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

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**Abstract**

Women are less likely than men to start firms and female entrepreneurs are less likely to succeed. This paper studies the effect of childbirth on women's entrepreneurial activity. Drawing on rich administrative data from Canada and using an event study and instrumental variable design, I show that childbirth has substantial negative effects on women's founding rates and firm performance, accounting for a large share of the gender gap in entrepreneurship. The impact spills over onto workers, who experience a decrease in earnings. The effects are permanent: entrepreneurial outcomes never recover to their pre-birth levels. The results are not due to a reduction in risk-taking and cannot be fully explained by household specialization based on labor market advantage. Childcare availability, progressive gender norms, and access to credit reduce the adverse effect of childbirth on the entrepreneurship gap.

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# 1 Introduction

Despite some convergence over the last decades, there still exists a significant gender gap in both the likelihood of women starting new firms and the performance of female-founded firms (Levine and Rubinstein, 2017; Fairlie and Robb, 2009). There is no consensus on what causes these discrepancies. This paper seeks to understand the role of children in driving women's entrepreneurial activities along the extensive margin (whether women are less likely to become entrepreneurs due to childbirth) and the intensive margin (whether firms founded by women underperform due to childbirth).

Understanding the impact of children on women's entrepreneurship decisions is important for two reasons. First, it can help explain why women may be less likely to start new businesses or why their firms tend to underperform men-led firms. If children are a significant factor behind these gender gaps in entrepreneurship—similar to what found by Kleven, Landais and Søgaard (2019) when analyzing gender gaps in employees' earnings—then policies supporting childcare could yield larger than anticipated returns as they can foster new business creation or prevent the closure of women-led firms. Second, examining a firm's performance before and after the birth of a child helps determine whether childbirth affects more than just the woman's career. If childbirth negatively impacts firm performance – a result that would be consistent with evidence on the importance of founders for business success (Smith et al., 2019; Becker and Hvide, 2022) – then this would suggest that childbirth effectively represents a negative externality on the firm. This further raises the importance of policies aimed at closing gender gaps in entrepreneurship.

This paper studies the impact of children on women's entrepreneurial activity using rich administrative data from Canada. Using an event study design around the birth of the first child, I find that childbirth accounts for a large portion of the gender gap in entrepreneurship. Childbirth among women entrepreneurs also generates large, negative spillovers. Firms' sales drop by over 20% following childbirth and workers' earnings by around 4%. Conversely, childbirth among men entrepreneurs has much more muted effects. I further show that child-care availability (supplied by either retired grandparents or educational centers) as well as more progressive gender norms reduce considerably the negative effect of childbirth on a firm's performance. These two results suggest that "frictions" – as captured by lack of child-care support and/or less progressive norms within the household – are an important explanation for the existence of gender gaps in entrepreneurship. Addressing these frictions can thus result in potential large increases in efficiency in the form of more newly created firms led by women or in better performance of firms originally founded by women.

Studying childbirth and its impact on entrepreneurship requires longitudinal data on individuals that can track child-birth events along with ownership, financial and personnel data of firms. I use the Canadian Employer-Employee Dynamics Dataset (CEEDD), a set of linkable administrative files compiled by Statistics Canada. The CEEDD is a matched employer-employee dataset derived from tax files that contain demographic information of workers as well as detailed balance sheet information on employers.

A unique advantage of the CEED is that this matched information on workers and firms can be linked with ownership data for the entire universe of Canadian firms. This data allows for the accurate identification of entrepreneurs and enables precise measurement of the earnings extracted from the firm by each founder. Another key strength of the CEEDD is that child-birth events can be identified from the Canadian Child Tax Benefit along with birth records. Finally, by using historical tax filing data, I can link entrepreneurs to their families of origin, which allows me to study the effect of informal childcare provided by grandparents.

The first part of the analysis looks at the effect of childbirth on entrepreneurship from an individual's perspective. I begin by looking at the extensive margin, i.e. the likelihood of women starting a newly incorporated business–which permits to exclude cases where new mothers simply become self-employed—following childbirth. Ex-ante, this effect is ambiguous. Entrepreneurship could provide an alternative career path to paid employment for mothers, who could benefit from greater flexibility (Yang, Kacperczyk and Naldi, 2024; Gottlieb, Townsend and Xu, 2022). However, others have noted that entrepreneurs work longer hours than employees (Levine and Rubinstein, 2017), often with unpredictable schedules, driven by the need to capitalize on time-sensitive opportunities that may quickly vanish if not seized. This could make entrepreneurship a quintessential greedy job (Goldin, 2014). I find a marked negative effect of childbirth on founding rates. The decline in founding rates begins in the year before childbirth, likely reflecting the anticipatory effects of pregnancy. This effect peaks at a 40% reduction in founding rates during the year of childbirth. While the decline gradually lessens in the following years, it never fully recovers to pre-birth levels, resulting in a "missing cohort" of female-founded firms.

Having analyzed the impact on the extensive margin of entrepreneurship, I then turn to the intensive margin. I focus on entrepreneurs who started an incorporated business at least two years prior to their first childbirth. I run event studies around the first birth event using as control group a matched sample of observationally similar firm-entrepreneur pairs in which the control women did not have children. I find that childbirth causes a significant decline in the compensation women receive from their businesses, which contracts by 18% on average over 5 years. Women are also more likely to leave entrepreneurship. In contrast, fathers experience no such decline. Prior to childbirth, mothers and fathers follow similar income trajectories, but their paths sharply diverge afterward, with fathers' income remaining stable or even increasing while mothers' earnings drop substantially. Based on this evidence, I therefore conclude that that childbirth represents a key element to explaining gender gaps in entrepreneurship both along the intensive and extensive margin.

The second part of the paper shifts the focus from the individual to the firm: how does a childbirth event experienced by the founder of a business affect the firm's performance? Using a matched event-study design that compares firms owned by women who become mothers to similar firms owned by women without children, I find that childbirth leads to a substantial deterioration in firms' performance. In the five years following childbirth, sales decline on average by 21% , assets by 17%, and profit by 21%, relative to the control group. The effects extend beyond mere downsizing. These firms become less profitable: profit margins and return on assets decrease by 6% and 7% respectively. Survival rates also dwindle, but the effect is quite modest. Over each year, there is an approximate 2.5% reduction in the likelihood of these firms remaining operational.

Crucially, firm's performance is only very moderately affected if it is a man, as opposed to a woman, who is having a childbirth event. The event studies show an analogous pattern to the one observed using women without children as the counterfactual group: men-led firms and women-led firms are on parallel trends up to the year of childbirth, but they sharply diverge in the year in which the first child is born as child-birth only has a moderate negative effect for men-led firms and instead lead to large, persistent, negative effects for women-led firms. The magnitude of the effect that I find when using men-led firms (who experienced a child-birth event) as the counterfactual group to estimate the spillover of childbirth on firm's performance is very similar to what I find using women-led firms without children as the control group. An Oaxaca decomposition shows that children are a substantial contributor to gender inequality in entrepreneurial outcomes, accounting for 47% of the gender gap in sales and 54% of the gap in profits.

Childbirth not only affects a firm's performance but also directly impacts the career trajectories of workers employed by women-led firms. Workers in firms whose founder is a woman see their earnings drop by an average of 2.2% in the first year after childbirth, and this decline persists for at least five years, with earnings remaining 3.6% below the pre-childbirth trajectory. Furthermore, there is a 1% increase in the risk of unemployment. Overall, these findings point to childbirth having an impact that extends well beyond the mother/entrepreneur as it negatively impacts both the firm's performance as well as the labor market careers of employees hired by these mother-led firms.

The event study approach around first childbirth has the advantage of capturing the overall treatment effect of all children in the population. I supplement the evidence with an instrumental variable approach, using the sex of the first two children as an instrument for the birth of a third child (Angrist and Evans, 1998). Analyzing the impact of a third child through this IV approach, I find that childbirth affects firms owned by mothers, but the effects are smaller and recovery is quicker compared to the first child. Importantly, the IV estimates closely align with the event-study estimates around the third child, lending support to the validity of the event-study design.

Next, I examine how the impact of children varies across firms at different stages of their life cycle. I find that the effect is stronger for early-stage startups (under 5 years old), confirming that young firms are especially vulnerable to disruptions in the supply of the founder's human capital. Turning to heterogeneous effects depending on the timing of birth relative to industry performance, I observe larger short-term effects when women have children during periods of high sectoral growth, suggesting that during those times they might miss out on valuable business opportunities. This result, combined with the pro-cyclical nature of fertility, casts doubt on the potential concern that women strategically time childbirth in anticipation of a decline in firm performance. As a further check, I restrict the sample to women who delay childbirth until after age 35. In this subsample, in which the timing of childbirth is more uncertain, I continue to find similar patterns.

To understand the mechanisms driving the results, I examine whether the decline in firm performance is a result of changes in preferences, such as reduced risk tolerance, or whether it is caused by external constraints, like limited childcare availability or credit access. First, I examine whether the decline could stem from a reduction in risk-taking. If female entrepreneurs were adopting safer but lower-return strategies after childbirth, this could explain the decrease in firm performance. However, the data does not support this explanation. The decline in firm outcomes appears to reflect a genuine drop in performance rather than a strategic shift toward safer investments.

Next, I explore the role of gender norms. By using a sample of second-generation immigrants to Canada, I find that women from cultures with more traditional gender norms experience a sharper decline in firm outcomes following childbirth, while there is no similar effect for fathers. This suggests that cultural expectations influence women's roles in childcare, reinforcing gendered divisions in household responsibilities. The findings on the role of gender norms suggest that the presence of children increases household specialization. This raises the question of whether this specialization is economically rational or if women take on childcare responsibilities regardless of their comparative advantage. I find some evidence that women who were the primary earners before childbirth tend to have better business outcomes afterwards, but even breadwinners experience large penalties. Moreover, households where women were the main earners experience income drops after childbirth relative to households with male breadwinners. This suggests that decline in women's entrepreneurial activity after childbirth cannot be fully explained by income-maximizing household specialization.

The results so far highlight the impact of parental preferences, but the role of external frictions remains a key question. I start by examining the role of credit access. I measure borrowing constraints using the ratio of tangible to total assets, based on the idea that tangible assets can be pledged as collateral. Using a sample of entrepreneurs who had their first child during the 2007–2008 financial crisis – a period characterized by severe credit constraints – I find that firms with better access to borrowing outperformed their more constrained counterparts.

To understand how family support networks influence entrepreneurial success, I link mothers to their own parents using tax identifiers. Grandparents, particularly grandmothers, are often relied upon for childcare, and proximity to them may boost mothers' business performance. I find that women who live near their parents see better business outcomes after childbirth. An event study around grandmother retirement shows a significant improvement in business performance for mothers living near newly retired grandmothers, with no similar effect from grandfather retirement, suggesting that the mechanism is tied specifically to caregiving.

The effects of grandmother's retirement are especially strong in municipalities with limited formal childcare availability. This suggests that family-provided childcare can substitute for formal services. To further explore the role of childcare expansion, I examine how expansions in formal childcare affect mothers' entrepreneurial outcomes. By analyzing increases in the density of childcare workers in municipalities and comparing the effects on mothers with young versus older children, I find that such expansions positively impact business performance.

This paper fits withing the growing literature on the gender gap in entrepreneurship.[1] To the best of my knowledge, it is the first to study the role of childbirth in explaining the entrepreneurship gap, quantifying the effect of motherhood on women's entrepreneurial activities both at the intensive and extensive margin. In particular, this study is closest to a small set of papers on childbirth and entrepreneurship. Yang, Kacperczyk and Naldi

[1] Supply-side explanations have emphasized the role of preferences and beliefs. Women's higher risk aversion could make entrepreneurship a less desirable career option compared to a regular job offering a more predictable income stream (Fossen, 2012; Caliendo, Fossen and Kritikos, 2014). Women might also discard entrepreneurship as a viable occupational choice because society views entrepreneurship as a stereotypically masculine activity (Yang and Aldrich, 2014; Yang and del Carmen Triana, 2019). Even when they do become entrepreneurs, women might be motivated by non-pecuniary career objectives, like reducing work-family conflict, rather than by the ambition to create the next billion-dollar venture (Burke, Fitzroy and Nolan, 2002; Looze and Desai, 2020). Demand-side factors focus on frictions and discrimination. Female entrepreneurs are less likely to raise financing, which is partly explained by investor biases (Guzman and Kacperczyk, 2019; Hebert, 2020; Hebert, Tookes, and Yimfor, 2024). The problem is exacerbated in contexts in which investors are predominantly males, such as VC: male financiers show less interest in female-founded ventures and are less skilled in assessing their potential (Ewens and Townsend, 2020; Raina, 2021). Another barrier women face when launching a business is the lack of female entrepreneurial role models in their social networks (Markussen and Røed, 2017).

(2024) find that, when child penalties in the labor markets are high, Swedish mothers are more likely to become entrepreneurs. Zandberg (2021) and Core (2024) study the effect of reproductive healthcare (abortion and emergency contraception, respectively) on female entrepreneurship. However, these studies focus on reproductive choice rather than the aggregate impact of children on the entrepreneurship gender gap. A second key difference is that my analysis relies on administrative data, which allows an extensive analysis of the effect of motherhood on women's entrepreneurial endeavors and the mechanisms that drive them. Another strand of literature studies the effect of family policies, specifically, parental leave and maternity benefits, on female entrepreneurship (Gottlieb, Townsend and Xu, 2022; Core and Karpati, 2024; Fontenay, 2024).

