# Hiring and the Dynamics of the Gender Gap

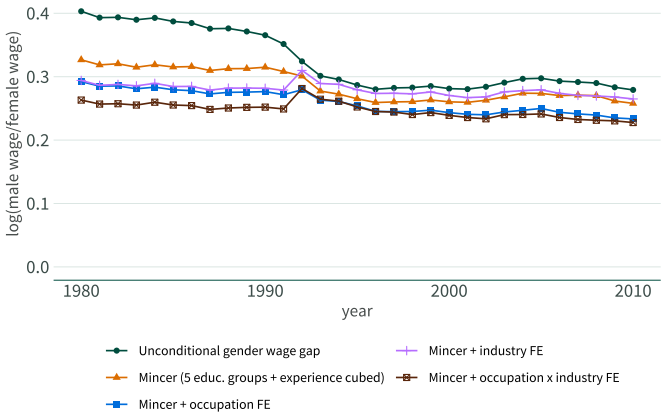
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# Motivation

The gender wage gap in Germany for full-time workers




- The gender wage gap is a pervasive feature of the labor market and increasingly difficult to explain from a pure human capital perspective (Goldin 2014)
- In a frictional labor market, men and women of equal productivity might still face disparate job opportunities and bargaining prospects (Manning 2011, Robinson 1933)

# Equal pay for equal work (opportunity)?

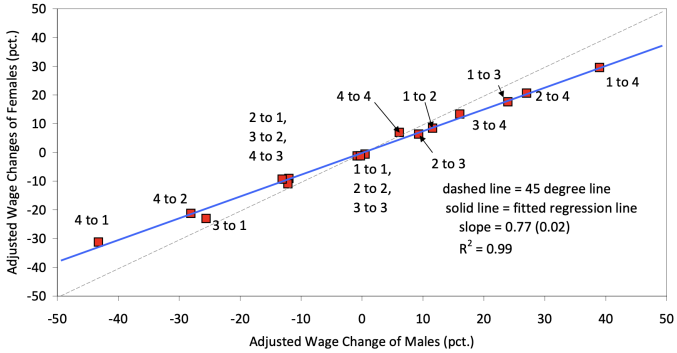
Prompted policies designed to tackle the gender pay gap that predominantly center around the role of firms

- Europe:
  - Job classification systems (the Netherlands)
  - Regular gender pay reporting, without audit (Denmark) or with audit (France and Sweden)
  - In Germany, companies employing more than 200 staff have to provide, upon request, the average wage of a group of colleagues of the opposite sex doing work of equal value to the member of staff in question (OECD report 2022)
- US: Title VII of the Civil Rights Act mandates that companies are barred from engaging in discriminatory practices against women and other protected groups concerning hiring, layoffs, and promotions

# Equal pay for equal work (opportunity)?

Moving across similar opportunities by gender (Card, Cardoso, and Kline 2016)

Figure III: Comparison of Adjusted Wage Changes of Male and Female Job Movers by Quartile of Coworker Wages at Origin and Destination Firms




- Firm-specific hiring and compensation practices? Challenging when men and women sort into different firms
- We ask **how similar work opportunities that arise within firms may lead to differences in wage and career outcomes for male and female incoming new hires**

# Preview

- Main idea
  - Sudden departures of existing workers ⟶ exogenous hiring shocks to firms
  - Sudden departures ⟶ identifying replacements through excess hiring

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- Main idea
  - Sudden departures of existing workers → exogenous hiring shocks to firms
  - Sudden departures → identifying replacements through excess hiring
- Main results
  - Using data between 1980 and 2016, comparing workers entering firms after similar unexpected departures and ex-ante probability of hiring a female or male worker, female workers earn on average 20 log points lower
  - Half of the gap persists when comparing workers with the same pre-hire wage at their previous firm
  - The gender hiring opportunity gap widens over time, and it does not narrow even for workers who remain full-time in the subsequent 5 years
  - In a firm-individual fixed effects model, this gap could be subsumed as individual fixed effects rather than differential firm fixed effects by gender

# Roadmap

Data with unexpected departure events

Empirical analysis of differential impact by replacement gender

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# Data with unexpected departure events

# German Social Security Data

Universe of employer-employee matched German social security records in 1975-2021

- All entries and exits of workers
- Reason for exits (including departure due to death) and exact dates
- Spell-level data to clearly identify outcomes pre- and post-departure
- Rich set of individual and establishment characteristics:
  - Daily wages, full-time status, detailed occupation code
  - Firm composition

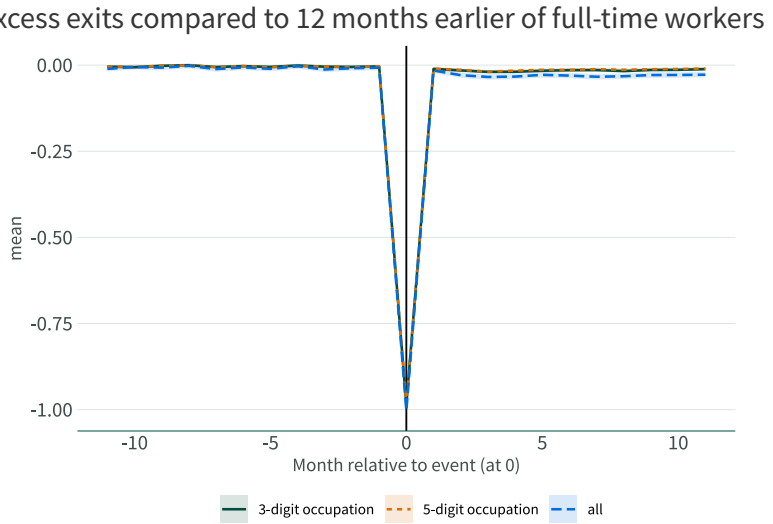
# Analysis sample

- Focus on unexpected death events between 1980 and 2016 of workers with high labor market attachment
- Following Jäger and Heining (2022) to restrict among departures due to death
  - At most 64 years old
  - Worked full-time at death event $d$ and 4 years prior $d - 4$
  - No sick leave of 6+ weeks in the 5 years preceding their death
- Small-medium establishments with at most 50 full-time workers and 150 total workers
- Starting point of 90,000 unexpected death events

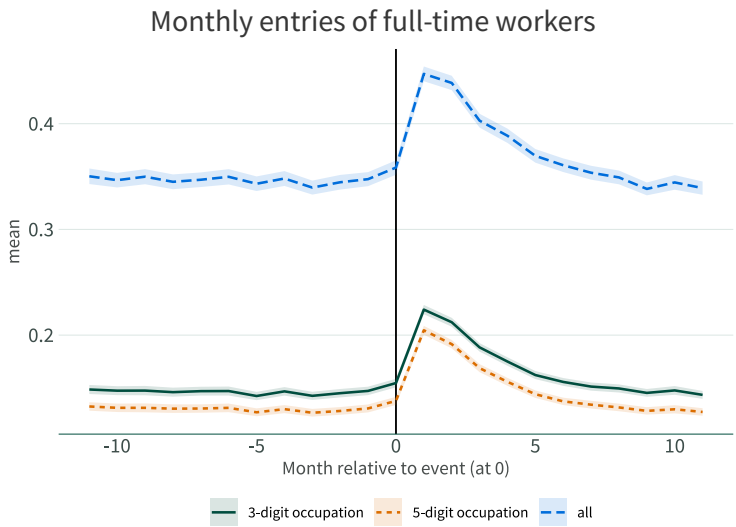
# Unexpected death as exogenous hiring shocks



