Minding Your Business or Your Child? Motherhood and the Entrepreneurship Gap

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Introduction

- Child penalties account for most of remaining earnings inequality between men and women (Kleven, Landais and Sogaard, 2019)
- Children permanently impact mothers' careers
 - More likely to leave the labor force
 - Less likely to take on a managerial role
- Talent misallocation hampers growth (Hsieh et al., 2019)
- What happens when mothers are not easily repleaceable? Are there spillovers from mothers' careers to firms and other workers?

- Entrepreneurship setting: young firms heavily rely on human capital of the founder (Becker and Hvide, 2022)
- Entrepreneurship important for job creation and innovation (Haltiwanger et al. 2013)
- Q: What is the effect of children on women's entrepreneurial activity?
 - Performance of women-owned firms
 - Women's entrepreneurial careers
 - Workers' careers
- What is the importance of women's preferences vs. external frictions? Is there a role for family policies?
- Heavy data requirement: household structure, including birth of children; firm ownership; balance sheets; workers' history

1. Gender gap in entrepreneurship

- Preferences (Fossen, 2012; Caliendo, Fossen and Kritikos, 2014; Yang and Aldrich, 2014; Burke, Fitzroy and Nolan, 2002)
- Frictions
 - Biases in credit markets (Hebert, 2020; Ewens and Townsend, 2020)
 - Peer effects and networks (Markussen and Røed, 2017)
 - Reproductive healthcare (Zandberg 2020, Core 2022)
- 2. Child penalty in labor markets (Kleven, Landais and Søgaard, 2019, 2021; Andresen and Nix, 2022; Kleven, 2022)

Empirical Design

- Canadian Employer-Employee Dynamics Dataset (CEEDD), 2001-2017
- Administrative dataset compiled by Statistics Canada from different sources:
 - T1 Personal Tax File: individual income and demographic information (e.g. age, gender, marital status)
 - T1 Family File: family identifiers, allows to connect family members over time
 - Canada Child Tax Benefit
 - T2 corporate tax file: firm financial statements
 - T2 Schedule 50: firm ownership structure for all Canadian-controlled private corporations
 - T4 statement of remuneration file: annual earnings
 - Immigration database

- 1. Event study around first childbirth
 - 1.1 Matched sample of mothers and women without children
 - 1.2 Comparison between mothers and fathers
 - Informs us about the gender gap due to children
 - Alleviates concerns about unobservable differences between parents and non-parents
 - Both approaches estimate aggregate effect of all children, including after first-born
- 2. IV based on siblings sex mix (Angrist and Evans, 1998)

Instrument

• Estimate effect of third child

Main Results

Firms

- Panel of women entrepreneurs who have their first child at event time t=0
- Restrict to women who were entrepreneurs for at least two years before childbirth
- Match at t = -2 to women-firm pairs with no children
 - Caliper matching
 - Exact: year, marital status, NAICS-4
 - Fuzzy: age (5 years caliper), income, family income (25 percentile), firm age (1 year)

$$Y_{ft} = \sum_{j \neq -2} \alpha_j \mathbb{I}_{[j=t]} + \sum_{j \neq -2} \beta_j \mathbb{I}_{[j=t]} \times \mathbb{I}_{[Mother]} + \gamma X_{ft} + FE + \epsilon_{ft}$$

- Controls X_{ft} : age, firm age, marital status
- FE: firm, industry × province × year

Firm Performance Deteriorates



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- Effects are concentrated among young firms
- Effects are driven by founders
- · Birth is more likely and effects are larger in periods of high industry growth
- Sample of women who have their first child after 35
- Results not dependent on matching algorithm
- Performance drops even for top firms
- Having a co-founder helps



- Firms owned by mothers or fathers for at least 2 years before first childbirth
- Exclude firms jointly owned by spouses
- Estimate equations for men and women separately:

$$Y_{ft}^g = \sum_{j \neq -2} \alpha_j^g \mathbb{I}[j=t] + X_{ft} + FE + \epsilon_{ft}^g$$

• Child penalty for women relative to men at time t: $P_t \equiv \frac{\hat{\alpha}_t^m - \hat{\alpha}_t^w}{\mathbb{E}[\tilde{Y}_{ist}^w|t]}$, where \tilde{Y}_{ist}^w is the predicted outcome omitting the event dummies