This paper is also related to the literature on the effect of childbirth on labor market outcomes.[2] While much of the literature examines the effects of children on individual career outcomes, this paper shifts the focus to the spillover effects that arise when women entrepreneurs have children. These spillover effects are critical, as childbirth impacts not only the entrepreneur herself but also the firm's growth trajectory and the wages of its workers. Given the role of entrepreneurs in driving job creation and economic growth, the effects of childbirth on entrepreneurial firms generate multiplier effects, extending well beyond the individual-level impacts studied in existing research.

## 2 Data

For my analysis, I use the Canadian Employer-Employee Dynamics Database (CEEDD), a comprehensive administrative dataset compiled by Statistics Canada. The CEEDD integrates data from multiple government agencies, including the Canada Revenue Agency, Employment and Social Development Canada, and Immigration, Refugees, and Citizenship Canada.

Each agency contributes specific data. The Canada Revenue Agency provides personal and corporate tax records. Specifically, the T1 personal tax file contains individual demographic and financial characteristics, such as birth year, gender, marital status, and municipality of residence. The T2 corporate tax file includes firm financial statements,

[2]Child penalties account for most of the remaining gender gap in earnings, while differences in human capital between men and women have now largely disappeared (Kleven, Landais and Søgaard, 2019). But why are child penalties are so large and persistent, and what can we do to reduce them? Theories based on mothers' comparative advantage due to biological differences have little explanatory power (Kleven, Landais and Søgaard, 2021; Andresen and Nix, 2022); instead, cultural norms correlate strongly with child penalties (Boelmann et al., 2024; Kleven, 2024). The effectiveness of public policies, including parental leave and childcare subsidies, in mitigating gender inequality is debated: some studies find positive effects on female labor supply (e.g., (Baker, Gruber and Milligan, 2008; Andresen and Nix, 2022b)), while others find no effects, or small effects concentrated among single mothers (e.g., (Nollenberger and Rodríguez-Planas, 2015; Kleven et al., 2024)).

location, and industry classification for all corporations in Canada. The T4 statement of remuneration file contains job-level information including annual employment income received by each individual worker from each employer.

Employment and Social Development Canada provides data on a number of federal government programs and services, including Employment Insurance. Finally, Immigration, Refugees, and Citizenship Canada provides detailed immigration records. By linking these administrative sources through unique identifiers (anonymized Social Insurance Numbers for individuals and Business Numbers for firms), the CEEDD creates a rich longitudinal dataset that enables detailed analysis of individuals, families, and firms over time.

**Identifying entrepreneurs** To construct the dataset, I start by identifying business owners. The T2 corporate tax file can be linked through firm-level identifiers to Schedule 50 (T2S50), a tax form containing information on firm ownership structure. Private Canadian-controlled corporations are required to file a Schedule 50 form to disclose the identity of all owners with a stake of 10% or more of common or preferred shares.[3] Combining the T2 Schedule 50 and T4 files allows me to accurately identify entrepreneurs and measure returns to entrepreneurship. This represents a significant improvement over existing literature that typically relies on the top earners in a firm during the first year to identify entrepreneurs. Since business owners can decide to pay themselves a salary or dividends (or a mix of both), the measurement error introduced by ignoring dividend income to identify top earners could be substantial. The availability of data on ownership stakes allows me to precisely identify entrepreneurs and measure the payoff extracted from the start-up by each founder.

Defining who is an entrepreneur is a debated issue among entrepreneurship scholars. There is no consensus on whether the definition should include all, or a subset, of the self-employed. I focus on individuals who start incorporated firms because incorporation might be a better proxy of entrepreneurship than overall self-employment (Rubinstein and Levine, 2020). Most unincorporated self-employed have little ambitions to grow their businesses, whereas incorporation is most apt for undertaking high growth potential investments, thanks to limited liability and a separate legal identity. (Levine and Rubinstein, 2017) show that individuals choose the legal form of their firm based on the nature of the planned business activity; they rarely switch legal form ex post based on the success of their ventures.

[3]Schedule 50 reports information on direct shareholders, which can be individuals or other corporations. When a firm has corporate owners, Statistics Canada reconstructs the ownership chain to identify the ultimate individual owners.

The sample covers the period from 2001 (the first year in which Schedule 50 on firm ownership is available) to 2017. I restrict the firms' sample to start-ups that were created during the sample period and had positive sales within the first 5 years since founding. I define entrepreneurs as start-up owners holding at least 20% [4] of firm shares in the first year in which ownership is reported, as long as the ownership structure is reported within 3 years since founding.[5] In my firm-level analysis, I exclude start-ups created by spouses (married and cohabiting couples) to disentangle the effect of childbirth on firms owned by fathers and mothers respectively.

**Family-level data** Family-level data is drawn from the T1 Family File (T1FF), which aggregates information on family units by linking tax filers to their spouses and children. Statistics Canada constructs family relationships by cross-referencing tax return filings and benefit claims.

To identify birth events, I use a family-level identifier to link individual tax files to a supplemental file containing information on children's year of birth and sex. Data on children is collected by Statistics Canada from the Canadian Child Tax Benefit, a federal program supporting families, and a supplemental file of births, ensuring comprehensive coverage of children born in Canada. I restrict the parents' sample to individuals who had their first child during the sample period, 2001 to 2017.

In addition, I use the family identifiers to construct intergenerational links over time. By observing individuals who have filed taxes together in the past as part of a family unit,[6] I can continue to track familial relationships in subsequent years, even when co-filing ceases. This allows me to link entrepreneurs to their parents and study the effect of informal childcare provided by grandparents.

**Immigration records** To identify immigrants, I link individuals to immigration records from the Longitudinal Immigration Database compiled by Immigration, Refugees and Citizenship Canada. This file contains information on all individuals who obtained their permanent residency status in Canada since 1980, including their country of origin and year of arrival. Through individual-level identifiers, immigration records can be linked to tax records.

[4] Results are robust to using alternative ownership thresholds.

[5] I adopt this rule because co-founders can opt to split the equity at a later time rather than immediately upon funding. Postponing the decision has some advantages: it allows founders to learn about each other's skills and contributions, avoiding costly ex-post renegotiations (Wasserman, 2008).

[6] This linkage is not strictly dependent on children filing a tax return: Statistics Canada imputes data for non-filing spouses and dependent children.

To construct my sample of second-generation-immigrant entrepreneurs, I first construct family linkages by linking entrepreneurs to their own parents, as described above. If the entrepreneurs do not appear in the immigration records themselves, indicating that they were born in Canada, while at least one of the parents is recorded in the immigration database, I classify these entrepreneurs as second-generation immigrants. Using the countries of origin of first- and second-generation immigrant entrepreneurs allows me to accurately determine their cultural background. This method differs from previous studies that relied on name-based inferences of CEOs' cultural heritage, eliminating the potential for measurement errors.

# 3 Empirical Methodology

Fertility shocks are not random events. Ideally, an econometrician would want to randomly assign children to individuals and compare entrepreneurial outcomes between parents and non-parents. Because this is an impossible experiment[7], I use a quasi-experimental approach based on event studies around the birth of the first child. The identifying assumption is that the sharp divergence in entrepreneurial outcomes between mothers and their control group around first childbirth is orthogonal to unobserved determinants of fertility decisions, which should evolve smoothly over time. I address threats to identification due to selection into motherhood by using different control groups and an instrumental variable design, as detailed below.

The first approach I use is to match firms owned by mothers to firms owned by women with zero observed lifetime fertility. Section 3.1 describes the matching algorithm. The identifying assumption behind this approach is that the decision to have a child is not correlated with business performance. One might argue that fertility can be timed strategically and wonder how pregnancy planning might affect the interpretation of the findings. For example, entrepreneurs might decide to have children after their start-ups have reached certain milestones, implying that their firms exhibit accelerated growth before pregnancy; alternatively, they might have a child when the business has been performing poorly. I show that firms owned by mothers do not grow faster (or more slowly) in the years before pregnancy; instead, they are on identical trends to control

[7]The closest approximation to this ideal experiment is Gallen et al. (2023), who exploit the failure of long-term contraception as an exogenous shock to pregnancy timing. They find that unplanned pregnancies lead to large earning penalties. Their estimates are similar to those obtained from event studies using observational data on all births. Conversely, they find smaller penalties using in vitro fertilization (IVF) success as an instrument for planned pregnancies. However, they show that women who undergo IVF unsuccessfully (the control group) also experience earning losses, suggesting that infertility itself could negatively impact earnings and the instrument might underestimate the effect of planned pregnancies.

firms up until childbirth and sharply diverge afterwards.

The second approach is to compare entrepreneurial outcomes for mothers and fathers, as described in Section 3.2. This comparison is informative about the effect of childbirth on the entrepreneurship gender gap. In addition, restricting the sample to parents helps mitigate the concern that people who choose to have children might be different from non-parents along some unobservable dimension which also determines entrepreneurial entry and success. The identifying assumption behind using fathers as a control group is that the decision to have a child is not correlated with business performance differently for mothers and fathers. I show that firms owned by mothers and fathers are on parallel trends until the year of birth of the first child, when firm performance sharply drops for mothers.

Even though I find no evidence of different trends before childbirth, one might argue that entrepreneurs have information about *future* performance which cannot be observed by the econometrician. Mothers could plan to have a child because they know that their firms will start doing poorly, even though there have been no observable signs up to that point. It should be noted that the inclusion of industry-by-year effects implies that the alleged anticipated drop in performance would be purely idiosyncratic. Naturally, even though fertility can be planned, there is a degree of unpredictability regarding the exact timing of pregnancy and childbirth; at the same time, future entrepreneurial opportunities and start-up outcomes are uncertain at the time of fertility decisions. To limit this concern, I verify that results are robust to restricting the sample to women who are close to the end of their child-bearing age, for whom pregnancy is costlier to postpone and pregnancy timing is harder to predict. I find that the results are similar for this sample, supporting the identifying assumption that the sudden drop in women's entrepreneurial activity observed upon childbirth is caused by the fertility shock, rather than by mothers planning the timing of childbirth with perfect foresight of future entrepreneurial outcomes.

Finally, to further reduce concerns related to selection biases, I use the sex of the first two children as an instrumental variable for the birth of a third child, as detailed in Section 3.3. I show that estimates from an event study around the birth of the third child and from the instrumental variable approach are very similar.

## 3.1 Mothers vs. women without children

In this section, I restrict the analysis to women, matching mothers to observationally similar women with zero observed lifetime fertility. I restrict the sample to individuals who have their first child during the sample period at event time $t = 0$ and I exclude firms jointly owned by spouses. I use a caliper matching algorithm without replacement to construct the comparison sample. In matching estimators terminology, I use exact matching on year, marital status, and Census Metropolitan Area, together with caliper matching on age, individual income percentile, and family income percentile (with calipers of 1 year and 3% respectively). The matching is performed two years before childbirth (the last year in which individuals do not know that they will have a child at $t = 0$).

To study the evolution of firm creation rates following childbirth, I estimate the following specification:

$$Y_{ist} = \sum_{\tau \neq -2} \alpha_\tau \mathbb{I}[\tau = t] + \sum_{\tau \neq -2} \beta_\tau \mathbb{I}[\tau = t] \cdot \mathbb{I}[mother] + \gamma X_{ist} + \mu_i + \mu_s + \epsilon_{ist}, \tag{1}$$

where $Y_{ist}$ is equal to 1 if individual $i$ starts a firm in event year $t$ in calendar year $s$. The regression equation includes a set of indicator variables for event times and their interaction with an indicator for mothers. The coefficients of interest, $\beta_\tau$, measure the effect of children relative to event time $t = -2$ (the last year in which individuals do not know that they will have a child at $t = 0$). The set of covariates $X_{it}$ includes age dummies to control for life-cycle trends and marital status. Finally, $\mu_i$ and $\mu_s$ represent individual and year fixed effects, respectively.

Next, I turn to the effect of childbirth on firm outcomes. I restrict the sample to a panel of start-up founders who have their first child during an entrepreneurship spell which lasted for at least 2 years between $t = -2$ and $t = 0$.For entrepreneurs, I use exact matching on firm industry at the 4-digit level, year, founder status, and marital status, with caliper-matching on firm age and entrepreneur's age, using calipers of 1 and 5 years respectively. I match firms two years before childbirth, or one year before childbirth for firms that were founded the year before giving birth. Firms owned by spouses are excluded. I estimate the following firm-level equation:

$$Y_{fst} = \sum_{\tau \neq -2} \alpha_\tau \mathbb{I}[\tau = t] + \sum_{\tau \neq -2} \beta_\tau \mathbb{I}[\tau = t] \cdot \mathbb{I}[\text{mother}] + \gamma X_{fst} + \mu_f + \mu_{kps} + \epsilon^{fst}, \tag{2}$$

where $Y_{ft}$ is a firm outcome for firm $f$ in event time $t$ in calendar year $s$. The set of control variables $X_{fst}$ includes firm age indicators, number of owners (team size proxies for how "dependent" the start-up is on the founder who has a child), a polynomial for entrepreneur's age, and marital status. I include firm fixed effects, $\mu_f$, to control for time-invariant firm characteristics: thus, the estimates only rely on within-firm variation over time. Finally, $\mu_{kps}$ denote industry-province-year fixed effects and $\epsilon_{fst}$ is the error term, which I cluster at the firm level.

Next, to study the effect of childbirth on workers employed at the matched firms described above, I focus on workers employed at the firm for at least one year prior to the entrepreneur's childbirth. I then follow these workers over time, allowing for the possibility that they change firms in the post-childbirth period. I estimate the following equation:

$$Y_{wst} = \sum_{\tau \neq -2} \alpha_\tau \mathbb{I}[\tau = t] + \sum_{\tau \neq -2} \beta_\tau \mathbb{I}[\tau = t] \cdot \mathbb{I}[\text{mother}] + \gamma X_{wst} + \mu_w + \mu_s + \epsilon^{wst}, \tag{3}$$

where $Y_{wst}$ represents the worker outcome for worker $w$ in event year $t$. The set of control variables $X_{wst}$ includes indicators for worker age; $\mu_w$ and $\mu_s$ denote worker and year fixed effects, respectively. The error term $\epsilon_{wst}$ is clustered at the worker level.

