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The Trade-off Between Union Wage Premium and Working Time Flexibility

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Motivation

Context of Unions



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- Negotiate **better wages, working conditions, and job security**
- Fight for **collective bargaining rights**
- Protect **workplace rights:**
 - Covering **fair pay and work-life flexibility**, and promoting **anti-discrimination legislation and gender equality**

Motivation

Background: Unions in Australia



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Source: Household, Income, and Labour Dynamics in Australia (HILDA) Survey (Waves 5–22)

Key Puzzles

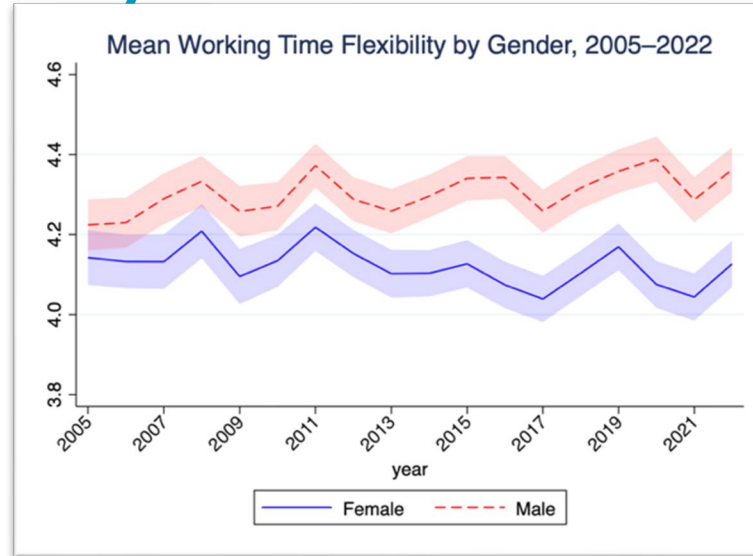
- Australian women have higher union membership rates than men since 2007
- Gender gap persists: 23.29% for union workers vs 25.15% overall

Motivation

Background: Flexibility in Australia



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Source: Household, Income, and Labour Dynamics in Australia (HILDA) Survey (Waves 5–22)

Key Puzzles

- Women consistently report lowest perceived flexibility levels

Motivation

Global reality: Women earn significantly less than men across most countries.

Proposed solutions:

- Unions → equitable pay via standardized wage structures & bargaining power.
- Flexibility → enables balance of work & caregiving demands, especially for women

The trade-off:

Unions often impose standardised schedules, which can unintentionally reduce individual flexibility.

Research Questions & Hypotheses



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Research question:

Would the trade-offs between union wage premiums and working time flexibility offset gender-equalizing benefits of union memberships?

Core Hypotheses:

H1: Union Wage Premium Hypothesis

—— Unions can raise wages for workers and the premium is higher for women.

H2: Union-Flexibility Hypothesis

—— Unions limit flexibility schedules.

Wage Effects

Unions → Higher Wages & Reduced Gender Segregation

Collective bargaining raises wages, especially benefiting lower-paid workers (DiNardo et al., 1996; Rubery & Fagan, 1995; Mao et al, 2016).

Contrasting Evidence on the Wage Effect of Flexibility

Flexible scheduling can close gender wage gaps (Goldin & Katz, 2016; Berniell et al., 2023), but flexibility stigma exists — workers may face penalties (Correll et al., 2014; Glass and Estes, 1997).

Union-Flexibility Tension

Unions improve working conditions but may limit individual accommodation (Freeman and Medoff, 1984; Heyes, 2011)

Budd & Mumford (2004): Unions advocate work-life balance but resist flexibility if it threatens standardization

Literature Gap



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Research gaps:

- Prior research treats unions and flexibility as separate forces
- Missing: How these two channels work together to shape the gender pay gap
→ Connects two research streams to study the interplay



Why Australia?

Data advantage — HILDA Survey (2005–2022)

Comprehensive and available survey data

Global relevance:

1. Australia's union density of approximately 12.2% (OECD, 2024) is broadly comparable to the OECD average of 15.2%.
2. Lessons for other developed countries designing union structures & flexibility policies to promote gender equity

Data Source:

Household, Income and Labour Dynamics in Australia (HILDA) Survey; Waves 1-22 (2005-2022)

Sample Characteristics

- A nationally representative longitudinal panel with rich annual individual-level data with 200,304 individual-year observations and 26,604 workers (13,435 men, 13,169 women).

