

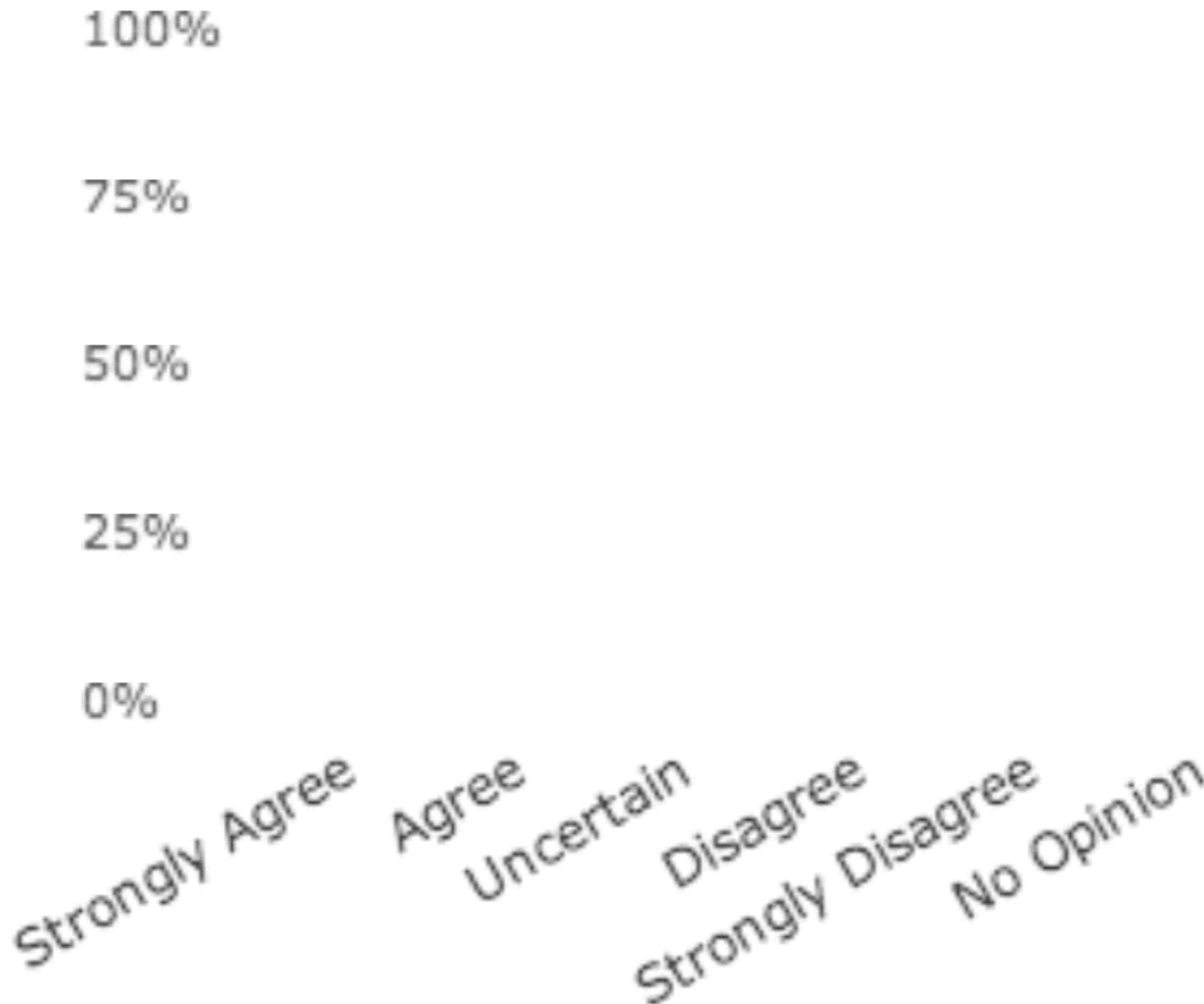
Price Floors and Employer Preferences: Evidence from a Minimum Wage Experiment

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http://www.john-joseph-horton.com/papers/minimum_wage.pdf

Minimum Wage

Question A: Raising the federal minimum wage to \$9 per hour would make it noticeably harder for low-skilled workers to find employment.



CHICAGO BOOTH

IGM FORUM

State of the “conventional” minimum wage literature

- Much of the evidence is quasi-experimental, from US states changing their minimums:
 - Card & Krueger, Card & Katz, Neumark & Wascher, Dube et al., Meer & West, Clemens & Wither and others

Challenges in conventional minimum wage research

- Lack of exogenous variation in minimum wages
- Lack of statistical power
- Measurement issues
 - Many hypothesized “margins of adjustment” are difficult to observe

This paper

- Uses data from a minimum wage experiment—and eventual platform-wide imposition—conducted in an **online labor market**
- Excellent measurement made at a range of minimum wages exogenously imposed for about 160K job openings

Agenda

- Empirical context
- Experimental design
- Experimental results
- Market-wide minimum wage announcement & imposition difference-in-differences results
- Conclusions

Experimental context

Empirical context

- A large online labor market for work that can be done remotely:
 - Computer programming, graphic design, data entry, etc.
- Focus is primarily on hourly contracts, with hours measured precisely by platform-provided software
- An excellent “testing ground” for phenomena that are generally hard to observe in conventional markets cf.
 - E.g., Pallais, Stanton & Thomas, Kerr & Stanton, Horton & Johari, Gilchrist, Luca & Malhotra

1. Employers post openings

Orthopaedic Surgery Research - Statistical Analysis

Statistical Analysis Posted 13 hours ago



Hourly Job

As needed - Less than 10 hrs/week
Less than 1 month

Indicates an hourly job

\$\$ Intermediate

I am looking for a mix of experience and value

Job Description

I have a data set that needs statistical analysis. It consists of multiple reviewers' (10-20) analyses of patient's x-rays. I need to examine the reviewers' overall agreement on the x-rays and their ability to judge surgical technique from the x-rays.

Skills Required

Data Science

Scientific Writing

Statistics

2. Workers apply & submit wage bids

Propose an hourly rate of:

Paid to You:

\$

10.00

/ hr

3. Employers screen applicants

Urgent! Translate a single slide into Chinese
Closed - Posted 12/06/2013 - [View or Edit](#) this job post

38 withdrawn or declined Sort by:

Wage bid

LIONG YAN WAI
Translator. Admin Assistant. Clerical Work. Web research. Da…
\$10.00 **★★★★★ 4.94** 100+ hours Malaysia Declined by Client

Hello. Thank you for posting your job offer. I am interested in contracting this job from you and I hope this job is still available by the time my application reaches ... [More](#)

Daphne Sung
Daphne Sung
\$1.11 **★★★★★ 4.85** 100+ hours Taiwan Withdrawn by Freelancer

Hi, I would like to apply for the job, Chinese is my native language. Thanks. [More](#)

Wencheng Hu
Chinese Translator; App Copywriter; Developer (Wordpress and…
\$15.00 **★★★★★ 4.91** 100+ hours United States Declined by Client

Hi, please look at the following: Talk Conclusions * Online labor is creating a new labor market unsegmented by geography * Great opportunities to: -Collect ... [More](#)

Productivity-relevant worker attributes

Experimental design

Platform-initiated minimum wage experiment

- Design goal: Create counter-factual in which job openings get same applicants they would have, but with below-minimum workers bidding up
- Randomization was at the level of the employer
 - Control (75% of sample): No minimum
 - Treatment Cells (25%): \$2/hour, \$3/hour & \$4/hour
- The minimum was enforced by not allowing wage bids below the employer's assigned minimum

Example Employer View

Control Treatment (MW2)

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38 withdrawn or declined Sort by: Best Match

 LIC Translators \$10.00 Hello and I am a native and I would like to apply for the job, Chinese is my native language. Thanks.	Wage bid: \$1.11	research. Da… a erested in contracting this job from you application reaches ...	Declined by Client
 Daphne Sung Daphne Sung \$1.11 ★★★★★ 4.85 100+ hours Taiwan	Withdrawn by Freelancer	Hi, I would like to apply for the job, Chinese is my native language. Thanks.	More
 Wencheng Hu Chinese Translator; App Copywriter; Developer (Wordpress and… \$15.00 ★★★★★ 4.91 100+ hours United States	Declined by Client	Hi, please look at the following: Talk Conclusions * Online labor is creating a new labor market unsegmented by geography * Great opportunities to: -Collect	More

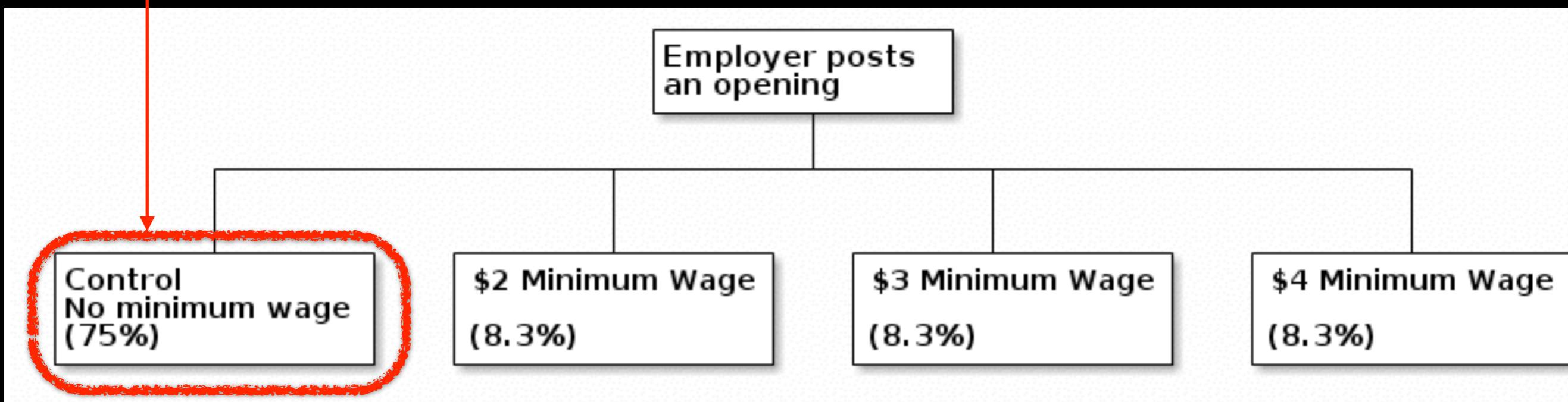
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75% of the sample
in the control to avoid
SUTA problems



