

# Why Do Workers Dislike Inflation?

## Wage Erosion and Conflict Costs

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# Why do Workers Dislike Inflation?

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- Prior work: **prices rise faster than wages** [Fischer & Modigliani '78; Shiller '97; Stantcheva '24]
- Relevant: how fast nominal wages **keep up with** prices, i.e., how fast **real wages** recover  
[Kessel & Alchian '60, Blanco et al '23]

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Instead, this paper:

- Workers must take **costly actions** (“**conflict**”) to have wages keep up with prices
- Substantial welfare costs of inflation **even if** real wages do not fall during inflations

## 1. Motivating survey evidence:

1.1 Workers get wage growth though **costly conflict** w/ firms

[E.g. tough conversations with employers; union strike; soliciting offers from other firms]

1.2 Costly conflict rises with inflation

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2. **Conflict-cost** model: “menu-cost style” model for wage setting
  - Workers consider costly conflict w/ firm to raise nominal wage [ + idiosyncratic shocks]

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2. **Conflict-cost** model: “menu-cost style” model for wage setting
  - Workers consider costly conflict w/ firm to raise nominal wage [ + idiosyncratic shocks]
3. Main analytical result: path of real wages no longer sufficient to inform welfare
  - 3.1 Wage catch-up after inflation from more frequent conflict doesn't raise welfare
    - On the margin: benefit of wage catch-up are offset by cost of conflict [envelope theorem]
  - 3.2 Impact of inflation on worker welfare determined by **wage erosion**
    - How inflation lowers real wages if conflict decision do not change

# Quantifying How Conflict Affects the Costs of Inflation

**Key term** for welfare: size of conflict cost

Survey evidence to quantify *conflict-cost* model:

- Workers willing to sacrifice **1.75% of wages** to avoid conflict

Explore inflation shocks within calibrated model:

→ incorporating conflict **more than doubles** the overall cost of inflation to workers

## **Inflation and Conflict.** [Lorenzoni & Werning '23 a,b]

- **This paper:** related but distinct notion of conflict—costly actions by workers raises wages
- Our focus is the **welfare costs of inflation**, theirs is the causes of inflation

## **Costs of inflation.** [Baily '56; Friedman '77; Fischer & Modigliani '78; Imrohoroglu '92; Lucas '00; Burstein & Hellwig '08; Alvarez et al '16; Nakamura et al '18; Binetti et al '24]

- **Previous:** inflation costs from range of mechanisms  
[e.g. shoe leather costs, menu costs, relative price distortions, inflation volatility, tax distortions]
- **This paper:** new + significant costs of inflation via labor markets

## **Costs of inflation via labor market.** [Shiller '97; Hadjini et al '22; Pilossoph & Ryngaert '23; Del Canto et al '23; Ferreira et al '23; Pallotti et al '23; Stantcheva '24; Afrouzi et al. '24; Pilossoph et al '24]

- **This paper:** real wage growth misses costs of inflation in labor market due to conflict



Survey Design

Motivating Evidence: Wage Growth, Inflation and Conflict

The Conflict-Cost Model

Eliciting Conflict Costs in our survey

Quantifying how conflict affects the costs of inflation

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# Our Survey

- Survey: **Prolific**
- 3000 prime-age, employed US workers, **Feb-March '24**
- **Representative** of the general population in terms of chosen **observable characteristics**
  - gender, education and political affiliation
- **Survey part I [now]:** Qualitative evidence to motivate model
  - Workers achieve wage growth through costly conflict with employers
- **Survey part II [later]:** Quantitative evidence to discipline the model

Representation

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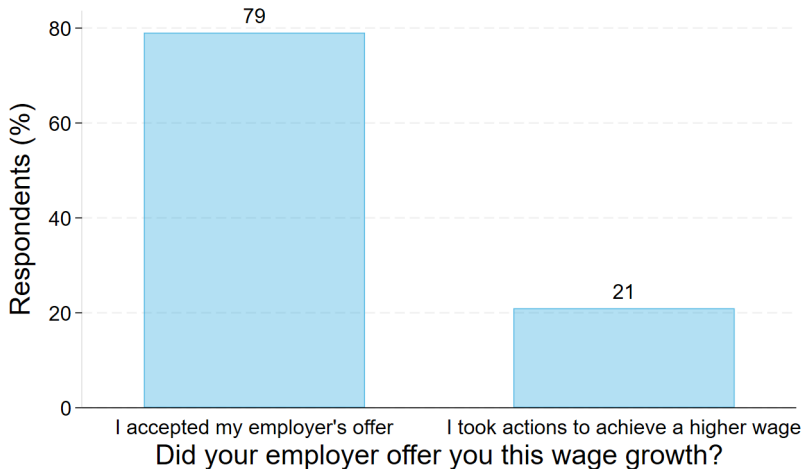
## Four findings relating conflict, wage growth, and inflation

1. **Workers choose between accepting employer's default wage offer or conflict**
2. Conflict raises wages
3. Workers who did not conflict believe conflict could have raised wages
4. Inflation leads to conflict: 1 p.p.  $\uparrow$  inflation  $\Rightarrow$  1.5 p.p.  $\uparrow$  prob. of worker conflict

# Workers Choose Employer Offer vs. Conflict to Raise Wage

Heterogeneity

By income



Note: actions include tough conversations with employers; union strike; soliciting other offers, etc.

actions

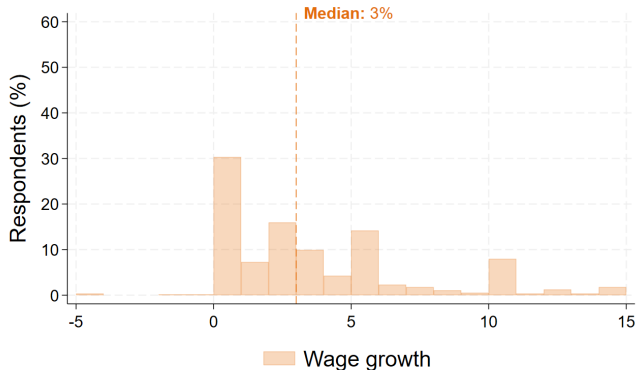
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# Conflict Leads to Higher Wages...

Within-individual

High wage workers



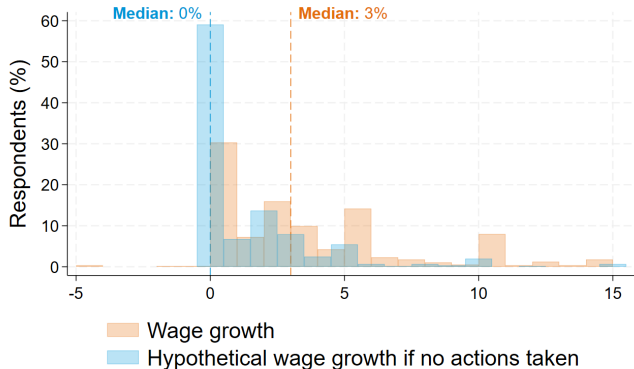
Sample: workers who took costly actions



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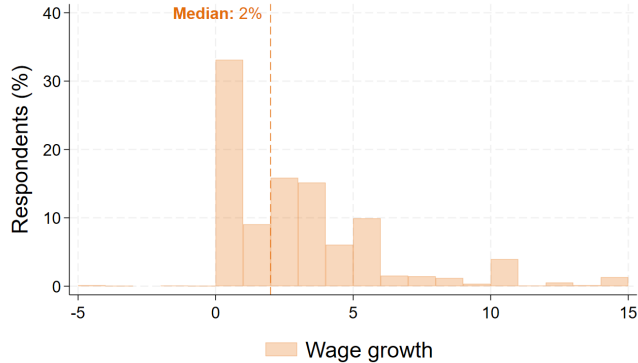


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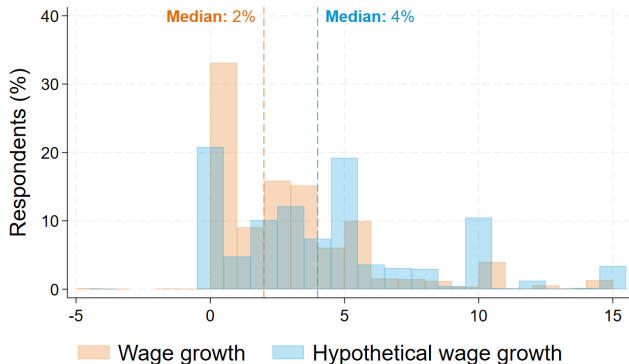
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# Workers Sacrifice Wage Growth To Avoid Conflict



