towards a Measurement of Firms' Regulatory Compliance Costs

- Direct costs of regulatory compliance come in **three main forms**:
 - 1 Compliance costs in **labor**
 - 2 Compliance costs in **capital**
 - 3 Compliance costs via **outside advisors**

Securities Industry Association (2006)



National Association of Manufacturers (2014)



- We focus on (1) labor costs and some (2) capital costs, accounting for over 90%
- We will not discuss indirect costs from distorted investments & misallocations

This Paper in a Nutshell

- 1 A new measure of firms' regulatory compliance costs
 - **RegIndex**: Share of a firm's labor spending to comply with government regulation
 - Regulatory compliance accounts for 1.34%-3.33% of total wage bill for a firm
 - Totalling up to \$239 billion in 2014 (as compared to \$353 U.S. gross business income tax)
- 2 An **inverted-U shape** between regulatory compliance costs and firm size
 - Firms with 500 employees have RegIndex 47% higher than smallest and 18% higher than largest
 - Large firms employ more compliance specialists, supporting the fixed-cost view
- 3 A shift-share IV methodology to decomposing RegIndex
 - The inverted-U shape is driven by **regulatory requirements** rather than heterogeneous enforcement
 - Consistent with regulatory exemptions for small firms and also regulatory capture by large firms

Part I: Measuring Firms' Regulatory Compliance Costs

OEWS Microdata from BLS \Rightarrow Each establishment's occupational cost

- survey of 1.2 million establishments stratified to represent the U.S. economy (2002-2014)
- covering each establishment's detailed **occupational** employment and wage rate

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O*NET (V23.0) Database ⇒ Each occupation's tasks and their weights

- over 800 detailed occupation categories, each occupation has on average 22 tasks
- Example: tasks for "Construction Managers"
 - ▷ *Direct and supervise construction or related workers.*
 - ▷ *Direct acquisition of land for construction projects.*
 - ▷ *Inspect or review projects to monitor compliance with environmental **regulations**.*
 - ▷ *Apply for and obtain all necessary **permits or licenses**.*
 - ▷ ...

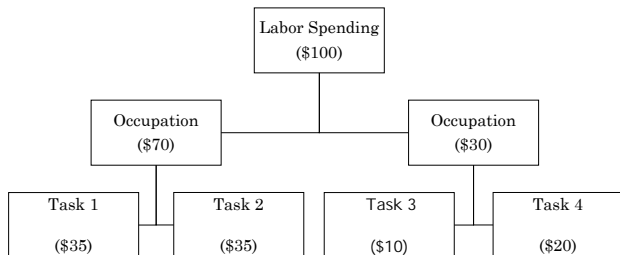
Measuring Establishments' Regulatory Compliance Costs

Bottom-up approach with 3 steps:

1

2

3



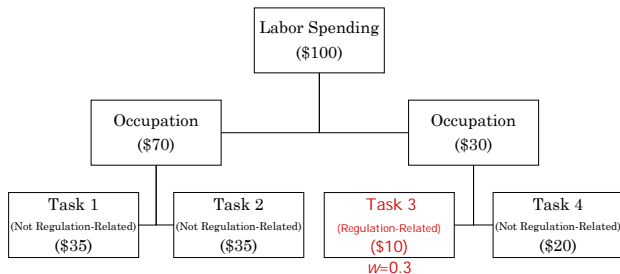
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1 Measuring each task's "regulation-relatedness" ▶ keywords+human annotation

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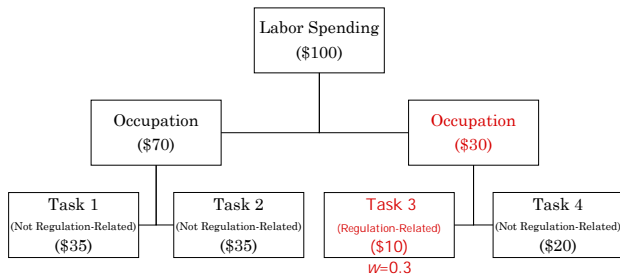
3



