Who Gets Screened Out?
The Opioid Crisis and Employer Skill Requirements

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ABFER Annaul Conference

Motivation

Broad consequences of the opioid crisis

- **The United States is experiencing the worst opioid epidemic in its history**
  - From 1999 to 2021, the number of fatal opioid overdoses increased more than tenfold (Centers for Disease Control, 1999–2019)
  - An average American is more likely to die from an opioid overdose than from vehicle accidents or breast cancer (National Center for Health Statistics, 2019)

- **Of particular interest to policymakers have been its implications for the labor market**
  - Most studies focus on the labor supply response to the opioid crisis
  - 75% of employers reporting that their workplace has been directly affected by employee use of opioids (National Safety Council, 2017)

This Paper

Question: How does the opioid crisis affect employers' skill requirements?

- **Employers utilize skill requirements as a major hiring tool.**
  (Modestino,Shoag, and Ballance, 2016; 2020; Hershbein and Kahn, 2018; Lochner et al., 2021)

- **Employers have incentives to adjust skill requirements in response to the opioid crisis.**
  1. They may try to screen out opioid abusers.
  2. They may lower recruitment intensity in response to the quality change in labor supply.
  3. They may try to adjust the skill composition of workers.

This Paper

- **Theoretical reasoning.** Present a search model of firms screening potential opioid abusers.
- **Empirical challenges.** Reverse causality, common causes, lack of data
- **Approach.** Construct firm-level variation in exposure to the OxyContin reformulation, which led to a large transition from prescription opioids to illicit opioids
- **Data.** Construct unique firm-level data on employment and job requirements
  - Use job posting data that cover the near universe of US job vacancies and include detailed information on skill requirements

$\Rightarrow$ Examine the firm-level impact of opioid crisis on employment and skill requirements

Contribution

1. **The opioid crisis and the labor market**
   (Harris et al, 2020; Park and Powell, 2021; Aliprantis et al, 2023; Cornaggia et al, 2025; Mukherjee, Sacks, and Yoo, 2025)
   - We investigate the effect of the opioid crisis on hiring strategies and skill requirments.

2. **The factors influencing skill requirments**
   (Autor, Levy, and Murnane, 2003; Hershbein and Kahn, 2018; Modestino,Shoag, and Ballance, 2020; Acemoglu et al, 2022; Braxton and Taska, 2023)
   - We suggest that firms respond to a decline in the quality of labor supply.

3. **Statistical discrimination in labor markets**
   (Altonji and Pierret, 2001; Morgan and Várdy, 2009; Guryan and Charles, 2013; Burn et al, 2019; Ballance, Clifford, and Shoag, 2020; Doleac and Hansen, 2020)
   - Employers could discriminate against less-skilled worker groups.

Roadmap

- Background
- Theoretical Framework
- Data & Empirical Strategy
- Estimation Results
- Discussion & Conclusion

Background on the OxyContin Reformulation

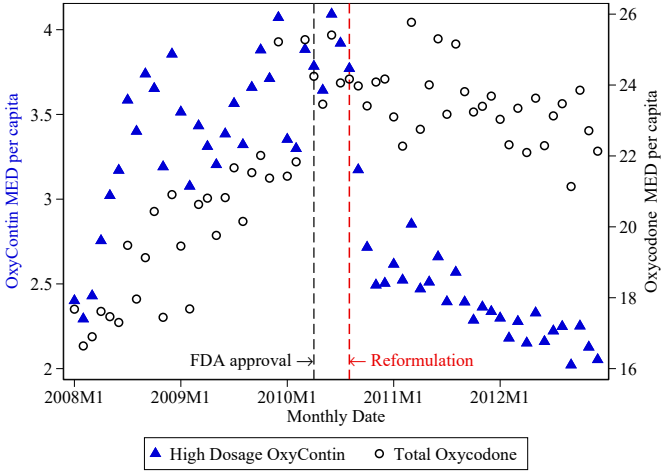
- **OxyContin was one of the leading opioids used for nonmedical purposes in the 2000s** (Cicero et al., 2005)
  - In 2009, over 3.5% of the population aged 12 or older had taken OxyContin recreationally at some point in their life, with about 1.35% misusing OxyContin in that year (National Survey of Drug Use and Health, 2010)

- **In August 2010, Purdue Pharma introduced an abuse-deterrent version of OxyContin**
  - Largest reduction in supply of abusable prescription opioids

