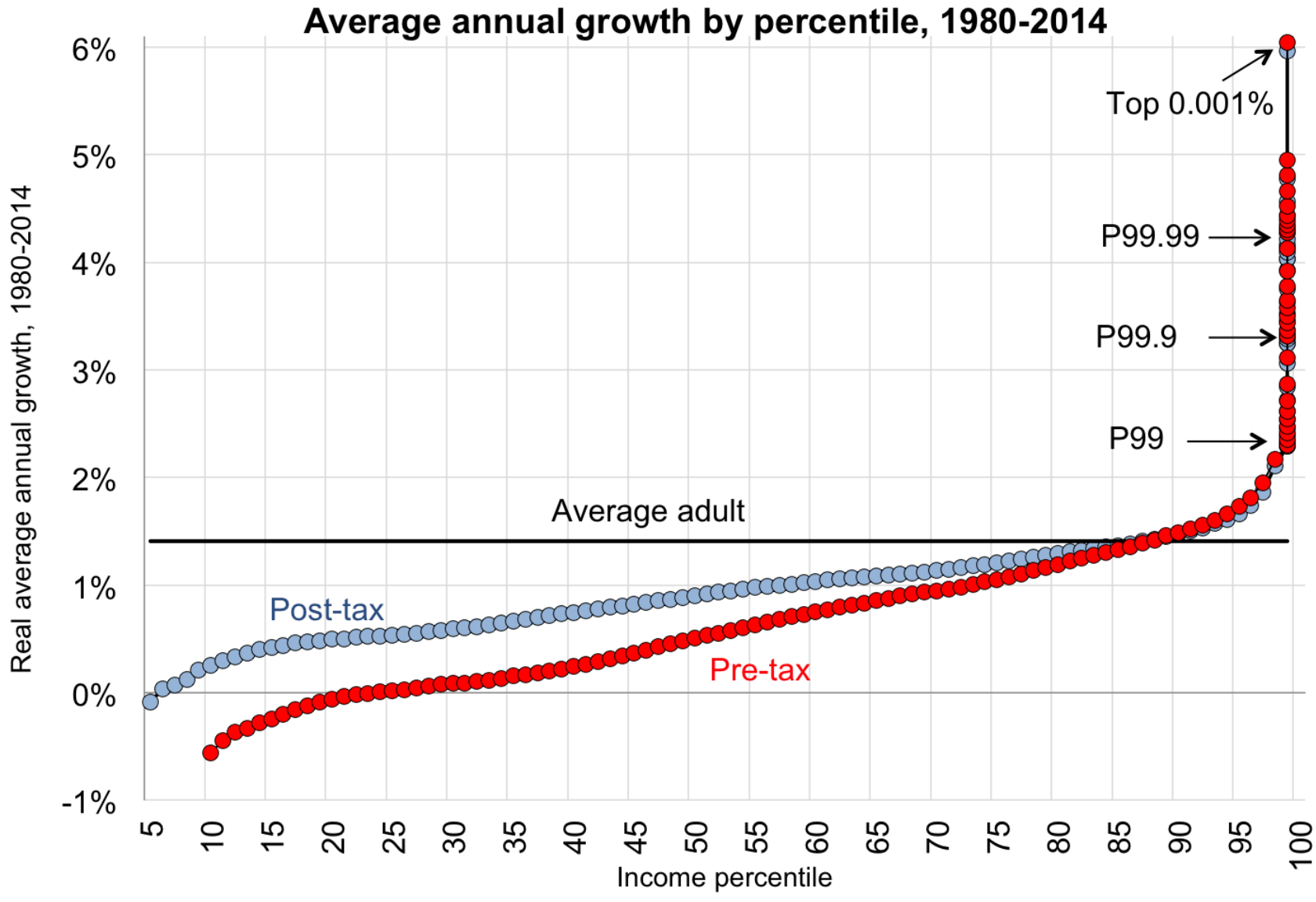
What can we learn from recent minimum wage increases in the US?

Claire Montialoux (CREST)

CEPREMAP, October 20th 2017

Context

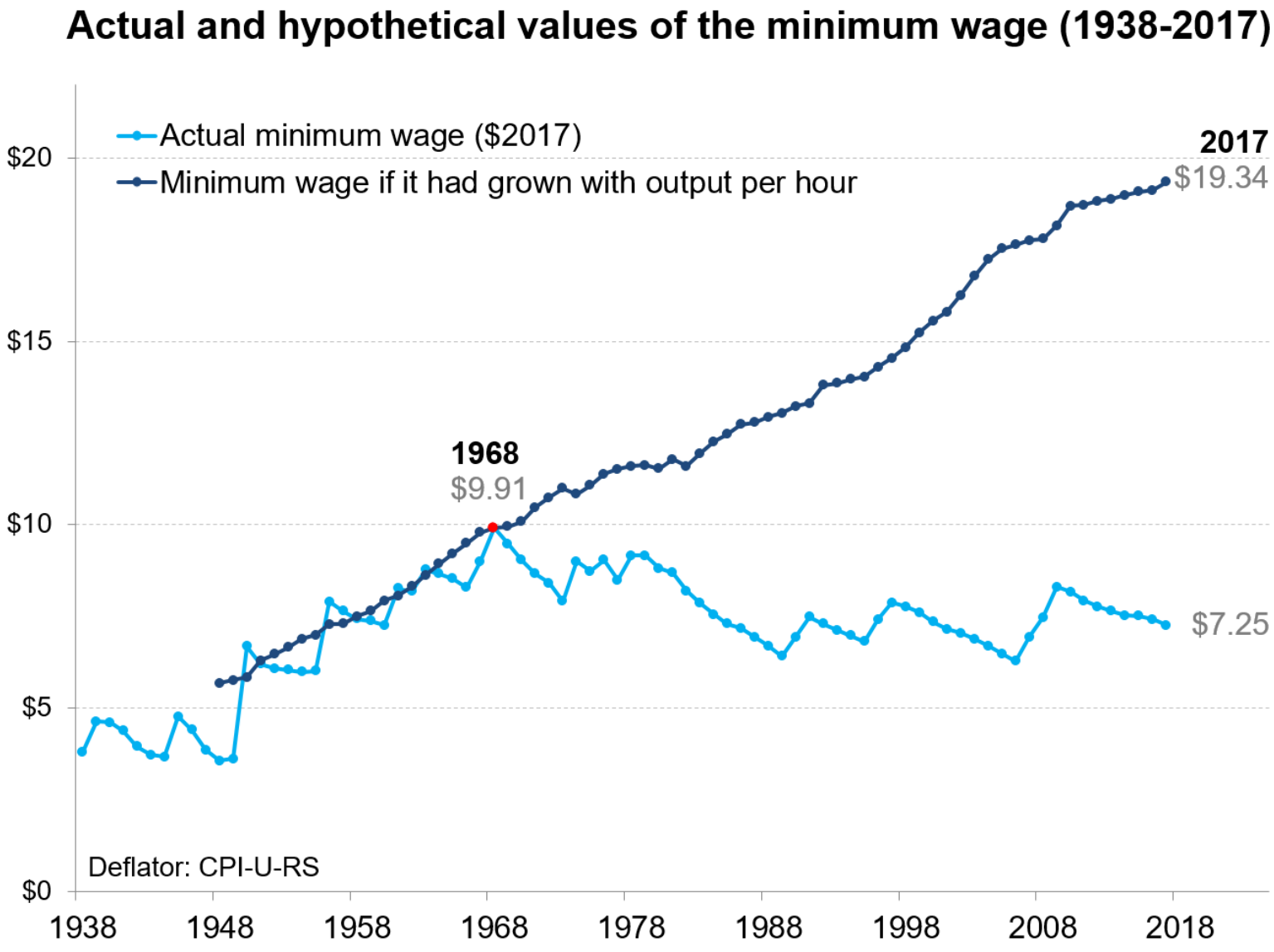
Rising inequality and wage stagnation for the bottom 50%



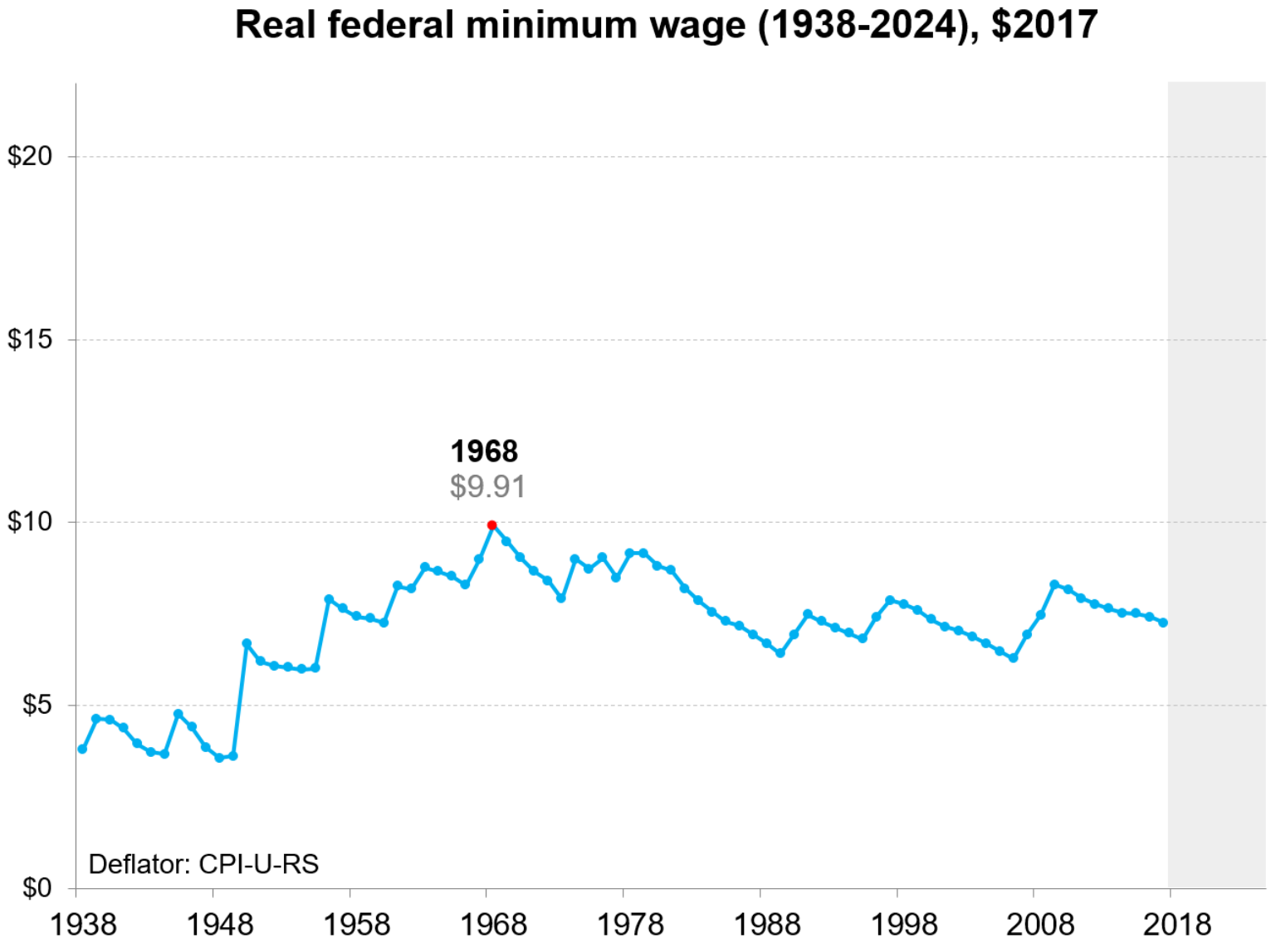
Source: Piketty, Saez, Zucman (Forthcoming 2018)

