

# Family-Friendly Firms and the Motherhood Penalty

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Introduction 

# Which Factors Explain the Motherhood Penalty?

- Persistent gender gaps in employment and earnings are largely driven by motherhood (Kleven et al., 2019).
- Mothers often reduce labor supply after their first childbirth (Kleven et al., 2024).
- One potential channel: women *sort into* more family-friendly jobs (Sorkin, 2018).
  - ▶ Sorting occurs across firms offering different levels of family-friendly benefits. public sector jobs, female CEOs (Kleven et al., 2019), higher female coworker shares (Hotz et al., 2017), or childcare-related benefits (Liu et al., 2021; Costas-Fernandez et al., 2024).
- **Open Questions:**
  1. When do mothers sort across firms?
  2. Which family-friendly amenities reduce post-birth employment and earnings losses?

# Measuring Firm Family-Friendliness: A Data Challenge

- Measuring firm-level family-friendliness is empirically challenging.
- Existing data sources have key limitations:
  - ▶ **Survey data:** Rich detail, but limited in time and sample coverage.
  - ▶ **Administrative data:** Comprehensive coverage, but lack information on workplace amenities.
  - ▶ **Scraped firm data:** Capture amenities and coverage, but miss demographics and family outcomes Liu et al., 2021.

⇒ First to combine administrative data with newly scraped amenity information

# What This Study Asks

1. Do mothers sort into more family-friendly firms?
  - ▶ If so, is this through job switching or differences in labor force survival?
2. Can firm-level amenities mitigate the motherhood penalty?
  - ▶ Which specific amenities most effectively reduce the career costs of childbearing?

⇒ *First detailed evidence linking firm-level amenities to motherhood penalties in Korea*

# Linking Admin Data with Firm-Level Amenity Information

- **Administrative Data:** Employer–Employee Matched Data and Business Registry
  - ▶ Linked to Population Census and Child Registry to identify childbirth timing.
- **Crowdsourced Amenity Data:**
  1. *Bokziri.com*: Information on fringe benefits (e.g., remote work, housing, family-related support).
  2. *Blind.com*: Employee ratings and workplace reviews.  
Covers ~90% of the top 1,000 firms; 12M registered users (as of March 2025).
- **Limitation:** Amenity data are time-invariant (scraped as of July 2023).

# What This Paper Documents

- Amenity information matched for 1,175 firms
  - ▶  $\approx 0.5\%$  of all 240,500 firms in Korea (2015–2020)
  - ▶ Represent 20.3% of total employment and 33% of total revenue
- The motherhood penalty reflects decisions to remain in the labor force.
  - ▶ Women initially employed at firms offering family-friendly benefits (e.g., generous leave, flexible hours) drop out **less** *post-childbirth*
- Quantifying the role of amenities:
  - ▶ *Difference-in-Differences*: Employment penalties are 33.6% lower for mothers initially working at firms with family-friendly benefits
  - ▶ *Causal Forest* (Athey & Wager, 2019): Onsite childcare and flexible work hours have the highest importance.



# What This Study Contributes

- **Motherhood Penalty Literature**
  - ▶ Provides the first firm-level evidence from Korea linking workplace institutions to variation in motherhood penalties.
- **Firm Amenities and Sorting Literature**
  - ▶ Shows that pre-birth sorting and post-birth retention at family-friendly firms account for much of the observed heterogeneity in child penalties.
- **Methodological Contribution (Causal Forest)**
  - ▶ Uses machine-learning-based causal forest methods to uncover which specific amenities (e.g., onsite childcare, flexibility) drive heterogeneity across firms.



## Data & Sample Construction

# Linking Administrative and Crowdsourced Data

- **Administrative Data (2015–2020):**

- ▶ **Business Register:** Firm-level characteristics matched with benefit data.
- ▶ **Employment Register:** Tracks workers' job spells and movements across firms.
- ▶ **Population Dynamics Register:** Records marriage and childbirth dates for 1983–1995 birth cohorts.

- **Crowdsourced Amenity Data:** Scraped  $\approx 1000$  firms as of July 2023

1. ***Bokziri.com***: Online platform reporting company benefit offerings 
  - ★ Entries are verified with HR representatives.  
e.g. remote work, vacation policy, onsite facilities, and family-related support.
2. ***TeamBlind.com***: Anonymous employee rating platform 
  - ★ Verified through corporate emails
  - ★ 12M users &  $\sim 90\%$  of top 1,000 firms (as of Mar 2025).  
5-point ratings on work–life balance, career growth, compensation, management, and culture.