## 3.2 Mothers vs. fathers

To assess the gender gap in the impact of childbirth, I compare mothers and fathers who had their first child during the sample year. Let $Y^g_{ist}$ denote an outcome for individual $i$ of gender $g \in \{m, w\}$ in year $s$ at event time $t$. Following Kleven, Landais and Søgaard (2019), I estimate the following equation separately by gender:

$$Y^g_{ist} = \sum_{\tau \neq -2} \alpha^g_\tau \mathbb{I}[\tau = t] + \sum_k \beta^g_k \mathbb{I}[k = age_{is}] + \sum_z \gamma^g_z \mathbb{I}[z = s] + \epsilon^g_{ist}. \tag{4}$$

The regression equation includes a set of indicator variables for event time, age, and calendar year. The coefficients of interest, $\alpha^g_\tau$, measure the effect of children relative to event time $t = -2$. The age dummies are included to control for life-cycle trends, also accounting for the fact that, on average, women become first-time parents at a younger age than men. Finally, the year indicators control for macroeconomic trends.

To ease interpretation, I express the level effects estimated in the previous equation as percentage effects. I calculate $P^g_t \equiv \frac{\hat{\alpha}^g_t}{\mathbb{E}[\tilde{Y}^g_{ist}|t]}$, where $\tilde{Y}^g_{ist}$ is the predicted outcome for individual $i$ omitting the event time indicators. Thus, $P^g_t$ equals the impact of childbirth at event time $t$, as a fraction of the average counterfactual outcome without children. The differential effect of children between men and women, $P^m_t - P^w_t$, is the penalty that mothers experience relative to fathers.

Next, to estimate the effect of childbirth on firm-level outcomes, I restrict the sample to a panel of mothers and fathers who have their first child during an entrepreneurship spell which lasted for at least 2 years between $t = -2$ and $t = 0$. I exclude firms jointly owned by spouses, to avoid confounding the effect of childbirth on mothers and fathers. I estimate the following equation:

$$Y^g_{fst} = \sum_{\tau \neq -2} \alpha^g_\tau \mathbb{I}[\tau = t] + \beta^g X_{fst} + \mu_f + \mu_{kps} + \epsilon^g_{fst}. \tag{5}$$

This specification mirrors the one used in 2, but now it is estimated separately for firms owned by mothers and fathers. The firm-level controls (a polynomial for entrepreneur's age, marital status, firm age dummies, and the number of firm owners) and fixed effects (firm and industry-province-year) are the same as in equation 2. The error term, $\epsilon^{g}_{fst}$, is clustered at the firm level.

**Gap due to childbirth** To understand how much of the gender gap in entrepreneurial outcomes is due to childbirth, I use a modified Oaxaca-Blinder decomposition. The Oaxaca-Blinder decomposition divides the gap in outcomes between two groups into two parts: the explained part, which is due to differences in observable characteristics, and the unexplained part, often attributed to discrimination or unobserved factors (Oaxaca, 1973; Blinder, 1973; Altonji and Blank, 1999; Fortin, Lemieux, and Firpo, 2011).

The mean gender gap $\Delta$ is given by $\Delta = (E[Y^m_{fst}] - E[Y^w_{fst}])/E[Y^m_{fst}]$, where $Y^g_{fst}$ is a firm outcome (e.g., profits) for firm $f$ owned by an individual of gender $g$ in event year $t$. $\Delta$ can be decomposed into inequality due to children and residual inequality:

$$\Delta = \frac{E[P_t \cdot \tilde{Y}^w_{fst}]}{E[\hat{Y}^m_{fst}]} + \sum_k (\beta^m_k - \beta^w_k) \frac{E[X^m_{kfs}]}{E[\hat{Y}^m_{fst}]} + \sum_k \beta^w_k \frac{E[X^m_{kfs}] - E[X^w_{kfs}]}{E[\hat{Y}^m_{fst}]}. \tag{6}$$

$P_t$ is the child penalty at event time $t$, $\tilde{Y}^w_{fst}$ is the predicted counterfactual earnings for women in the absence of children, and $\hat{Y}^m_{fst}$ is the predicted actual earnings for men. The first term measures the impact of children on women relative to men, capturing the effect of childbirth on gender inequality in entrepreneurial outcomes. The second term reflects differences in the returns to covariates that are unrelated to children (the unexplained component of the gender gap). Lastly, the third term accounts for differences in observable characteristics, such as men and women sorting into different industries (the explained component of the gap).

## 3.3 Instrument: sibling sex mix

As identification strategy to address the potential sample selection issues stemming from the endogeneity of childbirth, I compare estimates from an instrumental variable approach to estimates from an event study. I use the sex of the first two children as an instrument for the birth of a third child as in Angrist and Evans (1998). This approach relies on parents' preference for variety in the sex mix of their children: a couple who had two boys or two girls is more likely to have a third child than a couple with one child of each sex. The instrument estimates the local average treatment effect (LATE). This can be interpreted as the average effect of the treatment for compliers, i.e., for individuals who had a third child only because the first two children were of the same sex.

For this instrument to be valid, it needs to be as good as randomly assigned and to satisfy the exclusion restriction, requiring that children's sex has no independent impact on entrepreneurial outcomes.[8] These assumptions cannot be tested directly. However, I show that women who had two same-sex children are observationally similar to women who had two opposite-sex children, supporting the random assignment assumption. One could argue that children's sex might directly affect entrepreneurial outcomes in various ways; for example, women might invest more time or financial resources into raising children of a particular sex. I do not find evidence that women's entrepreneurial behavior is affected by children's sex (which would violate the exclusion restriction). I show that entrepreneurial outcomes do not differ between women who had a male or female first-born.

I restrict the sample to women who had their first child during the sample years and had at least two children *by the end of the sample period* (therefore, in a given year, they might have no children or one child and still be part of the estimation sample). Again, I estimate the dynamic effect of having a third child following Kleven, Landais and Søgaard (2019). I use the following specification:

$$Y_{ft} = \sum_{\tau \neq -2} \alpha_\tau \mathbb{I}[\tau = t] + \gamma X_{ft} + \mu_f + \mu_{ks} + \epsilon_{ft}, \tag{7}$$

where $Y_{ft}$ is an outcome for firm $f$. Indicator variables $\mathbb{I}[\tau = t]$ denote event times relative to the birth of the third child. Each indicator is instrumented by the interaction $\mathbb{I}[\tau = t] \times \mathbb{I}[\text{same sex}]$, where $\mathbb{I}[\text{same sex}]$ is equal to 1 if the first two children are of the same sex. In addition to controls included in previous specifications, control variables include binned event time indicators around the birth of the second child and an indicator for whether the entrepreneur already had their first child. I include firm and industry-year fixed effects.

Next, I replicate the analysis using OLS rather than 2SLS. The purpose of this exercise is two-fold. First, it allows me to assess the external validity of the instrumental variable approach. Recall that the IV yields the effect on compliers, while OLS estimates the effect on all the treated. Thus, finding similar estimates suggests that external validity is upheld; in other words, the effects observed among compliers are likely to be generalizable to a broader population. Second,this comparison strengthens the credibility of using event studies centered around child birth as a method for identification.

[8]An additional assumption, which is sometimes overlooked, concerns defiers —individuals who are *negatively* affected by the treatment. In this setting, defiers are individuals who prefer a particular sex, so that having two boys or two girls decreases the probability of having a third child. Unlike Dahl and Moretti (2008) in the United States, I do not find that parents in Canada have a systematic preference for boys during the sample period I examine. De Chaisemartin (2017) shows that it is possible to identify causal estimates under weaker assumptions than the absence of defiers and that the sufficient conditions are likely to hold in the context of the sibling sex mix instrument.

# 4 Results

## 4.1 Entrepreneurs' outcomes

I start by examining to which extent childbirth contributes to the gender gap in career trajectories and participation rates among entrepreneurs. While a substantial body of literature has documented the long-term effects of motherhood on women's earnings, the existing research focuses on salaried employees. The effect of career disruptions due to childbirth[9] may differ for entrepreneurs compared to the broader labor force.

In Figure 1, I compare mothers to a matched sample of women entrepreneurs without children. The sample is composed of women who had been entrepreneurs for at least two years before becoming mothers. Panel (b) shows that in the year of childbirth, the compensation women take from their firms – measured as the sum of wages and dividends – drops by 21%. Even five years after childbirth, their earnings remain 13% lower than pre-childbirth levels.

To examine whether childbirth affects women and men differently, Figure 2 compares the income trajectories of mothers and fathers around childbirth. Panel (a) shows that while mothers experience a 20% decline in total income, fathers show no such decline; fathers' total income remains stable and even trends slightly upward after childbirth. A contributing factor to this disparity is the reduction in compensation that mothers take from their firms after childbirth (panel (b)).

Up until this point, I have examined outcomes for women who were already entrepreneurs before having their first child. Next, I expand the analysis to study how motherhood impacts the likelihood of all women, regardless of prior entrepreneurial experience, to start a new firm. Figure 3 presents an event study that tracks firm entry surrounding childbirth. In panel (a), I use a matched sample of women without children as a control group. While the adverse effects on firm outcomes primarily appear after childbirth, the decline in entrepreneurship entry begins in the pregnancy year, during which soon-to-be mothers are 19% likely to found a business than women without children. This effect intensifies in the birth year, reaching its peak of 42%, and subsequently tapers off, albeit without reverting to pre-birth levels.

I replicate the analysis using fathers as a control group in panel (b). I estimate separate regressions for mothers and fathers. Much like the findings related to firm

[9] Research on career disruptions has generally concentrated on job loss events due to plant closures and mass layoffs, which tend to affect lower-wage and less-skilled workers. These studies tell us little about how high-skilled women, particularly entrepreneurs, experience career disruptions. An exception is Fedyk and Hodson (2024), who focus on high-skill white-collar workers.

outcomes, there is a remarkable similarity in both the magnitude and pattern of the estimates when fathers are used as the comparison group instead of women without children. We again see an anticipation effect in the year before childbirth, which translates into a decline in entry rates of 15% for mothers relative to fathers. The gap grows to 36% in the year of childbirth before gradually receding in the following years. In the main sample I exclude firms co-owned by spouses. In Panel (b) I include these firms and assign them to the spouse with majority ownership; the results are unvaried.

## 4.2 Firm outcomes

Figure 4 presents results for the effect of childbirth on firm outcomes. Panel (a) shows the evolution of firm sales. Businesses owned by mothers and by women without children are on parallel trends until the year just before childbirth. However, a sharp divergence occurs when entrepreneurs have their first child. At this juncture, businesses managed by mothers see a substantial decline in sales, exceeding 20%. Even after a five-year period, these businesses do not fully bounce back, as they still feature a 15% shortfall.

Similar patterns emerge for several different measures of firm performance. Panel (b) focuses on assets, which exhibit an average decline of approximately 18%. Moving to firm profits (i.e., net income) in panel (c), we observe an abrupt initial decline of about 27% in the year of childbirth. While there's a slow recovery in the following years, profits remain down by 17% after five years. To ensure these findings are not merely a result of downsizing, I also examine the effect on profit margin and returns on assets: both these metrics show an average decline of around 7% in the five years following childbirth.

The results shown up until this point are conditional on firms surviving.[10] Next, I turn to examining the effect of childbirth on firm survival. Figure 5 shows that motherhood reduces the probability of firm survival relative to firms owned by non-mothers. However, in contrast to the substantial impact seen in other firm outcomes, this effect is relatively modest, hovering around 3-4%. This result highlights how firm survival, while commonly used in prior literature to assess entrepreneurial performance, is an inadequate measure: these firms may stay in business but exhibit signs of stagnation in terms of sales, profitability, and other performance measures. One potential explanation for the persistence of these firms, even in the face of substantial declines in various outcomes,is that mothers have a low opportunity cost of keeping their ventures operational. Given

[10]In Figure A.7, I study the impact of childbirth on firm outcomes without conditioning on survival. I impute zeros for all firm outcomes in cases where the firms cease operations and use the inverse hyperbolic sine (IHS) of the outcome variables in place of logarithm, defined as $\text{IHS}(x) = \ln\left(x + \sqrt{x^2+1}\right)$. It approximates the log transformation for small values but is also defined for $x \leq 0$. Using this approach, I continue to find significant negative effects across all outcome variables.

the pervasiveness of child penalties in the labor market, the option of returning to traditional paid employment might not appear significantly more attractive than continuing to operate their businesses. Alternatively, some women might highly value the flexibility and control that entrepreneurship affords them, which could outweigh the challenges they encounter.

One might wonder whether the results depend on the specific matching algorithm used to create the control group. To address this concern, I employ an alternative design in which I randomly assign placebo births to women who never actually have children, drawing from the distribution of age at first childbirth among those who eventually become mothers. Figure A.1 shows that the results are consistent with those obtained from the matched sample. Relative to the control group, firms owned by mothers experience a large, sudden drop in performance at the time of childbirth; this decline persists, with no full recovery even after 5 years.

As an alternative to using women without children as a control group for mothers, I follow Kleven, Landais and Søgaard (2019) and employ fathers as a counterfactual group. This approach, commonly used in studies on the child penalty, is based on the premise that fathers provide a suitable counterfactual group for mothers since they experience parenthood but do not undergo the physiological and career disruptions associated with childbirth. It's worth noting that since we lack a corresponding control group for fathers, we cannot draw direct conclusions about the impact on men themselves. I show results in Figure 6. During the years leading up to childbirth, coefficients for both men and women are not statistically different from each other, indicating similar trends prior to childbirth.

