Health Insurance Costs, Upskilling, and Technology Investment

Janet Gao[1] Shan Ge[2] Lawrence Schmidt[3] Cristina Tello-Trillo[4]

[1]Indiana University

[2]NYU

[3]MIT

[4]Census

Disclaimer

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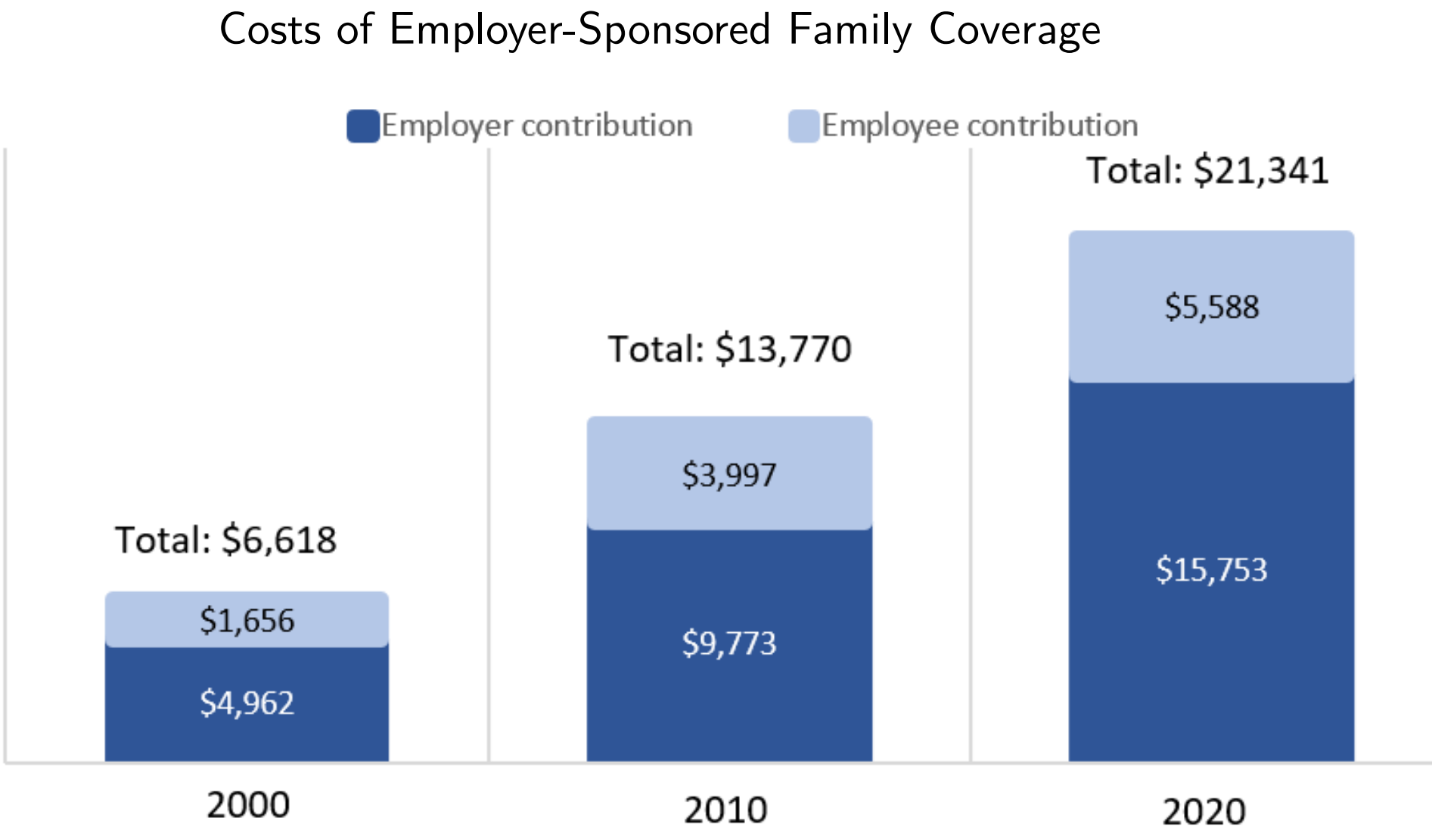
Some results do not use Census data.