The federal minimum wage in the long-run (1/4)

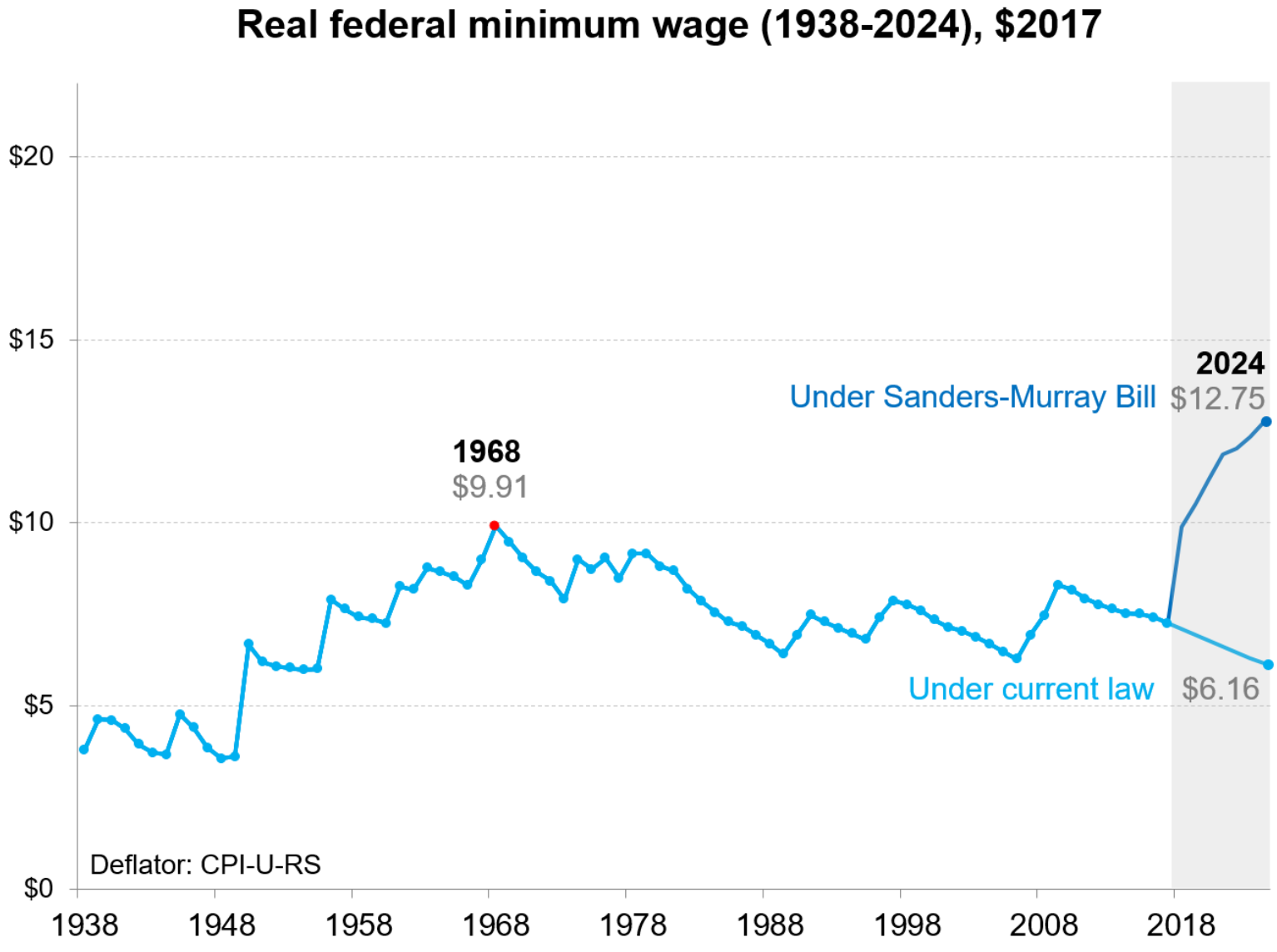
The federal minimum wage in the long-run (2/4)



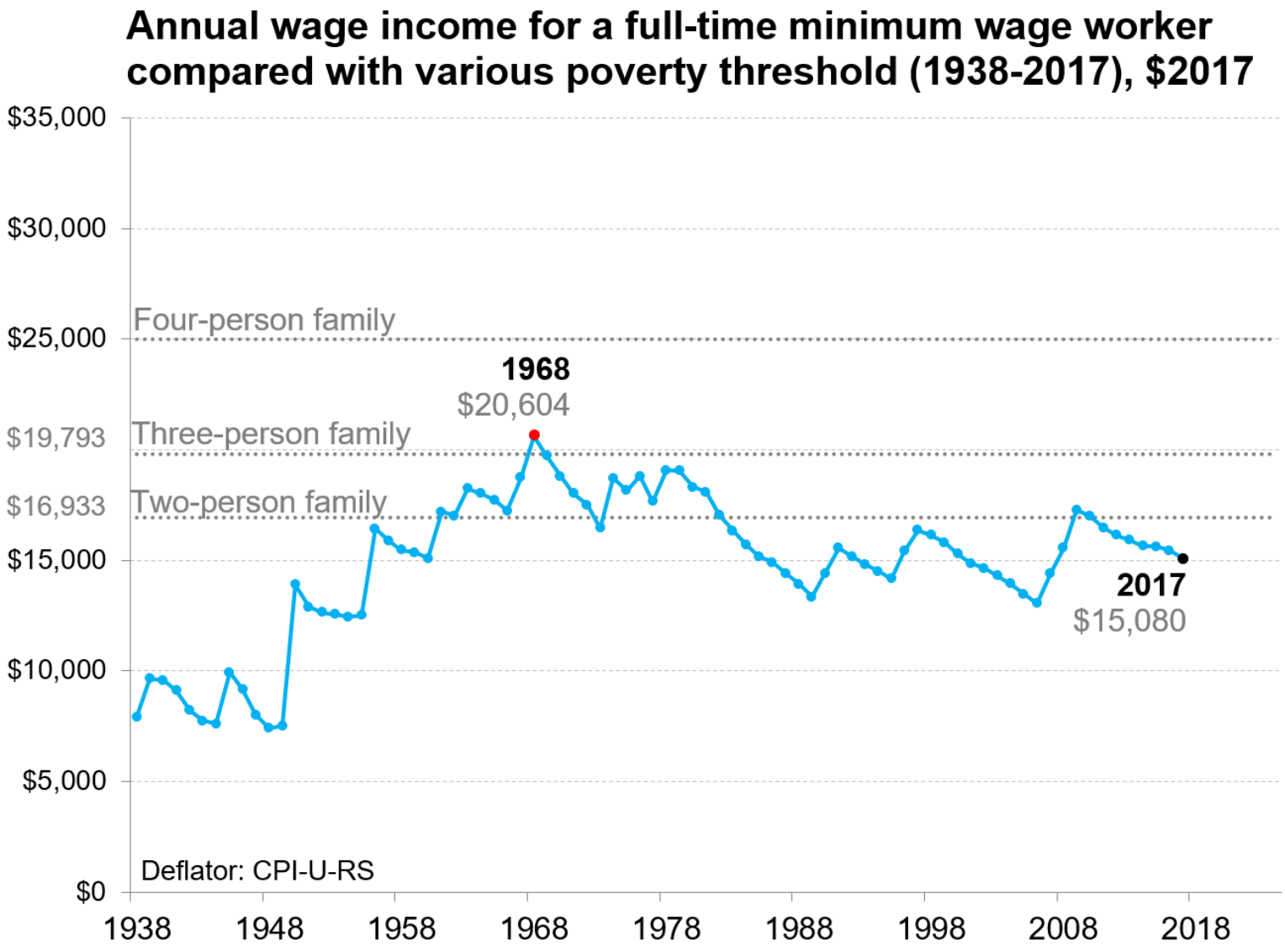
The federal minimum wage in the long-run (3/4)