Measuring Establishments' Regulatory Compliance Costs

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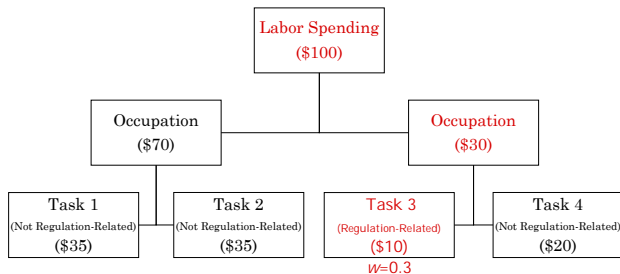
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- 3



Measuring Establishments' Regulatory Compliance Costs

Bottom-up approach with 3 steps:

- 1 Measuring each task's "regulation-relatedness" ▶ keywords+human annotation
- 2 Aggregating to occupation's regulation-task intensity (RTI)
- 3 Aggregating to establishment RegIndex



Firms and Establishments' Regulation Index

Establishment-level RegIndex is the percentage of an establishment's total labor spending on performing regulation-related tasks:

$$RegIndex_{i,t} = \frac{\sum_j RTI_j \times emp_{i,j,t} \times wage_{i,j,t}}{\sum_j emp_{i,j,t} \times wage_{i,j,t}}.$$

e.g., $RegIndex = (0.3 \times \$10) / \$100 = 3\%$ in the illustrated example

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Firm-level RegIndex is aggregated from the RegIndex of its establishments

- defining appropriate regulatory compliance entity is nontrivial
- we show all results at both firm and establishment levels for robustness

Three Validation Tests of RegIndex

Test 1: Can RegIndex pick up major industry-specific regulatory changes?

- Case 1: Deregulation and Re-regulation for Oil & Gas Industry
- Case 2: "FDA Guidance" for Pharmaceutical
- Case 3: "CARD Act" for Credit Card Issuers
- Case 4: "Affordable Care Act" for Hospitals

Test 2: Can RegIndex pick up time-series variation in agency-estimated compliance burden?

- Yes, in terms of correlation and level

Test 3: Can RegIndex pick up republican vs. democratic parties' regulatory stringency on states?

- Establishments from republican-leaning states have lower RegIndex after controlling for industry

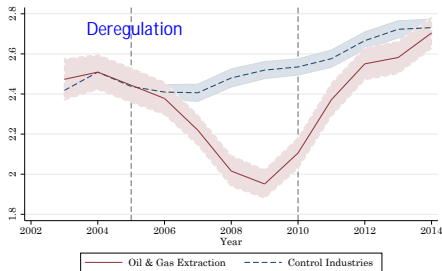
Case 1: Deregulation and Re-regulation for Oil & Gas

- **Deregulation:** Energy Policy Act of 2005 under Bush administration
- Re-regulation: Executive Order by Obama following BP Oil Spill in May 2010
- Treated: Oil & Gas Extraction (2221)
- Control: Input-Output-Related Industries (2212, 3241, 3251)

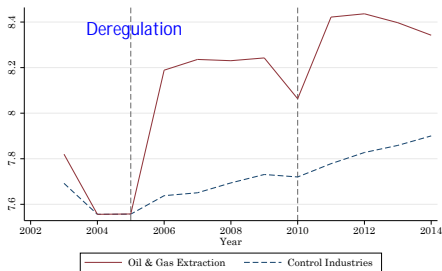
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Our RegIndex



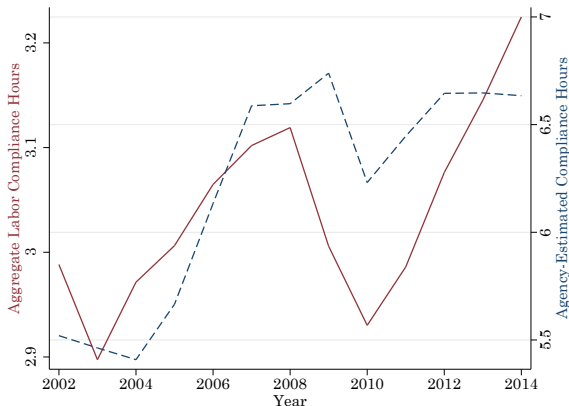
Text-based RegData



Takeaway: Our RegIndex can distinguish “Deregulation” from regulation

Validation 2: Relations with Agency-Estimated Hours

- Regulatory agencies report to White House their **estimated** compliance hours
- We compute the counter-party based on establishments' **de facto** compliance hours