Sample: workers who did not take costly actions

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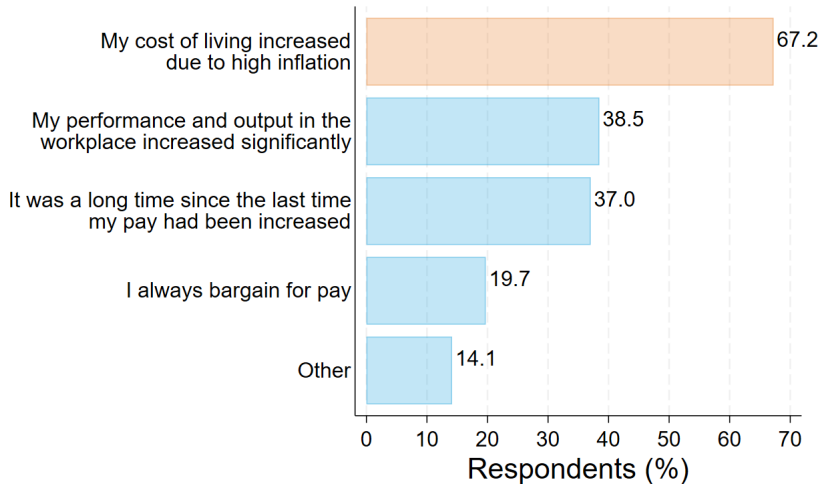
Sample: workers who did not take costly actions

- Workers who do not conflict, report having sacrificed 2pp of wage growth

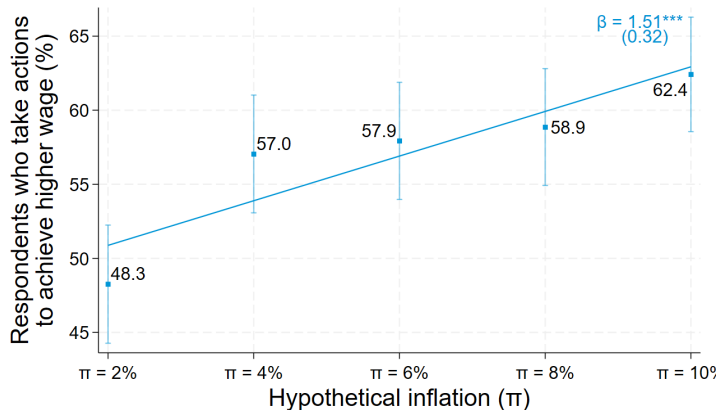
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# Inflation was the main motivation for conflict



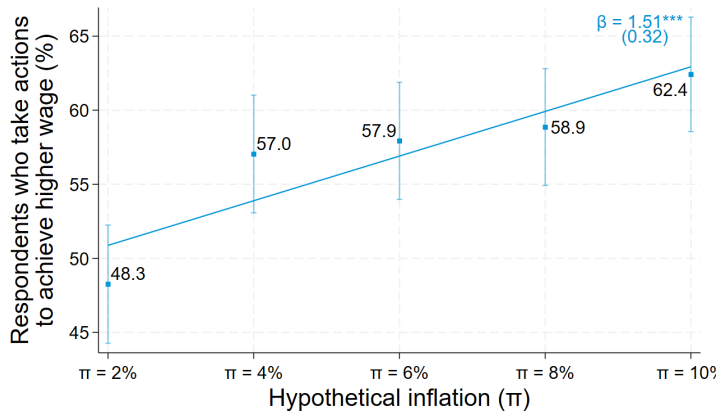
# Inflation Increases the Probability of Conflict



Q: consider a hypothetical situation, inflation is expected to be  $x\%$  in next 12 months.

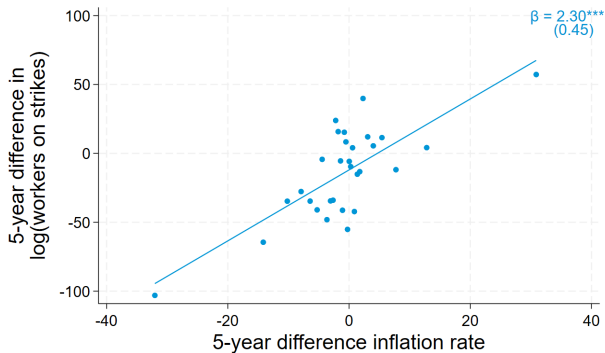
- Where  $x \in \{2, 4, 6, 8, 10\}$

# Inflation Increases the Probability of Conflict



- 1%  $\Delta\pi$  implies a 1.5% increase in conflict – **state-dependent conflict decisions**





$$\Delta \log 100 \times (\text{workers involved in strikes})_{i,t,t-5} = \gamma_i + \lambda_t + \beta \Delta \pi_{i,t,t-5} + \varepsilon_{it},$$

International Labor Organization data, 1960 – 2020

# Motivating Evidence: Wage Growth, Inflation and Conflict

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**Next: incorporate these features in a “menu-cost style” model of wage setting**

[Alvarez et al '16; Nakamura et al. '18; Auclert et al '24]

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# Workers' Problem

- A continuum of workers  $i \in [0, 1]$  balances **benefit of wage catch up** and **cost of conflict**

$$\max_{\{\mathcal{I}_{i,t}\}_{t=0}^{+\infty}} \mathbb{E}_0 \left[ \sum_{t \geq 0} \beta^t (\log c_{i,t} - \kappa_{i,t} \mathcal{I}_{i,t}) \right],$$

where  $\mathcal{I}_{i,t} = 1$  if the worker takes costly actions to increase pay and 0 otherwise.

- Now: hand-to-mouth  $c_{i,t} = w_{i,t}$ . [Paper: borrowing constraints.]
- $\kappa_{i,t}$ : i.i.d. “Calvo-plus” cost to increase pay [Nakamura & Steinsson '10; Auclert et al. '23]

$$\kappa_{i,t} = \begin{cases} \kappa & \text{with probability } 1 - \lambda \\ 0 & \text{with probability } \lambda \end{cases}$$

**Reduced form cost** captures a variety of conflict actions

# Workers' Problem

- Real wage

$$w_{i,t} = \begin{cases} w_{i,t-1} e^{\alpha - (1-\gamma)\pi_t} & \text{if } \mathcal{I}_{i,t} = 0 \\ w_{i,t}^* & \text{if } \mathcal{I}_{i,t} = 1 \end{cases}$$

- $\alpha$ : default nominal wage growth without inflation
  - $\gamma$ : degree of indexation
- Conflict-induced (real) wage  $w_{i,t}^*$ , keeps up w/ inflation & productivity

$$\log w_{i,t}^* = \log w_{i,t-1}^* + g_z + z_{i,t}$$

$z_{i,t} \in [-\bar{z}, \infty)$  is idiosyncratic productivity shock,  $g_z$  is trend productivity growth.