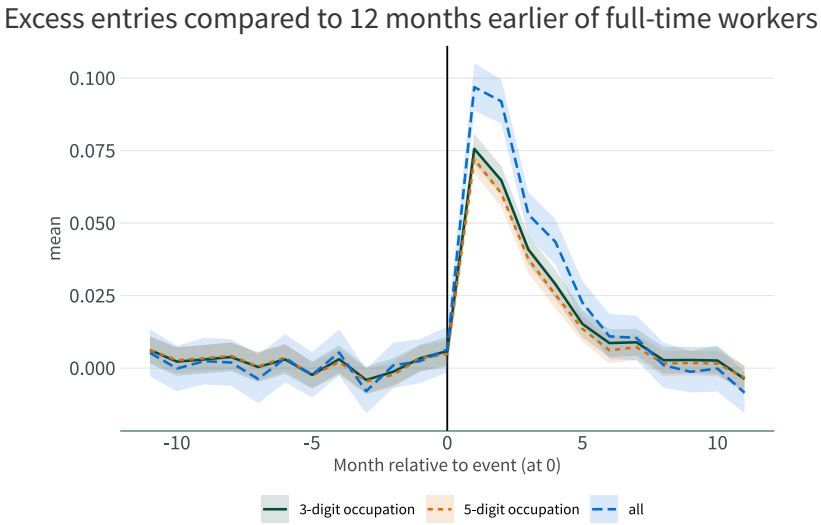
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# Construction of replacement workers

- Motivating factors:
  - Excess hiring is 78% (75%) concentrated in the same 3-digit (5-digit) occupation as the departing worker
  - Excess hiring occurs mostly in the first 6 months, and more concentrated in earlier months

# Construction of replacement workers

- Motivating factors:
  - Excess hiring is 78% (75%) concentrated in the same 3-digit (5-digit) occupation as the departing worker
  - Excess hiring occurs mostly in the first 6 months, and more concentrated in earlier months
- Replacement workers:
  - Excess hiring within the same 3-digit occupation of the outgoing worker within the first 6 months is strictly positive (30% of events)
  - First full-time new hire in the same 3-digit occupation of the outgoing worker

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# Empirical analysis of differential impact by replacement gender

# Comparing events by the gender of the replacement worker

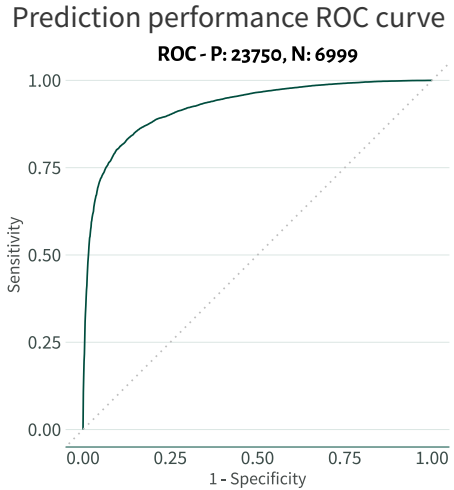
- Firms that hire a male or a female replacement worker can be different
  - Unexpected departures create exogenous hiring shocks, not exogenous replacement
- We use observables through a machine learning exercise to largely account for the ex-ante predicted chance of a female replacement worker being hired
  - Contrast with Jäger and Heining (2022) who use matched control firms to study the impact of sudden departures on coworkers
  - We focus on new hires and *differential impact* on wages and careers of new hires by gender
- Conditional on having the same chance of hiring a female replacement, the actual realization can be considered random
  - Assess by comparing levels (not just parallel trends) leading to the hiring event

# When do firms replace workers and with whom?

Use machine learning for two purposes:

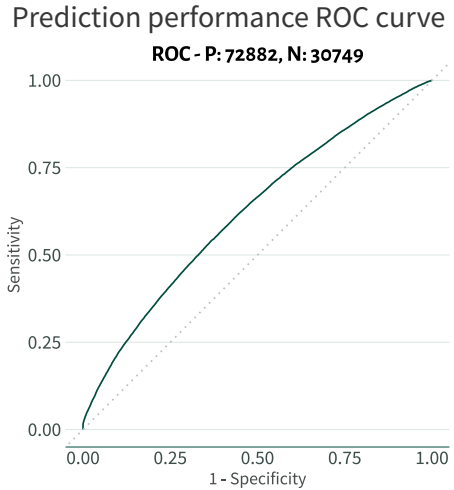
- Confirm that the sample of events with and without excess hiring is observably similar: very hard to predict even with a rich set of predictors
  - 500 variables covering firm and labor market conditions in the previous 3 years
- Predict the probability that the replacement worker is female versus male

# Prediction accuracy for excess female hiring




- Sensitivity = true positive rate
- 1 - Specificity = false positive rate
- The probability of being able to distinguish the two groups is 92.4% (area under the curve)
- Most predictive covariates relate to the share of females at the firm and in the same occupation as the departing worker

# Prediction accuracy for any excess hiring




- Sensitivity = true positive rate
- 1 - Specificity = false positive rate
- The probability of being able to distinguish the two groups is 62% (area under the curve)
  - Firms with and without a replacement worker are relatively similar observably

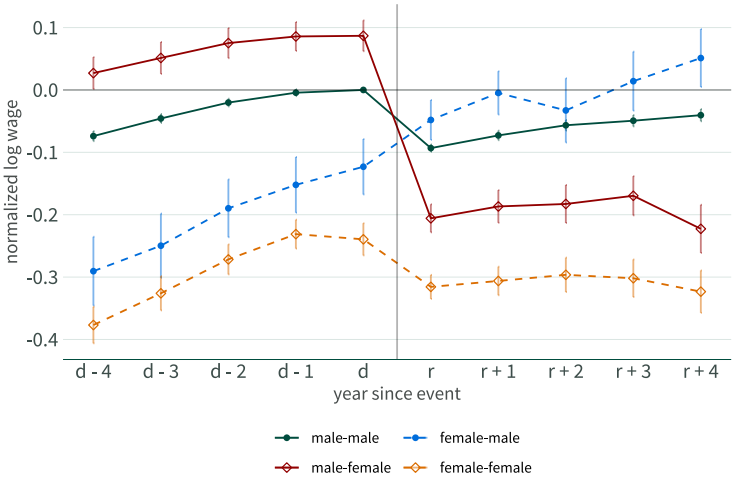
# Summary statistics

| | Male-Male | Male-Female | Female-Male | Female-Female |
|---|---|---|---|---|
| **Panel A: Outgoing worker** | | | | |
| Daily wage in EUR | 94.89 (44.20) | 105.04 (70.09) | 86.31 (60.71) | 75.60 (32.49) |
| Age | 46.00 (10.97) | 47.35 (10.58) | 44.10 (11.45) | 43.81 (11.84) |
| Tenure (years) | 7.65 (6.36) | 8.54 (6.68) | 7.63 (6.34) | 7.58 (6.19) |
| Experience (years) | 15.92 (8.33) | 16.69 (8.37) | 15.28 (8.34) | 14.35 (7.87) |
| Education (years) | 11.87 (1.33) | 12.39 (1.93) | 12.02 (1.72) | 11.86 (1.36) |
| **Panel B: Incoming worker** | | | | |
| Daily wage in EUR | 81.80 (27.83) | 72.28 (30.30) | 82.53 (33.04) | 63.87 (29.54) |
| Age | 33.75 (10.44) | 31.90 (10.28) | 33.39 (10.28) | 32.56 (10.68) |
| Experience (years) | 9.45 (7.21) | 7.71 (6.67) | 9.09 (7.55) | 8.12 (6.79) |
| Education (years) | 11.93 (1.47) | 12.37 (2.08) | 12.44 (2.00) | 12.00 (1.51) |
| Number of obs. | 22,961 | 3,226 | 1,049 | 3,818 |