# Linkage Between Administrative and Amenity Data

- **Firm-Level Linkage:**

- ▶ Amenity information successfully matched for 1,175 firms using *Bokziri.com*.
- ▶ Among these, 962 firms have additional company ratings from *TeamBlind.com*.
- ▶ Linked firms account for  $\approx 0.5\%$  of all 240,500 firms active in Korea (2015–2020).

- **Economic Coverage:**

- ▶ Linked firms represent 20.3% of total employment and 33% of total revenue among firms with 50+ employees in Korea (2015–2020).

- **Worker-Level Coverage:**

- ▶ Data on workplace benefits (*Bokziri*) cover 53% of job spells of workers born 1983–1995 employed at firms with 50+ employees.
- ▶ Sample restricted to full-time employees earning above the minimum wage and below 100M KRW ( $\approx \$100k$ ).

# Main Analysis Sample

- Amenity information not observed for all firms
  - ▶ Analyze using a subset of employees at *linked firms*
- **Target Population:**
  - ▶ Workers born 1983–1995 employed at registered firms with 50+ employees.
  - ▶ Focus on full-time employees earning above minimum wage and below 100M KRW ( $\approx$ \$100k in purchasing power).
  - ▶ Sample restricted to those experiencing childbirths during 2015–2020.
- **Motivation for Restriction:**
  - ▶ Bokziri and TeamBlind primarily reflect benefits and perceptions among young, high-skill, white-collar workers at medium and large firms.
  - ▶ Ensures consistency between survey-based amenity coverage and administrative worker sample.

# Definition of Family-Friendly Firms

- Firms classified as **Family-Friendly (FF)** if they meet at least one of the following criteria:
  1. **High Work–Life Balance Ratings:** Average rating above 4 (out of 5) on *TeamBlind.com*.
  2. **Family or Childcare Support Benefits:** Offer fertility, pregnancy, or childcare-related benefits (e.g., onsite childcare, paid leave after childbirth or miscarriage).
  3. **Flexible Work Arrangements:** Provide flexible hours, remote or hybrid options, or explicit limits on overtime.

# Descriptive Statistics of Target & Analysis Sample: Firms

<i>Panel A: Firm Characteristics</i>	Target Population		Available Data on Benefits		Diff	Std Err
	Mean	Std Dev	Mean	Std Dev		
Employment (Business Registry)	293	1305	1425	5146	1132	150.34
Average payroll (10k KRW)	303	162	408	207	105	6.12
Below-min-wage ratio	0.23	0.22	0.17	0.08	0.06	0.003
Female share (Business Registry)	0.34	0.25	0.32	0.20	-0.02	0.006
Average Job spells (months)	40.24	32.62	44.88	37.34	4.64	1.11
Revenue (1B KRW)	139.2	1425.7	1,176.3	5,895.8	1037.10	172.23
Number of Firms	N = 25,864		N = 1,175			

# Descriptive Statistics of Target & Analysis Sample: Workers

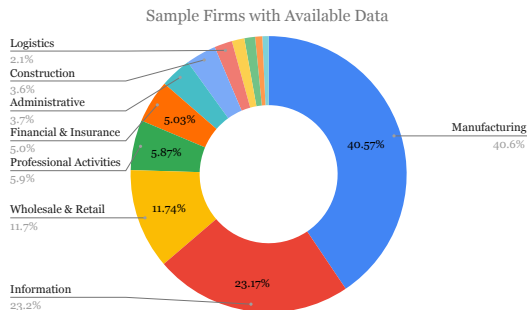
<i>Panel B: Job/Worker Characteristics</i>	Target Population		Available Data on Benefits		Diff	Std Err
	Mean	Std Dev	Mean	Std Dev		
Age at Hire (years)	29.6	3.6	29.7	3.6	0.08	(0.01)
Starting Salary (10k KRW)	3270.3	1986.4	3497.9	2320.6	227.6	(5.1)
Female (%)	0.419	0.493	0.368	0.482	-0.051	(0.001)
Married During Tenure (%)	0.267	0.442	0.248	0.432	-0.020	(0.001)
Childbirth During Tenure (%)	0.185	0.388	0.204	0.403	0.019	(0.001)
Family-Friendly Firm (%)	0.264	0.441	0.498	0.500	0.234	(0.001)
Number of Job Spells	N = 575,555		N = 304,533			



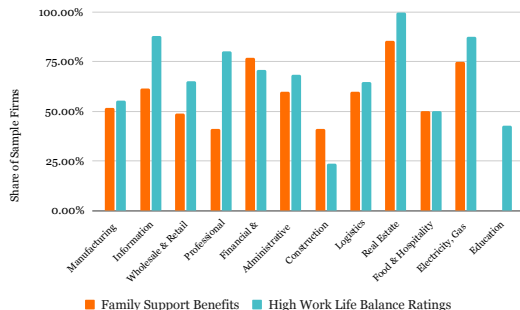
# Industry Composition of Firms with Available Data