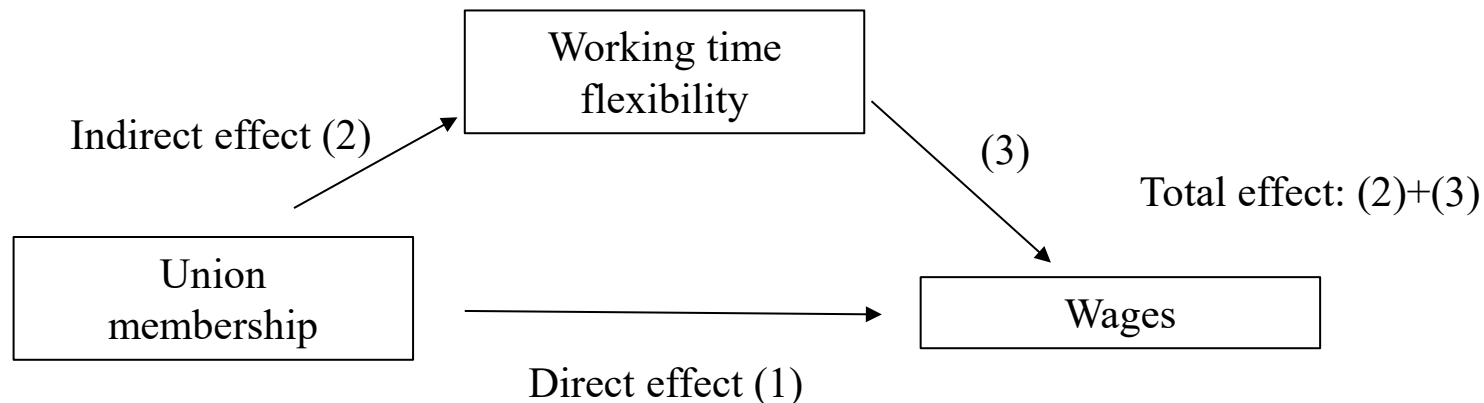
Key Variables

- Dependent: Log of real hourly wages (main job- the individual spends the most hours during the reference week)
- Union membership: Binary indicator
- Flexibility: Likert scale 1-7 (strongly disagree to strongly agree: “My working time can be flexible”)
- Controls: Experience, education, partner status, children, industry (two digits), year

Brief Introduction



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Estimation Strategies:

- POLS (benchmark)
- FE (individual heterogeneity)
- IV (lagged Industry-level unionization rates & flexibility prevalence) (Booth and Bryan, 2001)

Contribution



Ambiguous flexibility's wage effect in literature(Goldin & Katz, 2016; Berniell et al., 2023; Correll et al., 2014; Glass and Estes, 1997) → **Shows that flexibility provides wage premium in general**

New evidence → Shows that the **trade-off** between **union wage gains** and **reduced flexibility** plays a key role in shaping the **gender wage gap**

New insight → Offers implications for **stakeholders** such as

- Single mothers seeking flexible work
- Employers designing workplace policies
- Policymakers aiming to balance equity and flexibility

Table 2 Descriptive statistics

	Men				Women			
	All	Union	Non-union	Difference	All	Union	Non-union	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Real hourly wage of main job	30.23 (29.42)	35.68 (29.59)	28.70 (28.14)	6.97 (0.21)	28.46 (33.04)	33.29 (22.29)	26.93 (35.66)	6.37 (0.24)
Flexibility scale	4.31 (1.95)	3.73 (2.00)	4.47 (1.90)	-0.74 (0.02)	4.12 (2.07)	3.40 (2.07)	4.35 (2.01)	-0.95 (0.02)

Source: Household, Income, and Labour Dynamics in Australia (HILDA) Survey (Waves 1–22)

- Wages are higher in union jobs for both genders.
- Union workers consistently report lower flexibility for both genders.

Table 3 Union Membership Patterns by Gender in Australia

Gender	Always	Never	Switched	Total
Male	8.78%	62.88%	28.34%	100%
Female	8.51%	63.22%	28.27%	100%

Source: Household, Income, and Labour Dynamics in Australia (HILDA) Survey (Waves 1–22)

- Nearly 28% of workers experience changes in union membership status

Methodology



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Main models:

A. Direct Effect :

$$\ln(wage)_{it} = \theta_0 + \theta_1 Un_{it} + \theta_2 Fx_{it} + \theta_3 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (1)$$

B. Indirect analysis:

$$Fx_{it} = \gamma_0 + \gamma_1 Un_{it} + \gamma_2 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (2)$$

C. Total Effect :

$$\ln(wage)_{it} = b_0 + b_1 Un_{it} + b_2 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (3)$$

- θ_1 : the direct effect of union membership on wages;
- θ_2 : the direct effect of flexibility on wages;
- γ_1 : the mediation effect of union on flexibility;
- b_1 : the total effect of union membership on wages.