The estimated effects on firm outcomes are remarkably similar in magnitude when using fathers as the control group, as compared to using women without children. For instance, using women as the control group, we observe a 22% drop in sales during the year of childbirth and a peak decline of 28% in the following year. Using fathers as the control group, the results are almost identical: we see a 21% decrease in year 0 and a 28% decrease in year 1. Similarly, when examining assets, the effect is approximately 12% in year 0 and 17% in year 1 using women as the control group, while using fathers yields estimates of 11% and 15%, respectively.

Figure A.2 presents results from the instrumental variable approach, using the sex composition of the first two children as an instrument for the birth of a third child. The impact of a third child is smaller in magnitude compared to that of a first child. For instance, sales decline by 15% and profits by 11% in the year of birth, with both metrics fully recovering after three years. This smaller effect is expected, as the disruption caused by a third child for women who already have two children may be less severe than becoming a mother for the first time. In addition, the figure shows that the IV estimates closely align with the OLS estimates from the event study centered around the birth of a third child. The similarity between the two sets of estimates suggests that the IV estimates are likely to generalize to a broader population of female entrepreneurs, mitigating concerns related to external validity.

A clear pattern emerges in the main results presented so far – firms downsize and their performance deteriorates. I now turn to analyzing heterogeneity to better understand which firms are driving the results. I use the matched sample to analyze heterogeneity. In Figure 7 I look at firms' life cycle, comparing young firms experiencing the motherhood shock when they are at most 5 years old with older firms. While the overall pattern of performance decline holds for firms of all ages, it is larger in magnitude among young firms. For instance, looking at firm sales, we observe an immediate drop of 25% in the year of childbirth for the young group, which is more than double the decline experienced by older firms, standing at 11%.

The fact that effects are concentrated in young firms confirms the importance of founders' human capital for nascent firms. These fledgling businesses rely heavily on the founder's active involvement and dedication to build their competitive edge. To corroborate the key role of the founder's human capital in explaining these findings, Figure A.3 presents the results of a placebo test involving angel investors. Angel investors are defined in this context as individuals who neither receive wage compensation from the firm nor hold founder status, being absent from the initial ownership structure or owning less than 20% of the firm's initial capital. The results reveal no significant effect on any firm outcomes in the aftermath of childbirth for angel investors, implying that the documented shifts in firm outcomes are unlikely to be attributed to investment patterns but rather to the central contribution of founders' skills and knowledge to their ventures.

Figure A.4 analyses how business cycles influence entrepreneurial performance post-childbirth. Ex ante, it is not obvious whether the effects on firm outcomes should be more pronounced when childbirth coincides with a boom or bust. The opportunity cost of having a child during a boom might be higher, making entrepreneurs miss out on fleeting opportunities and rapid market expansion. Conversely, in the midst of a bust, the demands on founders to keep their ventures afloat might intensify, as navigating a contracting market could require a more substantial allocation of the founder's attention and resources.

I define booms as periods where industry sales growth ranks in the upper tercile of all industry-years and busts, analogously, as periods of growth in the lower tercile. I use only firms owned by male entrepreneurs to construct the terciles, to avoid introducing a mechanical link between the effect of childbirth and industry performance. I find evidence in favor of the first hypothesis: the short-term effects are stronger for women who have their first child during an industry expansion. For instance, in the immediate aftermath (year 0 and 1), sales exhibit a decline of 30% for women who become mothers during an industry boom, in contrast to the 20% decline during a bust. Assets and ROA follow a similar pattern, dropping respectively by 20% and 13% during industry expansions, in comparison to the 9% and 7% decline observed during contractions.

Figure A.5 focuses on women who gave birth at the age of 35 or older and were not married or cohabiting when they first founded their startups. For this subgroup, the timing of their pregnancy is arguably more unpredictable. First, the window of opportunity for family planning narrows as women age, resulting in less flexibility to time their pregnancy based on their business outcomes. Second, conception tends to require more time for women in this age bracket. Women between the ages of 35 and 39 experience a 50% reduction in the likelihood of spontaneous conception compared to women aged 19 to 26. In addition, the probability of complications also increase with age: miscarriage rates reach 27% at 40 (Taylor, 2003; Delbaere, 2020).

Focusing on this group helps mitigate reverse causality concerns, specifically the notion that women strategically time childbirth in anticipation of impending declines in firm performance. While it is challenging to entirely eliminate the potential for reverse causality, the scenario in which women accurately predict drastic downturns in firm performance in the subsequent year and opt for family planning as a response appears implausible. This is especially true considering the unpredictability of conception for women within this age bracket. In addition, under the hypothesis that the prediction of a decline in performance leads to having children, the anticipated decline would need to be idiosyncratic, because the inclusion of industry-province-year fixed effects absorbs industry-related shocks. For this group, I find that short-term effects are larger than for the overall population (for example, sales drop by 30% and profits by 32%), potentially reflecting the increased physical demands associated with delayed childbirth.

## 4.3 Worker outcomes

The existing literature on the effect of children focuses on how childbirth affects individual mothers' careers, but it generally overlooks potential spillovers to other employees within firms. This section examines the effect of the entrepreneur's childbirth on the earnings and employment prospects of workers employed in these firms. The sample for this analysis includes workers who were employed in treated or control firms for at least one year before the childbirth event. The algorithm used to match firms is described in section 3.1.

I find that workers' careers are disrupted by the childbirth event. In panel (a) of Figure 8 I use earnings in levels to include in the sample workers who leave the labor force. The reported effects are expressed as percentages of the counterfactual outcome in the absence of childbirth. On average, workers in treated firms experience an earnings decline of approximately 2.2% in the first year following childbirth, compared to the control group. This decline persists for at least five years, with earnings remaining 3.6% lower than the pre-childbirth trajectory. These numbers reflect both employed and non-employed workers.

Panel (b) examines the impact of childbirth on log earnings, which restricts the sample to workers with positive earnings. Workers in treated firms experience an average earnings decline of approximately 3.5% in the first 5 years following the entrepreneur's childbirth. Panel (c) examines the probability of experiencing a period of involuntary exit from the labor force, defined as receiving positive income from unemployment insurance. I find that the average increase in unemployment risk across the first five years after childbirth is approximately 1%. In panel (d), I consider an alternative measure of reduced career opportunities by defining underemployment as earning less than the equivalent of 12 weeks of full-time minimum wage employment. I find an average increase in underemployment risk of approximately 1.53%.

Figure 9 shows results for log earnings separately by worker age and sex. Panel (a) shows that the effects are concentrated among young workers (those below the median age of 33 at the time of childbirth), consistent with younger workers being especially vulnerable to economic shocks (Kahn, 2010; Oreopoulos et al., 2012). Panel (b) shows that both male and female workers experience a decline in earnings, with larger point estimates for men.

# 5 Mechanisms

In the previous section, I have presented evidence that childbirth affects entrepreneurial entry rates and firm performance. In this section, I delve into the underlying mechanisms to understand whether these outcomes primarily stem from maternal preferences, driven, for instance, by the desire to assume the dominant caregiving role for their children, or by frictions, where limited childcare alternatives compel mothers into this position. I study the role of cultural influences, household structure, and the availability of childcare, both formal and informal.

## 5.1 The risk-return tradeoff

The first possible explanation for the decline in firm outcomes post-childbirth could be related to changes in the risk-return profile of these firms. Specifically, the observed decrease in average firm outcomes might be attributed to a shift in risk-taking behavior: after childbirth, entrepreneurs may choose to adopt more conservative strategies, favoring safer but lower-risk investment.

A large literature has studied gender differences in risk preferences, s (see Bertrand (2011) for a review). Faccio, Marchica, and Mura (2016) show that differences in risk attitudes between men and women are reflected in corporate decision-making: firms led by female CEOs tend to have lower leverage and less volatile earnings, suggesting lower levels of risk-taking compared to firms led by men. The impact of parenthood on risk aversion may differ by gender due to the distinct roles men and women typically assume in childbirth and child-rearing. Women's significant investment in childbearing and caregiving could lead to increased risk aversion as a strategy to ensure the survival and well-being of both the mother and child. However, empirical evidence on the effect of childbirth on women's risk preferences is limited. Görlitz and Tamm (2020) find that both mothers and fathers become more risk-averse around the time of their first childbirth, with no significant difference in risk aversion between genders.

To investigate whether decreases in risk-taking might account for the observed decline in average performance post-childbirth, I use three proxies for firm risk-taking behavior. The first is the volatility of the firm's returns on assets, or $\sigma$(ROA). I calculate this measure using the standard deviation of returns on assets before and after childbirth. A decrease in $\sigma$(ROA) would indicate that the firm is experiencing less fluctuation in returns, suggesting a shift toward more conservative investment decisions post-childbirth. Similarly, profit volatility measures the variability of profits. Finally, I use leverage as a measure of the riskiness of corporate financing choices. Financial leverage is calculated as the ratio of total long term liabilities to total assets. Intuitively, a higher leverage ratio means the firm is more reliant on debt financing, which increases its exposure to shocks.

Table 3 shows that after the onset of parenthood, there is no significant change in the volatility of ROA or the volatility of profits. The leverage ratio, on the other hand, increases. While the risk-return trade-off would predict that a move towards more prudent investment should reduce both risk and returns, the data shows no decrease in risk. These findings suggest that the observed decline in average firm outcomes post-childbirth cannot be attributed to a shift towards lower-risk investment policies.

## 5.2 Financing

After childbirth, entrepreneurs may face higher financing constraints, particularly in accessing equity markets. The observed increase in leverage, documented in the previous section, suggests that firms may turn to debt as a substitute for equity to meet operational and investment needs. This shift toward higher leverage, as shown in A.6, begins precisely in the year of childbirth, indicating that firms react to the immediate financial pressures associated with parenthood. The reliance on debt financing could reflect challenges in raising equity, potentially driven by increased uncertainty regarding the entrepreneur's future involvement in the business or the firm's growth prospects post-parenthood.

To investigate whether financing constraints play a role in the performance of firms post-childbirth, I examine difference in post-childbirth outcomes for firms with different access to credit. I use the ratio of tangible to total assets as a proxy of borrowing ability, based on the idea that physical capital can be pledged as collateral, reducing lender risk and easing borrowing constraints. Table 4 shows that, within the same industry, firms with higher tangible assets perform better after childbirth, consistent with being better positioned to secure debt financing.

To further test the importance of financing constraints, I focus on entrepreneurs whose first child was born during the 2007–2008 financial crisis, a period characterized by a severe credit crunch. In this environment, in which financing became particularly tight, firms with lower collateral likely faced even greater difficulty in securing loans. The results show that, within the same industry, firms with higher levels of tangible assets performed significantly better after childbirth.

## 5.3 Culture

A large literature in economics has studied culture, defined a set of shared values, beliefs, and preferences that influences the behavior of individuals within a particular society or group, which remain persistent from generation to generation (Guiso, Sapienza and Zingales, 2006; Alesina and Giuliano, 2015; Boelmann et al., 2024). Gender norms are a subset of cultural norms that specifically pertain to the expectations associated with individuals based on their gender. Cultural values related to gender roles can have far-reaching effects, impacting the division of labor within households, influencing individuals' career choices by prescribing which professions are suitable for men and women, and affecting investment in human capital. In cultures where men are perceived as the primary earners, families may prioritize investing in the education of sons over daughters.

Gender norms can exert substantial pressure on women to align with traditional caregiving roles post childbirth, perpetuating the archetype of the "good mother" as one who prioritizes childcare over career advancement. In cultures where traditional gender norms are particularly entrenched, women may encounter societal disapproval if they opt to continue their careers without a substantial caregiving hiatus. In this section, I examine whether the effect of childbirth on women's entrepreneurial outcomes can be attributed to cultural preferences related to gender norms.

The *epidemiological approach* attempts to disentangle the effect of culture from the effect of the institutional environment by studying immigrants and their descendants. The idea is that immigrants to a given country face the same economic environment, but they carry the cultural values of their home countries to the host country (Fernández, 2011). Canada, with its large immigrant population and its long history of supporting cultural diversity, represents an ideal setting. During my sample years, about 20% of the population of Canada was made up of immigrants. In addition, the composition of the immigrant population is diverse and has changed over time: in the past, the majority of immigrants came from Europe, while today most immigrants are Asian, with an increasing share represented by Africans. As an initial illustration of the findings, I present case studies for a number of immigrant groups. In Figure xx, I show results for firm outcomes, focusing on sales. The two largest immigrant source countries, China and India, exhibit substantial heterogeneity: after childbirth, the gap in firm sales between firms owned by Indian male and female entrepreneurs is very large, at 29%; in contrast, the figure is virtually zero for Chinese immigrants. Because the firm sample is much smaller than the individual-level sample, I group other countries by geographical regions. For immigrants from the Middle East and North Africa, the impact of childbirth on the gap in firm sales lies between the pronounced disparity seen for Indians and the null effect among Chinese, at around 23%. This figure is comparable to the gap observed for Latin American immigrants. European countries, again, show considerable disparities: Northwestern Europe shows a modest and statistically insignificant effect of 7%, smaller than Southern Europe (14%, though imprecisely estimated) and Eastern Europe, (25%).

Next, I focus the analysis on second-generation immigrants, i.e., individuals who were born in Canada but whose parents were born abroad (in Canada these individuals are Canadian citizens since birth, thus, they are more properly referred to as second-generation Canadians). This approach offers several advantages compared to studying first-generation immigrants. Second-generation individuals typically have a stronger command of the host country's language and more exposure to its education system and labor market; in addition, they did not have a direct choice in the immigration decision, which was made by their parents (Fernández, 2007).