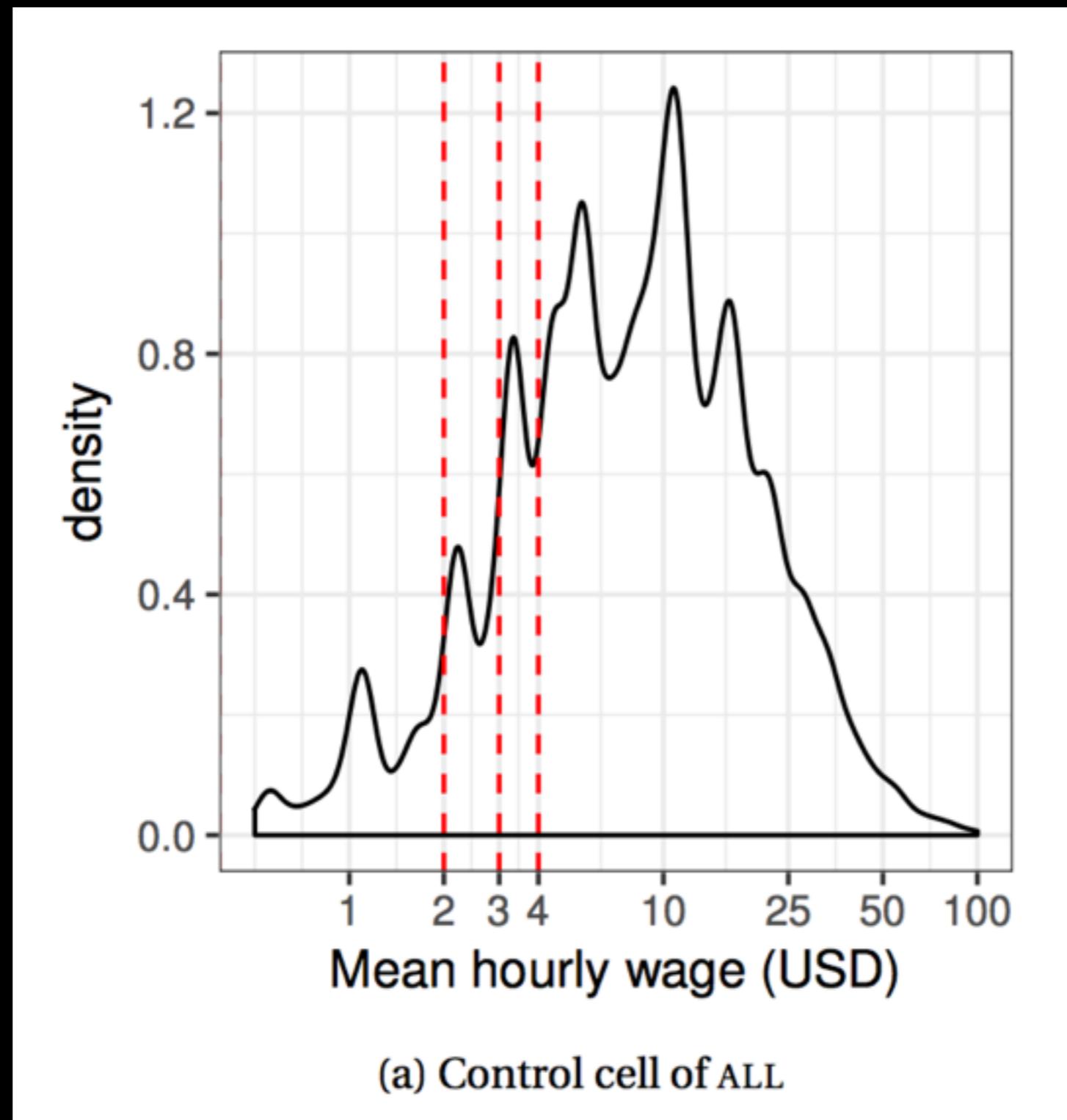
Threats to internal validity

1. Failed randomization: no evidence; openings well-balanced across cells
2. Workers “sort” across openings: logically difficult and no evidence—applicant counts and characteristics well-balanced across cells
3. Firms “sort” across platforms, or are displaced to offline work

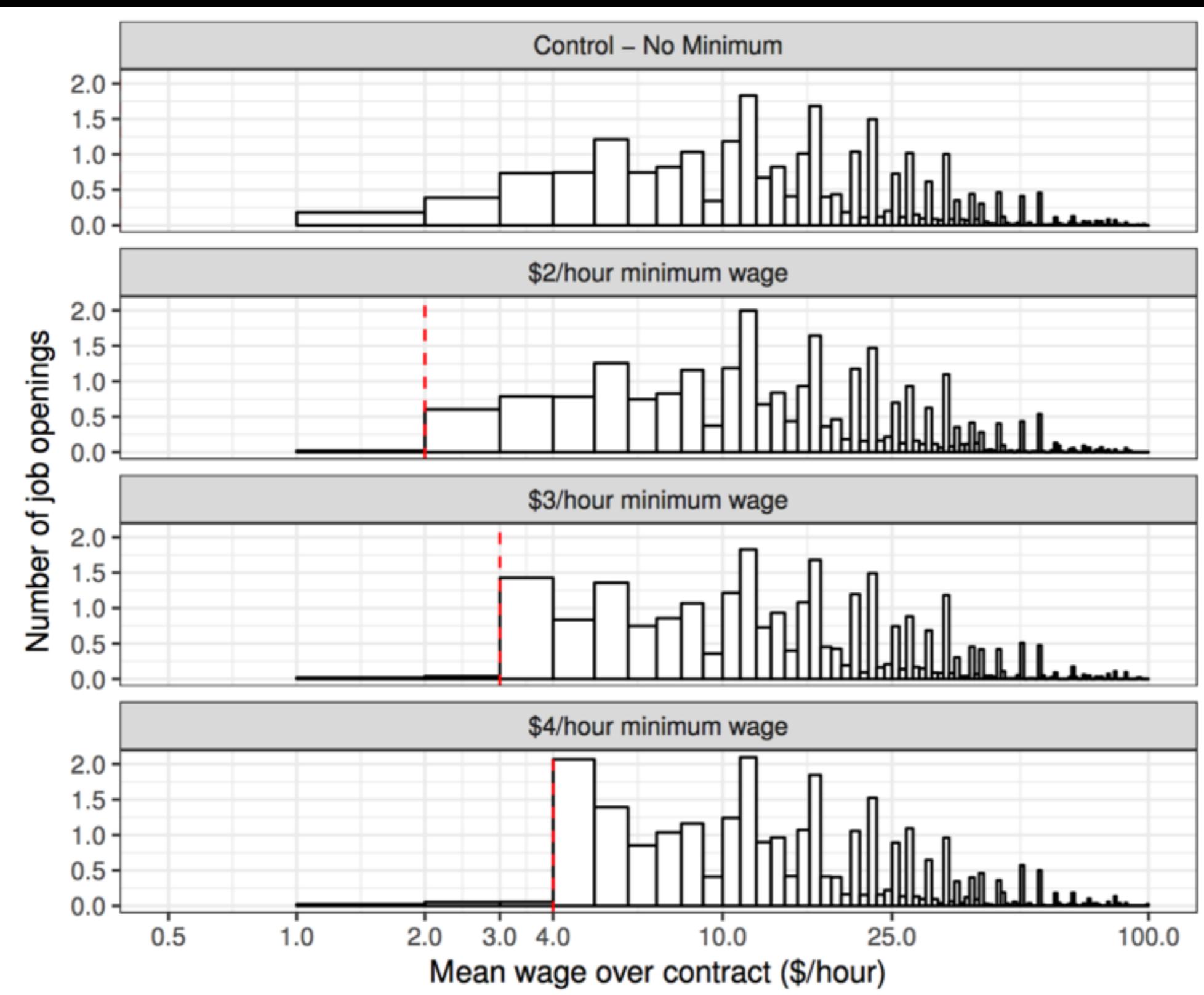
No evidence of displacement to other platforms. Prior survey evidence suggests weak online/offline substitutability

4. Market-moving violations of the SUTVA condition; intentionally small active treatment cells & relatively short duration

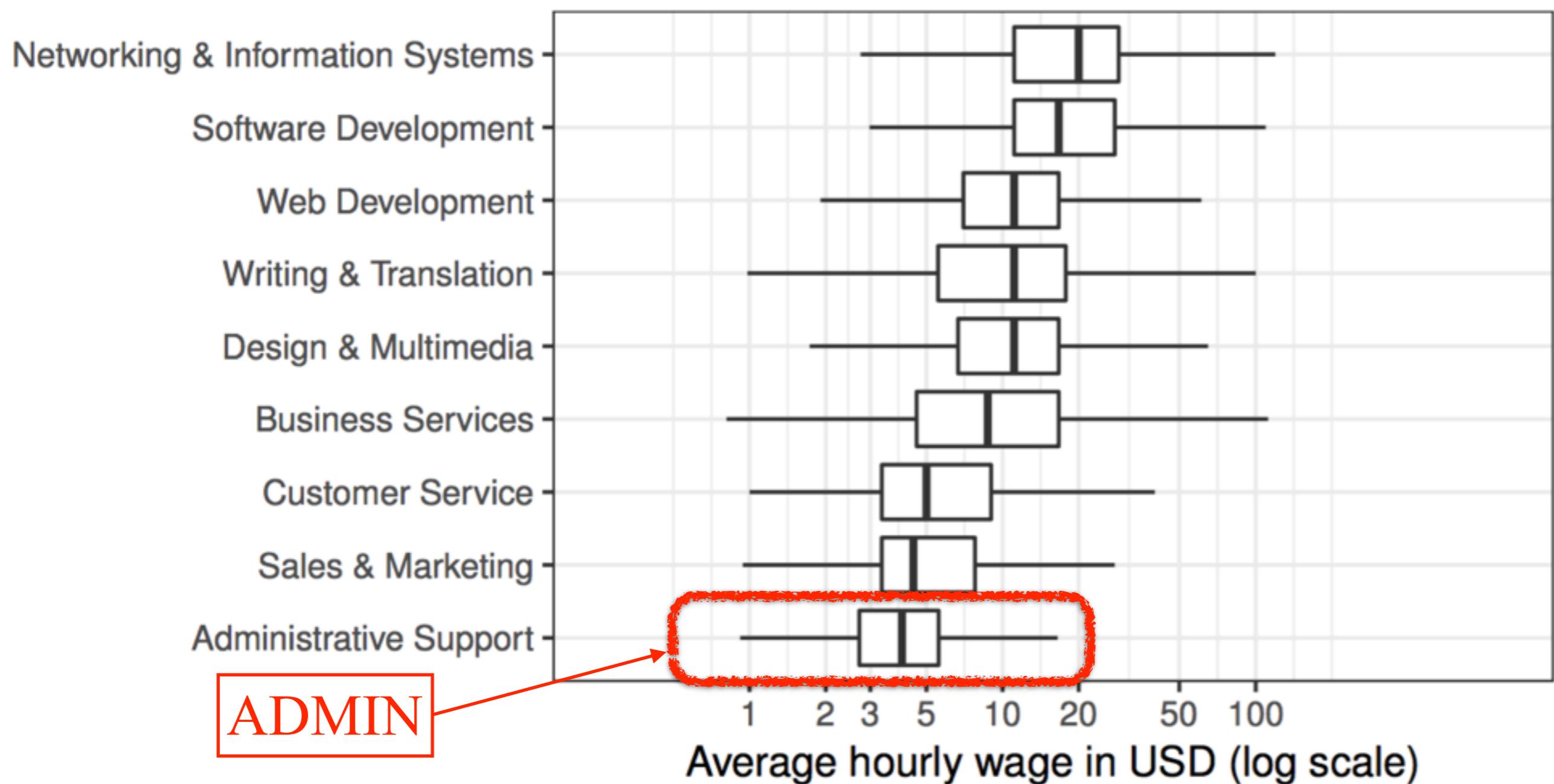
Does a \$2/hour MW ‘‘bite’’ in this market?