Estimation Strategies:

POLS, FE, IV (Industry-level unionization rates & flexibility prevalence)

Methodology



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Endogeneity of union membership and flexibility:

- (1) Unobserved characteristics;
- (2) Reverse causality

IV for union membership: (Booth and Bryan, 2001) **Lagged Industry-level unionization rates** =

$$\frac{\text{union memberships}}{\text{total worker}} \text{ within each specific industry-year-region cell}$$

IV for Flexibility: (Angrist & Pischke, 2009) **Lagged Industry-level flexibility prevalence** =

high-flexibility-rate (scores of 5 or above on the 7-point scale) within each specific industry-year-region cell

- (1) less noisy and less prone to outliers
- (2) reduce correlation with the fixed effects. (Supported by sensitivity tests)

Theoretical Validity:

- (1) Relevance Condition
- (2) Exclusion Restriction (individual wage determination cannot be affected directly)

Results (First Stage)



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Table A1 First-stage Results of IV Estimation (Main Results)

Dependent variable	Men		Women	
	Union	Flexibility	Union	Flexibility
	(1)	(2)	(3)	(4)
Lagged Industry Unionization Rate	0.8897*** (0.0157)	-0.3245*** (0.0682)	0.8329*** (0.0214)	-0.3607*** (0.0966)
Lagged Industry High-flexibility Rate	-0.0293** (0.0115)	2.6788*** (0.0544)	-0.0244 (0.0147)	2.8883*** (0.0757)
The F-value of Sanderson-Windmeijer weak identification test	3034.41***	2370.31***	1511.45***	1429.53***

Note: All regressions include year fixed effects and control variables as specified in the main text. SW F-statistic is the Sanderson-Windmeijer first-stage F-statistic testing the strength of identification for each endogenous variable. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Results (Direct Effects)



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$$\ln(wage)_{it} = \theta_0 + \theta_1 Un_{it} + \theta_2 Fx_{it} + \theta_3 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (1)$$

Table 3 Direct Effects of Union Membership and Flexibility on the log of Real Hourly Wages

	Men			Women			Gender Difference (Female-Male)
	POLS	FE	IV	POLS	FE	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Union membership	0.084*** (0.005)	0.033*** (0.008)	0.101*** (0.019)	0.134*** (0.004)	0.025*** (0.007)	0.151*** (0.028)	0.050* (0.030)
Flexibility	0.017*** (0.001)	0.001 (0.001)	0.043*** (0.006)	0.019*** (0.001)	0.005*** (0.001)	0.045*** (0.007)	0.002 (0.009)
Experience	0.024*** (0.001)	0.026*** (0.008)	0.024*** (0.001)	0.014*** (0.001)	0.014* (0.007)	0.014*** (0.001)	
Experience ² /100	-0.038*** (0.001)	-0.037*** (0.003)	-0.038*** (0.002)	-0.021*** (0.001)	-0.025*** (0.003)	-0.021*** (0.001)	
Partnered	0.102*** (0.005)	0.024** (0.009)	0.098*** (0.005)	0.042*** (0.004)	0.031*** (0.009)	0.038*** (0.004)	
Schooling	0.024*** (0.001)		0.023*** (0.001)	0.028*** (0.001)		0.027*** (0.001)	
Children	0.032*** (0.004)	0.018*** (0.004)	0.031*** (0.004)	0.080*** (0.005)	0.034*** (0.006)	0.072*** (0.005)	
Constant	-1.349*** (0.024)	-0.625*** (0.153)	-0.879*** (0.032)	-1.251*** (0.036)	-0.530*** (0.143)	-0.752*** (0.043)	
Individual Effects	No	Yes	No	No	Yes	No	No
Year & Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	50229	50229	50229	51423	51423	51423	101652
R-squared	0.294	0.256	0.286	0.261	0.236	0.248	0.327
Adj. R-squared	0.298	0.277	0.298	0.260	0.235	0.247	0.271

(Women- Men)

Results (Mediation & Total Effects)



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$$Fx_{it} = \gamma_0 + \gamma_1 Un_{it} + \gamma_2 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (2)$$

Table 5 Mediation and Total Effects Analysis

(Women- Men)