# Mean log wage by transition group

Plotting raw group mean by relative event time and associated standard error

- Normalizing Male-Male to 0 at event time 0



# Main empirical specification

Interested in differences in outcomes of female versus male replacement workers:

$$y_{it} = \beta_{0t} + \beta_{1t}\text{female_replacement}_i + \gamma_{it}X_{i,-1} + \epsilon_{it}$$

- $i$ is a hiring event associated with a sudden departure
- $t$ is time relative to the event
  - $t \leq 0$: hiring firm / departing worker
  - $t > 0$: incoming worker
- **Same hiring opportunity:** $X_{it}$ controls for deciles of: ex-ante probability of female replacement, departing worker's wage at $t = -1$, firm size, share of females in the firm, etc.
- **+ Same pre-hire wage:** Additionally control for the incoming worker's pre-hire wage at their previous firm
- Estimating separately for each $t$

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- Heterogeneity
- Mechanisms

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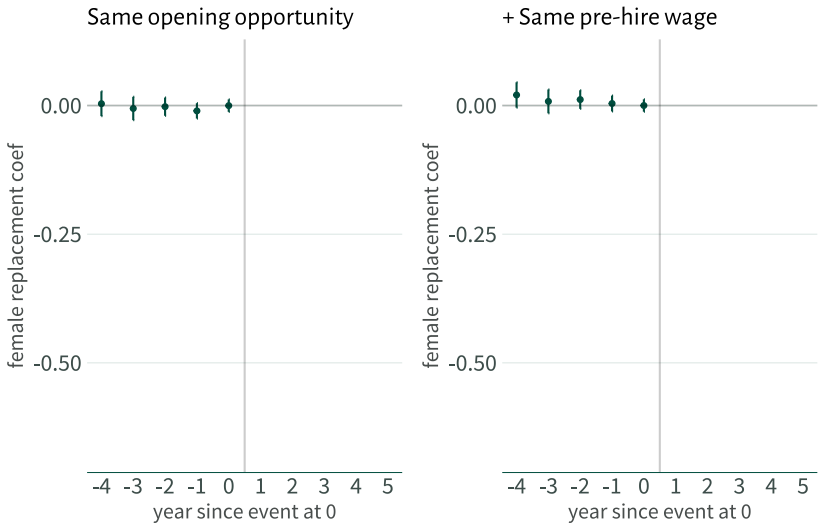
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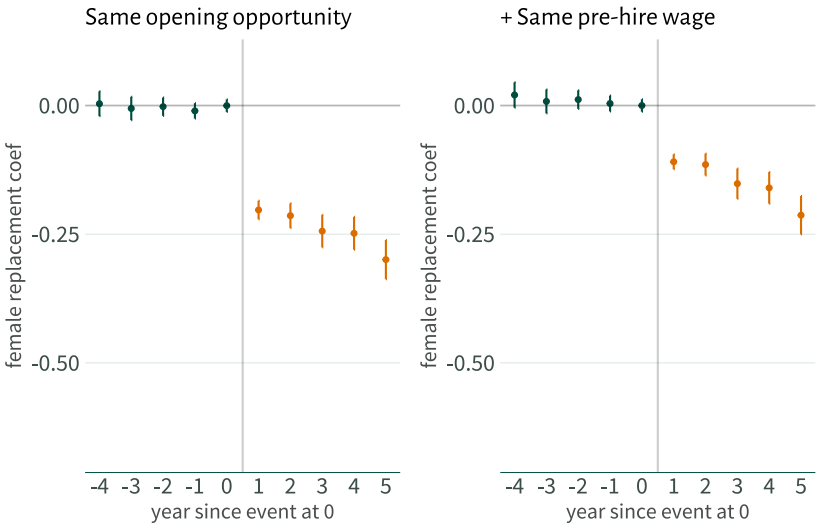
# The gender hiring opportunity gap

- Firms respond to the same hiring shocks:
  - Hiring workers of different levels of productivity based on their gender
  - Compensating workers with similar productivity differently

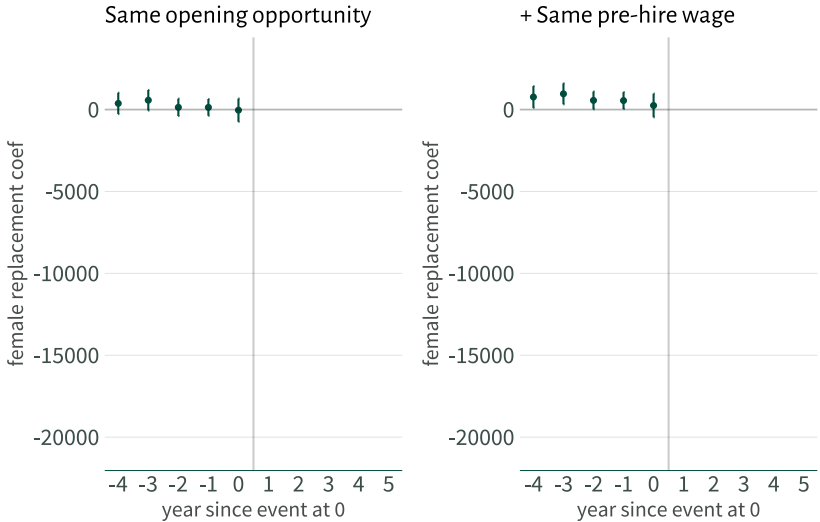
# Log wage difference by replacement gender



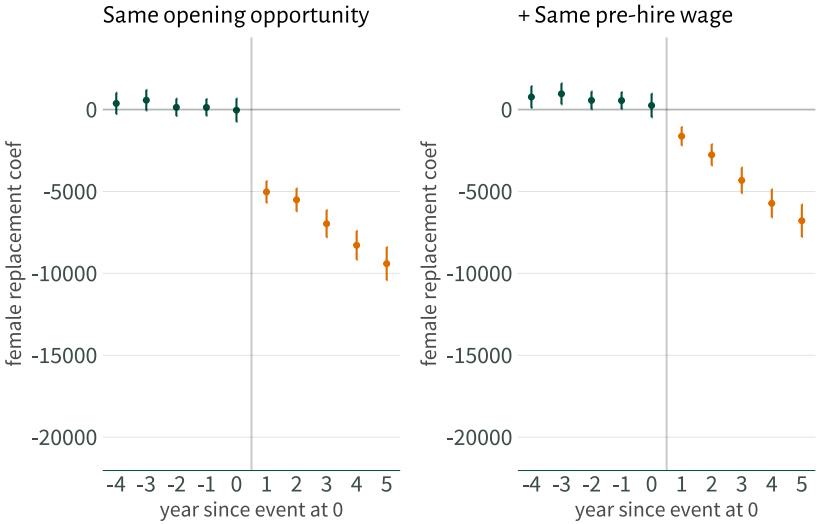
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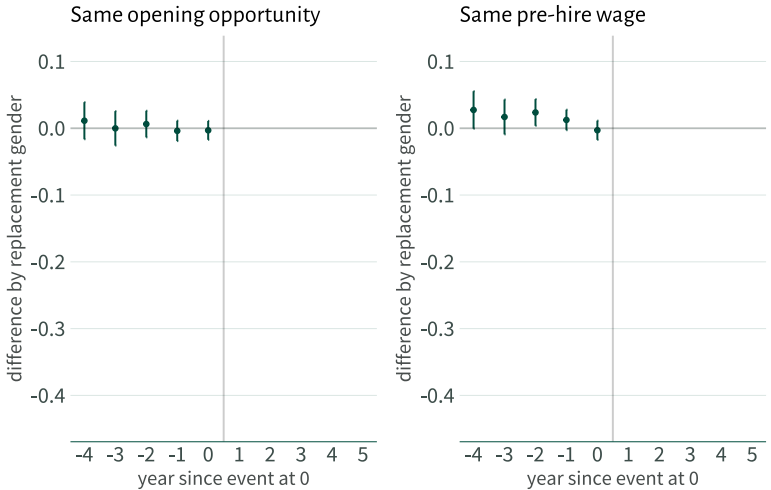