- Making pills hard to crack
- Making pills hard to snort
- No instant high

Reformulation led to a sharp decline in OxyContin dispensing

High dosage OxyContin and oxycodone dispensing in retail pharmacies



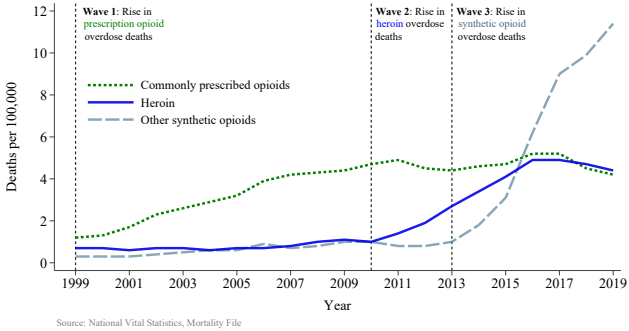
Data: Automation of Reports and Consolidated Orders System (ARCOS) ▷ Total OxyContin

Background on the OxyContin Reformulation: Consequences

- **Evidence that opioid abusers substituted to illicit opioids and illicit markets** (Alpert et al., 2018; Evans et al., 2019)
  - Reductions in non-medical OxyContin misuse
  - Rise in heroin overdoses & heroin-related substance use treatment admissions
  - *"Most people that I know don't use OxyContin to get high anymore. They have moved on to heroin [because] it is easier to use, much cheaper, and easily available."* (Cicero et al., 2012)
- **Expansion of illegal drug market**
  - Increased accessibility of opioids to people who have not misused OxyContin
  - Increased likelihood of crime and victimization

Background on the OxyContin Reformulation: Consequences

Three waves in the opioid crisis

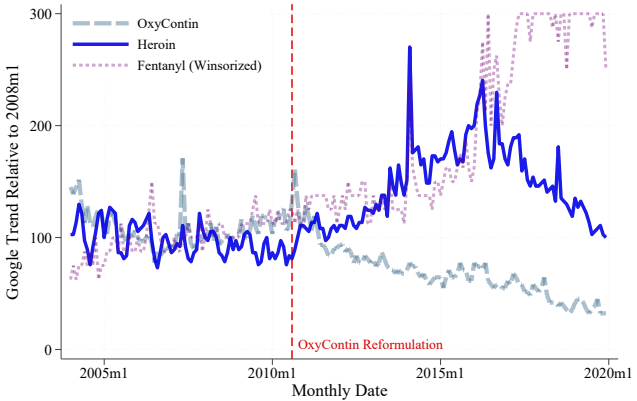


Data: Centers for Disease Control (CDC)

- The literature describes the opioid crisis as having three waves.

Background on the OxyContin Reformulation: Consequences

Whether economic agents were aware of the problem at the time

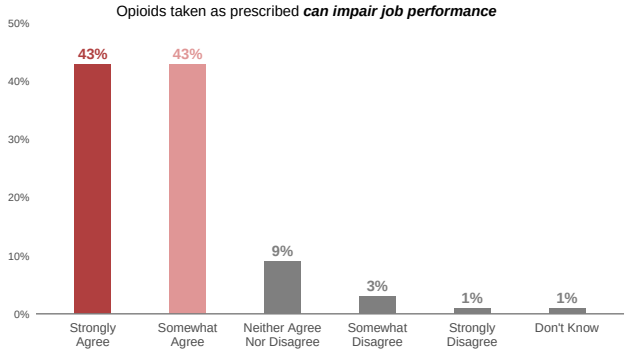


Data: Google Search Trends

- Economic agents could have updated their perceptions and adjusted their behavior.

Background on Employer Incentive

What employers think about employees' use of opioids



Data: National Safety Council (2020)

- The vast majority of employers clearly recognize that opioid use can affect worker productivity.

Background on Employer Incentive: Why not drug testing?

- **Timing limitations:** Pre-employment drug testing is legally available only after the candidate receives a conditional offer
- **Legal restrictions:** Pre-employment drug testing is restricted
  - Iowa - Drug testing is permitted if the candidate is informed at the time of application that a drug test is required. Job ads and applications must show notice of drug testing. Job applicants must also receive a list of the substances to be tested
- **Difficulty in distinguishing substances:** Illegal opioids (e.g., heroin) may not be distinguishable from other legal opioids
- **Short detection window:** It is detectable only for approximately 2 to 8 hours following heroin use
- **Drug test cheating:** More employees are cheating on workplace drug tests