# The Impact of Inflation Shocks on Worker Welfare and Wages

- Start from a steady state with inflation  $\pi^{ss} \geq 0$ .
- An unexpected  $t = 0$  **inflation shock**,  $\{\hat{\pi}_t\}_{t=0}^{+\infty} = \{\pi_t - \pi^{ss}\}_{t=0}^{+\infty}$ . Perfect foresight after.
- Study its impact on aggregate worker welfare

$$\mathcal{W} \equiv \int \mathbb{E}_0 \left[ \sum_{t=0}^{\infty} \beta^t \{ u(c_{i,t}) - \kappa_{i,t} \mathcal{J}_{i,t} \} \right] di$$

and aggregate log real wages

$$\log w_t \equiv \int_0^1 \log(w_{i,t}) di.$$

## Model: Higher inflation increases share of conflict

### Proposition.

*If  $\gamma < 1$ , then an **increase in inflation** at  $t = 0$  leads to a **larger fraction** of workers engaging in **conflict** at  $t = 0$ .*

- State dependency: likelihood of conflict increases with inflation
- Unless default wages were fully indexed ( $\gamma = 1$ )

# The Impact of Inflation Shocks on Worker Wages

## Definition 1.

The impact of inflation shocks on aggregate log real wage can be decomposed into

$$\hat{w}_t \equiv \log w_t - \log w^{ss} = \hat{w}_t^{\text{erosion}} + \hat{w}_t^{\text{catch-up}},$$

- **Wage erosion**: impact of inflation shocks holding conflict decision at steady state  $\mathcal{J}_{i,t}^{ss}$

$$\hat{w}_t^{\text{erosion}} \equiv \omega_t \left( \pi_t, \mathcal{J}_{i,t}^{ss} \right) - \omega_t \left( \pi^{ss}, \mathcal{J}_{i,t}^{ss} \right),$$

where  $\omega_t(\pi_t, \mathcal{J}_{i,t})$  is aggregate log real wage at time  $t$  given  $\pi_t, \mathcal{J}_{i,t}$ .

- **Wage catch-up**: impact of inflation shocks through changes in conflict decision  $\mathcal{J}_{i,t}$

$$\hat{w}_t^{\text{catch-up}} \equiv \omega_t \left( \pi_t, \mathcal{J}_{i,t} \right) - \omega_t \left( \pi_t, \mathcal{J}_{i,t}^{ss} \right).$$



## Theorem.

The (first-order) impact of inflation shocks on worker welfare is given by **wage erosion**

$$\underbrace{\hat{\mathcal{W}}}_{\text{impact on worker welfare}} \approx \sum_{t=0}^{\infty} \beta^t \hat{w}_t^{\text{erosion}} = \underbrace{\sum_{t=0}^{\infty} \beta^t \hat{w}_t}_{\text{aggregate wage response}} - \sum_{t=0}^{+\infty} \beta^t \hat{w}_t^{\text{catch-up}}.$$

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Because the benefits of **wage catch-up** are offset by **costs of conflict**

$$\sum_{t=0}^{\infty} \beta^t \hat{w}_t^{\text{catch-up}} \approx \underbrace{\int \mathbb{E}_0 \left[ \sum_{t=0}^{\infty} \beta^t \kappa_{i,t} (\mathcal{I}_{i,t} - \mathcal{I}_{i,t}^{ss}) \right] di}_{\text{aggregate costs of inflation due to conflict}}.$$

[Milgrom-Segal '02 envelope theorem applied to discrete choice set]

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- The impact of inflation on **aggregate wage**  $\sum_{t=0}^{\infty} \beta^t \hat{w}_t$  **does not measure** welfare
  - Even  $\approx 0$ , inflation could still be costly because wage catch-up comes from costly conflicts

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- Contrast w/ purely time-dependent wage setting:  $\kappa \rightarrow \infty$ ,  $d\mathcal{W} = \sum_{t=0}^{\infty} \beta^t \hat{w}_t$ 
  - Special case in which aggregate real wage sufficient for welfare

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  - Special case in which aggregate real wage sufficient for welfare
- Conflict cost are **aggregate** deadweight loss, not just redistribution from workers to firms
- Extensions: (1) other aggregate shocks, (2) borrowing constraints, (3) unemployment, (4) general random menu costs

Survey Design

Motivating Evidence: Wage Growth, Inflation and Conflict

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# Elicit Conflict Costs with the Survey

**Key parameters** for welfare: conflict costs and degree of inflation indexation in default wages

Use survey to directly elicit them, then quantify how conflict impact costs of inflation

- **Elicit conflict costs** (utility costs of conflict  $\kappa$  & prob. of free catch-up  $\lambda$ )
- Elicit how default wage offer changes after inflation absent conflict (indexation  $\gamma$ )



# Eliciting Conflict Costs

- Elicit nominal wage growth workers believe they get **via costly actions**

$$\Delta W^{\text{conflict}} \equiv \log W_{i,t}^* - \log W_{i,t-1}$$

[ $W_{i,t}^*$  : conflict-induced nominal wage]

*What pay growth in next 12 months do you think you would get if you do your best to increase pay using any strategies at your disposal, including the common strategies listed above?*

# Eliciting Conflict Costs

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$[W_{i,t}^* : \text{conflict-induced nominal wage}]$

*What pay growth in next 12 months do you think you would get if you do your best to increase pay using any strategies at your disposal, including the common strategies listed above?*

- Elicit nominal wage growth  $\Delta W^{\text{indiff}}$  where workers are **indifferent** between
  - Accepting** if offered by their employers vs **taking costly actions**
- Find  $x^{\text{conflict}}$ , the fraction of wage that workers would sacrifice to avoid conflict

$$x^{\text{conflict}} \equiv \Delta W^{\text{conflict}} - \Delta W^{\text{indiff}}$$

- Directly linked with the conflict cost  $\kappa$ .

# Eliciting Costs of Conflict

Elicit  $\Delta W^{\text{indiff}}$  via “multiple price list” standard in experimental economics

[Jack et al. '22]

|                                        | I would accept my<br>employer's pay<br>growth offer | I would do my best<br>using any<br>strategies at my<br>disposal to<br>increase my pay<br>further |
|----------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------------|
| Employer offers you pay growth of 4%   | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 3.5% | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 3%   | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 2.5% | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 2%   | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 1.5% | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 1%   | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 0.5% | <input type="radio"/>                               | <input type="radio"/>                                                                            |
| Employer offers you pay growth of 0%   | <input type="radio"/>                               | <input type="radio"/>                                                                            |

Consider a respondent who reports  $\Delta W^{\text{conflict}} = 4\%$ . They get a list of potential employer offers  $\leq 4\%$ .

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Elicit  $\Delta W^{\text{indiff}}$  via “multiple price list” standard in experimental economics

[Jack et al. '22]

|                                        | I would accept my employer's pay growth offer | I would do my best using any strategies at my disposal to increase my pay further |
|----------------------------------------|-----------------------------------------------|-----------------------------------------------------------------------------------|
| Employer offers you pay growth of 4%   | <input checked="" type="radio"/>              | <input type="radio"/>                                                             |
| Employer offers you pay growth of 3.5% | <input checked="" type="radio"/>              | <input type="radio"/>                                                             |
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| Employer offers you pay growth of 0%   | <input checked="" type="radio"/>              | <input type="radio"/>                                                             |

Respondent never engages in conflict

Always accept employer offers & never conflict  $\implies$  high conflict cost.

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[Jack et al. '22]

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| Employer offers you pay growth of 4%   | <input type="radio"/>                         | <input checked="" type="radio"/> Respondent always engages in conflict            |
| Employer offers you pay growth of 3.5% | <input type="radio"/>                         | <input checked="" type="radio"/>                                                  |
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| Employer offers you pay growth of 1%   | <input type="radio"/>                         | <input checked="" type="radio"/>                                                  |
| Employer offers you pay growth of 0.5% | <input type="radio"/>                         | <input checked="" type="radio"/>                                                  |
| Employer offers you pay growth of 0%   | <input type="radio"/>                         | <input checked="" type="radio"/>                                                  |

Never accept employer offers & always conflict  $\implies$  zero conflict cost.