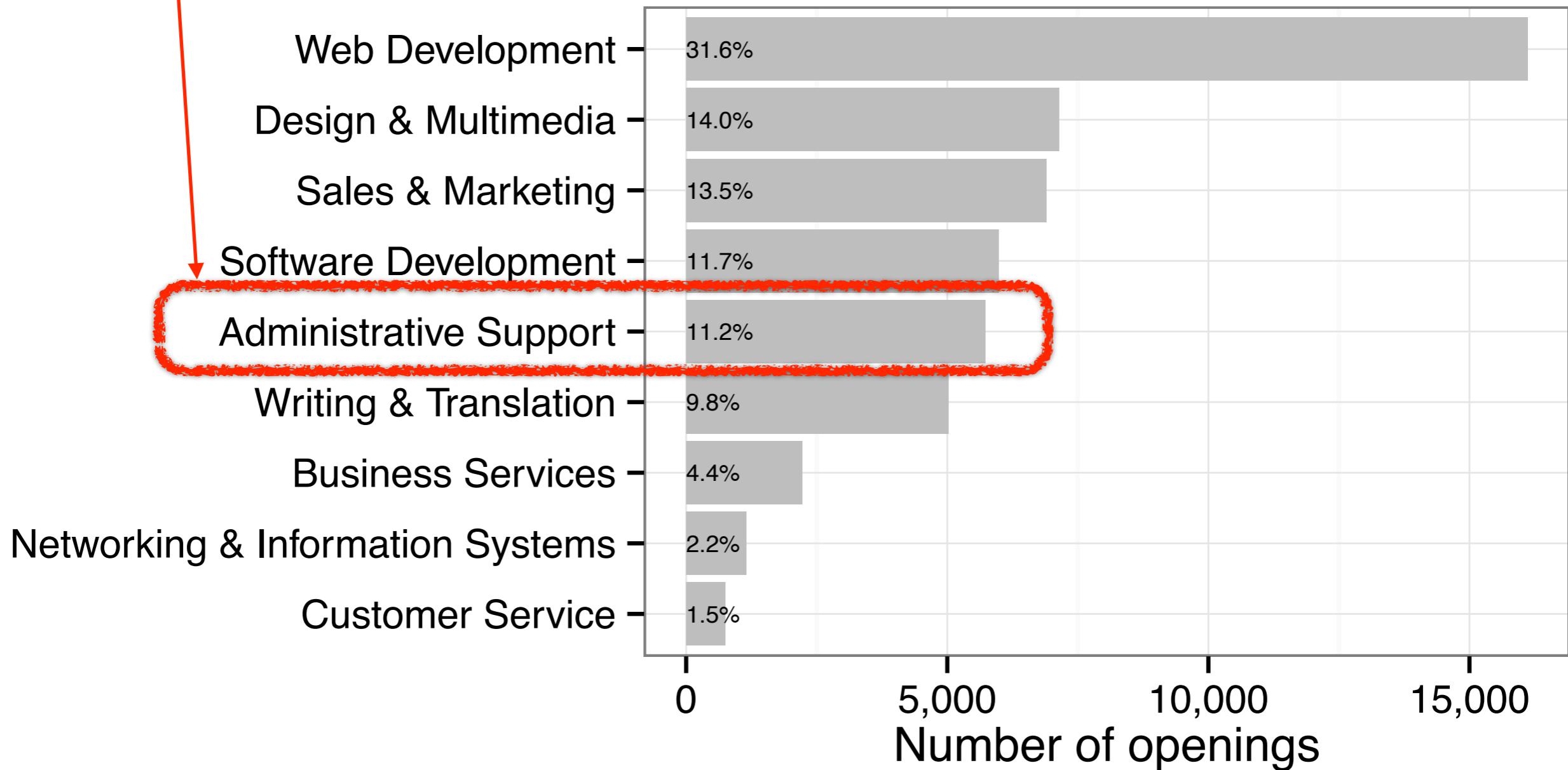
Compliance?



Where to look for effects?

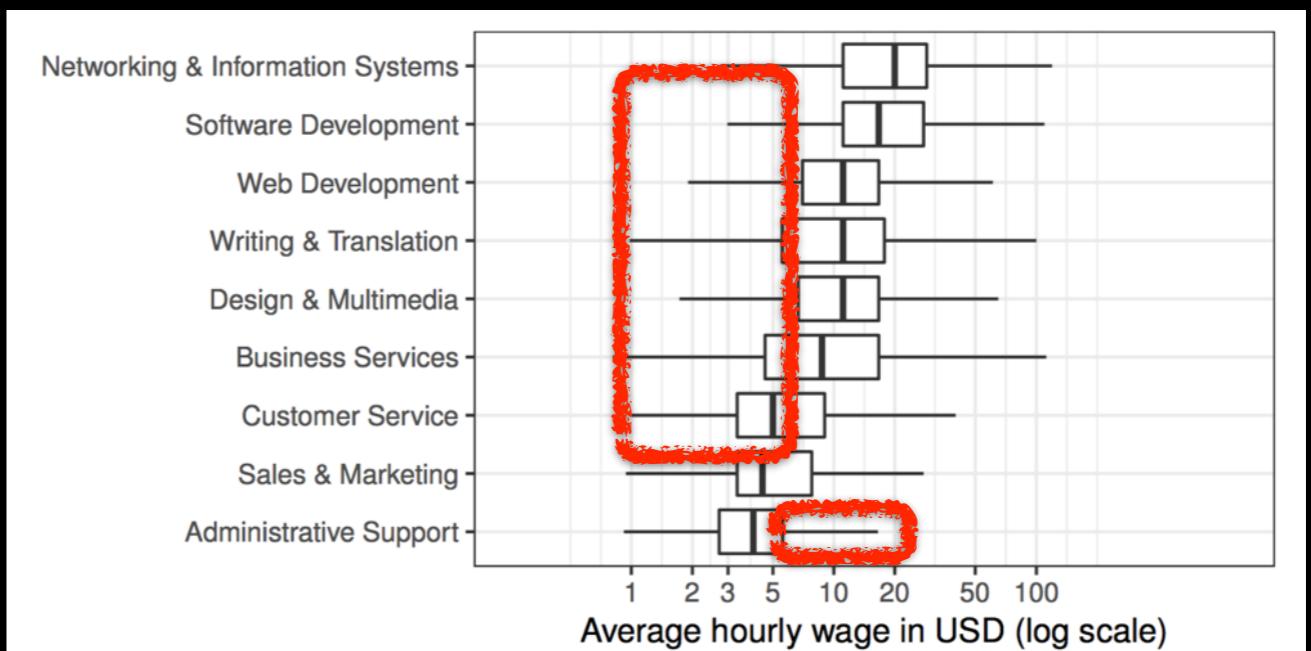


Only about 11%
of openings



Using historical platform data to predict low-wage openings

- Not all low-paying openings are in ADMIN and not all ADMIN openings are low-paying
- **Solution:** I fit a predictive model of wages using historical data, then selected openings with low-predicted wages as the LPW sample.

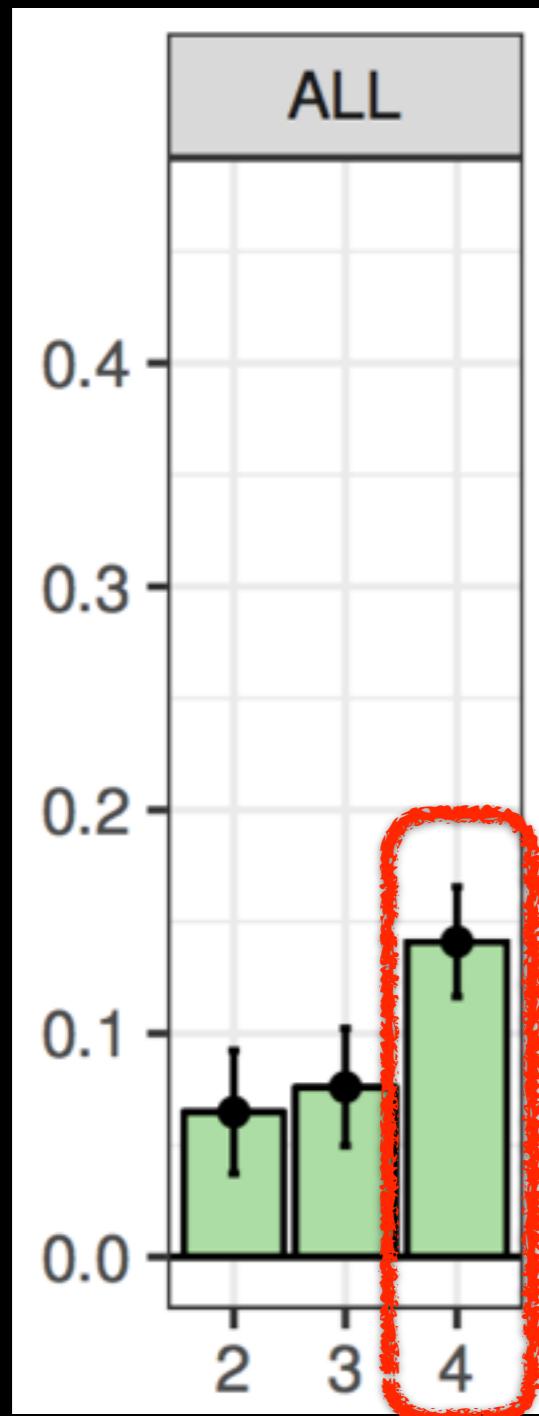


Experimental results

Outcomes

- Price
 - Log wage of hired worker (conditional upon hired)
- Quantities
 - Anyone hired?
 - Hours-worked (conditional upon a hire)
- Attributes of hired workers
 - Past wages, profile rates, past earnings
 - Country of hired workers

Outcome: Log wage of the hired worker



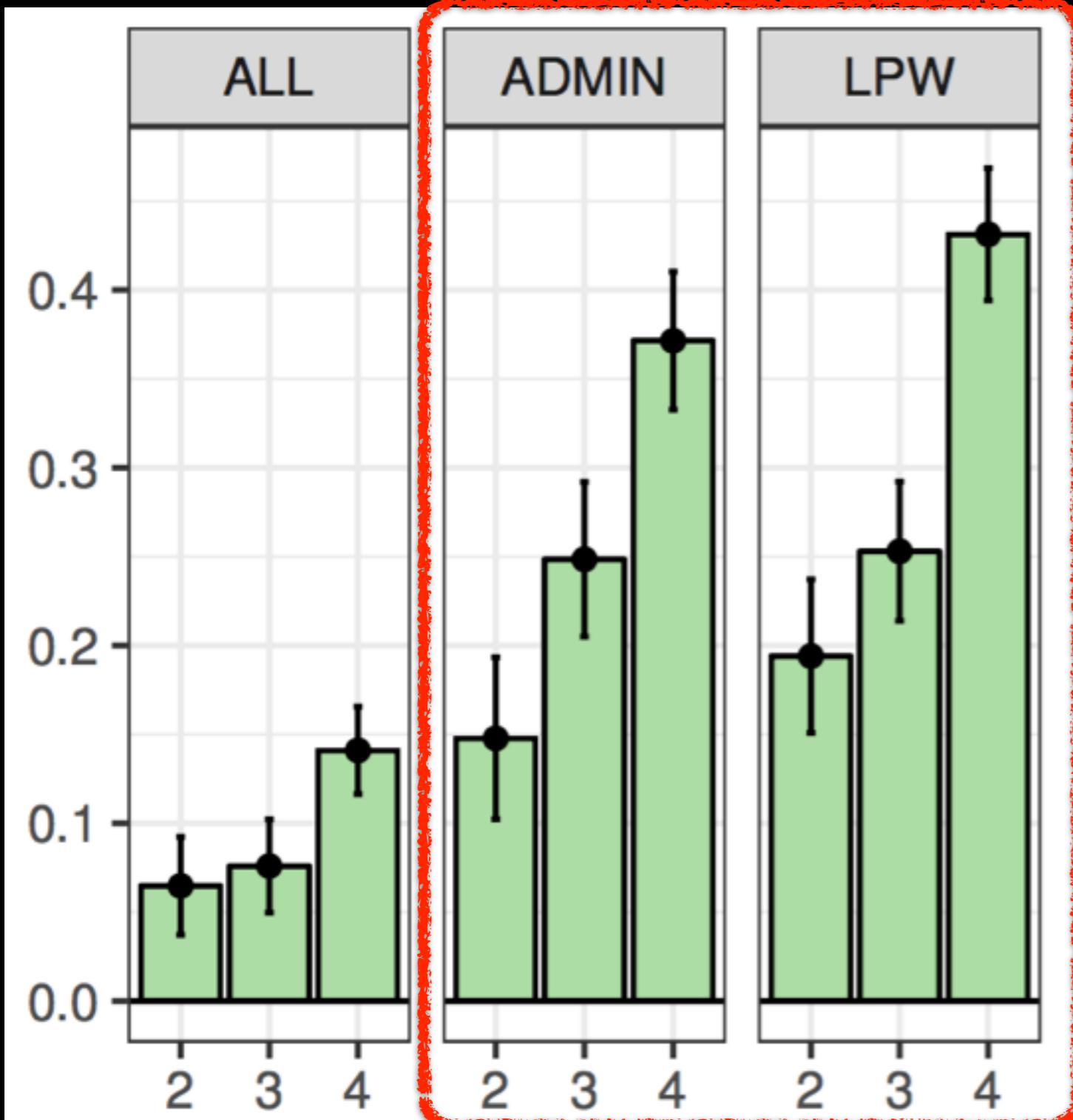
In MW4, hired worker wages were about 14% higher

ALL
(1)

Panel A: Group indicators

MW4	0.141*** (0.015)
MW3	0.076*** (0.015)
MW2	0.065*** (0.015)
Constant	2.107*** (0.004)
Observations	53,032
R ²	0.002

Outcome: Log wage of the hired worker



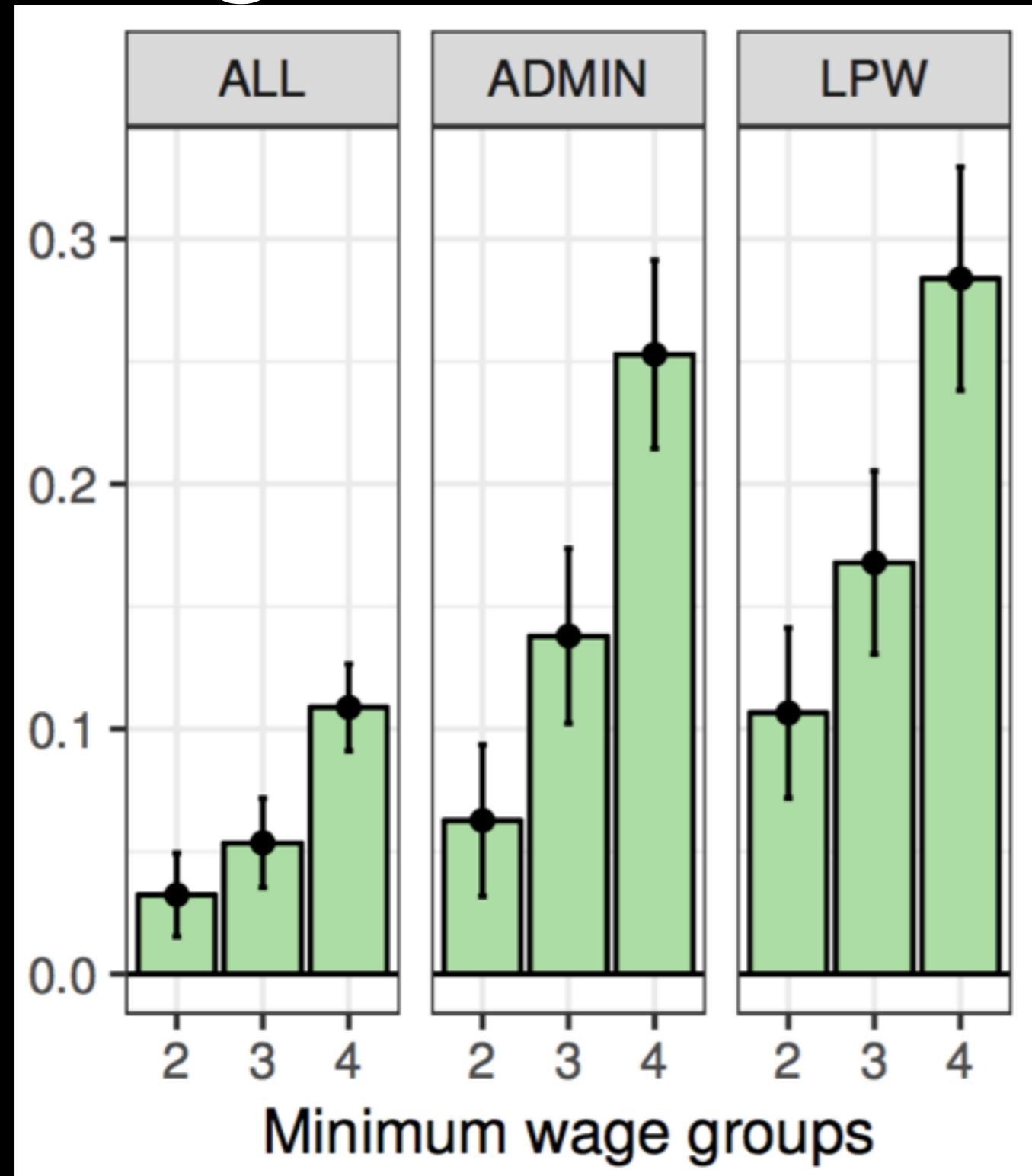
Even stronger wage increases in the sub-populations—around 40% in MW4.

LPW: “Low predicted wage” - predictions from a ML model fit w/ pre-experiment data

Why did wages increase?

- Markup effects—same workers hired, but at a higher wage
- Selection effects—jobs that would have paid low wages went unfilled
- Substitution effects—different (more productive) workers hired

Outcome: “Markup” in the wage bid of the hired worker



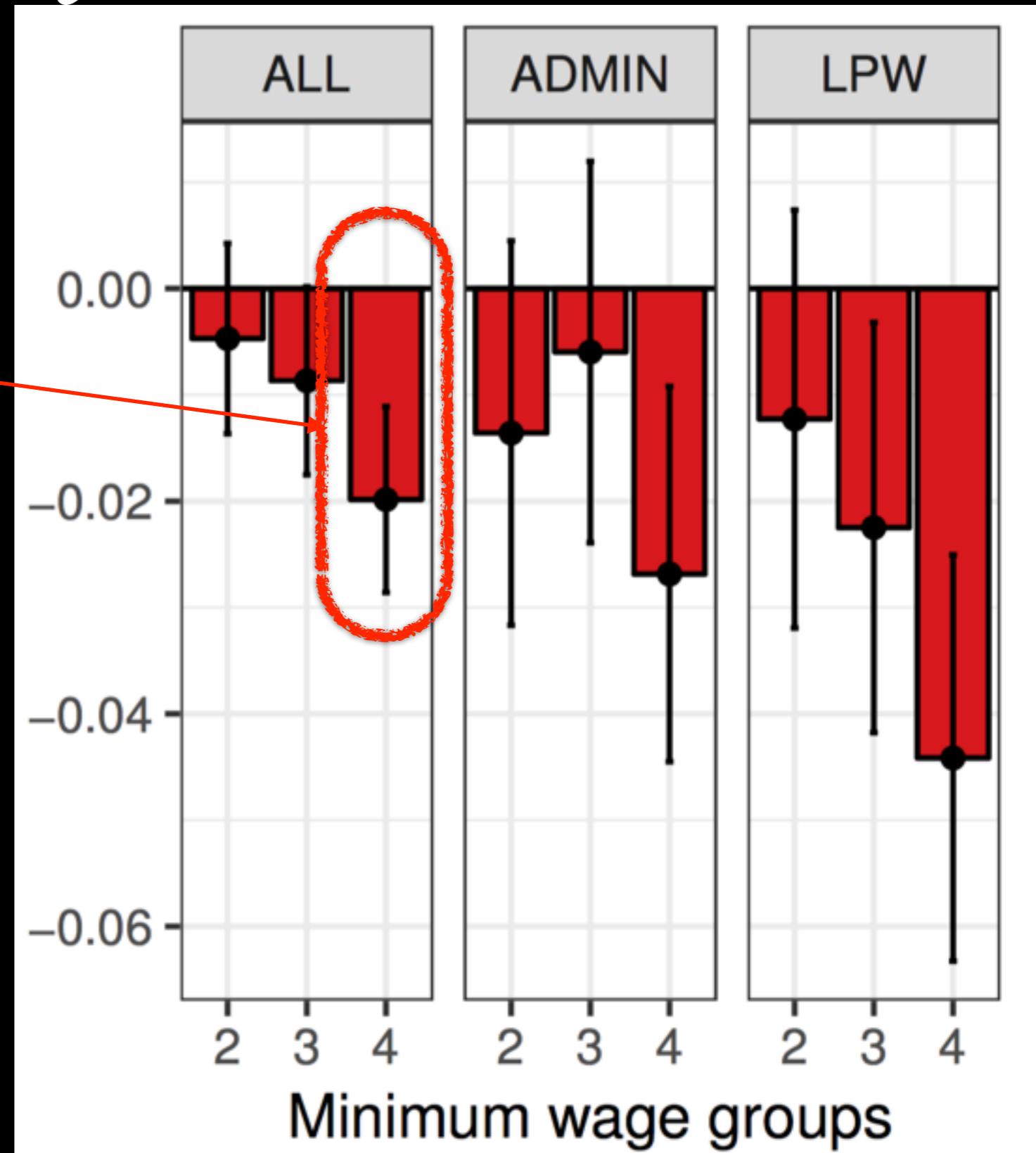
Markup:
Hired worker
wage relative to
their profile rate

Workers
are getting
a higher wage
relative to previous
“market” wage

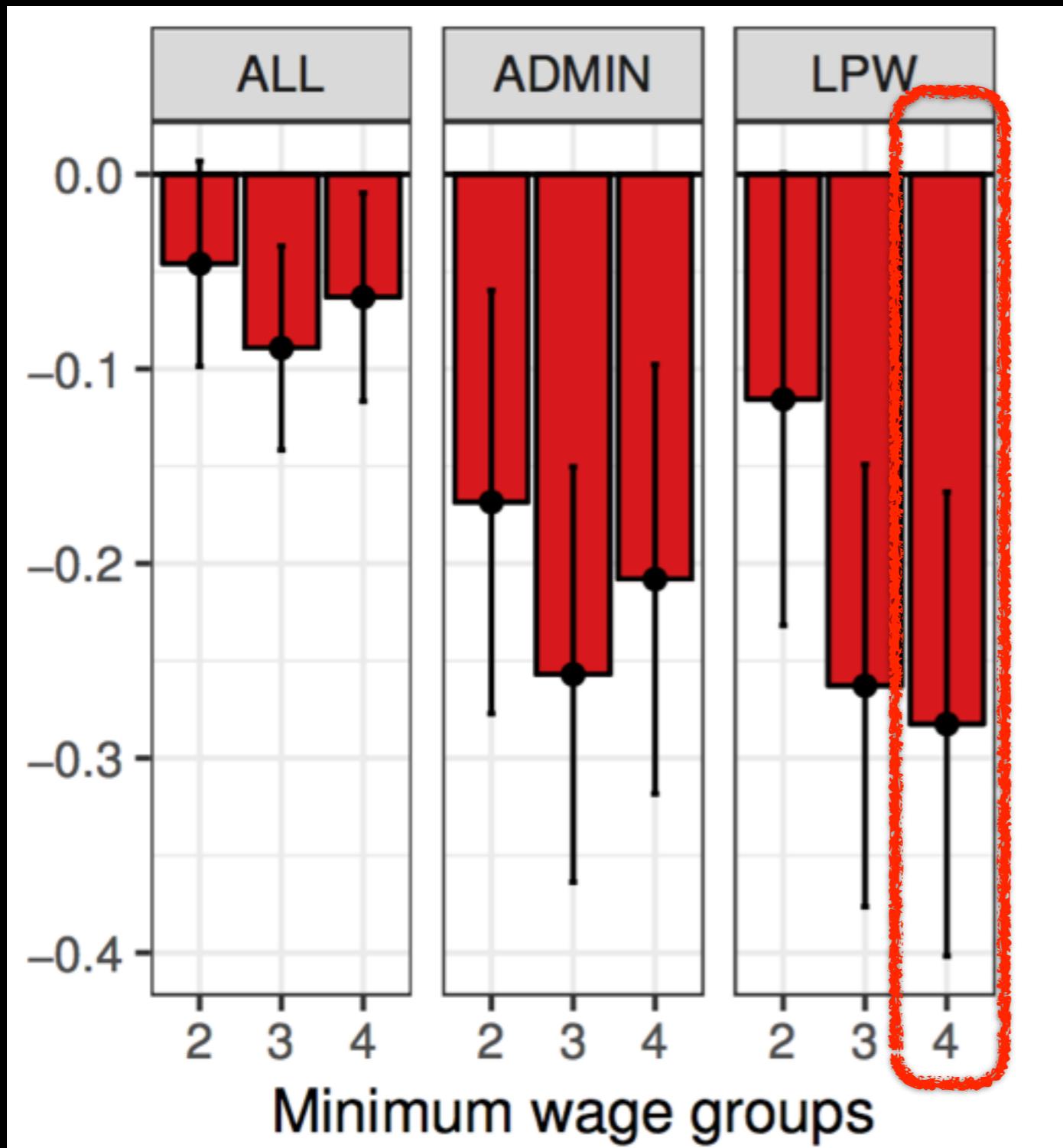
Outcome: Any worker hired?

This is only a 2 percentage point reduction, or about 4%

These are small effects.
E.g., ADMIN MW3:
1% decrease for a
MW near the median



Outcome: Log hours-worked, conditional upon a hire



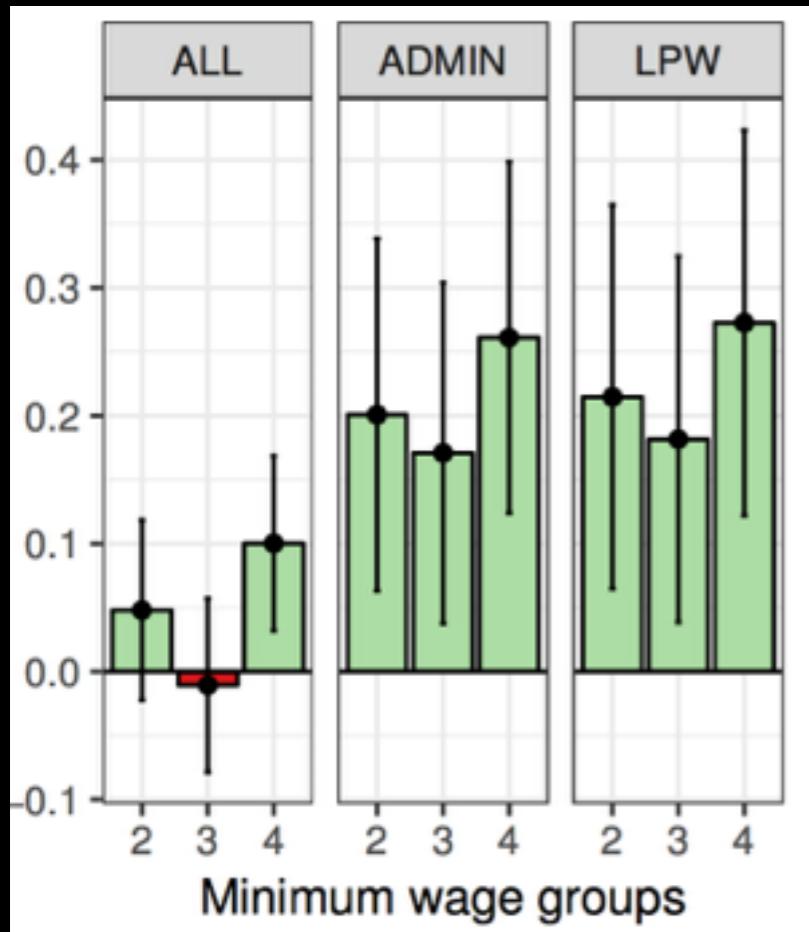
Large reductions
in hours-worked; e.g.,
nearly -30% in MW4
in LPW

Why the reduction in hours-worked?

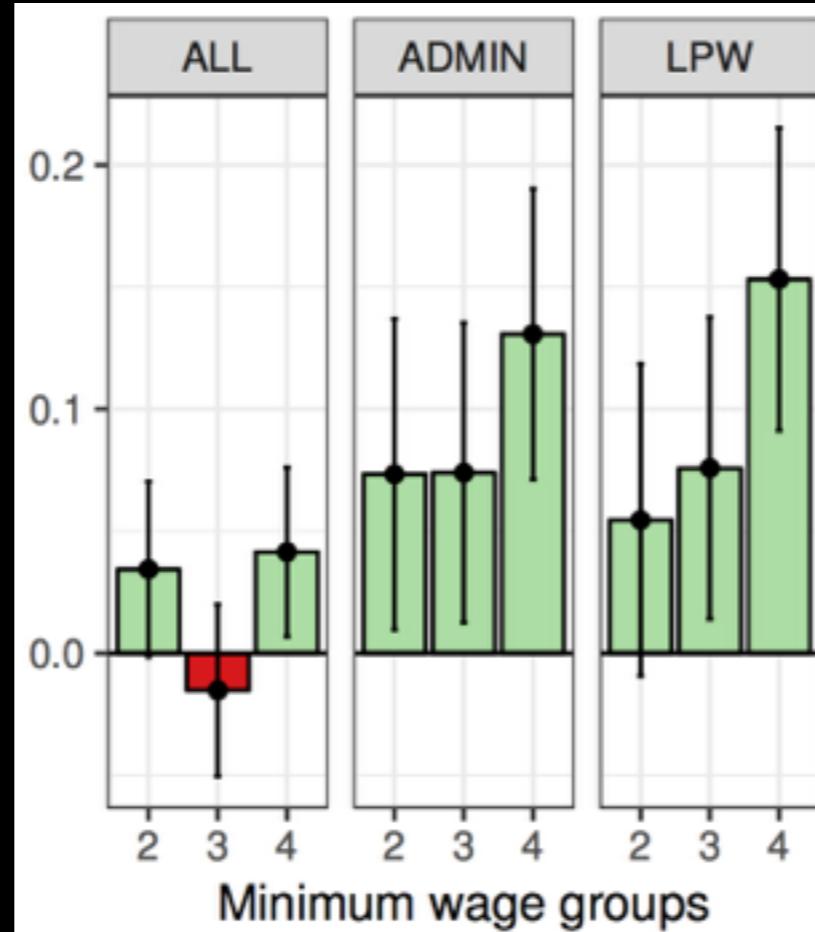
- Endogenous project sizes: Firms reduce the scope of projects when labor costs are higher
- Efficiency wage: Firms hire same workers, but they are made more efficient and can complete projects more quickly
- Labor-Labor substitution: Firms hire more productive, higher wage workers that can complete projects more quickly

