The Heterogeneous Effects of Large and Small Minimum Wage Changes: Evidence over the Short and Medium Run Using a Pre-Analysis Plan

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Outline

- **Outline:**
  - Motivation: Key facts and open questions from the minimum wage literature.
  - Discussion of what our paper finds and how we went about finding it.
  - Sketch of simple models that can rationalize much of the literature.
  - Discussion of how the literature fits together.

Where does the minimum wage literature stand?

- Two facts about the literature:
  - The average employment elasticity estimate is small and negative (Neumark and Shirley, 2021).
    - Estimates range from small and positive to large and negative.
  - A number of well-published recent studies find null employment effects.
    - Three recent papers in the Quarterly Journal of Economics report null net employment effects, reductions in racial wage disparities, and a reallocation of workers from "bad" firms to "good" firms.

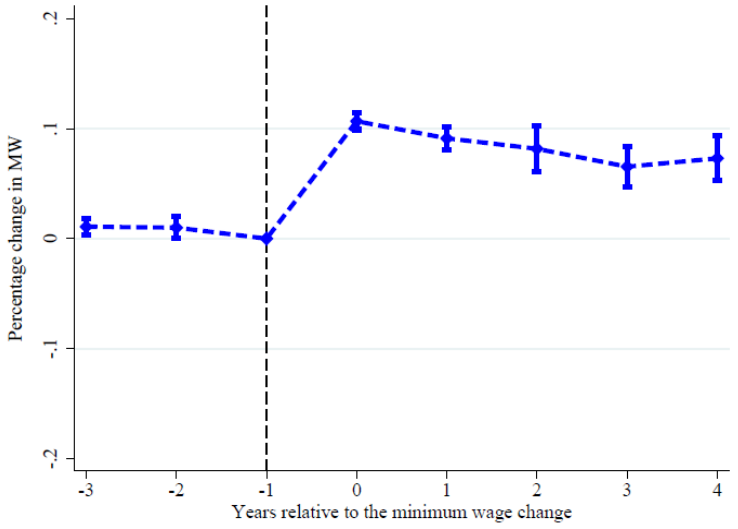
- Questions:
  - To what extent can the estimates in the literature be rationalized?
  - Should the "consensus" estimates of small or near-zero employment effects be used to project the effects of a $15 federal minimum wage?

Proponents contend that we already know what we need to know about a $15 minimum wage.

- Researchers at Berkeley's IRLE have simulated the effect of a $15 minimum wage in Mississippi (Reich, Allegretto, and Montialoux, 2019).
  - "The key finding in Table 9 is that a $15 minimum wage will have a very small positive net effect on employment in Mississippi."

- But the estimates from key studies rely on variation far more modest than an increase from $7.25 to $15, as would occur in Mississippi.

