# The Pass-through of Minimum Wages into US Retail Prices: Evidence from Supermarket Scanner Data

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# Motivation

- **Wage stagnation** for bottom 50% in the US.

$\rightarrow$ Increasing interest for min. wages as redistributive policy.

- Large literature on efficiency costs of min. wage, but **few studies on pass-through into prices**.
- Concern that nominal wage increases offset by price $\nearrow$ among poorest households.
- Literature on price pass-though has focused on restaurants, but $\sim$ small share of household expenditures.

$\rightarrow$ Our paper brings **new evidence on price pass-through of min. wage** $\nearrow$ & welfare implications **in grocery stores**.

# This paper

We use **high-frequency scanner level data**

- Document price effects in **grocery stores**, in which household expenditure share is 3 $\times$ larger than in restaurants. Figures
- Study **dynamics of price changes**.
- Study **heterogeneity** of price response across stores and consumers types.

We use **several research designs**

- Exploit recent changes in min. wages at the state-level.
- Consistent results in design that exploits changes in fraction of affected workers across states.

$\rightarrow$ Our paper **moves us closer to a full understanding of price pass-through in low-wage sectors** & overall redistributive effects.

# Our results

- A 10% minimum wage increase translates into a 0.2% increase in grocery stores prices.
- This is consistent with a **full-pass-through** of min. wages into prices.
- Prices increase in the three months after passage of legislation, then stabilize.
- Similar price increases faced by high-income vs. low-income households.

$\rightarrow$ **Redistributive effects still positive for poorest households** after accounting for induced price increases.

# Contribution to literature

- **Price effects** of min. wage changes

  $\rightarrow$ Lit. has focused on restaurants.

  $\rightarrow$ We document price effects in retail.

  Card and Krueger (1995), Aaronson (2001), MacDonald and Aaronson (2006), Aaronson and French (2007), Aaronson et al. (2008), Allegretto and Reich (2018), Ganapati and Weaver (2017), Leung (2018).

- **Welfare implications** of min. wage changes

  $\rightarrow$ Quantifies welfare effects of min. wage $\nearrow$ after accounting for full-pass-through into prices.

  Harasztosi and Lindner (2017), MaCurdy (2015).

- **Firms behavior in terms of price setting**

  $\rightarrow$ Min. wage $\nearrow$ offers clearly identified future cost shocks.

  $\rightarrow$ Provides micro-evidence on firms price setting.

  Gali and Gertler (1999), Mavroeidis et al. (2014).

# Outline

1. Data and empirical strategy
2. Main results and robustness checks
3. Interpretation of the magnitude of the price response
4. Heterogeneity across households
5. Welfare implications
6. Conclusion

# Data and empirical strategy

# A new minimum wage database

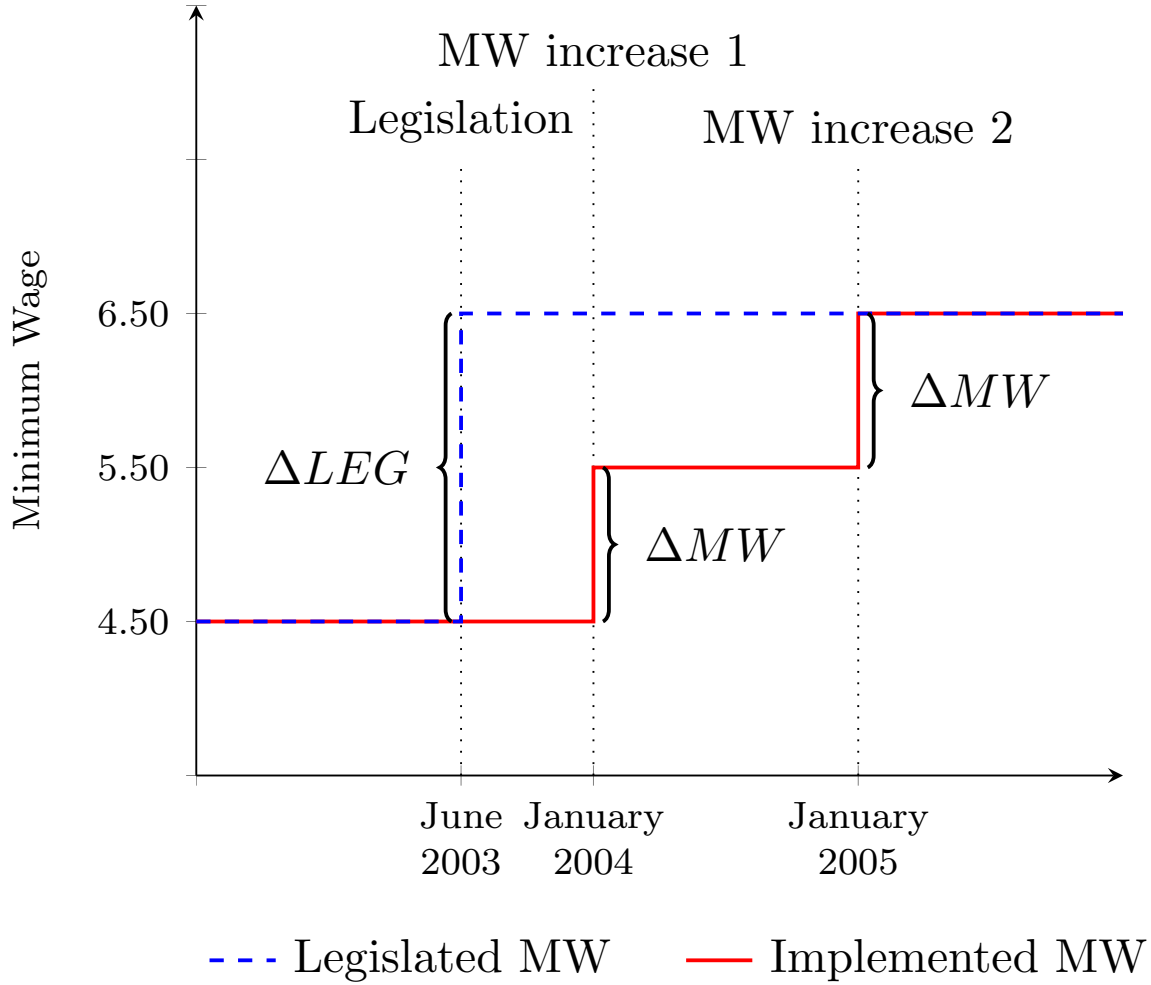
We build a new database on minimum wage changes in the US

- We collect information on minimum wage changes at the federal and state level.
- We collect **legislation dates** for every min. wage increase, on top of implementation dates.

  $\rightarrow$ Firms may act in anticipation of future cost increases if presence of nominal frictions.

$\rightarrow$ Allow us to study **dynamics of price response around time of legislation & implementation**.

# Example of minimum wage increase: Illinois, 2003–2005




→ As in Illinois, **most min. wage laws schedule step-wise** ↗.

# High-frequency scanner level data

We use **point-of-sale scanner data** from IRI Symphony

- Provides weekly revenues and quantities for unique products.

  $\rightarrow$ Information on $\sim$ 60,000 products (UPC) grouped in 31 categories (e.g. packaged food, personal care products, alcoholic and non-alcoholic beverages, dairy, etc.).
  $\rightarrow \sim 3,000$ stores located in 41 states and 530 counties.
  $\rightarrow$ Spans Jan. 2001-Dec 2012.

- Large panel of households linked to store-level information.

  $\rightarrow$ Allow us to investigate welfare implications of price $\nearrow$.

$\rightarrow$ **Price indices at store level** rather than product level bc wages are determined at store level.

# We build a Laspeyres price index at store level

**Step 1.** We determine **monthly regular** (= nonsale) **prices**.
$\rightarrow$ We focus on permanent price changes due to min. wage $\nearrow$.
$\rightarrow$ Our results hold even if we do not use regular prices.

**Step 2.** We build price index for product $i$ in category $c$ in store $j$:

$$I_{j,t,c} = \prod_{i \in S_{j,c}} \left( \frac{P_{i,j,t}}{P_{i,j,t-1}} \right)^{\omega_{i,y(t)}}$$

**Step 3.** We then aggregate price changes across product categories to get a single index for each store $j$:

$$I_{j,t} = \prod_{c} I_{j,t,c}^{\omega_{c,y(t)}} \text{ and } \pi_{j,t} = \log I_{s,t}$$

$\rightarrow$ Consumption basket in each store updated every year (weights $\omega_{i,y(t)}$ = yearly rev.) to allow for changes in shopping behavior.

# Main empirical specification

$$\pi_{j,t} = \delta_j + \phi_t + \sum_{r=-k}^{k} \alpha_r \Delta leg_{s(j),t-r} + \sum_{r=-k}^{k} \beta_r \Delta mw_{s(j),t-r} + \gamma X_{j,t} + \epsilon_{j,t}$$

- $\pi_{j,t}$: monthly inflation rate in store $j$.
  $\rightarrow$ Inflation rather than price level bc both price levels and min. wage changes are non-stationary.
- $\Delta leg$ and $\Delta mw$: log min. wage $\nearrow$ around legislation & implementation dates.
- $\alpha_r$, $\beta_r$: min. wage elasticities of prices $r$ months from event.

$\rightarrow$ We ultimately care about changes in **price levels**, and compute cumulative elasticities (e.g. $E_R^{leg} = \sum_{r=-1}^{R} \alpha_r$).

$\rightarrow$ We estimate $\alpha$ and $\beta$ jointly to take into account that effects at leg. and impl. dates may capture same price change.