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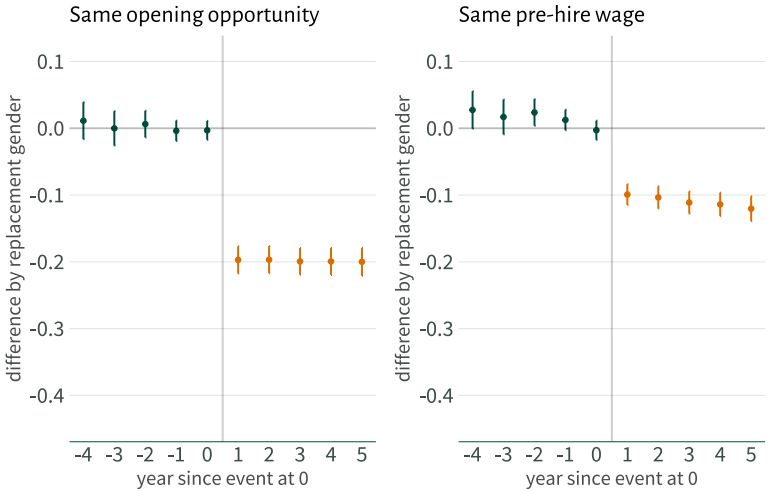
# Log wage difference by replacement gender

## Replacements who stay full-time for 5 years



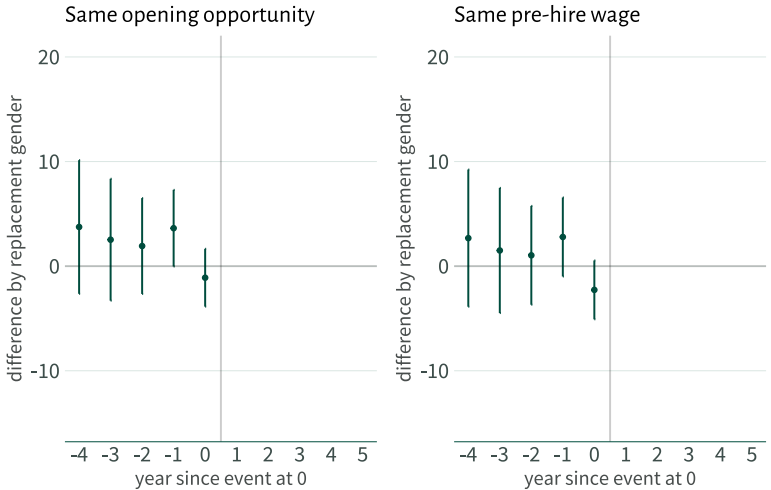
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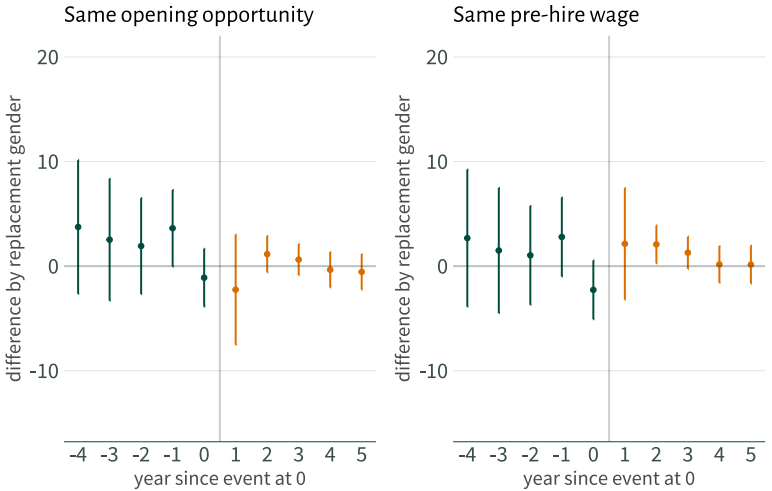
# Number of days working full-time

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# The gender hiring opportunity gap

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  - Compensating workers with similar productivity differently
- Role of statistical discrimination:
  - *In the year of hire*: Remarkably similar gender gap in 5-year full-time sample compared to overall
  - Over time: Gaps stay the same in the 5-year full-time sample, unlike overall where they widen

    → initial disparities lead to differential on-the-job training at the same employer or negative signals to new employers

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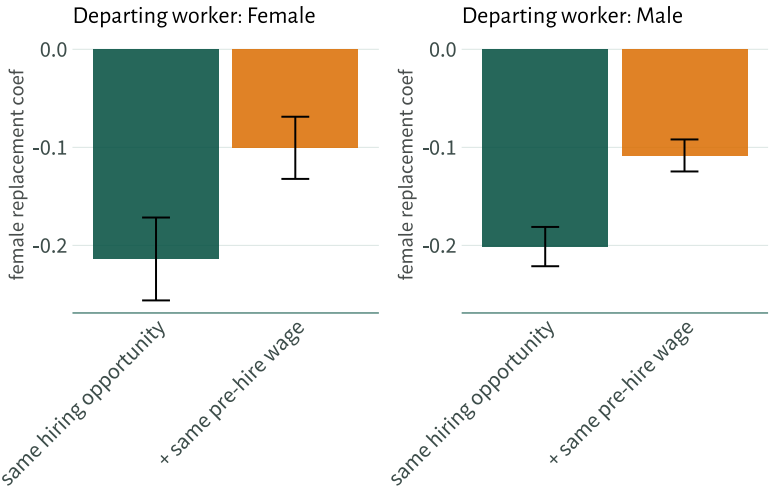
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## Heterogeneity

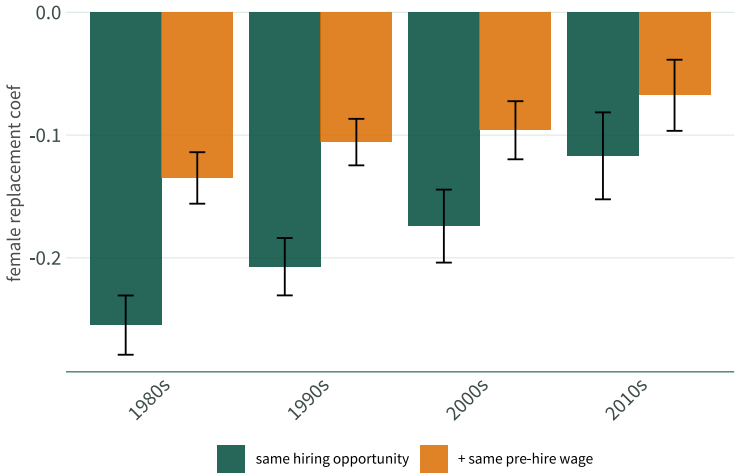
# The gender hiring opportunity gap

Taking stock: log wage difference in the year of hire



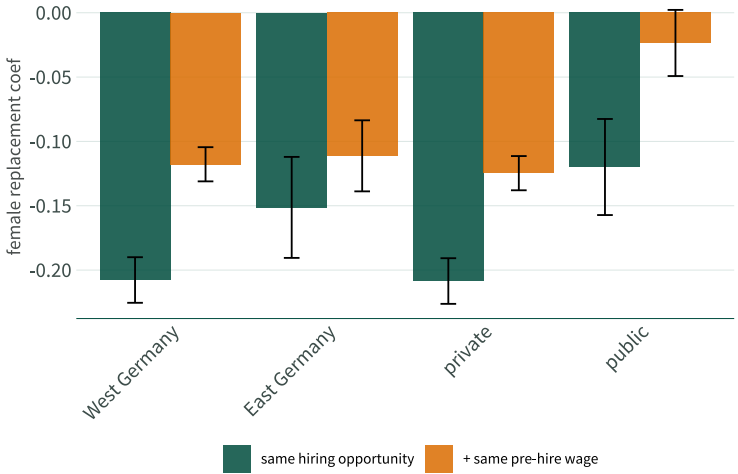
# Changes over the decades

- The gap is the largest in the 1980s and closing in the 2010s
- As large as half of the adjusted gender wage gap



