Why Do Workers Dislike Inflation? Wage Erosion and Conflict Costs

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Why do Workers Dislike Inflation?

- Prior work focuses on movements in the real wage – do nominal wages keep up with prices?

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  - Should account for conflict costs when considering welfare costs of inflation
  - Meaningful welfare costs of inflation for workers even if real wages do not fall

Paper Outline

1. Motivating evidence from survey:
   (b) Costly conflict rises with inflation [Afrouzi et al. '24; Pilossoph et al '23 '24]

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   - Workers consider costly conflict w/ firm to raise nominal wage

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1. Motivating evidence from survey:
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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

3. Main analytical result: impact of inflation on worker welfare determined by wage erosion
   - Wage erosion: how inflation would lower real wages if conflict decisions did not change

4. Quantify conflict costs using survey moments to discipline model
   - incorporating conflict more than doubles the overall cost of inflation to workers

Outline

Survey and Motivating Evidence

The Conflict-Cost Model

Quantifying the Importance of Conflict: Roadmap

Conclusion

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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

Representation

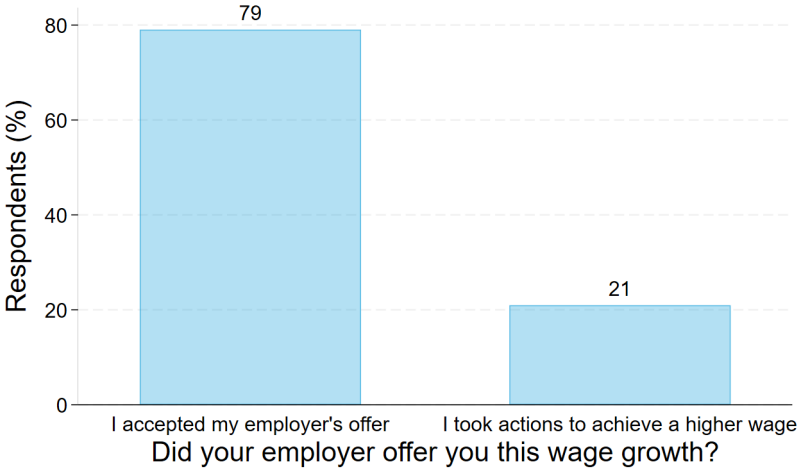
- Survey part I [now]: Qualitative evidence to motivate model structure
  → Workers achieve wage growth through costly conflict with employers
- Survey part II [later]: Quantitative evidence to inform model calibration

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 take action believe it could have raised wages
4. Inflation leads to conflict

Workers Choose Employer Offer vs. Conflict to Raise Wage

Hetergeneity | By income



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

actions | wording

Four findings relating conflict, wage growth, and inflation

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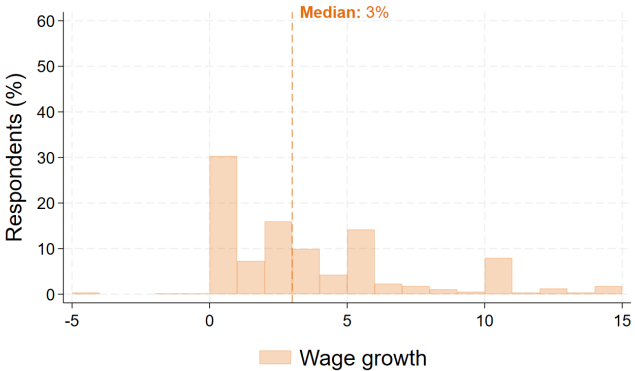
Conflict Leads to Higher Wages...



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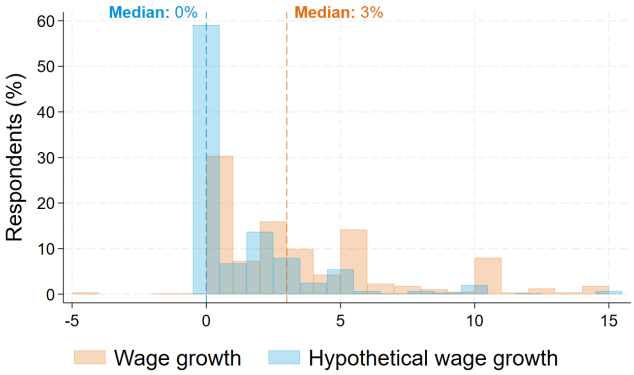

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1. Workers choose between accepting employer's default wage offer or conflict
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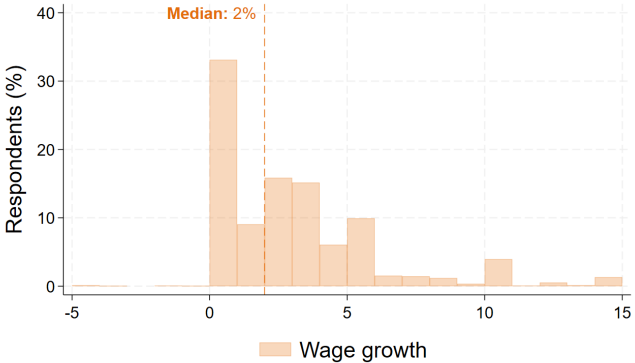
Workers Sacrifice Wage Growth To Avoid Conflict



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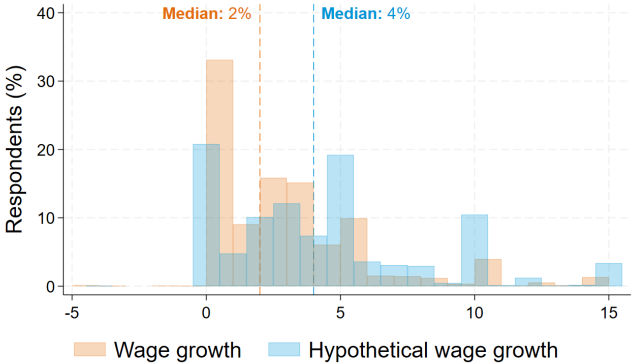


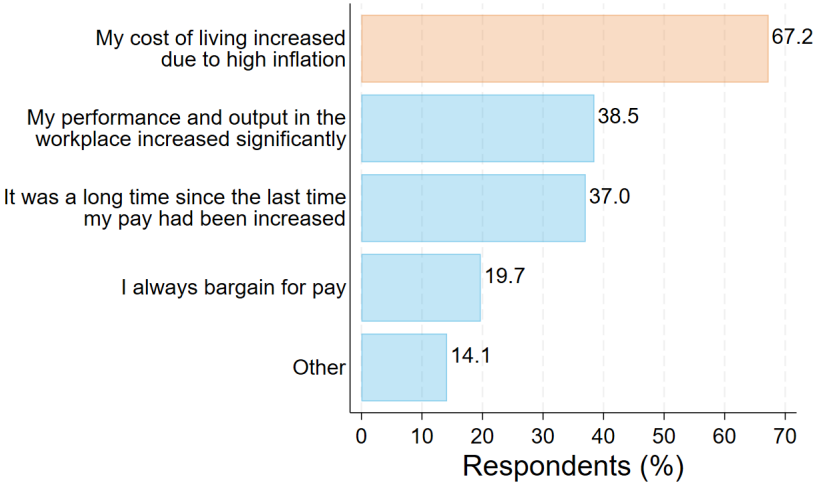
→ Workers who do not conflict report having sacrificed 2pp of wage growth