# Eliciting Costs of Conflict

Elicit  $\Delta W^{\text{indiff}}$  via “multiple price list” standard in experimental economics

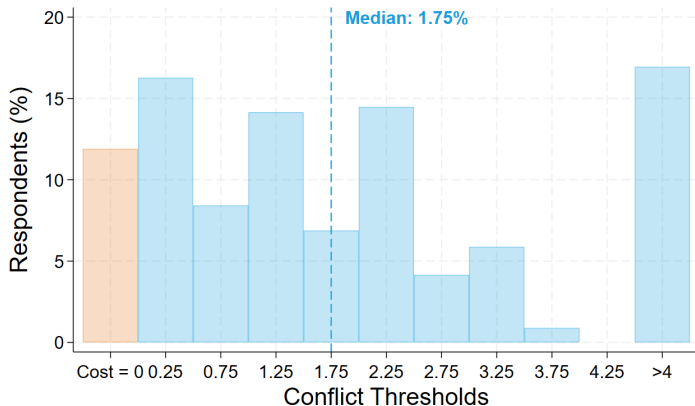
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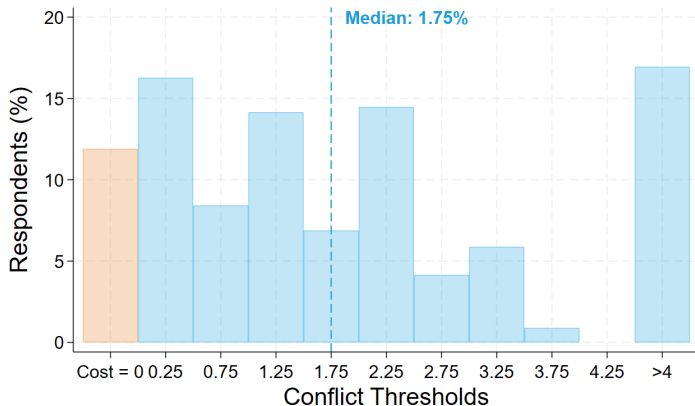
Respondent indifference wage is between 2% and 2.5% pay growth

Let  $\Delta W^{\text{indiff}}$  denote lowest nominal wage growth where workers accept employers' offer, then:

$$x^{\text{conflict}} \in [\Delta W^{\text{conflict}} - \Delta W^{\text{indiff}}, \Delta W^{\text{conflict}} - \Delta W^{\text{indiff}} + 0.5].$$



- Direct evidence on **conflict costs**:  $\kappa_{i,t} = 0$  with prob.  $\lambda$  and  $\kappa_{i,t} = \kappa$  otherwise
  - $\lambda = 0.029$  (quarterly) to match share of people who would always conflict
  - Calibrate  $\kappa$  to median  $x^{\text{conflict}} = 1.75\%$



- In paper, **validation exercises**:

1. **Lower conflict costs** predict **higher likelihood** of having taken **actions** in 2023
2. **Lower conflict costs** predict **less wage sacrificed** from not taking actions in 2023

[Here](#)

[Here](#)



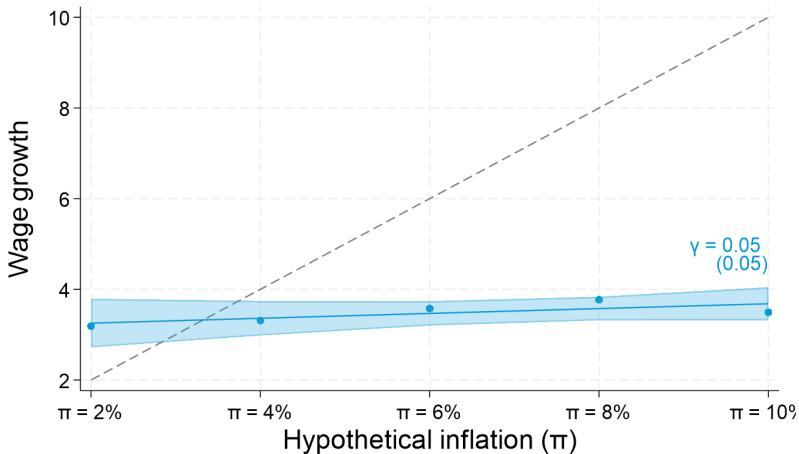
# Elicit Conflict Costs with the Survey

**Key parameters** for welfare: conflict costs and degree of inflation indexation in default wages

Use survey to directly elicit them, then quantify how conflict impact costs of inflation

- Elicit conflict costs (utility costs of conflict  $\kappa$  & prob. of free catch-up  $\lambda$ )
- **Elicit how default wage offer changes after inflation absent conflict** (indexation  $\gamma$ )

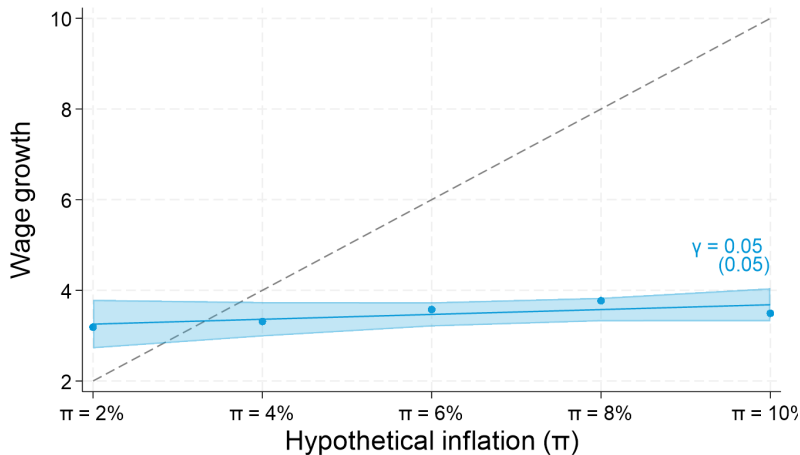
## Indexation: Perceived Nominal Wage Growth without Conflict



Question:

- Consider a hypothetical situation, inflation is expected to be  $x\%$  in the next 12 months.

## Indexation: Perceived Nominal Wage Growth without Conflict



- Evidence on **default wages + indexation**:  $W_{i,t}^{default} = W_{i,t-1} e^{\alpha + \gamma \pi_t}$
- Indexation:  $\Delta \pi = 1\%$  then  $\Delta \log W_{i,t}^{default} = 0.05\% \Rightarrow \gamma = 0.05$

## Empirical Takeaway

1. **Significant cost of conflict**  $x^{\text{conflict}} = 1.75\%$  of wages and  $\lambda = 0.029$
2. **Almost no indexation**: 1 p.p. inflation  $\Rightarrow \sim 0$  in employer-offered nominal wage growth

Survey Design

Motivating Evidence: Wage Growth, Inflation and Conflict

The Conflict-Cost Model

Eliciting Conflict Costs in our survey

Quantifying how conflict affects the costs of inflation

# Calibration - Quarterly Frequency

|            | <i>Description</i>                                    | <i>Value</i> | <i>Target</i>                                             |
|------------|-------------------------------------------------------|--------------|-----------------------------------------------------------|
| $\beta$    | Discount factor                                       | 0.99         | Standard                                                  |
| $\kappa$   | Conflict cost                                         | 8.14%        | Own survey<br>such that $\underline{x}^{ss} = -1.75\%$    |
| $\lambda$  | Probability of free catchup                           | 2.87%        | Own survey                                                |
| $g$        | Trend real wage growth                                | 0.76%        | ASEC-CPS<br>3.02% annual real wage growth                 |
| $\alpha$   | Default nom. wage growth at $\pi^{ss}$                | 0.81%        | Own survey                                                |
| $\gamma$   | Indexation of default nominal wage                    | 0.05         | Own survey                                                |
| $\pi^{ss}$ | Steady state inflation                                | 0.5%         | 2% annual inflation                                       |
| $z_{i,t}$  | Idios. shocks $z_{i,t} + \mu \sim \text{Gamma}(a, b)$ | (0.14, 0.03) | $\mathbb{E}[z_{i,t}] = 0$<br>48% yearly share of conflict |

# Quantifying the Aggregate Costs of Inflation Due to Conflict

Solve first-order responses to inflation shocks  $\{d\pi_t\}_{t \geq 0}$  using **SSJ** methods

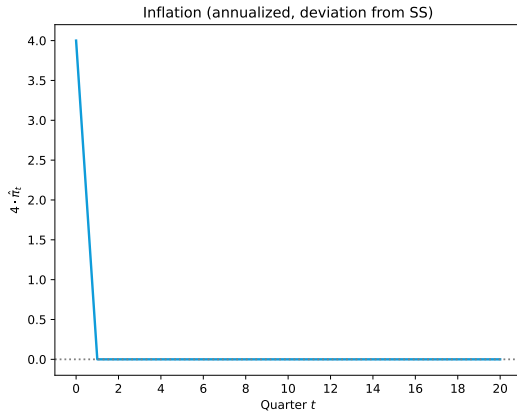
[Auclert-Bardóczy-Rognlie-Straub '21, Auclert-Rigato-Rognlie-Straub '24]