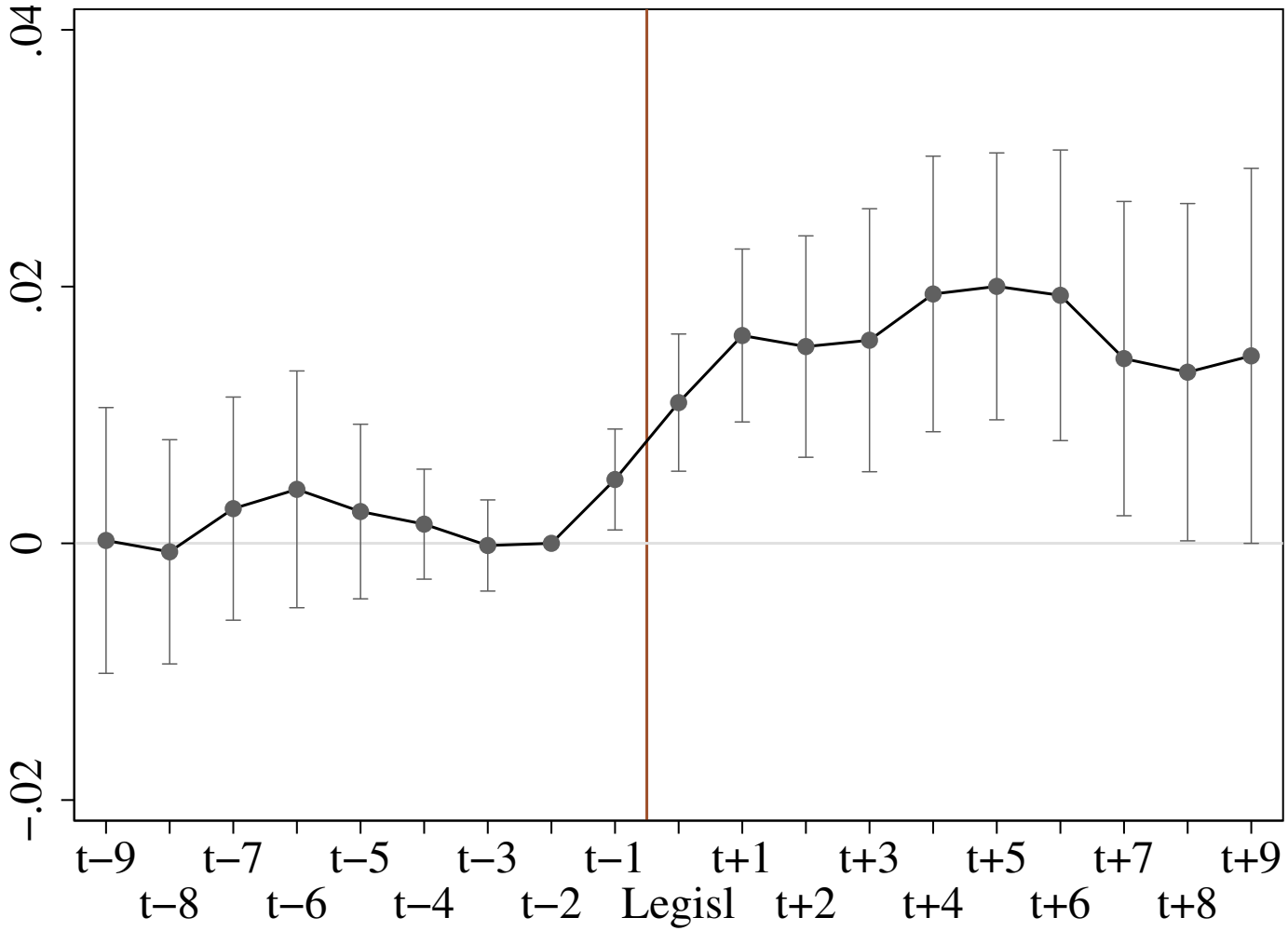
# Identification assumption

Absent min. wage $\nearrow$, inflation in stores in states that had a min. wage $\nearrow$ would have evolve as inflation in states that did not have min. wage $\nearrow$.

- **Conditional on a set of controls and fixed effects**.
  $\rightarrow$ Inclusion of county-level unemp. rate and state-level house price growth.
  $\rightarrow$ Inclusion of time and store fixed effects $\rightarrow$ effectively controls for trends in stores' price levels in our setting.
- Identification comes from **variation in min. wage across states and time & from var. in size of min. wage $\nearrow$**.
  States Time

# Main results and robustness checks

# Price elasticity around legislated min. wage increase




→ The price elasticity wrt to min. wage increase is $\sim 0.2$.

→ Similar elasticity around implementation date. graph

# Potential threats to identification strategy

- **1.** Inflation may cause min. wage increases

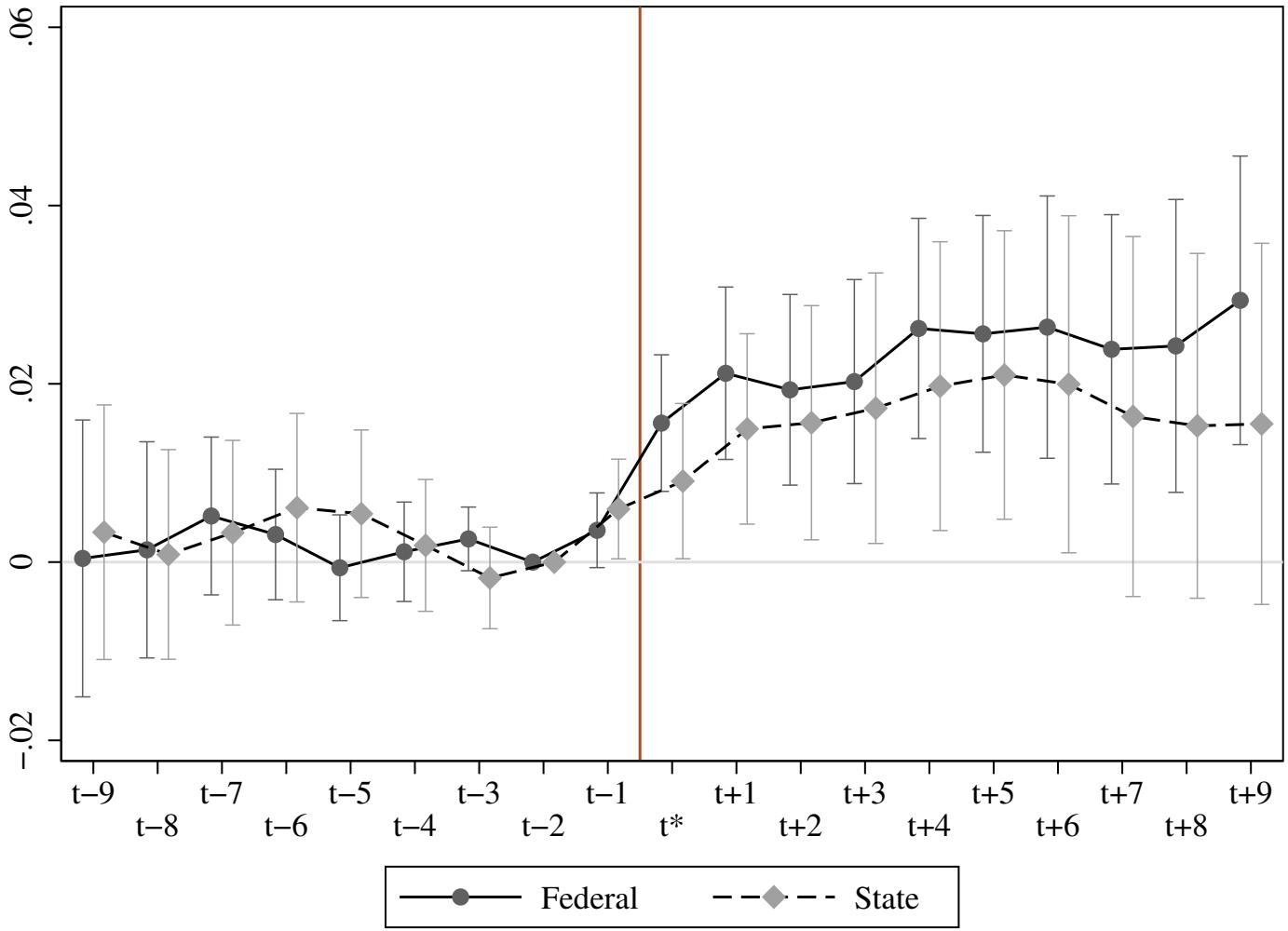
  $\rightarrow$ Timing of effects not consistent with reverse causality.
  $\rightarrow$ No $\neq$ between response to federal and state-level hikes.
  $\rightarrow$ Consistent results when using alternative design exploiting differences across high-wage vs. low-wage counties.

- **2.** Prices and min. wages $\nearrow$ may follow same seasonal pattern

  $\rightarrow$ Inclusion of time fixed effects in main specification.
  $\rightarrow$ We check that our results are robust to inclusion of state$\times$month fixed effects.

$\rightarrow$ We conduct **series of robustness checks** to verify that our results are not driven by these threats.

# Price response to state and federal min. wage increases




Months around legislation date

$\rightarrow$ No $\neq$ between response to federal ($\sim$ proxy for exogenous $\nearrow$) and state-level hikes $\rightarrow$ **no evidence of reverse causality**.

# Alternative design to study price response

Use **geographical variation in bite of min. wage increases**

- Compare evolution of prices in counties where min. wage is highly binding (= low-wage counties) to counties where min. wage is less binding (= high-wage counties).
- Identification comes from variation in initial wages across counties, size of min. wage ↗ fixed.

$$\pi_{j,q} = \delta_j + \phi_{s(j),q} + \sum_{r=-k}^{k} \gamma_r \Delta leg_{s(j),q-r} \times \overline{W}_{c(j),q-r} + \epsilon_{j,q}$$

→ We absorb state-quarter variation in inflation to further control for potential reverse causality.

# Results using alternative design to study price response

| | Baseline |
|---|---|
| $\text{wage}_q \times \Delta\text{leg}_{q-1}$ | -0.012 |
| | (0.010) |
| $\text{wage}_q \times \Delta\text{leg}_q$ | -0.028** |
| | (0.014) |
| $\text{wage}_q \times \Delta\text{leg}_{q+1}$ | 0.003 |
| | (0.013) |
| Observations | 84,741 |
| Controls | Y |
| Store FE | Y |
| State time FE | Y |

$\rightarrow$ Stores in high-wage counties experience *lower* inflation than stores in low-wage counties.

$\rightarrow$ Consistent with expectations $\rightarrow$ **no evidence of reverse causality**. More results

# Main results and robustness checks

| Dep. variable: Store inflation | **Separate estimation** | | | | | | **Joint estimation** | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Legislation | 0.021*** | 0.014** | 0.013*** | | | | 0.019*** | 0.021*** | 0.015** |
| | (0.007) | (0.006) | (0.004) | | | | (0.007) | (0.005) | (0.006) |
| Implementation | | | | 0.011 | 0.004 | -0.003 | 0.016 | 0.006 | -0.000 |
| | | | | (0.011) | (0.007) | (0.007) | (0.013) | (0.009) | (0.008) |
| $\sum$ Pre-event | -0.002 | 0.002 | 0.003 | 0.025* | 0.008 | 0.010 | 0.010 | -0.007 | 0.001 |
| | (0.007) | (0.010) | (0.008) | (0.014) | (0.009) | (0.007) | (0.016) | (0.019) | (0.012) |
| *N* | 191568 | 191568 | 190768 | 191568 | 191568 | 190768 | 191568 | 191568 | 190768 |
| Division time FE | NO | **YES** | NO | NO | **YES** | NO | NO | **YES** | NO |
| Chain time FE | NO | NO | **YES** | NO | NO | **YES** | NO | NO | **YES** |

→ Price elasticities measured 4 months after min. wage increase.

→ Baseline estimates **robust to** separate estimations and **restrictive set of fixed effects**. Legisl. Legisl. FE Impl. Joint

# Additional results on heterogeneity of price response

**Heterogeneity across stores types**

→ Larger effects in cheaper and larger stores Cheap vs. exp. stores

→ Larger effects in larger stores Stores size

→ Larger effects in smaller and regional chains of stores Chains

**Heterogeneity across type of min. wage increase**

→ No effects for legislative events with long time to first ↗ Timing

# Interpretation of the magnitude of the price response

# Theory: the elasticity of marginal cost wrt min. wage

**Question**: is our estimated price elasticity consistent with a full pass-through of the minimum wage?

We derive **elasticity of marginal cost wrt min. wage** in a model w/ Cobb-Douglas production, CES demand & monopolistic competition in product and labor markets:

$$\underbrace{\frac{\partial \ln MC}{\partial \ln MW}}_{\substack{\text{Elasticity of marginal} \\ \text{cost wrt min. wage} \\ \approx .02 \\ \text{(from baseline reg.)}}} = \underbrace{\underbrace{\frac{\overline{W}L}{C}}_{\substack{\text{Labor share} \\ \text{in cost} \\ \approx .16}} \cdot \underbrace{\frac{\partial \ln \overline{W}}{\partial \ln MW}}_{\substack{\text{Avg. wage elasticity} \\ \text{wrt min. wage} \\ \approx .11}}}_{\approx .02} + \underbrace{\frac{P_Q Q}{C} \cdot \frac{\partial \ln P_Q}{\partial \ln MW}}_{\substack{\text{Change in wholesale} \\ \text{price of tradables} \\ \approx 0 \text{ (absorbed in FE)}}}$$

$\rightarrow$ The elasticity of marginal cost wrt min. wage can be decomposed into 3 components that we can empirically calibrate.