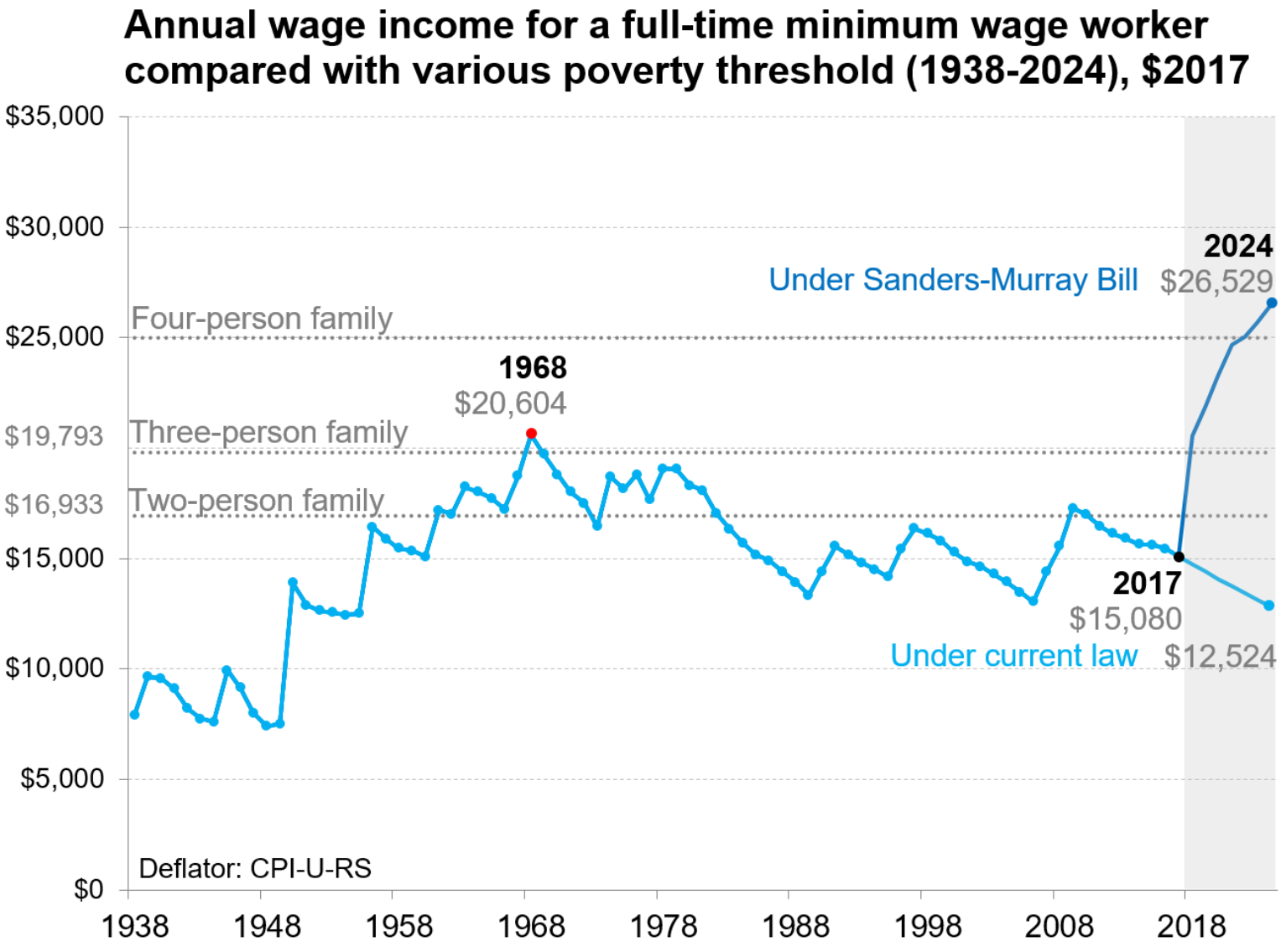
The federal minimum wage in the long-run (4/4)



Federal minimum wage and poverty (1/2)

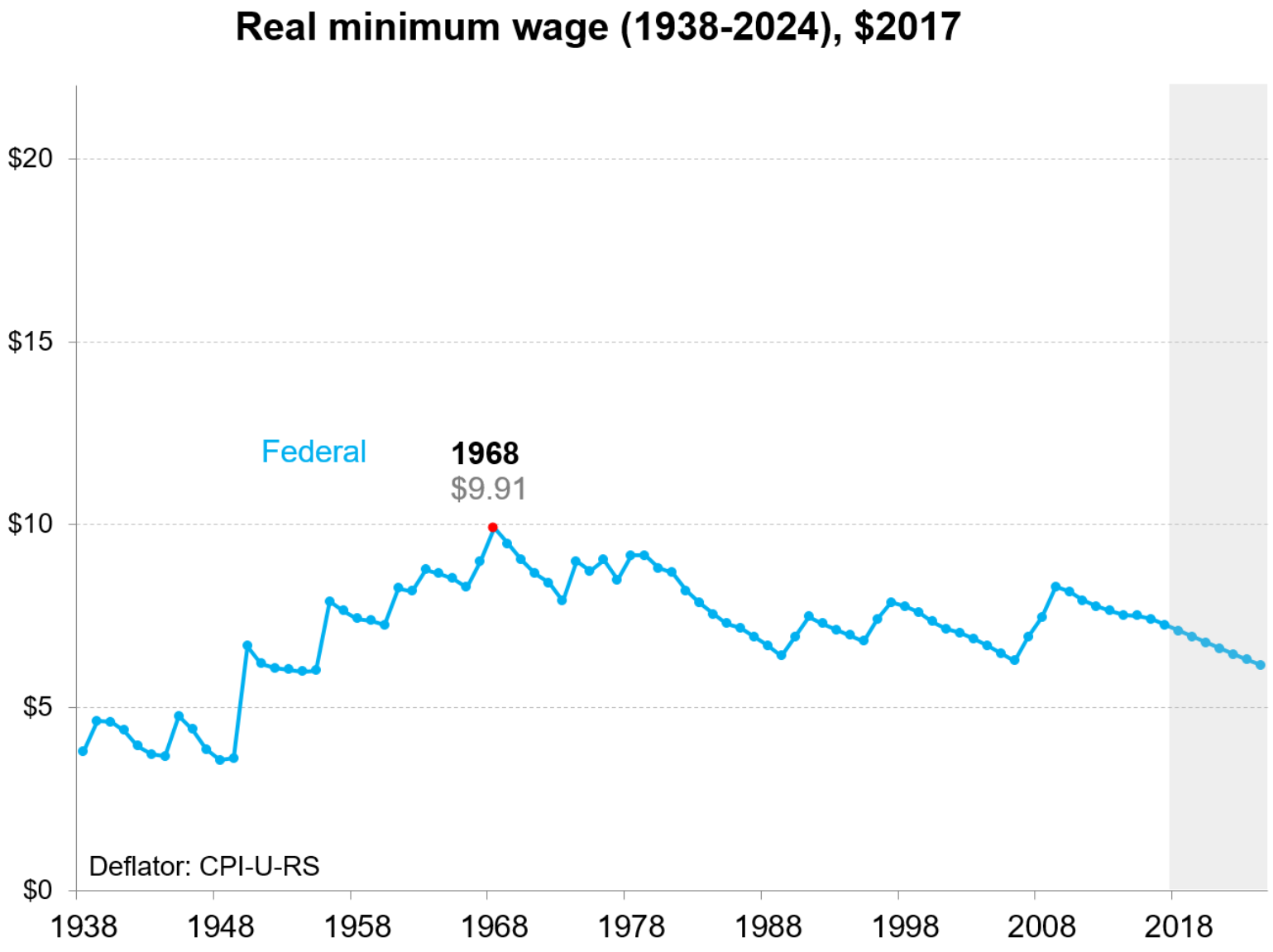


Federal minimum wage and poverty (2/2)