Gender Gap in Firm Performance Increases





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Entrepreneurs' outcomes

Entrepreneurial Careers





Workers

Workers' Careers Are Disrupted



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- Compared to a matched group of women, mothers' firms lose \sim 20% sales and profits
- Results are quantitatively similar when comparing mothers and fathers
- Results are driven by founders and concentrated in young firms
- Childbirth explains 47% of gender gap in sales and 54% of gender gap in profits
- Female entrepreneurs lose 22% of their income relative to fathers
- Mothers are less likely to start new ventures
- Workers' earnings decrease by 3%, probability that they receive income from El increases by 1%

Mechanisms

- Women are more likely to be the secondary earners in the household
- Couples might rationally decide that the secondary earner takes on childcare responsibilities
- Are results driven by within-household specialization?
- If women being secondary earners drives results, negative effects should be smaller for mothers who were breadwinners before childbirth
- The impact of childbirth on household income should not differ systematically between couples where the breadwinner is female versus male

Labor Market Advantage and Firm Outcomes

	Log Sales	Profits	Profit margin	Household income
Dest x Mathem	-0.348***	-22,310***	-0.077***	0.073***
Post × Mother	(0.035)	(2016)	(0.011)	(0.016)
Post X Mother X Preadwinner	0.143***	1111	0.014	-0.067***
Post × Mother × Breadwinner	(0.048)	(2704)	(0.017)	(0.024)
Controls	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes
Ν	86,110	93,745	86,110	227,195

- Even firms with a breadwinner entrepreneur experience large declines after childbirth
- Household income declines in families with a mother breadwinner relative to families with a father breadwinner
- If all women were breadwinners, we would close the gender gap in firm outcomes by at most \sim one third

- In cultures with "traditional" gender norms, women may face societal disapproval if they prioritize career over caregiving
- *Epidemiological approach*: based on idea that immigrants face the same economic environment, but carry the cultural values of their home countries (Fernandez, 2011)
- Compare effect of childbirth for second-generation Canadians from traditional vs. egalitarian cultures
- Country of ancestry: administrative immigration records (IMDB)
- Gender norms by country of ancestry: World Values Survey



Culture and Firm Outcomes

Mothers			Fathers			
Sales	Profits	Profit margin	Sales	Profits	Profit margin	
-0.256**	-34,205***	-0.141**	0.176**	-1952.81	0.027	
(0.123)	(4705)	(0.061)	(0.070)	(5718)	(0.033)	
Yes	Yes	Yes	Yes	Yes	Yes	
Yes	Yes	Yes	Yes	Yes	Yes	
Yes	Yes	Yes	Yes	Yes	Yes	
Yes	Yes	Yes	Yes	Yes	Yes	
8,525	9,475	8,525	31,430	34,845	31,430	
	Sales -0.256** (0.123) Yes Yes Yes Yes 8,525	Mothers Sales Profits -0.256** -34,205*** (0.123) (4705) Yes Yes S,525 9,475	Mothers Sales Profits Profit margin -0.256** -34,205*** -0.141** (0.123) (4705) (0.061) Yes Yes Yes Ses Yes Yes Ses 9,475 8,525	Mothers Profit Profit Sales -0.256** -34,205*** -0.141** 0.176** (0.123) (4705) (0.061) (0.070) Yes Yes Yes Yes Sales Yes Yes Yes Sales Yes Yes Yes Yes Yes Yes Yes Sales 9,475 8,525 31,430	MothersFathersSalesProfits marginSalesProfits Profits-0.256**-34,205***-0.141**0.176**-1952.81(0.123)(4705)(0.061)(0.070)(5718)YesS5259,4758,52531,43034,845	

• Women whose parents originated from traditional cultures experience larger declines in firm outcomes

- 1. Informal, e.g. family networks
 - Grandparents are an important source of informal childcare (Zamarro, 2020)
 - Does proximity to grandparents improve entrepreneurial outcomes for new mothers?
 - Compare mothers who live in the same municipality as grandparents to mothers who do not live in the same municipality
 - Event study around grandmother retirement
- 2. Formal: public or private daycare centres
 - Exploit expansion of centre-based childcare at municipality level

Access to Informal Childcare

	Mothers			Fathers			
	Sales	Profits	Profit margin	Sales	Profits	Profit margin	
Post \times Close to grandma	0.133*** (0.035)	5,728** (2287)	0.042** (0.021)	0.019 (0.019)	-3748*** (1338)	0.015 (0.009)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	
Industry $ imes$ province $ imes$ year FE	Yes	Yes	Yes	Yes	Yes	Yes	
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	
Ν	49,770	54,820	49,770	236,635	259,890	236,635	