Four findings relating conflict, wage growth, and inflation

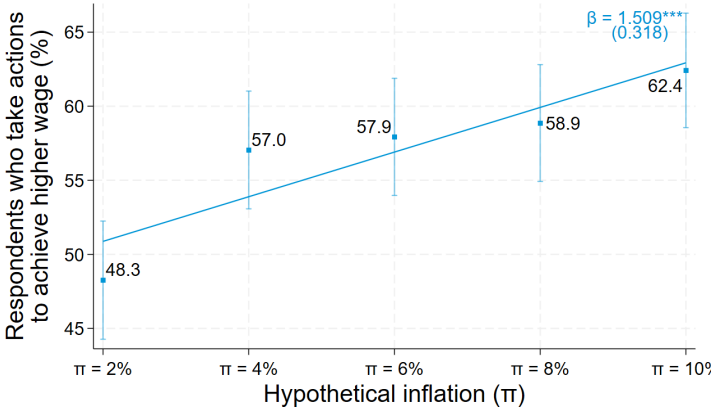
1. Workers choose between accepting employer's default wage offer or conflict
2. Conflict raises wages
3. Workers who did not take action believe it could have raised wages
4. **Inflation leads to conflict**

Inflation was the main motivation for conflict

Wording



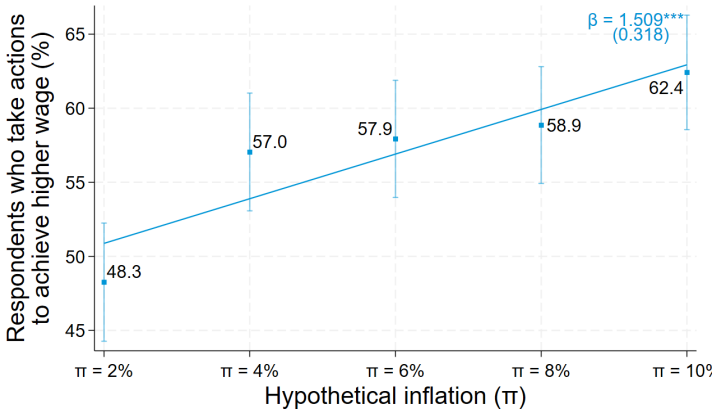
Inflation Increases the Probability of Conflict



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

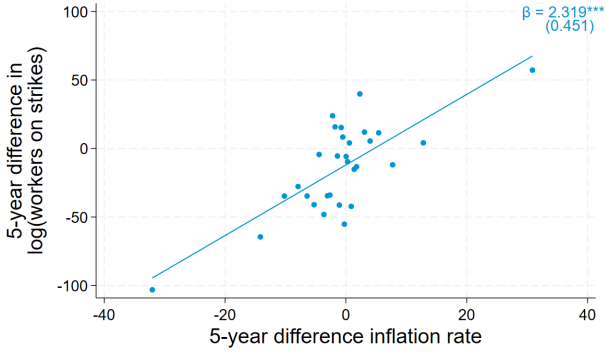
- Where $x \in \{2, 4, 6, 8, 10\}$

Inflation Increases the Probability of Conflict



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

Inflation is Associated with Higher Union Activity



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

International Labor Organization data, $1960 - 2020$

Motivating Evidence: Wage Growth, Inflation and Conflict

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

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

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

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

- Now: hand-to-mouth $c_{i,t} = \frac{W_{i,t}}{P_t}$.
- $\kappa_{i,t}$: i.i.d. "Calvo-plus" cost to increase pay

[Alvarez et al '16; 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

- Nominal wage

$$W_{i,t} = \begin{cases} W_{i,t-1} e^{\alpha + \gamma(\pi_t - \pi^{ss})} & \text{if } \mathscr{I}_{i,t} = 0 \\ P_t w^*_{i,t} & \text{if } \mathscr{I}_{i,t} = 1 \end{cases}$$

  - α: default nominal wage growth without inflation shocks
  - γ: degree of indexation to inflation shocks

- Conflict-induced (real) wage $w^*_{i,t}$, keeps up w/ inflation & productivity

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

$z_{i,t} \in [-\overline{z}, \infty)$ 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

$$\mathscr{W} \equiv \int \mathbb{E}_0 \left[\sum_{t=0}^{\infty} \beta^t \left\{ \log c_{i,t} - \kappa_{i,t} \mathscr{I}_{i,t} \right\} \right] di$$

and aggregate log real wages

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

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 $\mathscr{I}_{i,t}^{ss}$

$$\hat{w}_t^{\text{erosion}} \equiv \int_0^1 \log \omega_t \left(\pi_t, \mathscr{I}_{i,t}^{ss}, h_{i,t}\right) di - \int_0^1 \log \omega_t \left(\pi^{ss}, \mathscr{I}_{i,t}^{ss}, h_{i,t}\right) di,$$

  where ω_t is wage given path of inflation π_t, conflict choices $\mathscr{I}_{i,t}$, & idio. conditions $h_{i,t}$.

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

$$\hat{w}_t^{\text{catch-up}} \equiv \int_0^1 \log \left(\omega_t \left(\pi_t, \mathscr{I}_{i,t}, h_{i,t}\right)\right) di - \int_0^1 \log \left(\omega_t \left(\pi_t, \mathscr{I}_{i,t}^{ss}, h_{i,t}\right)\right) di.$$

Theorem.

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

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

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

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

[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 ≈ 0, inflation could still be costly because wage catch-up comes from costly conflicts
  - Sufficient for welfare only w/ purely time-dependent wage setting ($\kappa = \infty$)

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  - Sufficient for welfare only w/ purely time-dependent wage setting ($\kappa = \infty$)
- Extensions: (1) general distribution of $\kappa_{i,t}$; (2) Rotemberg; (3) $w_{i,t}^*$ impacted by inflation shocks; (4) other agg. shocks; (5) unemployment; (6) beyond hand-to-mouth

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Step 1: Use survey to directly inform key parameters governing importance of conflict

- Utility costs of conflict κ
- Prob. of free catch-up λ
- Wage indexation γ and α

Step 2: Use quantitative model to benchmark contribution of conflict

Estimating 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?

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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?