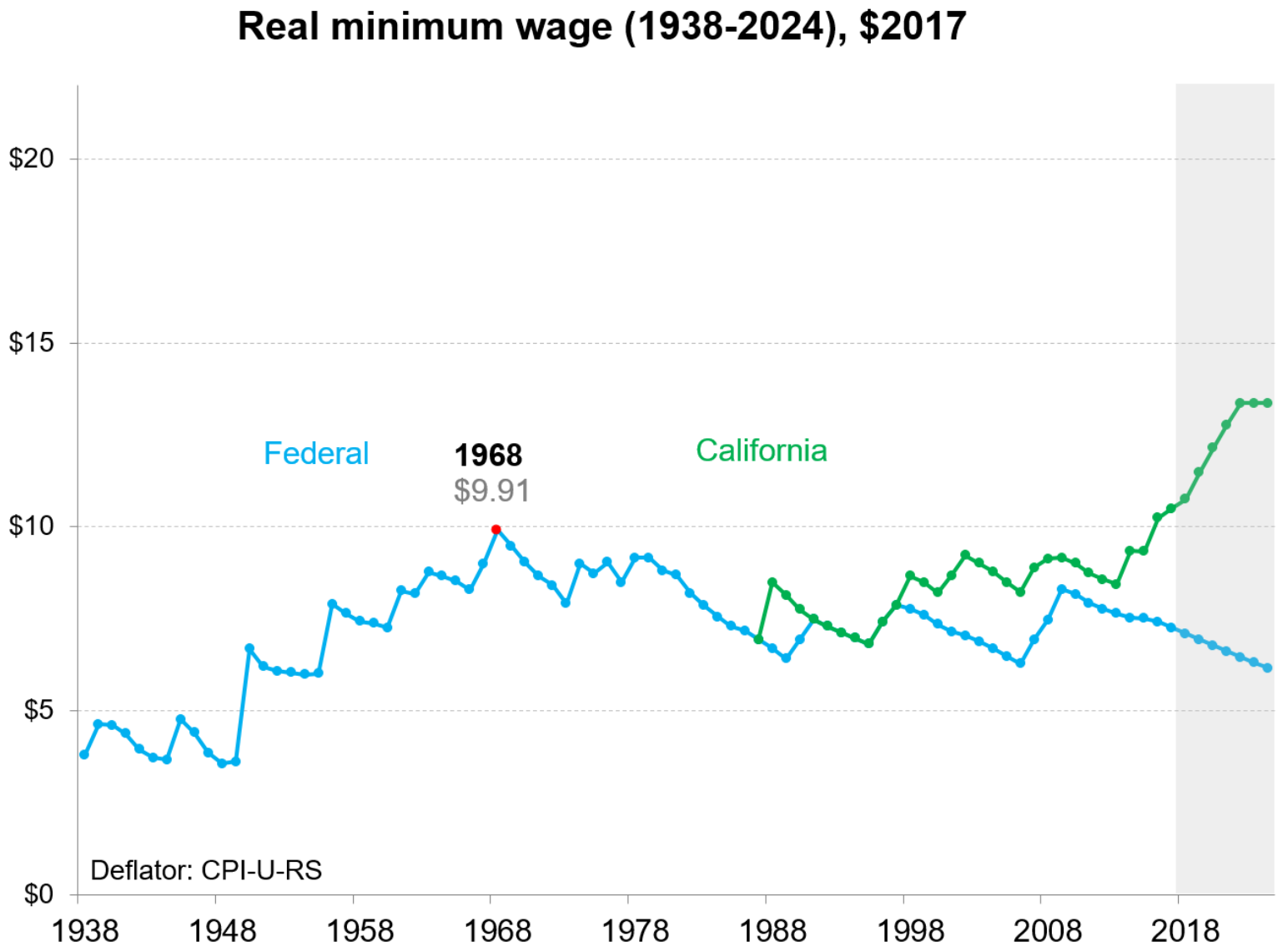


State and local minimum wage increases

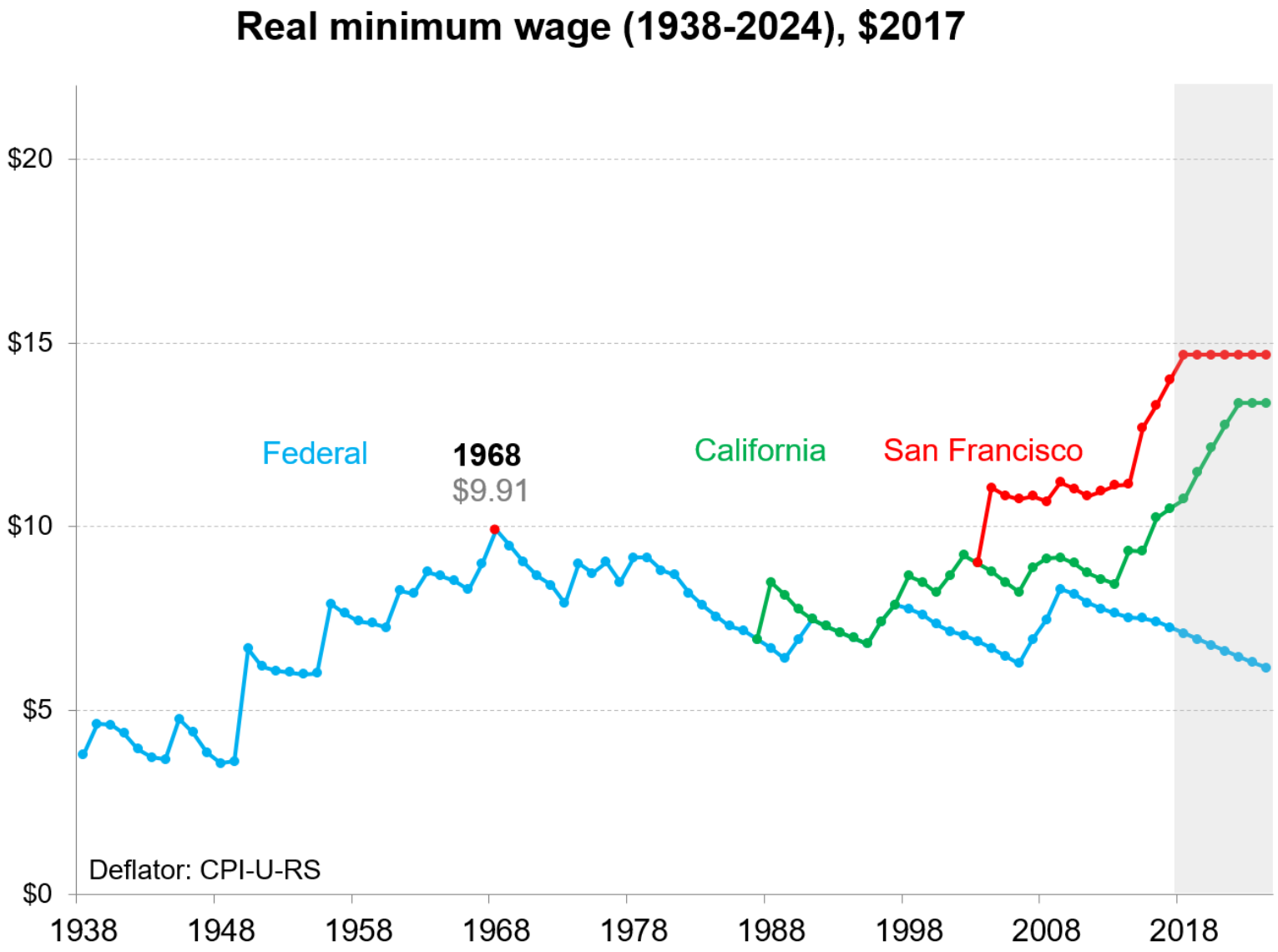
State and local minimum wages in the long-run (1/3)



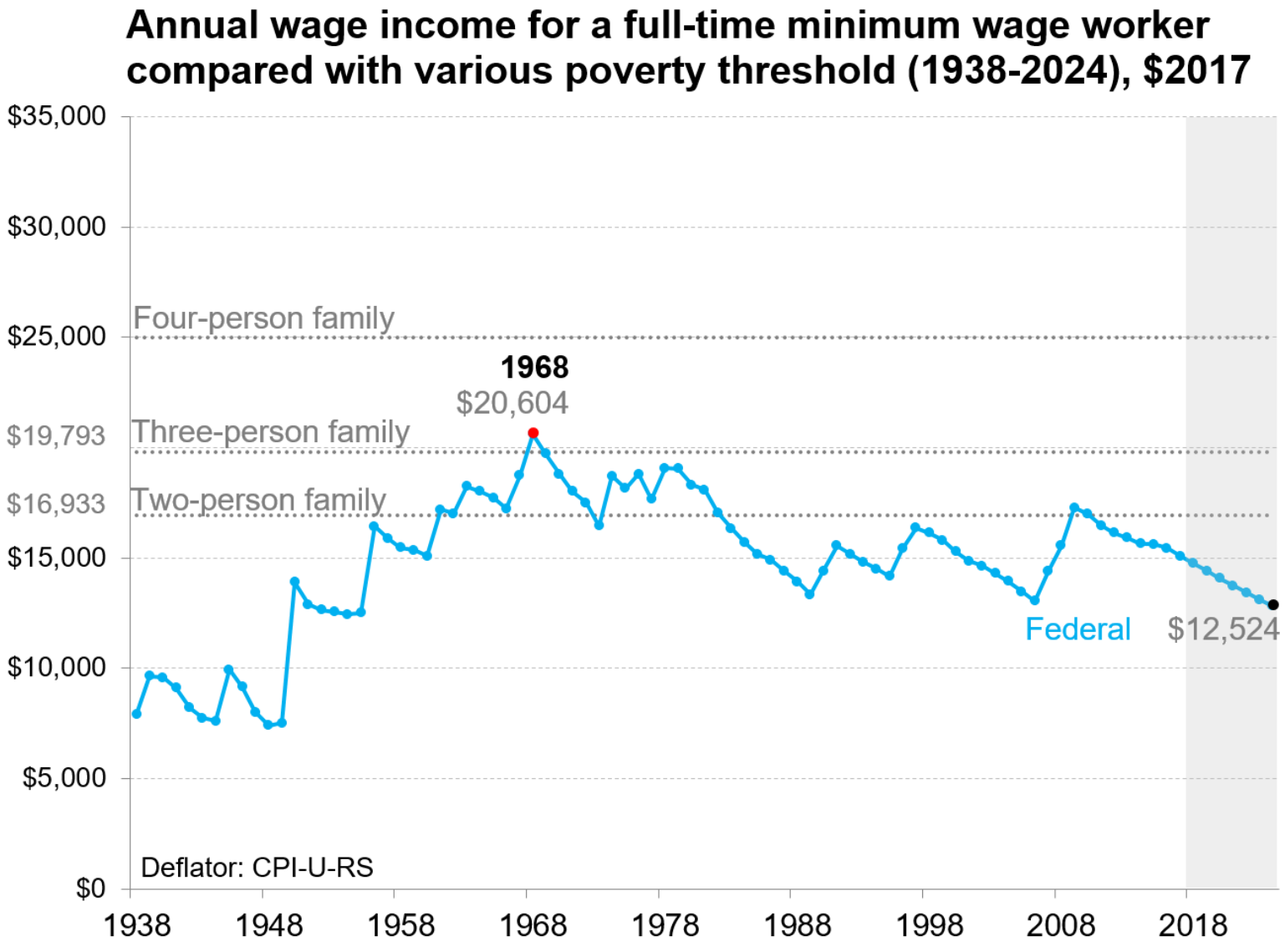
State and local minimum wages in the long-run (2/3)



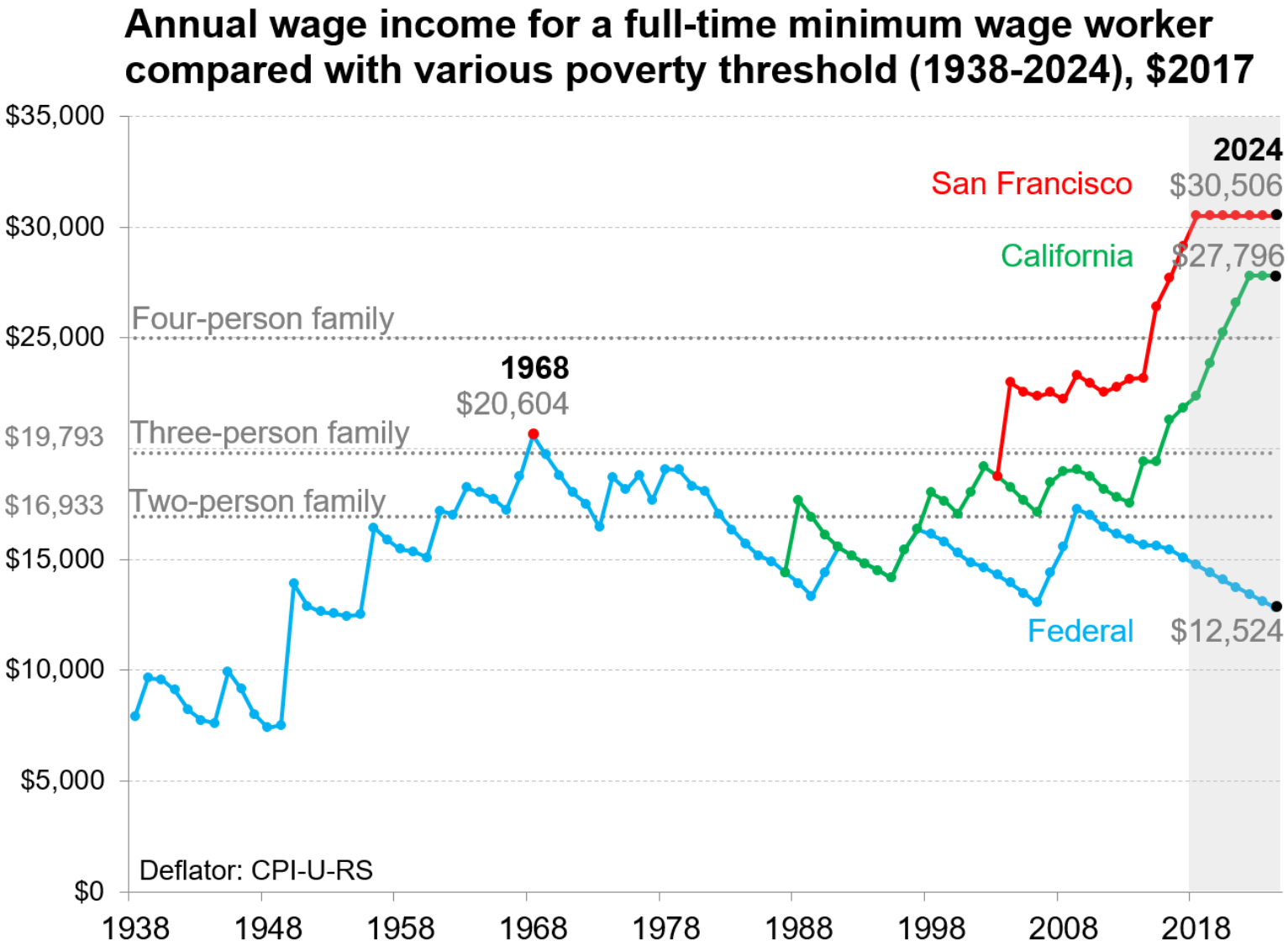
State and local minimum wages in the long-run (3/3)