Evaluate welfare costs of inflation shocks to workers

$$\hat{\mathcal{W}} = \sum_{t=0}^{\infty} \beta^t \hat{w}_t^{\text{erosion}} = \underbrace{\sum_{t=0}^{\infty} \beta^t \hat{w}_t}_{\text{aggregate wage response}} - \underbrace{\hat{\mathcal{L}}}_{\text{aggregate costs of inflation due to conflict}}.$$

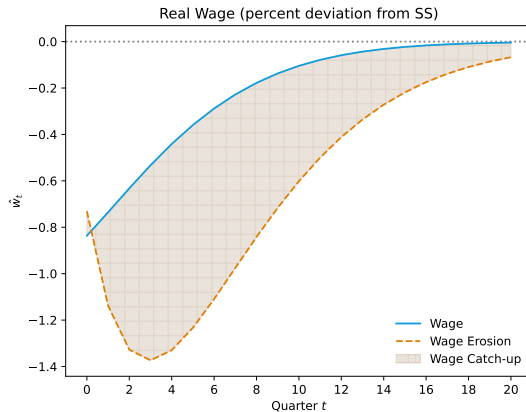
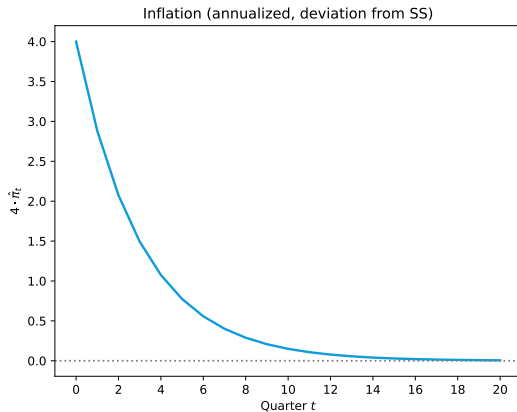
1. Transitory inflation shocks:  $d\pi_0 > 0$  and  $d\pi_t = 0$  for  $t \geq 1$
2. Persistent inflation shocks:  $d\pi_t = \rho^t \varepsilon$ , with  $\rho = 0.72$
3. 2021-23 inflation experience (perfect foresight and observed inflation expectations)

# Transitory Inflation Shocks





# Persistent Inflation Shocks

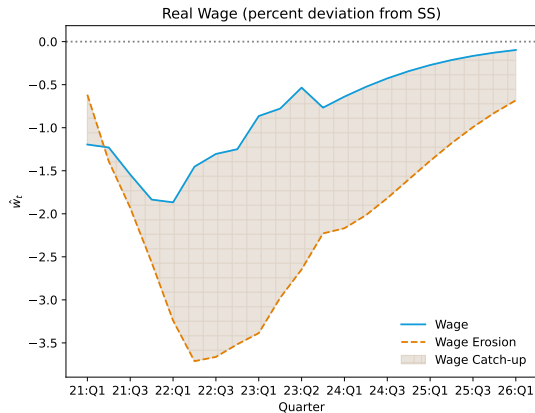
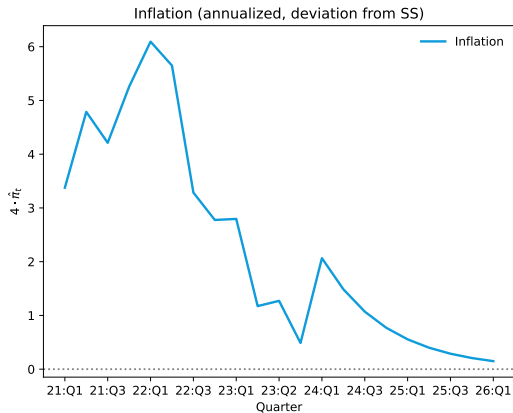


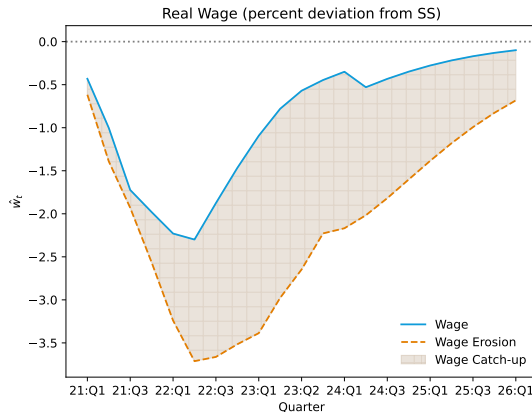
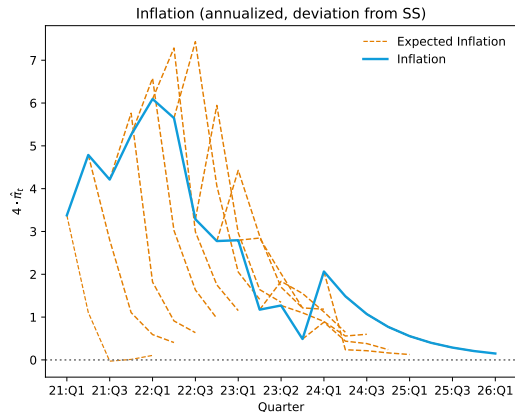
# Welfare Decomposition

|                      | Overall Welfare Change | Real Wage Response | Aggregate Costs of Inflation<br>due to Conflict |
|----------------------|------------------------|--------------------|-------------------------------------------------|
| Transitory inflation | −0.95%                 | −0.22%             | −0.73%                                          |
| Persistent inflation | −3.31%                 | −1.16%             | −2.15%                                          |

Note: Welfare units = % of 1-year consumption

- **Costs of inflation** incorporating conflict **more than double** costs via falling real wages





Finding that aggregate costs of inflation due to conflict are significant is **robust** to

- Alternative calibration of the indexation parameter  $\gamma$
- Alternative calibration of the probability of free wage catch-up  $\lambda$
- Alternative calibration of the conflict cost  $\kappa$
- General equilibrium determination of employment and wages

Gamma

Lambda

Kappa

GE

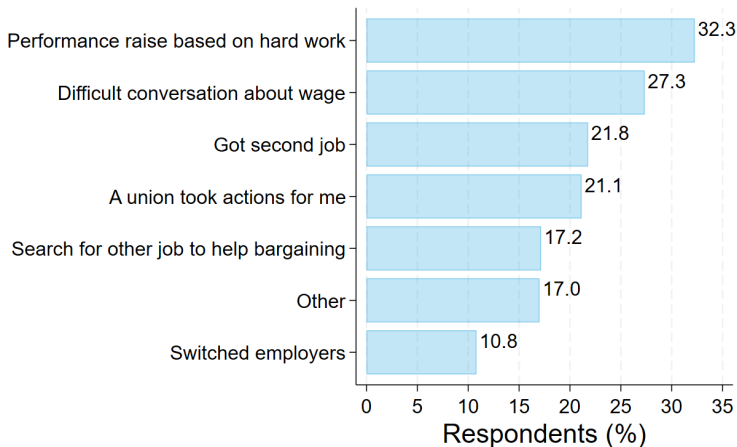
# Conclusion

- Workers incur **conflict costs** to have nominal wages keep up with inflation
- Survey: workers willing to sacrifice 1.75% of wages to avoid costly conflicts
- We capture conflict cost in a menu-cost style model applied to wage setting
- Incorporating conflict costs **more than doubles** costs of inflation to workers.
- Broader agenda: a tractable approach to **introduce state-dependent wage setting**
  - In progress: firms' costs in adjusting wages away from default & downward wage rigidity