- Linked Data cover 962 firms across 12 industries
- About 82% of sample firms provide at least one family friendly benefits
- About 50% of sample workers are employed at FF firms

(1) Sample Firms

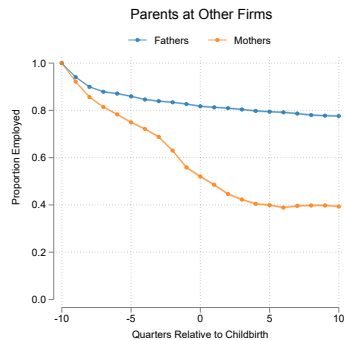
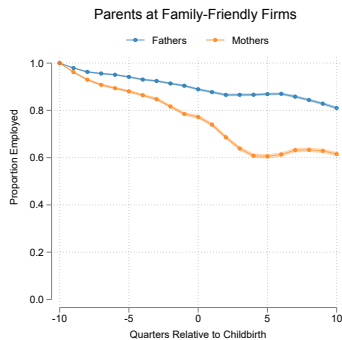
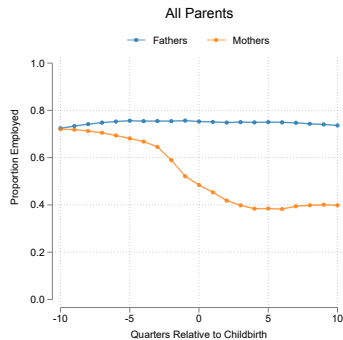


(2) Share of FF Firms by Industry



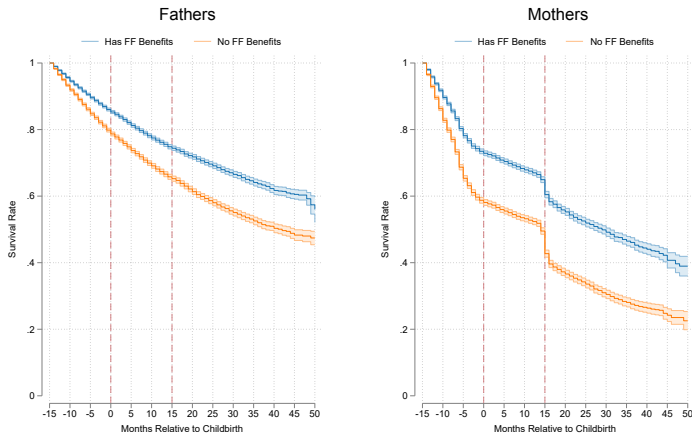
## Motivating Facts

# Fact 1: Mothers at FF firms are less likely to exit labor force



- Balanced Panel of Parents with childbirths between July, 2017 - June, 2018
  - ▶ (1) All parents in our sample, (2)&(3) Employed at firms in -10Q
- Mothers at FF firms are less likely to exit labor force ▶ Earnings
  - ▶ 60% vs. 40% are employed as of 10 quarters after childbirth

## Fact 2: Partially because they stay at these firms



- A fraction remaining employed at these firms since -15 months to childbirths
- Those with no data exhibit similar pattern as no FF firms ▶ NoInfo
- Similar patterns for subcategories ▶ FamilyBenefit ▶ WLB Rating

## Fact 3: Higher survival at FF firms Robust to Other Controls

- Cox model on separation hazard of parents with childbirths while at firms
- Other ratings, log salary, and Industry FE do not fully explain the differences

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family-Friendly Benefits	-0.409*** (0.017)	-0.414*** (0.018)	-0.409*** (0.017)	-0.420*** (0.017)	-0.305*** (0.017)	-0.379*** (0.018)	-0.293*** (0.018)
Company Culture Ratings		0.034 (0.033)					-0.022 (0.042)
Career Growth Ratings			0.001 (0.033)				-0.084** (0.040)
Management Ratings				0.294*** (0.051)			0.374*** (0.061)
Log Salary					-0.692*** (0.021)		-0.623*** (0.022)
N Job Spells	53479	53479	53479	53479	53479	53479	53479
Industry Indicators	-	-	-	-	-	Yes	Yes

# Quantifying the Role of Family-Friendly Amenities in Motherhood Penalties

# Two Approaches to Quantify the Role of Amenities

## 1. Difference-in-Differences Regression

- **Objective:** Quantify the average differences by family-friendliness of firms
- **Sample:** Female employees at firms linked to *Bokziri data* (amenity data)
  - ▶ Treated: Mothers giving first birth at these firms (2017–2020)
  - ▶ Control: Childless female coworkers of the same age at the same firm
  - ▶ 1:1 matching on age, tenure, income rank within firm, and commuting area
- Assign hypothetical event date following Kleven, Landais, & Leite-Mariante (2025)