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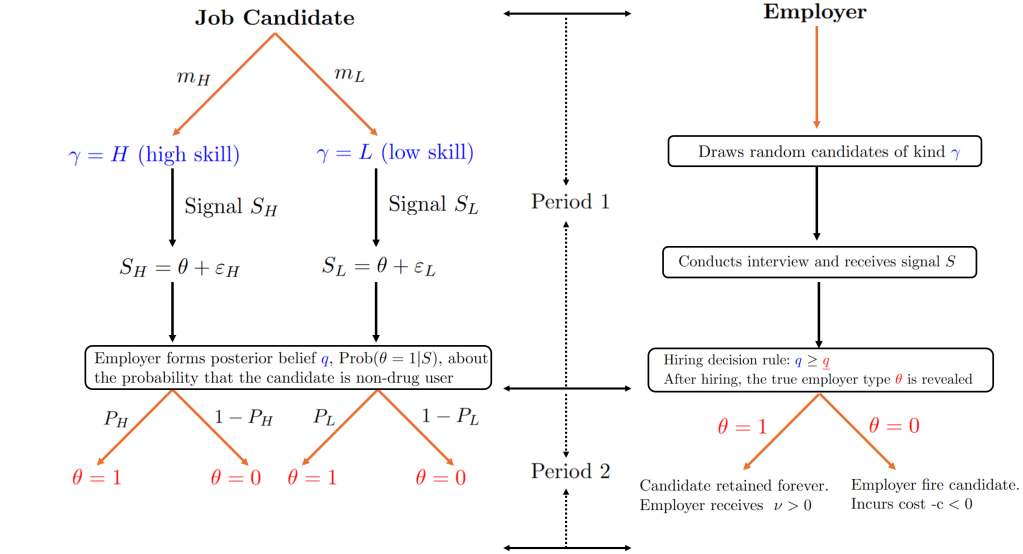
Theoretical Framework: Setting

- We introduce a search model to clarify how firms adjust hiring in response to the opioid crisis
- We adapt the framework in Morgan and Várdy (2009):
  - **Hiring environment:**
    - An employer fills a vacancy by randomly drawing candidates from a worker pool
  - **Candidate attributes:**
    - Skill kind $\gamma \in \{\text{H,L}\}$ (high- vs. low-skilled), observable to employers
    - Productivity type $\theta \in \{1, 0\}$ (non-drug user vs. drug user), unobservable to employers
  - **Assumption:**
    - Non-drug users can perform the job: $\theta = 1$
    - Drug users cannot perform the job: $\theta = 0$

Theoretical Framework: Setting



Theoretical Framework: Policy Implications

- The **optimal hiring strategy** is to set a common optimal threshold, $\underline{q}^*$, for all candidates
  - The employer hires a job candidate only if $q > \underline{q}^*$, regardless of the kind of job applicant

- **Propositions (Policy Implications)**

  When the share of drug users increases in the population of low-skill candidates (i.e., $p_L \downarrow$):

  1. **The optimal hiring threshold, $\underline{q}^*$, increases**
  2. **The permanent composition of low-skill workers declines**

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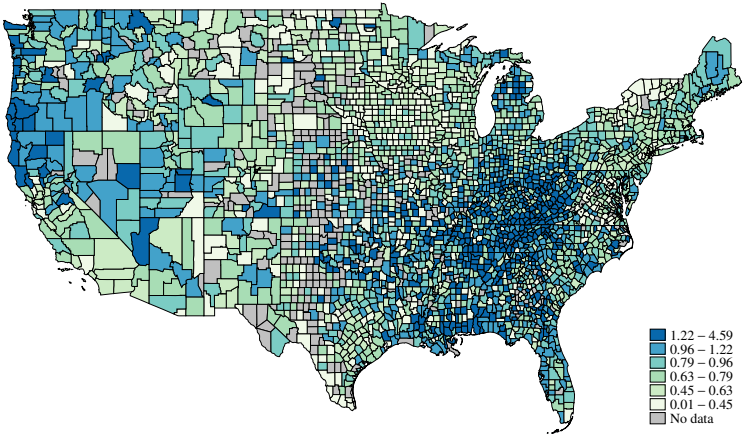
Data

- **Prescription opioid use** (Centers for Disease Control and Prevention, 2006–2009)
  - The number of Schedule II opioid prescriptions per capita in the county
- **Company financial statements and employment** (Compustat, 2005–2019)
- **Online job posting data** (Lightcast, 2007 & 2010–2019)
  - The near universe of online job ads in the US
  - Detailed information on each job vacancy (employer, location, occupation, skill requirements, etc.)
  - We classify skill requirements following Deming and Kahn (2018) List