Effects on output | Demand or Supply? | Labor share

# From theory to empirical calibrations (1/2)

We estimate the **labor share in grocery stores' cost** using Economic Census data and Annual Retail Trade Surveys:

| | Variable Cost | | | Fixed Cost |
|---|---|---|---|---|
| | Labor | COGS | Other | |
| Share in Total Cost | 14.7 | 75.1 | 0.6 | 9.7 |
| Share in Variable Cost | **16.3** | 83.1 | 0.7 | NA |

$\rightarrow$ The labor share in grocery stores' cost $\approx .16$.

# From theory to empirical calibrations (2/2)

We estimate the **elasticity of avg. wage wrt min. wage** using Quarterly Census Employment and Wages data:

| Dep. variable: log avg. earnings | Retail trade | | Grocery stores | | Acc. and food services | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| log minimum wage | 0.048* | 0.038 | **0.108**** | 0.083*** | 0.151*** | 0.147*** |
| | (0.026) | (0.024) | (0.043) | (0.027) | (0.024) | (0.025) |
| N | 124,000 | 124,000 | 80,722 | 80,759 | 98,056 | 98,080 |
| Controls | Y | Y | Y | Y | Y | Y |
| County FE | Y | Y | Y | Y | Y | Y |
| Time FE | Y | Y | Y | Y | Y | Y |
| Linear state trends | N | Y | N | Y | N | Y |

$\rightarrow$ The elasticity of avg. wage wrt min. wage is $\approx 0.11$.

# Is our price elasticity consistent with a full pass-through?

We derive the **pass-through formula** as:

$$\text{Pass-through} = \frac{\text{Price elasticity wrt min. wage}}{\text{Labor cost share} \times \text{Avg. wage elast. wrt min. wage}}$$

| | (1) Baseline | (2) Region-time FE | (3) Chain-time FE |
|---|---|---|---|
| | Pass-through at legislation | | |
| Pass-through | **1.103** | **1.171** | **0.843** |
| p-value PT = 1 | 0.780 | 0.531 | 0.651 |

$\rightarrow$ We cannot reject pass-through $= 1$ for any specification.
$\rightarrow$ Our estimated price elasticity is **consistent with a full pass-through**.

# Heterogeneity across households

# Heterogeneity of price response across households

We define **low-income** (<25K annual income), **medium-** (25K–75K) **and high-income** (>75K) households.

| | Separate estimation | | | | | | Joint estimation | | |
|---|---|---|---|---|---|---|---|---|---|
| Dep. variable: Store inflation w. different weights | (1) Low | (2) Medium | (3) High | (4) Low | (5) Medium | (6) High | (7) Low | (8) Medium | (9) High |
| Legislation | 0.013** | 0.013** | 0.014*** | | | | 0.021*** | 0.021*** | 0.021*** |
| | (0.005) | (0.006) | (0.005) | | | | (0.005) | (0.005) | (0.006) |
| Implementation | | | | 0.009 | 0.010 | 0.008 | 0.006 | 0.007 | 0.008 |
| | | | | (0.009) | (0.009) | (0.009) | (0.012) | (0.012) | (0.011) |
| $\sum$ Pre-Event | -0.006 | -0.008 | -0.008 | 0.005 | 0.007 | 0.010 | -0.018 | -0.018 | -0.014 |
| | (0.008) | (0.006) | (0.007) | (0.008) | (0.008) | (0.008) | (0.017) | (0.017) | (0.017) |
| *N* | 146815 | 146739 | 146739 | 146739 | 146739 | 146739 | 146739 | 146739 | 146739 |

→ **No ≠ in price response across households**.

→ But grocery expenditures share varies across households.

→ Welfare implications?

# Welfare implications

# Welfare implications of price increases in grocery stores

We compute **equivalent variation** of hypothetical 20% min. wage increase for each household income category $j$:

$$\Delta U_j = \underbrace{\Delta Y_j}_{\substack{\text{Increase in} \\ \text{nominal wage gains} \\ = \textbf{Benefits}}} - \underbrace{E_j \Delta P_j}_{\substack{\text{Offset by} \\ \text{price increases} \\ = \textbf{Costs}}}$$

**Benefits** of nominal wage gains

$\rightarrow$ Predicted using Current Population Survey.

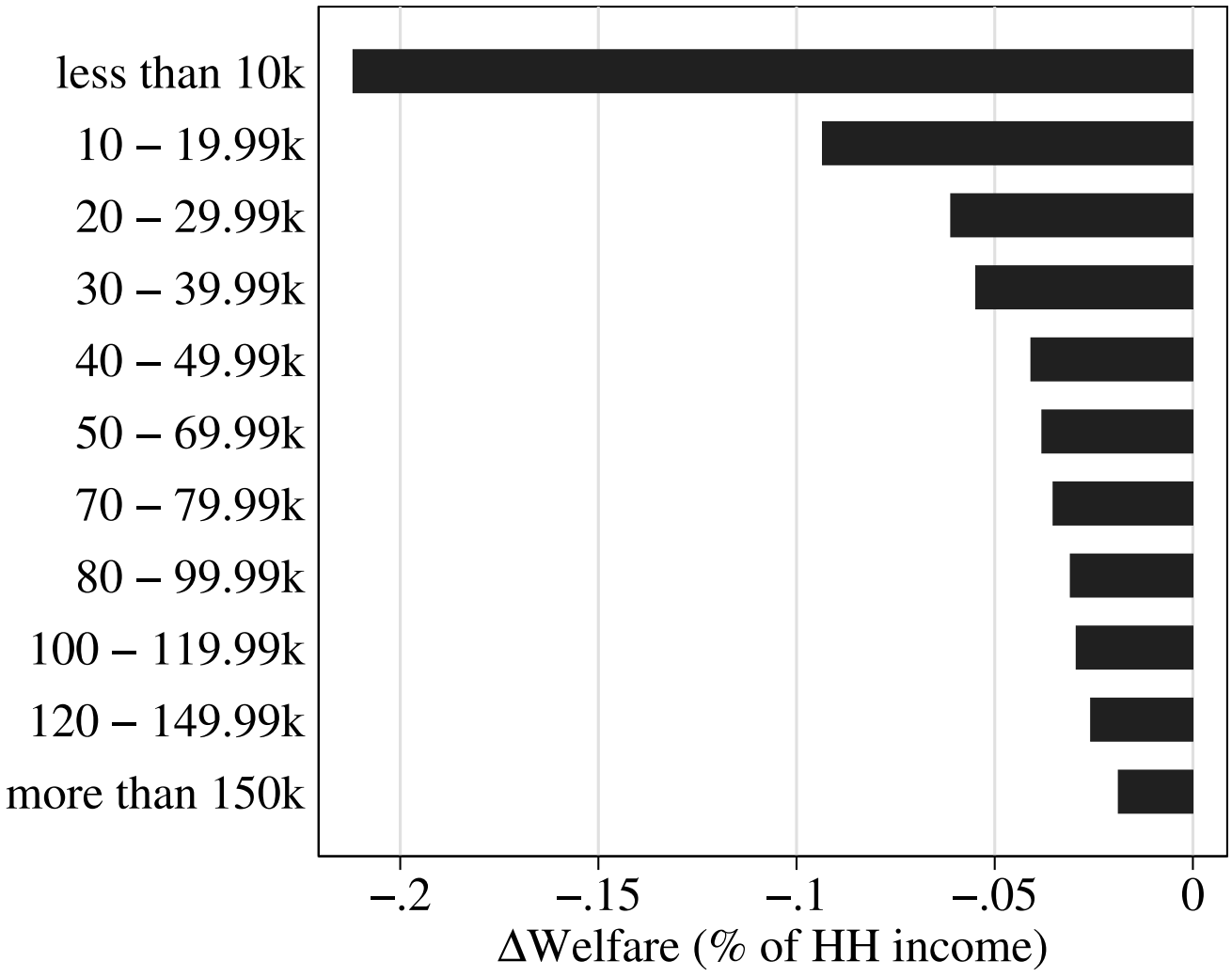
$\rightarrow$ Assumes no change in hours or employment.

$\rightarrow$ Assumes spillover effects up to 130% of old min. wage.

**Costs** of price increases

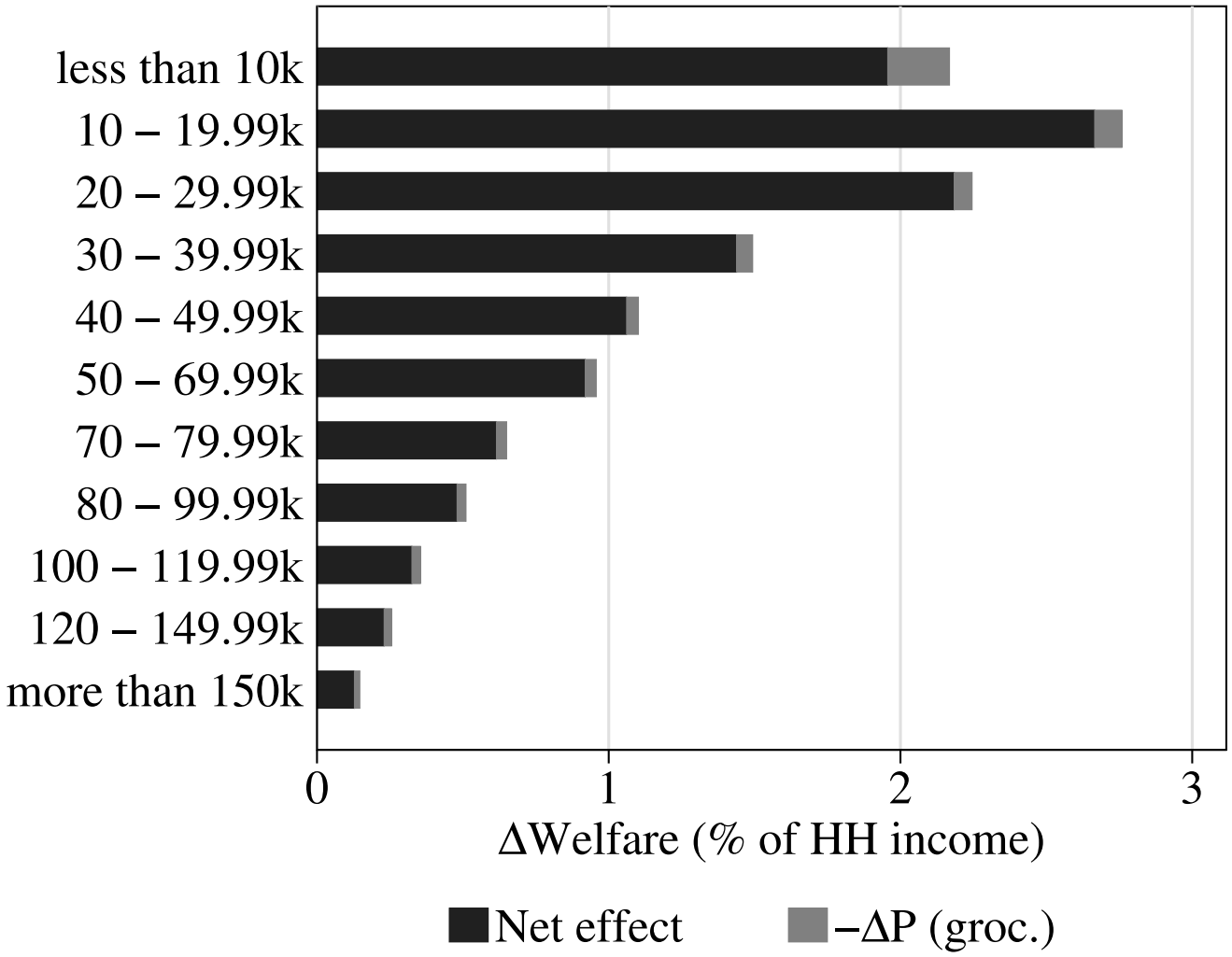
$\rightarrow$ $E_j$ = grocery exp. from Consumer Expenditure Survey.