Outcome: the *attributes* of hired worker that are proxies for productivity

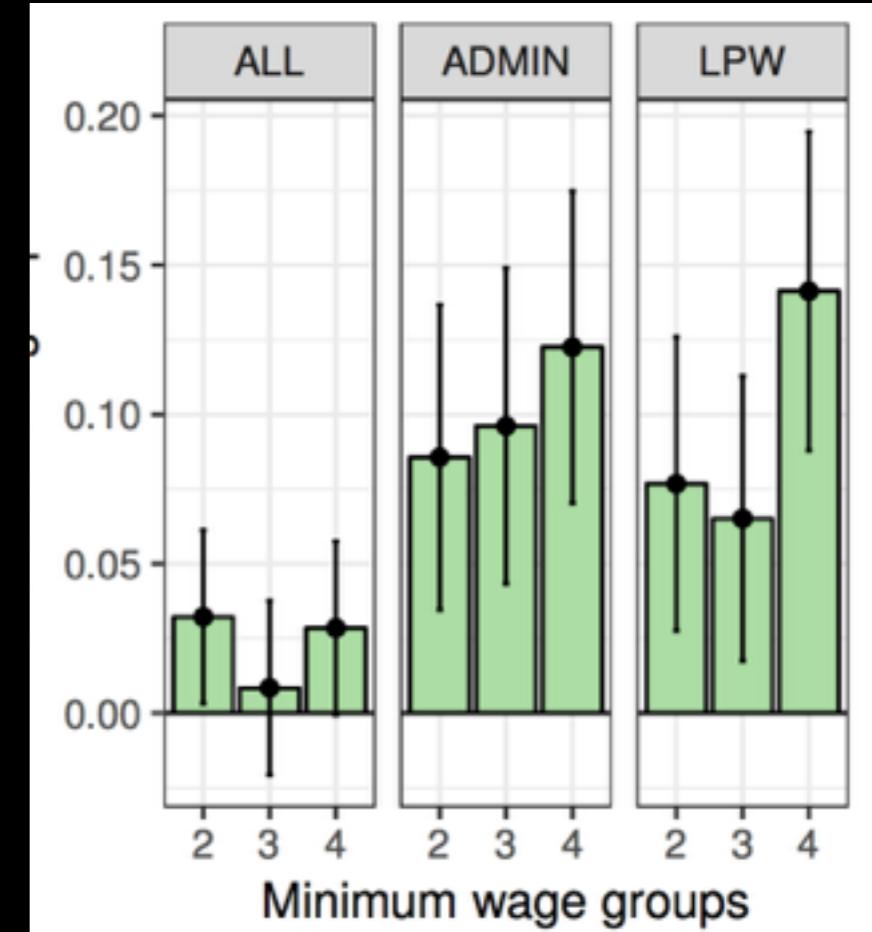
Log cumulative past earnings



Log average past wage



Hired worker profile rate



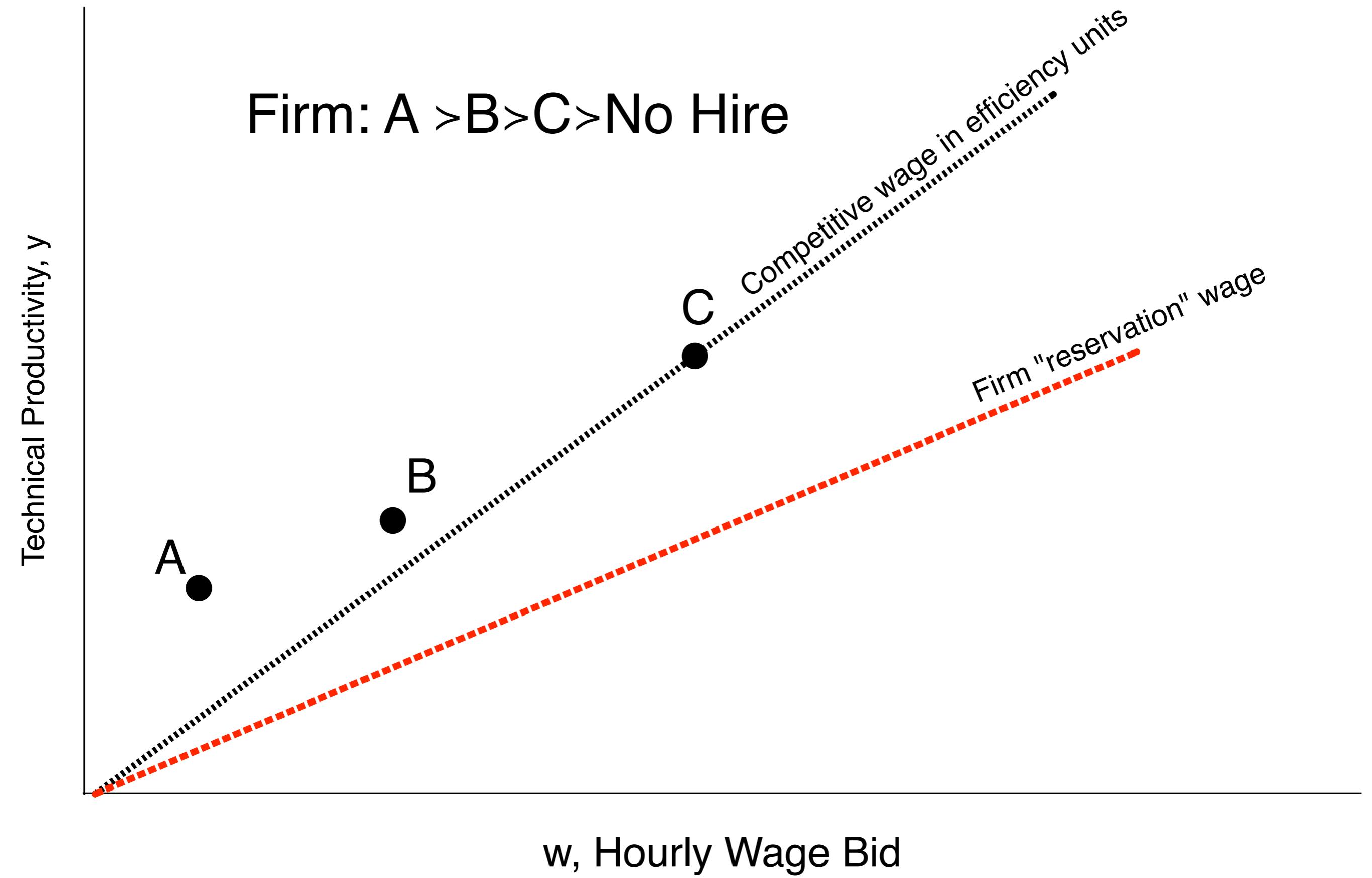
Answers to the questions I posed

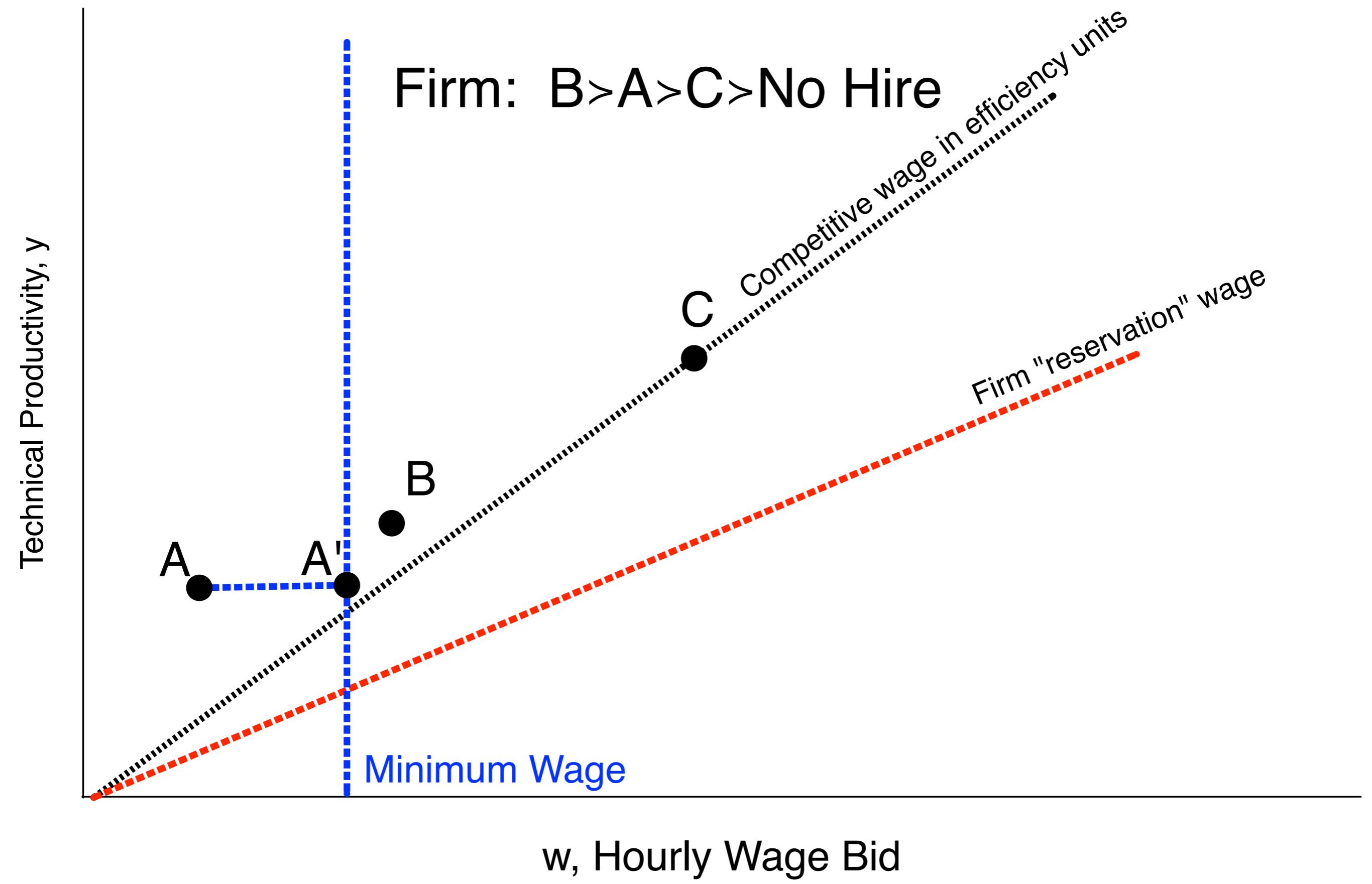
- Why did wages increase?
 - Both substitution towards higher wage workers & a markup effects; no evidence of much of selection effect
- Why did hours-worked decrease?
 - In part substitution towards more productive workers; no evidence on endogenous project size reduction or efficiency wage effects

How does substitution “work” here?

- Employers have projects of size Y . Workers vary in their technical productivity, y ; jobs get done in Y/y hours. Workers submit an hourly wage bid, w .
- From a collection of candidates:
$$\max_{j \in J} \left\{ \underline{u}_i, pY - w_j \frac{Y}{y_j} \right\}.$$
- What matters to employers is the ratio of the wage to the technical productivity

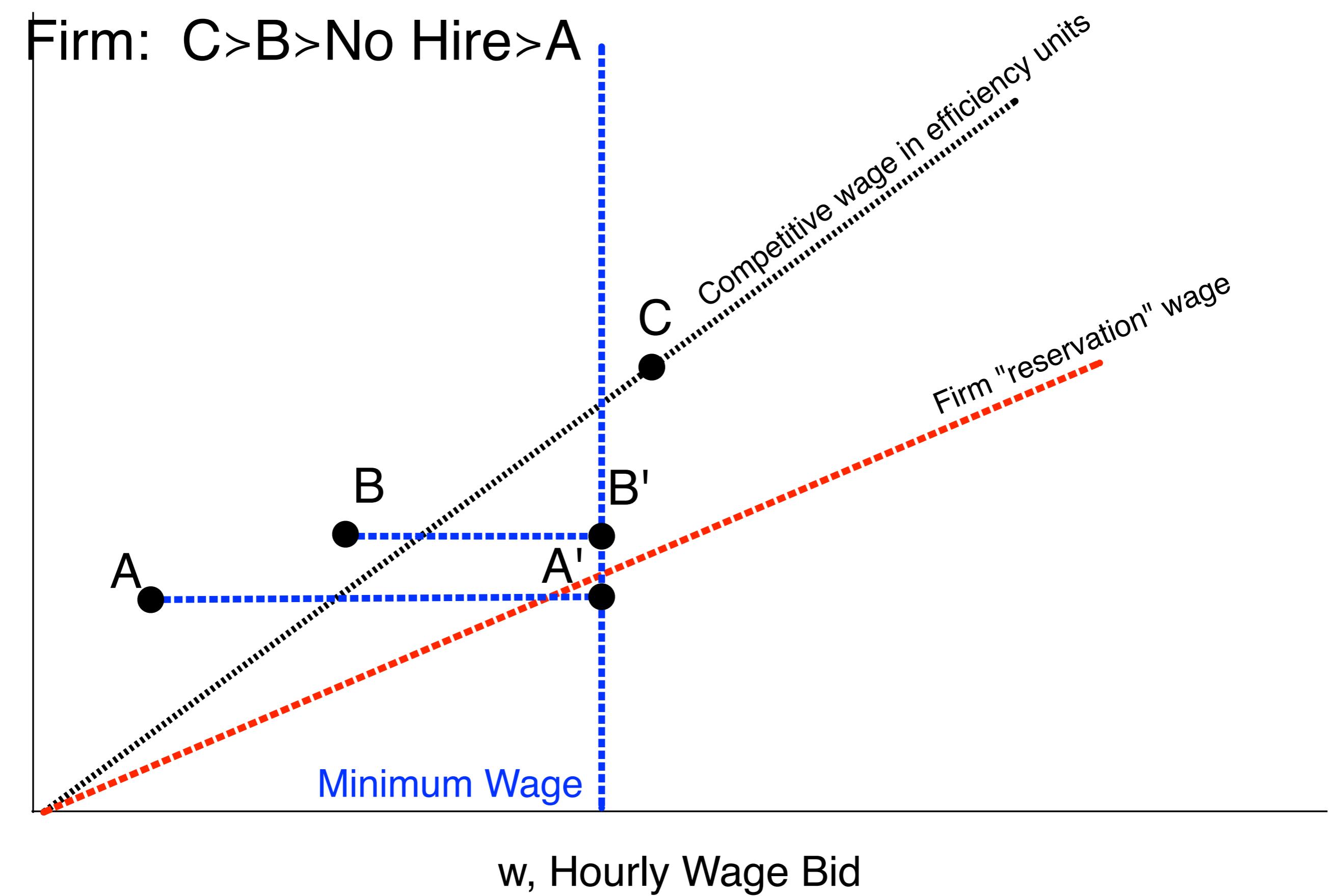
Firm: A >B>C>No Hire





Firm: C>B>No Hire>A

Technical Productivity, y



Labor-labor substitution in conventional research

- Not much evidence of it, through some exceptions (e.g., Giuliano 2013), however it is almost always looked for by looking at employment by demographic group:
 - Teenagers, women, African-Americans, and so on
 - What if we try to do the same demography-focused analysis to look for substitution?