$\Rightarrow$ We combine these datasets at the firm level

Variation in Pre-reformulation Prescription Opioids per Capita, 2006–2009



The reformulation had a greater effect on OxyContin misuse and heroin use in regions with higher initial rates of prescription opioid use (Alpert et al., 2018; Evans et al., 2022, 2019) Correlation ▷

Measuring Exposure at Firm Level

- Establishments of a firm are located across counties
- We construct firm-level exposure measure using pre-intervention, establishment-level number of job postings as a weight Industry Variation ▷
  - Implicit assumption: # job postings represent the size of the establishments
- Advantages of using firm-level variation compared to local or industry-level variation
  - Reduce concerns around local- or industry-level time-varying confounders
  - An aggregate-level analysis reflects mechanisms other than a firm's hiring decision

Event Study Model

$$y_{fgt} = \sum_{t=2005, t \neq 2007}^{2019} \delta_t Exposure\_Pre_f \times \mathbf{1}_t + \alpha_f + \gamma_{gt} + X_{ft}'\beta + \varepsilon_{fgt},$$

- y_{fgt}: Logged outcomes for firm f in industry g (3-digit NAICS code) during year t
- γ_{gt}: Industry-by-year fixed effects
- X_{ft}: Time-varying firm-level characteristics, including the interaction of firm-level Great Recession shock with year dummies
- Standard errors are clustered at the firm level
- Identification assumption: without the reformulation, outcomes for firms with different initial prescription opioid use rates would have trended similarly over time

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  - Main results
  - Robustness Checks
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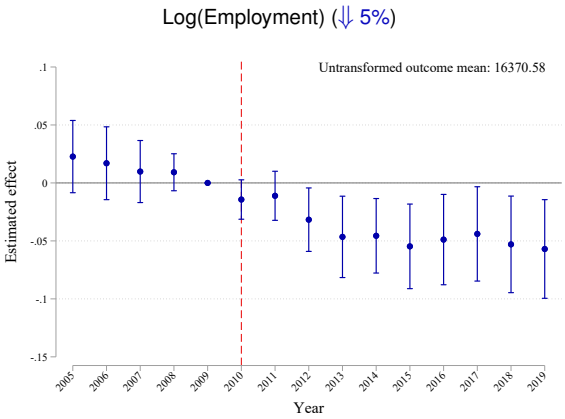
The opioid crisis leads to a reduction in firm employment

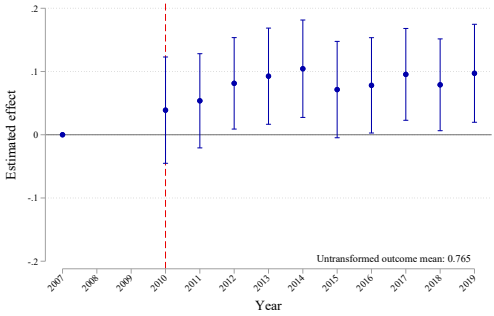


↑ 1 SD in firm-level exposure (↑ 0.22 per-capita opioid prescriptions in the pre- period)

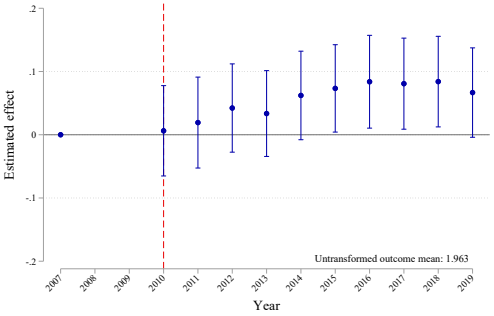
⇒ 5% decline in employment

The opioid crisis leads to an increase in skill requirements

Log(# Cognitive Skills) (⇑ 8%)



Log(# Computer Skills) (⇑ 5.4%)



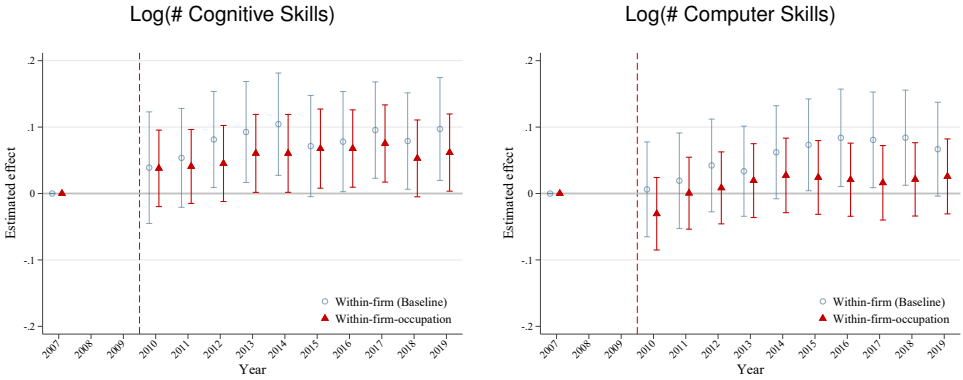
↑ 1 SD in firm-level exposure (↑ 0.22 per-capita opioid prescriptions in the pre- period)