## 2. Causal Forest Approach

- **Objective:** Document how the impact of childbirth on mothers' employment trajectories differs by firms' family-friendly amenities
- Matching-learning, data-driven identification of heterogeneity by firm-level amenity traits (Athey & Wager, 2019)

# Constructing Regression Analysis Sample

- First time mothers during 2017-2020 at firms linked to benefits data (*Bokziri*)
  - ▶ At least  $[-2, +3]$  years since childbirth observations
  - ▶ Mothers who are employed as of 1 or 2 years prior to childbirth at these firms
- Control: Childless female coworkers of the same age at the same firm
  - ▶ 1:1 matching on age, within firm earnings-by-tenure quartile, and commuting area to assign hypothetical event date
  - ▶ Within each bin, 1-1 caliper matching based on propensity score based on age, earnings, tenure
- Total 9,300 mothers at 683 firms are matched



# Descriptive Statistics of Regression Sample: Individuals

	Treat mean (sd)	Control mean (sd)	Diff. coef (se)
Age	27.56 (3.33)	29.28 (3.03)	-1.72*** (0.05)
Tenure (months)	34.97 (20.19)	35.05 (20.58)	-0.08 (0.30)
Annual earnings (10k KRW) (Pre-event)	3,383 (1,854)	3,421 (1,959)	-38.07 (27.97)
<i>Area Distribution (%)</i>			
Seoul-Incheon-Gyeonggi	72.9	72.9	-
Busan-Ulsan-Gyeongnam	10.1	10.1	-
Daejeon-Sejong-Chungcheong	7.9	7.9	-
N Individuals	9,300	9,300	-

- Treated (first-time mothers) are 1.7 years older than childless female colleagues
- Otherwise, similar in tenure and earnings, and area distribution

# Descriptive Statistics of Regression Sample: Firms

	Regression Sample		Available Data on Benefits	
<i>Panel A: Firm Characteristics</i>	Mean	Std Dev	Mean	Std Dev
Employment	2,268	6,592	1,425	5,146
Average payroll (10k KRW)	415	183	408	207
Below-min-wage ratio	0.17	0.07	0.17	0.08
Female share	0.37	0.20	0.32	0.20
Average Job spells (months)	45.79	36.21	44.88	37.34
Revenue (1B KRW)	1,886.7	7,628.6	1,176.3	5,895.8
N Firms		683		1,175

- Firms in the regression sample are larger in employment size
- Otherwise similar in average payroll, female share, and average job spell
- Industry composition is also similar across samples [► Industry](#)

# Part I. Difference-in-Differences Regressions

$$\Delta Y_{ibj} = \beta_{FF}(Treated_i \times FF_j) + \beta_T Treated_i + \gamma CovidBirth_{ib} + \delta_b + \omega_j + X_i' \Gamma + \varepsilon_{ibj}$$

- **Unit:** Individual  $i$  (with hypothetical childbirth  $b$ ) employed at pre-birth firm  $j$ .
  - ▶  $Treated_i$ : 1 if first-time mother.
  - ▶  $FF_j$ : 1 if pre-birth firm offers any family-friendly amenity:  
*Generous family leave, onsite childcare, flexible or remote work options.*
  - ▶  $CovidBirth_{ib}$ : 1 if childbirth in 2020Q1–2020Q4 (for treated individuals).
  - ▶  $\delta_b$ : birth-month-year fixed effects;  $\omega_j$ : pre-birth firm fixed effects.
  - ▶  $X_i$ : pre-birth demographics (age, tenure, commuting area), and match-year fixed effects (matched at  $t-1$  or  $t-2$  pre-birth).
- $\Delta Y_{ibj}$ : first-differenced outcome between pre-event and 3 years post-event
- Standard errors clustered at the firm level.

# Part I. Difference-in-Differences Regressions

$$\Delta Y_{ibj} = \beta_{FF}(Treated_i \times FF_j) + \beta_T Treated_i + \gamma CovidBirth_{ib} + \delta_b + \omega_j + X_i' \Gamma + \varepsilon_{ibj}$$

- **Unit:** Individual  $i$  (with hypothetical childbirth  $b$ ) employed at pre-birth firm  $j$ .
- $\Delta Y_{ibj}$ : first-differenced outcome between pre-event and 3 years post-event
  - ▶  $\Delta Y_{ib} = Y_{i,b+3} - Y_{i,b-1}$
  - ▶ Earnings relative to pre-birth levels
  - ▶ Employment in regular or any jobs
- Standard errors clustered at the firm level.