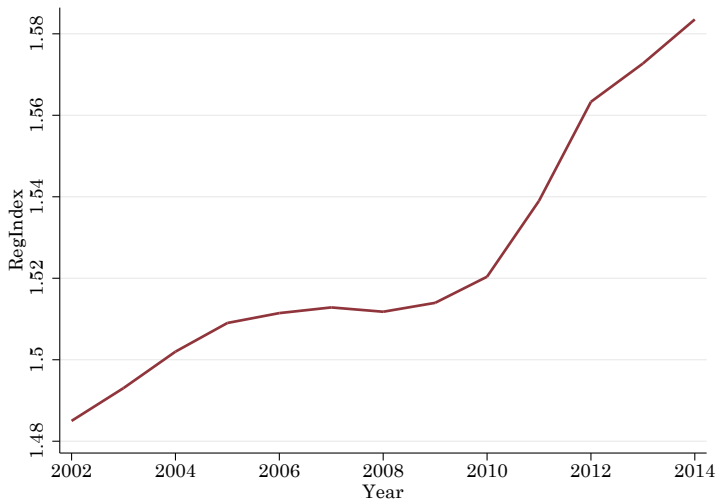
Takeaway: Our RegIndex matches the dynamics of agency-estimated compliance hours (and also the level depending on versions)

Summary Statistics

Our sample for establishment/firm analyses excludes industries where legal or compliance work is their primary function or source of revenue, including legal services, accounting services, central banks, and public administration.

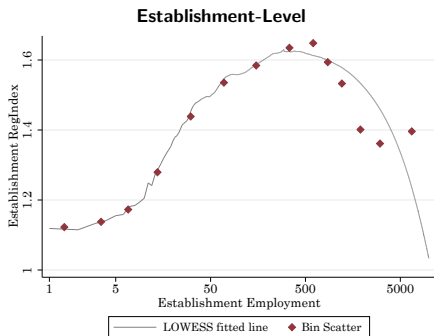
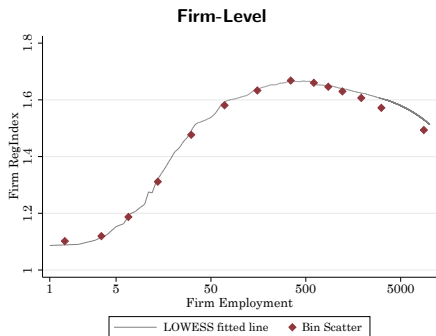
Variable	Mean	SD	P0.5	Median	P99.5	Obs.
Panel A: Firms						
Employment	92.16	617.16	1.00	13.00	2,465.00	3,027,680
Annual Wage (\$ million)	4.07	31.30	0.02	0.46	115.48	3,027,680
RegIndex	1.34	1.88	0	0.86	10.46	3,027,680
Panel B: Establishments						
Employment	47.79	192.45	1.00	13.00	875.00	3,364,336
Annual Wage (\$ million)	2.09	11.73	0.02	0.44	43.31	3,364,336
RegIndex	1.31	1.90	0	0.80	10.57	3,364,336
Panel C: Industry						
Employment (1,000)	90.66	285.44	0.01	25.13	2,041.20	15,159
Annual Wage (\$ million)	3,611.91	11,112.21	0.12	1,001.32	67,466.05	15,159
RegIndex	1.66	1.02	0	1.60	5.58	15,159

