## Inflation and the Gender Wage Gap The Role of Belief Frictions for Wage Bargaining

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May 14, 2025

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How do Gender Wage Gaps (GWGs) respond to inflation surges?

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Exposure to Business Cycles	Wage Bargaining	
Men work in industries/jobs more exposed to	Women may be less inclined to ask for a raise	
business cycles [Bredemeier et al., 2017,	in nominal wages [Caldwell et al., 2025,	
Albanesi and Şahin, 2018, Hoynes et al., 2012].	Leibbrandt and List, 2015] when inflation	

How do Gender Wage Gaps (GWGs) respond to inflation surges?

Estimate GWGs of full-time employees in the US (CPS)

Series 1: adjusted for demographics (age, educ, region, race) only Series 2: adjusted for demographics, industry and occupation

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- $\Rightarrow$  Suggests prevalence of the bargaining channel!

#### A candidate mechanism: Macroeconomic Narratives

[Andre et al., 2022]: Consumers more so than experts have *supply-side narrative* of inflation

SVAR to measure response of womens and mens beliefs (SCE, demographics and industry adjusted) to inflationary demand and supply shocks



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 $\Rightarrow$  Women have a more supply-side narrative and interpret inflation as bad news about the economy!

# Modelling belief frictions and wage bargaining in response to inflation

Quantifying the effects of belief frictions on the cyclicality of GWGs

New Keynesian Search and Match Model with Two Household Members

# Modelling belief frictions and wage bargaining in response to inflation

Quantifying the effects of belief frictions on the cyclicality of GWGs

New Keynesian Search and Match Model with Two Household Members

- Despite consumption insurance women and men bargain separately for wages
- Belief friction: women expect that job finding probability decreases when inflation increases (irrespective of type of shock)
- $\Rightarrow$  Replicate co-movement of adjusted gender wage gap with inflation

## Contributions

**Trends and Fluctuations in Gender Wage Gaps** [Blau and Kahn, 2017, Goldin, 2014, Bredemeier et al., 2017, Kovalenko and Töpfer, 2021, Kandil and Woods, 2002, Albanesi and Şahin, 2018, Neyer and Stempel, 2021, Hoynes et al., 2012, Bergholt et al., 2024]

- $\rightarrow\,$  Response of industry and occupation controlled gaps to macroeconomic shocks
- $\rightarrow~$  Distributional consequences of monetary policy

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Household Inflation Expectations and their Effects on Labor Market Expectations [D'Acunto et al., 2024, Weber et al., 2022, Kamdar, 2018, Hajdini et al., 2023, Stantcheva, 2024, Baek and Yaremko, 2024, Andre et al., 2022]

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New Keynesian Search and Match Models [Christiano et al., 2016, Blanchard and Galí, 2010]

- $\rightarrow~$  Introduce male and female labor supply
- $\rightarrow\,$  Introduce biased beliefs about inflation and job finding

## **Overview**

#### 1. A Novel Fact

- 1.1 Computation of Adjusted GWG
- 1.2 GWGs in response to inflationary shocks

#### 2. A Candidate Mechanism

- 2.1 SCE Data
- 2.2 Beliefs in response to inflationary shocks

#### 3. Quantifying the Effects of the Belief Fraction

- 3.1 Model Setup
- 3.2 Calibration
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## Computing a series of Adjusted GWGs

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Data: Monthly CPS from 1982-2021

- US consumers in full-time employment
- Sample size 9 000 15 000/month
- Observation of weekly earnings, age, education, fip-code, race, occupation (389 categories, 1990 census) and industry code (247 categories, 1990 census)

## Computing a series of Adjusted GWGs

Adjusted GWGs represent gaps between male and female earnings unexplained by sector sorting, occupational choices, working hours, or observable demographics.