# Mothers at FF firms experience smaller impacts of childbearing

Dependent variable:	$\Delta$ Earnings (Rel. Pre-Level)	$\Delta$ Employed in Regular Job	$\Delta$ Employed Any Job
$Treated \times FF \text{ Amenity}$	0.202* (0.104)	0.089** (0.0275)	0.070** (0.0231)
Treated	-0.981*** (0.102)	-0.264*** (0.0255)	-0.198*** (0.0214)
Childbirth date FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Matching-year FE	Yes	Yes	Yes
Demographic controls: age, tenure, Covid birth FE, Area FE			
Observations	18,600	18,600	18,600
R-squared	0.162	0.195	0.130

- *Treated* shows a negative effect, while  $Treated \times FF$  offsets part of this loss
- Mothers employed at family-friendly (FF) firms experience smaller declines in earnings and employment after childbirth

# Which amenities are most associated with smaller impacts?

- We observe myriads of different amenities being listed under each firm

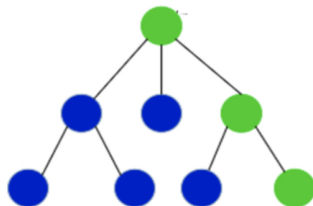
Example of Amenities associated with Regression Sample

Amenity	Firms (%)	Workers (%)	Amenity	Firms (%)	Workers (%)
Meals Subsidy	80.5	76.9	Onsite Gym	23.0	20.2
Health Check up	79.1	74.2	Company Housing	22.8	16.5
Long Service Award	60.8	49.1	Onsite Childcare	20.6	36.0
Housing Subsidy	46.1	47.9	Commuting Bus	14.5	15.3
Childbirth Leave	38.5	46.3	Overtime Subsidy	14.3	13.7
Paternity Leave	36.2	40.8	Remote Work	14.2	15.7
Convenience Facility	31.3	23.5	Flexible PTO Usage	13.8	8.2
Employee Benefit Credits	27.5	31.5	Horizontal Culture	6.4	4.6
Flexible hours	26.6	31.3	Miscarriage Leave	4.8	9.5

⇒ *Need a data driven approach*

## Part II. Causal Forest (Athey & Wager, 2019)

- Estimate heterogeneous **TEs** using a **machine learning** approach
- Partition the data into subgroups with different treatment effects (Athey & Imbens, 2016)
- Causal Trees extend decision trees to estimate subgroup-specific treatment effects



- Each split is chosen to maximize the variance of  $\hat{\tau}(x)$  across partitions
- Estimates **TE** heterogeneity using  $(Post - Pre)$  differences in outcomes

*Wang(2021): Effect of Medicaid on wait times by hospital characteristics*

*Miao et al. (2021): Effect of surge pricing on drivers' labor supply by demographics*

# Aggregating Individual Treatment Effects by Amenity

**Assumption:** Unconfoundedness  $\{Y_i(0), Y_i(1)\} \perp W_i \mid X_i$

where  $X_i$  represents amenities and other covariates, and  $W_i$  indicates childbirth status.

## Conditional Average Treatment Effect (CATE)

$$\tau(x) = E[Y_i(1) - Y_i(0) \mid X_i = x]$$

## Estimation of Treatment Effects

$$\hat{\tau}(x) = \frac{1}{|\{i : W_i = 1, X_i \in L(x)\}|} \sum Y_i - \frac{1}{|\{j : W_j = 0, X_j \in L(x)\}|} \sum Y_j$$

- Each level  $L(x)$  partitions the data by similar amenity and worker characteristics
- Within-level estimates capture individual-level heterogeneity in the child penalty
- Aggregating  $\hat{\tau}(x)$  across leaves enables comparisons of heterogeneous **TEs** across industries, amenity groups, and other dimensions.



# Estimating TEs by Amenity

## Outcome Variables

- Growth in annual earnings: Avg. annual earnings (post 3 yrs) / Avg. annual earnings (pre 1 yr)
- Employed in 3 years: Employed at the firm 3 years after childbirth
- $\Delta$  Annual earnings: Avg. annual earnings (post 2 yrs – pre 2 yrs)
- $\Delta$  Worked months: Avg. worked months (post 2 yrs – pre 2 yrs)

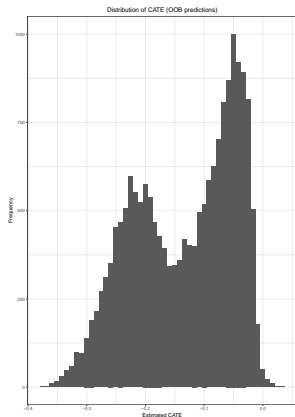
## Covariates for Heterogeneity Analysis