• Proximity to grandparents improves entrepreneurial outcomes for mothers

• Effects are stronger during early childhood

Event study

Event Study: Grandmother Retirement



Sample an

Grandfather

- Falsification: grandfather retirement
- Effect is concentrated among women in municipalities in which centre-based childcare provision is lacking

	Sales	Profits	Profit margin
Deat V Devent	-0.048	711	-0.054*
Post × Parent	(0.041)	(2,992)	(0.029)
Post y Parant y Young Child	0.113**	4,625	0.072***
	(0.050)	(3,913)	(0.027)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Industry $ imes$ year FE	Yes	Yes	Yes
Municipality $ imes$ year FE	Yes	Yes	Yes
N	58,335	58,335	58,335

Sample and design

Conclusion

- Childbirth has a large, negative effect on women's entrepreneurial activity, both at the extensive and intensive margins
- Effects are permanent: entrepreneurial outcomes never recover to pre-birth levels
- Effect is concentrated among young start-ups, which are more dependent on founders' human capital
- Labor market advantage within household doesn't fully explain results
- Childcare availability and belonging to a culture with egalitarian gender norms improves outcomes for mothers

Appendix

Descriptive Statistics

Variables: firms		Raw	Treated	Control
E mite ale ma	mean	78.20	80.42	83.22
Equity snare	SD	(29.09)	(28.14)	(26.78)
Acceta (lam)	mean	10.78	11.00	10.93
Assets (log)	SD	(2.68)	(2.47)	(2.46)
Not in some (000)	mean	30.54	40.70	40.03
Net Income (000)	SD	(82.44)	(90.85)	(90.43)
Variables: entrepreneurs		Raw	Treated	Control
	mean	64.46	71 13	70 57

-				
Total income (000)	mean	64.46	71.13	70.57
	SD	(115.97)	(111.63)	(98.54)
Family income (000)	mean	127.71	133.58	132.46
	SD	(205.50)	(190.19)	(234.70)
Married	%	65	59	59
N		20,865	11,484	11,484

Firm Life Cycle: Stronger Effects for Young Start-ups



Placebo: Angel Investors



Business Cycle





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Women Over 35





(d) Profit margin



Randomly Assigned Birth Events



- Panel of women who have their first child at event time t=0
- Match to women with no children at t = -2
 - Exact: year, marital status, birth year, Census Metropolitan Area
 - Fuzzy: income, family income (2 percentile caliper)
- Specification:

$$Y_{it} = \sum_{j \neq -2} \alpha_j \mathbb{I}_{[j=t]} + \sum_{j \neq -2} \frac{\beta_j}{\beta_j} \mathbb{I}_{[j=t]} \times \mathbb{I}_{[Mother]} + \gamma X_{it} + FE + \epsilon_{it}$$

- Controls X_{it} : age, marital status
- FE: individual, province×year

Entry

Gap in Entry Rates: Long Run



Mothers vs. Fathers

Gap in Entry Rates Grows



Long run

- Sex of the first two children as an instrument for the birth of a third child (Angrist and Evans, 1998)
- IV estimates effect of third child for mothers who only have a third child because the first two are of the same sex (LATE)
- Estimate using sample of women with at least two children:

$$Y_{ft} = \sum_{j \neq -2} \alpha_j \mathbb{I}[j=t] + X_{ft} + FE + \epsilon_{ft}$$

- $\mathbb{I}[j=t]$ denote event times relative to the birth of the third child
- Each indicator is instrumented by the interaction $\mathbb{I}[j = t] \times \mathbb{I}[\text{same sex}]$

Children's Sex and Family Size

	Third child	Third child	Third child	Second child
Same sex	0.047*** (0.006)			
Two sons		0.045*** (0.008)		
Two daughters		0.049*** (0.008)		
First-born daughter			0.001 (0.002)	0.002 (0.004)
Controls	Yes	Yes	Yes	Yes
Province $ imes$ year FE	Yes	Yes	Yes	Yes
R^2	0.020	0.020	0.042	0.207
Ν	77,260	77,260	253,500	253,500
F-statistic	45.15	33.86		

- Unconditional probability of having a third child is $\sim 13\% \rightarrow$ effect of IV is large
- No evidence that systematic preference for boys creates a large population of defiers