# Welfare cost of price increase (% of household income)




→ Price ↗ in grocery stores due to 20% min. wage ↗ cost ∼ .2% of annual income among poorest households (<10K).

# Welfare implications of price increases in grocery stores




→ Price ↗ offset up to 10% of income for poorest hh (<10K).

→ **Redistributive effects** still **positive among poorest** after accounting for price ↗ in restaurants as well. Including restaurants

# Conclusion

**Consumers bear the cost of the min. wage**.

- A 10% minimum wage increase translates into a 0.2% increase in grocery stores prices.
- Consistent with a **full-pass-through** of min. wages into prices.

**Similar price increases for** products bought by **high-income vs. low-income households**.

**Redistributive effects still positive for poorest households** after accounting for induced price increases.

# Appendix

# Labor share in grocery stores' cost

Back

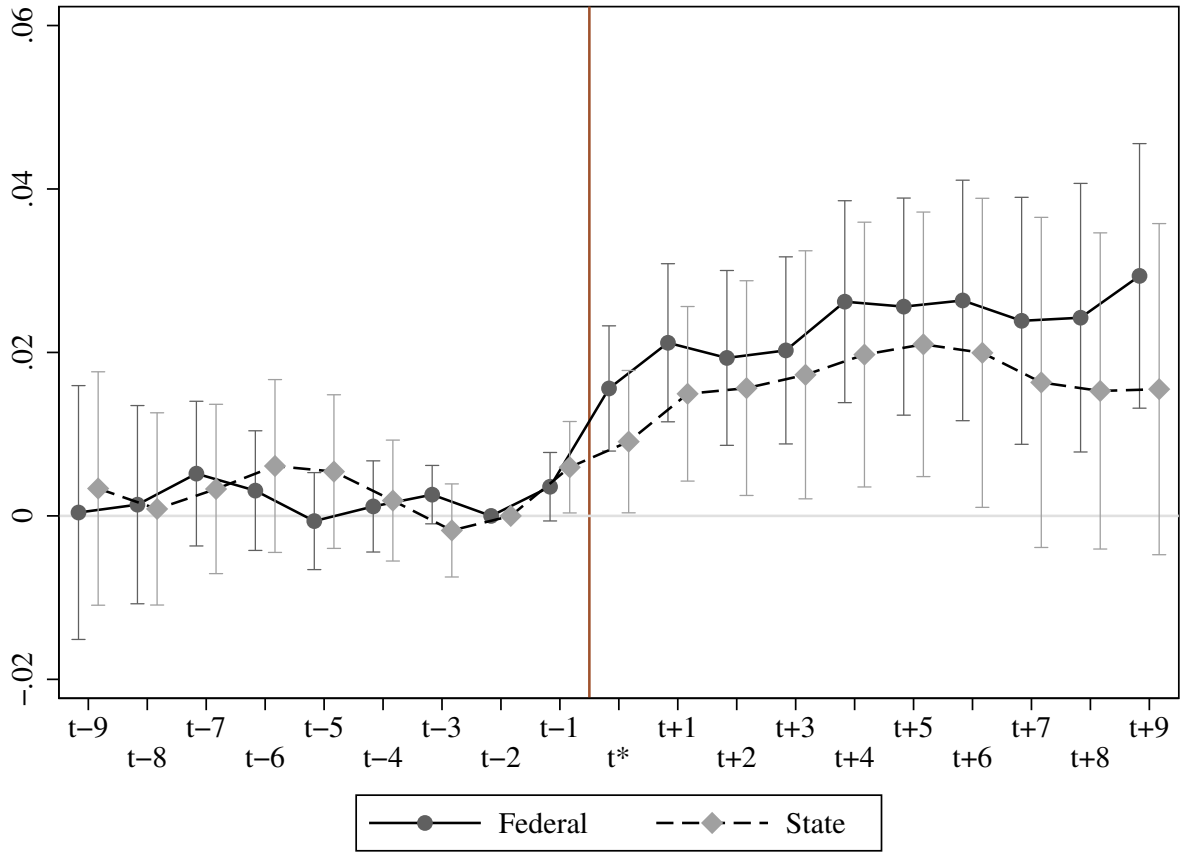
| | Variable Cost | | | Fixed Cost |
|---|---|---|---|---|
| | Labor | COGS | Other | |
| Share in Total Cost | 14.7 | 75.1 | 0.6 | 9.7 |
| Share in Variable Cost | **16.3** | 83.1 | 0.7 | NA |

Data: Balance sheets for grocery store sector, Annual Retail Trade Survey (Census Bureau)

- Labor cost is the second most important factor
- Most important factor for grocery stores are COGS
- Data available only at national sector level every 5 years

# State and federal legislation

Back




- Federal legislation affects states w/o higher state-level MW
- Treatment more likely independent of **local** inflation

$\Longrightarrow$ Reverse causality of state level legislation is not an issue

# Identification within states

Back

- MW increase less binding in counties with higher initial wage
- Identification through variation in wage, keeping MW increase fixed
- Expect negative relationship:
  higher wage $\implies$ MW increase less binding

$$\pi_{j,q} = \delta_j + \phi_{s(j),q} + \sum_{r=-k}^{k} \gamma_r \Delta leg_{s(j),q-r} \times \overline{W}_{c(j),q-r} + \epsilon_{j,q}$$

- Allows to absorb state-quarter variation
  - Differences in average state inflation at any time
  - Differences in legislators' inflation expectations at any time

# Identification within states

Back

| Dep. variable: Store inflation | (1) Baseline | (2) Chain-time | (3) Baseline | (4) Chain-time |
|---|---|---|---|---|
| | | Legislation | | |
| $\text{wage}_q \times \Delta\text{leg}_{q-1}$ | -0.012 | 0.005 | | |
| | (0.010) | (0.010) | | |
| $\text{wage}_q \times \Delta\text{leg}_q$ | -0.028** | -0.031** | | |
| | (0.014) | (0.013) | | |
| $\text{wage}_q \times \Delta\text{leg}_{q+1}$ | 0.003 | 0.004 | | |
| | (0.013) | (0.010) | | |
| | | Implementation | | |
| $\text{wage}_{q-2} \times \Delta\text{mw}_{q-1}$ | | | -0.026 | -0.006 |
| | | | (0.035) | (0.028) |
| $\text{wage}_{q-2} \times \Delta\text{mw}_q$ | | | 0.012 | 0.036 |
| | | | (0.035) | (0.023) |
| $\text{wage}_{q-2} \times \Delta\text{mw}_{q+1}$ | | | -0.016 | 0.010 |
| | | | (0.028) | (0.025) |
| | | Estimation Summary | | |
| Observations | 84741 | 84503 | 84748 | 84512 |
| Controls | YES | YES | YES | YES |
| Store FE | YES | YES | YES | YES |
| State time FE | YES | YES | YES | YES |
| Chain time FE | NO | YES | NO | YES |

# Store level price indices

Back

Index construction similar to Stroebel and Vavra (2015):

1. Determine weekly regular (nonsale) price using Kehoe and Midrigan (2015) algorithm

2. Index over price changes for store $j$, category $c$

$$I_{j,t,c} = \prod_{i \in S_{j,c}} \left( \frac{P_{i,j,t}}{P_{i,j,t-1}} \right)^{\omega_{i,y(t)}}$$

3. Aggregate category indices to single index for store $j$:

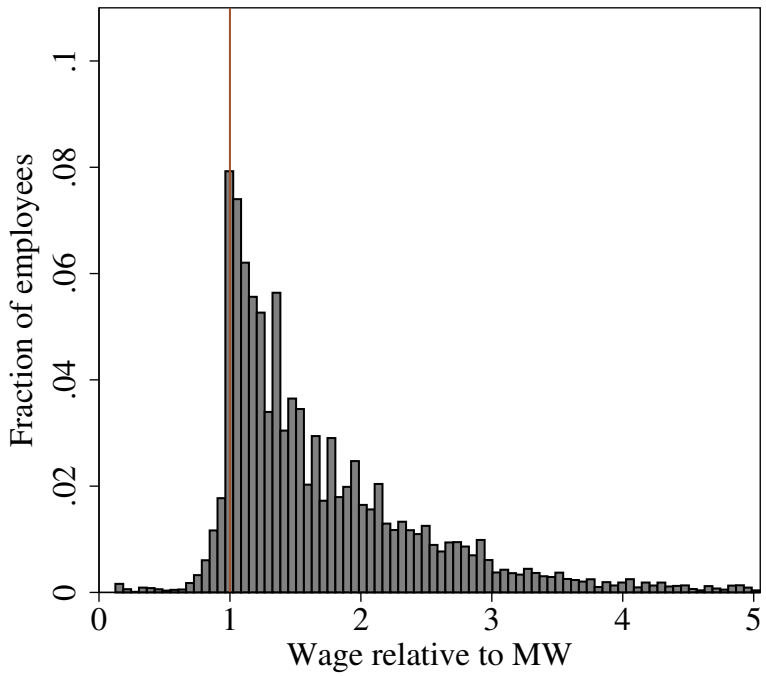
$$I_{j,t} = \prod_{c} I_{j,t,c}^{\omega_{c,y(t)}} \text{ and } \pi_{j,t} = \log I_{s,t}$$

4. Yearly revenues as weights in both steps

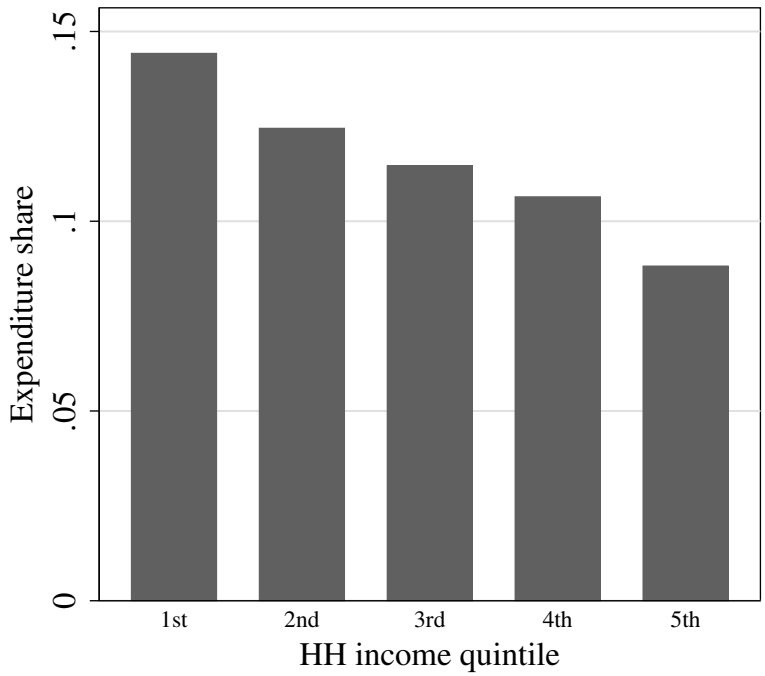
# Why grocery stores?