Motivation

- Concern about $\downarrow$ demand for labor, especially low-skilled labor
  - A lot of focus has been on imports, outsourcing, & automation
- A large cost of labor is health insurance: firms paid 10% of wages for health insurance in 2021
- Health insurance is a heatedly debated topic in U.S. politics
  - 58% of Americans $<$65 obtain health insurance through employers
    - Many counties provide health insurance/care funded by progressive tax
  - Employers' plans have to be affordable: workers pay $<$9.6% of wages
  - Costs to employers higher for low-skilled, esp. relative to productivity
- Health insurance costs has $\uparrow$; by 236% since 2000

Motivation


Costs of Employer-Sponsored Family Coverage
Employer contribution
Employee contribution
Total: $6,618
$1,656
$4,962
Total: $13,770
$3,997
$9,773
Total: $21,341
$5,588
$15,753
2000
2010
2020

Motivation

- Important question: how health insurance costs affect firms' employment & investment

Methodology

- Difficulty: Regressing firms' employment on health insurance premiums $\rightarrow$ biased results
  - When a firm wants to attract or retain more workers, it may make the health insurance benefits more generous, which $\uparrow$ premiums
- Use idiosyncratic & exogenous shocks to firms' health insurance costs
  - Instrument for health premiums: prior losses of firms' health insurers

Research Questions & Hypotheses

When health insurance costs ↑, how do firms change

1. employment
   - hypothesis: ↓ as the cost of labor ↑
2. labor composition
   - hypothesis: low-skilled (low-wage) labor ↓ by more because
     - ↑ labor costs of low-skilled relative to high-skilled
     - low-skilled workers are more easily replaced by technology
3. technology investment
   - hypothesis: ↑ to replace workers

Results Overview

When firms' health insurance costs $\uparrow$,

- firms' employment $\downarrow$
  - $\downarrow$ by more if firms have a high premium/wage ratio
- low-wage workers are more likely to leave & become unemployed
- firms' technology investment $\uparrow$

Literature on the effect of health insurance on firms

- Baicker & Chandra (2005)
  - use state-level data on health insurance instrumented premiums
  - $\uparrow$ in health insurance costs $\downarrow$ aggregate employment
- Thurston (1997) & others find that part-time employment $\uparrow$ when employers are required to offer health insurance
- Effect of ACA
  - Almeida et al (2020): public firms $\downarrow$ # covered, not employment
  - Mulligan (2020): firms $\downarrow$ jobs to stay below the 50-employee mandate
  - Dillender et al (2020): firms $\uparrow$ part-time employment
  - Many things changed, e.g. labor supply (outside options, Medicaid expansion, exchange premium cap...)

Contribution

- We show the distributional effect on employment across skill levels & on technology investment
- We improve on identification by using idiosyncratic & exogenous shocks; granular data, on mostly private firms
- We also contribute to the literature on labor demand elasticity using an idiosyncratic shock

Employer Health Insurance Market (No Census data used)

- Employers shop policies through brokers
- Avg # of insurers in a year:
  - 291 (149 serve more than 100 employers in our sample)
  - 150 each state, 69 each commuting zone
- Avg insurer HHI: 1,881 at state level, 2,803 commuting zone
- Employer health insurance market is not competitive, e.g., Dafny (2010), Dafny, Duggan, & Ramanarayanan (2012)
- On avg, 11% of employers switch their insurers in a year

Data

Health insurance data

- Department of Labor's Form 5500, 2009-2019
- EIN, address, insurer, number of covered people, total premiums
  - $\rightarrow$ premiums per person, paid by worker & employer
- Exclude self-insured firms & union firms

Census

- W2: # of employees with wages $\geq$ 40 hr/week at minimum wage
- American Community Survey: job routine/manual score
- Require the difference in growth rate between # of workers & # of participants to be [-30%, 30%]