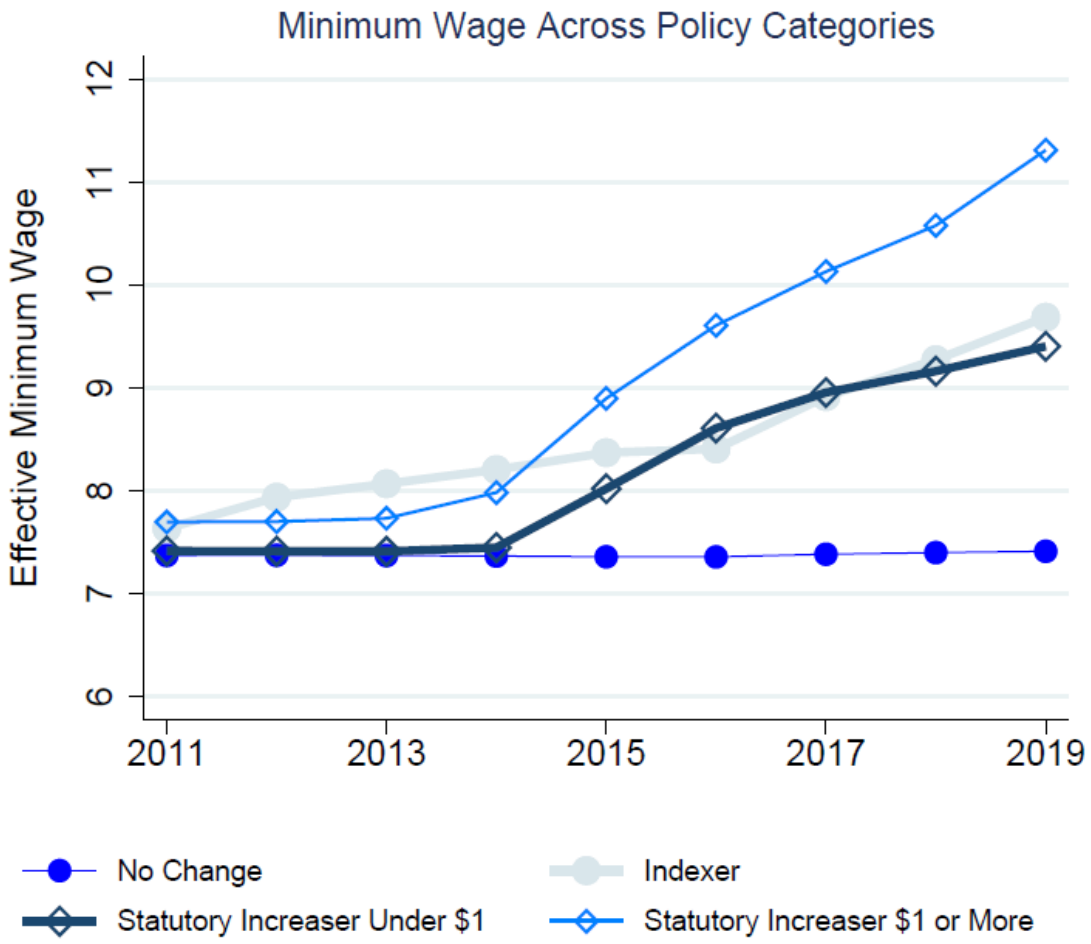
Across the 138 historical changes analyzed by Cengiz et al (QJE, 2019, Figure A4), the average is just over 8 log points.



The 2010s provide richer variation than previous decades

- Minimum wage variations have been substantial over the last decade.
  - Large differences have emerged.
  - These differences have been sustained for longer than has been typical.

- We analyze these variations two ways:
  - We implement a wave of analyses that draw on recent insights into best practice (specifically, a "stacked event study" estimator and an "imputation" estimator).
  - Our primary analyses emphasize transparency. We follow a pre-analysis plan we developed while analyzing data that extended from 2011 to 2015.



Large vs. Small Minimum Wage Increases

- Differentiating between "large" and "small" minimum wage changes is a more important empirical innovation than you might think:
  - Most models predict qualitatively different impacts.
    - Competitive model with non-wage compensation (e.g., fringe benefits).
    - Competitive model with non-compensation amenities/disamenities (e.g., contractible effort).
    - Imperfectly competitive models with "bargaining wedges."
    - Recent equilibrium models of minimum wage impacts (e.g., Berger, Herkenhoff, and Mongey, 2021 or Hurst, Kehoe, Pastorino, and Winberry, 2021).
  - Yet empirical work has historically regressed ln(Employment) on ln(min wage), which imposes a constant elasticity.
  - Recent work, including ours, has used "event-based frameworks," which make it natural to consider heterogeneity across the events.

- CBO's simulations allow for modest differences in the elasticities applied to small vs. large minimum wage increases.

What do we see in the employment data?

- Estimates of minimum wage employment effects draw on comparisons of employment in states that increased minimum wages relative to those that did not.
- The tables below present the unadjusted tabulations of ACS and CPS data that underlie our estimates for individuals ages 16 to 25 with less than a completed high school education.

Table 6. Unadjusted Differences Across Policy Regimes Using ACS Data and $1 Cutoff

	(1) 2011-2013	(2) 2019	(3) Change	(4) Change Relative to Non-Increasers
Low-Skilled Employment				
Non-Increasers	0.239	0.293	0.054	
Indexers	0.222	0.291	0.069	0.015
Increase < $1	0.246	0.291	0.045	-0.009
Increase >= $1	0.188	0.202	0.014	-0.040

Table A4. Unadjusted Differences Across Policy Regimes Using CPS Data and $1 Cutoff

	(1) 2011–2013	(2) 2019	(3) Change	(4) Change Relative to Non-Increasers
Low-Skilled Employment				
Non-Increasers	0.250	0.282	0.032	
Indexers	0.240	0.273	0.033	0.001
Increase < $1	0.238	0.326	0.088	0.056
Increase >= $1	0.198	0.198	0.000	–0.032

- In the unadjusted data, low-skilled employment in states with “large” increases underperforms relative to states with no increases.
- There are mixed findings (comparing the CPS and ACS) for states with “small” increases.
- The “Indexer” states modestly overperform.

Labor Markets in States with Minimum Wage Increases Had Stronger Macroeconomic Tailwinds

Table 6. Unadjusted Differences Across Policy Regimes Using ACS Data and $1 Cutoff

	(1) 2011-2013	(2) 2019	(3) Change	(4) Change Relative to Non-Increasers
House Price Index				
Non-Increasers	274.0	373.8	99.8	
Indexers	290.6	469.7	179.1	79.3
Increase < $1	302.4	394.7	92.3	-7.5
Increase >= $1	455.0	677.4	222.4	122.6
Income *per capita* ($1000s)				
Non-Increasers	40.99	51.26	10.27	
Indexers	40.87	53.05	12.18	1.91
Increase < $1	44.79	56.50	11.71	1.44
Increase >= $1	50.52	68.42	17.9	7.63
Prime-Age Employment				
Non-Increasers	0.751	0.791	0.040	
Indexers	0.746	0.797	0.051	0.011
Increase < $1	0.768	0.812	0.044	0.004
Increase >= $1	0.748	0.802	0.054	0.014

- Regression adjustments for proxies for macroeconomic conditions will tend to result in estimates that are more strongly negative for “large” minimum wage increases.

Regression Permutations in the Pre-Analysis Plan

- (1) ACS or CPS data.
- (2) Analysis samples consisting of “low-skilled workers” or “young workers.”
- (3) Difference-in-differences or triple-difference specifications.
- (4) A “post” period consisting of 2015-2019 or of 2019 alone.
- (5) The barrier between “large” and “small” changes based on changes enacted through January 2015 or based on changes enacted through January 2018.
- (6) Including all states in the analysis or omitting states that shift policy categories between January 2015 and January 2018.
- (7) Variations on the variables in the set of demographic and macroeconomic controls.

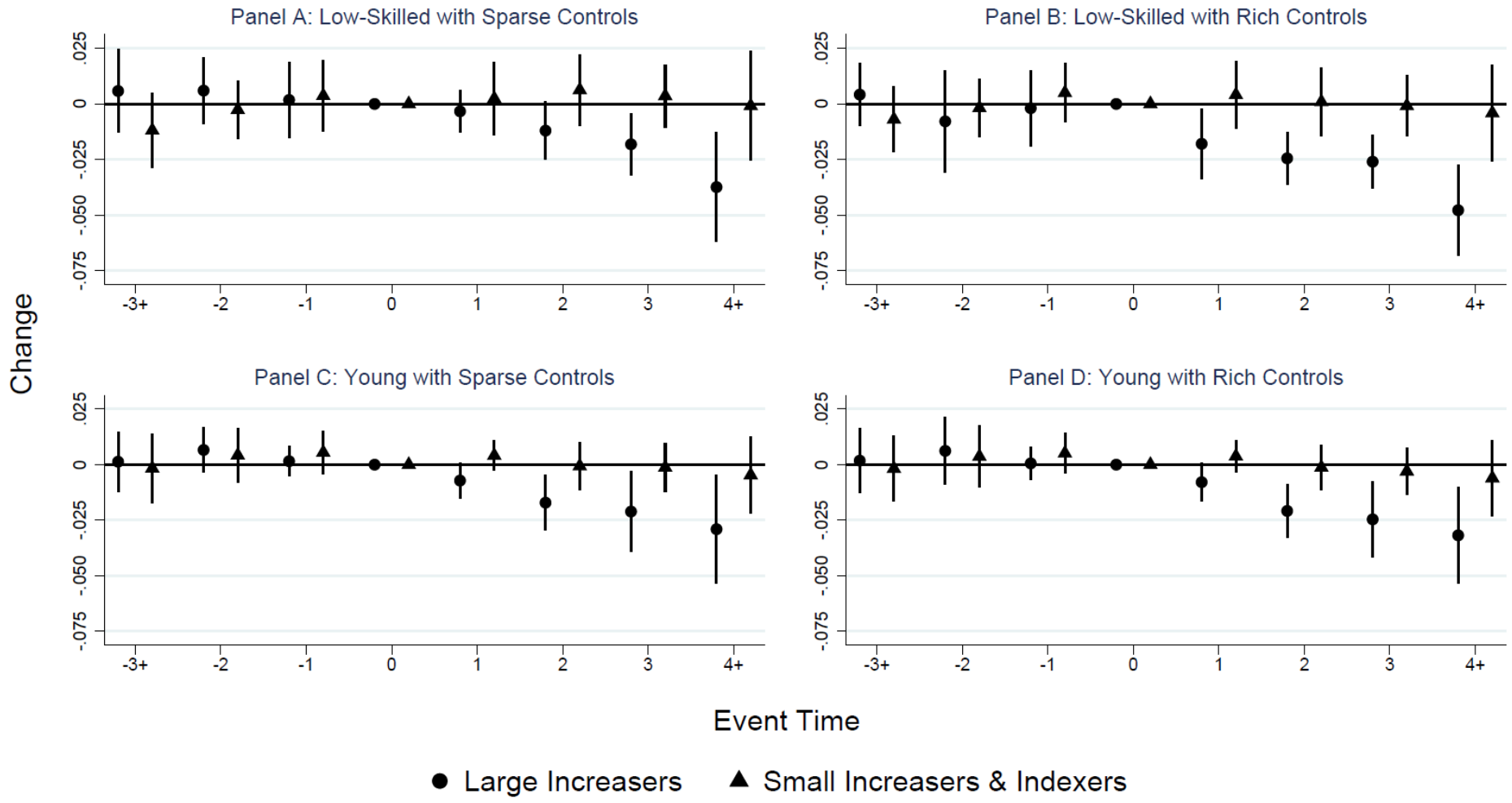
Summaries across Our Full Set of Estimates

Table 8. Summary of Employment Regression Results

Panel A. Low-Skilled Workers	(1)	(2)	(3)	(4)
Sample	All	All	All	All
Policy Group	All Changers	Large	Small	Indexer
Original Categories				
Post Period 2015–2019	−0.0038	−0.0277	0.0117	0.0046
Post Period 2019	−0.0080	−0.0419	0.0171	0.0009
Original Categories No Switchers				
Post Period 2015–2019	−0.0049	−0.0282	0.0104	0.0031
Post Period 2019	−0.0085	−0.0422	0.0172	−0.0006
Updated Categories				
Post Period 2019	−0.0094	−0.0315	0.0044	−0.0012
Overall Averages	−0.0066	−0.0340	0.0124	0.0020
Panel B. Young Workers	**(1)**	**(2)**	**(3)**	**(4)**
Sample	All	All	All	All
Policy Group	All Changers	Large	Small	Indexer
Original Categories				
Post Period 2015–2019	−0.0059	−0.0182	0.0001	0.0005
Post Period 2019	−0.0090	−0.0235	0.0006	−0.0040
Original Categories No Switchers				
Post Period 2015–2019	−0.0064	−0.0177	0.0013	−0.0027
Post Period 2019	−0.0104	−0.0238	0.0007	−0.0081
Updated Categories				
Post Period 2019	−0.0076	−0.0115	−0.0066	−0.0049
Overall Averages	−0.0075	−0.0190	−0.0010	−0.0023