# Reflects prevailing gender dynamics across markets

- Higher in West Germany than East Germany
- Closes for workers in the public sector with same pre-hire wage



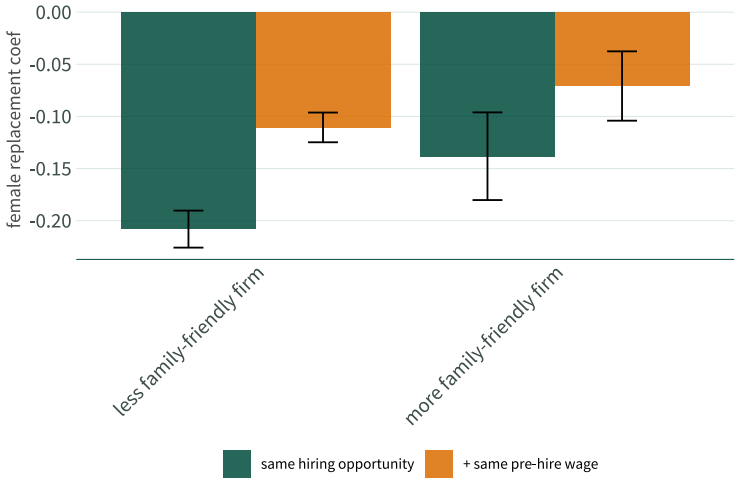
# Reflects prevailing gender dynamics within firms

- By existing gender wage gap



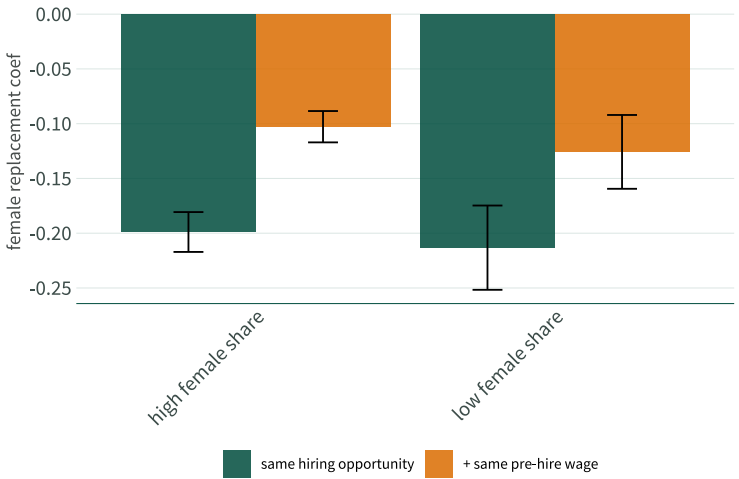
# Reflects prevailing gender dynamics within firms

- By existing gender wage gap
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# Reflects prevailing gender dynamics within firms

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- By family-friendliness of firms (female manager with young child)
- Not by shares of females at the firm



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## Mechanisms

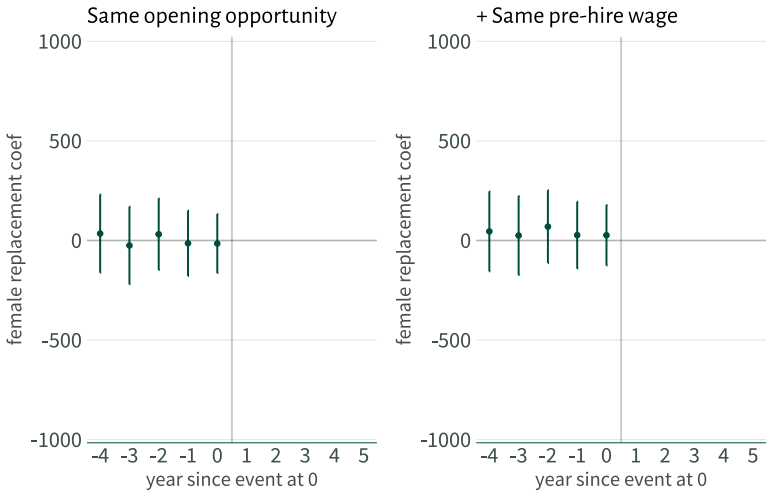
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- Do firms shift wages paid to other coworkers?

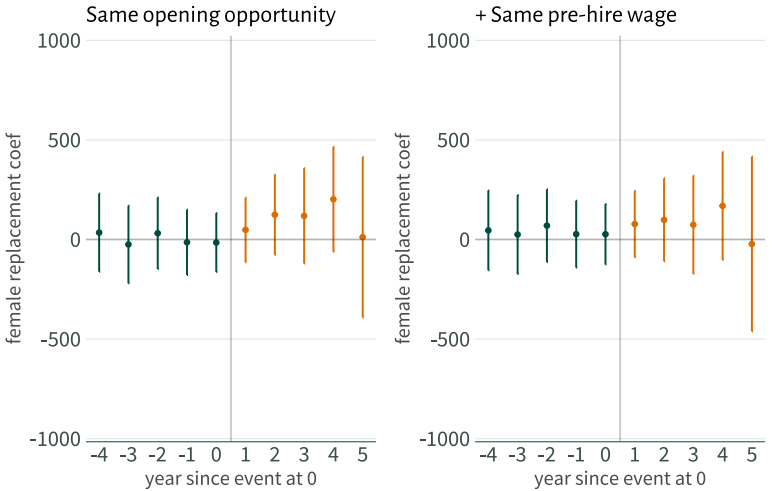
- Female replacement workers have worse outside options?

- Compensating differentials for job amenities?

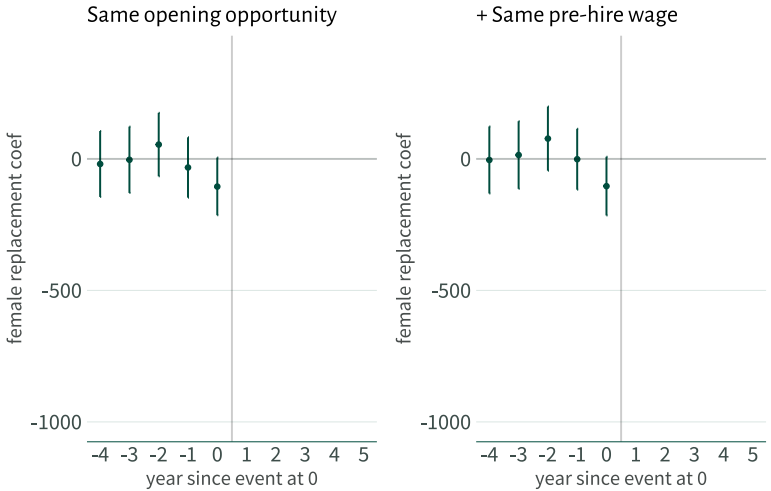
# Coworkers? Total same-occupation male wage bill (EUR)