Aberdeen survey

- Firms' budget on IT & PC

Summary Statistics

Variable	**Mean**	**Standard Deviation**
Number of employees	278	356
Number of participants	410	816
Participants to employee ratio	1.34	0.72
Premium per person (annual)	6162	2981
Total wage to premium ratio	8.33	7.19

Instrument for Health Insurance Costs

OLS bias:

- regressing # of workers on health insurance premiums:
- E.g., if a firm wants to attract/retain more workers, it may offer generous health insurance benefits with high premiums

Instrument for Health Insurance Costs

- Obamacare: individual insurers' 3-year medical loss ratio (claims/premiums) $\geqslant 0.85$ in three consecutive years, or send rebates
- IV: max(insurers' group's past 3-year medical loss ratio, 0.85)
- Instrument firm i's premium in t using its $t-1$ insurer' performance from $t-3$ to $t-1$
- Insurers may $\uparrow$ premiums when they suffer losses
  - use past losses to predict future costs
  - moving closer to optimal price subject to the 0.85 rule
  - relax financial constraints, or

Instrument for Health Insurance Costs: Exclusion

- Insurers' losses should be exogenous to firms' employment & investment, when controlling for location*year FE & firm FE
- Robustness for the next version
  - control for commuting zone*year FE & firm FE
  - restrict to firms whose lag premiums $<1\%$ of insurer-yr total

Instrument for Health Insurance Costs: Exclusion (5500 Data)

Dependent Var:	$\log(\text{Claim per person})_t$	$(\text{Premium/Claim})_t$
$\text{Insurer Loss}_{t-3 \text{ to } t-1}$	-0.35	1.24*
	(-1.64)	(1.73)
Fixed Effects	Firm, Yr	Firm, Yr
N	27602	27419
adj. R-sq	0.684	0.510

Insurers' losses do not predict higher claims, but is associated with higher premium/claim ratio (markup).

Regression Specification at the Firm Level

First Stage:

$$log(premium\ per\ person)_{i,t} = \lambda + \gamma \cdot insurer\ loss_{i,t-3\ to\ t-1} + FE_i + FE_t + \epsilon_{i,t}$$

Second Stage:

$$Y_{i,t} = \alpha + \beta \cdot log(premium\ per\ person)_{i,t} + FE_i + FE_t + u_{i,t}$$