Aggregate Series of Regulation Index



Part II: Regulatory Compliance Costs and Firm Size

Regulatory Compliance Costs and Size — An Inverted-U

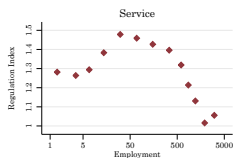
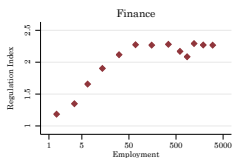
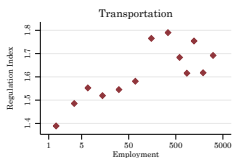
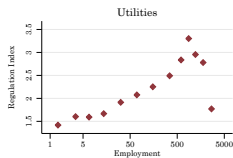
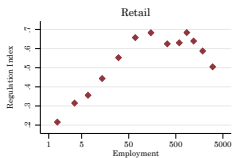
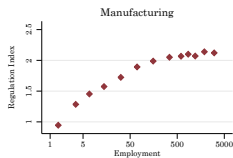
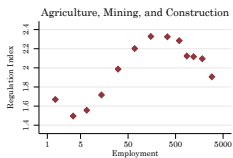
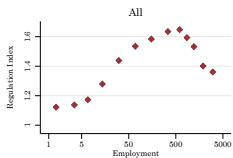


▶ Quadratic regressions with various fixed effects including **NAICS6**, **state**, **firm**, **year**.

Takeaway: RegIndex for mid-size firms is about 47 percent greater than that of the smallest firms and 18 percent greater than that of the largest firms.

RegIndex and Size By Sector

Inverted-U relationship is observed in many sectors but with exceptions



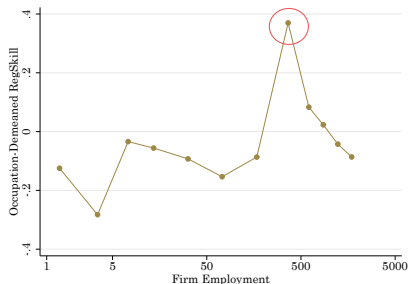
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 - Our RegIndex measure assumes an occupation's tasks is invariant by firm size
 - We extract regulatory requirements from 14 million job posting textual data (Burning Glass)
 - We inspect small and large firms' regulatory requirement **within-occupation** at firm-occ-year level

$$\text{Occ-Demeaned RegSkill}_{i,k,t} = \text{RegSkill}_{i,k,t} - \text{Occ-Year Average}_{k,t}$$



Takeaway: Accounting for within-occupation heterogeneity **only reinforces** the inverted-U shape between regulatory compliance costs and firm size

Robustness 2: Compliance Beyond Labor Spending—Capital Cost

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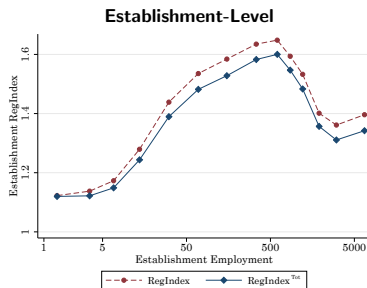
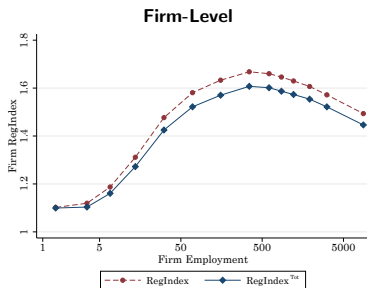
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 - We extract **equipment expenditure** for each occupation following Caunedo et al. (2023 AER)
 - We construct an alternative $\text{RegIndex}^{\text{Tot}}$ using both labor cost and capital cost:

$$\text{RegIndex}_{i,t}^{\text{Tot}} = \frac{\sum_j RTI_j \times \text{emp}_{i,j,t} \times (\text{wage}_{i,j,t} + \text{kcost}_{j,t})}{\sum_j \text{emp}_{i,j,t} \times (\text{wage}_{i,j,t} + \text{kcost}_{j,t})}.$$