- Average employment effects are modest.
- Estimates for the “large” increases are systematically more negative (-3.4 ppt for the “low-skilled” sample and -1.9 ppt for the “young” sample).
- Estimates for “small” increases are close to 0 on average.
- Estimates for states with inflation-indexation regimes are almost exactly 0 on average.

Illustration of employment effects using a "stacked event study" estimator.



Implied Elasticities

Table 10. Summary of Wage Regression Elasticities (D-in-D Estimates)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Skill Group	Low-Skill	Low-Skill	Low-Skill	Low-Skill	Young	Young	Young	Young
Policy Group	All Changers	Large	Small	Indexer	All Changers	Large	Small	Indexer
Panel A. Employment								
Overall Average Effects	–0.007	–0.034	0.012	0.002	–0.007	–0.019	–0.001	–0.002
Mean in 2011–2013 Baseline	0.211	0.188	0.246	0.222	0.365	0.330	0.415	0.384
Change from Baseline (%)	–3.111	–18.105	5.033	0.884	–2.043	–5.752	–0.250	–0.612
Panel B. Hourly Wages								
Overall Average Effects	1.009	1.641	0.921	0.466	0.788	1.339	0.697	0.327
Mean in 2011–2013 Baseline	8.511	9.192	8.448	8.549	8.794	9.535	8.963	8.978
Change from Baseline (%)	11.858	17.849	10.900	5.454	8.960	14.046	7.778	3.645
Panel C. Minimum Wages								
Overall Average Effects	1.923	2.912	1.898	0.961	1.921	2.915	1.913	0.935
Mean in 2011–2013 Baseline	7.690	7.721	7.407	7.804	7.686	7.713	7.411	7.810
Change from Baseline (%)	25.013	37.712	25.627	12.308	24.997	37.798	25.813	11.976
Panel D. Elasticities								
Own Wage	–0.262	–1.014	0.462	0.162	–0.228	–0.409	–0.032	–0.168
Minimum Wage	–0.124	–0.480	0.196	0.072	–0.082	–0.152	–0.010	–0.051

Summary of Findings and Their Relation to the Literature

- Across the full set of minimum wage increases we analyze our elasticity estimates are near the "consensus" estimates from the literature.
  - The average elasticity of employment for low-skilled groups with respect to the minimum wage is around -0.1. This is close to the ranges highlighted by both Neumark and Shirley (2021) and Wolfson and Belman (2019).
  - The average "own wage" elasticity is -0.23. This is close to the median of studies as analyzed by Dube (2019).

- The averages mask considerable heterogeneity:
  - For our set of large increases, we estimate much larger elasticities.
  - For small increases we estimate smaller and sometimes positive elasticities.
  - We also estimate smaller effects for minimum wage increases that occur predictably in some states due to inflation updates.
  - Medium-run effects are more negative than short-run effects.

What forces might tie together the literature?

- **Overall Assessment:** A broad set of facts in the recent literature can be readily accounted for by a blend of several factors:
  - Adjustments to **margins like worker effort and fringe benefits**
  - Employer **market power** sufficient to hold wages back **modestly**, but not dramatically, from competitive market levels.
  - **Adjustment costs** that may lead firms to ignore small minimum wage increases, in particular during economic expansions.

- **Implication:** The effects of large minimum wage changes may be much more strongly negative than the effects of small minimum wage changes.

- A set of simple "models" can usefully illustrate how these forces might fit into the picture.