- *Demographics*: Age, tenure at current firm as of childbirth date.
- *Calendar time fixed effects*: Birth-month fixed effects.
- *Firm-level amenities*: 50 amenity indicators

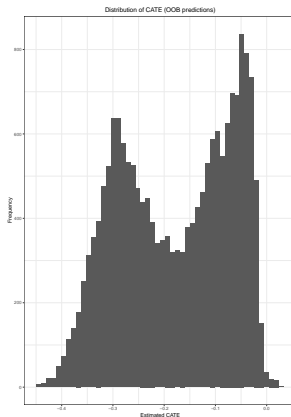
# Substantial Heterogeneity in Impact of Childbearing

- Estimated  $\hat{\tau}_i$  at individual level: effects of childbearing in 3 years post-birth

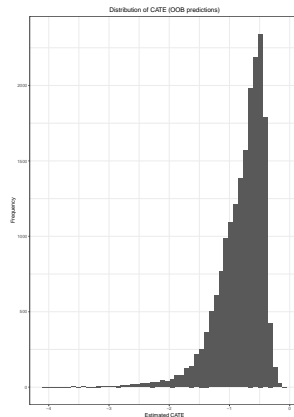
**Employment Probability**



**Employment in Regular Jobs**



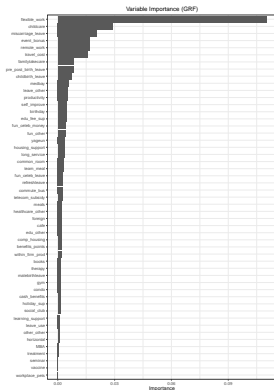
**Earnings Rel. to Pre-birth**



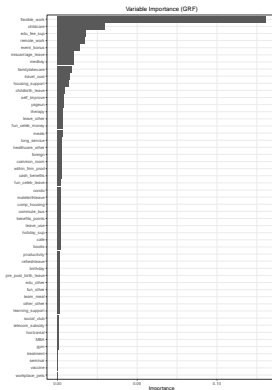
# Which covariates (Amenity) are most explanatory of CATE?

- We rank amenity indicators by their importance in explaining **TE** variance  
*Importance in explaining the difference in impact of childbearing*
- **Flexible workhours & Onsite childcare** most explanatory

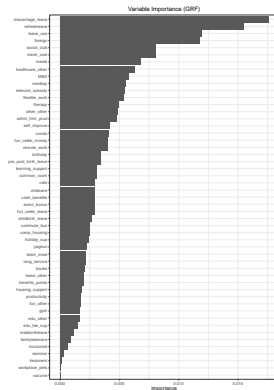
Employment Probability



Employment in Regular Jobs



Earnings Rel. to Pre-birth

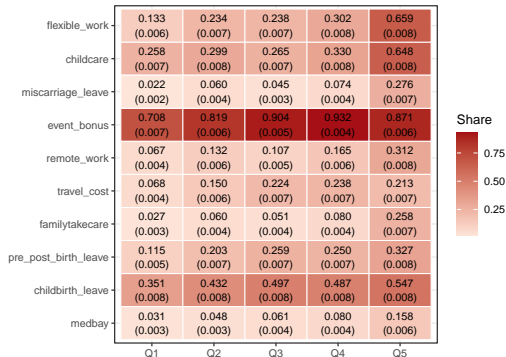


# Those with *smallest* penalty work at firms with FF amenity

- (y-axis) We compute the share of workers at firms providing each amenity
- (x-axis) quintile of their  $\hat{\tau}(x)$ , child penalty, with Q5 smallest reduction

## CATE on Employment Probability

Amenity Shares by CATE Quintile (Top 10 by VI)



# Discussion

- Significant heterogeneity in the effect of childbearing on mothers' employment and earnings within three years after childbirth.
- Among all covariates, **flexible workhours** and **onsite childcare** show the strongest explanatory power across outcomes:
  - ▶ Flexible hours explain 11–13% and onsite childcare about 3% of the variance in treatment effects.
  - ▶ Tenure explains 43–45%, area 6–11%, remote work 1.4–1.6%, and family-related leave 0.8–2%.
- **Interpretation:** Amenities that facilitate sustained work–family balance—particularly flexible hours and onsite childcare—are most associated with smaller motherhood penalties.
- Individuals with smaller estimated impacts (CATE Q5) are more likely to work at firms offering these family-friendly amenities.