⇒ 8% increase in cognitive skill requirements, and 5.4% increase in computer skill requirements.

Supporting Mechanism of Screening

- **Key question:** Is upskilling driven by ...
  - Higher skill requirements within the same occupation? (within-occupation change)
  - A shift toward higher-skilled occupations? (composition change)
- **Screening:** We should see upskilling within narrowly defined occupations
- **Empirical approach:**
  - Construct firm $\times$ occupation $\times$ year panel
  - Estimate event study with firm-occupation FE and occupation-year FE
  - Occupation: 6-digit SOC
  - Identifies within-firm-job changes in skill requirements

Upskilling within Firm-by-occupation



⇒ Increase in cognitive skills largely occurs within firm-by-occupation, consistent with the screening mechanism

⇒ Increase in computer skills is attenuated within firm-by-occupation

- Not inconsistent with our argument that screening is one mechanism

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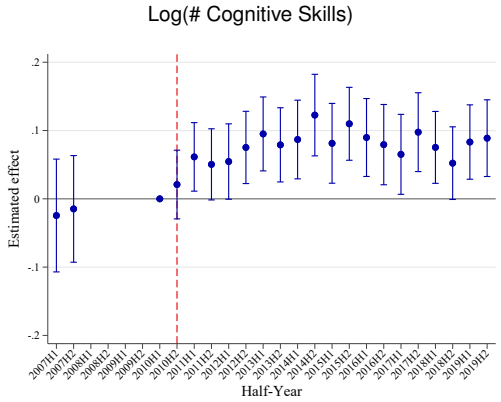
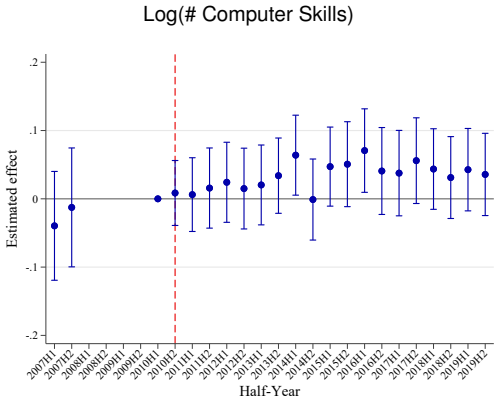
Robustness Test 1: Half-year Data

Concern: Due to data limitations, the pre-period does not extend beyond 2007

Approach: We use half-year (or quarterly) data instead of annual data





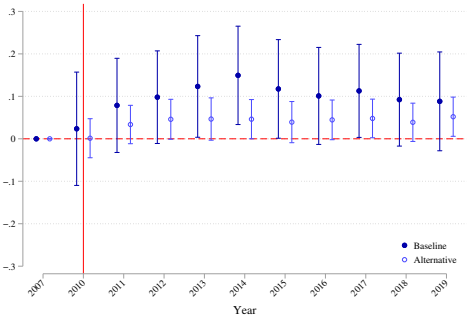
Robustness Test 2: Firm-by-State Analysis

Concern: Other firm-level, time-varying confounders

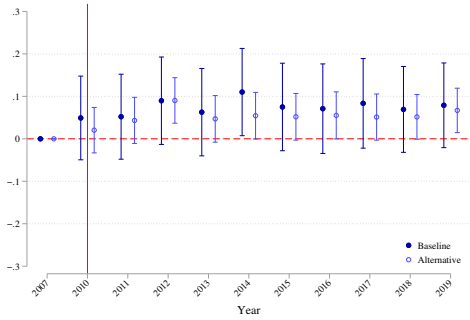
Question: Do we still observe upskilling in within-firm, across-establishment comparisons?