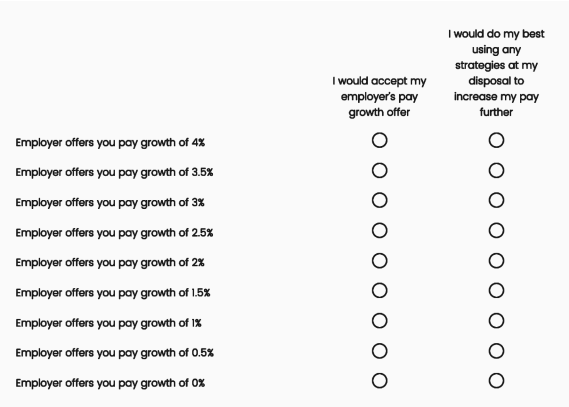
- Elicit nominal wage growth ΔW^{indiff} where workers are **indifferent** between
  - Accepting if offered by their employers vs taking costly actions
- Find x^{conflict}, the fraction of wage that workers would sacrifice to avoid conflict

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

  - Directly linked with the conflict cost κ

Estimating Costs of Conflict

Elicit ΔW^{indiff} via "multiple price list" standard in experimental economics [Jack et al. '22]

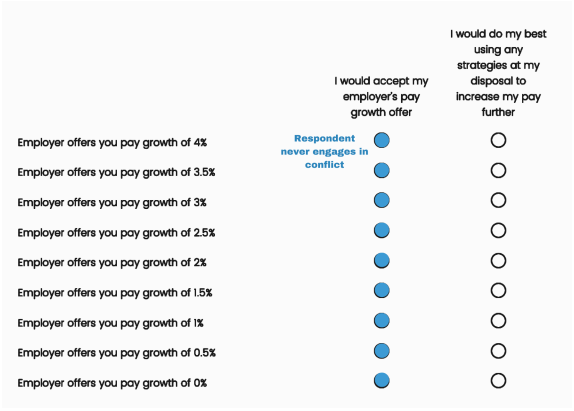


	I would accept my employer's pay growth offer	I would do my best using any strategies at my disposal to increase my pay further
Employer offers you pay growth of 4%	○	○
Employer offers you pay growth of 3.5%	○	○
Employer offers you pay growth of 3%	○	○
Employer offers you pay growth of 2.5%	○	○
Employer offers you pay growth of 2%	○	○
Employer offers you pay growth of 1.5%	○	○
Employer offers you pay growth of 1%	○	○
Employer offers you pay growth of 0.5%	○	○
Employer offers you pay growth of 0%	○	○

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

Eliciting Costs of Conflict

Elicit ΔW^{indiff} via "multiple price list" standard in experimental economics [Jack et al. '22]



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

Estimating Costs of Conflict

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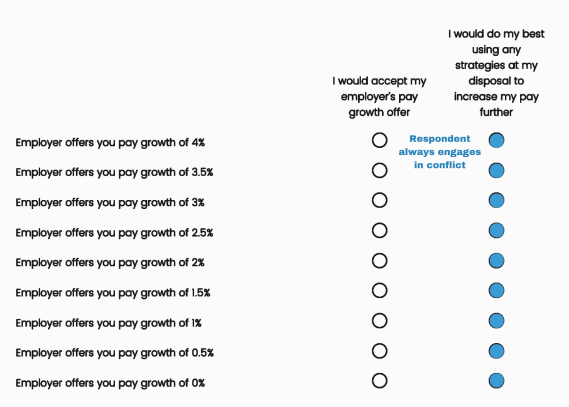

Never accept employer offers & always conflict $\Longrightarrow$ zero conflict cost.

Estimating Costs of Conflict

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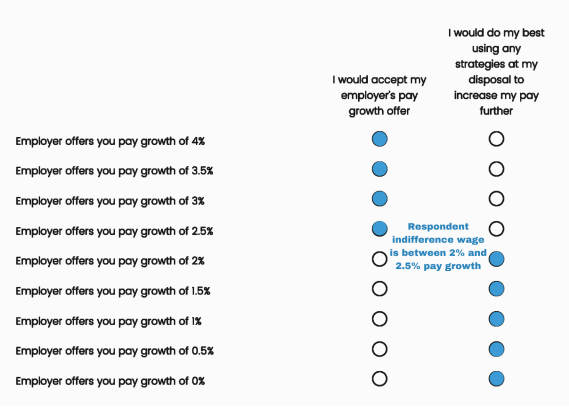
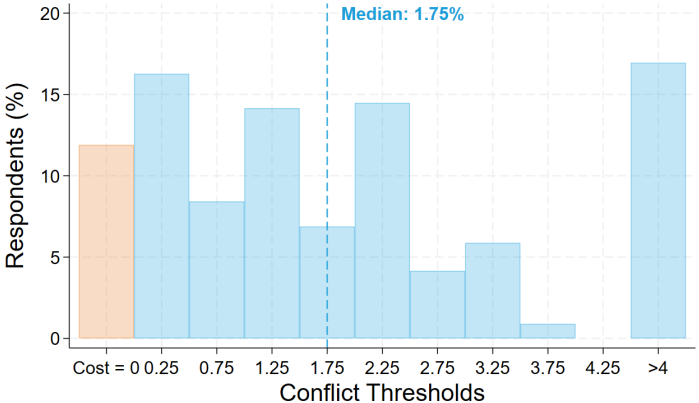


Let ΔW^{indiff} denote lowest nominal wage growth where workers accept employers' offer, then:

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

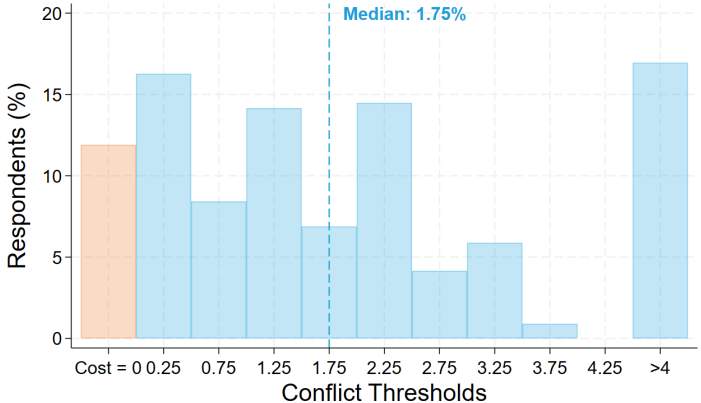
Conflict Thresholds



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

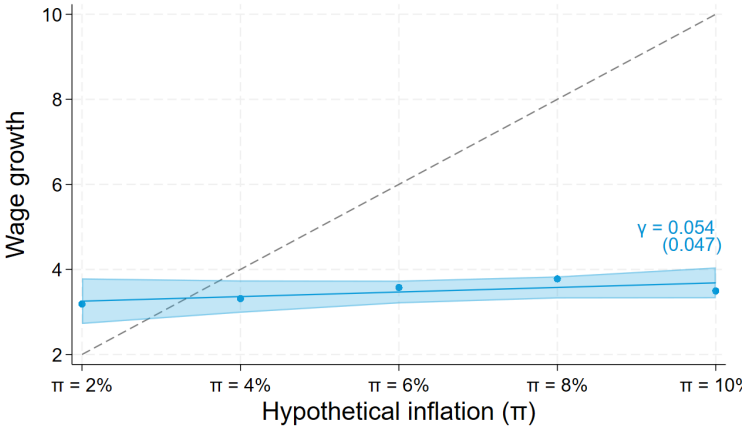
Calibrating κ | Union Dues

Conflict Thresholds



- Two key validation exercises:
  1. Lower conflict costs predict higher likelihood of having taken actions in 2023 Here
  2. Lower conflict costs predict less wage sacrificed from not taking actions in 2023 Here