Data: Monthly CPS from 1982-2021

Method: Oaxaca-Blinder decomposition following [Blau and Kahn, 2017]

1. Estimate

$$Y_m = X_m B_m + \gamma_m OCC1990_m + \zeta_m IND1990_m + u_m$$
$$Y_f = X_f B_f + \gamma_f OCC1990_f + \zeta_f IND1990_f + u_f$$

2. Predict

$$\hat{Y}_{mm} = X_m \hat{B}_m + \hat{\gamma}_m OCC1990_m + \hat{\zeta}_m IND1990_m$$
$$\hat{Y}_{mf} = X_m \hat{B}_f + \hat{\gamma}_f OCC1990_m + \hat{\zeta}_f IND1990_m$$
$$\Rightarrow \text{Adjusted GWG} = \exp\left(\sum_i \hat{Y}_{mm,i}\omega_i - \sum_i \hat{Y}_{mf,i}\omega_i\right)$$

## Adjusted GWGs over time



Reduced form:

$$Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + A_3 Y_{t-3} + u_t, \quad u_t \sim N(0, \Sigma)$$

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Sign Restrictions: Restrict the sign of the response of certain variables to shocks  $\Rightarrow$  identify response of GWG in response to supply or demand shock

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**Sign Restrictions:** Restrict the sign of the response of certain variables to shocks  $\Rightarrow$  identify response of GWG in response to supply or demand shock

**Zero Restrictions:** Some elements of the impact matrix are set to zero  $\Rightarrow$  required to distinguish the residual shock from supply and demand  $\Rightarrow$  assume that GWG has no instantaneous effect on inflation and unemployment

Reduced form:

$$Y_t = c + A_1 Y_{t-1} + A_2 Y_{t-2} + A_3 Y_{t-3} + u_t, \quad u_t \sim N(0, \Sigma)$$

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	Demand	Supply	Residual
$\pi$	+	+	0
U	-	+	0
GWG	?	?	+

#### **GWG** response to Supply and Demand Shocks



Adjusted GWGs (January 1982 - February 2020, 3 months moving average)

### **GWG** response to Supply and Demand Shocks



Undjusted GWGs (January 1982 - February 2020, 3 months moving average)

#### Robustness

- Number of lags
  - $\rightarrow$  BIC suggests 3 lags
- Unsmoothed series

no moving average

• Alternative measures of output

Industrial production

- Including Covid period
- A gender gap in switching jobs?

Male share in newjob

• Alternative measures of GWGs



• Demographic subgroups



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Data: Monthly SCE from 2013 - 2023

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- US consumers in full-time employment
- Sample size 1000/month
- Observation of age, education, region, income, numeracy and expectations

Data: Monthly SCE from 2013 - 2023

#### Unemployment Expectations

What do you think is the percent chance that 12 months from now the unemployment rate in the U.S. will be higher than it is now?

#### Job Finding Expectations

Suppose you were to lose your main job this month. What do you think is the percent chance that within the following 3 months, you will find a job that you will accept, considering the pay and type of work?

#### Earnings Expectations

Please think ahead to 12 months from now. Suppose that you are working in the exact same job at the same place you currently work, and working the exact same number of hours. By about what percent do vou expect your earnings to have increased/decreased? Please give your best guess.

**Data:** Monthly SCE from 2013 - 2023 **Method:** Oaxaca-Blinder decomposition following [Blau and Kahn, 2017]

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$$\hat{Y}_{mm} = X_m \hat{B}_m + \hat{\zeta}_m IND_m$$

 $\Rightarrow$  Individuals with mens characteristics behaving like men: "men"

$$\hat{Y}_{mf} = X_m \hat{B}_f + \hat{\zeta}_f IND_m$$

 $\Rightarrow$  Individuals with mens characteristics behaving like women: "women"

#### Beliefs of men and women over time



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#### Beliefs of men and women over time



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### Beliefs of men and women over time



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Method: SVAR with Zero and Sign Restrictions SVAR method



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# Consumption

Representative household with two members

- Identical preferences over consumption of a CES aggregate
- Perfect consumption insurance

 $\max \mathbf{E}_0 \sum_{t=0}^{\infty} \beta^t \left[ \zeta U_{M,t} + (1-\zeta) U_{F,t} \right] \quad \text{where } U_{G,t} = \ln C_{G,t} - \frac{\chi N_{G,t}^{1+\varphi}}{1+\varphi}, \quad G \in F, M.$ 

subject to  $P_t C_t + R_t B_t \leq B_{t-1} + W_{F,t} N_{F,t} + W_{M,t} N_{M,t} + D_t$ 

and 
$$C_t = C^{\zeta}_{M,t} C^{1-\zeta}_{F,t}$$

## Production

**Final goods firms** indexed by  $i \in [0, 1]$ : produce good  $Y_t(i)$  according to  $Y_t(i) = X_t(i)$ and purchase intermediate goods  $X_t(i)$  at price  $P_t^I$ 