	Men			Women			Gender Difference
	POLS	FE	IV	POLS	FE	IV	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Union Effects on Working Time Flexibility							
Union membership	-0.702*** (0.020)	-0.203*** (0.030)	-0.948*** (0.076)	-0.625*** (0.020)	-0.228*** (0.031)	-0.999*** (0.113)	-0.052 (0.136)
Other regressors	Yes	Yes	Yes	Yes	Yes	Yes	
Individual Effects	No	Yes	No	No	Yes	No	
Year & Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	57807	57807	57760	55749	55749	55731	
R-squared	0.106	0.013	0.103	0.138	0.024	0.133	
Adj. R-squared	0.105	0.012	0.102	0.137	0.023	0.131	

Results (Mediation & Total Effects)



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$$\ln(wage)_{it} = \theta_0 + \theta_1 Un_{it} + \theta_2 Fx_{it} + \theta_3 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (1)$$

Table 4 Direct Effects of Union Membership and Flexibility on the log of Real Hourly Wages (Women- Men)

	Men			Women			Gender Difference
	POLS (1)	FE (2)	IV (3)	POLS (4)	FE (5)	IV (6)	IV (7)
Union membership	0.084*** (0.005)	0.033*** (0.008)	0.101*** (0.019)	0.134*** (0.004)	0.025*** (0.007)	0.151*** (0.028)	0.050* (0.030)



Panel B: Total Effects of Union on the Log of Real Hourly Wages (without Flexibility controlled)

Union membership	0.079*** (0.004)	0.044*** (0.007)	0.089*** (0.015)	0.119*** (0.004)	0.028*** (0.006)	0.126*** (0.023)	0.037 (0.028)
Other regressors	Yes	Yes	Yes	Yes	Yes	Yes	
Individual Effects	No	Yes	No	No	Yes	No	
Year & Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	71203	71203	70803	69678	69678	69461	140264
R-squared	0.350	0.329	0.350	0.309	0.291	0.309	0.335
Adj. R-squared	0.349	0.328	0.349	0.309	0.290	0.308	0.330

$$\ln(wage)_{it} = b_0 + b_1 Un_{it} + b_2 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (3)$$

Heterogeneity Analysis:

Wage distribution effect (Foresi & Peracchi, 1995)



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Following Foresi & Peracchi (1995), from the 10th to the 90th percentiles, in steps of 5 percentile points, define a binary outcome at threshold of the log wage distribution:

$$Y_{itp} = 1\{\ln(wage_{it}) > w_{pt}\} \quad (4)$$

For each w_{pt} , estimate the IV binary regression:

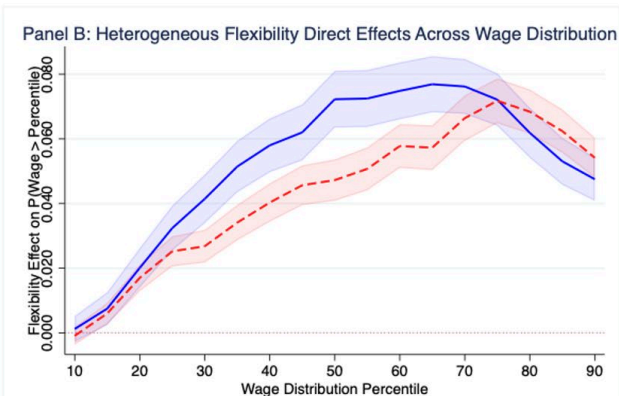
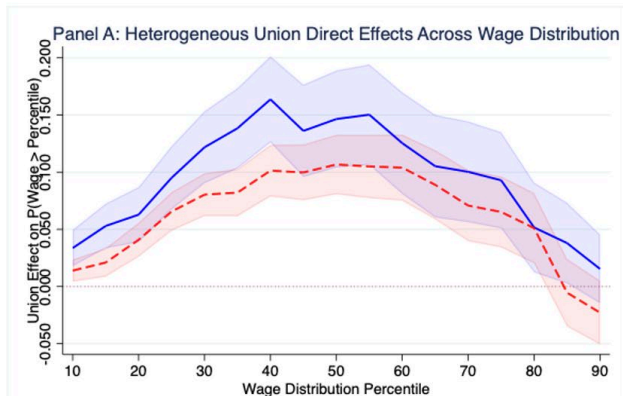
$$P(Y_{itp} = 1 | Un_{it}, Fx_{it}, X_{it}) = F(\theta_p + \theta_{1p}Un_{it} + \theta_{2p}Fx_{it} + \theta_{3p}X_{it}) \quad (5)$$

Heterogeneity Analysis: Wage distribution effect (Foresi & Peracchi, 1995)