1. Grocery stores employ many MW workers
2. Groceries cover a large share of consumer expenditure

## (1) Wage distribution




## (2) Expenditure share




Back

# Share of MW workers (in %) Back

| | in employment | | in hours | | in earnings | |
|---|---|---|---|---|---|---|
| % of MW cutoff | $\leq 110\%$ | $\leq 130\%$ | $\leq 110\%$ | $\leq 130\%$ | $\leq 110\%$ | $\leq 130\%$ |
| | | | 2001 - 2005 | | | |
| Grocery Stores | **12.1** | 29.6 | 9.0 | 23.0 | 4.5 | 13.1 |
| Other sectors | 4.0 | 8.5 | 3.1 | 6.8 | 0.9 | 2.3 |
| | | | 2006 - 2009 | | | |
| Grocery Stores | **20.7** | 38.8 | 16.1 | 31.4 | 8.9 | 19.0 |
| Other sectors | 5.2 | 11.1 | 4.1 | 9.0 | 1.2 | 3.2 |
| | | | 2010 - 2012 | | | |
| Grocery Stores | **25.1** | 48.8 | 19.2 | 40.3 | 11.1 | 25.4 |
| Other sectors | 6.5 | 14.7 | 5.1 | 12.0 | 1.6 | 4.4 |

- Data: CPS MORG
- Share of workers with avg. hourly earnings below cutoff, averaged over states

# Expenditure shares for grocery products (in %) Back

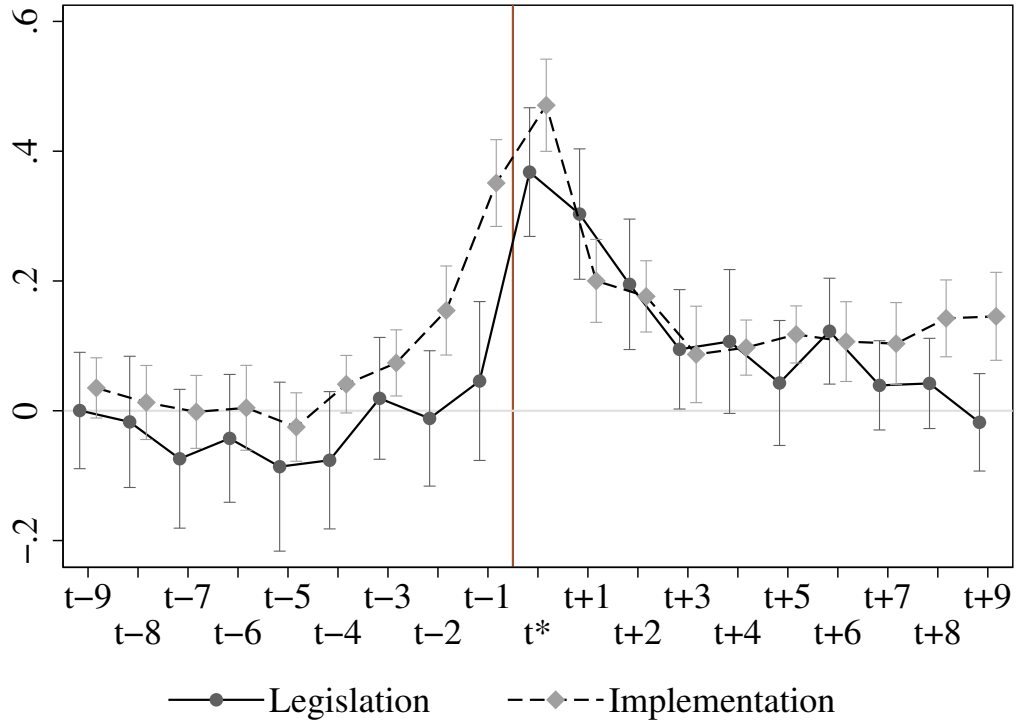
| | All house-holds | Poorest quintile | 2nd quintile | 3rd quintile | 4th quintile | Richest quintile |
|---|---|---|---|---|---|---|
| 2001 - 2005 | 11.1 | 15.3 | 13.6 | 12.1 | 11.1 | 9.1 |
| 2006 - 2009 | 10.7 | 14.3 | 12.7 | 11.4 | 10.7 | 9.0 |
| 2010 - 2012 | 11.0 | 14.4 | 12.8 | 11.6 | 10.8 | 9.4 |

- Data: CES
- Grocery products include "food at home", "household supplies", "personal care products", "alcoholic beverages" categories

# Salience of minimum wage legislation

Back

Google Search volume for "minimum wage + $statename_s$"

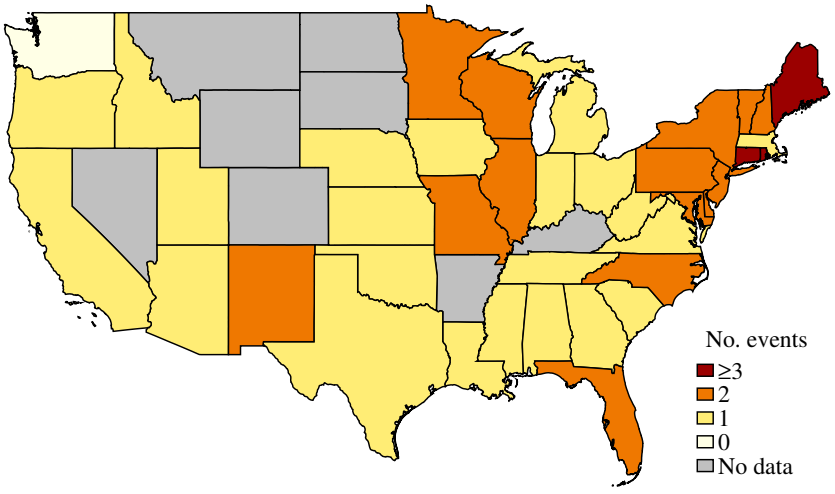



$$\log search_{s,t} = \delta_s + \gamma_t + \sum_{r=-k}^{k} \beta_r incr_{s,t-r} \sum_{r=-k}^{k} \alpha_r legis_{s,t-r} + \epsilon_{s,t}$$