- Monopolistically competitive
- Price setting subject to Calvo frictions

### Production

**Final goods firms** indexed by  $i \in [0, 1]$ : produce good  $Y_t(i)$  according to  $Y_t(i) = X_t(i)$ and purchase intermediate goods  $X_t(i)$  at price  $P_t^I$ 

- Monopolistically competitive
- Price setting subject to Calvo frictions

**Intermediate goods firms** indexed by  $j \in [0, 1]$ : produce according to  $X_t(j) = A_t N_{F,t}(j)^{\alpha} N_{M,t}(j)^{1-\alpha}$ 

- Employment evolves according to  $N_{G,t}(j) = (1 \delta)N_{G,t-1}(j) + H_{G,t}(j), \quad G \in F, M$
- All firms are identical and there are no sticky wages for firms such that all firms have the same employment and hiring decisions
- Cost-per-hire  $G_{G,t} = A_t \Gamma x_{G,t}^{\gamma}$  which depends on the job finding rate  $x_{G,t} \equiv \frac{H_{G,t}}{U_{G,t}}$
- Taste-based discrimination causes GWG in steady state

# Wage Bargaining

Households surplus from an established employment relationship:

$$\mathcal{S}_t^{H_G} = \mathcal{V}_t^{N_G} - \mathcal{V}_t^{U_G} = w_{G,t} - MRS_{G,t} + \beta(1-\delta)\mathsf{E}_t\Big\{\frac{C_t}{C_{t+1}}(1-\tilde{\mathsf{E}}_t x_{G,t+1})\mathcal{S}_{t+1}^{H_G}\Big\}.$$

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Firms surplus from an established employment relationship:

$$\mathcal{S}_t^{\mathcal{F}_G} = \frac{P_t^{\prime}}{P_t} \mathcal{M} P_{G,t} - w_{G,t} + \beta (1-\delta) \mathbf{E}_t \Big\{ \frac{C_t}{C_{t+1}} \mathcal{S}_{t+1}^{\mathcal{F}_G} \Big\} = \mathcal{G}_{G,t}$$

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Firms surplus from an established employment relationship:

$$\mathcal{S}_t^{F_G} = \frac{P_t^I}{P_t} M P_{G,t} - w_{G,t} + \beta (1-\delta) \mathbf{E}_t \left\{ \frac{C_t}{C_{t+1}} \mathcal{S}_{t+1}^{F_G} \right\} = G_{G,t}$$

Nash bargaining wage:

$$w_{G,t} = \chi C_t N_{F,t}^{\varphi} + \frac{(1-\vartheta)}{\vartheta} \left( G_{G,t} - \beta (1-\delta) \mathbf{E}_t \left\{ \frac{C_t}{C_{t+1}} G_{G,t+1} \right\} (1 - \tilde{\mathbf{E}}_t \{ x_{G,t+1} \}) \right)$$

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Assumed connection of job finding and inflation:

$$\tilde{\mathsf{E}}_t x_{G,t+1} = \frac{\mathsf{E}_t x_{G,t+1}}{\mathsf{E}_t (1+\pi_{t+1})^{\eta_G}}$$

 $\Rightarrow \eta_G$  represents bias

# Calibration

#### Standard parameters in New Keynesian Framework

	Parameter	Value	Comment
β	Discount factor	0.99	
$\varphi$	Inverse of Frisch labor supply elasticity	5	
$\epsilon$	Elasticity of substitution	10	
$\theta$	Price stickiness	0.75	
$\phi_{\pi}$	Weight on inflation in Taylor rule	1.5	
$\phi_{y}$	Weight on output gap in Taylor rule	0.0125	Annualized 0.5
ρΑ	Persistence of technology shock	0.9	
$\sigma_A^2$	Variance of technology shock	0.0625	1 percentage point annualized
$\rho_i$	Persistence of monetary policy shock	0.5	
$\sigma_{\mu}^2$	Variance of monetary policy shock	0.0625	1 percentage point annualized

# Calibration

#### Standard parameters in Search and Match models

	Parameter	Value	Comment
$\gamma$	Hiring function parameter	1	For equivalence with matching function
Г	Hiring cost parameter	0.02	Blanchard and Gali 2010
$\vartheta$	Bargaining weight of households	0.4	Blanchard and Gali 2010
$\delta$	Job separation rate	0.04	US Average 2000-2024, private sector