To measure gender norms by country of ancestry, I rely on data from the World Values Survey (WVS), a large-scale international research project that examines people's values and beliefs in countries around the world. The survey has been conducted in multiple waves since its inception in the early 1980s, involving thousands of respondents in many countries. It covers a wide range of topics and it has been used to study attitudes toward democracy, social capital, religion, gender roles, family, and more. I use answers to several questions in WVS to construct a gender progressivity index, i.e., a measure of average attitudes that reflect gender norms across countries (see Appendix B for a detailed explanation of how the index is constructed). Figure A.9 shows the distribution of gender norms across countries.

Table 5 compares firm outcomes after childbirth for entrepreneurs whose parents immigrated from countries with more egalitarian versus more conservative gender norms, separately by gender. Women whose parents originated from traditional cultures experience larger declines in sales, profits, and profit margin than their egalitarian counterparts. These results are not explained by systematic differences in pre-birth firm characteristics. Next, I repeat the exercise for fathers. The pattern is completely reversed: male entrepreneurs from traditional cultural backgrounds exhibit better business outcomes following the birth of a child. This divergence in outcomes is consistent with women from traditional backgrounds prioritizing family responsibilities over their entrepreneurial pursuits post-childbirth, affecting their business performance. Conversely, traditional gender values might reinforce male roles as primary providers.

Table x shows the effect of cultural norms on entry into entrepreneurship. Men from traditional cultures become significantly more likely to become entrepreneurs after the birth of their first child. However, I find no evidence that gender norms impact entrepreneurial entry for mothers. Therefore, the gender gap in entrepreneurial entry increases in traditional cultures, but this increase is driven by differences in men's, and not women's, behavior. This suggests that cultural values related to traditional gender roles might motivate men to pursue entrepreneurship as a means of providing for their families; while, for women, the decision to enter entrepreneurship may be influenced by factors other than cultural expectations related to motherhood.

### 5.4 Individual or household decisions?

Up to this point, I have treated outcomes after childbirth as resulting from women's individual choices. However, most entrepreneurs with children are married. As a result, there is a substantial element of household decision-making involved in the process. Households may face increased pressure to specialize after having children; women, on average, earn less than their husbands and may prioritize tasks related to home production, such as childcare, while their spouses pursue their comparative advantage in the labor market. I divide women based on whether they are the main earner in the household in the year before having their first child (when about 75% of soon-to-be-mothers are married or cohabiting). If specialization is driving the results, when the mother is the breadwinner, couples will opt for her to focus on entrepreneurship while the spouse takes on a more prominent role in childcare.

I find some evidence consistent with household specialization being at play for entrepreneurial mothers. Table 6 shows that firms owned by main earners outperform those owned by secondary earners. Naturally, one might assume that female breadwinners are inherently more skilled as entrepreneurs. In fact, firms owned by main earners are on average larger; larger firms experience smaller declines in performance after childbirth and this is true regardless of the entrepreneur's main earner status.

To disentangle the role of household specialization, I use inverse probability weighting (IPW) to achieve similar firm distributions for main and secondary earners. The results are very similar after rebalancing the sample: primary earners still maintain an edge in firm performance. But even among main earners, the performance penalty following childbirth remains substantial. For instance, the effect on sales after childbirth is reduced by approximately 40% compared to secondary earners, but it still amounts to a decrease of 20%. Similarly, the effect on profit margin, although less severe, remains at 6%. Startup still endure significant challenges in maintaining their performance after the arrival of a child, even in entrepreneurial households in which mothers are the breadwinners.

Next, I examine the impact of childbirth on personal and household income depending on main earner status. If parents allocated childcare and labor market responsibilities efficiently based on comparative advantage, the effect of children on family income should be similar regardless of which spouse is the breadwinner. In addition, mothers who are primary earners should experience a less negative (or even positive) impact on their own income, as they might increase their labor supply as a response to the additional financial responsibilities that come with raising children. Table x shows that households in which the wife is the main earner prior to childbirth experience a negative impact on family income, while families with a breadwinner husband do not. Moreover, I find that the effect on individual income for female main earners is more negative than for secondary earners, while their spouses experience an income increase. The birth of a child prompts a shift in household dynamics, leading to a "breadwinning reversal" effect: breadwinner mothers are 13% less likely to remain as primary earners after childbirth.

These findings might be explained by mothers having an inherent comparative advantage in childcare responsibilities, independently of their advantage in the labor market. The existing literature has largely ruled out giving birth as the primary cause of large career penalties for mothers, as shown by the fact that adopting and non-adopting mothers face similar penalties, except for a modest short-term difference (Kleven, Landais and Søgaard, 2021; Andresen and Nix, 2022). These findings notwithstanding, it is possible that the comparative advantage in childcare responsibilities might be related to nurturing abilities other than giving birth or nursing. Perhaps more plausibly, preferences and gender norms might shape decision-making within households, leading women to prioritize childcare responsibilities even if they possess a stronger labor market advantage.

## 5.5 Informal childcare

The role of grandparents in providing childcare to their grandchildren is an important aspect of family support networks. In the United States, 20% of working mothers with children under five use grandparents as their primary childcare providers (Posadas and

Vidal-Fernandez, 2013); in Mexico, grandmothers take care of 40% of children aged under six (Marcos, 2023). Several studies have found that the availability of childcare provided by grandparents has a positive effect on mothers' labor supply but a negative effect on grandmothers' employment (Posadas and Vidal-Fernandez, 2013; Kaufmann, Özdemir, and Ye, 2022; Zamarro, 2020; Marcos, 2023). In this section, I study the role of proximity to grandparents in mitigating the impact of childbirth on women's entrepreneurial outcomes.

To examine the role of grandparents, I first establish a connection between parents within my sample and their own parents. This linkage is made possible by the fact that individuals residing at the same address file taxes together (non-filers, such as children who do not receive income, are input by Statistics Canada). Thus, individuals who lived with their own parents at some point from 2001 onward are included in the sample. Next, I assess whether mothers reside in the same city (more precisely, Census Metropolitan Area or Census Agglomeration) as their parents[11]. This measure of proximity serves as an indicator of potential childcare availability and support networks within families.

Table 7 shows that women who live in the same city as their parents experience less adverse effects on their startup businesses following motherhood. Geographical proximity to grandparents acts as a buffer, alleviating the impact of childbirth on sales, profits, entrepreneurial rents, and profitability. Figure A.10 presents an event study focused on sales and profits, showing that the mitigating effect of grandparents' proximity for mothers is most pronounced when the child is very young. This observation may be explained by the greater caregiving demands associated with infants and toddlers, which could lead mothers to rely more heavily on the support provided by nearby grandparents during these crucial early years. In addition, as children grow older, formal childcare options, such as preschool or daycare, may become more accessible and practical for mothers. Panel (b) of Table 7 presents a falsification test involving fathers, showing that the proximity of grandparents has no discernible influence on entrepreneurial outcomes of fathers after the arrival of children.

To move beyond a simple cross-sectional comparison, I exploit the longitudinal nature of the data to study the impact of grandmother retirement on their daughters' entrepreneurial outcomes. I restrict the analysis to mothers who did not experience childbirth during their entrepreneurial spell, ensuring that their selection into motherhood is not driven by the grandmother's retirement. In addition, I restrict the sample to

[11] A Census Metropolitan Area (CMA) is akin to a commuting zone. Statistics Canada defines CMA as a region with a population of at least 100,000, composed by a core urban area of at least 50,000 people, along with adjacent municipalities that have a high degree of social and economic integration with the urban core, as measured by commuting flows. In rural areas, a Census Agglomeration must have a core population of at least 10,000.

grandmothers who were employed at some point in time to capture a shift in their time availability for childcare.

Figure 10 presents an event study that examines the impact of grandmother retirement on the business performance of mothers. The empirical strategy compares the effect of the retirement event for mothers who live in the same municipality as their newly retired mothers versus those who live farther away. I find that mothers living in close proximity see significant improvements in business performance following the retirement event, with increases in sales, profits, and profit margins. Examining pre-trends, there is no evidence that the retirement event is driven by an increase or a decline in business performance prior to retirement, supporting the interpretation that the improvements in firm outcomes are a result of the grandmother's retirement, rather than the retirement being a consequence of pre-existing trends.

A potential concern is that these results may reflect general family assistance (for example, involvement with the business) rather than caregiving support. To address this, I conduct a falsification test by examining the effect of grandfather retirement and find no such improvement in entrepreneurial outcomes (Figure A.11). This suggest that the results are not driven by broader family involvement but are specific to the caregiving support traditionally provided by grandmothers.

Table 8 shows that effect of grandmother retirement on business performance is concentrated among women living in municipalities where center-based childcare provision is lacking. This suggests that there is some degree of substitution between family-provided and formal childcare support, consistent with findings that the expansion of formal childcare services partially crowds out family support (Baker, Gruber and Milligan, 2008). Details on how I measure childcare provision at the municipality level are discussed in Section 5.6.

## 5.6 Formal childcare

In this section, I analyze the impact of formal childcare on mothers' entrepreneurial outcomes, using instances of large childcare expansions at the municipality level. To measure the availability of formal childcare, I look at the density of workers employed in childcare centers relative to the number of children under 2 in each municipality. Since the data does not report hours worked, childcare workers are classified as full-time if their annual earnings exceed the equivalent of full-time minimum wage. If a childcare worker's annual earnings are below this threshold, I consider them as a fraction of a full-time worker, proportional to their earnings relative to the full-time minimum wage.

I define childcare shocks as a one standard deviation increase in the density of childcare workers within a municipality over a given year. If a municipality undergoes multiple instances of childcare expansion based on the above definition, I consider the municipality treated starting from the first expansion event. To assess the impact of these shocks, I compare mothers with children under 6 who experienced the expansion of childcare services when their child was at most 2 years old with mothers whose children were older at the time of the expansion. This triple difference design allows me to evaluate how the timing of the childcare expansion affects mothers who could potentially benefit more due to their child's younger age.

The results presented in Table 9 show that the expansion of formal childcare has a significant positive effect on the business performance of mothers with young children. Specifically, the interaction term Post × Parent × Young Child shows increases in both sales and profit margin, with sales increasing by 11.3% and profit margin rising by approximately 7.2% relative to mothers who had older children at the time of childcare expansion.

# 6 Theoretical framework

## 6.1 Model of occupational choice

I develop a simple model of occupational choice, building on the canonical model of Lucas (1978). I introduce fertility choices in subsection 6.2. Individuals value monetary payoffs and leisure; they make a choice between wage employment and entrepreneurship to maximize utility. Productivity $z \in [0, \bar{z}]$ is distributed heterogeneously across individuals according to a known distribution $F(z)$. All workers receive the same wage $w$, while entrepreneurs' payoffs depend on their productivity. Workers cannot choose how many hours they work: contractually, they have to work $h_w$ hours, earning $W = w \cdot h_w$. Conversely, entrepreneurs have the flexibility of optimally choosing their working hours. The maximum number of available hours is denoted by $H$, thus, an individual who works $h$ hours enjoys $H - h$ hours of leisure.

Individuals maximize the following value function by choosing to become workers ($x = 0$), in which case they earn the equilibrium wage, or entrepreneurs ($x = 1$), in which case they pocket firm profits given the optimal labor demand and hours worked:

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

I assume that firms use workers' labor $n$ and entrepreneur's labor $h$ as inputs. Firm profits are increasing at a decreasing rate in both inputs ($f_n > 0$, $f_h > 0$, $f_{nn} < 0$, $f_{hh} < 0$). In addition, I assume complementarity among inputs and between inputs and productivity, that is, all cross-partial derivatives of $f$ are positive. Finally, the production function exhibits concavity in $n$ and $h$, jointly, which requires, in addition to the conditions on $f_{nn}$ and $f_{hh}$, that the determinant of the Hessian matrix of the function should be positive:

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

This implies that the utility function of the entrepreneur is concave in $n$ and $h$, since the utility from leisure is also concave, and the cost of employed labour $Wn$ is linear in $n$. Under these assumptions, the first order conditions are sufficient for determining the maximizing input combination.

**Proposition 1**: For any given $W$, there exists a single threshold $\hat{z}$ above which individuals choose to become entrepreneurs. For the proof, see Appendix A.

To close the model, we use two equilibrium conditions. First, wage is such that the labor market clears, that is, the number of workers equals total labor demand from entrepreneurs:

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

Second, the marginal entrepreneur is indifferent between entrepreneurship and wage work. The break-even conditions for the marginal entrepreneurs allows us to find $\hat{z}$:

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

## 6.2 Occupational choice with children

We can now extend the model to encompass selection into parenthood, in addition to the previously discussed occupational choice. The model now features two periods to capture dynamic entry into and exit from entrepreneurship. In the first period, individuals make their first occupational choice under a veil of ignorance regarding their desire for children.[12] At the beginning of the second period, they draw a valuation of children $b \in [\underline{b}, \bar{b}]$, which represents the subjective benefit that individuals associate with becoming parents and is unique to each individual.

Women with children incur an additional disutility of hours worked $\phi(h)$, capturing the costs associated with being away from their children, such as the potential need to rely on others for childcare, the loss of bonding opportunities, and cultural expectations. I assume that the disutility of work for mothers is increasing at a weakly increasing rate

[12]This assumption is inconsequential in the current framework because there are no costs associated with exit from entrepreneurship, such as irrecoverable investment. Thus, the problem faced by individuals in this two-period model is again static.

in hours worked: $\phi_h > 0$ and $\phi_{hh} \geq 0$. Alternatively, women with children have to devote a fixed number of hours $\kappa$ to child-rearing responsibilities, so that the total number of available working hours is now $H' = H - \kappa$[13]. Workers with children switch to a part-time contract; denoting as $h_1$ the hours worked by non-parents, parents work $h_2 < h_1$ hours[14]. Each part-time worker is equivalent to $h_2/h_1$ full-time workers. After learning their value of children $b$, individuals weigh the costs and benefits of having children ($y = 1$) or not ($y = 0$) and make their second occupational choice between entrepreneurship ($x = 1$) and wage work ($x = 0$).