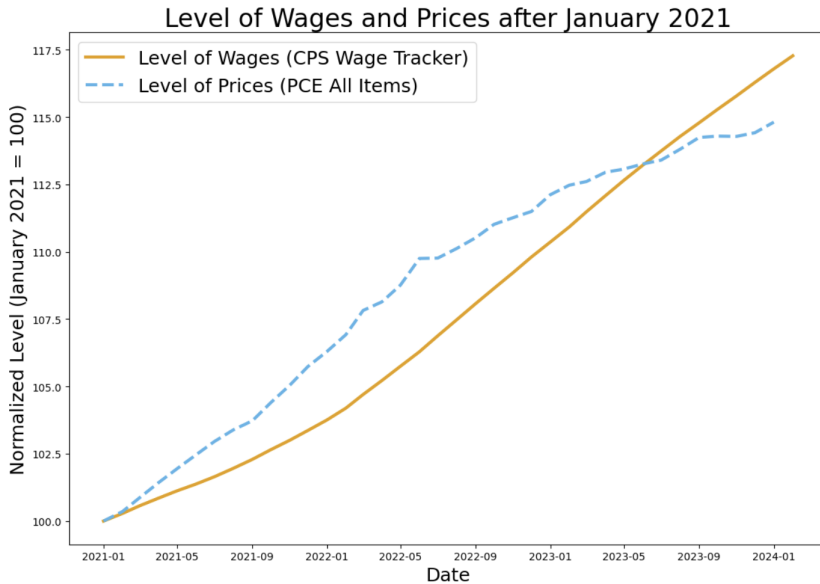
Extra Slides



# What are the Costly Actions?

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**Takeway:** Workers engage in a **diverse set of costly actions**



**Table 3:** Distributions in Survey Sample vs. Population

|                                      | Survey | US population |
|--------------------------------------|--------|---------------|
| Male                                 | 0.52   | 0.52          |
| Female                               | 0.48   | 0.48          |
| Secondary education (e.g. GED/GCSE)  | 0.02   | 0.02          |
| High school diploma/A-levels         | 0.37   | 0.39          |
| Technical/community college          | 0.12   | 0.11          |
| Undergraduate degree (BA/BSc/other)  | 0.32   | 0.30          |
| Graduate degree (MA/MSc/MPhil/other) | 0.14   | 0.13          |
| Doctorate degree (PhD/other)         | 0.04   | 0.04          |
| Democrat                             | 0.28   | 0.28          |
| Republican                           | 0.26   | 0.26          |
| Independent                          | 0.33   | 0.33          |
| None                                 | 0.07   | 0.07          |
| Other party                          | 0.06   | 0.06          |
| 22-29 years old                      | 0.24   | 0.20          |
| 30-39 years old                      | 0.38   | 0.29          |
| 40-49 years old                      | 0.21   | 0.26          |
| 50-60 years old                      | 0.16   | 0.26          |

**Table 3:** Distributions in Survey Sample vs. Population

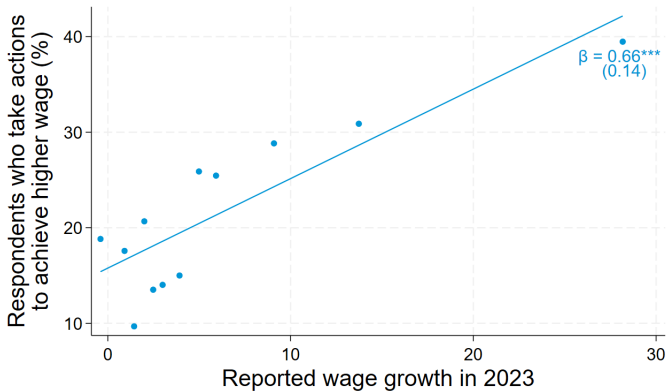
|                            | Survey | US population |
|----------------------------|--------|---------------|
| Full-Time                  | 0.83   | 0.83          |
| Part-Time                  | 0.17   | 0.17          |
| For-profit company         | 0.80   | 0.77          |
| Not-for-profit corporation | 0.09   | 0.07          |
| State government           | 0.03   | 0.06          |
| Federal government         | 0.02   | 0.03          |
| Local government           | 0.04   | 0.07          |
| Other employer             | 0.01   |               |
| White                      | 0.68   | 0.75          |
| Black                      | 0.12   | 0.14          |
| Asian                      | 0.08   | 0.07          |
| Mixed                      | 0.08   | 0.02          |
| Other                      | 0.04   | 0.02          |
| Not reported               | 0.00   |               |

**Table 3:** Distributions in Survey Sample vs. Population

|                     | Survey | US population |
|---------------------|--------|---------------|
| Covered by a union  | 0.11   | 0.13          |
| Not part of a union | 0.81   | 0.87          |
| Not reported        | 0.08   |               |
| <u>Income</u>       |        |               |
| \$0-\$19,999        | 0.12   | 0.12          |
| \$20,000-\$39,999   | 0.24   | 0.22          |
| \$40,000-\$69,999   | 0.34   | 0.31          |
| \$70,000-\$99,999   | 0.17   | 0.16          |
| \$100,000-\$124,999 | 0.06   | 0.08          |
| \$125,000+          | 0.07   | 0.11          |

# Workers with higher wage growth were more likely to have taken costly actions

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## Lemma.

*Let the value function be*

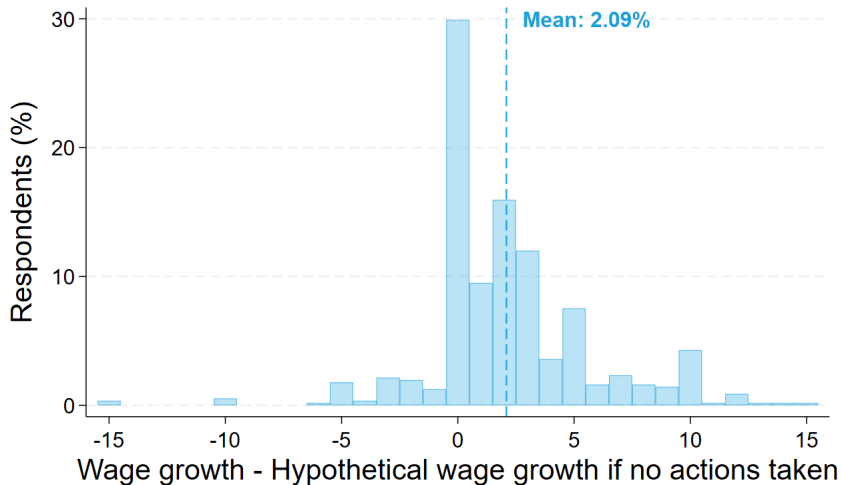
$$v(x) \equiv \max \left\{ x + \beta \mathbb{E} \left[ \max \left\{ v(0) - \kappa', v(x') \right\} \right] \right\}$$

*where  $x \equiv \log(w_{i,t}/w_{i,t}^*)$  denotes the wage gap. Then,*

$$v(-x^{\text{conflict}}) = v(0) - \kappa.$$

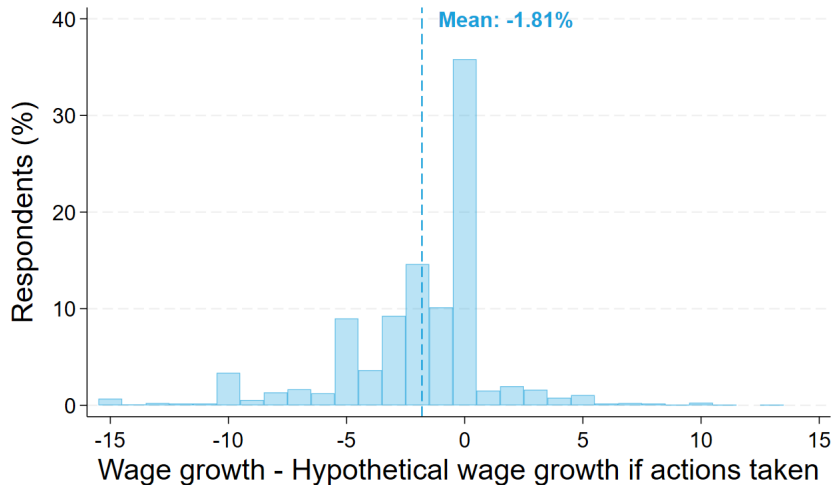
- Measured conflict cost is directly informative of  $\kappa$ .