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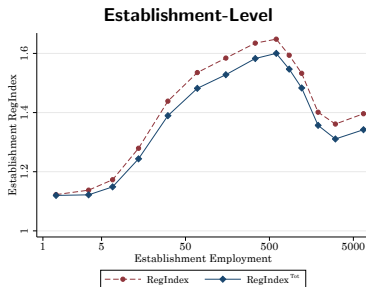
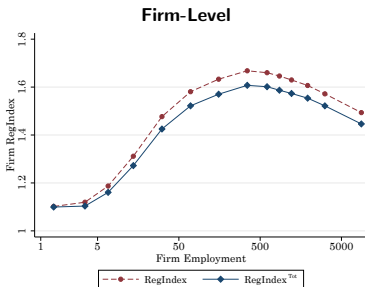
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- **Spending on outside advisors:** We have limited data on this but the [National Association of Manufacturers \(2014\)](#) shows that small (<50 emp) firms are 30% less likely to employ outside advisors than large (100+ emp) firms

Robustness 3: Heterogeneous Specialization in Regulatory Compliance

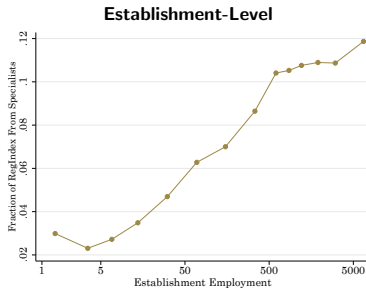
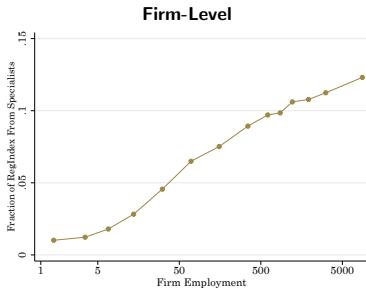
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 - We inspect the **fraction** of total regulatory compliance costs paid to specialists:

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Takeaway:

- Specialization supports the **fixed cost view** for large firms to have low RegIndex
- What explains smaller firms having lower RegIndex?
- We examine the regulatory environment small and large firms face

Part III: Regulatory Requirements vs. Enforcement

Requirement-Sensitive Tasks vs. Enforcement-Sensitive Tasks

RegIndex is composed of a cluster of regulation-related tasks

- Some tasks focus on learning new regulations — “Requirement-sensitive tasks”
 - e.g., “learn about and analyze the potential impacts of proposed environmental policy regulations”

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Our procedure: estimate each task o 's sensitivity to requirement shocks and enforcement shocks

$$\underbrace{\Delta \log RegIndex_{iot}}_{\text{firm's chg in task } o} = \alpha_o + \beta_o \underbrace{IV(\Delta \log Req_{i,t})}_{\text{instrumented req shock}} + \gamma_o \underbrace{IV(\Delta \log Enf_{i,t})}_{\text{instrumented enf shock}} + \delta_o X_{i,t} + \epsilon_{i,o,t}$$

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Assignment rule:

- task o 's *requirement-sensitive* if $\beta_o > \gamma_o$ is significant
- task o 's *enforcement-sensitive* if $\gamma_o > \beta_o$ is significant
- task o 's *mixed (50/50)* to both shocks if β_o and γ_o are not significantly different

Shift-Share Instruments for Requirement vs. Enforcement Shocks

Our procedure requires two shocks to estimate a task o 's sensitives:

$$\Delta \log \text{RegIndex}_{iot} = \alpha_o + \beta_o \underbrace{IV(\Delta \log \text{Req}_{i,t})}_{\text{requirement shock}} + \gamma_o \underbrace{IV(\Delta \log \text{Enf}_{i,t})}_{\text{enforcement shock}} + \delta_o X_{i,t} + \epsilon_{i,o,t}$$

We construct two shift-share IVs based on industries' exposure to 12 major agencies' shocks:

$$IV(\Delta \log \text{Reg}_{j,t}) = \sum_{k=(1,..12)} r_{jkt} \times \Delta \log \text{reg}_{kt}$$

$$IV(\Delta \log \text{Enf}_{j,t}) = \sum_{k=(1,..12)} r_{jkt} \times \Delta \log \text{enf}_{kt}$$

r_{jkt} : firm's NAICS6 industry's exposure to a regulatory agency

- we use a Google Bert model to compute the similarity of each NAICS6 industry's task text and each agency's text in the Code of Federal Regulations chapters