Denoting by $y$ the decision of having children, the value function facing individuals in the second period is as follows:

$$
\begin{aligned}
V(z, b, w) = \max_{\substack{x \in \{0,1\} \\ y \in \{0,1\}}} \Bigg\{ & (1-x)(1-y) \left[ w\, h_1 + \frac{(H-h_1)^{1-\gamma}}{1-\gamma} \right] \\
& + (1-x)\, y \left[ w\, h_2 + b + \frac{(H-h_2)^{1-\gamma}}{1-\gamma} - \phi(h_2) \right] \\
& + x\,(1-y) \max_{n,h} \left[ f(z,h,n) - wn + \frac{(H-h)^{1-\gamma}}{1-\gamma} \right] \\
& + x\, y \max_{n,h} \left[ f(z,h,n) - wn + b + \frac{(H-h)^{1-\gamma}}{1-\gamma} - \phi(h) \right] \Bigg\}.
\end{aligned}
$$

**Proposition 2**: For any given $w$, there exists a unique threshold $\hat{z}_2(w)$ above which mothers become entrepreneurs. For the proof, see Appendix A.

Given $\hat{z}_1(W)$ and $\hat{z}_2(W)$, we determine the optimal value and policy functions of an entrepreneur with value $z$ as follows. First, regardless of the value of $b$ and the presence ($y = 1$) or absence of children ($y = 0$), she will become an entrepreneur if $z \geq \hat{z}_1(w)$ and $z \geq \hat{z}_2(w)$. If $z$ is below $\hat{z}_1(w)$ and $\hat{z}_2(w)$, she will work for any $b$ or $y$. The strategy for individuals with productivity between $\hat{z}_1(w)$ and $\hat{z}_2(w)$ depends on whether

[13] Time allocated to childcare responsibilities might itself be a function of productivity $z$. For example, relatively less productive women might be the secondary income earner in their family and take on a larger share of childcare tasks, while the primary income earner increases labor supply. The empirical evidence partially corroborates the presence of household specialization; however, the division of labor between parents appears to be significantly influenced by traditional gender roles. For instance, Parker and Wang (2013) find that stay-at-home mothers spend 19.7 hours per week watching their children, about three times as many hours as their husbands, who spend 6.5 hours. By contrast, stay-at-home husbands spend 11.3 hours on childcare tasks; their wives, 8.9 (a ratio of 1.3). Mothers in dual-income couples spend on childcare only 3 more hours than their solo-earner counterparts (11.9 vs 8.9) and 70% more hours than their husbands.

[14] I assume that a part-time regime is welfare-improving for workers, that is, $wh_1 + \frac{(H-h_1)^{1-\gamma}}{1-\gamma} - \phi(h_1) < wh_2 + \frac{(H-h_2)^{1-\gamma}}{1-\gamma} - \phi(h_2)$. This reflects the empirical observation that mothers opt to reduce working hours after having a child (Kleven et al., 2019). This implies that $w < \frac{\frac{(H-h_2)^{1-\gamma}}{1-\gamma} - \phi(h_2) - \frac{(H-h_1)^{1-\gamma}}{1-\gamma} + \phi(h_1)}{h_1 - h_2}$.

$\hat{z}_2(w) > \hat{z}_1(w)$ or $\hat{z}_2(w) < \hat{z}_1(w)$. I analyze here the former case because it is supported by the empirical findings presented in the next section; in the Appendix, I describe the strategy for the latter case. When $z \in [\hat{z}_1(w), \hat{z}_2(w))$ and $\hat{z}_2(w) > \hat{z}_1(w)$, she will become an entrepreneur if she does not have children. Put formally:

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

Given the optimal policy for $x$ conditional on $y$, we similarly develop the optimal policy for $y$ on a case by case basis. First, if $z < \hat{z}_1(w)$, so that $x = 0$ (she always works), a woman will choose to have children if and only if:

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

So we define the threshold

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

If $z \geq \hat{z}_2(w)$ so $x = 1$ and she always chooses entrepreneurship, a woman will choose to have children if and only if:

$$\underbrace{f(h'(z, W), z, W) - Wn(h'(z, W); z, W) + \frac{(H - h'(z, W))^{1-\gamma}}{1-\gamma} - \phi(h'(z, W))}_{f_2(z)} + b \geq$$
$$\underbrace{f(h^*(z, W), z, W) - Wn(h^*(z, W); z, W) + \frac{(H - h^*(z, W))^{1-\gamma}}{1-\gamma}}_{f_1(z)}$$

Denoting the value function of the entrepreneur without children as $f_1(z)$ and the entrepreneur with children as $f_2(z)$, the relevant threshold is:

$$b\big(z \geq \hat{z}_2(w)\big) \equiv f_1(z) - f_2(z)$$

This threshold is increasing in $z$ since:

$$\frac{\partial f_1(z)}{\partial z} - \frac{\partial f_2(z)}{\partial z} = f_z(h^*(z, W), z, W) - f_z(h'(z, W), z, W) > 0.$$

As before, the envelope theorem cancels terms. The right inequality holds because of the fact that $f_{zn} > 0$ and $f_{zh} > 0$, in combination with $h^* > h'$ and $n^* > n'$ (higher productivity increases output more with higher inputs).

Finally, between $\hat{z}_1(w)$ and $\hat{z}_2(w)$, the threshold value of $b$ for having children depends upon the value function for being an entrepreneur without children, and the utility from being a worker with children. Following the same notation as before:

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

Note that $f_1(z)$ is increasing in $z$, so the threshold value of $b$ must be as well. Appendix B details the equilibrium conditions to close the model. Figure A.13 Panel (a) depicts an example of equilibrium for the two cases $\hat{z}_2(w) > \hat{z}_2(w)$.

## 6.3 Discussion

The model offers several empirical predictions. First, more productive individuals have a higher likelihood of becoming entrepreneurs. Productivity is hard to measure; nonetheless, since most individuals have work experience before starting their own firm, we can look at selection of entrepreneurs from the labor market to get a sense of the relationships between productivity and entrepreneurship.

Panel A of Figure A.14 depicts the probability that a worker in the $n^{th}$ percentile of the wage distribution starts a firm within the following year. Entry rates increase exponentially with labor income for both men and women. Panel B shows that workers who before starting their firm belonged to the the top of the wage distribution make up a disproportionate fraction of entrepreneurs; for example, former workers in the 99$^{\text{th}}$ percentile represent about 3.4% of all entrepreneurs, compared to an average of 0.5% for workers in each percentile below the 50$^{\text{th}}$. But because women are increasingly underrepresented as we move to the right tail of the wage distribution, the female share of entrepreneurs coming from top jobs is small. The prediction that individual productivity is correlated with participation in entrepreneurship is also consistent with the finding that entrepreneurs are more educated and, as youths, scored higher on learning aptitude tests than salaried workers and the self-employed (Levine and Rubinstein, 2017).

Second, entrepreneurs with children will decrease their own labor supply to the firm. This holds true under different modelling choices — assuming that mothers have to allocate a fixed amount of time to childcare, thereby reducing the total time allocatable to work or leisure, or that mothers incur a cost for each hour they work, and this cost escalates as they increase their working hours (because they must cover childcare expenses or experience the adverse consequence of spending less time with their children). Given the equilibrium wage, firm performance declines for start-ups owned by mothers relative to equally productive entrepreneurs who don't have children. The empirical evidence in this paper is consistent with the prediction that childbirth leads to a deterioration in start-up performance.

The model points out the theoretical ambiguity surrounding the effect of childbirth on entrepreneurial participation. On the one hand, entrepreneurs' ability to set their own schedules makes entrepreneurship more appealing for mothers. If the marginal entrepreneur does not have to work excessive hours, the flexibility of entrepreneurship could lead to an increase in the number of entrepreneurs after childbirth. On the other hand, if the production function of the firm heavily relies on the founder's labor, reducing work hours could be prohibitively costly. In such cases, entrepreneurship may become less attractive for mothers, as they might be unable to balance the demands of childcare with the substantial time commitment needed for the firm to operate optimally.

The impact of motherhood on entrepreneurship is also affected by the structure and institutions prevailing in the labor market. In a labor market with substantial penalties[15] for women, entrepreneurship becomes relatively more attractive as it lowers the required rate of return that entrepreneurs are willing to accept. Entrepreneurship might become a more appealing option even in a labor market with no financial penalties for mothers but also no flexibility, for example, no part-time — so that the consumption-leisure trade-off is unfavorable.

The effect of children on women's entrepreneurial activity is ultimately an empirical question. In this paper, I show evidence of a large, negative effect of motherhood on entrepreneurship rates. Firm entry drops substantially around childbirth, while exit only increases slightly. These findings are consistent with the existence of exit costs, including the loss of business networks, potential discounting of entrepreneurial experience by prospective employers[16], and costs associated with terminating business contracts prematurely. Women may anticipate the potential impact of motherhood on their entrepreneurial endeavors and avoid entering entrepreneurship when they anticipate having a child. I find that the drop in entry rates starts one year before childbirth, suggesting

[15]The use of the term *child penalties*, describing the decline in women's earnings after childbirth, has sometimes faced criticism on the ground that this decline may arise from women's preferences in allocating their time between childcare and wage work, rather than being a result of external factors or discrimination in the labor market. Kleven, Landais and Søgaard (2019) find that the decrease in mothers' earnings can be attributed roughly equally to drops in labor force participation, working hours, and wage rates. In my model, I do not allow individuals to exit the labor market altogether and I do not model heterogeneity in job tasks or discrimination, which would result in different wage rates. Instead, I model child penalties as a reduction in hours which improves the trade-off between labor and leisure in the presence of children.

[16]In a UK audit study, Koellinger et al. (2015) find that previous self-employment experience is interpreted as a bad signal in the labor market. Employers may infer that such candidates possess different skills, work habits, or personality traits that are deemed less suitable for employment positions.

anticipatory decision-making, while the performance of existing entrepreneurs remains unaffected until the year of childbirth.

Finally, the model speaks to the relationship between career choices and fertility. In careers where compensation is more closely linked to productivity and longer hours are rewarded, such as entrepreneurship, only women with a high enough desire for children can justify incurring the career costs imposed by motherhood. In the population, the relative fertility rates of entrepreneurs and workers are determined by the correlation between fertility preferences and productivity. Estimating this correlation is challenging because any empirical proxy for productivity (e.g., wage or education) is potentially influenced by fertility decisions, even before they occur[17]. But if desire for children is distributed in the population independently of productivity, the model implies that fertility rates are lower for more productive women, who are more likely to become entrepreneurs.

# 7 Conclusion

Entrepreneurship is a key driver of economic growth and innovation, yet women remain significantly underrepresented among entrepreneurs, particularly in high-growth ventures. Female entrepreneurs are less likely to succeed in scaling their businesses or achieving high-value outcomes, such as acquisitions or IPOs. Despite a growing literature on female entrepreneurs, our understanding of the underlying factors driving the entrepreneurship gender gap remains incomplete.

This paper contributes to filling this gap by examining the effects of childbirth on women's entrepreneurial activity. Drawing on comprehensive administrative data from Canada, I show that childbirth leads to a sharp decline in women's likelihood of starting a business and a persistent deterioration in the performance of their existing firms. Even though the effects taper off over time, they never return to pre-birth levels. The negative spillovers also extend to employees, who face reduced earnings and higher risks of unemployment. Children explain a significant fraction of the entrepreneurship gender gap,

[17] Adda et al. (2017) study the career cost of children in a structural model and find that women with high fertility preferences preemptively choose careers with flatter paths, and make educational choices accordingly, to mitigate the risk of potential infertility. A large literature has studied the relationship between income and fertility behavior. An empirical regularity in fertility studies based on the last two centuries of data has been the negative relationship between income and fertility, as well as between women's education and fertility, in post-industrialization societies. This pattern has started to disappear or even reverse in the past two decades: for example, the relationship between women's labor force participation and fertility is now *positive*. This shift has led to the emergence of new models of fertility, in which reconciling career and family is a crucial determinant of fertility decisions (see Doepke et al. (2023) for a review).

and therefore, any scholarly or policy discourse concerning the entrepreneurship gender gap cannot ignore the role of family formation.

In recent years, policymakers have championed many initiatives to promote women's participation in entrepreneurship, ranging from financing programs to mentorship and networking initiatives. At the same time, concerns about declining birth rates and aging populations in many developed countries have sparked discussions around policies to encourage family formation and boost fertility. Recognizing the interconnectedness of these issues is crucial: the old divide between family and career has shifted, with more women now aiming to succeed in both (Goldin, 2014). Understanding how motherhood affects women's careers and entrepreneurial pursuits is key to creating policies that help women integrate family and professional aspirations.

This paper focuses on women's entrepreneurial activities and on the entrepreneurship gender gap arising as a consequence of childbirth. However, family formation can have other consequences for entrepreneurship at the aggregate level, affecting both men and women. For example, a working spouse can provide consumption insurance in case of failure, increasing entrepreneurial entry and risk taking. Avenues for future research include this and other important questions related to family formation, risk sharing within the household, and their consequences for entrepreneurship.

## References


**Adda, J., Dustmann, C., and Stevens, K.** 2017. The career costs of children. *Journal of Political Economy 125(2)*, pp. 293-337.