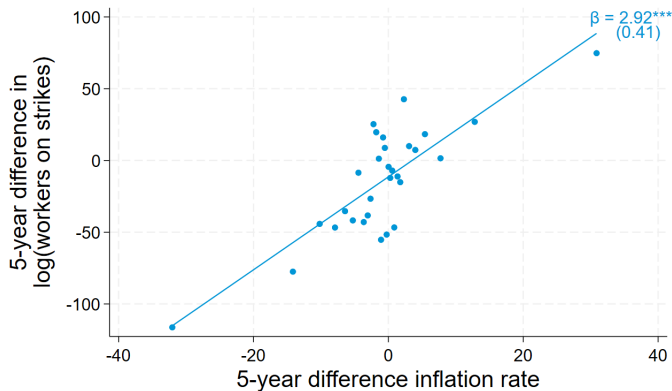
# Conflict Leads to Higher Wages: Within-individual

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# Workers sacrifice wage growth not to conflict: Within-individual

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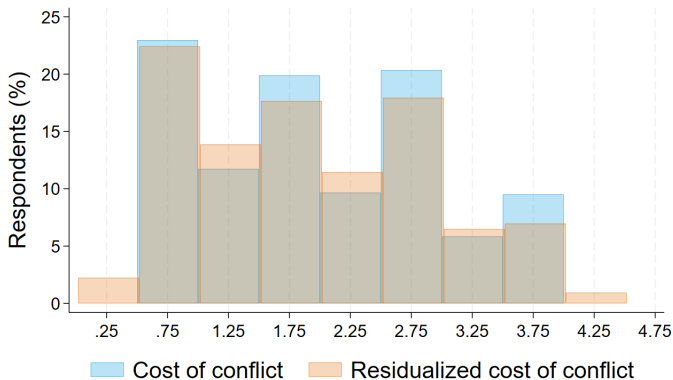
$$\Delta \log(\text{workers involved in strikes}) * 100_{i,t,t-5} = \beta \Delta \pi_{i,t,t-5} + \varepsilon_{it}^1$$

<sup>1</sup>Note: Standard errors are clustered at the country level.

$$\Delta \log(\text{workers involved in strikes}) * 100_{i,t,t-5} = \gamma_i + \lambda_t + \beta \Delta \pi_{i,t,t-5} + \varepsilon_{it}$$

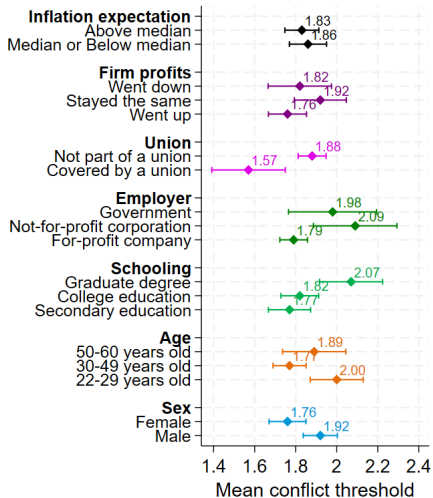
- The dependent variable is the 5-year long log difference of "Workers involved in strikes and lockouts", sourced from the International Labour Organization, multiplied by 100 for ease of interpretation.
- As independent variable, we employ the 5-year long difference of headline inflation, sourced by the World Bank, trimmed at 2.5% on each tail.
- Country and year fixed effects are included.
- Observations are unweights.
- Standard errors are clustered at the country level only.
- The data availability per year depends on the country. The analysis includes 78 countries, between 1969 to 2022: Algeria, Australia, Austria, Bangladesh, Barbados, Belgium, Botswana, Brazil, Burundi, Cameroon, Canada, Chile, Colombia, Costa Rica, Cyprus, Denmark, Ecuador, Egypt, Arab Rep., El Salvador, Estonia, Fiji, Finland, France, Germany, Ghana, Greece, Guatemala, Haiti, Honduras, Hungary, Iceland, India, Indonesia, Ireland, Israel, Italy, Jamaica, Japan, Kenya, Korea, Rep., Latvia, Lithuania, Malaysia, Malta, Mauritius, Mexico, Morocco, Myanmar, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Poland, Portugal, Romania, Russian Federation, San Marino, Slovak Republic, South Africa, Spain, Sri Lanka, Suriname, Sweden, Switzerland, Thailand, Trinidad and Tobago, Tunisia, Türkiye, Uganda, Ukraine, United Kingdom, United States, and Uruguay.

# Conflict Costs vs Residualized Conflict Costs

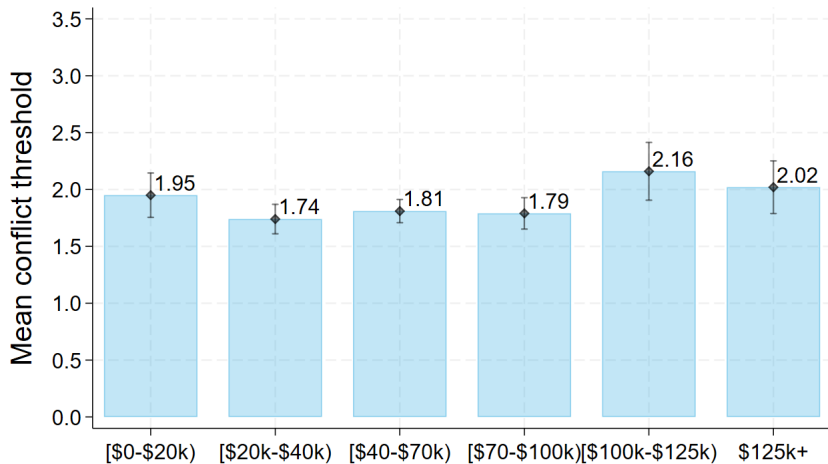
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2

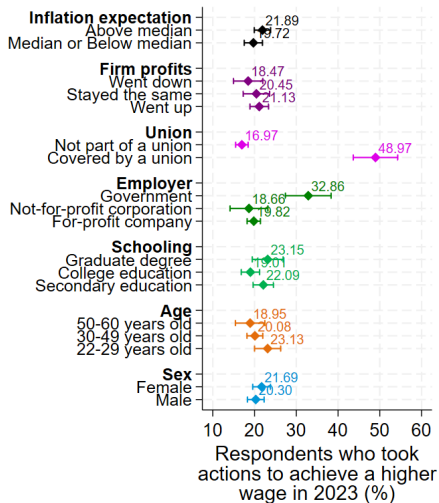
<sup>2</sup>Note: Respondents who never and always engage in conflict have been excluded from the figure and the calculation of the residualized cost of conflict. The residualized cost of conflict has been generated by regressing cost of conflict on dummy variables for the categories of age, education, income and union coverage. The categories excluded were 30-49 years old, income of [100k-125k), graduate education and non-union coverage.



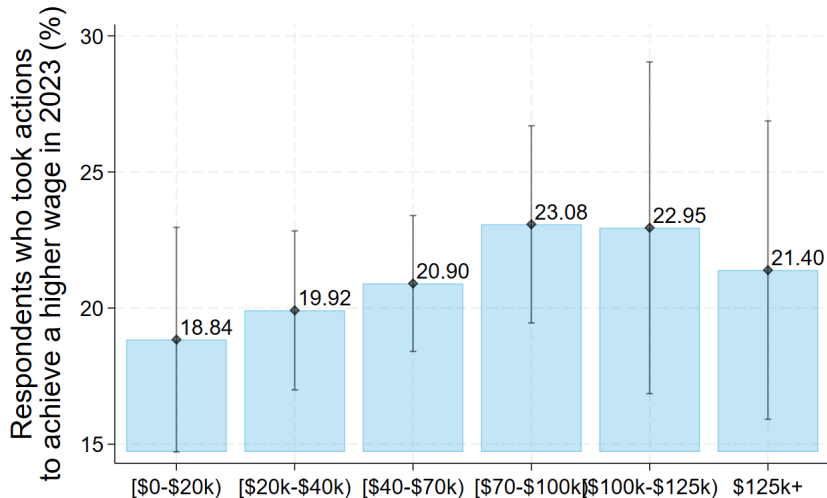
# Heterogeneity: Conflict Costs, by income

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# Heterogeneity: Respondents engaging in conflict in 2023