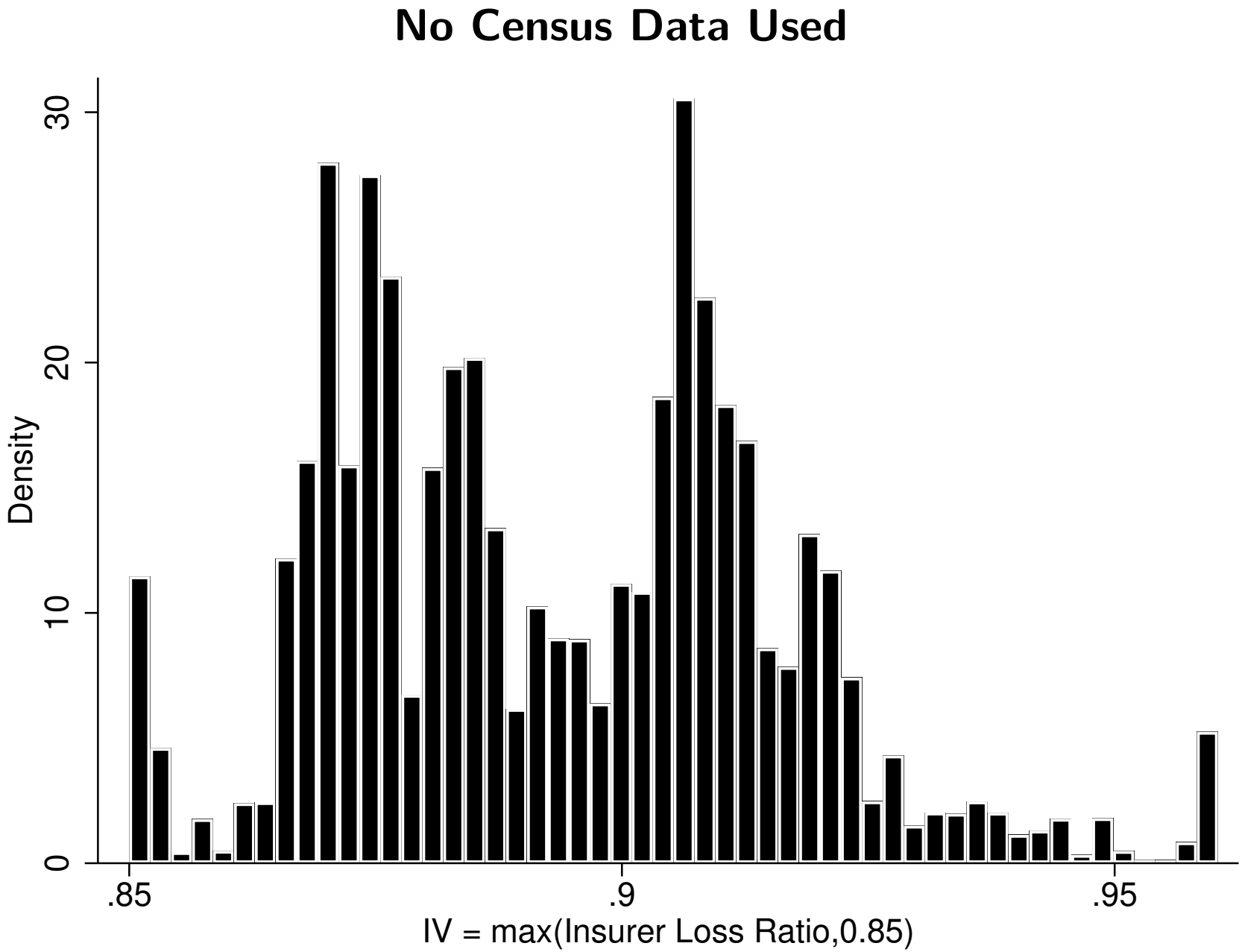
i: firm

t: year

Y: # of participants, employees, & technology investment

Premiums for t are determined in $t-1$

Instrument for Health Insurance Costs (5500 Data)



Instrument for Health Insurance Costs: Relevance

	IV 1st Stage
Dependent Var:	$\log(\text{Premium per participant})_t$
$\text{Insurer Loss}_{t-3 \text{ to } t-1}$	0.6192***
	(6.79)
Fixed Effects	Firm, Yr
Observations	85000
Cragg-Donald F Stat	135.90

When insurer loss $\uparrow$ by 1 std dev (0.022), premium per participant $\uparrow$ by 1.3%

Effect of Health Insurance Costs on # of Participants

If health premiums have an effect, the # of participants should change

	(1)	(2)	(3)	(4)	(5)
Method:	OLS	IV	IV	IV	IV
Dependent Var:			$\log(\#\text{ of Participants})_t$		
$\log(\text{Premium})_t$	-0.5900***	-0.7600***	-0.7723***	-0.7452***	-0.7796***
	(-85.54)	(-5.68)	(-6.49)	(-5.69)	(-5.84)
$\log(\text{Employment})_{t-4}$					0.02052***
					(10.45)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr*State	Firm, Yr*Industry	Firm, Yr
Observations	155000	85000	85000	85000	83500
Cragg-Donald F Stat		135.90	183.80	140.20	135.40

Exclude firms in health insurance associations (repeated obs)

- When premiums ↑ by 20%, # of participants ↓ 14%;
- An elasticity of -0.7; Avg is -0.6 in the literature, Liu & Chollet (2006).

Effect of Health Insurance Costs on Employment

	(1)	(2)	(3)	(4)
Dependent Var:		$\log(\text{Employment})_t$		
$\log(\text{Premium})_t$	-0.2704**	-0.2019**	-0.2502**	-0.2615**
	(-2.38)	(-2.09)	(-2.27)	(-2.33)
$\log(\text{Employment})_{t-4}$				0.01772***
				(10.05)
Fixed Effects	Firm, Yr	Firm, Yr*State	Firm, Yr*Industry	Firm, Yr
Observations	92000	88500	89000	90500
Cragg-Donald F Stat	147.50	195.80	149.90	147.60

- Include firms in health insurance associations
- When premiums $\uparrow$ by 20%, firms $\downarrow$ employment by 4%.