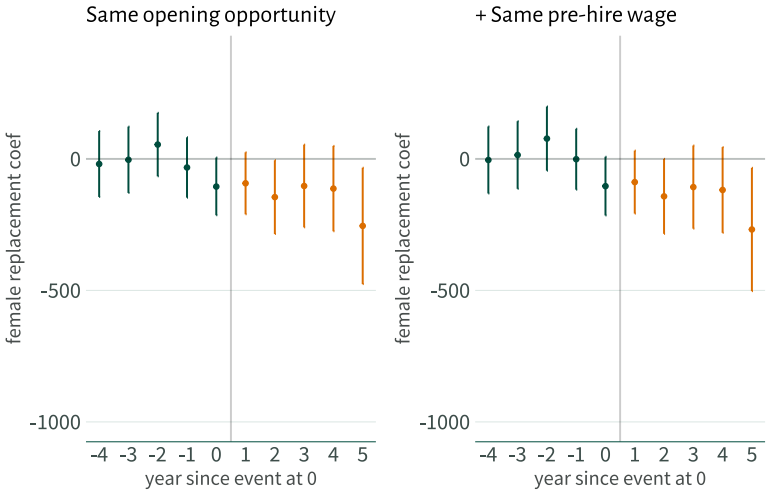
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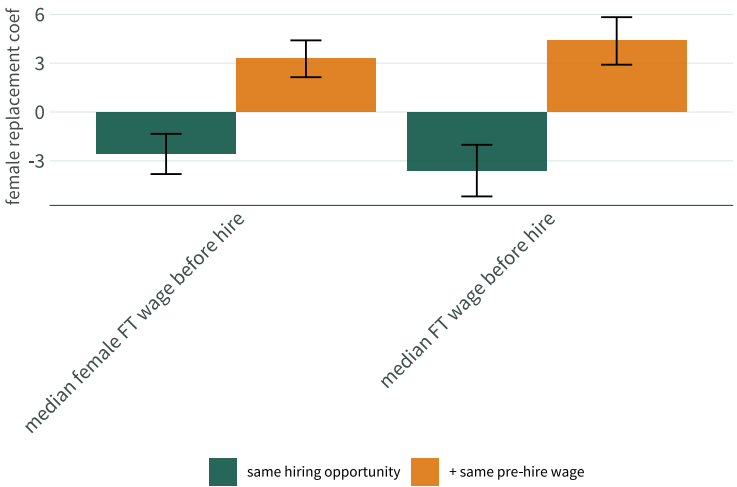


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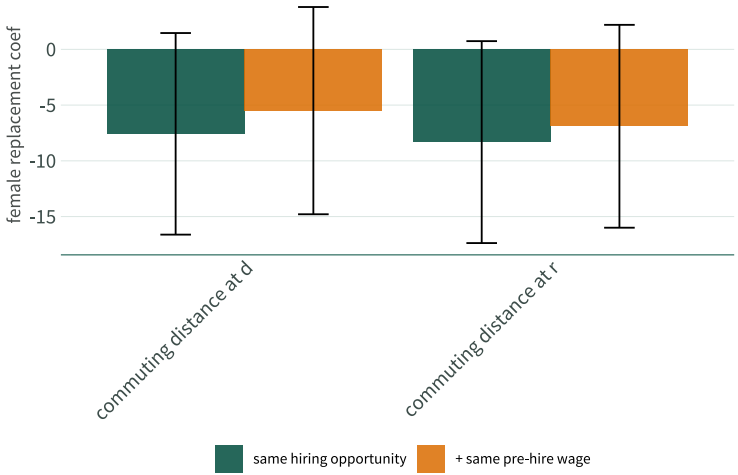
# Outside options? Proxy using previous firm

- Using characteristics of the replacement worker's firm in the year before the hiring event as proxy for the worker's outside option cannot explain the gap
- For replacements that have similar pre-hire wage, females tend to come from better paying firms



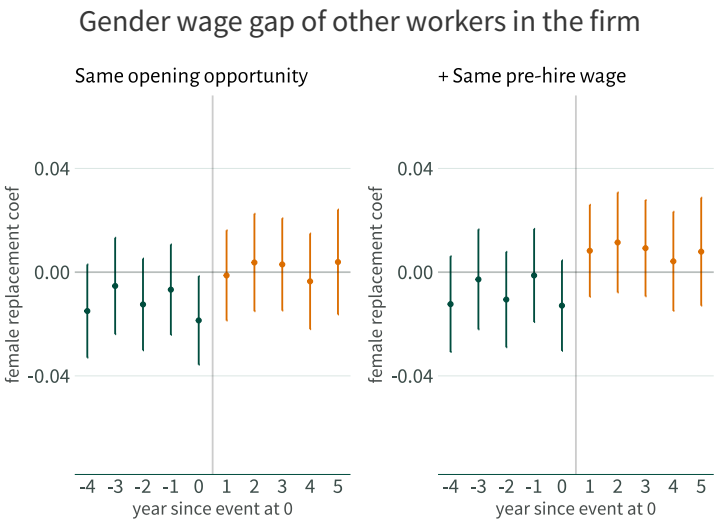
# Amenities? Commuting distance before and after hire

- Women commute less than men
- But changes in commuting distance from the previous job cannot explain the difference



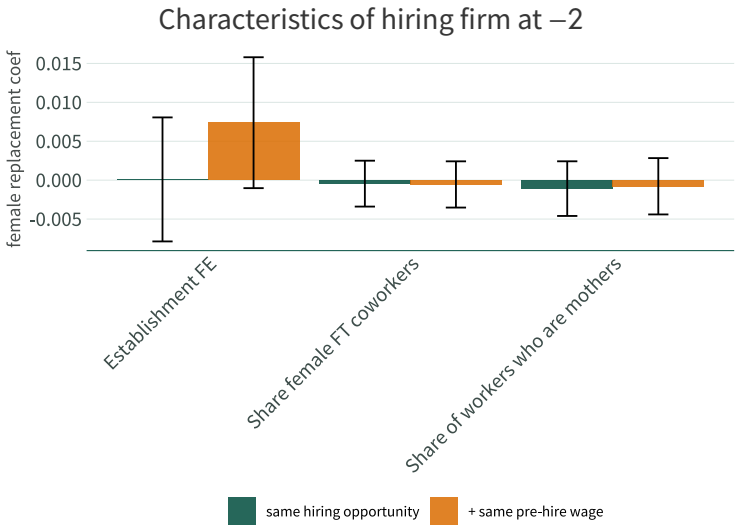
# Amenities? Characteristics of new firms

- For example: Figure shows gender wage gap in the years prior to the vacancy is similar between firms that hire a male vs. female replacement
- Also recall: “same hiring opportunity” controls for share of females in the firm at −1



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- Also recall: “same hiring opportunity” controls for share of females in the firm at −1



# The gender hiring opportunity gap

- Do firms shift wages paid to other coworkers?
  - The magnitude of changes in total wage bill for other coworkers is too small
  - Supports that the replacement worker is not “misidentified”
- Female replacement workers have worse outside options?
  - Proxy for outside options by wages at their previous firm
  - Not in the case when they have the same pre-hire wage
- Compensating differentials for job amenities?
  - Not changes in commuting distance
  - Not that women are moving to firms that offer amenities they are likely to value more