Perfectly Competitive Model

- Notation:
  - Value of the worker i's output = a_i. Firm offers a wage of w_i.
  - Working delivers utility of U = u(c) s.t. c = w. The reservation utility from not working is v_i.
  - Minimum wage is set at w_{min}.

- Implications of perfect competition:
  - Competition between firms for workers drives the wage w_i to a_i.
  - The individual works so long as $v_i < u(w_i)$.

- Implications of minimum wage:
  - If $w_{min} < a_i$, then it is non-binding and has no effect.
  - If $w_{min} \geq a_i$, then it is binding and reduces employment.

- Conclusion: Binding minimum wages reduce employment.

Models with additional features

- Models with additional features raise the possibility that the minimum wage can impact wages without reducing employment.
  - Some features sit comfortably within a perfectly competitive framework.
    - Examples include fringe benefits or other non-wage job attributes.
    - **Implication:** The minimum wage can harm workers even if they remain employed.
  - Some features shift us into models of imperfectly competitive labor markets.
    - Examples include search frictions or other sources of firm market power.
    - **Implication:** These model features create scenarios in which the minimum wage can increase worker welfare.
  - In all of these models, employment effects become negative when the minimum wage rises substantially.

Competitive Model with Fringe Benefits

- Notation:
  - Value of the worker i's output = a_i.
  - Firm offers a wage and benefit package such that $a_i = w_i + f_i$.
  - Worker has utility from working of $U(c,f) = u(c) + z(f)$ s.t. $c = w$.
    - Optimal mix of wage and benefit involves w^* such that $u'(w^*) = z'(a - w^*)$.
  - Minimum wage is set at w_{min}.

- Implications of the minimum wage:
  - If $w_{min} < w^*$, then it is non-binding and has no effect.
  - If $w^* < w_{min} < a$, the fringe benefit falls to offset the cost increase from the minimum wage.
  - If $w_{min} \geq a$, then the firm will not hire the worker.

- Conclusion: There is a range within which minimum wages can have null employment effects. In this model the impact on worker welfare will tend to be either neutral or negative.

Evidence on the role of fringe benefits

- Evidence on the role of fringe benefits is modest.
  - No effect: Simon and Kaestner, 2004.
  - Some effect: Dworsky et al, 2021; Clemens, Kahn, and Meer, 2018.

- Data on these margins are limited.
  - Measures of health insurance are typically binary and thus do not capture changes on margins like the worker's share of the premium or cost-sharing terms.
  - Measures of other fringe benefits tend to be lacking

Competitive Model with Non-Compensation Job Attributes (e.g., contractible effort, a classic productive disamenity)

- Notation:
  - Value of the worker's output depends on contractible effort a = a(e).
  - Worker has utility from working of U(c,e) = u(c) - d(e) s.t. c = w = a(e).
  - Optimal effort is e* such that u'(a(e*))a' = d'(e*).
  - Reservation utility is still v. Define e_{res} such that U(a(e_{res}), e_{res}) = v.
  - Minimum wage is set at w_{min}.

- Implications of the minimum wage:
  - If $w_{min} < w^*$ then it is non-binding and has no effect.
  - If $w^* < w_{min}$ then the effort requirement rises to e_{min} such that a(e_{min}) = w_{min}.
  - Once $e_{min} > e_{res}$ the effort requirement induced by the minimum wage leads the worker to exit employment.

- Conclusion: There is a range within which minimum wages can have null employment effects. In this model the impact on worker welfare is negative.

Evidence on the role of non-compensation attributes

- Recent evidence of substantial effects on the effort margin.
  - Retail setting: Coviello, Deserrano, and Persico, 2021.
  - Agricultural setting: Ku, Forthcoming.

- On-the-job-training.
  - Was a regular topic of theoretical and empirical studies for many years. (Mincer and Leighton, 1980; Hashimoto, 1981; Acemoglu and Pischke, 2003).
  - Less so in recent years.