Approach: For each firm, we combine establishments in the same state into an integrated entity

Log(# Cognitive Skills)



Log(# Computer Skills)



Robustness Test 3: Controlling for Labor Supply Factors

Concern: The upskilling results might be driven by labor supply changes

Approach: We control for labor force participation rates by demographic group

▷ WageControls

	Baseline	Add Gender	Add Education	Add Race
Panel A: Employment				
Opioid Exposure × Post	-0.051***	-0.051***	-0.052***	-0.051***
	(0.017)	(0.016)	(0.016)	(0.016)
	[0.002]	[0.002]	[0.001]	[0.002]
Panel B: Cognitive Skill Requirements				
Opioid Exposure × Post	0.079**	0.075**	0.069*	0.069*
	(0.036)	(0.037)	(0.037)	(0.037)
	[0.027]	[0.042]	[0.060]	[0.062]
Panel C: Computer Skill Requirements				
Opioid Exposure × Post	0.054*	0.052	0.044	0.044
	(0.032)	(0.034)	(0.033)	(0.033)
	[0.095]	[0.123]	[0.188]	[0.185]
LFP by Gender	No	Yes	Yes	Yes
LFP by Education	No	No	Yes	Yes
LFP by Race	No	No	No	Yes

Other Robustness Checks

- **Confounding effects of Great Recession**
  - Correlation: 0.08
- **Confounding effects of retiring baby boomers**
- **Dropping Appalachian states**
- **Using a 4-digit industry code**
  - Larger and stronger upskilling effects when using 4-digit industry-by-year fixed effects

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Policy Implications

Our study highlights ...

- The *distributional effects* of the opioid crisis on workers
  - Even those less-skilled workers without a history of opioid use disorders can also be impacted by these changes
- The importance of *diversifying resources* beyond the prevention and treatment of opioid use
- Employers may have strong incentives to participate in efforts aimed at mitigating opioid use disorders

Conclusion

- The literature has primarily focused on exploring the effect of the opioid crisis on labor supply
- Using a novel dataset and exploiting policy variation, we find that the transition to illicit opioids has had **substantial and persistent effects on skill requirements**
- Our findings contribute to our understanding of the **economic consequences of the opioid crisis and the role of employers** during this crisis
  - Implications for understanding how the crisis could impact both firms and non-opioid users
  - Implications for understanding how the crisis could differentially impact less-skilled amd more-skilled workers

Thank you!

Feedback is welcome online or in person

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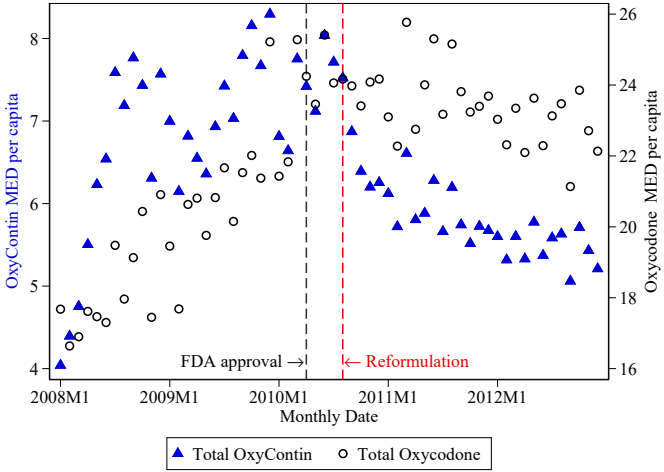
Reformulation led to a sharp decline in OxyContin dispensing