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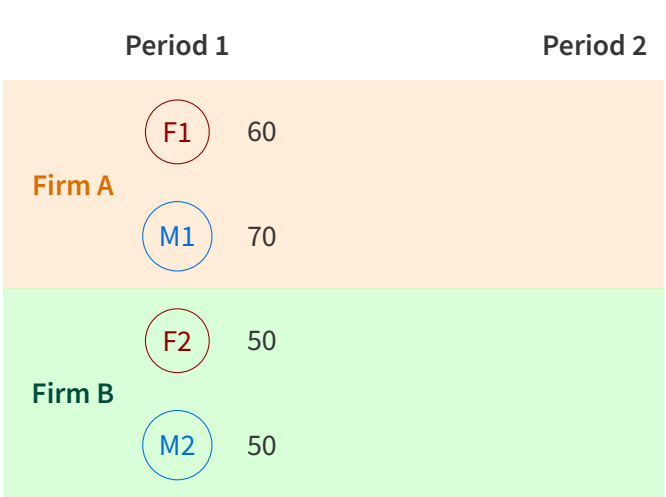
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# “Bargaining” channel of the gender wage gap

- The empirical strategy we employ in this paper helps isolate the component that arises from men and women moving to the same hiring opportunities
  - In the language of Card, Cardoso, and Kline (2016), it speaks to the “bargaining” (within-firm) component of the gender gap, instead of the “sorting” (across-firm) component
  - Could reflect firm discrimination and/or worker preferences and negotiation

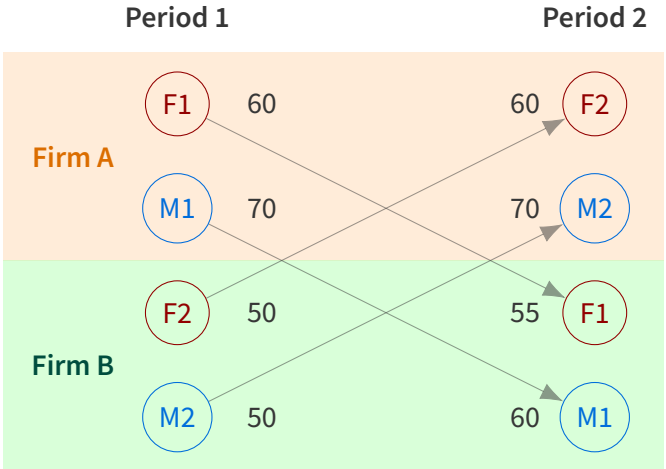
- Over time, the gender hiring opportunity gap for equally productive workers can translate into differences in individual fixed effects rather than differential firm fixed effects
  - $y_{it} = \alpha_i + \psi^{G(i)}_{J(i,t)} + X'_{it}\beta^{G(i)} + r_{it}$
  - Equally productive men and women can be given different opportunities, and women may work in jobs below their productivity levels

# Implications for estimating gender wage gap within firms



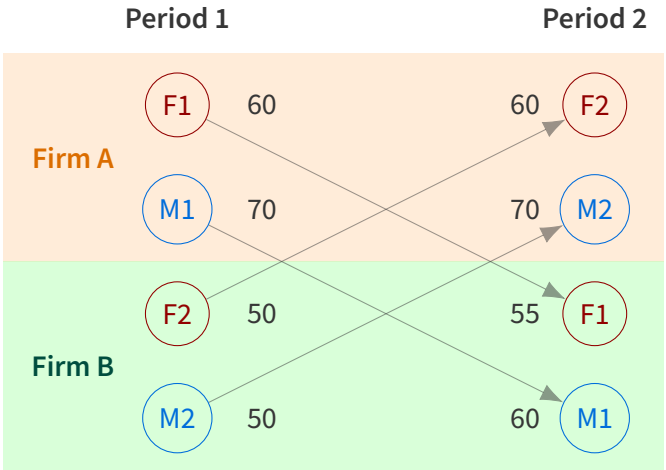

- $y_{it} = \alpha_i + \psi^{G(i)}_{J(i,t)} + X'_{it}\beta^{G(i)} + r_{it}$
- Firm A pays equally productive M and F 70 and 60, respectively
- Firm B is a lower-paying firm that pays equally

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- Firm A pays equally productive M and F 70 and 60, respectively
- Firm B is a lower-paying firm that pays equally and "undoes" more of M's higher wages

# Implications for estimating gender wage gap within firms

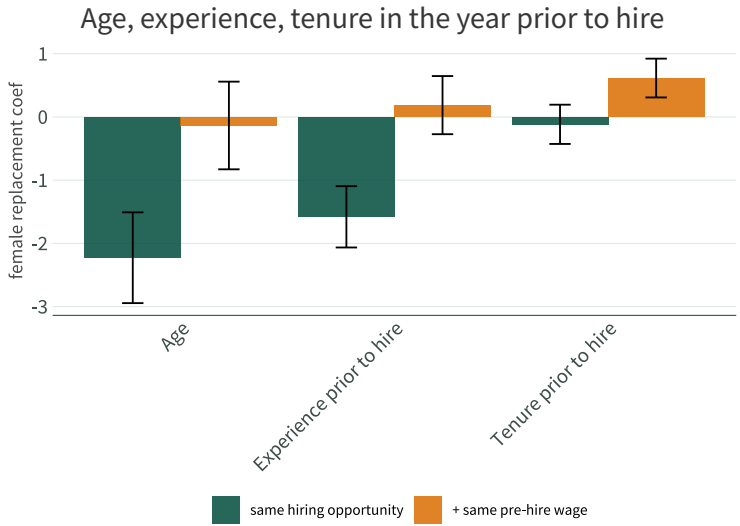



- $y_{it} = \alpha_i + \psi^{G(i)}_{J(i,t)} + X'_{it}\beta^{G(i)} + r_{it}$
- Firm A pays equally productive M and F 70 and 60, respectively
- Firm B is a lower-paying firm that pays equally and "undoes" more of M's higher wages
- Dynamics of the gender gap
  → *Male FEs are higher than Female FEs*
  → *Fails to attribute the full gender gap at firm A to gender-differential firm FEs*

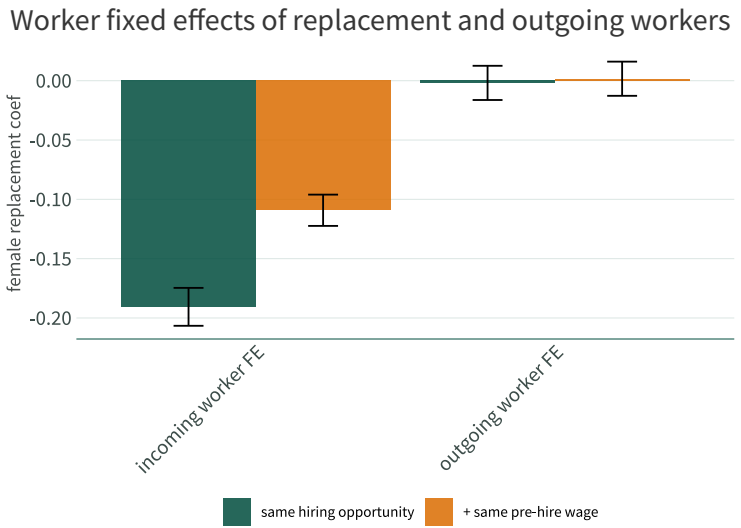
# Comparing replacement workers by gender