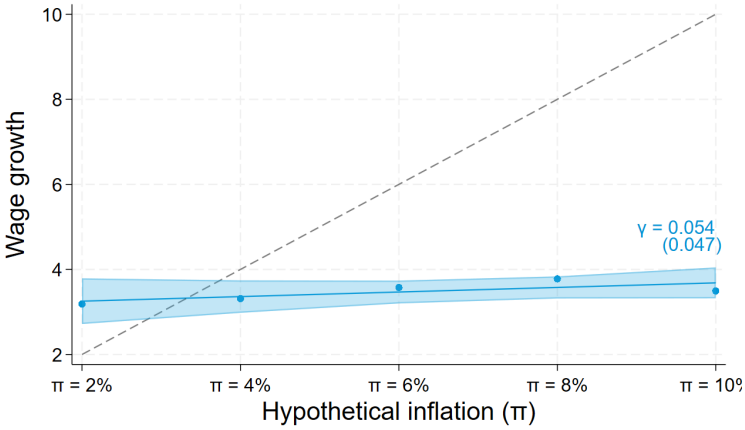
Indexation: Perceived Nominal Wage Growth without Conflict



Question:

- Consider a hypothetical situation, inflation is expected to be x% in the next 12 months.
- Where $x \in \{2, 4, 6, 8, 10\}$

Indexation: Perceived Nominal Wage Growth without Conflict



$$W_{i,t}^{\text{default}} = W_{i,t-1} e^{\alpha + \gamma(\pi_t - \pi^{ss})}$$

- Slope: $\Delta\pi = 1\%$ then $\Delta \log W_{i,t}^{\text{default}} = 0.05\% \Rightarrow \gamma = 0.05$
- Intercept: with zero inflation, 3% default annual wage growth $\Rightarrow \alpha = 0.81\%$

Quantifying the Importance of Conflict

Step 1: Use survey to directly inform key parameters governing importance of conflict

- Utility costs of conflict κ
- Prob. of free catch-up λ
- Wage indexation γ and α

Step 2: Use quantitative model to benchmark contribution of conflict

Quantifying the Aggregate Costs of Inflation Due to Conflict

Solve for first-order responses to inflation shocks $\{d\pi_t\}_{t\geq 0}$, starting from steady state

- Using SSJ methods [Auclert-Bardóczy-Rognlie-Straub '21, Auclert-Rigato-Rognlie-Straub '24]
- Standard quarterly calibration of other parameters

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Evaluate welfare costs of inflation shocks to workers

$$\hat{\mathscr{W}} = \underbrace{\sum_{t=0}^{\infty} \beta^t \hat{w}_t}_{\text{aggregate wage response}} - \underbrace{\sum_{t=0}^{+\infty} \beta^t \hat{w}_t^{\text{catch-up}}}_{\substack{\text{aggregate costs of} \\ \text{inflation due to conflict}}}$$

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

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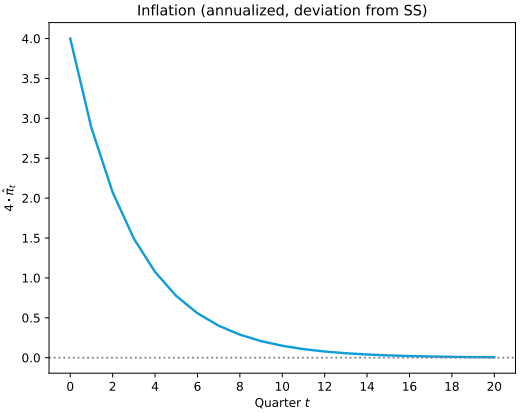
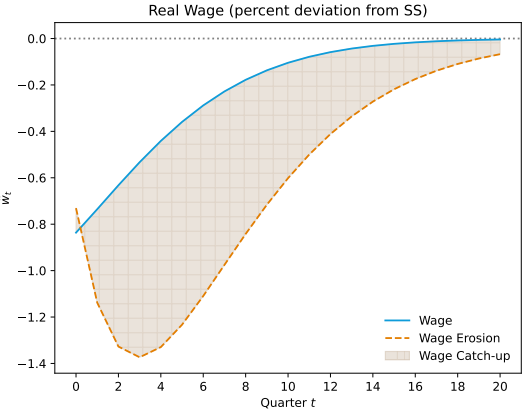
Persistent Inflation Shocks





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

Quantitative Robustness

- Finding that conflict costs are meaningful share of overall costs robust to:
  - Any level of indexation of default wages $\gamma < 1$ Here
  - 3x higher probability of free catch-up (λ) Here
  - Conflict thresholds below 1% Here
  - General equilibrium determination of employment and wages Here

Outline

Survey and Motivating Evidence

The Conflict-Cost Model

Quantifying the Importance of Conflict: Roadmap

Conclusion

Conclusion

- Workers must take actions to have nominal wages keep up with inflation
- Conflict is costly: workers willing to sacrifice 1.75% of wages to avoid actions
- We capture these conflict costs 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

Outline

Extra Slides

General equilibrium determination of employment and wages

- Inflation can impact worker welfare through employment & conflict-induced real wages
  - "Inflation greases the wheels of the labor market"
  - How do these channels affect the importance of the conflict channel?

General equilibrium determination of employment and wages

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- Model overview:
  - Workers problems similar to above, but with exogenous separation rate s
  - Firms post vacancies & competitive free entry
  - Employment E_t depends on random matching between unemployed & vacancies
  - Conflict-induced wage increases with E_t: $\hat{w}_t^* = \psi_E \hat{E}_t$ [Blanchard-Gali '10, Christiano et al. '16]

General equilibrium determination of employment and wages

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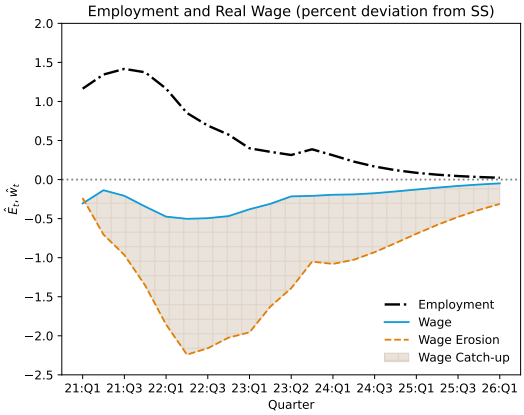
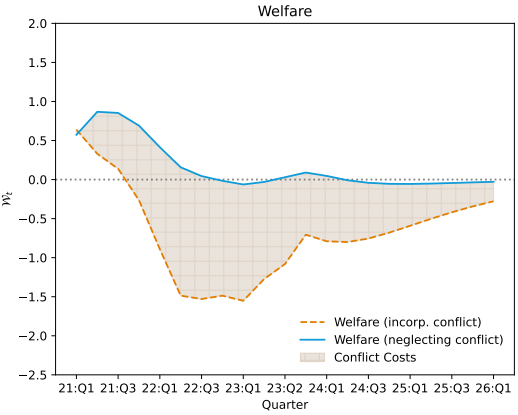
- Wage catch-up achieved through more costly conflict still does not contribute to welfare

General equilibrium determination of employment and wages





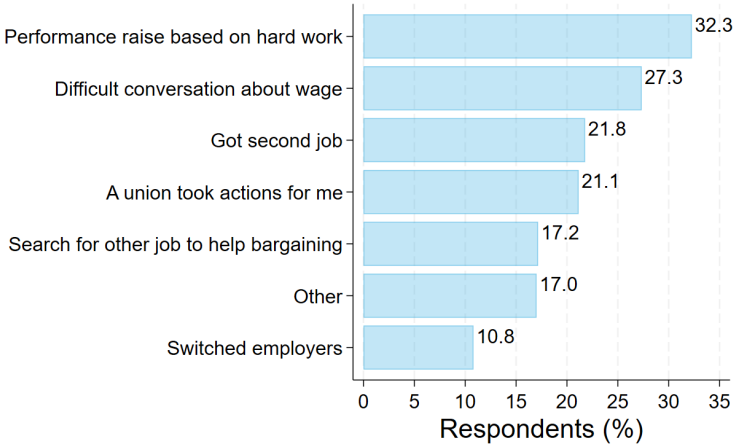
Aggregate costs of inflation due to conflict remain **significant**

Conclusion

- Workers must take costly action to have nominal wages keep up with inflation
- Conflict is costly: workers willing to sacrifice 1.75% of wages to avoid costly actions
- 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

What are the Costly Actions?