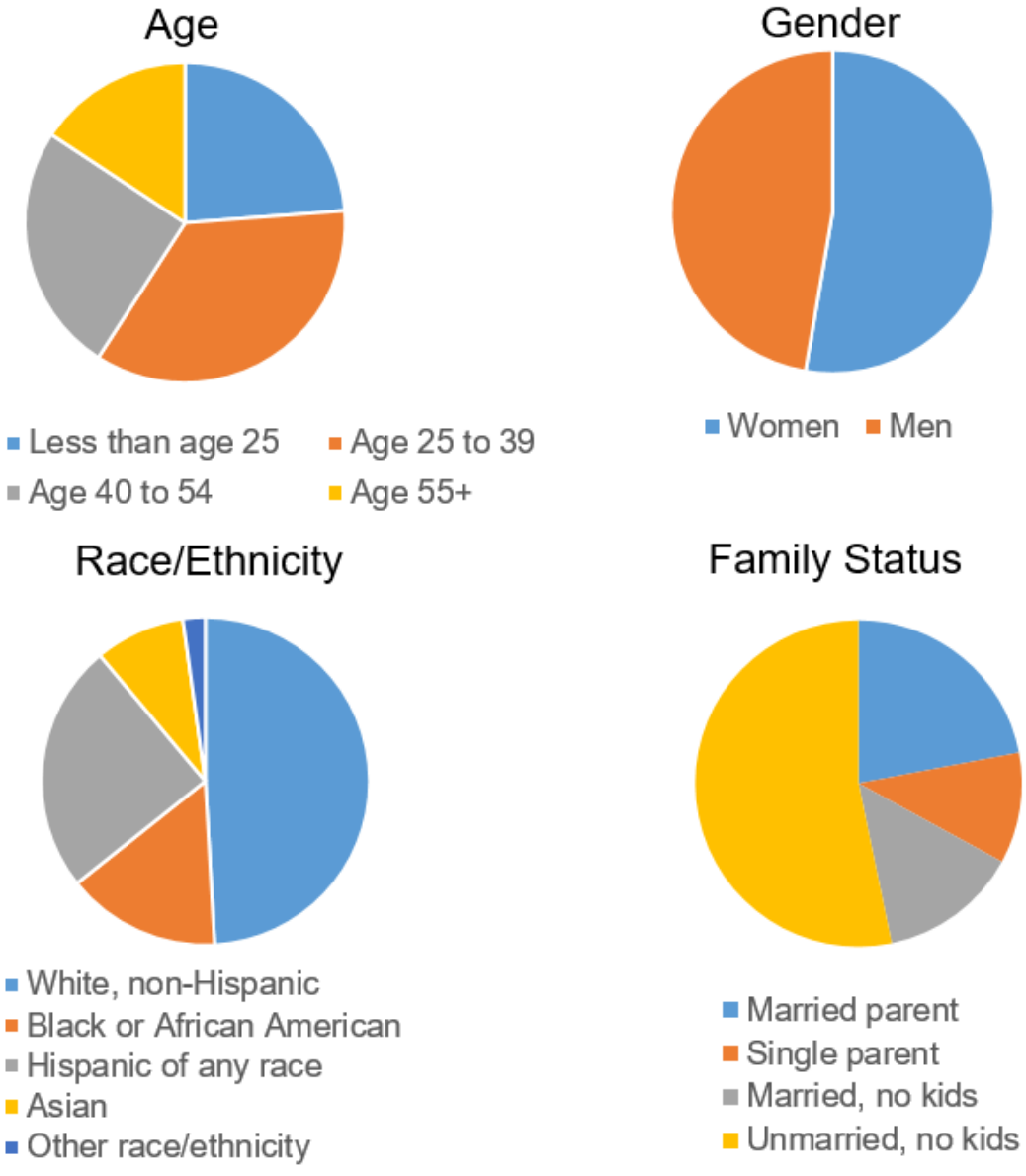
State and local minimum wages and poverty (1/2)



State and local minimum wages and poverty (2/2)