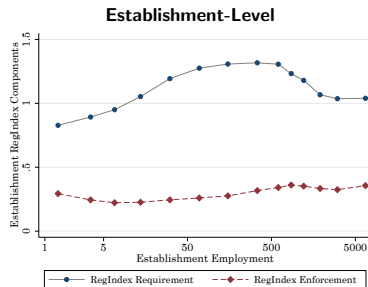
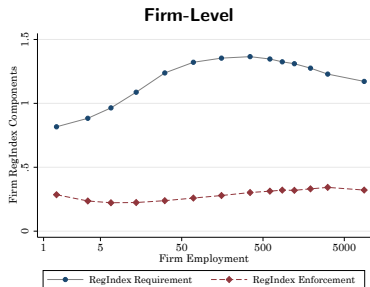
$\Delta \log \text{reg}_{kt}$: shocks to an agency's regulatory requirements

- From white house OIRA annual report: major regulatory agency's reported changes in estimated compliance hours due to enactment and retirement of regulations

$\Delta \log \text{enf}_{kt}$: shocks to an agency's enforcement effort

- From FOIA request to U.S. Office of Personnel Management: individual-level data allowing us to measure major regulatory agencies' enforcement employees change

Results of Decomposition of RegIndex



Takeaway:

- Regulatory requirements drive the inverted-U relationship, supporting regulatory tiering
- Heterogeneous enforcement does not seem to play a major role

Conclusion

- We propose a new approach for measuring firms' regulatory compliance costs — RegIndex
- Our approach is validated & delivers sensible quantitative estimates
 - regulatory compliance costs accounts for 1.34%-3.33% of total wage bill for an average U.S. firm
- Regulatory compliance costs exhibits an inverted-U relationship with firm size
 - Firms around 500 employees carry a substantially heavier relative burden than small or large firms
 - Important implications for firm growth, e.g., the missing middle in firm-size distribution
- Because we are dealing with de facto measures of compliance, we can decompose RegIndex
 - A shift-share IV method suggests that regulatory requirements drive our findings
- Future work: impact of regulatory costs on corporate policies and productivity

RegIndex and Size — An Inverted-U Shape

Robustness of the inverted-U shape to more controls [▶ Back](#)

Panel A: Firm-Level					
	(1)	(2)	(3)	(4)	(5)
Emp	2.897*** (0.065)	2.920*** (0.065)	2.008*** (0.076)	1.935*** (0.068)	0.544*** (0.074)
Emp ²	-2.902*** (0.068)	-2.927*** (0.068)	-1.963*** (0.073)	-1.909*** (0.064)	-0.542*** (0.069)
<i>max</i>	1.961*** (0.028)	1.965*** (0.015)	1.782*** (0.018)	1.755*** (0.016)	1.517*** (0.018)
<i>argmax</i>	0.499*** (0.003)	0.499*** (0.003)	0.511*** (0.003)	0.507*** (0.003)	0.501*** (0.018)
Year FE	-	Yes	-	-	Yes
Year-Ind FE	-	-	Yes	-	-
Year-Ind-State FE	-	-	-	Yes	-
Firm FE	-	-	-	-	Yes
Observations	3,027,680	3,027,680	3,027,241	2,918,296	2,162,080
Adjusted R ²	0.007	0.007	0.378	0.412	0.597

Measuring “Regulation-Relatedness” of Each Task

Method: keyword matching for each task statement + human annotation

- ▶ Tier 1 regulation keywords: *regulation, regulations, regulatory*
- ▶ Tier 2 regulation keywords: *law, laws, statute, statutes, statutory, ordinance, ordinances, legislation, legislative, code, codes, public policy, public policies, standards, license, licenses, licensing, permit, permits, certification, certifications, government, governments, governmental, federal, legislature, policy makers, governing agencies, public agencies, compliance, noncompliance*
- ▶ Tax keywords: *tax, taxes*

Outcome: Three versions of “regulation-relatedness” for each task

- ▶ Broad/Medium/Conservative

Takeaway: 1/3 of occupations have at least one regulation-related task, covering all sorts of occupations, e.g., HR, nurses, electrician...