Labor-labor substitution by hired worker country

Labor-labor substitution by demographics only
detectable at highest wages

	Hired worker from:			
	US	India	Philippines	Bangladesh
	(1)	(2)	(3)	(4)
MW4	0.032*** (0.008)	-0.003 (0.012)	-0.011 (0.014)	-0.025* (0.012)
MW3	0.009 (0.008)	0.007 (0.012)	-0.006 (0.014)	-0.016 (0.012)
MW2	0.003 (0.008)	0.001 (0.012)	0.009 (0.014)	-0.008 (0.012)
Constant	0.073*** (0.002)	0.187*** (0.004)	0.303*** (0.004)	0.209*** (0.004)
Observations	14,131	14,131	14,131	14,131
R ²	0.001	0.00003	0.0001	0.0004

What about in equilibrium?

- The problem: If all firms tried to hire more productive workers, it would bid up their wages
 - Equilibrium results might look very different from the experimental results

Platform-wide announcement and imposition

- After the experiment ended, the platform publicly announced and then imposed a \$3/hour minimum wage
- DD: I analyze job openings posted job before and just after, using one calendar year prior as a comparison.
- What's nice here: I can compare the experimental estimates to the “equilibrium” estimates

Anyone hired?

Announcement
(2 weeks before/after)

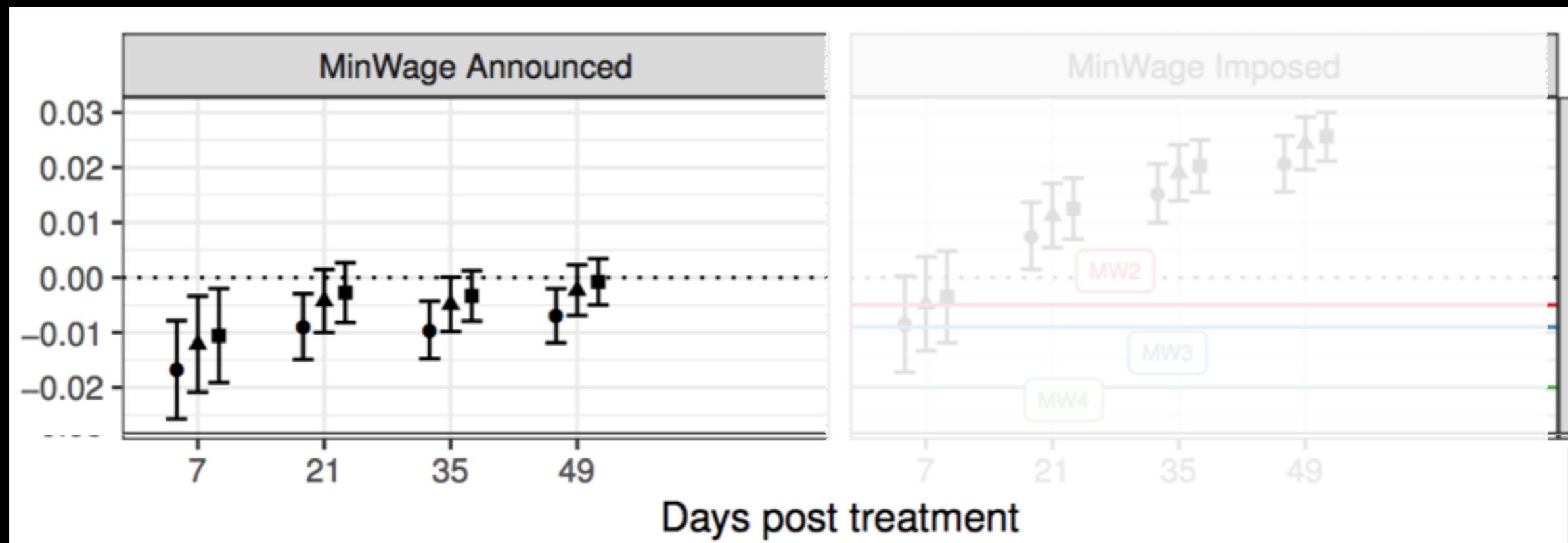
Imposition
(2 weeks before/after)

Dependent variable:

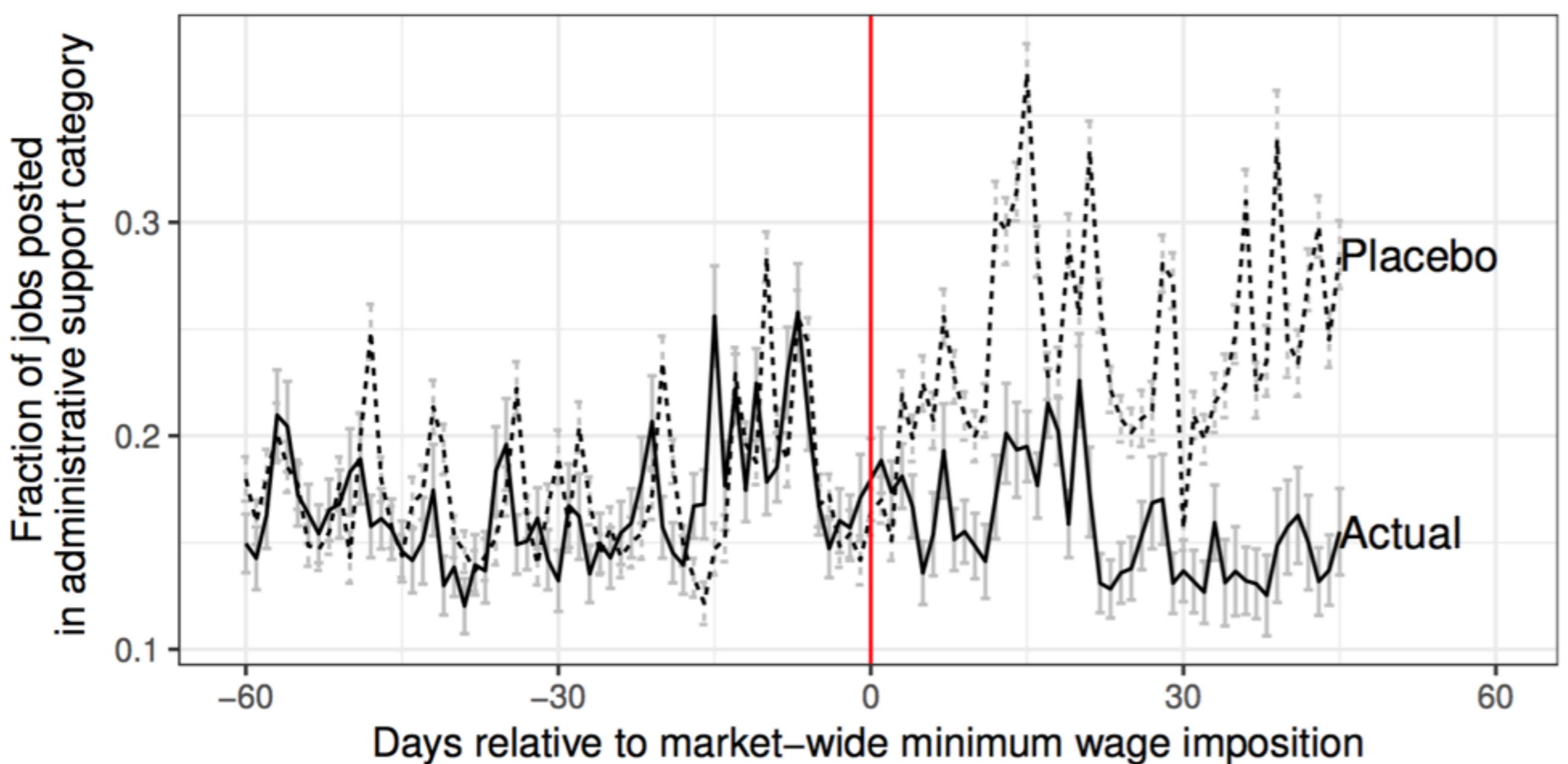
	Announce (Actual)	Announce (Placebo)	Anyone hired?	
	(1)	(2)	(3)	(4)
POST	0.0001 (0.004)	0.007 (0.004)	-0.002 (0.004)	0.005 (0.004)
Constant	0.395*** (0.003)	0.392*** (0.003)	0.382*** (0.003)	0.365*** (0.003)
R ²	0.00000	0.0001	0.00001	0.00003

Outcome: Hire made?

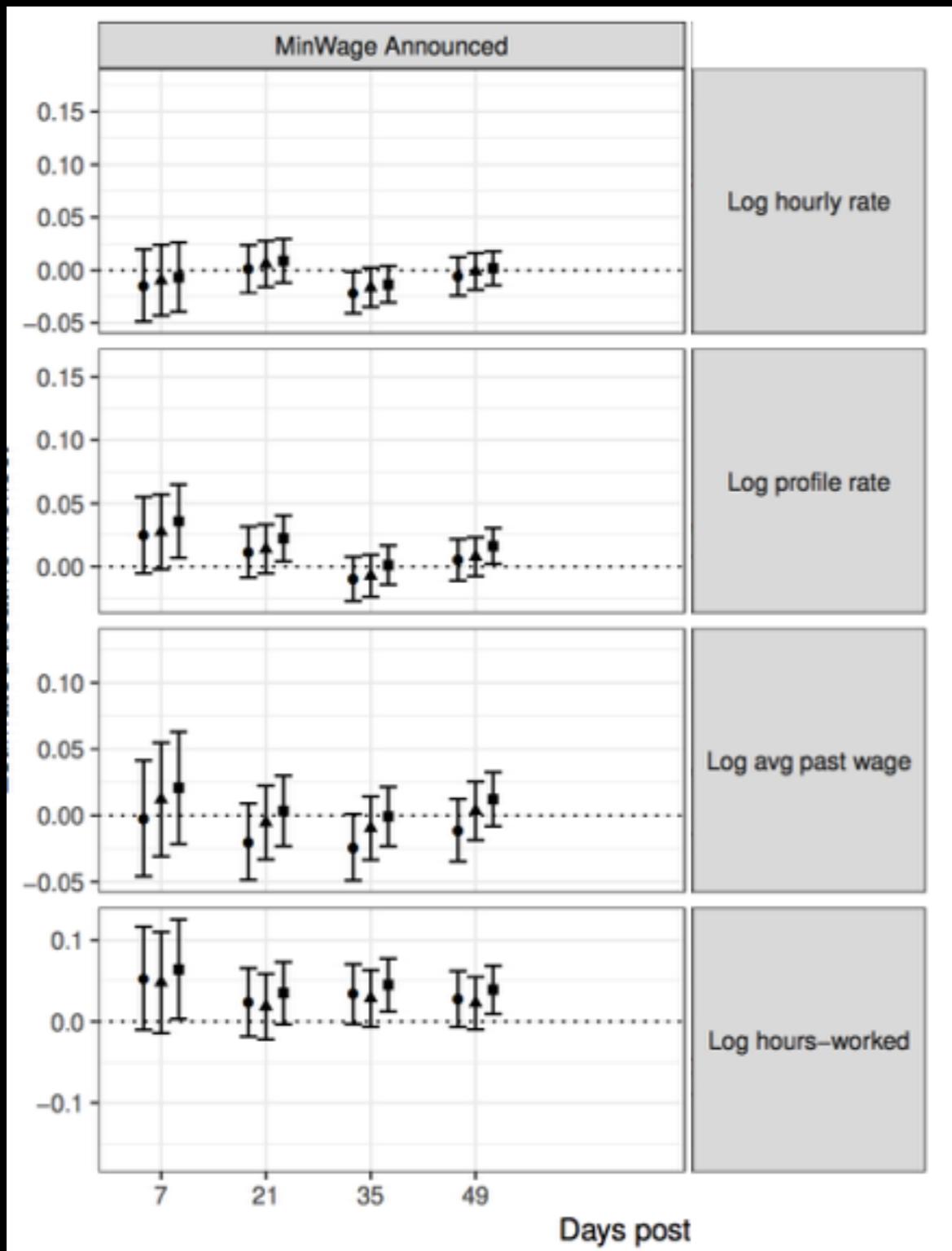
$$(Y_{post}^{Actual} - Y_{pre}^{Actual}) - (Y_{post}^{Placebo} - Y_{pre}^{Placebo})$$