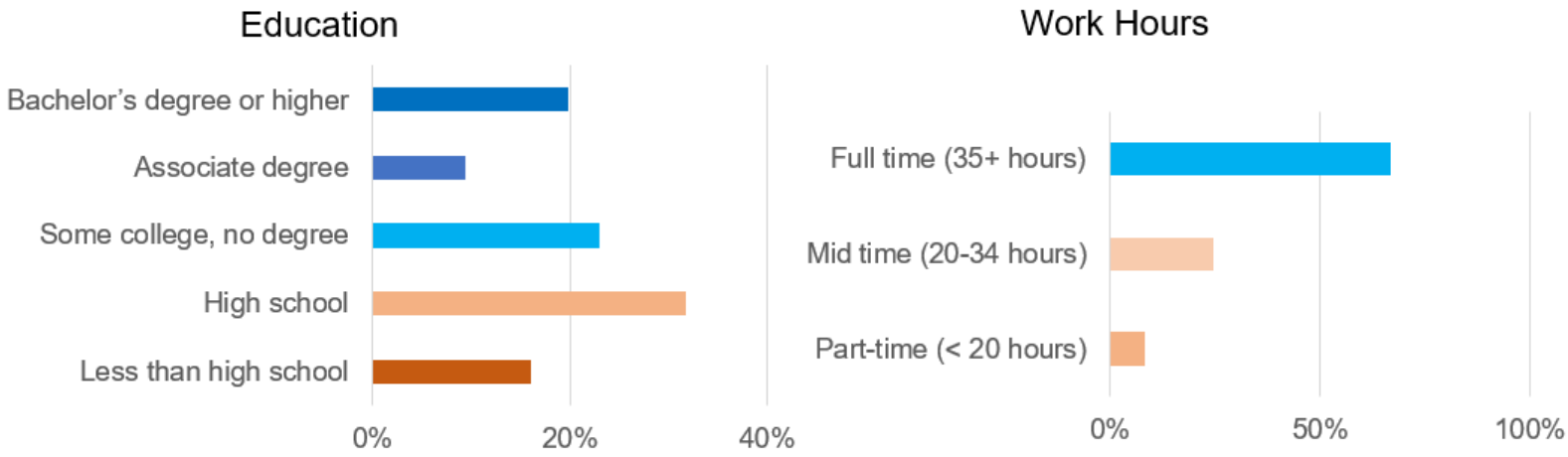


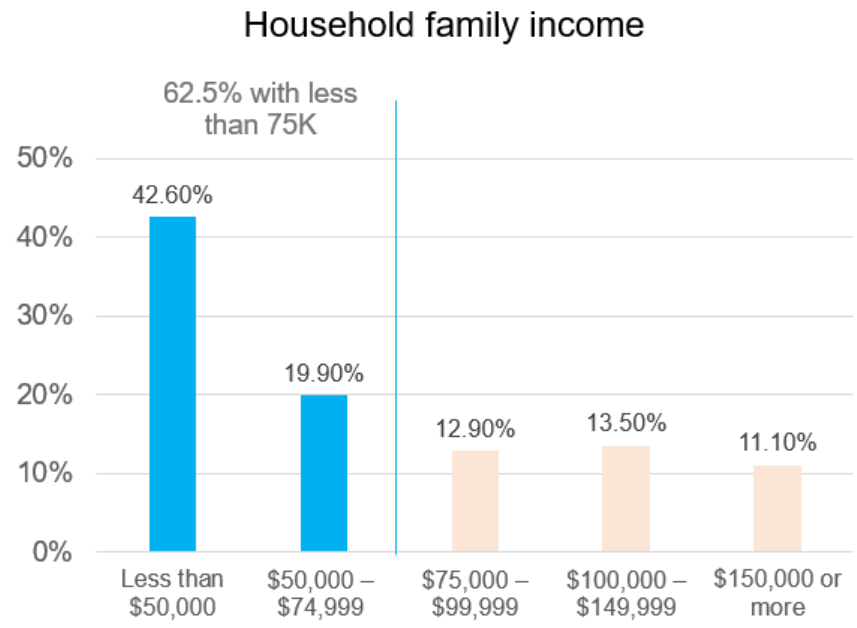
Impact of a $15 MW in New York State



Source: Cooper (2016), American Community Survey microdata, 2014

Impact of a $15 MW in New York State





Source: Cooper (2016), American Community Survey microdata, 2014

The pass-through of minimum wage into retail prices

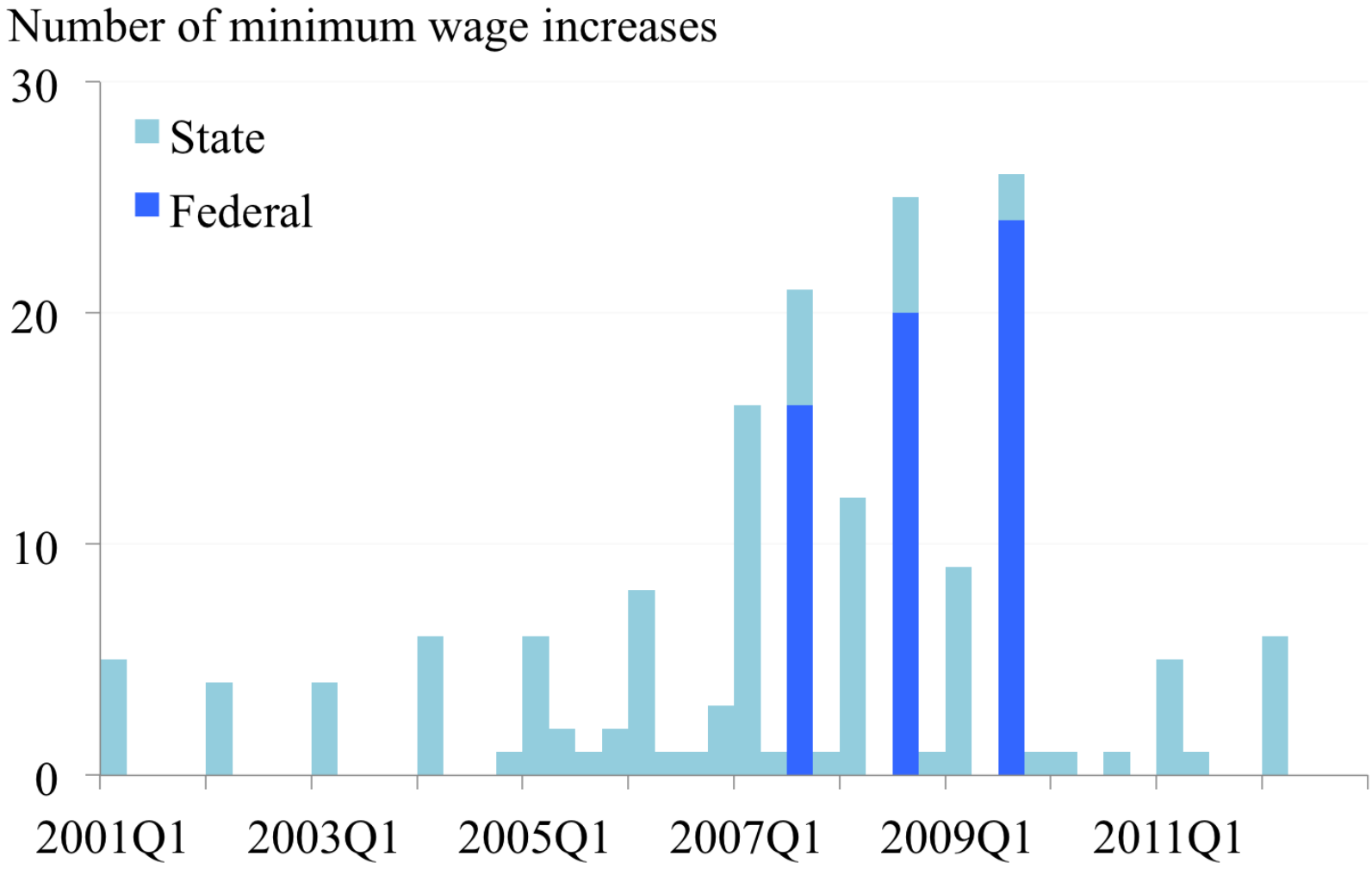
Introduction

- Existing literature focuses on employment
- Very few studies on prices and profits
- We bring new evidence on the price effect of minimum wage changes

What we do

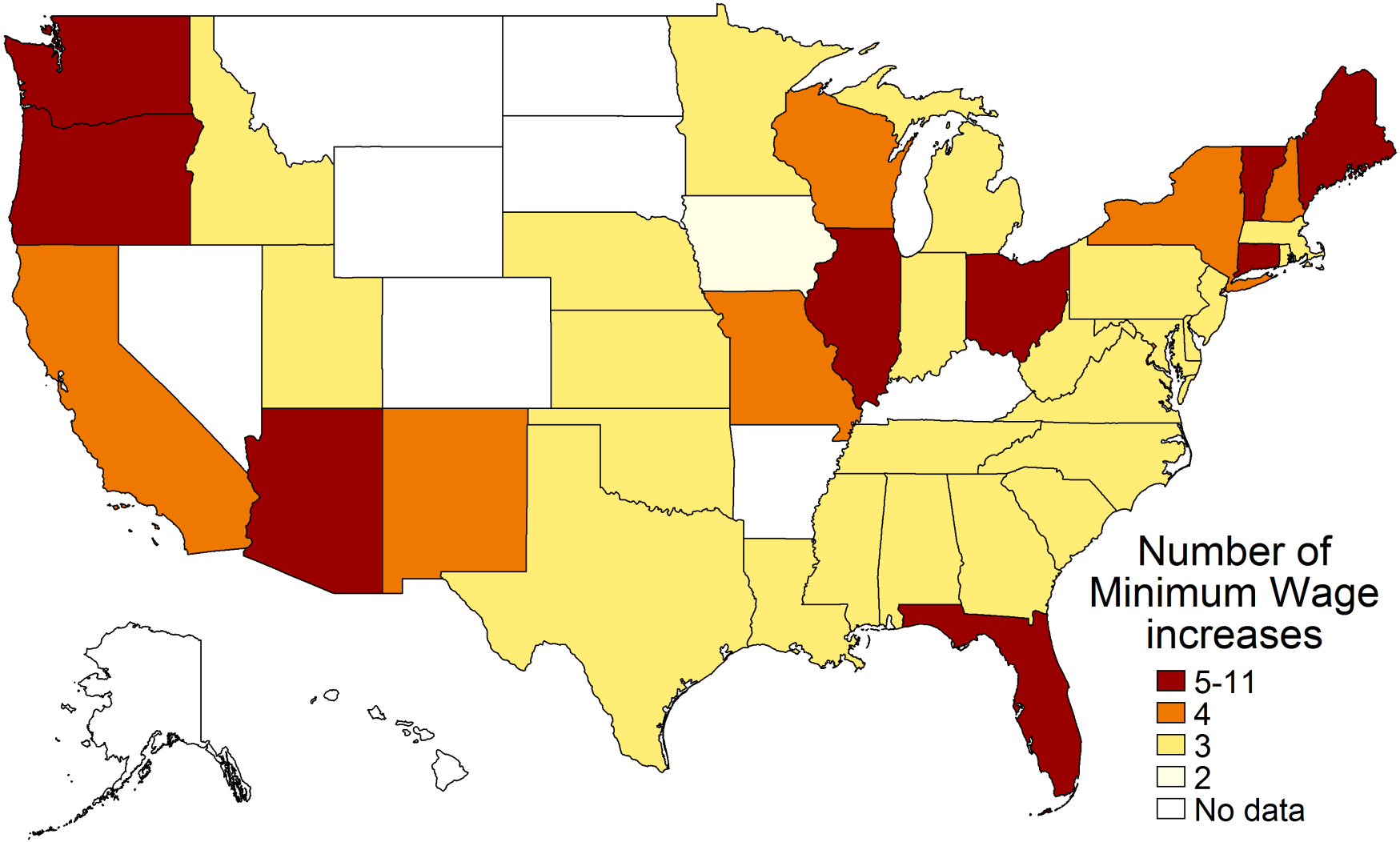
1. We use high-frequency scanner level data Data Price index
2. We exploit recent changes in minimum wages at the state-level
3. Main result: A 10 % MW hike increases prices by 0.3%
4. This is consistent with a **full pass-through** of minimum wages into grocery stores prices

Timing of minimum wage increases (2001-2012)



Details

Distribution of MW increases across states (2001-2012)



Details

Empirical specification

We estimate the following panel data model:

$$\pi_{i,s,t} = \delta_i + \gamma_t + \sum_{r=-k}^{k} \beta_r \Delta mw_{s,t-r} + \gamma X_{s,t} + \epsilon_{i,s,t}$$

Controls:

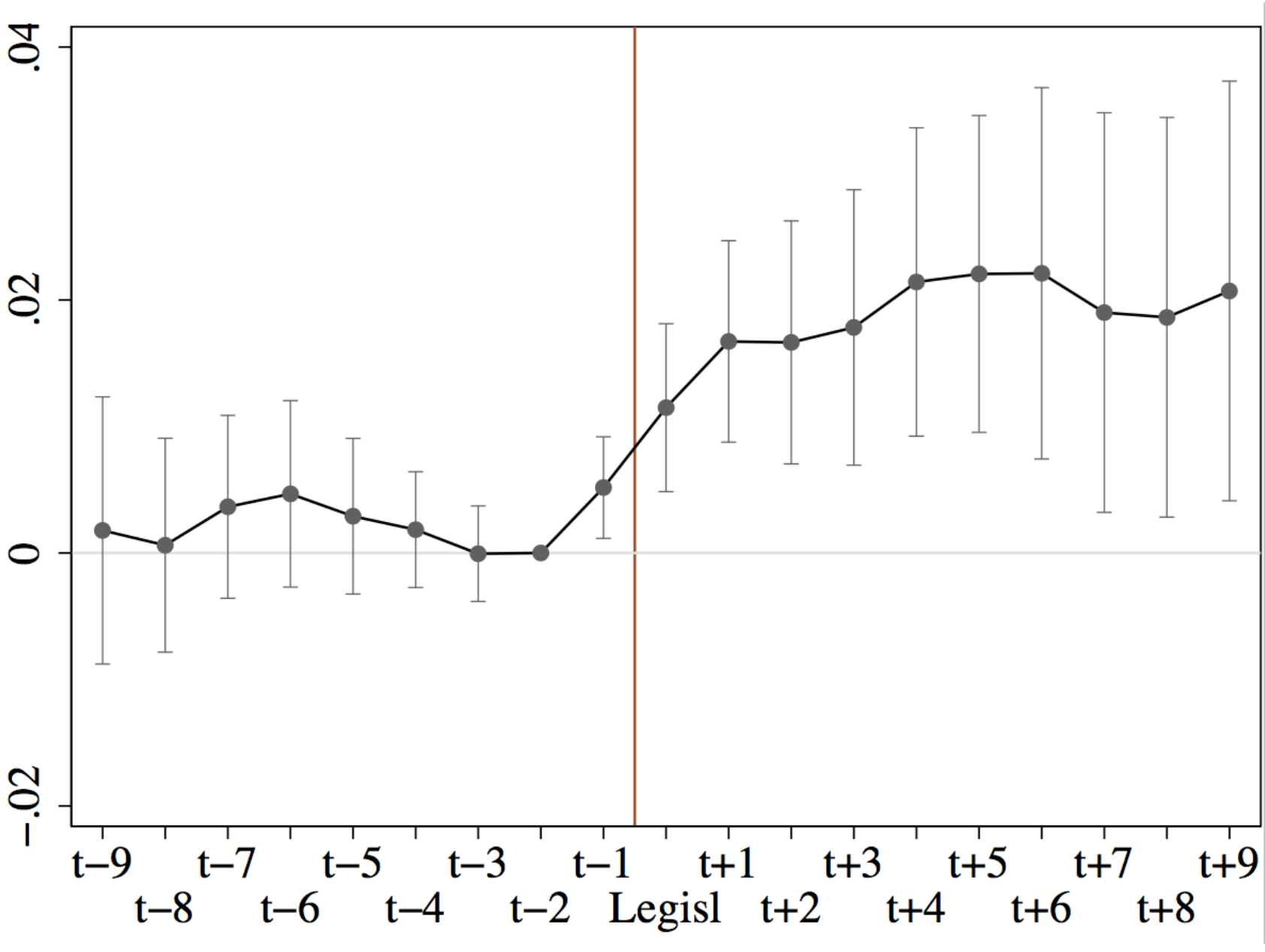
- Store fixed effect δ_i, time fixed effect γ_t
- X_t contains house price growth and unemployment rate

Interpretation:

- β_r: Price elasticity wrt MW increase r months from the implementation
- We will focus at the "cumulative" elasticity at time $t + R$, $E_R = \sum_{r=-k}^{R} \beta_r$

Details Identification Treatment

Prices around minimum wage legislation



Baseline estimation

	Joint estimation
Legis t-6 to t-4	-0.002
	(0.004)
Legis t-3 to t-1	-0.001
	(0.003)
Legis t to t+2	0.008**
	(0.004)
Legis t+3 to t+5	0.003
	(0.003)
Incr t-6 to t-4	0.011*
	(0.007)
Incr t-3 to t-1	-0.001
	(0.006)
Incr t to t+2	0.015*
	(0.009)
Incr t+3 to t+5	0.002
	(0.005)
Elasticity estimate	0.036**
	(0.016)

Baseline controls are time and state FE, local unemp. rate and house price growth. Table shows sum of regression coefficients for indicated months with robust SE in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Details

Is this elasticity consistent with a full pass-through?