# Conclusion

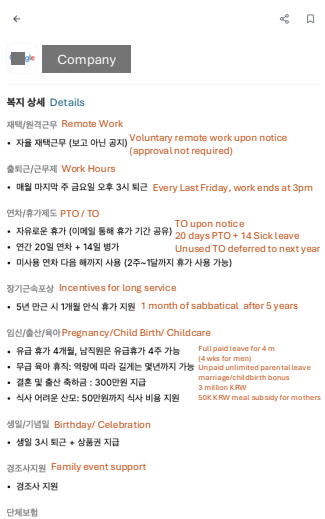
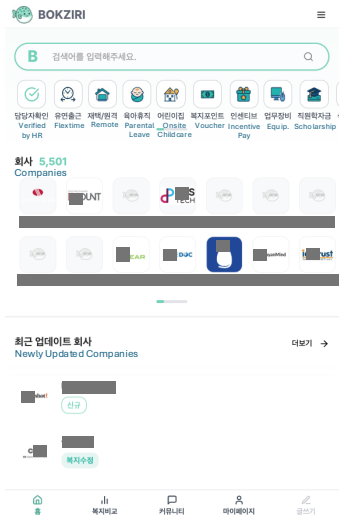
- **RQ:** Which firm amenities mitigate the motherhood penalty?
  - ▶ First to link large-scale administrative data with firm-level amenity information.
  - ▶ First to document amenity-level heterogeneity in motherhood penalties using machine-learning methods
- We find:
  - ▶ Mothers at **family-friendly firms** experience smaller declines in employment and earnings after childbirth.
  - ▶ Substantial heterogeneity remains even after controlling for demographics and firm traits.
  - ▶ **Flexible workhours** and **onsite childcare** explain most of the variation in effects.
- Firm-side policies can complement public programs in retaining female talent

## Appendix







# Bokziri.com Website





# Blind.com Website

 홈 기업 리뷰 금주의 특가 AD

 Company  
★ 4.6 (577개 리뷰)

Company

은(는) 일해 보고 싶은 회사인가요?    
*Would you say this company is a good place to work?*

소개  
Company Information

리뷰  
Ratings

게시글  
Board

연봉  
Salary

뉴스  
News

갤러리  
Photos

Company

## 리뷰

### Overall Ratings

4.6 ★★★★★ 577개 리뷰

5 ★

4 ★

3 ★

2 ★

1 ★

### Ratings by Category

항목별 평점

4.5 ★

커리어 향상 **Career Growth**

4.5 ★

업무와 삶의 균형 **Work-life Balance**

4.5 ★

급여 및 복지 **Compensation & Benefits**

4.5 ★

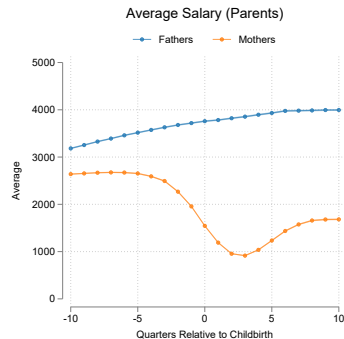
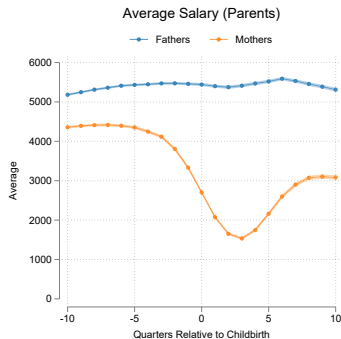
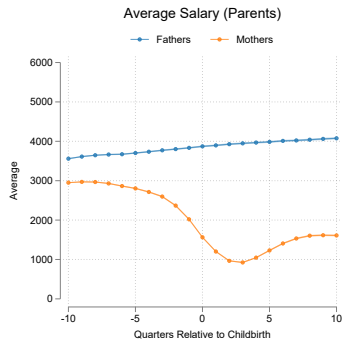
사내 문화 **Corporate Culture**

4.1 ★

경영진 **Management**

[▶ Back](#)

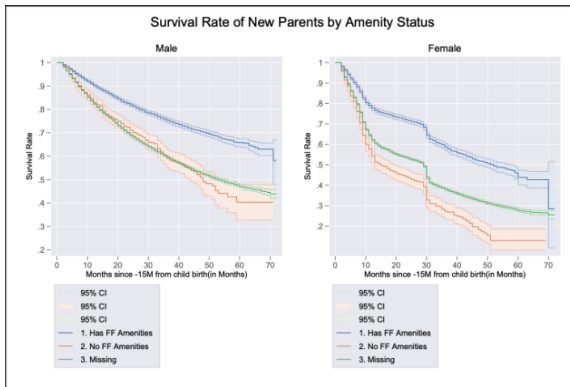
# Earnings of Mothers at FF firms recover Post Childbirth