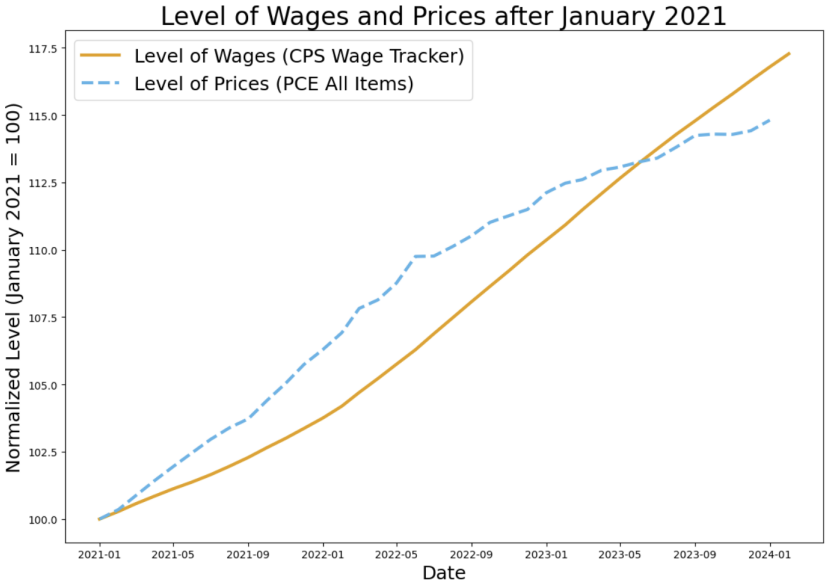
Back



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

Wages and prices in the post-Pandemic inflation

Back



Sample Representation 1/3

Back

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

Sample Representation 2/3

Back

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	

Sample Representation 3/3

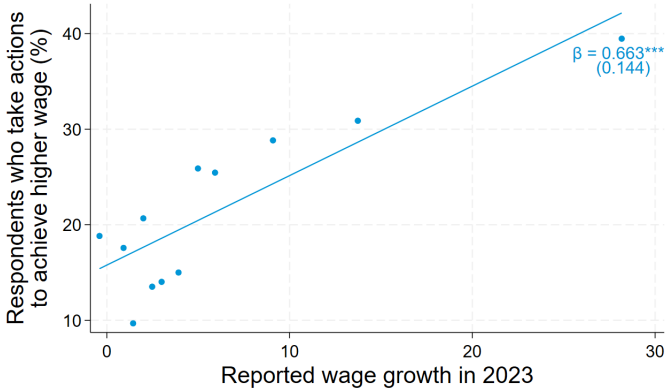
Back

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	
Income		
$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

Back



Calibrating κ

Back

Lemma.

Let $v^{ss}(x)$ denote worker's value as a function of end-of-period wage gap x

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

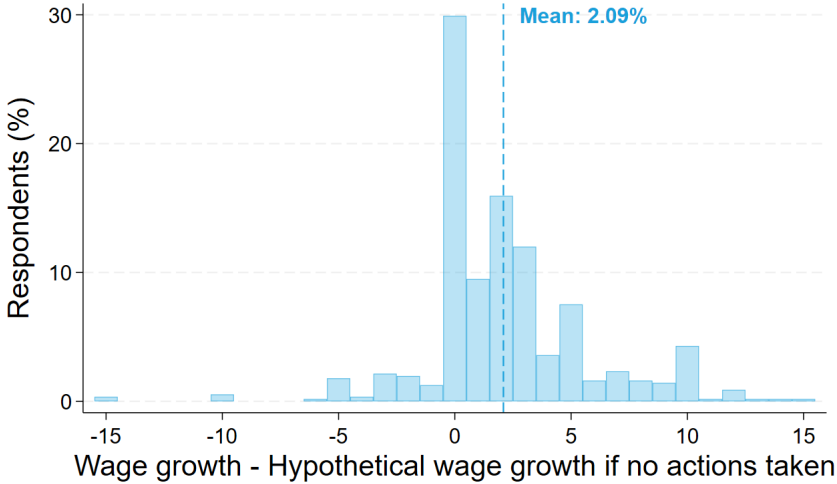
where $x \equiv \log\left(w_{i,t}/w^*_{i,t}\right)$ denotes the wage gap. Then,

$$v^{ss}\left(-x^{conflict}\right) = v^{ss}(0) - \kappa.$$

- Measured conflict cost is directly informative of κ.

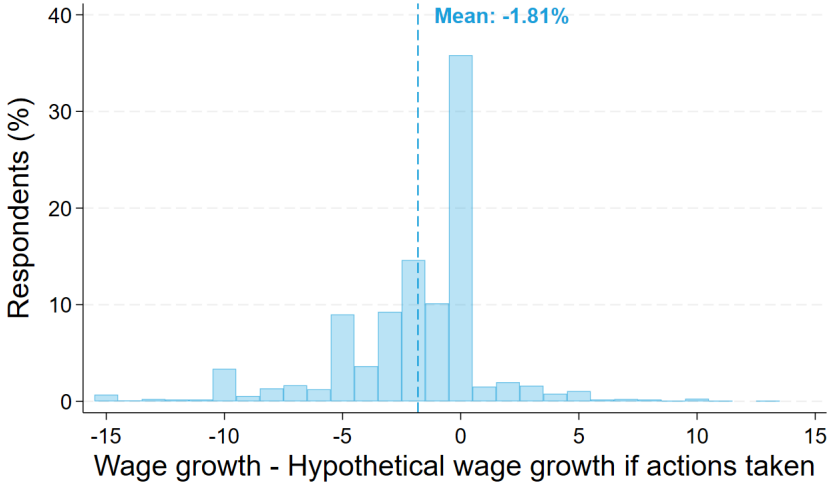
Conflict Leads to Higher Wages: Within-individual

Back



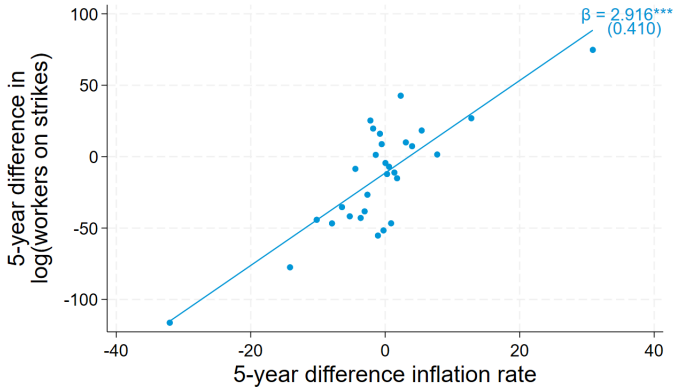
Workers sacrifice wage growth not to conflict: Within-individual

Back



Evidence from Unions

Back



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

Evidence from Unions: Specification

Back

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

- 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 he 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, Turkiye, Uganda, Ukraine, United Kingdom, United States, and Uruguay.