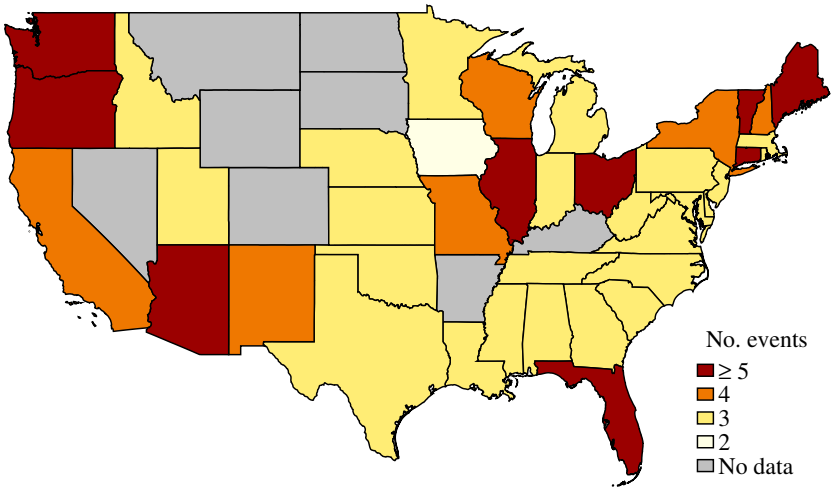
# Distribution over states

Back

(a) MW Legislation




(b) MW increase

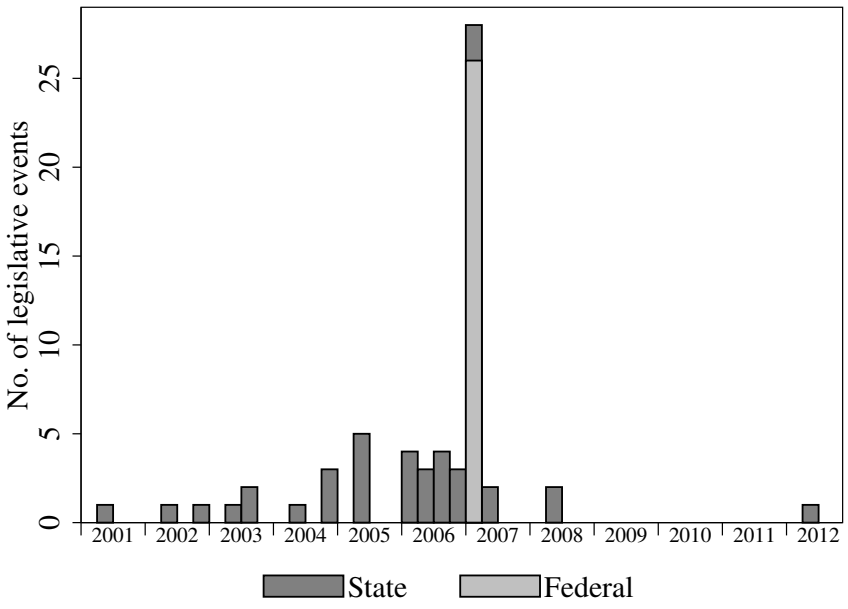



- 62 legislative events
- 166 MW increases
- Price data covers 41 states

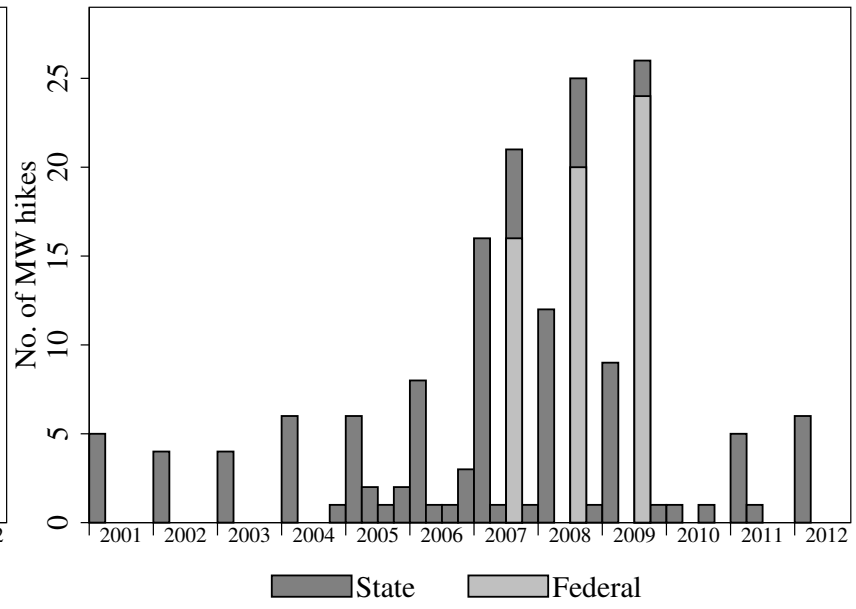
# Distribution over time

Back

(a) MW Legislation




(b) MW increase



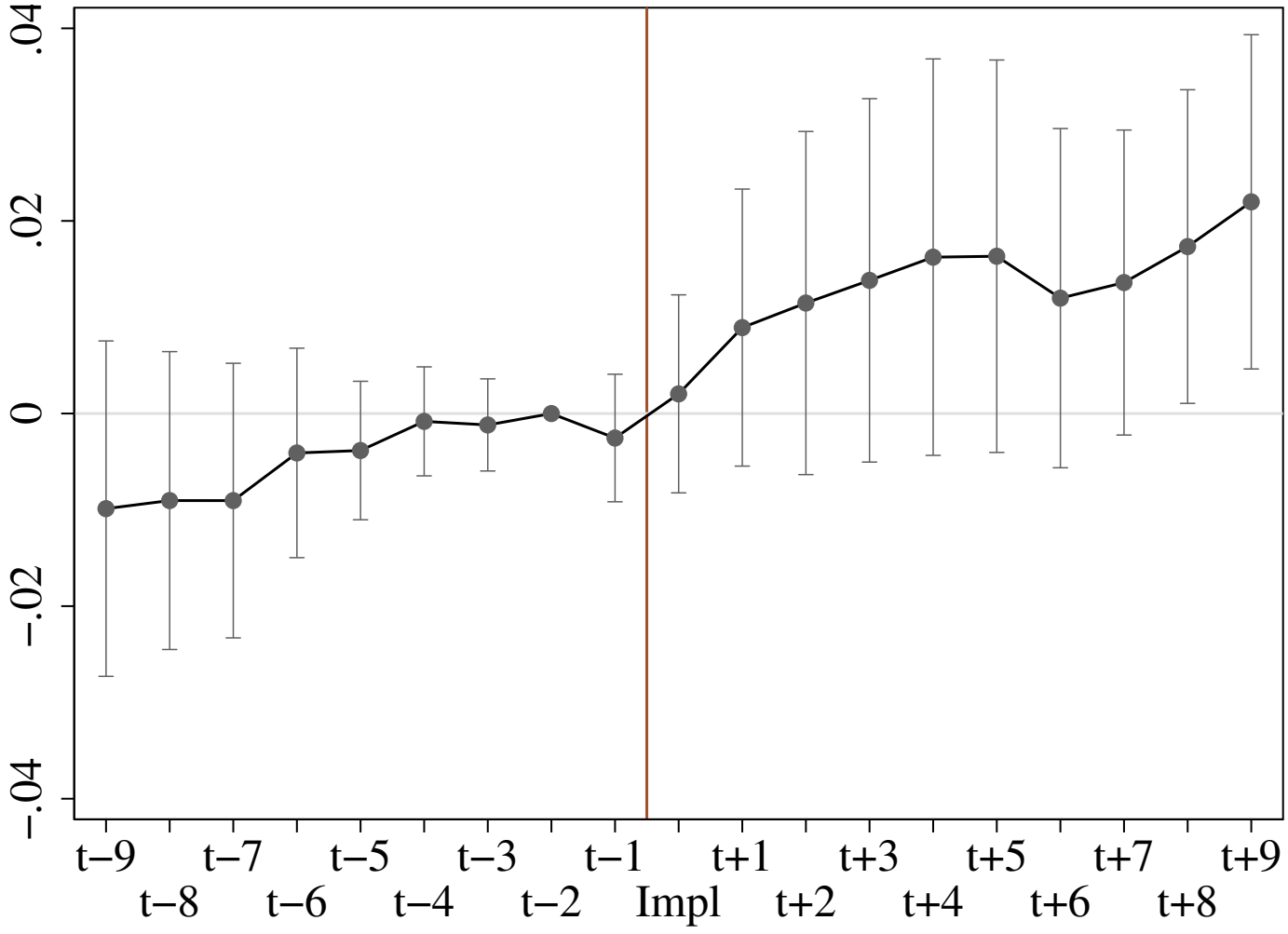

- 62 legislative events
- 166 MW increases
- Many events follow from 2007 federal MW increase

# Summary statistics

Back

| | MW hikes | | MW legislation | |
|---|---|---|---|---|
| | Mean | SD | Mean | SD |
| Log size | 0.08 | (0.05) | 0.20 | (0.12) |
| Events per state | 4.05 | (1.97) | 1.51 | (0.75) |
| Months to last event | 13.86 | (7.03) | 23.32 | (16.76) |
| Months hike to legislation / legislation to first hike | 15.65 | (9.82) | 8.74 | (8.01) |
| Share federal hike | 0.36 | (0.48) | 0.42 | (0.50) |
| Share indexed hike | 0.24 | (0.43) | | |
| Share 2001–2005 | 0.16 | (0.37) | 0.24 | (0.43) |
| Share 2006–2008 | 0.54 | (0.50) | 0.74 | (0.44) |
| Share 2009–2012 | 0.30 | (0.46) | 0.016 | (0.13) |
| Share January | 0.46 | (0.50) | 0.45 | (0.50) |
| Share July | 0.43 | (0.50) | 0.048 | (0.22) |
| Number of Events | 166 | | 62 | |

# Price elasticity around implemented min. wage increase




→ Price elasticity around implementation date ∼ 0.2. Back

# Results using alternative design

Back

| Dep. variable: Store inflation | (1) Baseline | (2) Chain-time | (3) Baseline | (4) Chain-time |
|---|---|---|---|---|
| | | Legislation | | |
| $\text{wage}_q \times \Delta\text{leg}_{q-1}$ | -0.012 | 0.005 | | |
| | (0.010) | (0.010) | | |
| $\text{wage}_q \times \Delta\text{leg}_q$ | -0.028** | -0.031** | | |
| | (0.014) | (0.013) | | |
| $\text{wage}_q \times \Delta\text{leg}_{q+1}$ | 0.003 | 0.004 | | |
| | (0.013) | (0.010) | | |
| | | Implementation | | |
| $\text{wage}_{q-2} \times \Delta\text{mw}_{q-1}$ | | | -0.026 | -0.006 |
| | | | (0.035) | (0.028) |
| $\text{wage}_{q-2} \times \Delta\text{mw}_q$ | | | 0.012 | 0.036 |
| | | | (0.035) | (0.023) |
| $\text{wage}_{q-2} \times \Delta\text{mw}_{q+1}$ | | | -0.016 | 0.010 |
| | | | (0.028) | (0.025) |
| | | Estimation Summary | | |
| Observations | 84741 | 84503 | 84748 | 84512 |
| Controls | YES | YES | YES | YES |
| Store FE | YES | YES | YES | YES |
| State time FE | YES | YES | YES | YES |
| Chain time FE | NO | YES | NO | YES |

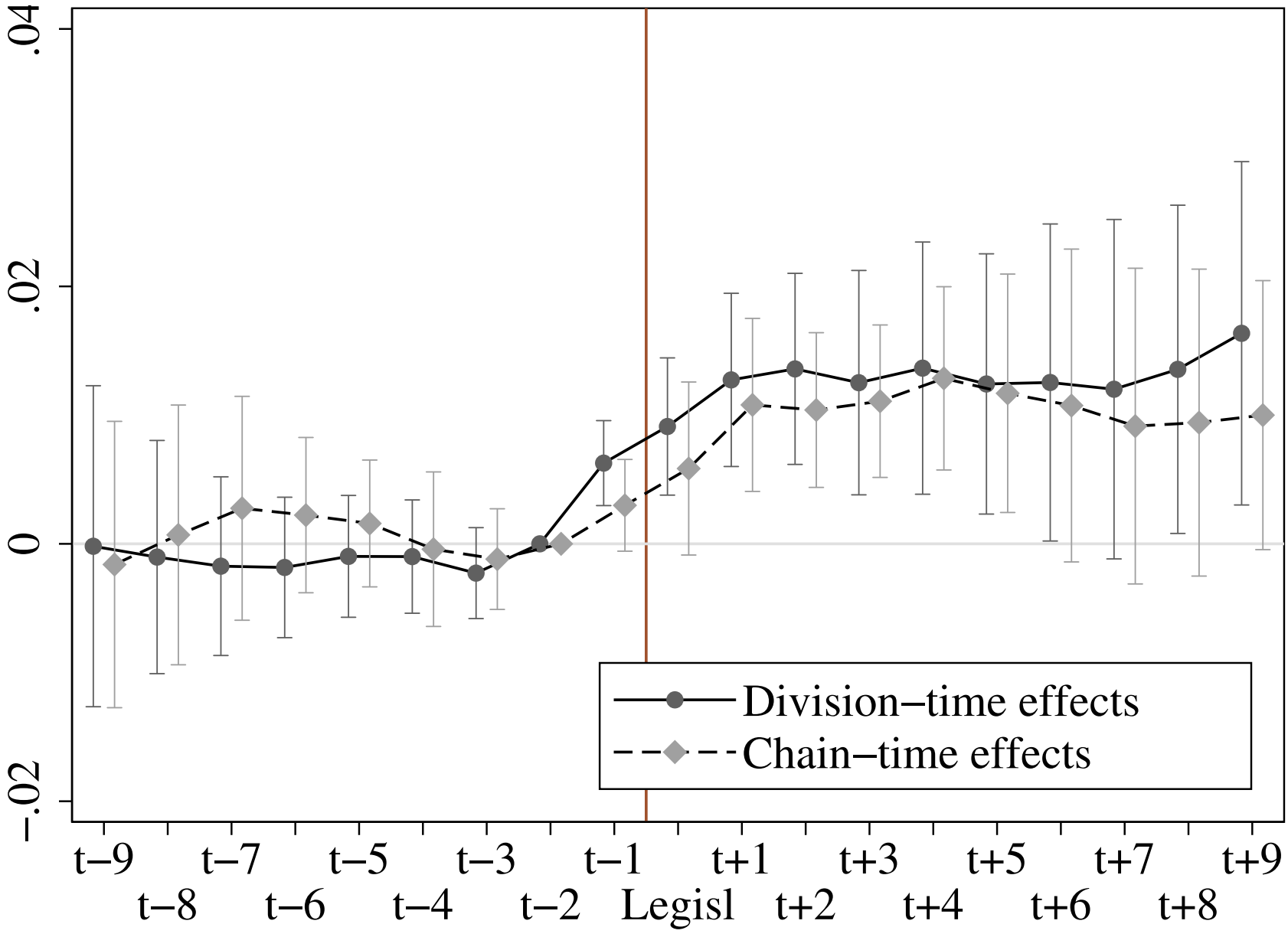
# Robustness checks for effects at legislation

Back

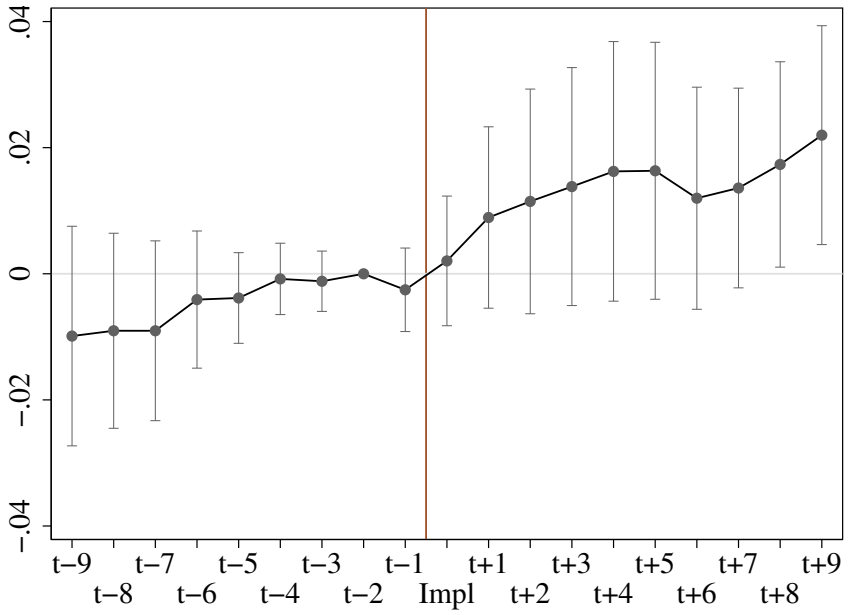
| Dep. variable: Store inflation | (1) Weighted | (2) No Controls | (3) No store FE | (4) Seasonal | (5) No salesfilter | (6) Winsorized |
|---|---|---|---|---|---|---|
| | | | Legislation | | | |
| $E_0^{leg}$ | 0.009** | 0.011*** | 0.012*** | 0.009** | 0.018*** | 0.009*** |
| | (0.003) | (0.004) | (0.004) | (0.004) | (0.005) | (0.003) |
| $E_2^{leg}$ | 0.016*** | 0.017*** | 0.017*** | 0.016*** | 0.022*** | 0.014*** |
| | (0.005) | (0.006) | (0.006) | (0.006) | (0.007) | (0.004) |
| $E_4^{leg}$ | 0.022*** | 0.021*** | 0.022*** | 0.020*** | 0.024*** | 0.019*** |
| | (0.007) | (0.007) | (0.008) | (0.007) | (0.008) | (0.006) |
| | | | Estimation Summary | | | |
| $\sum$ All | 0.022* | 0.019 | 0.021 | 0.018 | 0.036*** | 0.014 |
| | (0.013) | (0.016) | (0.018) | (0.016) | (0.013) | (0.013) |
| $\sum$ Pre-event | -0.002 | -0.002 | -0.001 | -0.001 | 0.014 | -0.004 |
| | (0.006) | (0.007) | (0.008) | (0.008) | (0.010) | (0.006) |
| $N$ | 191568 | 191641 | 191568 | 191568 | 191568 | 191568 |
| Controls | YES | NO | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES |
| Store FE | YES | YES | NO | YES | YES | YES |
| Seasonality | NO | NO | NO | YES | NO | NO |
| Weights | Obs | NO | NO | NO | NO | NO |