- Balanced Panel of Parents with childbirths between July, 2017 - June, 2018
  - (1) All parents in our sample, (2)&(3) Employed at firms in -10Q
- Earnings bounce back more for mothers at FF firms than those at other firms [▶ Back](#)

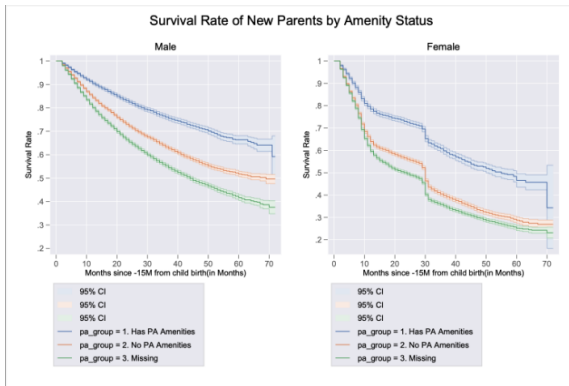
# Survival Rate: Including Firms with No Information

- A fraction remaining employed at family-friendly firms, others, and firms with no information



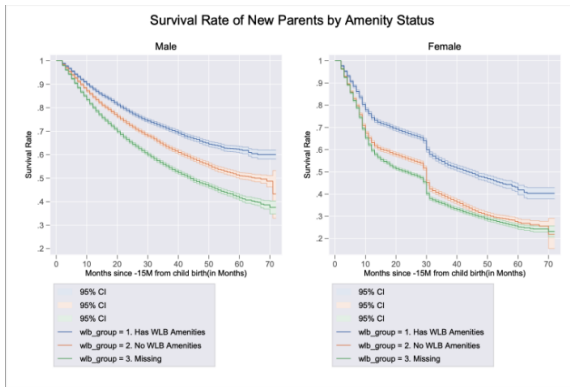
# Survival Rate by Family Benefit

- A fraction remaining employed at firms with family related benefefits, no benefits, and no information



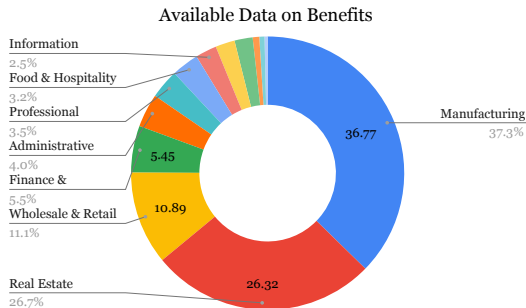
# Survival Rate by WLB rating

- A fraction remaining employed at firms with high, or low work life balance ratings, or no information

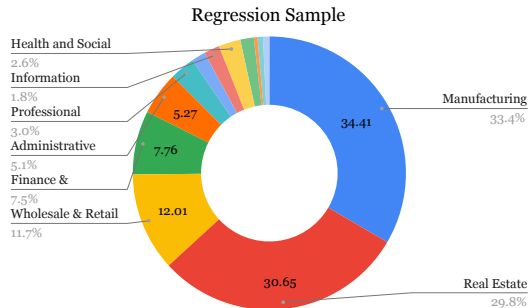


# Industry Composition of Regression Sample

## Firms with Data on Amenity (*Bokziri* data)



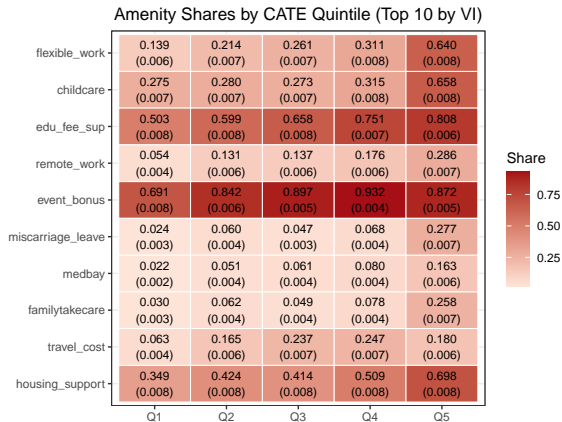
## Firms in Regression Sample



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# Share of Amenity by CATE on Regular Employment

- (y-axis) We compute the share of workers at firms providing each amenity
- (x-axis) by quintile of their  $\hat{\tau}(x)$ , child penalty, with Q5 smallest penalty





# Share of Amenity by CATE on Earnings

- (y-axis) We compute the share of workers at firms providing each amenity
- (x-axis) by quintile of their  $\hat{\tau}(x)$ , child penalty, with Q5 smallest penalty