- There is a full pass-through into prices when:

$$\varepsilon^{p}_{w_l} = s_{L_l}$$

Theory 1/2 Theory 2/2

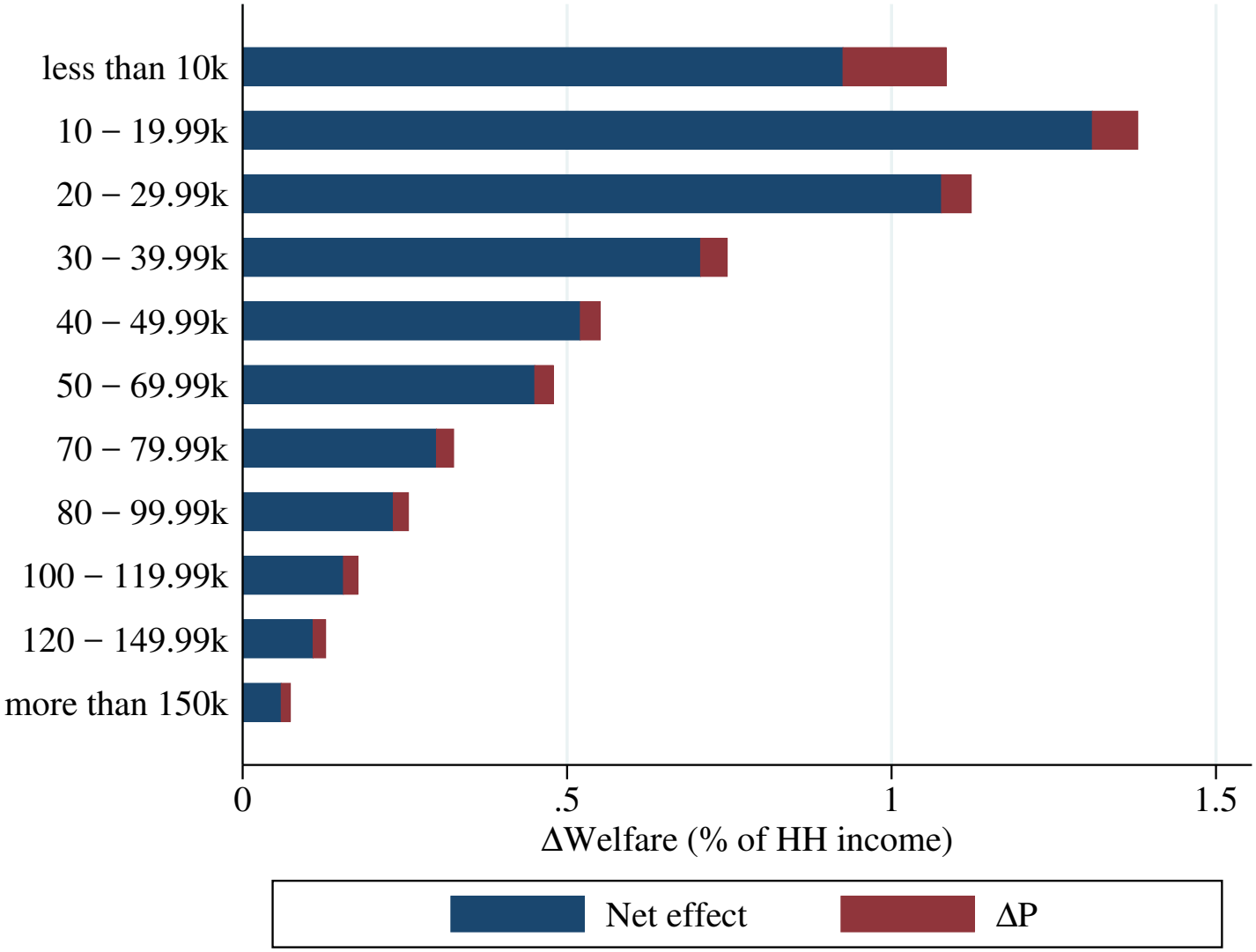
- This formula can be decomposed into well-identified elasticities, and calibrated:

$$\varepsilon^{p}_{w_l} = \underbrace{\left(\varepsilon^{\bar{w}^d}_{w_l} \cdot s^{d}_{L}\right)}_{\substack{\text{pass-through in} \\ \text{direct labor costs}}} + \underbrace{\left(\varepsilon^{p_i}_{w_l} \cdot s^{i}_{L}\right)}_{\substack{\text{pass-through in} \\ \text{indirect labor costs}}}$$

$$\underbrace{\varepsilon^{p}_{w_l}}_{\simeq 0.036} = \underbrace{\left(\varepsilon^{\bar{w}^d}_{w_l} \cdot s^{d}_{L}\right)}_{\substack{\simeq 0.11 \cdot 0.16 = 0.018 \\ \simeq 0.033}} + \underbrace{\left(\varepsilon^{p_i}_{w_l} \cdot s^{i}_{L}\right)}_{\simeq 0.018 \cdot 0.84 = 0.015}$$

Sources Wage elasticities

Redistributional effects (% of household income)



Assumptions

Future work

- Evaluation of the effect of high minimum wages in the 1950s, 1960s and 1970s
- Integrating the effects of minimum wages in the product market to derive sufficient statistics formulas to understand the redistributive effects of minimum wage changes
- Evaluation of price pass-through of city-level minimum wage increases

References (1/3)

- Minimum Wage Tracker here
- Handbooks
  - Belman, Dale, and Paul J. Wolfson. 2014. *What Does the Minimum Wage Do?*, W.E.Upjohn Institute for Employment Research, Kalamazoo, Michigan.
  - Card, David, and Alan B. Krueger.1995. *Myth and Measurement: The New Economics of the Minimum Wage*, Princeton, NJ: Princeton University Press, 1995.
  - Neumark, David, and William L. Wascher. 2008. *Minimum Wages*, MIT Press.

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- Aaronson, Daniel. 2001. "Price Pass-Through and the Minimum Wage", *The Review of Economics and Statistics*, 83(1), 158-169.
- Aaronson, Daniel, and Eric French. 2007. "Product Market Evidence on the Employment Effects of the Minimum Wage", *Journal of Labor Economics*, 25(1), 167-200.
- Aaronson, Daniel, Eric French and James MacDonald. 2008. "The Minimum Wage, Restaurant Prices and Labor Market Structure", *The Journal of Human Resources*, 43(3), 688-720.
- Autor, David, Alan Manning, and Christopher L. Smith. 2016. "The Contribution to the Minimum Wage to U.S. Wage Inequality over Three Decades: A Reassessment", *American Economic Journal: Applied Economics*, 8(1), 58-99.

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- Bronnenberg, Bart J., Micahel W. Krueger, and Carl F. Mela. 2008. "The IRI Marketing Data Set", *Marketing Science*, 27(4).
- Fougère, Denis, Erwan Gautier and Hervé Le Bihan. 2010. "Restaurant Prices and the Minimum Wage", *Journal of Money, Credit and Banking*, 42(7), 1199-1234.
- Stroebel, Johannes and Joseph Vavra. 2015. "House Prices, Local Demand, and Retail Prices", *Working Paper*.

Appendix

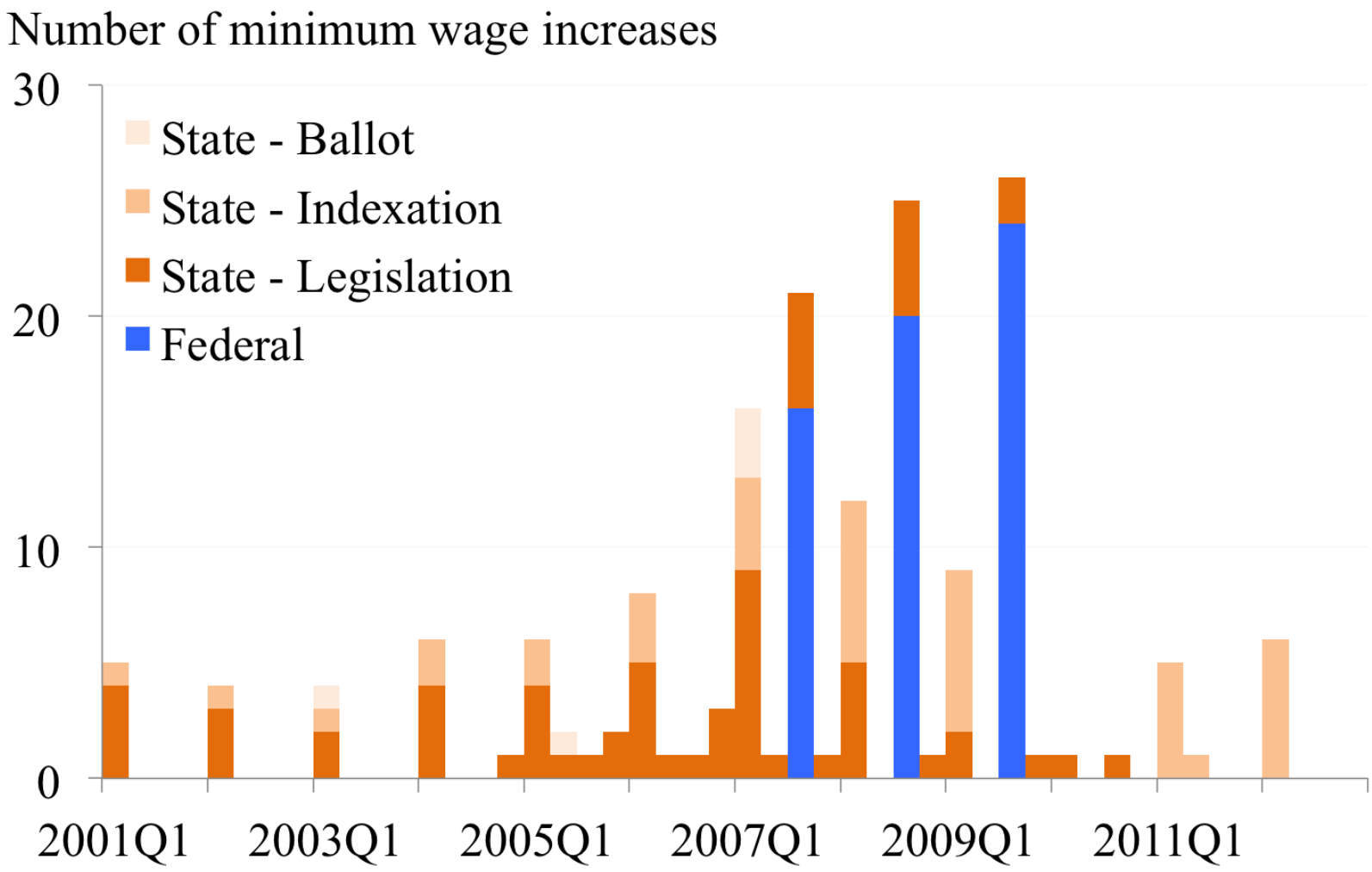
Prospective impacts of a $ 15 MW

	California (by 2023)	NY State (by 2021)
Percent of eligible workforce receiving pay increases	38.0	36.6
Total number of workers receiving increases (millions)	5.26	3.16
Number of workers affected directly	*3.95*	*2.42*
Number of workers affected indirectly	*1.32*	*0.75*
Average hourly wage increase (2017 dollars)	$2.37	$3.05
Average annual earnings increase for workers receiving increases (2017 dollars)	$4,059	$5,075
Average percent annual earnings increase for workers receiving increases	25.4	23.4
Total aggregate increase in wages (2017 dollars) (in billions)	21.13	18.67