**Alesina, A. and P. Giuliano.** 2015. Culture and institutions. *Journal of Economic Literature 53(4)*, pp. 898-944.

**Altonji, J.G. and Blank, R.M.** 1999. Race and gender in the labor market. In *Handbook of Labor Economics Vol. 3*, pp. 3143-3259.

**Andresen, M.E., and E. Nix.** 2022. What causes the child penalty? Evidence from adopting and same-sex couples. *Journal of Labor Economics 40(4)*, pp. 971-1004.

**Andresen, M.E. and E. Nix.** 2022. Can the child penalty be reduced? Evaluating multiple policy interventions.

**Andrews, M.J., A. Chatterji, J. Lerner, and S. Stern.** 2022. *The Role of Innovation and Entrepreneurship in Economic Growth*. University of Chicago Press.

**Angrist, J. and W.N. Evans.** 1998. Children and their parents' labor supply: Evidence from exogenous variation in family size. *American Economic Review 88*, pp. 450–477.

**Baker, M., J. Gruber, and K. Milligan.** 2008. Universal child care, maternal labor supply, and family well-being. *Journal of Political Economy 116(4)*, pp. 709-745.

**Becker, S.O., and H.K. Hvide.** 2022. Entrepreneur Death and Startup Performance. *Review of Finance 26(1)*, pp. 163-185.

**Bertrand, M.** 2011. New perspectives on gender. In *Handbook of Labor Economics* Vol. 4, pp. 1543-1590. Elsevier.

**Blinder, A.** 1973. Wage Discrimination: Reduced Form and Structural Estimates. *Journal of Human Resources 8*, pp. 436-455.

**Boelmann, B., A. Raute, and U. Schonberg.** 2021. Wind of change? Cultural determinants of maternal labor supply. *American Economic Journal: Applied Economics*, forthcoming.

**Burke, A.E., F.R. Fitzroy, and M.A. Nolan.** 2002. Self-employment wealth and job creation: The roles of gender, non-pecuniary motivation and entrepreneurial ability. *Small Business Economics 19*, pp. 255-270.

**Caliendo, M., F. Fossen, and A.S. Kritikos.** 2014. Personality characteristics and the decisions to become and stay self-employed. *Small Business Economics 42*, pp. 787-814.

**Core, F.** 2024. Female innovative entrepreneurship and maternity risk. *Review of Finance*, p. rfae014.

**Core, F. and Karpati, D.** 2024. Self-Employed Mothers: Child Penalties, Maternity Benefits, and Family Health.

**Correll, S.J., S. Benard, and I. Paik.** 2007. Getting a job: Is there a motherhood penalty? *American Journal of Sociology 112(5)*, pp. 1297-1338.

**Cuddy, A.J., S.T. Fiske, and P. Glick.** 2004. When professionals become mothers, warmth doesn't cut the ice. *Journal of Social Issues 60(4)*, pp. 701-718.

**Dahl, G.B. and E. Moretti.** 2008. The demand for sons. *The Review of Economic Studies 75(4)*, pp. 1085-1120.

**De Chaisemartin, C.** 2017. Tolerating defiance? Local average treatment effects without monotonicity. *Quantitative Economics 8(2)*, pp. 367-396.

**Delbaere, I., Verbiest, S., and Tydén, T.** 2020. Knowledge about the impact of age on fertility: a brief review. *Upsala Journal of Medical Sciences 125(2)*, pp. 167-174.

**Doepke, M., Hannusch, A., Kindermann, F., and Tertilt, M.** 2023. The economics of fertility: A new era. In *Handbook of the Economics of the Family*, Vol. 1, No. 1, pp. 151-254. North-Holland.

**Ewens, M., and R.R. Townsend.** 2020. Are early stage investors biased against women? *Journal of Financial Economics 135(3)*, pp. 653-677.

**Faccio, M., Marchica, M.T., and Mura, R.** 2016. CEO gender, corporate risk-taking, and the efficiency of capital allocation. *Journal of Corporate Finance 39*, pp. 193-209.

**Fairlie, R.W. and Robb, A.M.** 2009. Gender differences in business performance: evidence from the Characteristics of Business Owners survey. *Small Business Economics 33*, pp.375-395.

**Fedyk, A. and Hodson, J.** 2024. Lehman's Lemons: Do Career Disruptions Matter for the Top 5

**Fernández, R.** 2007. Women, work, and culture. *Journal of the European Economic Association 5(2-3)*, pp. 305-332.

**Fernández, R.** 2011. Does culture matter? *Handbook of Social Economics 1*, pp. 481-510.

**Fontenay, S.** 2024. How can paid maternity leave boost female entrepreneurship? *Journal of Human Resources.*

**Fortin, N., Lemieux, T., and Firpo, S.** 2011. Decomposition methods in economics. In *Handbook of Labor Economics (Vol. 4)*, pp. 1-102. Elsevier.

**Fossen, F.M.** 2012. Gender Differences in Entrepreneurial Choice and Risk Aversion–A Decomposition Based on a Microeconometric Model. *Applied Economics 44(14)*, pp. 1795-1812.

**Gallen, Y., J.S. Joensen, E.R. Johansen, and G.F. Veramendi.** 2023. The Labor Market Returns to Delaying Pregnancy.

**Goldin, C.** 1990. Understanding the gender gap: An economic history of American women. National Bureau of Economic Research.

**Goldin, C.** 2014. A grand gender convergence: Its last chapter. *American Economic Review 104(4)*, pp. 1091-1119.

**Görlitz, K. and Tamm, M.** 2020. Parenthood, risk attitudes and risky behavior. *Journal of Economic Psychology 79.*

**Gottlieb, J.D., R.R. Townsend, and T. Xu.** 2022. Does career risk deter potential entrepreneurs? *The Review of Financial Studies 35(9)*, pp. 3973-4015.

**Guiso, L., P. Sapienza, and L. Zingales.** 2006. Does culture affect economic outcomes?. *Journal of Economic Perspectives 20(2)*, pp. 23-48.

**Guzman, J. and A. Kacperczyk.** 2019. Gender gap in entrepreneurship. *Research Policy 48(7)*, pp. 1666-1680.

**Haltiwanger, J., R.S. Jarmin, and J. Miranda.** 2013. Who creates jobs? Small versus large versus young. *Review of Economics and Statistics 95(2)*, pp. 347-361.

**Hebert, C.** 2020. Gender Stereotypes and Entrepreneur Financing.

**Hebert, C., Tookes, H., and Yimfor, E.** 2024. Financing The Next VC-Backed Startup: The Role of Gender. Available at SSRN 4784414.

**Hsieh, C.T., Hurst, E., Jones, C.I., and Klenow, P.J.** 2019. The allocation of talent and us economic growth. *Econometrica 87(5)*, pp.1439-1474.

**Kahn, L. M.** 2010. The long-term labor market consequences of graduating from college in a bad economy. *Labour Economics 17(2)*, pp. 303-316.

**Kaufmann, K., Y. Özdemir, and H. Ye.** 2022. Spillover Effects of Old-Age Pension across Generations: Family Labor Supply and Child Outcomes.

**Kleven, H., C. Landais, and J.E. Søgaard.** 2019. Children and gender inequality: Evidence from Denmark. *American Economic Journal: Applied Economics 11(4)*, pp. 181-209.

**Kleven, H., C. Landais, and J.E. Søgaard.** 2021. Does biology drive child penalties? Evidence from biological and adoptive families. *American Economic Review: Insights 3(2)*, pp. 183-198.

**Kleven, H.** 2022. The Geography of Child Penalties and Gender Norms: A Pseudo-Event Study Approach. National Bureau of Economic Research Working Paper No. w30176.

**Kleven, H., Camille Landais, Johanna Posch, Andreas Steinhauer, Josef Zweimuller.** 2024. Do Family Policies Reduce Gender Inequality? Evidence from 60 Years of Policy Experimentation. *American Economic Journal: Economic Policy 16(2)*, pp. 110-149.

**Koellinger, P.D., Mell, J.N., Pohl, I., Roessler, C., and Treffers, T.** 2015. Self-employed but looking: A labour market experiment. *Economica 82(325)*, pp. 137-161.

**Levine, R., and Y. Rubinstein.** 2017. Smart and Illicit: Who Becomes an Entrepreneur and Do They Earn More?. *The Quarterly Journal of Economics 132(2)*, pp. 963-1018.

**Looze, J., and S. Desai.** 2020. Challenges along the entrepreneurial journey: Considerations for entrepreneurship supporters.

**Marcos, M.A.T.** 2023. Grandmothers and the Gender Gap in the Mexican Labor Market. *Journal of Development Economics 162*, p. 103013.

**Markussen, S. and K. Røed.** 2017. The gender gap in entrepreneurship–The role of peer effects. *Journal of Economic Behavior & Organization 134*, pp. 356-373.

**Nollenberger, N. and N. Rodríguez-Planas.** 2015. Full-time universal childcare in a context of low maternal employment: Quasi-experimental evidence from Spain. *Labour Economics 36*, pp. 124-136.

**Oaxaca, R.** 1973. Male-Female Wage Differentials in Urban Labor Markets. *International Economic Review 14*, pp. 693-709.

**Oreopoulos, P., von Wachter, T., and Heisz, A.** 2012. The short- and long-term career effects of graduating in a recession. *American Economic Journal: Applied*

*Economics 4(1)*, pp. 1-29.

**Posadas, J., and M. Vidal-Fernandez.** 2013. Grandparents' childcare and female labor force participation. *IZA Journal of Labor Policy 2*, pp. 1-20.

**Raina, S.** 2021. VCs, founders, and the performance gender gap.

**Rocha, V. and M. Van Praag.** 2020. Mind the gap: The role of gender in entrepreneurial career choice and social influence by founders. *Strategic Management Journal 41(5)*, pp. 841-866.

**Rubinstein, Y., and Levine, R.** 2020. Selection into entrepreneurship and self-employment.

**Schumpeter, J.A.** 1942. *Capitalism, Socialism and Democracy.* Vol. 36, Harper & Row, New York, pp. 132-145.

**Smith, M., Yagan, D., Zidar, O. and Zwick, E.** 2019. Capitalists in the twenty-first century. *The Quarterly Journal of Economics 134(4)*, pp.1675-1745.

**Smith, M., O. Zidar, and E. Zwick.** 2023. Top wealth in America: New estimates under heterogeneous returns. *The Quarterly Journal of Economics 138(1)*, pp. 515-573.

**Taylor, A.** 2003. Extent of the problem. *BMJ 327(7412)*, pp. 434-436.

**Wasserman, N.** 2008. The founder's dilemma. *Harvard Business Review 86(2)*, pp. 102-109.

**Yang, T., A. Kacperczyk, and L. Naldi.** 2024. The motherhood wage penalty and female entrepreneurship. *Organization Science 35(1)*, pp. 27-51.

**Yang, T. and H.E. Aldrich.** 2014. Who's the boss? Explaining gender inequality in entrepreneurial teams. *American Sociological Review 79(2)*, pp. 303-327.

**Yang, T. and M. del Carmen Triana.** 2019. Set up to fail: Explaining when women-led businesses are more likely to fail. *Journal of Management 45(3)*, pp. 926-954.

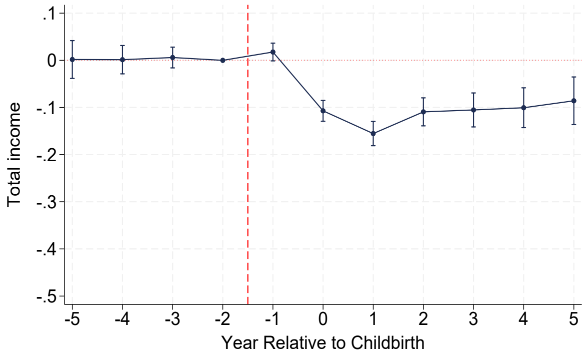
**Zamarro, G.** 2020. Family Labor Participation and Child Care Decisions: The Role of Grannies. *SERIEs 11(3)*, pp. 287-312.

**Zandberg, J.** 2021. Family comes first: Reproductive health and the gender gap in entrepreneurship. *Journal of Financial Economics 140(3)*, pp. 838-864.