- Analyses of other non-compensation job attributes are limited.
  - Scheduling is a margin of potential interest (Clemens and Strain, 2020).
  - On-the-job safety?
  - Employee discounts and other amenities?

Imperfectly Competitive Model with a "Bargaining Wedge"

- Notation:
  - Value of the worker i's output = a_i.
  - Market power and/or search frictions enable firms to pay $w_i = \theta a_i$.
    - $\theta < 1$ implies an imperfectly competitive labor market.
  - Minimum wage is set at w_{min}.

- Implications of minimum wage:
  - If $w_{min} < \theta a_i$, then it is non-binding and has no effect.
  - If $\theta a_i < w_{min} < a_i$, then it increases the wage without reducing employment.
  - If $w_{min} \geq a_i$, then it reduces employment.

- Conclusion: There is a range within which minimum wages have null employment effects. In this model the impact on worker welfare is positive in this range.

Evidence on the role of firm market power.

- Evidence that employment effects are more negative in more competitive labor markets.
  - Azar, Huet-Vaughn, Marinescu, Taska, and Von Wachter, 2019.

- There is more work on the relationship between labor market competition and wages than on competition's role in mediating the effects of minimum wages.

- **Crucial empirical question:** How large can bargaining wedges plausibly be for low wage workers?

The central role of the “bargaining wedge”

- I find it difficult to rationalize high minimum wages with plausible bargaining wedges.
  - Suppose you thought search frictions and employer market power systematically held wages 20% below their competitive levels: $\theta = 0.8$.
  - Then a worker with w = $8 would have a competitive wage of $10.
    - $a = w/\theta = 8/0.8 = 10$.
  - Increasing the federal minimum wage into the $8 to $10 range would help such a worker, but anything beyond $10 would eliminate their job.
- This is consistent with what we see when contrasting the last decade’s “smaller” and “larger” minimum wage increases.

Dynamics

- The simple models from the previous slides are static.

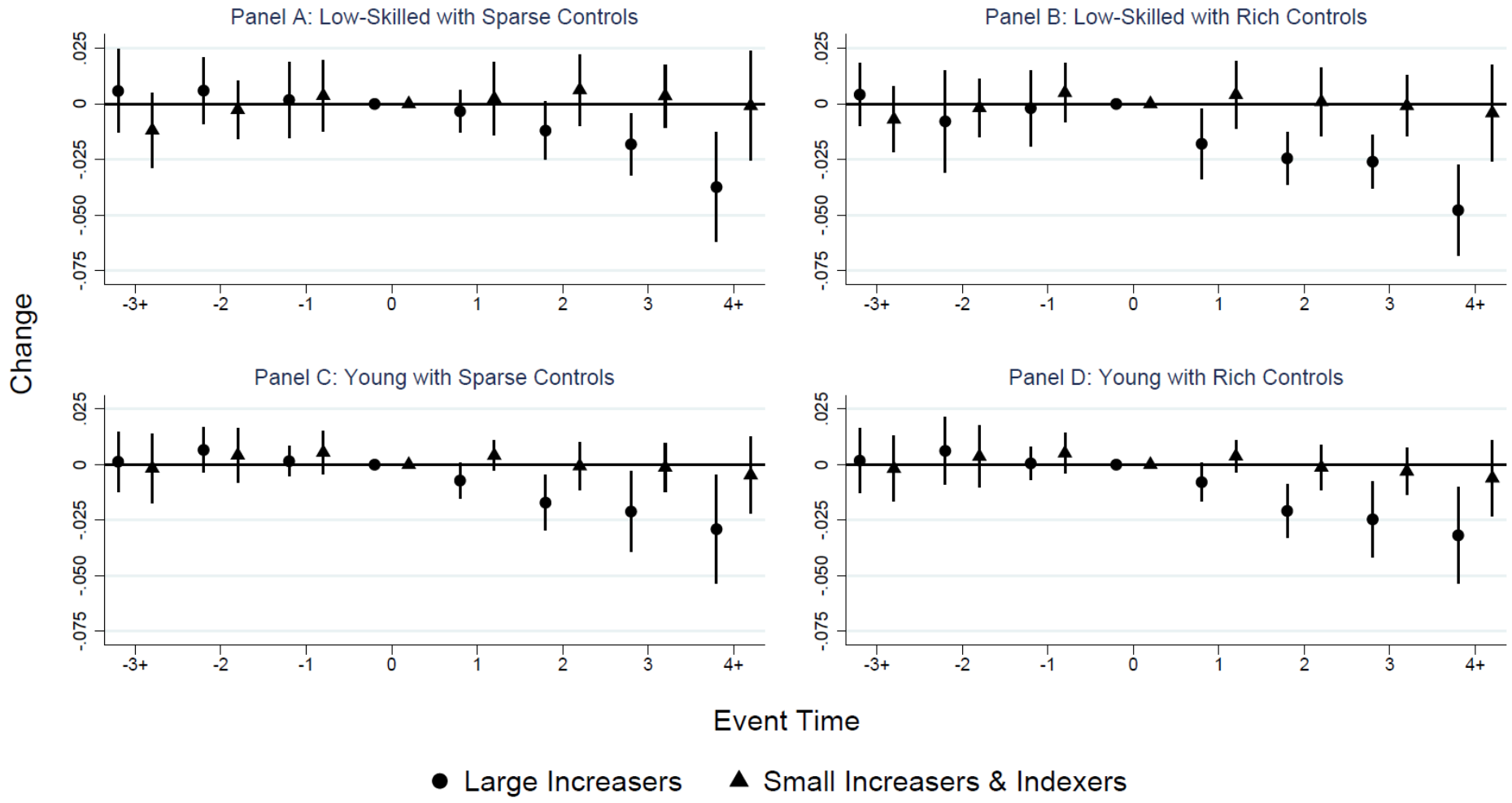
- Another possibility is that small employment effects of historical minimum wage changes may reflect transition dynamics (Sorkin, 2015).
  - Firms may not adapt quickly due to adjustment frictions.