Effect of Health Insurance Costs on # of Participants

Mechanism 1

- Workers pay for some of the ↑ in health insurance premiums
- Some workers opt out of employers' insurance (e.g., join spouses')
- Some workers leave

Mechanism 2

- Firms pay for all the ↑ in premiums, but stop offering health insurance to some workers (e.g., by converting them to part-time)
- Firms lay off some workers and/or some of the workers that lost health insurance benefits leave

Labor Demand Elasticity

- 1% $\uparrow$ in health premiums $\rightarrow$ a 0.2% $\downarrow$ in employment
- Assume: firms pay 66% of premiums & bear all the $\uparrow$
- 1% $\uparrow$ in labor costs $\rightarrow$ a 2.6% $\downarrow$ in employment
- Within the range of elasticity estimates in the literature
  - We use a rare idiosyncratic shock

Effect of Health Insurance Costs on Employment

Dependent Var:	(1) $\log(\#$ of Retained$)_t$	(2) $\log(\#$ of New Hires$)_t$
$\log(\text{Premium})_t$	-0.2540**	-0.1414
	(-2.20)	(-0.63)
Fixed Effects	Firm, Yr	Firm, Yr
Observations	92000	92000
Cragg-Donald F Stat	145.40	145.40

- Effect on employment mostly through # of retained workers

Heterogeneous Effect on Firm-Level Employment

Effect is larger for firms with a high total premium/wage ratio

	(1)	(2)	(3)
Dependent Var:		$\log(\text{Employment})_t$	
Sample:	High (Premium/Wage)	Low (Premium/Wage)	All
$\log(\text{Premium})_t$	-0.3963**	0.01959	-0.3848**
	(-2.12)	(0.17)	(-2.24)
$\log(\text{Premium})_t$ *Low (Premium/Wage)			0.2882
			(1.35)
Low (Premium/Wage)			-2.4760
			(-1.33)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr
Observations	52000	36000	92000
Cragg-Donald F Stat	60.790	111.40	41.610

Effect on Wages

- Would firms pass the $\uparrow$ in health insurance costs to workers through $\downarrow$ wages or $\uparrow$ workers' own contribution?
- We observe wages, but not workers' own health insurance contribution
- Literature suggests when health insurance costs $\uparrow$ by \$1, wage does not change or $\downarrow$ by less than \$1

Effect on Wage Growth at Worker Level

Dependent Var:	Wage Grth Rate	
	t-4 to t	t-4 to t+1
$\log(\text{Premium})_t$	0.04617	0.02389
	(0.61)	(0.29)
Fixed Effects	Firm, Yr	Firm, Yr
Observations	12470000	10700000

- Health insurance costs do not affect workers' wage growth rate

Pre-trend & Persistence

Dependent Var:	(1) $\log(\text{Participants})_{t-4}$	(2) $\log(\text{Employment})_{t-4}$	(3) $\log(\text{Employment})_{t+1}$	(4) $\log(\text{Employment})_{t+2}$
$\log(\text{Premium})_t$	0.1413	-0.1028	-0.3875*	-0.05407
	(0.42)	(-0.61)	(-1.90)	(-0.16)
Fixed Effects	Firm, Yr	Firm, Yr	Firm, Yr	Firm, Yr
Observations	63000	67000	71000	52500
Cragg-Donald F Stat	69.910	71.620	51.600	15.720

Heterogeneous Effect on Workers' Retention

Hypothesis: low-skilled workers are more likely separated

- Low-skilled workers earn lower wages (Juhn et al. (1993), Acemoglu & Autor (2011), Guvenen et al. (2014), Abowd et al. (2003))
- Affordability mandate requires firms to bear more of the $\uparrow$ in premiums for low-skill workers
- $\uparrow$ labor costs of low-skilled relative to high-skilled $=$ marginal product of low-skilled relative to high-skilled