Conflict Costs vs Residualized Conflict Costs

Back

[1] 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.

Workers taking actions had higher wage growth in 2023

Back

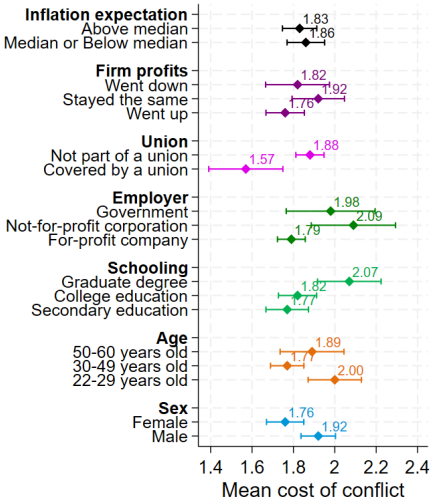
$$\Delta \log w_i = \beta \text{Conflict}_i + \alpha X_i + \varepsilon_i$$

	(1)	(2)
Conflict	1.720***	1.725***
	(0.263)	(0.275)
N	2958	2799
Controls in X_i?	No	Yes

- Controls in X_i: tenure with employer, age, gender, income level, education, sectoral unionization

Heterogeneity: Conflict Costs

Back



Heterogeneity: Conflict Costs, by income

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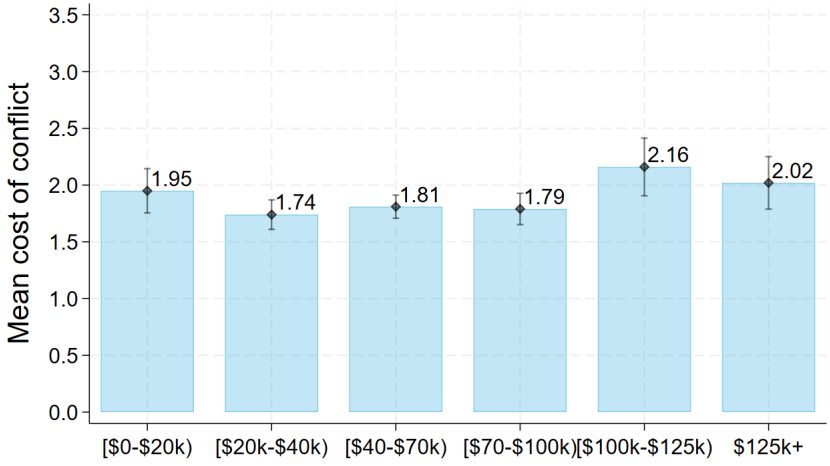
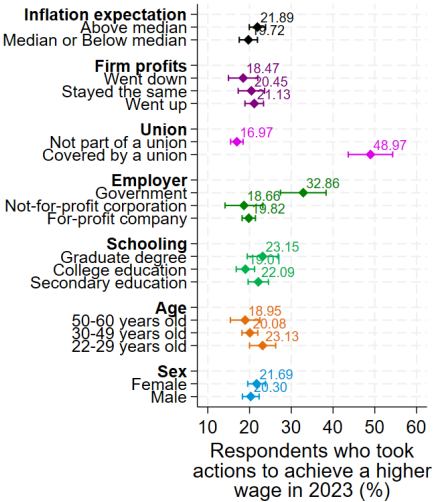


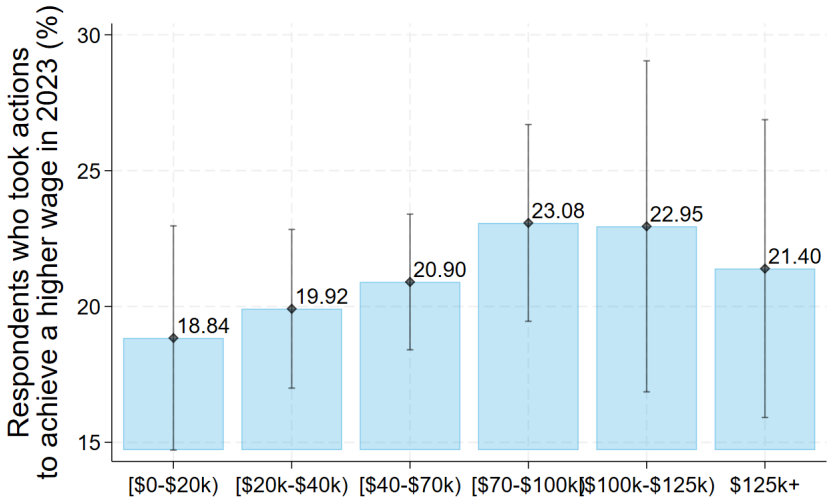
Heterogeneity: Respondents engaging in conflict in 2023

Back



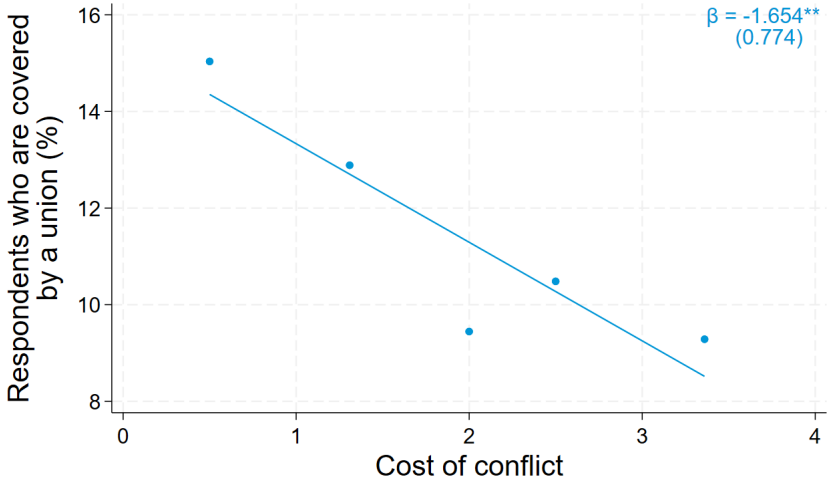
Heterogeneity: Respondents engaging in conflict in 2023, by income

Back



Union members have lower cost of conflict

Back



Extension: Beyond log-utility or hand-to-mouth consumers

Back

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

- Two differences relative to baseline
  1. Worker wages weighted by marginal utilities $\left(\frac{u'\left(c_{i,t}^{ss}\right) w_{i,t}^{ss}}{\int_0^1 u'\left(c_{i,t}^{ss}\right) w_{i,t}^{ss} di} \right)$
  2. Ability to smooth temporary wage fluctuations lowers cost of wage erosion $\left(\int_0^1 u'\left(c_{i,t}^{ss}\right) w_{i,t}^{ss} di \right)$

Extension: w_{it}^* affected by inflation shocks

Back

$$\hat{\mathscr{W}} = \sum_{t=0}^{\infty} \beta^t \hat{w}_t^{\text{erosion}}$$

$$\hat{w}_t^{\text{erosion}} \approx -(1-\gamma) \sum_{s=0}^{t} \Phi_{t-s}^{ss} \hat{\pi}_{t-s} + \sum_{s=0}^{t} (1 - \Phi_{t-s}^{ss}) \hat{g}_{w,s}$$

- where $g_{w,k} = \log\left(\frac{w_k^*}{w_{k-1}^*}\right)$: growth rate of aggregate conflict-induced (real) wages

$\rightarrow$ Growth $g_{w,k}$ increases the real wage at t only if workers engage in conflict between s and t

Milgrom & Segal '02: Envelope Theorems for Arbitrary Choice Sets

Back

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

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

Theorem.