- Some interesting evidence points in this direction (next slide).
  - At the same time, some of the work that estimates null effects has looked at time horizons as far out as 5 years.
  - Accounting for adjustment costs may require jointly considering the magnitude of the increase AND the time horizon.

Evidence of interest for thinking about dynamics

- Long-standing discontinuities in age-based minimum wages have large employment effects (Kreiner, Reck, and Skov, 2020; Kabátek, 2021).
- Effects show up more cleanly on job growth than on the employment level (Meer and West, 2016).
- The city of Seattle's initial minimum wage increase appears to have had much more modest effects than its subsequent minimum wage increases (Jardim *et al.*, 2017).
- During expansions, firms adjust by altering hiring standards or reducing hiring rather than by increasing firing (Clemens, Kahn, and Meer, 2021; Gopalan *et al.*, 2021; Jardim *et al.*, 2018).
- Increases had large effects during the Great Recession (Clemens and Wither, 2019).

We observe growing impacts in our “stacked event study” estimator.



Takeaways regarding the claims of $15 minimum wage proponents

- Proponents of a $15 minimum wage overstate what recent studies can tell us about the effects of large minimum wage increases.
  - Ignoring the many margins through which firms can adjust leads to an overstatement of positive effects for workers.
  - Many papers continue to find evidence of settings in which employment impacts are negative (Neumark and Shirley, 2021).
  - Historical evidence cannot be straightforwardly extrapolated to project the effects of minimum wages in the $12 to $15 range.

Conclusions based on our analysis

- Modest overall employment elasticities.
  - Consistent with “consensus” estimates.
- Large negative effects of large increases.
- Effects of large increases become more negative over time.
- Evidence of qualitative differences between the effects of large increases relative to small increases.
  - Extrapolating from estimates based on small increases is a mistake.
  - CBO’s estimates likely understate the divergence between the effects of proposed increases in the federal minimum wage to $10, $12, or $15.