Use avg. income from past 5 years (not including 0) to proxy skill

Using David Dorn's classification for routine & manual jobs

Heterogeneous Effect on Workers

IV Second Stage:

$$Y_{i,j,t} = \beta_2 \cdot log(premium)_{i,t} \cdot log(past\ avg\ wage)_{i,j,t} +$$

$$\beta_3 \cdot log(premium)_{i,t} \cdot Routine_{i,j} + \beta_4 \cdot log(premium)_{i,t} \cdot Manual_{i,j} +$$

$$\beta_5 \cdot log(past\ avg\ wage)_{i,j,t} + \beta_6 \cdot Routine_{i,j} + \beta_7 \cdot Manual_{i,j} + FE_{i,t} + u_{i,j,t}$$

i: firm; j: individual; t: year

$log(past\ avg\ wage)_{i,j,t}$, $Routine_{i,j}$, $Manual_{i,j}$ are standardized

Y:

- $I(Retained)_t$ if worker earns at least minimum wage full-time pay from her employer of $t-1$
- $I(Unemployed)_t$ if worker earns less than minimum wage full-time pay in year t

Heterogeneous Effect on Workers' Retention

Individual-year level

Dependent Var:	I(Retained)$_t$	I(Retained)$_{t+1}$
log(Premium)$_t$ $*$ *Routine*	-0.007397	-0.01031
	(-0.61)	(-0.63)
log(Premium)$_t$ $*$ *Manual*	-0.05668*	-0.07587*
	(-2.23)	(-2.23)
log(Premium)$_t$ $*$ *log*(*AvgWage*)	0.1094***	0.1479***
	(3.94)	(4.04)
Controls	Yes	Yes
Fixed Effects	Firm * Yr	Firm * Yr
Observations	4542000	4542000

- When premiums $\uparrow$ by 1%, if a worker's past wage is 2 std dev lower, the worker is 0.3 pp more likely to be separated, 2% of mean (16%)

Heterogeneous Effect on Workers' Unemployment

Individual-year level

Dependent Var:	$\mathbb{I}(\text{Unemployed})_t$	$\mathbb{I}(\text{Unemployed})_{t+1}$
$\log(\text{Premium})_t * \textit{Routine}$	-0.006586	0.001022
	(-1.13)	(0.12)
$\log(\text{Premium})_t * \textit{Manual}$	0.0007712	0.01579
	(0.07)	(1.02)
$\log(\text{Premium})_t * \textit{log}(\textit{AvgWage})$	-0.04221***	-0.03978*
	(-3.35)	(-2.41)
Controls	Yes	Yes
Fixed Effects	Firm * Yr	Firm * Yr
Observations	4542000	4542000

- When premiums $\uparrow$ by 1%, if a worker's past wage is 2 std dev lower, the worker is 0.08 pp more likely to unemployed, 3% of mean (3%)

Effect on Firms' Technology Investment (Aberdeen Data)

Firm-Year Level, **No Census Data Used**

Dependent Var:	log(Total PC Budget)$_t$			
	(1)	(2)	(3)	(4)
log(Premium)$_t$	1.09	0.86	1.29**	1.22**
	(1.30)	(1.11)	(1.99)	(2.05)
log(Employment)$_{t-1}$				0.39***
				(38.38)
Fixed Effects	Firm, Yr	Firm, Yr*State	Firm, Yr*Industry	Firm, Yr
N	102805	100510	91195	88970
Cragg-Donald F Stat	31.91	35.30	49.64	48.91

When premiums ↑ by 1%, firms ↑ PC budget by 1%.

Effect on Firms' Technology Investment (Aberdeen Data)

Firm-Year Level, **No Census Data Used**

Dep. Variable	log(PC Budge Per Worker)			
	(1)	(2)	(3)	(4)
log(Premium)	1.67**	1.32*	1.30**	1.19**
	(2.04)	(1.86)	(2.24)	(2.11)
log(L.Employment)				-0.07***
				(-6.88)
FE	Firm Yr	Firm State-Yr	Firm Ind-Yr	Firm Yr
N	102499	100208	90925	88899
Cragg-Donald F Stat	31.12	35.49	48.36	48.85

When premiums ↑ by 1%, firms ↑ PC budget by 1%.