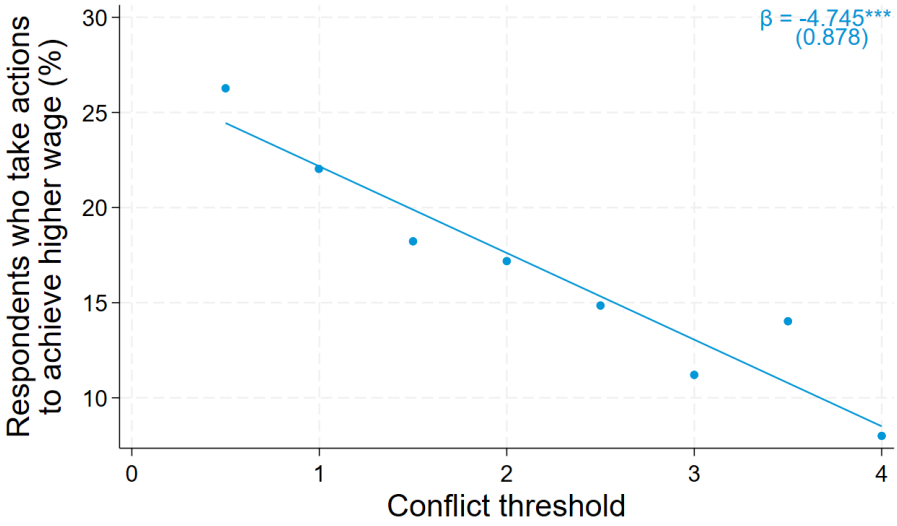
If $f(x,\cdot)$ is differentiable in $\theta \in [0,1]$ for all $x \in X$ and $X^*(\theta) \neq \emptyset$ for all $\theta \in [0,1]$, then for any selection of x^* of X^*,

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

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

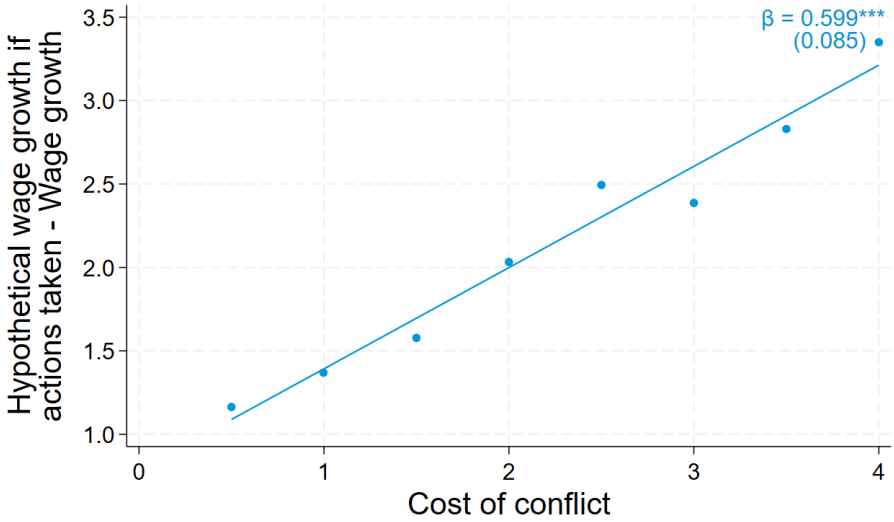
Lower Conflict Costs Predict Costly Actions

Back Union



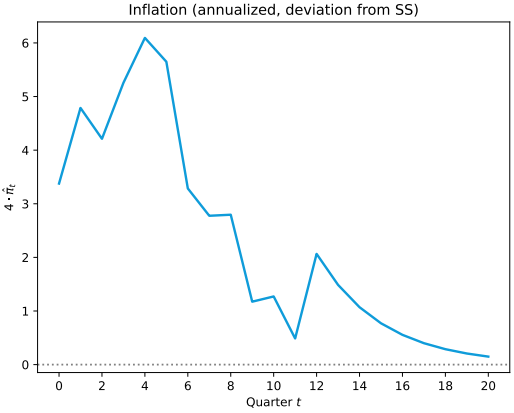
Lower Conflict Costs Predict Lower Sacrifice from Not Taking Actions

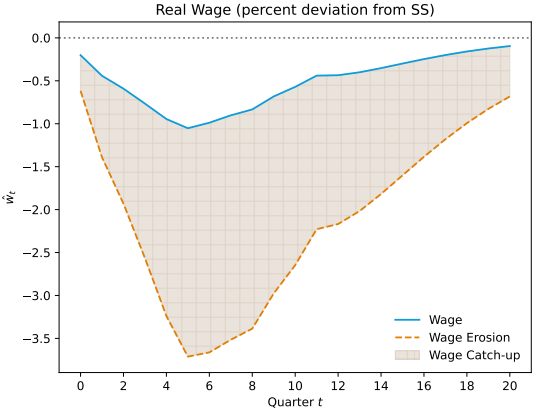
Back



Wage Dynamics: 2021-23 Inflation without foresight

Back





Robustness: Indexation Parameter γ

Back

Proposition 2.

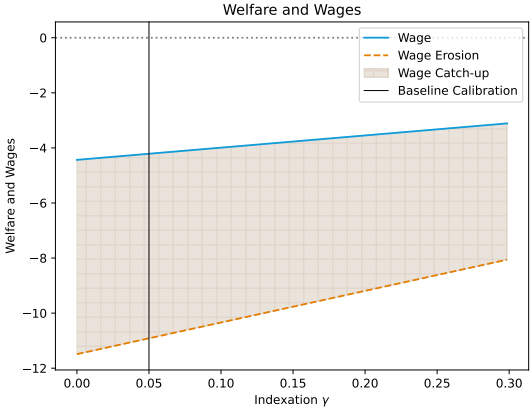
The ratio of aggregate costs of inflation due to conflict to its overall costs, $\hat{\mathscr{X}}/\hat{\mathscr{W}}$, is invariant to the degree of indexation of default wage $\gamma \in [0,1)$.