# Calibration

#### Gender specific parameters

	Parameter	Value	Comment
$\eta_{F} \ \eta_{M} \ lpha \ d_{f}$	Supply-side bias for women Supply-side bias for men Female share in production Distate for female employees	1 0 0.5 0.06	No statistical discrimination Taste-based discrimination
			[Neyer and Stempel, 2021]

### **Impulse Responses**



# Discussion

Alternative Mechanisms

- Increased job search instead of wage bargaining [Cortés et al., 2023, Pilossoph and Ryngaert, 2024]
- $\Rightarrow$  Most alternative offers are used to re-bargain [Caldwell et al., 2025]
- Firm-level differences affect bargaining [Card et al., 2016]
- $\Rightarrow$  Implies some industry and occupation effects can also be attributed to bargaining (increases importance of bargaining channel)

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- ⇒ Implies some industry and occupation effects can also be attributed to bargaining (increases importance of bargaining channel)

What explains the bias?

- Risk aversion
- Attention to demand and supply shocks may differ between men and women
- Differential narratives of the macroeconomy [Andre et al., 2022]

# Conclusion

- 1. Cyclicality of Gender Wage Gaps
  - Adjusted GWGs increase in response to both inflationary supply and demand shocks
  - Unadjusted GWGs increase only in response to inflationary demand shocks but decrease in response to inflationary supply shocks
  - $\Rightarrow\,$  Evidence in support of a bargaining channel that determines the cyclicality of the GWG

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  - $\Rightarrow\,$  Bargaining differential may be driven by supply side narrative of the economy
- 3. Belief frictions contribute to women's reduced wage bargaining in response to inflationary macroeconomic shocks
  - NK & SAM Model: Work in progress

# Thank you!



#### 4. Appendix

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### Alternative measures of the GWG



Baseline timeseries

# Adjusted GWGs over time by demographic group



## Increasing lags: p=12


### Removing the moving average



# **Including Covid period**



#### Alternative business cycle measures: Industrial production



#### Alternative GWG measures: Unadjusted



### Alternative GWG measures: Raw gaps



#### Alternative GWG measures: Female characteristics



#### Alternative GWG measures: Median



### Alternative GWG measures: [Penner et al., 2022]



### **Demographic groups: Above 30**



### **Demographic groups: Above 40**



### **Demographic groups: Above 50**



### Demographic groups: Below 30



#### Demographic groups: Children below 5 years



# A gender gap in switching jobs

### **Correlating Inflation Expectations with Labor Market Beliefs**



Binscatter (excluding Covid)

# **Correlating Inflation Expectations with Labor Market Beliefs**

	$\mathbf{E}_t$ Job Finding <sub>t+3</sub>		$\Delta \mathbf{E}_t$ Job Finding <sub>t+3</sub>		$E_t \operatorname{Wage}_{t+3}$		$\Delta \mathbf{E}_t \; Wage_{t+3}$	
$\mathbf{E}_t \pi_{t+12}$	-0.001 (0.031)	0.096** (0.043)			0.149*** (0.006)	0.177*** (0.008)		
$\mathbf{E}_t \pi_{t+12}  imes$ female	-0.197*** (0.040)	-0.238*** (0.054)			-0.029*** (0.008)	-0.048*** (0.010)		
$\Delta \mathbf{E}_t \pi_{t+12}$	. ,		0.057** (0.022)	0.037 (0.029)			0.036*** (0.007)	0.038*** (0.009)
$\Delta \mathbf{E}_t \pi_{t+12}  imes$ female			-0.014 (0.029)	0.005 (0.037)			-0.022*** (0.009)	-0.026** (0.011)
$\pi_t$	0.860*** (0.044)	2.563*** (0.154)	0.006 (0.004)	0.003 (0.014)	0.055*** (0.009)	-0.038 (0.030)	0.001 (0.001)	-0.004 (0.004)
Period	2013-2023	2013-2019	2013-2023	2013-2019	2013-2023	2013-2019	2013-2023	2013-2019
Observations	61,842	40,259	61,842	40,259	61,842	40,259	61,842	40,259
R <sup>2</sup>	0.056	0.062	0.0002	0.0002	0.043	0.044	0.0003	0.0004

\*p<0.1; \*\*p<0.05; \*\*\*p<0.01.

Pooled OLS estimation. Controls for female, age, income, education and region in all models.

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Note: