Why Did Gender Wage Convergence in the United States Stall?

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BE-Lab: Team & Research

- **Theme**: Applied microeconomics specializing in education, labor, and public
- **Team**: Duke, Penn, University of Minnesota, Southern Utah, University of South Florida, St. Bonaventure, and Harvard.
- **Research Pipeline**:
  1. Occupational Licensing as a Job Market Signals
  2. Is School Spending Efficient?
  3. Why Don't Elite Colleges Expand?
  4. Do Universities Cultivate Human Potential?

Overview of Benjamin Posmanick's Research

- **Theme**: Applied microeconomics specializing in finance and labor
- **Research Pipeline**:
  1. How does tenure, gender, and licensure on corporate boards affect board functioning and firm outcomes?
  2. Determinants of the gender wage gap

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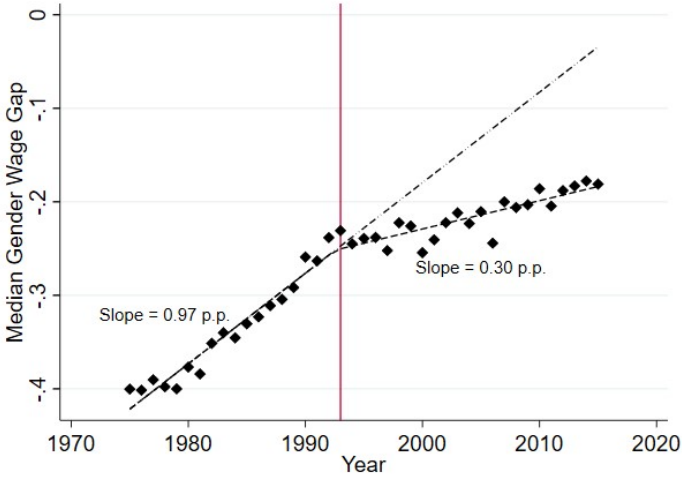
Outline of talk

Puzzle: Why did the Gender Wage Gap Close More Slowly in 1990s when Compared to the 1980s?



What Caused Convergence during the 1980s? Why Was it Slower in 1990s?

Convergence during the 1980s is well understood (Blau and Kahn, 2006)

1. Declining unionization
2. Reduced gender gaps in: education, labor market experience, occupational sorting into high wage jobs,
3. Reduction in gender differences in the "unexplained" component of wages.

Why was it slower in 1990s?

1. We argue that the introduction of job-protected family-leave policies caused the stagnation.

Several Hypotheses Have Been Offered

1. Convergence between the occupational distributions stalled in the 1990s (Blau and Kahn, 2013)
2. The growth of the service sector, where women have a comparative advantage, slowed during the 1990s (Olivetti and Petrongolo, 2016)
3. There has been no convergence in overwork (more than 50 hours per week) and overwork amongst men has increased the gender wage gap by 10 percent
4. There is a documented stagnation in the "mommy penalty" during the 1990s in the United States (Kleven, 2022)

The Current Hypotheses Cannot Explain Gender Wage Stagnation

1. Changes in observable characteristics cannot explain the stagnation, and have actually led to more convergence, not less
2. Attributing the stagnation to unobservable factors, such as the mommy penalty, is incomplete. "What causes the mommy penalty to stagnate in the 1990s?"

We show that the introduction of family-leave policies can explain the stagnation in gender wage convergence which is unaccounted for with observable characteristics!

Why Might Family-Leave Policies Stagnate Gender Wage Convergence

- Family-leave is costly to provide to employees
  - 58% of employees on leave have their workload shifted to other workers and 6% are replaced by temporary workers (Brown et al., 2020)
- Costs may be passed onto employees during future salary negotiations, either during annual reviews and promotions, or during subsequent hiring negotiations
  - Antecol et. al. (2018): clock stoppage policies in academia decreases tenure rates of women in economics
  - Thomas (2016) finds an 8 percentage-point reduction in female promotions after passage of the Family and Medical Leave Act
  - Bailey et al. (2019) find that paid leave in CA reduced women's wages by 8 percent in the decade after passage

Family & Medical Leave Act

- Federal legislation passed in 1993
- Guarantees 12 weeks of unpaid family leave to workers
- Requirements: worked for their employer for at least a year & worked 1,250 hours in the past year
- Gender-neutral policy with greater take up rates and 14-business-day longer leave spells by women
  - (Brown et al., 2020)
- Preceded by family-leave policies in 12 states and the District of Columbia (Waldfogel, 1999)

Approach & Preview of Findings

1. Descriptive Results: trend break in gender wage convergence occurs in FMLA year 1993
2. Causal Results: Use state and federal variation in pre-FMLA policies to show a pattern of gender wage convergence before (0.7 p.p.) and stagnation thereafter (0.03 p.p.), which explains 94% of the stagnation in gender wage convergence which is unaccounted for with observable characteristics
3. Alternative Explanations: rule out EITC and Welfare Reform as possible explanation using wage levels of workers with and without college degrees
4. Usage data show no difference between white women and white men in length of non-family leave spells, but a 36 day difference in length of family-leave spells
5. Heterogeneity analysis: show mothers affected more than women without children

Literature Review on Family-Leave Policies

- Prior work has shown that gender neutral policies have gendered effects based on usage
  - Gruber (1994), Antecol et al. (2018)
- Prior work has shown that women experience worse labor-market outcomes after the birth of a child
  - Bertrand et al. (2010), Kleven et al. (2018), Kleven et al. (2019), Kleven (2022), Pan et. al. (2018)
- Family-leave policies have been looked at for their impact on women
  - Waldfogel (1999) found that women did not experience lower wage levels after FMLA
  - Trajkovski (2019) shows that men decreased time spent on childcare after paid leave implemented in California
  - Ginja et al. (2020) shows that increasing paid-leave time available increased gender wage gaps in Sweden
  - Mandel and Semyonov (2005) show that countries with greater family-leave policies experienced larger gender wage gaps

Descriptive Results

Data & Sample Selection

- We use data from the ASEC supplement of the CPS available through IPUMS for the years 1976–2016
- Due to timing of the data, income and other work variables cover 1975–2015
- We keep white and black individuals aged 18-65 during the previous year
- We also only keep workers who reported working 35 or more hours per week
- We winsorize the wage data to the middle 99%

Descriptive Statistics

	White Men		White Women		Black Women		Black Men	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Real Hourly Wage (Year 2000)	19.23	14.15	13.92	9.96	12.97	9.13	15.23	10.89
Hours	44.54	8.51	41.57	6.11	40.91	5.45	42.62	7.30
Age	38.58	11.87	38.28	11.94	38.29	11.57	38.49	11.85
Less than High-School	0.14	0.35	0.10	0.30	0.12	0.33	0.18	0.38
High-School Graduate	0.34	0.47	0.35	0.48	0.36	0.48	0.38	0.49
Some College	0.24	0.43	0.27	0.44	0.30	0.46	0.26	0.44
College	0.17	0.38	0.19	0.39	0.15	0.35	0.12	0.32
Post-Graduate	0.10	0.31	0.10	0.30	0.07	0.26	0.06	0.23
Number of Children	1.08	1.24	0.95	1.12	1.14	1.25	0.93	1.28
Married	0.70	0.46	0.60	0.49	0.38	0.49	0.54	0.50
Full-Year Worker	0.89	0.31	0.85	0.36	0.85	0.36	0.86	0.35
Weeks Worked	48.31	9.56	46.96	11.24	46.99	11.41	47.26	11.02
Observations	1,290,979		907,022		136,947		124,214	

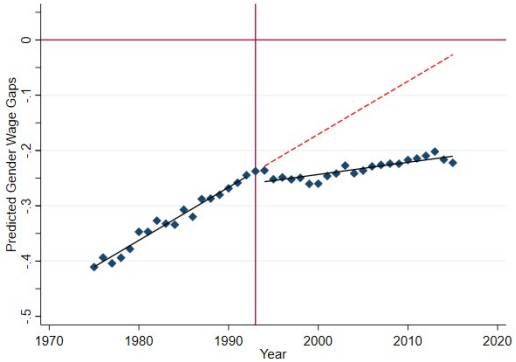
Descriptive Results: Wage Gaps over Time

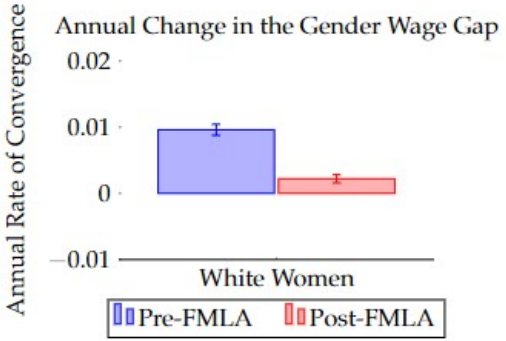
We compute gender wage gaps for each year:

$$\log(w_{it}) = \alpha_{0t} + \beta_{1t} WW_{it} + \beta_{2t} BW_{it} + \beta_{3t} BM_{it} + \vec{\gamma}_t \cdot \vec{X}_{it} + \epsilon_{it}. \quad (1)$$

- WW_{it}, BW_{it}, and BM_{it} are indicator variables for white woman, black woman, and black man
- $\vec{X}$ includes educational indicators, age as a quadratic, state fixed effects, occupation fixed effects, hours per week, and full-year indicator
- Estimated for each year in the sample

Regression Results Show Stagnation for White Women in 1993





Causal Event Study Analysis

Causal Analysis: Event Study Using Only the Pre-Treated States

- We only include observations for workers in states that are treated with family-leave policies prior to the FMLA
- Using the subsample prevents the FMLA, or some other policy passed in 1993, from dominating the results
- Identifying assumptions: time of passage of the law random, no confounding state policies that are common to all states

States Passed Family-Leave Policies Prior to FMLA

State	Maternity	Paternity
Massachusetts	1972	-
Connecticut	1973	1990
Washington	1973	1989
California	1980	1992
Minnesota	1987	1987
Rhode Island	1987	1987
Maine	1988	1991
Oregon	1988	1988
Tennessee	1988	-
Wisconsin	1988	1988
New Jersey	1990	1990
Washington, DC	1991	1991
Vermont	1992	1992

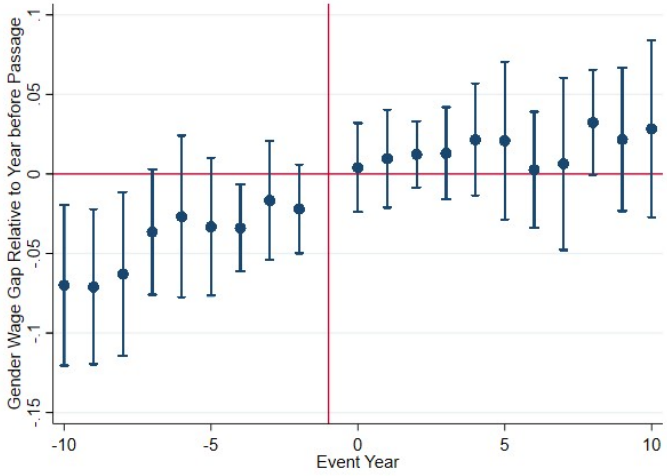
Source: Waldfogel (1999)

Event Study Regression

$$\log(\omega_{ist\tau}) = \sum_{\tau'=-10}^{-2} \beta_\tau \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_\tau \mathbb{1}(\tau' = \tau) +$$
$$\sum_{\tau'=-10}^{-2} \beta_{\tau,ww} WW_i \times \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_{\tau,ww} WW_i = 1 \times \mathbb{1}(\tau' = \tau) +$$
$$\sum_{\tau'=-10}^{-2} \beta_{\tau,bw} BW_i \times \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_{\tau,bw} BW_i \times \mathbb{1}(\tau' = \tau) +$$
$$\sum_{\tau'=-10}^{-2} \beta_{\tau,bm} BM_i \times \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_{\tau,bm} BM_i \times \mathbb{1}(\tau' = \tau) +$$
$$\alpha_0 + \beta_{ww} WW_i + \beta_{bw} BW_i + \beta_{bm} BM_i + \vec{\gamma} X_i + Year_t + State_s + \epsilon_{ist\tau}$$

- Individual controls, $\mathbf{X_i}$, include age as a quadratic, education indicators, and occupational fixed effect. The model includes calendar-year fixed effects and state fixed effects.
- For white women, black women, and black men, the event study results for event-year τ are provided by $\beta_{\tau,ww}$, $\beta_{\tau,bw}$, and $\beta_{\tau,bm}$.

Event Study Confirms Stagnation for White Women After State Family-Leave Policy



Causal Estimates: Using State and Federal Policies

- Include states without pre-FMLA policy
- Set event time $\tau = 0$ in 1993
- Include welfare-reform controls obtained from Kleven (2019)

Event Study Confirms Stagnation for White Women After Family-Leave Policy

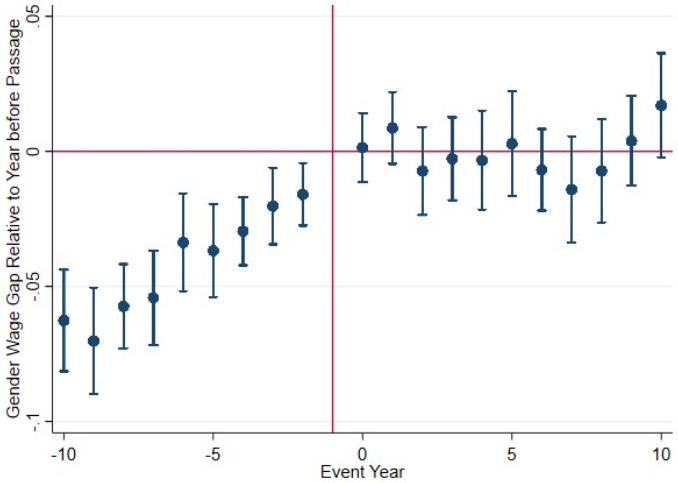
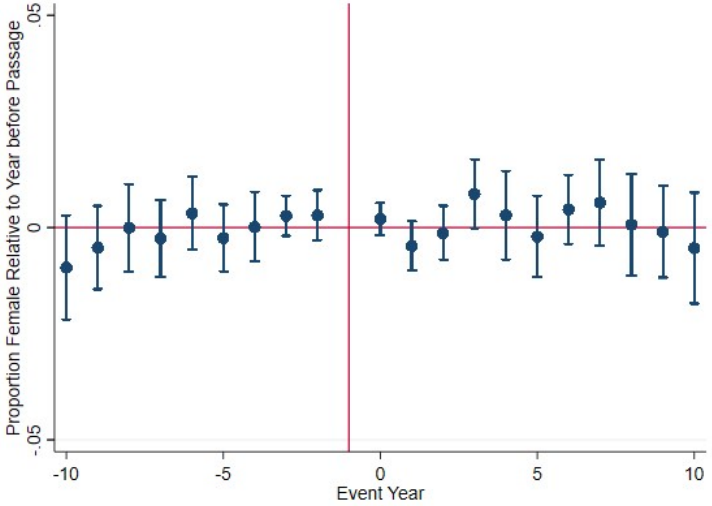


Table: **Rate of Wage Convergence for White Women**

	State Variation	State and Federal Variation
Event-time Trend ($\tilde{\beta}_g$)	0.0070	0.0070
	(0.0009)	(0.0007)
Post ($\tilde{\gamma}_g$)	0.0078	-0.0022
	(0.0072)	(0.0065)
Event-time Trend × Post ($\tilde{\phi}_g$)	-0.0053	-0.0067
	(0.0013)	(0.0011)
Constant	0.0003	-0.0003
	(0.0050)	(0.0043)
Rate of Convergence Post Period ($\tilde{\beta}_g + \tilde{\phi}_g$)	0.0017	0.0003
	(0.0009)	(0.0008)
Observations	20	20
R-squared	0.9358	0.9251

$$\widehat{\text{wage gap}}_{\tau,g} = \tilde{\alpha}_{0g} + \tilde{\beta}_g \mathit{Trend}_{\tau,g} + \tilde{\gamma}_g \mathbb{1}(\tau \geq 0) + \tilde{\phi}_g \mathbb{1}(\tau \geq 0) \times \mathit{Trend}_{\tau,g} + \tilde{\epsilon}_{\tau,g}. \quad (2)$$

Event Study for the Proportion of Women in the Sample



How Much of the Stagnation is Explained by the Introduction of Family-Leave Policies?

- We use the wage decomposition approach in Blau and Kahn (2006), which builds upon the methodology of Juhn et al. (1991)
- Changes in the wage gap are decomposed into changes in observable Xs, changes in observable price, changes in unobservable skills ("Gap Effect"), unobserved prices.

$$Y_{it} = \beta_t X_{it} + \sigma_t \theta_{it}. \tag{3}$$

- The "Gap Effect" is given by θ_{it} and measures the effects of unobservable characteristics and the extent of discrimination in the labor market

The Decomposition Shows the Introduction of Family-Leave Policies Explains 85% of the Stagnation

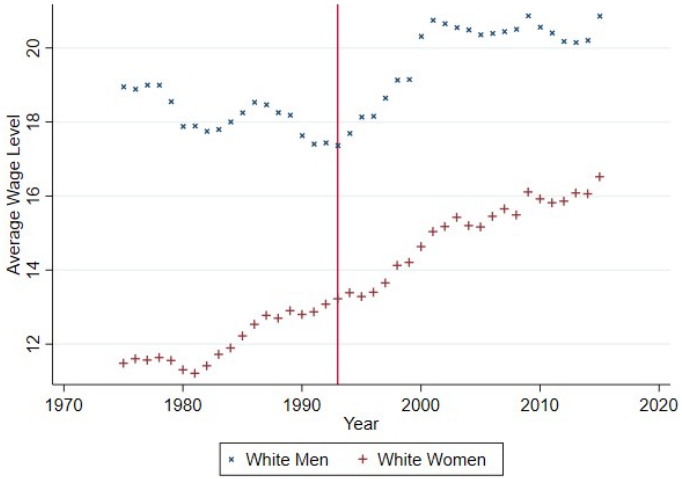
Time Period	1976-1992	1993-2015	Difference
Change in Gender Wage Gap	-0.1927	-0.0799	-0.1128
Observed Xs	-0.0999	-0.0296	-0.0703
Observed Prices	0.0731	-0.0348	0.1079
Gap Effect	-0.1850	-0.0282	-0.1568
Unobserved Prices	0.0191	0.0127	0.0064

- Convergence due to the "Gap Effect" declines by 17p.p in the post-period
- We estimate a 14.74 p.p decline in gender-wage convergence based on the event study which includes state and federal family-leave policies
- Family-leave policies explain 94% of the stagnation which is unaccounted for with observables

Whose Wages Changed to Cause Stagnation?

- We estimate event studies for the average wage rate paid to white men and white women to see what is causing the stagnation
  1. Federal + State Event Study: white men's wages go from stagnant to increasing; white women's wages are unchanged

Average Wages Show that Men Earned More after the FMLA

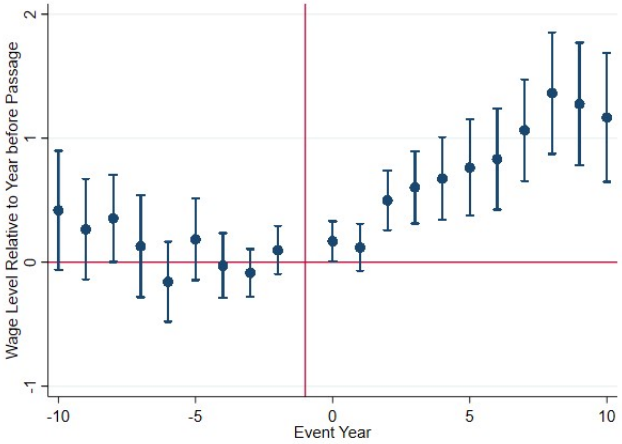


Event Study for Wage Levels

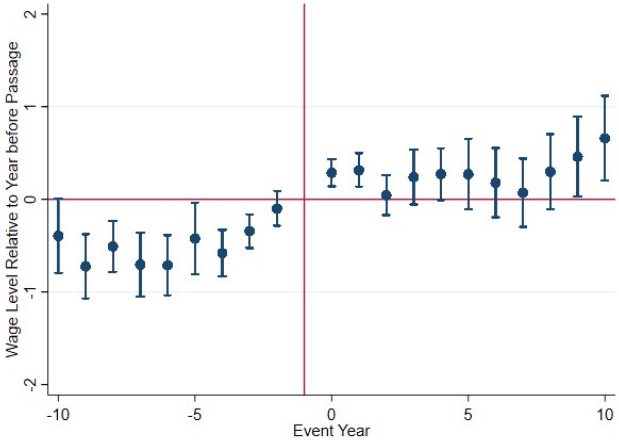
$$\omega_{isty} = \sum_{\tau'=-10}^{-2} \beta_\tau \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_\tau \mathbb{1}(\tau' = \tau) +$$
$$\sum_{\tau'=-10}^{-2} \beta_{\tau,ww} WW_i \times \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_{\tau,ww} WW_i = 1 \times \mathbb{1}(\tau' = \tau) +$$
$$\sum_{\tau'=-10}^{-2} \beta_{\tau,bw} BW_i \times \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_{\tau,bw} BW_i \times \mathbb{1}(\tau' = \tau) +$$
$$\sum_{\tau'=-10}^{-2} \beta_{\tau,bm} BM_i \times \mathbb{1}(\tau' = \tau) + \sum_{\tau'=0}^{10} \beta_{\tau,bm} BM_i \times \mathbb{1}(\tau' = \tau) +$$
$$\alpha_0 + \beta_{ww} WW_i + \beta_{bw} BW_i + \beta_{bm} BM_i + \vec{\gamma} X_i + Year_t + State_s + \epsilon_{ist\tau}$$

- ω_{isty} is the wage level for worker i in year t in state s
- Individual controls, $\mathbf{X_i}$, include age as a quadratic, education indicators, and occupational fixed effect. The model includes calendar-year fixed effects and state fixed effects.
- For WM, WW, BW, and BM, the event study point estimates are: β_τ, $\beta_\tau + \beta_{\tau ww}$, $\beta_\tau + \beta_{\tau bw}$, and $\beta_\tau + \beta_{\tau bm}$.

Event Study Impacts of Family Leave on White Men's Wages



Event Study Impacts of Family Leave on White Women's Wages



Testing Alternative Hypothesis: Earned Income Tax Credit (EITC)

The EITC is Reformed in 1993, Welfare is Reformed from 1992–1997

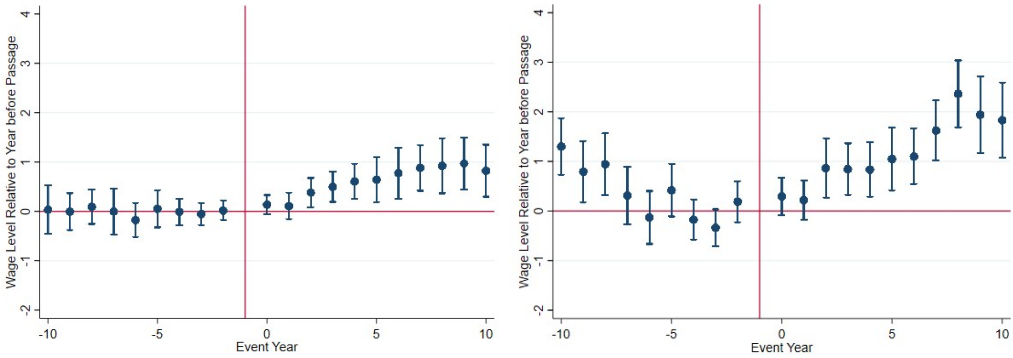
- Reforms to the EITC and Welfare are potential confounding policies for the impacts of family-leave on the gender wage gap
- Because welfare is reformed in different states and years from 1992–1997, we can and do control for welfare reform in the national event study
- Because the EITC is reformed nationally in the same year as the FMLA, we cannot control for it directly

We Use Education Levels as a Proxy for EITC and Welfare Eligibility

- If the EITC or welfare reform were causing our results, we would expect the largest wage effects for workers with lower levels of educational attainment, who are more likely to qualify for the programs
- We estimate the event studies for wage levels using first a subset of workers who do not have a college degree and second a second subset of workers who do have a college degree

Educated White Men have the Largest Impacts; the EITC and Welfare are not Causing the Stagnation

Figure: White Men without College Degrees (Left) and with College Degrees (Right)



White Women

Analysis of Family-Leave Usage Data

We Use Usage Data on Leave from the Department of Labor

- The U.S. Department of Labor provides survey data on leave-taking by employees for 4 years: 1995, 2000, 2012, and 2018
- The surveys allow us to identify whether an employee has recently taken leave (the prior 12 to 18 months) and the reason
- We identify employees who take leave for any reason, those who take leave unrelated to the birth or adoption of a child (not-family leave), and those who take leave related to the birth or adoption of a child (family-leave)
- We also integrate the data on the length of leave taken between the datasets

Estimating the Use of Leave

$$Leave_{it} = \eta_0 + \eta_1 WW_i + \eta_2 BW_i + \eta_3 BM_i + \eta_4 Age_i + \eta_5 Age_i^2 + \eta_6 Married_i + Year_t + \epsilon_{it} \quad (4)$$

- $Leave_{it}$ is an indicator equal to 1 if employee i took any leave, not-family leave, or family-leave
- We include year fixed effects and cluster the standard errors at the year level

White Women are More Likely to Take Leave than White Men

Table: **Probability of Taking Leave**

	Leave Taken?		
	Any Leave	Non-Family Leave	Family Leave
White Female	0.0361	0.0224	0.0137
	(0.0142)	(0.0082)	(0.0060)
Black Female	0.0945	0.0772	0.0174
	(0.0038)	(0.0044)	(0.0009)
Black Male	-0.0130	0.0033	-0.0163
	(0.0061)	(0.0109)	(0.0049)
Constant	0.0850	-0.0368	0.1217
	(0.0685)	(0.0665)	(0.0187)
Observations	10,673	10,673	10,673
R-squared	0.0081	0.0108	0.0256
Sample Mean	0.1722	0.1323	0.04

Estimating the Length of Leave

$$Length_{it} = \eta_0 + \eta_1 WW_i + \eta_2 BW_i + \eta_3 BM_i + \eta_4 Age_i + \eta_5 Age_i^2 + \eta_6 Married_i + Year_t + \epsilon_{it} \quad (5)$$

- $Length_{it}$ is the length of leave taken by employee i, given that they took leave
- We also interact the demographic indicators with an indicator for family-leave
- We include year fixed effects and cluster the standard errors at the year level

White Women Take 36-Day Longer Family-Leave Spells than White Men

Table: **Length of Leave Taken in Days**

	Any Leave	Non-Family Leave	Family Leave
White Female	10.26	2.02	36.72
	(3.26)	(3.40)	(4.39)
Black Female	11.48	3.96	37.23
	(1.84)	(3.32)	(3.84)
Black Male	0.81	-1.79	13.11
	(1.47)	(1.65)	(3.31)
Constant	33.25	17.33	-11.47
	(9.24)	(7.32)	(12.71)
Observations	4,925	3,998	927
R-squared	0.0313	0.0153	0.2768
Sample Mean	26.83	24.41	34.87
Mean for White Men	20.85	23.16	12.73

Heterogeneity Analysis

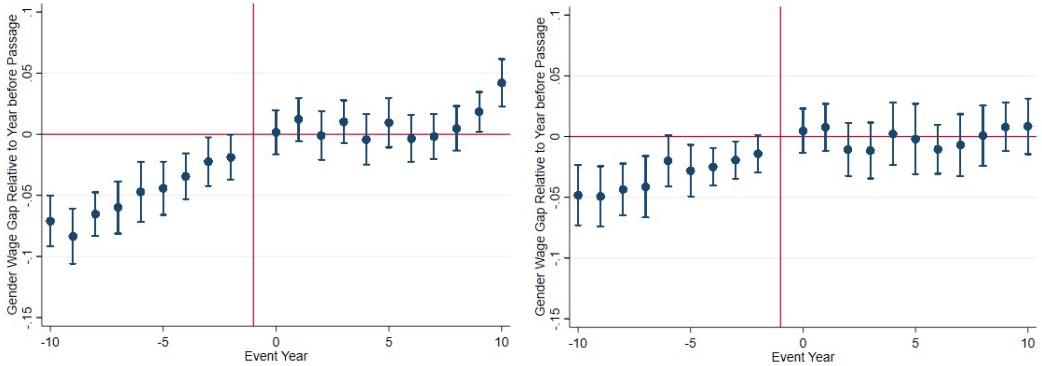
Stronger Gender Wage Stagnation Effects for Mothers Compared to Women without Children

	Mothers	Childless	Difference
Convergence Rate Before (p.p.)	0.804	0.520	0.284
	(0.071)	(0.071)	(0.101)
Drop in Convergence Rates (p.p)	0.577	0.420	0.157
	(0.102)	(0.101)	(0.143)
Convergence Rate After (p.p.)	0.227	0.100	0.127
	(0.070)	(0.083)	(0.109)
Gender Wage Gap at Passage (p.p.)	-34.58	-19.66	-14.93
	(0.758)	(0.663)	(0.970)

Bootstrap standard errors in parentheses ($n = 100$ replications)

Event Study Confirms that White Mothers Experienced Greater Affect of Family-Leave Policy

Figure: Mothers (Left) and Childless Women (Right)

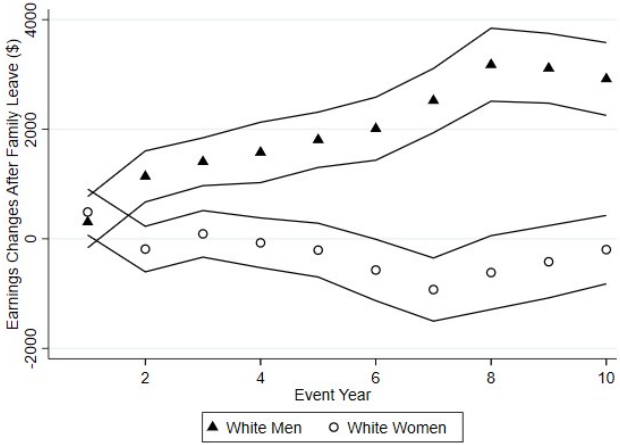


Back-of-Envelope Calculation

Back-of-the-Envelope Methodology

1. Goal: calculate the impact on earnings due to state-specific family leave policies by demographic group
2. Use the point estimates for wage impacts in the pre-period to generate a trend line, which can be used to generate counter factual wages in the post-period
3. Subtract the observed wages from the counter factual wages to obtain an estimate of the wage impact of family-leave policies
4. Multiply wage impact by 2,000, which provides the earnings impact for a full-time worker with 2 weeks of vacation
5. Bootstrap the estimates 100 times to obtain confidence intervals

Back of the Envelope Calculation

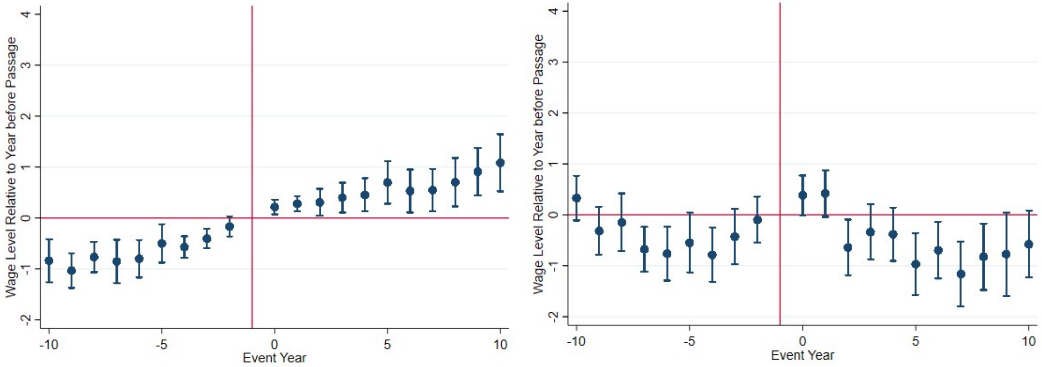


Conclusion

- We provide causal estimates that show family-leave policies contributed to stagnation in gender wage gaps
- Solve a longstanding puzzle in economics
- Mechanism raised the wages of men without changing wages of women

Educated and Uneducated White Women Have Similar Non-Impacts

Figure: White Women without College Degrees (Left) and with College Degrees (Right)



Go Back