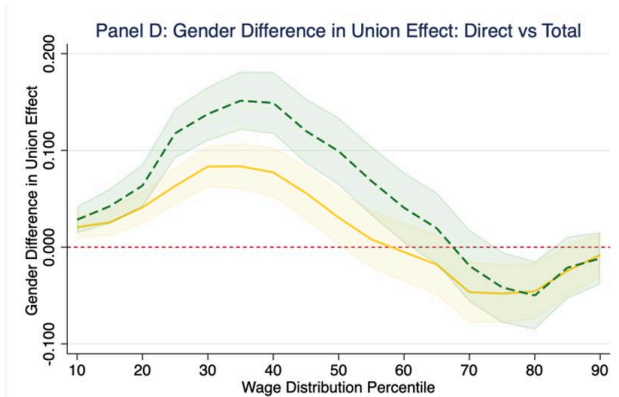
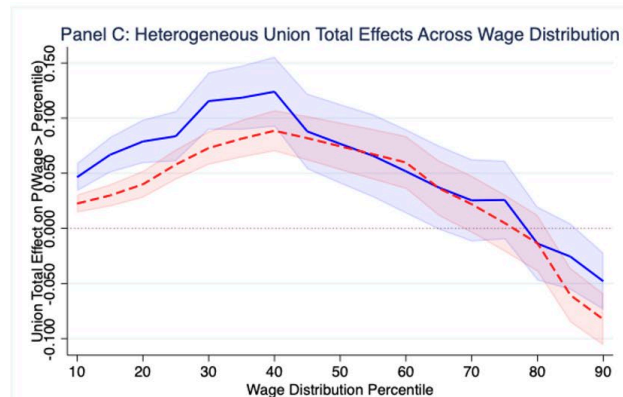


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Figure 3 Heterogeneous Union and Flexibility Effects Across the Wage Distribution



— Female - - - Male



- - - Direct Effect — Total Effect

Heterogeneity Analysis: family structure



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$$\ln(wage)_{it} = \theta_0 + \theta_1 Un_{it} + \theta_2 Fx_{it} + \theta_3 X_{it} + \lambda_t + \delta_i + \varepsilon_{it} \quad (1)$$

Table 7 Union and Flexibility Direct Effects on Women by Family Structure under IV estimation

	(1) Single, No Child	(2) Single w/ Child	(3) Partnered, No Child	(4) Partnered w/ Child
Union	0.098** (0.049)	0.090 (0.060)	0.141** (0.060)	0.245*** (0.086)
Flexibility	0.028 (0.018)	0.016 (0.017)	0.024 (0.022)	0.068*** (0.014)
<i>N</i>	21993			

Note: IV estimates for women only. All regressions include controls for experience, education, and year fixed effects. Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Results (Robustness test)



Table 7 Robustness Test – Lagged Industry Unionization Rate

	Main IV (one-year-lagged)				Robustness (rolling rate of past 3 years)			
	Direct		Total		Direct		Total	
	Men	Women	Men	Women	Men	Women	Men	Women
Union	0.101*** (0.019)	0.151*** (0.028)	0.089*** (0.015)	0.126*** (0.023)	0.107*** (0.018)	0.136*** (0.026)	0.094*** (0.014)	0.112*** (0.021)
Flexibility	0.043*** (0.006)	0.045*** (0.007)			0.044*** (0.006)	0.045*** (0.007)		
Gender difference of Union	0.050* (0.030)		0.037 (0.028)		0.039* (0.030)		0.007 (0.016)	
<i>N</i>	50229	51423	70803	69461	50220	51395	70401	69260

Note: Main IV uses one-year lagged industry unionization rate, robustness test uses three-year rolling average of lagged industry unionization rates. Both specifications use one-year-lagged industry flexibility prevalence (≥ 5) as the flexibility instrument. All regressions include comprehensive controls for work experience, experience squared, educational attainment, partnered status, number of children under age 5, year and industry fixed effects. Standard errors clustered at the individual level are reported in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Why women may still rationally choose union membership even if the relative gender advantage disappears:

1. The absolute wage benefits remain positive and substantial (12.6% total effect).
2. Women may value non-wage benefits that unions provide, such as job security, grievance procedures, and protection against workplace discrimination.
3. Women may hope that unions will eventually adapt to provide both wage protection and schedule accommodation.

Conclusion

- 1. Unions help narrow the gender wage gap once flexibility is controlled.**
- 2. Unions impose similar flexibility constraint on both genders, challenging existing theory.**
- 3. The union-flexibility trade-off offsets unions' gender-equalizing effects because women derive higher wage returns from flexibility across most wage distribution.**
- 4. Union and flexibility wage premiums are concentrated on middle-income workers.**
- 5. Partnered mothers gain the largest benefits from unions and flexibility, while single mothers remain the most disadvantaged group.**



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Thank you!
Questions & Suggestions Welcome