Total OxyContin and oxycodone dispensing



Data: Automation of Reports and Consolidated Orders System (ARCOS) ▷ Go Back

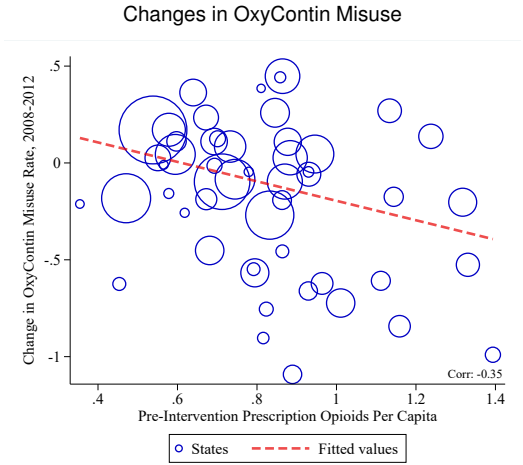
Data

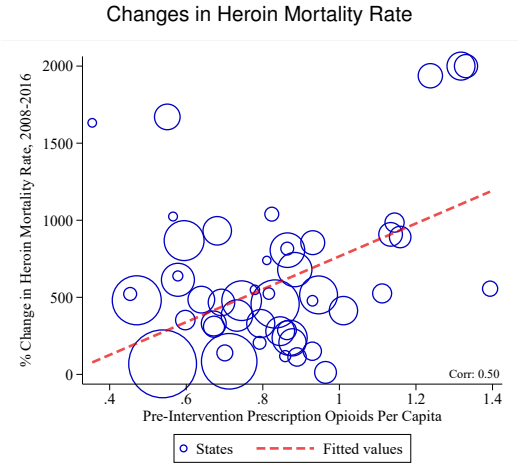
Skill Categorization

Category	Key words and phrases
Cognitive	Problem Solving, Research, Analytical, Critical Thinking, Math, Statistics
Computer	Computer, Spreadsheets, Common Software (e.g. Microsoft Excel, Powerpoint), Programming language or specialized software (e.g. Java, SQL, Python, etc.)
Social	Communication, Teamwork, Collaboration, Negotiation, Presentation
Customer Service	Customer, Sales, Client, Patient
Management	Project Management, People Management (Supervisory, Leadership, Management, Mentoring, Staff)
Writing	Writing

Go Back

Reductions in both OxyContin misuse and Rates of Prescription Opioid Use





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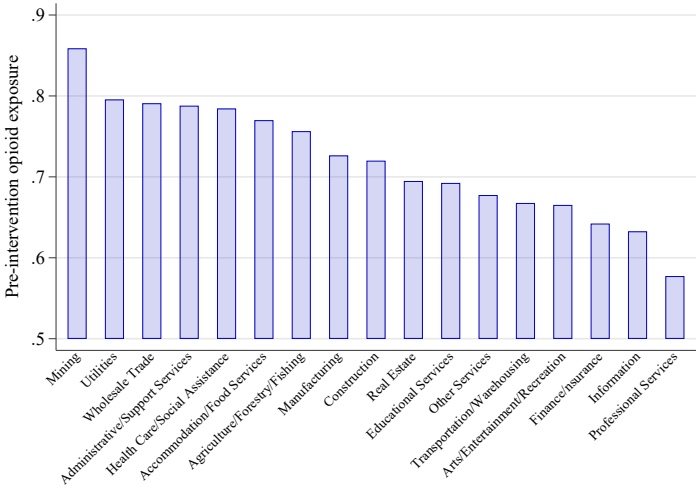
Firm Exposure to Pre-Intervention Prescription Opioids by Sector



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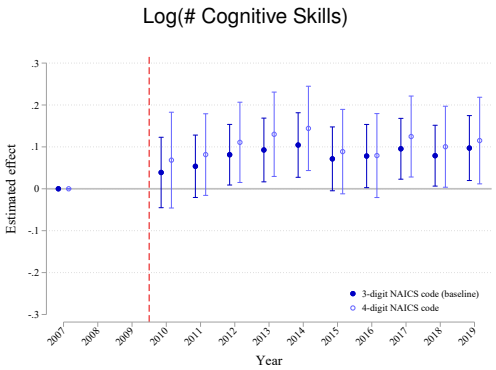
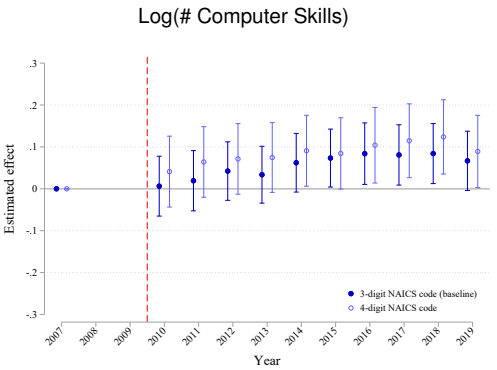
Robustness: Using a 4-digit industry code.

Stronger effects when using 4-digit industry code instead of 3-digit code





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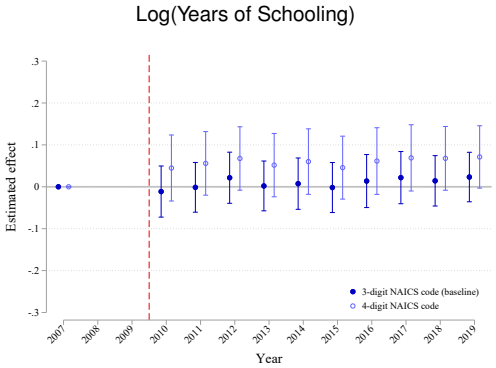
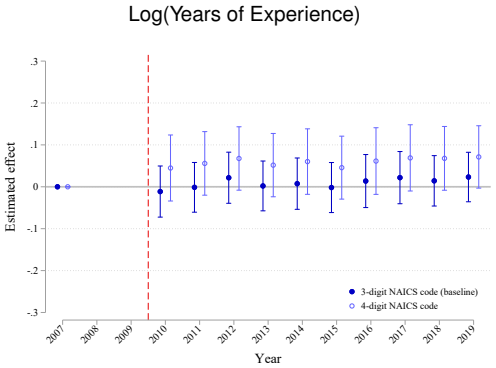
Robustness: Using a 4-digit industry code.

Stronger effects when using 4-digit industry code instead of 3-digit code





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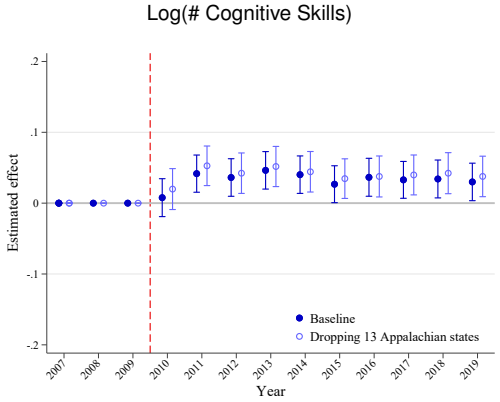
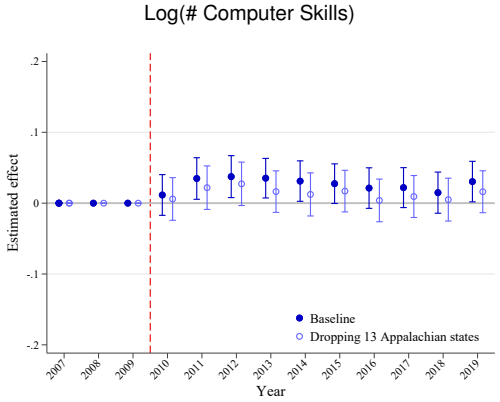
Robustness: Dropping Appalachian States





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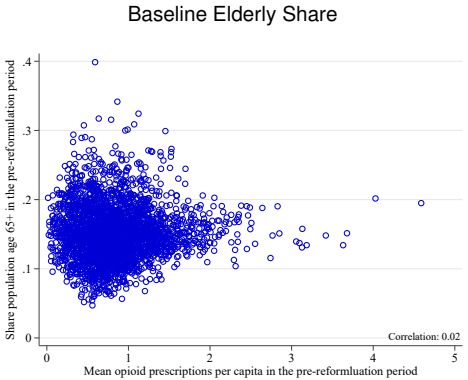
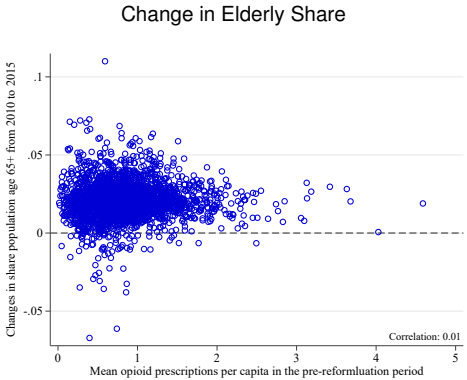
Alternative explanation: Potential confounding impacts of the change in the age structure

Low Correlation Between Initial Prescription Opioid Use and Elderly Population Share





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Robustness analysis: Controlling for Labor Supply Factors

	(1) Baseline	(2) Add Gender	(3) Add Education	(4) Add Race
Panel A: Employment				
Opioid Exposure × Post	-0.051***	-0.050***	-0.049***	-0.044**
	(0.017)	(0.017)	(0.017)	(0.017)
	[0.002]	[0.003]	[0.004]	[0.011]
Panel B: Cognitive Skill Requirements				
Opioid Exposure × Post	0.079**	0.084**	0.084**	0.085**
	(0.036)	(0.036)	(0.036)	(0.037)
	[0.027]	[0.019]	[0.021]	[0.021]
Panel C: Computer Skill Requirements				
Opioid Exposure × Post	0.054*	0.065**	0.061*	0.062*
	(0.032)	(0.033)	(0.033)	(0.033)
	[0.095]	[0.048]	[0.062]	[0.062]
Wage by Gender	No	Yes	Yes	Yes
Wage by Education	No	No	Yes	Yes
Wage by Race	No	No	No	Yes

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