Source: Cooper (2016)

Back

Timing of minimum wage increases (2001-2012)



Characteristics of Minimum Wage increases

	Hikes		Legislation	
Size	0.0816	(0.0560)	0.201	(0.116)
Distance to last hike	13.86	(7.028)	23.32	(16.76)
Distance to legislation	15.65	(9.823)	8.742	(8.014)
Federal	0.361	(0.482)	0.419	(0.497)
Indexation	0.235	(0.425)		
2001–2005	0.157	(0.365)	0.242	(0.432)
2006–2008	0.542	(0.500)	0.742	(0.441)
2009–2012	0.301	(0.460)	0.0161	(0.127)
January	0.458	(0.500)	0.452	(0.502)
July	0.434	(0.497)	0.0484	(0.216)
Events per state	4.049	(1.974)	1.512	(0.746)
N	166		62	

Back

Price data

- Point-of-sale scanner data from IRI Symphony
- Contains weekly prices and quantities at the level of unique products
- 1,916 stores and 60,600 unique products in 31 product categories (packaged food, personal care products, alcoholic and non-alcoholic beverages, dairy, etc.)
- Stores are located in 41 states. Covers Jan 2001 to Dec 2012

Back

Constructing state level price indices

1. We determine nonsale prices for each week and aggregate to months.
2. For each product in category c and store i we construct a geometric index with expenditure weights that are updated each year. We then aggregate the category indices to a single one.

$$P_{i,t} = \prod_{c=1}^{31} P_{cit}^{\omega_{cit}}$$

3. We then take the difference in the log of prices in t and $t-1$ to construct our outcome variable:

$$\pi_{i,t} = \log P_{i,t} - \log P_{i,t-1}$$

Back

Robustness checks

	(1)	(2)	(3)	(4)	(5)	(6)
Legis t-6 to t-4	-0.002	-0.002	-0.002	-0.001	0.002	0.009
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.007)
Legis t-3 to t-1	-0.001	-0.001	-0.001	-0.001	-0.004	0.011**
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)
Legis t to t+2	0.008**	0.008**	0.009**	0.009**	0.010**	0.014**
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)
Legis t+3 to t+5	0.003	0.003	0.001	0.003	0.004	0.002
	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
Incr t-6 to t-4	0.011*	0.011*	0.009	0.011	0.012*	0.001
	(0.007)	(0.007)	(0.007)	(0.007)	(0.006)	(0.009)
Incr t-3 to t-1	-0.001	-0.001	-0.002	-0.001	0.006	-0.004
	(0.006)	(0.006)	(0.006)	(0.007)	(0.006)	(0.008)
Incr t to t+2	0.015*	0.015*	0.015*	0.014	0.015*	0.015*
	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)
Incr t+3 to t+5	0.002	0.003	0.005	0.002	0.006	0.002
	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)	(0.007)
Elasticity estimate	0.036**	0.037**	0.033**	0.035*	0.047***	0.027*
	(0.016)	(0.016)	(0.015)	(0.018)	(0.016)	(0.014)
N	227,890	227,974	227,890	227,905	227,890	227,890
controls	YES	NO	YES	YES	YES	YES
Time FE	YES	YES	YES	YES	YES	YES
Store FE	YES	YES	YES	NO	YES	YES
Seasonality	NO	NO	YES	NO	NO	NO
Weights	NO	NO	NO	NO	Obs	NO

Baseline controls are time and state FE, local unemp. rate and house price growth. Table shows sum of regression coefficients for indicated months with robust SE in parenthesis. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Back

Empirical specification

We use the following reduced-form equation to estimate the effects of minimum wage increases at both the legislation date and implementation date:

$$\pi_{i,s,t} = \delta_i + \gamma_t + \sum_{r=-k}^{k} \alpha_r \Delta mw_{s,t-r} + \sum_{r=-k}^{k} \beta_r \Delta legis_{s,t-r} + \gamma X_{s,t} + \epsilon_{i,s,t}$$

$\Delta mw_{s,t-r}$ is the effective change in the minimum wage in month t and $\Delta legis_{s,t-r}$ the legislated change
Interpretation:

- α_r: Price elasticity wrt MW increase r months from the implementation
- β_r: Price elasticity wrt MW increase r months from the legislated change

Back

Identification

- Assumption: Absent minimum wage increases, control states and treated states would have had the same inflation trend
- Potential issues: inflation may cause MW increases
  - Timing of effects is not consistent with reverse causality
  - Federal hikes

Back

Treatment

Because minimum wage increases are typically announced several months in advance, we look at the price response around two types of treatments:

- Legislation package
- Minimum wage increase

Back

Theory (1/2)

- We adapt the tax pass-through formula to the minimum wage:

$$\varepsilon^{p}_{w_l} = \frac{1}{1 + \varepsilon_D / \varepsilon_S} \cdot s_{L_l}$$

  - w_l: minimum wage
  - $\varepsilon^{p}_{w_l}$: price elasticity wrt minimum wage
  - ε_D: price-elasticity of demand
  - ε_S: price-elasticty of supply
  - s_{L_l}: payroll share of minimum wage workers in total costs

Back

Theory (2/2)

$$\varepsilon_{w_l}^p = \underbrace{\frac{1}{1+\varepsilon_D/\varepsilon_S}}_{=\rho} \cdot s_{L_l}$$

- There is a full pass-through when the unit-tax pass-through rate $\rho = 1$, i.e.:
  - ε_D is finite, $\varepsilon_S = +\infty$
  - $\varepsilon_D = 0$, ε_D is perfectly inelastic
- The full pass-through formula is:

$$\varepsilon_{w_l}^p = s_{L_l}$$

Back

Sources for empirical calibrations

- The pass-through in direct labor costs is estimated using:
  - $\varepsilon_{w_l}^{\bar{w}^d}$: estimated using QCEW data
  - S_L^d: estimated using Economic Census data and Annual Retail Trade Surveys
- The pass-through in indirect labor costs is estimated using BEA input-output tables
- Although there is measurement error, our reduced-form estimates are consistent with full pass-through:

$$\underbrace{\varepsilon_{w_l}^{p}}_{\simeq 0.036} = \underbrace{(\varepsilon_{w_l}^{\bar{w}^d} \cdot s_L^d)}_{\substack{\simeq 0.11 \cdot 0.16 = 0.018 \\ \simeq 0.033}} + \underbrace{(\varepsilon_{w_l}^{p_i} \cdot s_L^i)}_{\simeq 0.018 \cdot 0.84 = 0.015}$$

Back

Wage elasticities using QCEW data

	(1)	(2)
Retail trade	0.049**	0.038
	(0.023)	(0.024)
	124,000	124,000
Grocery stores	0.108**	0.083***
	(0.042)	(0.027)
	80,722	80,759
Acc. and food services	0.151***	0.147***
	(0.022)	(0.025)
	98,056	98,080
Controls	Y	Y
County FE	Y	Y
Time FE	Y	Y
Linear state trends	N	Y

Back

Earnings elasticities by bindiness of the minimum wage

	(1) Retail trade	(2) Grocery stores	(3) Acc. and food services
Bindiness of the MW			
Strongly binding	0.081***	0.155***	0.168***
	(0.024)	(0.045)	(0.026)
	28,606	16,567	21,242
Moderately binding	0.026	0.081**	0.183***
	(0.025)	(0.033)	(0.022)
	30,840	19,200	23,724
Weakly binding	0.010	0.083*	0.184***
	(0.026)	(0.042)	(0.033)
	32,216	21,406	25,076
Very weakly binding	0.007	0.079	0.079***
	(0.033)	(0.067)	(0.028)
	32,139	19,851	25,880
Controls	Y	Y	Y
County FE	Y	Y	Y
Time FE	Y	Y	Y

Heterogeneity of the price response across household types

	Low	Medium	High
Elasticity estimate	0.035*	0.034*	0.034*
	(0.019)	(0.019)	(0.018)

Baseline controls are time and store FE. SE are clustered at the state level. * p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01.

Heterogeneity of the price response across store types

	expensive		cheap	
Legisl t-9 to t-7	0.002	(0.003)	0.001	(0.003)
Legisl t-6 to t-1	0.002	(0.004)	0.005	(0.004)
Legisl t to t+5	0.013***	(0.005)	0.019***	(0.005)
Legisl t+6 to t+9	-0.003	(0.004)	0.004	(0.004)
Incr t-9 to t-7	0.003	(0.006)	-0.003	(0.005)
Incr t-6 to t-1	0.020**	(0.008)	0.004	(0.007)
Incr t to t+5	0.018**	(0.008)	0.011	(0.007)
Incr t+6 to t+9	0.005	(0.005)	0.012***	(0.004)
Elasticity estimate	0.050***	(0.011)	0.033***	(0.011)
Full sum	0.060***	(0.015)	0.052***	(0.014)
N	4,813		4,813	

Baseline controls are time and state FE, local unemp. rate and house price growth. Table shows sum of regression coefficients for indicated months with robust SE in parenthesis. * p $<$ 0.1, ** p $<$ 0.05, *** p $<$ 0.01.

Welfare Analysis

- We compute the equivalent variation of a hypothetical 10% minimum wage increase for each household income category j:

$$\Delta U_j = \Delta Y_j - E_j \Delta P$$

- Benefits side
  - Using March CPS 2011
  - Assuming no change on hours or employment
  - Assuming ripple effects of 130% (low) of the old minimum wage
- Cost side
  - Using Consumer Expenditure Survey to compute grocery stores expenditures
  - Assuming a price elasticity of 0.036 for each household income category

Back