# Price pass-through around min. wage legislation

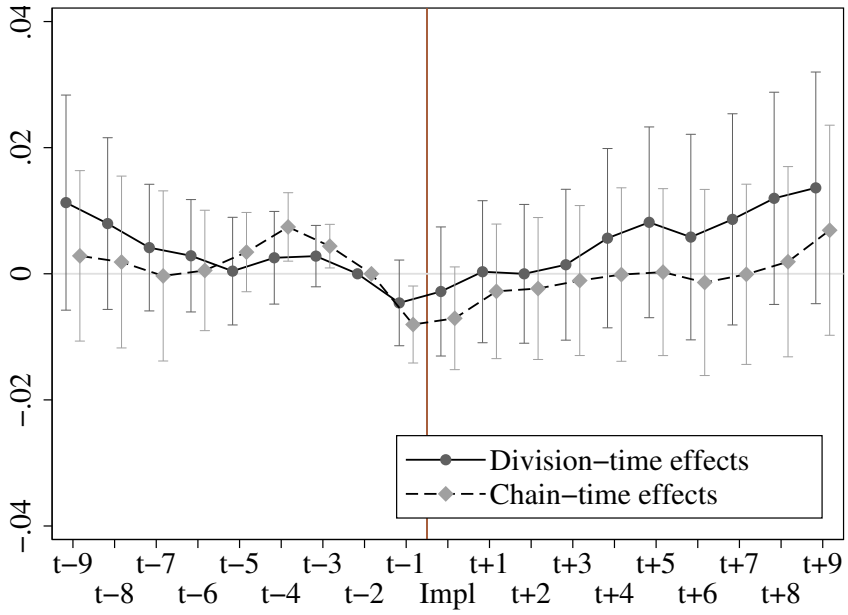
Back



# Prices around MW implementation




(a) Baseline




(b) Chain-time or region-time FE

Back

# Robustness checks for joint estimates

Back

| Dep. variable: Store inflation | (1) Weighted | (2) No Controls | (3) No Store FE | (4) Seasonal | (5) No Salesfilter | (6) Winsorized |
|---|---|---|---|---|---|---|
| | | | Legislation | | | |
| $E_0^{leg}$ | 0.008** | 0.011*** | 0.011*** | 0.009** | 0.018*** | 0.010*** |
| | (0.003) | (0.003) | (0.003) | (0.003) | (0.006) | (0.002) |
| $E_2^{leg}$ | 0.014*** | 0.015*** | 0.016*** | 0.015*** | 0.026*** | 0.013*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.009) | (0.004) |
| $E_4^{leg}$ | 0.019*** | 0.019*** | 0.021*** | 0.019*** | 0.031*** | 0.017*** |
| | (0.006) | (0.007) | (0.007) | (0.006) | (0.009) | (0.005) |
| | | | Implementation | | | |
| $E_0^{inc}$ | 0.008 | 0.002 | 0.001 | 0.002 | -0.004 | 0.003 |
| | (0.007) | (0.006) | (0.007) | (0.006) | (0.008) | (0.006) |
| $E_2^{inc}$ | 0.016 | 0.012 | 0.011 | 0.011 | 0.013 | 0.012 |
| | (0.011) | (0.011) | (0.012) | (0.011) | (0.009) | (0.011) |
| $E_4^{inc}$ | 0.024* | 0.017 | 0.015 | 0.018 | 0.022* | 0.015 |
| | (0.013) | (0.013) | (0.014) | (0.013) | (0.011) | (0.012) |
| | | | Estimation Summary | | | |
| $E_4^{leg}+E_4^{inc}$ | 0.042*** | 0.036** | 0.036** | 0.037** | 0.053*** | 0.033** |
| | (0.015) | (0.014) | (0.016) | (0.014) | (0.015) | (0.013) |
| $\sum$ All | 0.058*** | 0.046* | 0.046 | 0.046* | 0.041 | 0.040* |
| | (0.020) | (0.024) | (0.028) | (0.025) | (0.027) | (0.021) |
| $\sum$ Pre-event | 0.014 | 0.010 | 0.008 | 0.008 | -0.004 | 0.004 |
| | (0.013) | (0.016) | (0.018) | (0.016) | (0.018) | (0.014) |
| $N$ | 191568 | 191641 | 191568 | 191568 | 191568 | 191568 |
| Controls | YES | NO | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES | YES | YES |
| Store FE | YES | YES | NO | YES | YES | YES |
| Seasonality | NO | NO | NO | YES | NO | NO |
| Weights | Obs | NO | NO | NO | NO | NO |

# Results by chain type

Back

| Dep. variable: Store inflation | (1) Small Chain | (2) Regional Chain | (3) Large Chain | (4) National Chain |
|---|---|---|---|---|
| | | Legislation | | |
| $E_0^{leg}$ | 0.011*** | 0.010** | 0.007*** | 0.006* |
| | (0.004) | (0.004) | (0.002) | (0.004) |
| $E_2^{leg}$ | 0.018*** | 0.016*** | 0.007* | 0.008 |
| | (0.005) | (0.005) | (0.004) | (0.006) |
| $E_4^{leg}$ | 0.018*** | 0.016** | 0.005 | 0.009 |
| | (0.006) | (0.007) | (0.005) | (0.008) |
| | | Implementation | | |
| $E_0^{inc}$ | 0.003 | 0.004 | -0.009 | -0.012 |
| | (0.005) | (0.005) | (0.008) | (0.009) |
| $E_2^{inc}$ | 0.006 | 0.005 | -0.005 | -0.006 |
| | (0.007) | (0.007) | (0.007) | (0.009) |
| $E_4^{inc}$ | 0.013 | 0.011 | -0.005 | -0.006 |
| | (0.008) | (0.009) | (0.010) | (0.012) |
| | | Estimation Summary | | |
| $E_4^{leg}+E_4^{inc}$ | 0.031** | 0.027** | 0.001 | 0.003 |
| | (0.011) | (0.013) | (0.012) | (0.016) |
| $\sum$ All | 0.037** | 0.037* | 0.003 | -0.004 |
| | (0.018) | (0.020) | (0.017) | (0.019) |
| $\sum$ Pre-event | 0.007 | 0.012 | 0.003 | -0.004 |
| | (0.007) | (0.009) | (0.010) | (0.011) |
| $N$ | 108336 | 131959 | 98141 | 74518 |
| controls | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES |
| Store FE | YES | YES | YES | YES |
| Division time FE | YES | YES | YES | YES |

# Results by store size

Back

| Dep. variable: Store inflation | (1) Small (revenue) | (2) Small (prod. range) | (3) Large (revenue) | (4) Large (prod. range) |
|---|---|---|---|---|
| | | Legislation | | |
| $E_0^{leg}$ | 0.015*** | 0.012** | 0.007** | 0.007*** |
| | (0.005) | (0.005) | (0.003) | (0.003) |
| $E_2^{leg}$ | 0.013** | 0.008 | 0.016*** | 0.018*** |
| | (0.005) | (0.005) | (0.005) | (0.005) |
| $E_4^{leg}$ | 0.006 | 0.003 | 0.020*** | 0.022*** |
| | (0.006) | (0.006) | (0.006) | (0.006) |
| | | Implementation | | |
| $E_0^{inc}$ | -0.010 | -0.008 | 0.004 | 0.003 |
| | (0.008) | (0.008) | (0.005) | (0.005) |
| $E_2^{inc}$ | -0.007 | -0.000 | 0.006 | 0.003 |
| | (0.007) | (0.007) | (0.007) | (0.007) |
| $E_4^{inc}$ | -0.007 | -0.002 | 0.015 | 0.013 |
| | (0.008) | (0.008) | (0.010) | (0.009) |
| | | Estimation Summary | | |
| $E_4^{leg}+E_4^{inc}$ | -0.000 | 0.001 | 0.034** | 0.035*** |
| | (0.011) | (0.012) | (0.013) | (0.013) |
| $\sum$ All | 0.001 | 0.000 | 0.042* | 0.047** |
| | (0.015) | (0.018) | (0.022) | (0.021) |
| $\sum$ Pre-event | 0.011* | 0.006 | 0.004 | 0.010 |
| | (0.006) | (0.008) | (0.010) | (0.010) |
| $N$ | 95077 | 103473 | 111400 | 103004 |
| Controls | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES |
| Store FE | YES | YES | YES | YES |
| Division time FE | YES | YES | YES | YES |

# Results by store price level

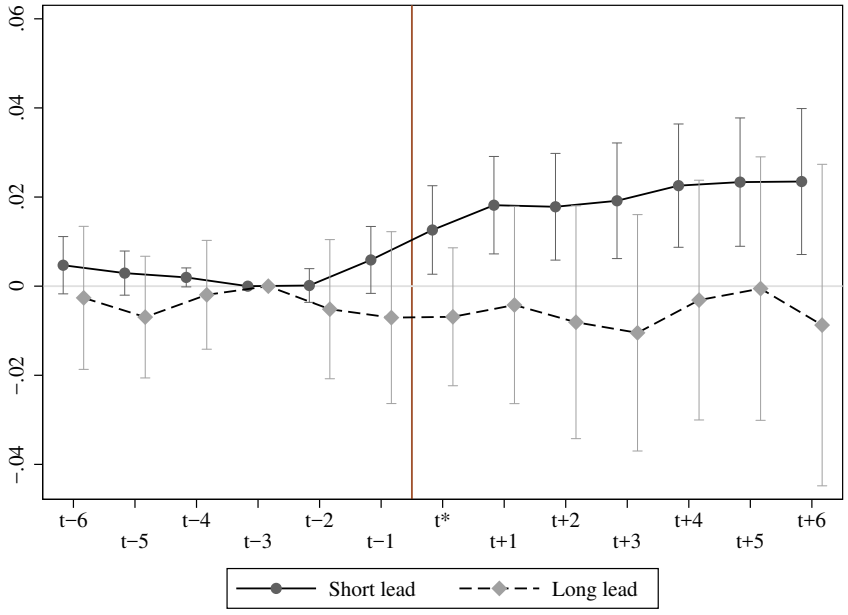
Back

| Dep. variable: Store inflation | (1) Cheap (state) | (2) Cheap (county) | (3) Expensive (state) | (4) Expensive (county) |
|---|---|---|---|---|
| | | Legislation | | |
| $E_0^{leg}$ | 0.012*** | 0.013*** | 0.003 | 0.003 |
| | (0.003) | (0.003) | (0.005) | (0.006) |
| $E_2^{leg}$ | 0.015*** | 0.015*** | 0.008 | 0.004 |
| | (0.004) | (0.005) | (0.007) | (0.009) |
| $E_4^{leg}$ | 0.014*** | 0.013** | 0.008 | 0.013 |
| | (0.005) | (0.005) | (0.009) | (0.009) |
| | | Implementation | | |
| $E_0^{inc}$ | -0.002 | -0.001 | -0.001 | -0.004 |
| | (0.005) | (0.006) | (0.006) | (0.007) |
| $E_2^{inc}$ | 0.003 | 0.003 | -0.000 | -0.009 |
| | (0.006) | (0.006) | (0.008) | (0.011) |
| $E_4^{inc}$ | 0.007 | 0.010 | 0.012 | 0.005 |
| | (0.008) | (0.008) | (0.010) | (0.014) |
| | | Estimation Summary | | |
| $E_4^{leg}+E_4^{inc}$ | 0.021** | 0.023** | 0.020 | 0.018 |
| | (0.010) | (0.010) | (0.013) | (0.017) |
| $\sum$ All | 0.024 | 0.034* | 0.046** | 0.037 |
| | (0.016) | (0.017) | (0.022) | (0.032) |
| $\sum$ Pre-event | 0.005 | 0.015* | 0.030** | 0.018 |
| | (0.007) | (0.008) | (0.013) | (0.017) |
| $N$ | 155518 | 126557 | 50959 | 32658 |
| Controls | YES | YES | YES | YES |
| Time FE | YES | YES | YES | YES |
| Store FE | YES | YES | YES | YES |
| Division time FE | YES | YES | YES | YES |