# Comparing replacement workers by gender



# Comparing replacement workers by gender



# Roadmap

Data with unexpected departure events

Empirical analysis of differential impact by replacement gender

The gender hiring opportunity gap

Discussion

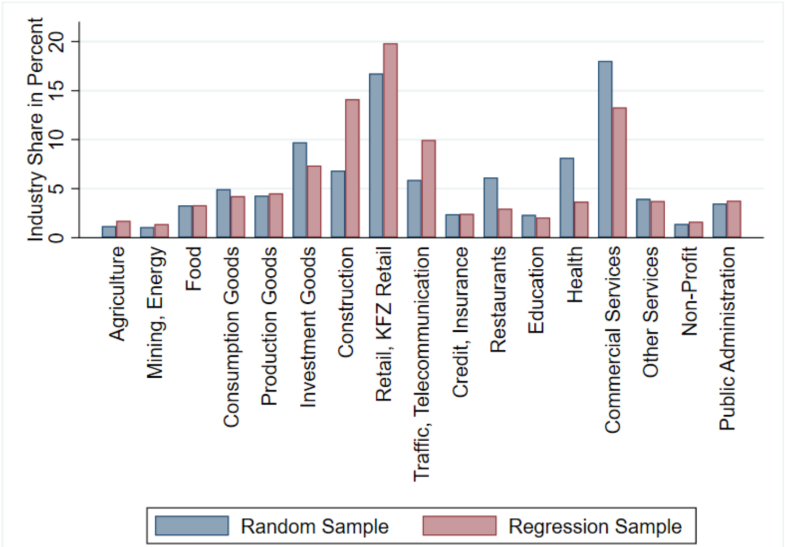
Conclusion

# Conclusion

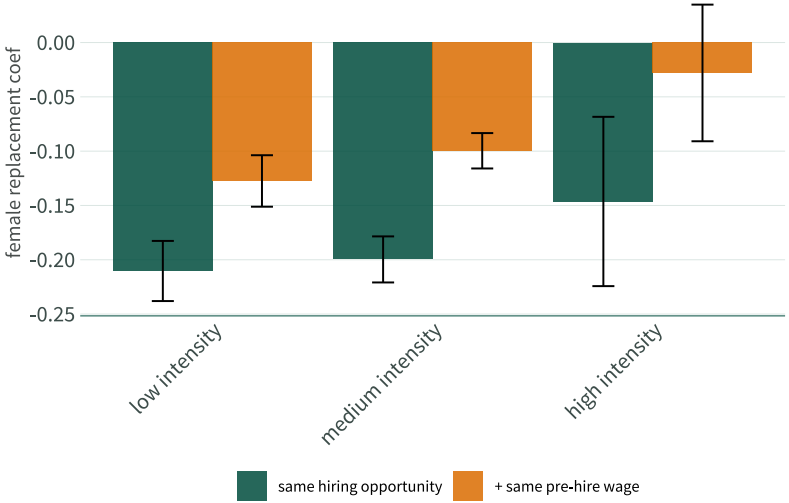
# Conclusion

- Firms respond to the same hiring shocks by hiring and paying workers differently based on gender
  - Equally productive men and women can be given different opportunities, and women may systematically work in jobs below their potential productivity levels
  - Not captured in a firm-worker fixed effects framework
- Important to go beyond the static gender wage gap
  - Male and female workers getting paid the same wage within a firm may come from different prior wages
  - Suggests a different emphasis from “equal pay for equal work” policies: current wage is not a sufficient statistic for “equal pay”

# Industry composition relative to a random sample

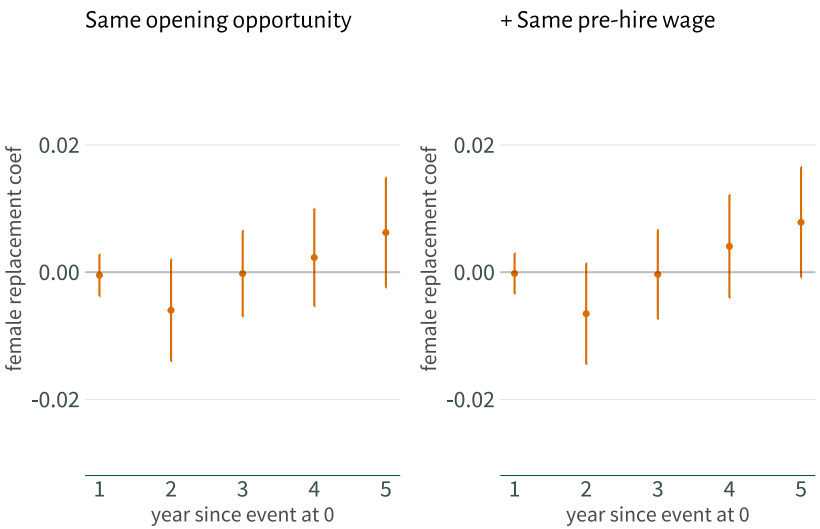


# Gender hiring opportunity gap by occupational skill intensity

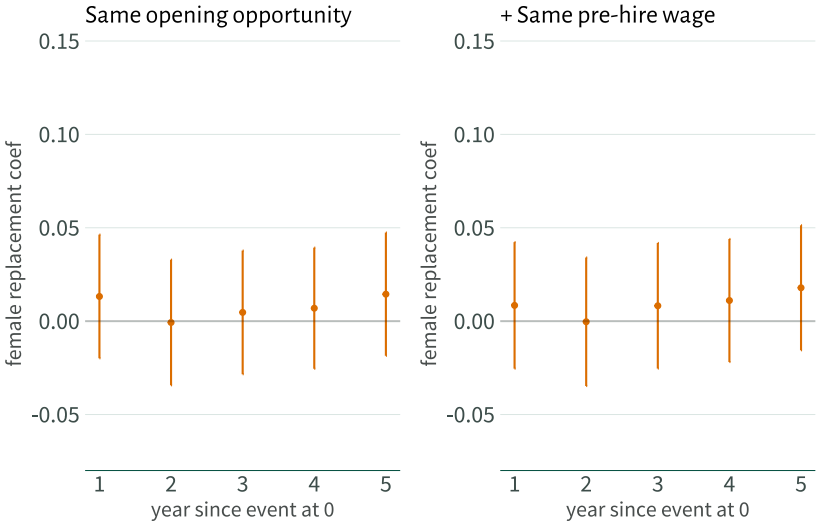



Log wage

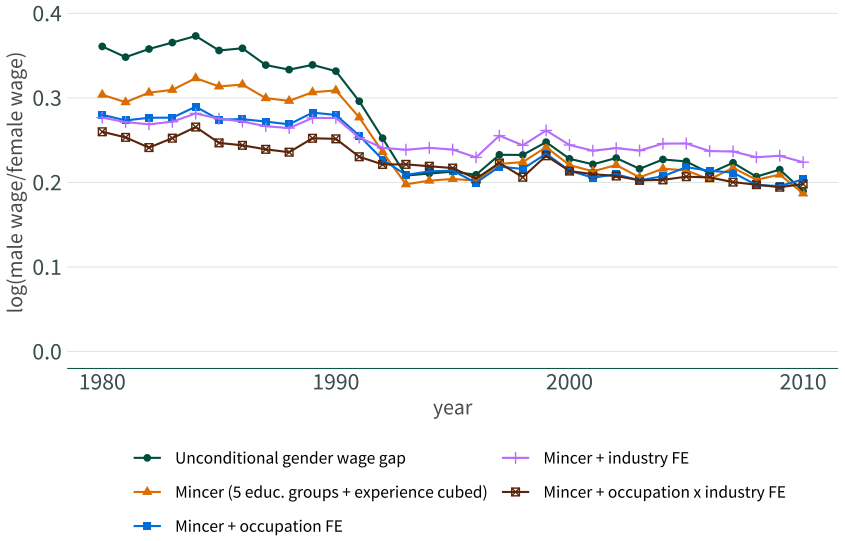
# Differential firm exit



# Staying at the same firm



# Gender wage gap of full-time movers



# Gender wage gap of full-time movers

## Controlling for pre-move wage