Daily fraction of job openings in administrative category



Effects of MinWage announcement on filled opening outcomes

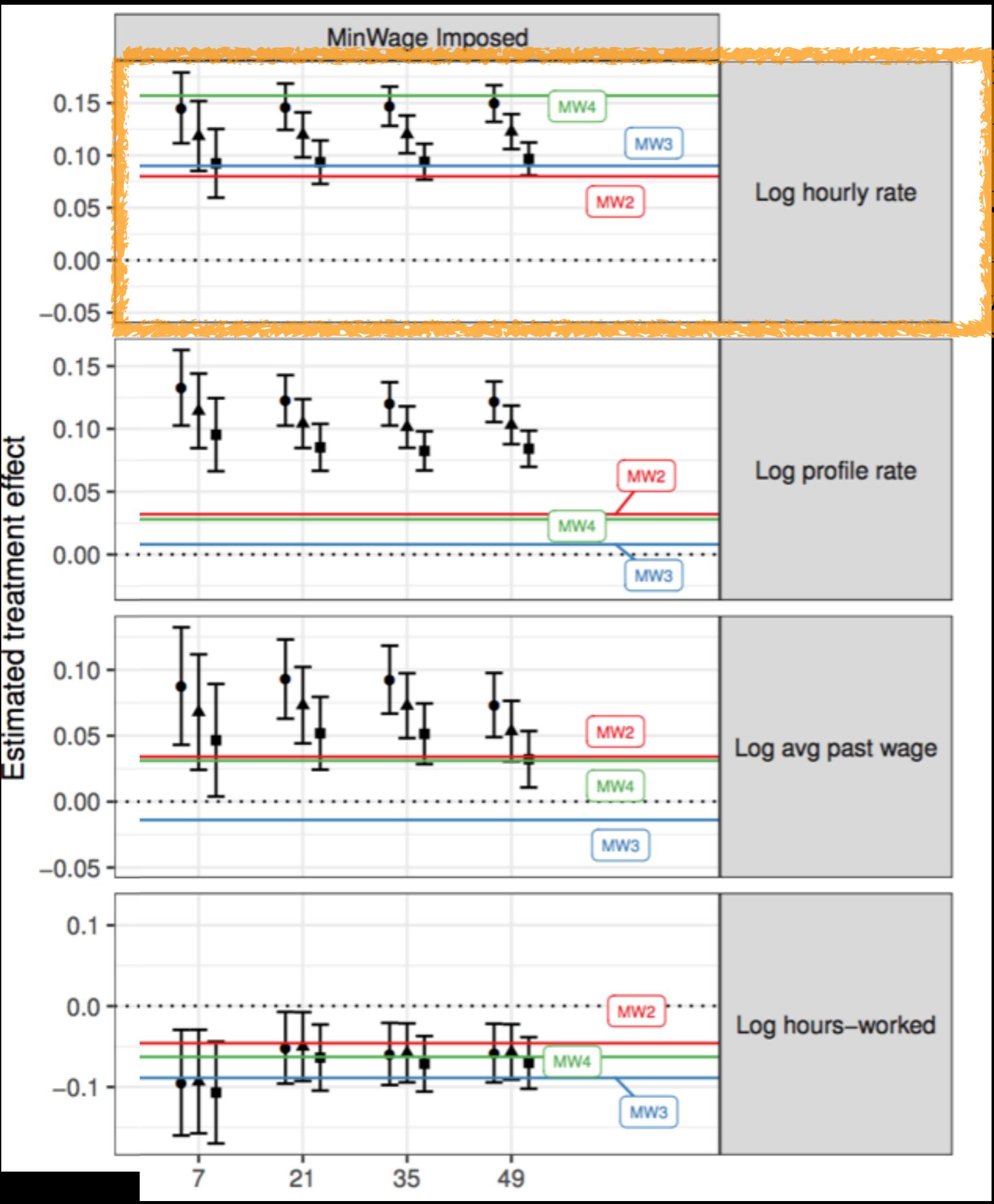


Hired worker wage

Hired worker profile rate

Hired worker past wage

Hours-worked



Wage
Profile Rate
Past wage
Hours-worked

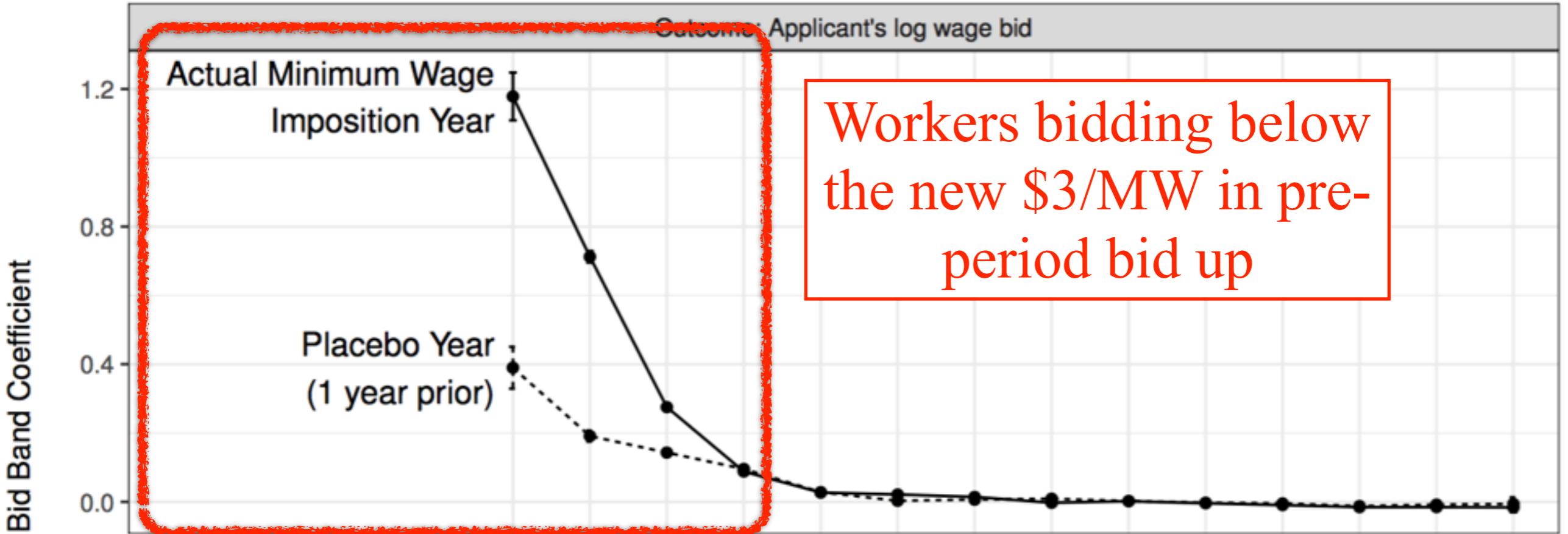
Effects of imposition of worker bidding and hire rates

Indicator for application after the minimum wage is imposed

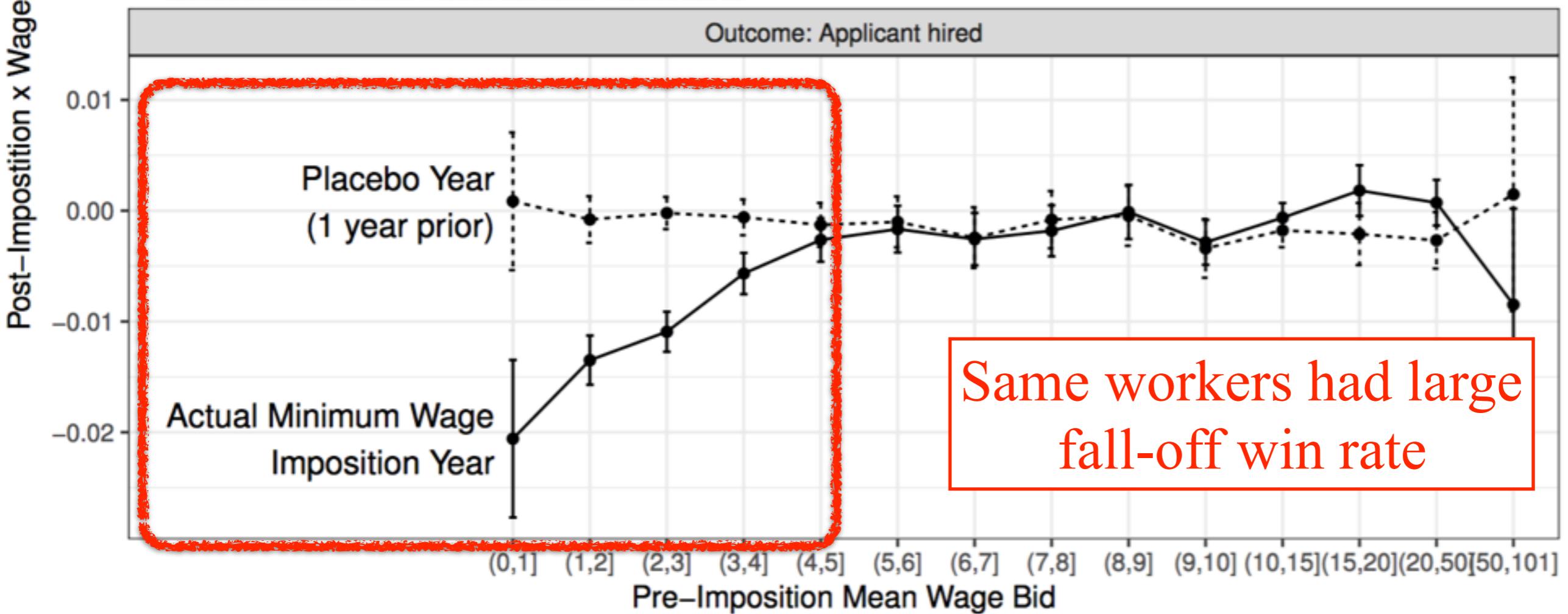
Indicators for average pre-period freelancer hourly wage bid

Worker FE

$$y_{ij} = \sum_{k \in K} \beta_k (\text{POST}_{ij} \times \text{PREWAGEBAND}_i^k) + c_i + \epsilon,$$



Workers bidding below the new \$3/MW in pre-period bid up



Same workers had large fall-off win rate

Summary of findings

- Prices: Large increase in hourly wages from an imposed minimum
- Quantities:
 - Little reduction in hiring from even *very* high minimum wages
 - Large reductions in hours-worked, even when no reduction in hiring
- Hired worker attributes:
 - Substantial substitution towards more productive workers
 - Evidence that the market-wide minimum wage made it harder for low-wage workers to be hired

Concluding thoughts

- Labor-labor substitution results only detectable because of fine-grained productivity measures
 - Plausible that this substitution happens in conventional markets but goes largely undetected because most variation in productivity is *within* demographic groups rather than *between*

Thanks!

- Paper: Price Floors and Employer Preferences: Evidence from a Minimum Wage Experiment
- Author: John J. Horton, NYU Stern School of Business
- Paper: www.john-joseph-horton.com/papers/minimum_wage.pdf