Effect of Third Child on Firm Outcomes: IV



IV vs. OLS





World Values Survey's Questions

- 1. A working mother can establish just as warm and secure a relationship with her children as a mother who does not work.
- 2. Both the husband and wife should contribute to household income.
- 3. When jobs are scarce, men should have more right to a job than women.
- 4. On the whole, men make better political leaders than women do.
- 5. A university education is more important for a boy than for a girl.
- 6. On the whole, men make better business executives than women do.
- 7. If a woman earns more money than her husband, it's almost certain to cause problems.
- 8. When a mother works for pay, the children suffer.
- 9. Do you think that a woman has to have children in order to be fulfilled or is this not necessary?
 Back to cl

Gender Norms: World Values Survey



Back to culture

Event Study: Informal Childcare



• Figures show coefficients for Event Time imes Close to grandparents

- Restrict the sample to parents who can be linked to their families of origin (grandparents) through tax file T1
- Restrict sample to mothers who don't experience birth during entrepreneurship spell (so selection into motherhood is not triggered by grandmother retirement)
- Compare effect of grandmother retirement for mothers who live in the same municipality as grandmother vs. different municipality

$$Y_{ft} = \sum_{j \neq -1} \alpha_j \mathbb{I}_{[j=t]} + \sum_{j \neq -1} \frac{\beta_j}{\beta_j} \mathbb{I}_{[j=t]} \times \mathbb{I}_{[Neighbor_{ft}]} + \gamma X_{ft} + FE + \epsilon_{ft}$$



Grandmother Retirement and Centre-Based Childcare

	Sales	Profits	Profit margin
Post v Close to grandma	0.217***	16,016**	0.144**
Fost × Close to grandina	(0.065)	(6,354)	(0.071)
Post y Close to grandma y High childran	-0.176**	-16,515**	-0.212***
	(0.073)	(7,149)	(0.080)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Industry $ imes$ year FE	Yes	Yes	Yes
Municipality $ imes$ year FE	Yes	Yes	Yes
Ν	37,190	37,190	37,190

- Matched sample restricted to parents of a child between 0 and 6 years old
- Parents of a young child (0-2 years old) should be most affected by childcare expansion
- Ratio of workers in childcare centres to children under 2 within a municipality
- Increases of at least 1 SD in a single year

 $Y_{ft} = \mathsf{Post} \; \mathsf{Expansion} \times \mathsf{Parent} \times \mathsf{Young} \; \mathsf{child} + FE + \epsilon_{ft}$

- Version of Lucas (1978) with labor-leisure trade-off and fertility choices
- Agents are heterogeneous in productivity $z \in [0, \bar{z}]$
- All workers receive wage w
- Entrepreneurs receive firm profits, which depend on productivity
- Workers have to work h_w hours, earning $W=w\cdot h_w$
- Entrepreneurs have the *flexibility* of optimally choosing their working hours
- An individual who works h hours enjoys H-h hours of leisure

- The firm uses workers' labor and the founder's labor as inputs
- Individuals maximize the following value function by choosing wage work (x = 0) or entrepreneurship (x = 1):

$$V(z,W) = \max_{x \in \{0,1\}} \left\{ (1-x) \left[W + \frac{(H-h_w)^{1-\gamma}}{1-\gamma} \right] + x \max_{n,h} \left[f(z,h,n) - Wn + \frac{(H-h)^{1-\gamma}}{1-\gamma} \right] \right\}$$

• **Proposition 1**: For any given W, there exists a single threshold \hat{z} s.t. individuals with $z > \hat{z}$ choose to become entrepreneurs



Equilibrium conditions

• 1. Labor market clears:

$$F(\hat{z}(W)) = \int_{\hat{z}(W)}^{\overline{z}} n^*(z, W) dF(z)$$

2. Marginal entrepreneur is indifferent:

$$W + \frac{(H - h_w)^{1 - \gamma}}{1 - \gamma} = f^*(\hat{z}, W) - Wn^*(\hat{z}, W) + \frac{(H - h^*(\hat{z}, W))^{1 - \gamma}}{1 - \gamma}$$

- Two periods
- At the beginning of the second period, individuals draw a valuation of children $b \in [\underline{b}, \overline{b}]$
- Women with children incur an additional disutility of hours worked $\phi(h),$ where $\phi_h>0$ and $\phi_{hh}\geq 0$
 - Alternatively, women with children must devote κ hours to child-rearing, so total number of hours is now $H'=H-\kappa$
- Workers with children switch to a part-time contract; non-parents work h_1 , parents work $h_2 < h_1$ hours



- Proposition 2: For any given w, there exist thresholds ẑ₁(w) s.t. women without children with z ≥ ẑ₁(w) become entrepreneurs and ẑ₂(w) s.t. mothers with z ≥ ẑ₂(w) become entrepreneurs.
- Entrepreneurial labour supply decreases—given z and w—if the entrepreneur chooses to have children: $h' < h^{\ast}...$
- ...leading to a decline in firm performance
- Effect on entrepreneurship rates depend on whether $\hat{z}_2(w)$ or $\hat{z}_1(w)$ is greater