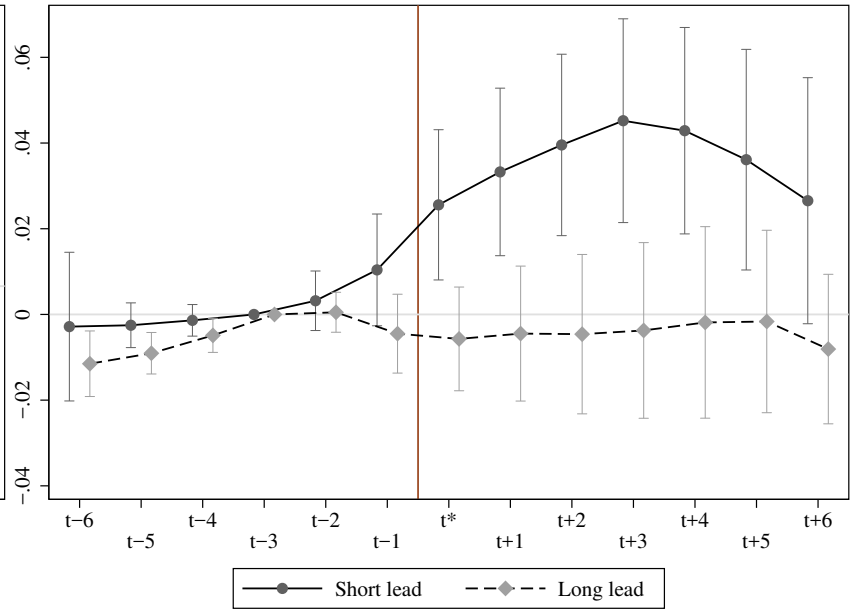
# Results by timing

Back

(a) at legislation




(b) at implementation




- (a) time from legislation to first hike <> 9 months
- (b) time from corresponding legislation to hike <> 9 months

# Effects on output and revenues

Back

| | (1) Quantity index | (2) Log revenues | (3) Quantity index | (4) Log revenues | (5) Quantity index | (6) Log revenues |
|---|---|---|---|---|---|---|
| Legislation | -0.039 | 0.001 | | | -0.033 | -0.014 |
| | (0.045) | (0.041) | | | (0.045) | (0.047) |
| Implementation | | | -0.056 | -0.044 | -0.041 | -0.020 |
| | | | (0.055) | (0.056) | (0.064) | (0.067) |
| $\sum$ Pre-event | -0.012 | -0.054 | -0.084 | -0.018 | -0.022 | -0.024 |
| | (0.035) | (0.036) | (0.059) | (0.066) | (0.068) | (0.074) |
| *N* | 201973 | 201578 | 201973 | 201578 | 201973 | 201578 |

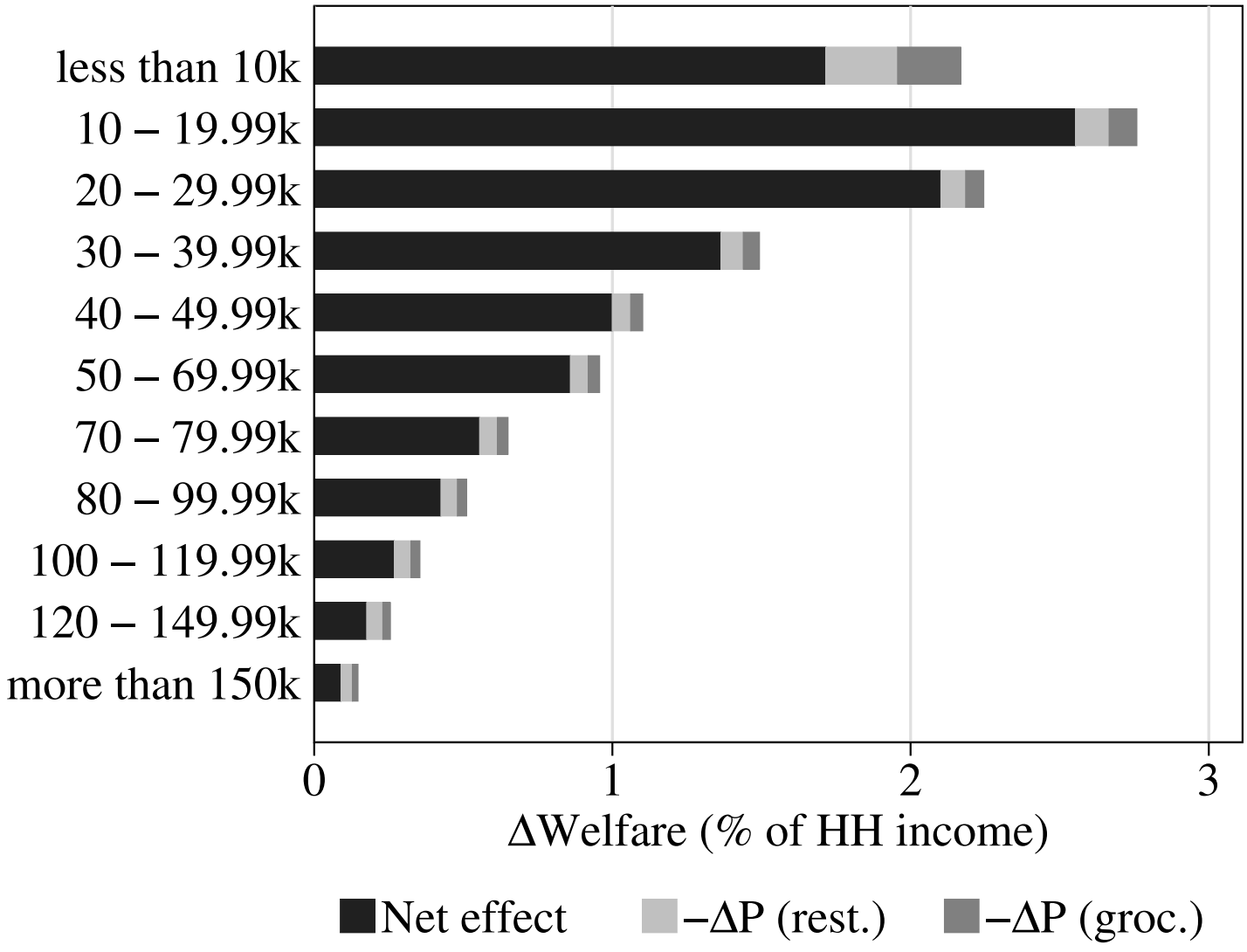
- Cumulative elasticity 4 months after event
- No significant effects on output or revenues
- Potentially a problem of precision, negative point estimates

# Demand or supply? Back

- We view minimum wage shocks as a cost shock
- Minimum wages may shift market demand for groceries
- This is unlikely to drive our results:
  1. The income elasticity of most groceries is substantially below one
  2. Literature finds no effects of MW increases on expenditures on non-durables even for HH with MW income
     Aaronson et al. (2012)
  3. Many workers but few customers earn MW. Moreover, these customers spend little because they are poor
  4. Grocery prices respond little even to larger demand shocks
     Gagnon and Lopez-Salido (2014), Loupias and Sevestre (2013)

# Relative to nominal gains including restaurants

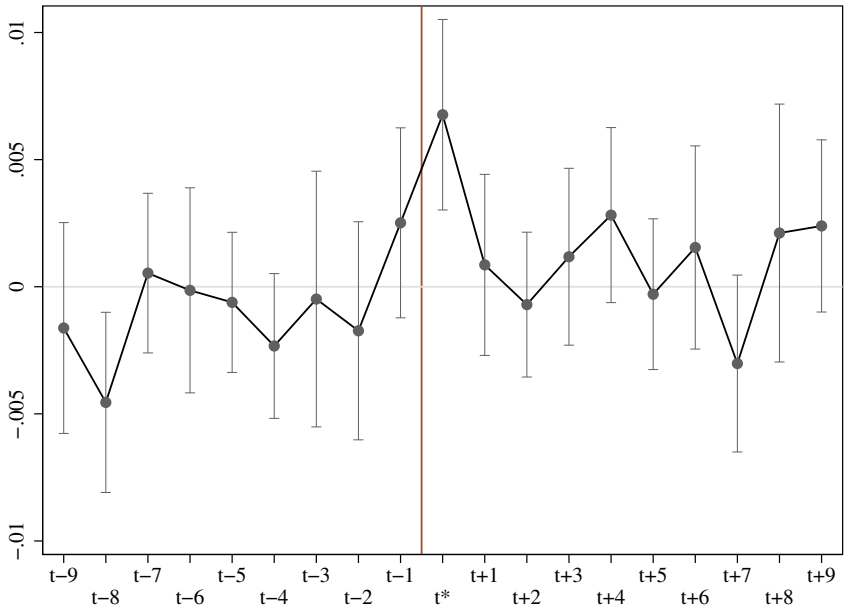
Back



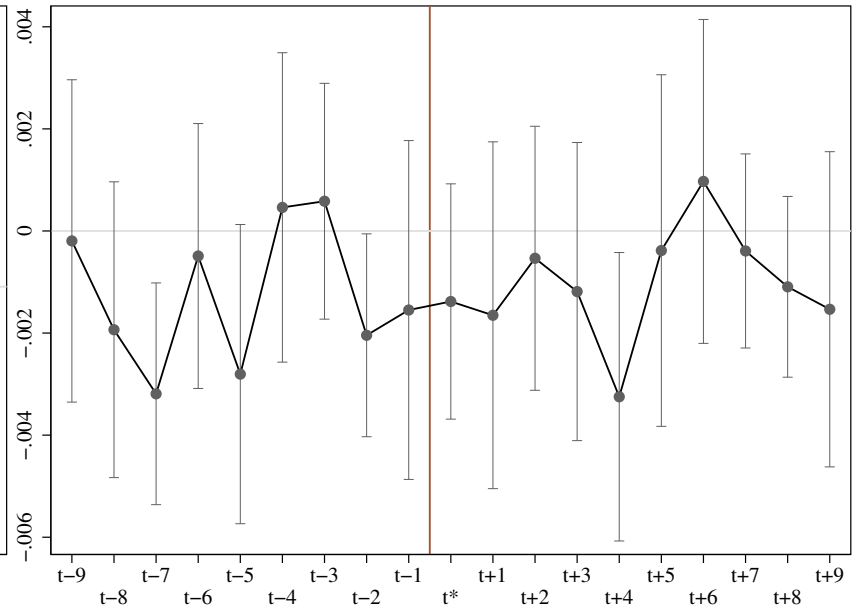
# Frequency of price increases and decreases

Back

(a) Increases




(b) Decreases



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