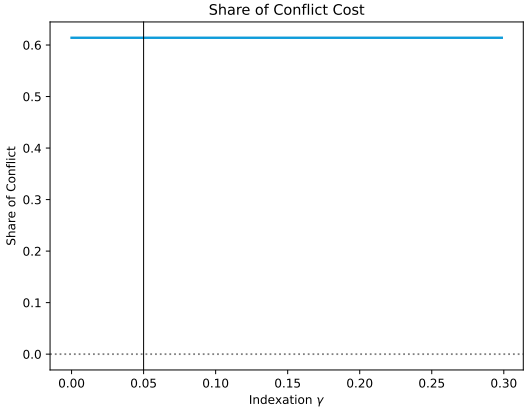
Intuition:

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

Robustness: Indexation Parameter γ

Back

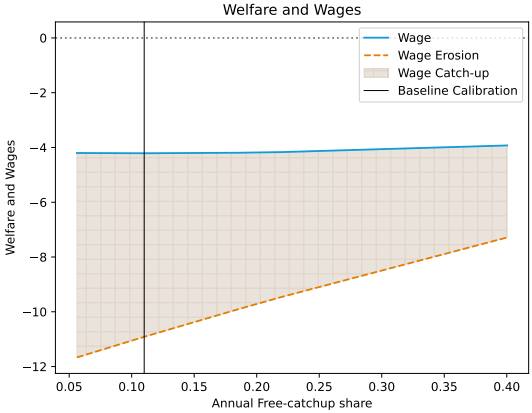


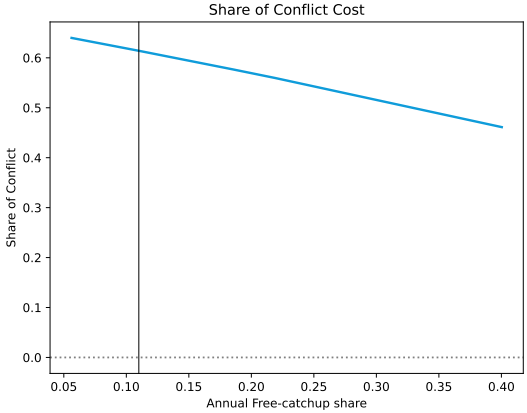


Theorem

Robustness: Prob. of Free Wage Catch-up λ

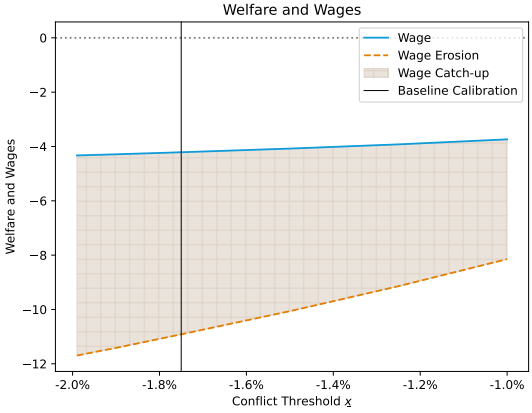
Back

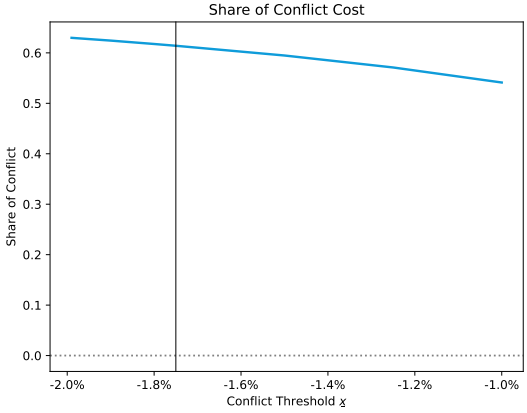




Robustness: Conflict Costs κ

Back





Union Dues

Return

- 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$990k members): two hours pay per month for full time members and 1.15% of straight-time hourly pay for part time and per diem members.
- National Education Association ($\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.

Survey Question: Employer Offer vs. Conflict

Back

Did your employer offer you this [wage growth] or did you, or a union on your behalf, use any of the actions above or other actions to increase your pay? *Common strategies to increase pay include initiating a difficult conversation with your employer to ask for a raise, searching for higher paying jobs with other employers, or switching employers in order to get a raise. Moreover, you could have obtained a second job or worked longer hours to get a raise. A union could also bargain for higher pay on your behalf.*

Did your employer offer you this [wage growth] or did you, or a union on your behalf, use any of the actions above or other actions to increase your pay?

1. *My employer offered me this pay by default*
2. *My employer did not offer me this pay by default and I, or a union on my behalf, used some of the strategies above*

Survey Question: Hypothetical wage growth with no action

Back

Above, you indicated that you got a pay raise of this XX% by implementing a common strategy to increase pay such as initiating a difficult conversation with your employer to ask for a raise, searching for higher paying jobs with other employers, switching employers in order to get a raise or other. Moreover, you could have obtained a second job or worked longer hours to get a raise. A union could have also bargained for higher pay on your behalf.

If you, or possibly your union, had not implemented any of these strategies, what pay growth do you think your employer would have offered you in 2023?

Please write your answer in percent. If you mean x%, input x.

Survey Question: Hypothetical wage growth with action

Back

Above, you indicated that you got a pay growth of XX% in 2023. What pay growth do you think you could have attained in 2023 if you had taken actions such as initiating a difficult conversation with your employer to ask for a raise, searching for higher paying jobs with other employers, switching employers in order to get a raise, or others?

Please write your answer in percent. If you mean x%, input x.

Survey Question: Motivation for Actions

Back

What was your, or your union's, motivation for taking actions in order to secure a pay increase in 2023? Please pick up to three options.

1. My cost of living increased due to high inflation, therefore I needed more money to fund my spending and saving plans
2. My performance and output in the workplace increased significantly
3. I always bargain for pay
4. It was a long time since the last time my pay had been increased
5. Other, please add additional comments below

Survey Question: Hypothetical Inflation

Back

Consider a hypothetical situation in which inflation is expected to be XX% in the next 12 months. Suppose that you are working at the same job at the same place you currently work, and working the same number of hours.

Q1: What pay growth do you think you would get by default if you do not take any strategies at your disposal to increase your pay (such as initiating a difficult conversation about pay with employers, or searching for higher paid jobs with other employers)?

Please write your answer in percent, if you mean x%, input x

Q2: Would you accept your employer's offer without taking any actions to increase your pay or would you do your best to increase your pay using any strategies at your disposal?

1. I would accept my employerâs pay growth offer
2. I would do my best using any strategies at my disposal to increase my pay further

Survey Question: Hypothetical Inflation

Back

Consider a hypothetical situation in which inflation is expected to be XX% in the next 12 months. Suppose that you are working at the same job at the same place you currently work, and working the same number of hours.

Q1: What pay growth do you think you would get by default if you do not take any strategies at your disposal to increase your pay (such as initiating a difficult conversation about pay with employers, or searching for higher paid jobs with other employers)?

Please write your answer in percent, if you mean x%, input x

Q2: Would you accept your employerâs offer without taking any actions to increase your pay or would you do your best to increase your pay using any strategies at your disposal?

1. I would accept my employerâs pay growth offer
2. I would do my best using any strategies at my disposal to increase my pay further

Beyond Perfect Foresight: Observed Inflation Expectations

back

But, people did **not have perfect foresight** over the path of inflation

- Can adapt the SSJ approach beyond perfect foresight, to any model of expectations

[Auclert-Rognlie-Straub '20]

- Can even use expectations from data directly [BardÃ³*czy – Guerreiro'*23]

Next: what wage dynamics are implied by the **observed path of inflation expectations**?

- Observed expectations: SCE + SPF
  - SCE gives expectations over next 12 months
  - Use term structure of SPF to extrapolate to quarterly inflation forecasts
- Assess welfare with ex-post realized outcomes

2021-23 Inflation (Observed Inflation Expectations from Survey)