Equilibrium





- 1. More productive individuals are more likely to be entrepreneurs
- 2. Entrepreneurs with children decrease own labor supply to the firm \rightarrow decline in firm performance
- 3. Effect of childbirth on entrepreneurial participation is ambiguous
 - Flexibility makes entrepreneurship more appealing for mothers
 - But if firm's production function relies heavily on founder's labor, reducing work hours could be too costly
 - Labor market institutions matter too
- 4. Fertility is lower at the top of the distribution



- Firm profits are increasing at a decreasing rate in both workers' labor and founder's labor: $f_n > 0$, $f_h > 0$, $f_{nn} < 0$, $f_{hh} < 0$
- Joint concavity in n and h, implying positive determinant of the Hessian matrix:

$$f_{nn}f_{hh} - f_{hn}f_{nh} = f_{nn}f_{hh} - (f_{hn})^2 > 0.$$

• Complementarity among inputs and between inputs and productivity: $f_{nh} > 0, f_{zh} > 0, f_{zn} > 0$

• Part-time regime is welfare-improving for workers:

$$wh_1 + \frac{(H-h_1)^{1-\gamma}}{1-\gamma} - \phi(h_1) < wh_2 + \frac{(H-h_2)^{1-\gamma}}{1-\gamma} - \phi(h_2)$$

• A worker with the minimum possible benefit \underline{b} does not want children:

$$wh_1 + \frac{(H-h_1)^{1-\gamma}}{1-\gamma} > wh_2 + \underline{b} + \frac{(H-h_2)^{1-\gamma}}{1-\gamma} - \phi(h_2)$$

• Combining these two conditions, we obtain: $\underline{b} < \phi(h_1)$

Decision to Have Children

• If $z < \hat{z}_1(w)$, so that x = 0, choose to have children iff:

$$b(z < z_1(w)) \ge w(h_1 - h_2) + \frac{(H - h_1)^{1 - \gamma} - (H - h_2)^{1 - \gamma}}{1 - \gamma} + \phi(h_2)$$

• If $z \ge \hat{z}_2(w)$, so that x = 1, choose to have children iff:

$$b(z \ge \hat{z}_2(w)) \ge f_1(z) - f_2(z),$$

where $f_1(z)$ is the value function of entrepreneur w/o children and $f_2(z)$ the value function of the entrepreneur with children

If \$\hat{z}_1(w) < z < \hat{z}_2(w)\$, she either chooses work + children or entrepreneurship + no children:

$$b(\hat{z}_1(w) \le z < \hat{z}_2(w)) \ge f_1(z) - wh_2 - \frac{(H - h_2)^{1 - \gamma}}{1 - \gamma} + \phi(h_2)$$

Strategy when $\hat{z}_2(w) > \hat{z}_1(w)$

$$(x,y) = \begin{cases} (1,1) & \text{ if } z \ge \hat{z}_2(w) \ \& \ b \ge b(z) \\ (1,0) & \text{ if } z \ge \hat{z}_2(w) \ \& \ b < b(z) \\ (1,0) & \text{ if } z \in [\hat{z}_1(w), \hat{z}_2(w)) \ \& \ b < b(z) \\ (0,1) & \text{ if } z \in [\hat{z}_1(w), \hat{z}_2(w)) \ \& \ b \ge b(z) \\ (0,1) & \text{ if } z < \hat{z}_1(w) \ \& \ b \ge b(z) \\ (0,0) & \text{ if } z < \hat{z}_2(w) \ \& \ b < b(z) \end{cases}$$

• Labor market clearing:

$$\int_{\underline{z}}^{\hat{z}_1} \int_{\underline{b}}^{\hat{b}(z)} h_1 dF(z) d\Theta(b) + \int_{\underline{z}}^{\hat{z}_2} \int_{\underline{b}}^{\hat{b}(z)} h_2 dF(z) d\Theta(b) =$$
$$= \int_{1}^{\overline{z}} \int_{1}^{\hat{b}(z)} n^*(z, w) dF(z) d\Theta(b) + \int_{1}^{\overline{z}} \int_{1}^{\overline{b}} n^*(z, w) dF(z) d\Theta(b)$$

Example of equilibrium with $\hat{z}_1 > \hat{z}_2$



Selection of Entrepreneurs