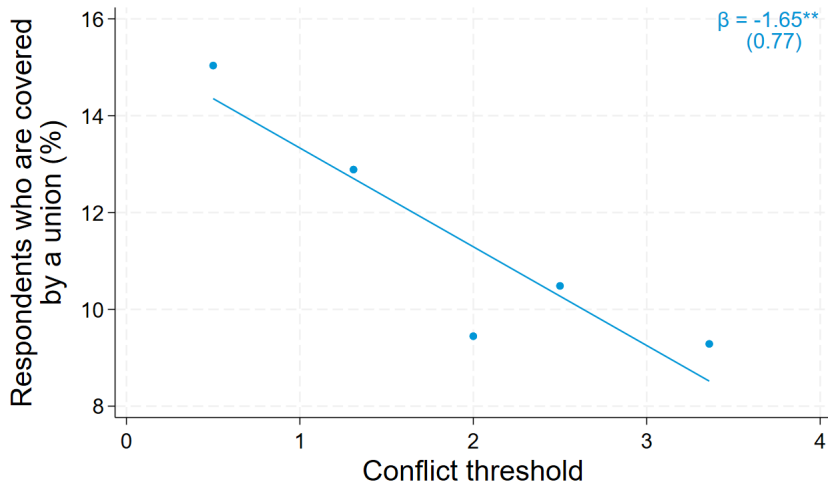
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## Heterogeneity: Respondents engaging in conflict in 2023, by income

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# Union members have lower cost of conflict

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- **Beyond** log-utility or **hand-to-mouth** consumers (e.g., standard borrowing constraints)

$$\hat{\mathcal{W}} \approx \sum_{t=0}^{\infty} \beta^t \left[ \int_0^1 u'(c_{i,t}^{ss}) w_{i,t}^{ss} di \right] \int_0^1 \frac{u'(c_{i,t}^{ss}) w_{i,t}^{ss}}{\int_0^1 u'(c_{i,t}^{ss}) w_{i,t}^{ss} di} \hat{w}_{i,t}^{\text{erosion}} di$$

- Allowing **other aggregate shocks** (e.g., changing productivity growth  $g_t$ )

$$\hat{\mathcal{W}} = \sum_{t=0}^{\infty} \beta^t \hat{w}_t^{\text{erosion}} \quad \& \quad \hat{w}_t^{\text{erosion}} \approx -(1-\gamma) \sum_{k=0}^t \Phi_k^{ss} \hat{\pi}_{t-k} - \sum_{k=0}^t (1-\gamma_g) \Phi_k^{ss} \hat{g}_{t-k} + \sum_{k=0}^t \hat{g}_{t-k}$$

- wage erosion and “conflict costs” relevant for the welfare costs of other shocks

- Let  $X$  be an **arbitrary** non-empty set and  $f : X \times [0,1] \rightarrow \mathbb{R}$  be a real-valued function.
- Let  $V(\theta)$  be the optimal value as a function of  $\theta$  and let  $X^*(\theta)$  be the set of maximizers.

$$V(\theta) := \sup_{x \in X} f(x, \theta), \quad \forall \theta \in [0,1] \quad \text{and} \quad X^*(\theta) := \{x \in X \mid f(x, \theta) = V(\theta)\}$$

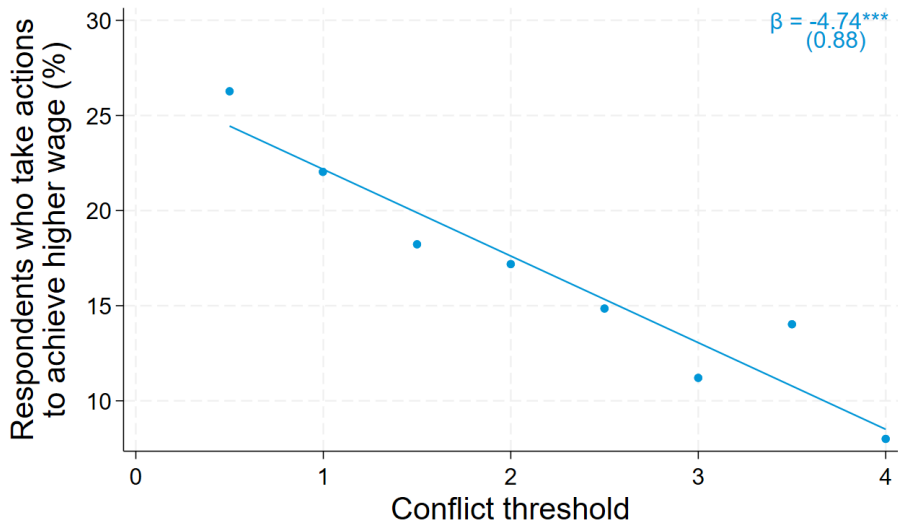
## Theorem.

If  $f(x, \cdot)$  is differentiable in  $\theta \in [0,1]$  for all  $x \in X$  and  $X^*(\theta) \neq \emptyset$  for all  $\theta \in [0,1]$ , then for any selection of  $x^*$  of  $X^*$ ,

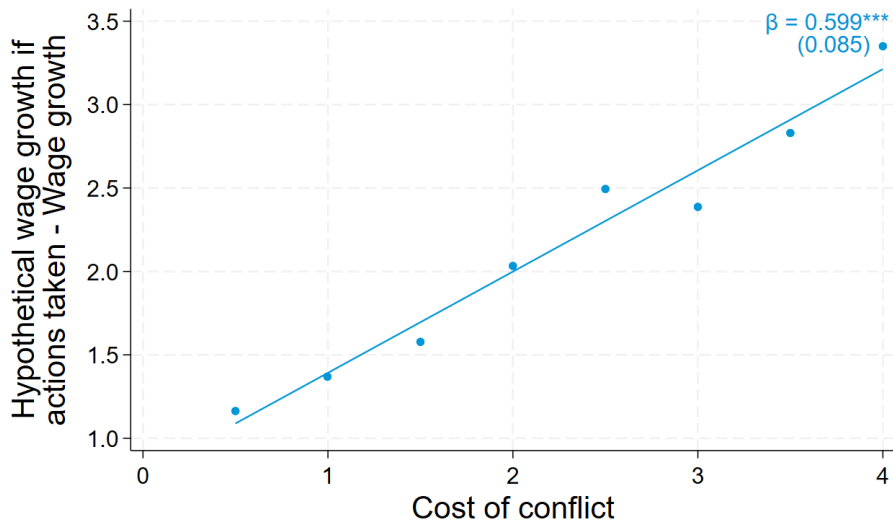
$$V(\theta) = V(0) + \int_0^\theta \frac{\partial f(x^*(z), z)}{\partial \theta} dz \quad \forall \theta \in [0,1] \quad \text{and} \quad V'(\theta) = \frac{\partial f(x^*(\theta), \theta)}{\partial \theta} \quad \text{a.s.}$$

- For us, for each worker  $i$ ,  $\theta \leftrightarrow \{d\pi_t\}_{t=0}^{+\infty}$  &  $x \leftrightarrow \{\mathcal{J}_{i,t}\}_{t=0}^{+\infty}$  (conflict choice,  $\mathcal{J}_{i,t} \in \{0,1\}$ )
- The envelope theorem holds a.s. at the worker level, and everywhere at the aggregate level

# Lower Conflict Costs Predict Costly Actions

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# Lower Conflict Costs Predict Lower Sacrifice from Not Taking Actions

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## Proposition 2.

*The ratio of aggregate costs of inflation due to conflict to its overall costs,  $\hat{\kappa}/\hat{\mathcal{W}}$ , is invariant to the degree of indexation of default wage  $\gamma \in [0, 1)$ .*

Intuition:

- All matters is *inflation net-of-indexation*  $\hat{\pi}_t^{net} \equiv (1 - \gamma) \hat{\pi}_t$ .
- So, both  $\hat{\kappa}$  and  $\hat{\mathcal{W}}$  scale proportionally with  $1 - \gamma$ .

- Service Employees International Union ( $\approx 1.9$  million members): 1.7% of the member's gross monthly salary for time in regular pay status.
- International Brotherhood of Teamsters ( $\approx 1.4$  million members): if you make \$15 an hour, your dues are  $\approx 1.5\%$  of income.
- United Auto Workers ( $\approx 990$ k members): two hours pay per month for full time members and 1.15% of straight-time hourly pay for part time and per diem members.
- National Education Association ( $\approx 3$  million members): National dues are \$15 per year. For Chicago, to be a member costs from \$745.20 to \$1,242.00 a year.