Effect on Firms' Technology Investment (Aberdeen Data)

Firm-Year Level, **No Census Data Used**

Dependent Var:	$\log(\text{Total IT Budget})_t$			
	(1)	(2)	(3)	(4)
$\log(\text{Premium})_t$	1.52*	0.93	1.06*	1.01*
	(1.72)	(1.19)	(1.69)	(1.76)
$\log(\text{Employment})_{t-1}$				0.39***
				(40.28)
Fixed Effects	Firm, Yr	Firm, Yr*State	Firm, Yr*Industry	Firm, Yr
N	102949	100645	91323	89045
Cragg-Donald F Stat	32.05	35.29	49.84	49.01

When premiums ↑ by 1%, firms ↑ PC budget by 1%.

Effect on Firms' Technology Investment (Aberdeen Data)

Firm-Year Level, **No Census Data Used**

Dep. Variable	log(IT Budge Per Worker)			
	(1)	(2)	(3)	(4)
log(Premium)	2.22**	1.51**	1.13**	1.02*
	(2.47)	(2.06)	(2.06)	(1.90)
log(L.Employment)				-0.05***
				(-5.80)
FE	Firm Yr	Firm State-Yr	Firm Ind-Yr	Firm Yr
N	102631	100331	91041	88974
Cragg-Donald F Stat	31.32	35.54	48.64	48.95

When premiums ↑ by 1%, firms ↑ IT budget by 1%.

Conclusion

Results: When health insurance costs $\uparrow$ exogenously, firms

- $\downarrow$ employment, especially for low-skilled workers
- $\uparrow$ technology investment

Contribution:

- Causal effect of health insurance costs on firms
- First to show firms' health insurance costs affect workers differently across skill levels
- Contribute to policy debate on:
  - Mandate employers to provide health insurance
  - Effect of $\uparrow$ in health insurance costs
  - A potential force that $\downarrow$ labor demand, especially for low-skilled workers

Effect on Health Insurance Take-up Rate

	(1)	(2)	(3)	(4)
		# of Participants$_t$/#*ofEmployees_t*		
log(Premium)$_t$	-0.5728***	-0.6803***	-0.5711***	-0.5688***
	(-3.46)	(-4.64)	(-3.53)	(-3.42)
log(Employment)$_{t-4}$				0.003967**
				(2.17)
Fixed Effects	Firm, Yr	Firm, Yr*State	Firm, Yr*Industry	Firm, Yr
Observations	81000	80500	81000	79500
Cragg-Donald F Stat	124.70	169.20	129.20	123.20

Effect on Firm-Year Total Wage

	(1)	(2)	(3)	(4)
			$\log(\text{Total Wage})_t$	
$\log(\text{Premium})_t$	-0.2193*	-0.2137**	-0.2107*	-0.2120*
	(-1.78)	(-2.04)	(-1.74)	(-1.73)
$\log(\text{Employment})_{t-4}$				0.01761***
				(9.69)
Fixed Effects	Firm, Yr	Firm, Yr*State	Firm, Yr*Industry	Firm, Yr
Observations	92000	88500	89000	90500
Cragg-Donald F Stat	147.50	195.80	149.90	147.60

Effect on Firm-Year Total Wage & Premium

	(1)	(2)	(3)	(4)
		$\log(\text{Total Wage \& Premium})_t$		
$\log(\text{Premium})_t$	-0.5612***	-0.4589***	-0.4737***	-0.5734***
	(-3.31)	(-3.12)	(-2.96)	(-3.37)
$\log(\text{Employment})_{t-4}$				0.01937***
				(9.50)
Fixed Effects	Firm, Yr	Firm, Yr*State	Firm, Yr*Industry	Firm, Yr
Observations	92000	88500	89000	90500
Cragg-Donald F Stat	147.50	195.80	149.90	147.60