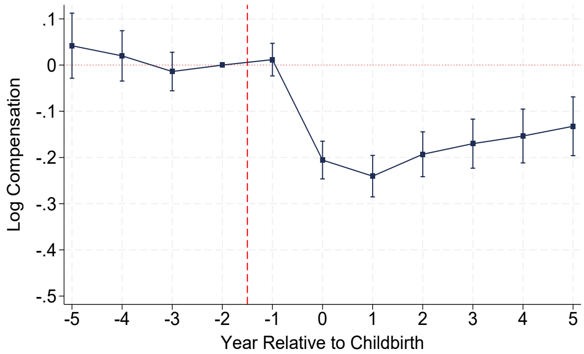
# Figures

### Figure 1: Entrepreneur’s outcomes: matched sample

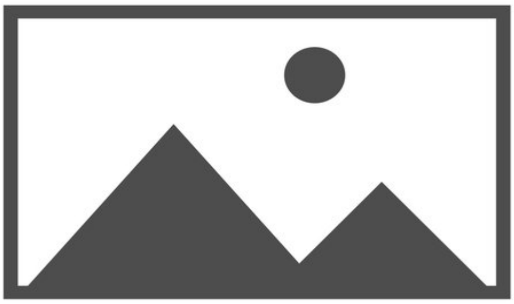
**(a)** Total income



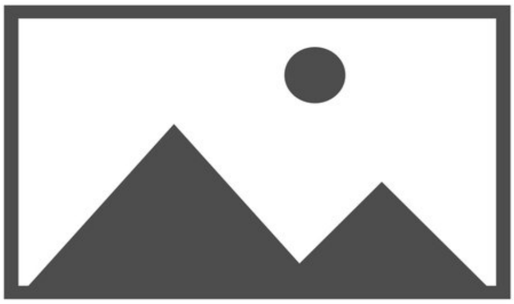

**(b)** Entrepreneur’s compensation




**(c)** Entrepreneurship



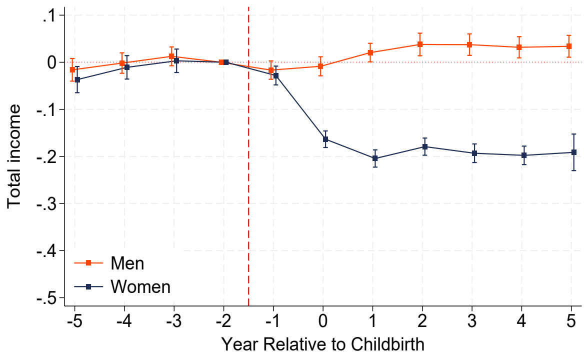
**(d)** Serial entrepreneurship



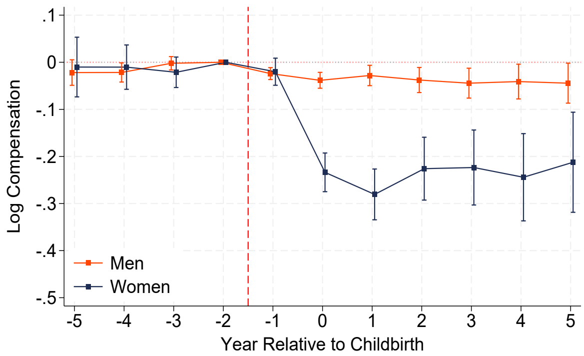
*Notes:* **These results have not yet been released by Statistics Canada.**

**Figure 2: Entrepreneur's outcomes: mothers vs. fathers**

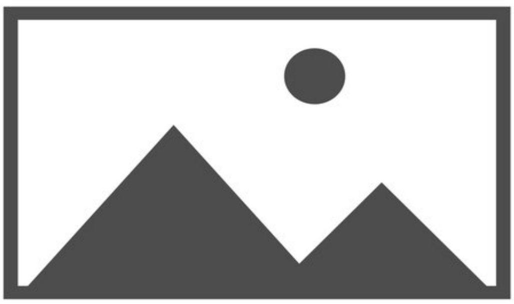
**(a)** Total income



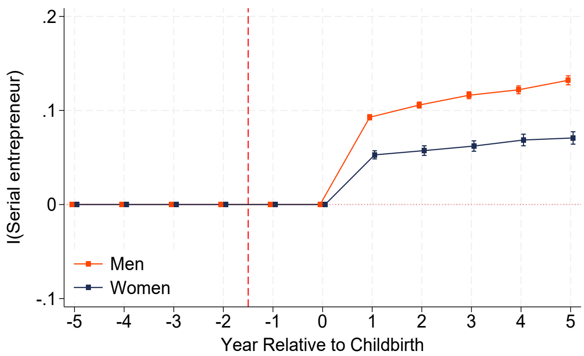

**(b)** Entrepreneur's compensation




**(c)** Entrepreneurship



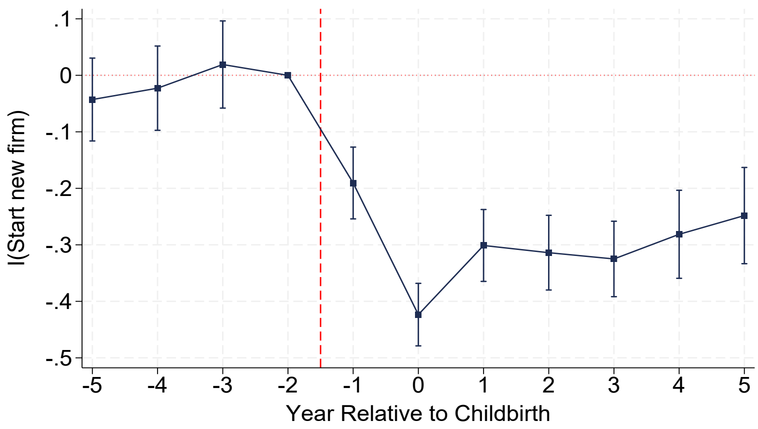
**(d)** Serial entrepreneurship



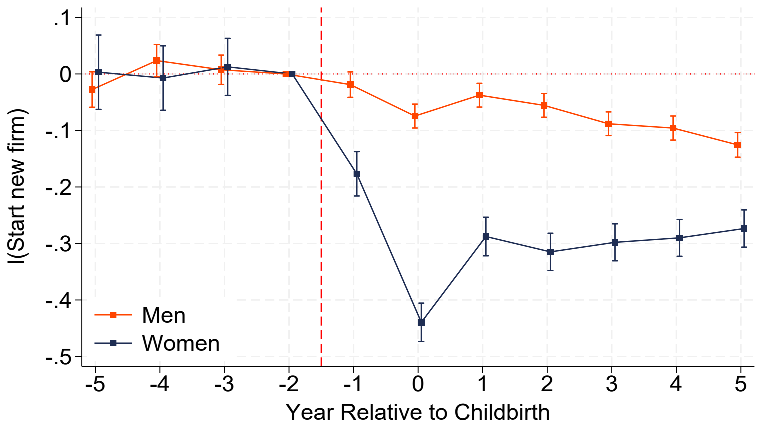

*Notes:* **These results have not yet been released by Statistics Canada.**

**Figure 3: Firm founding rates**

**(a)** Founding rates: matched sample



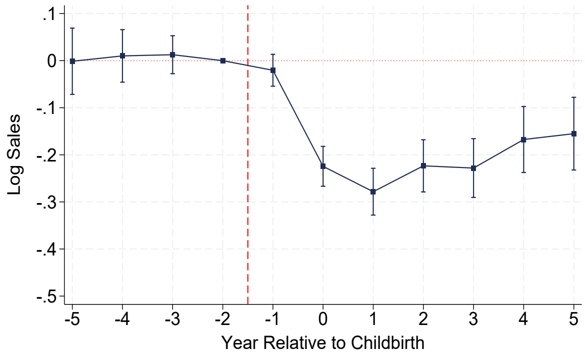

**(b)** Founding rates: mothers vs. fathers



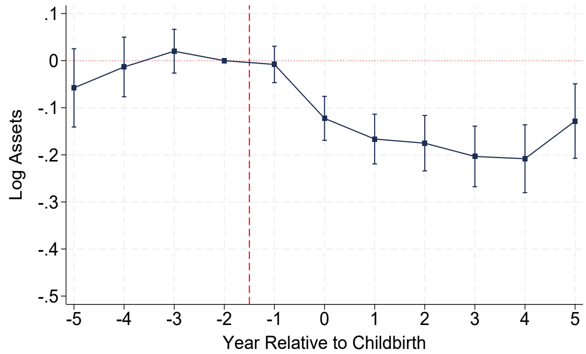

*Notes:* The graphs show event-study estimates obtained by fitting equation 1 (panel (a)) and 4 (panel (b)) on new firm founding rates. Year 0 is when the first childbirth event takes place. The dependent variable is an indicator equal to 1 if the individual starts a new incorporated firm in a given year. In panel (a), the treated group is a sample of women who have a first-born child during the sample period. The control group is a matched sample of women with zero observed fertility. In panel (b), all men and women who had a first-born child during the sample period are included. Coefficients are reported as a percentage of the counterfactual outcome absent children. I report 95% confidence intervals based on standard errors which are clustered at the individual level.

## Figure 4: Firm outcomes: matched sample

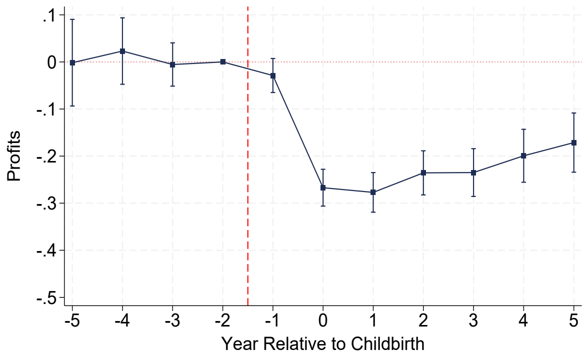
**(a)** Sales



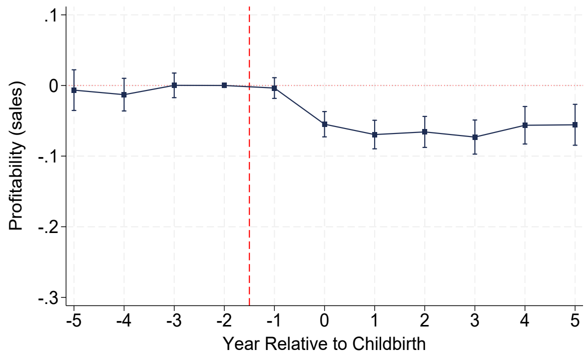

**(b)** Assets




**(c)** Profits

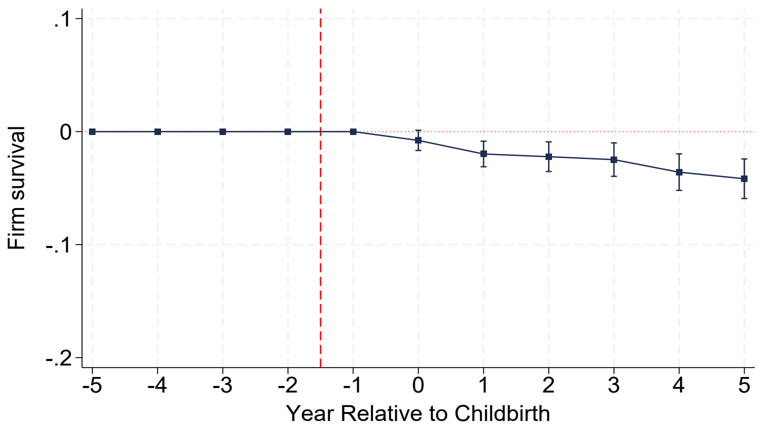



**(d)** Profit margin



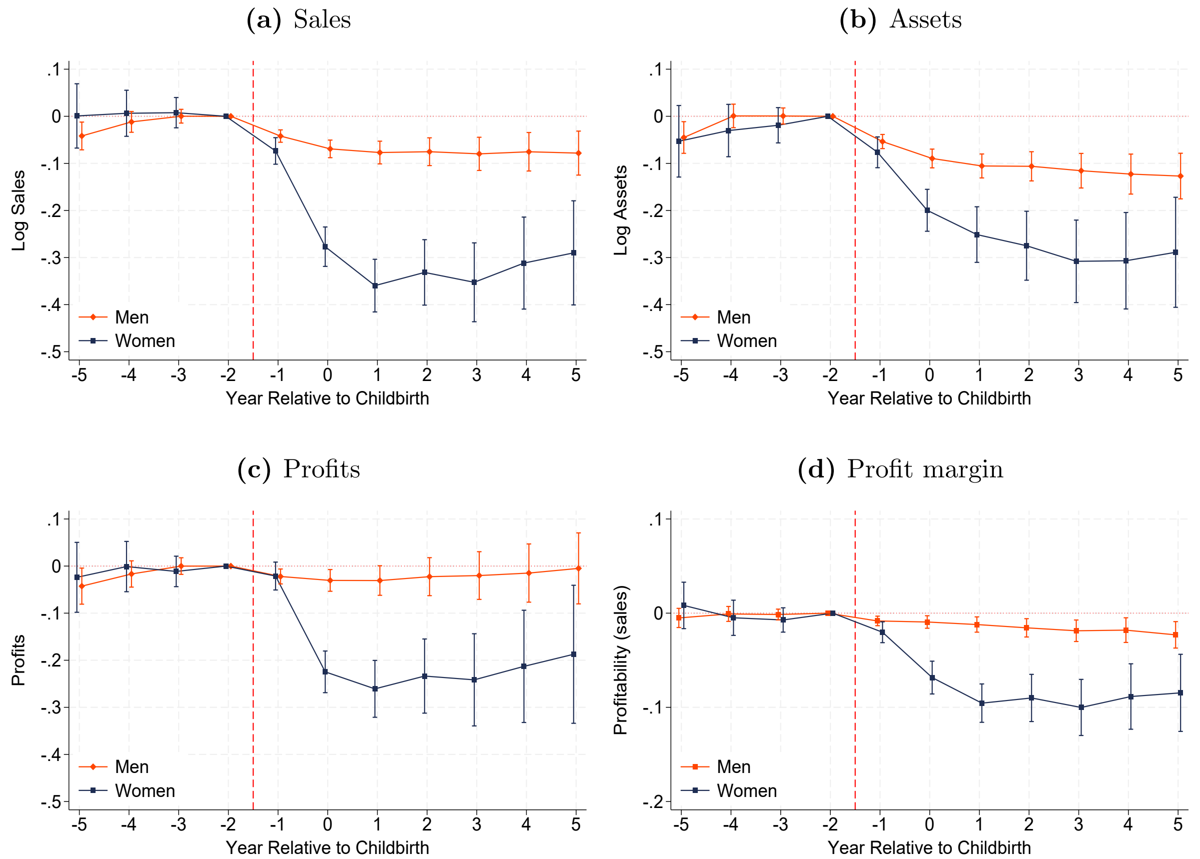

*Notes:* The graphs show event-study estimates obtained by fitting equation 2 on log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)). Year 0 is when the first childbirth event takes place. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

**Figure 5: Firm survival**



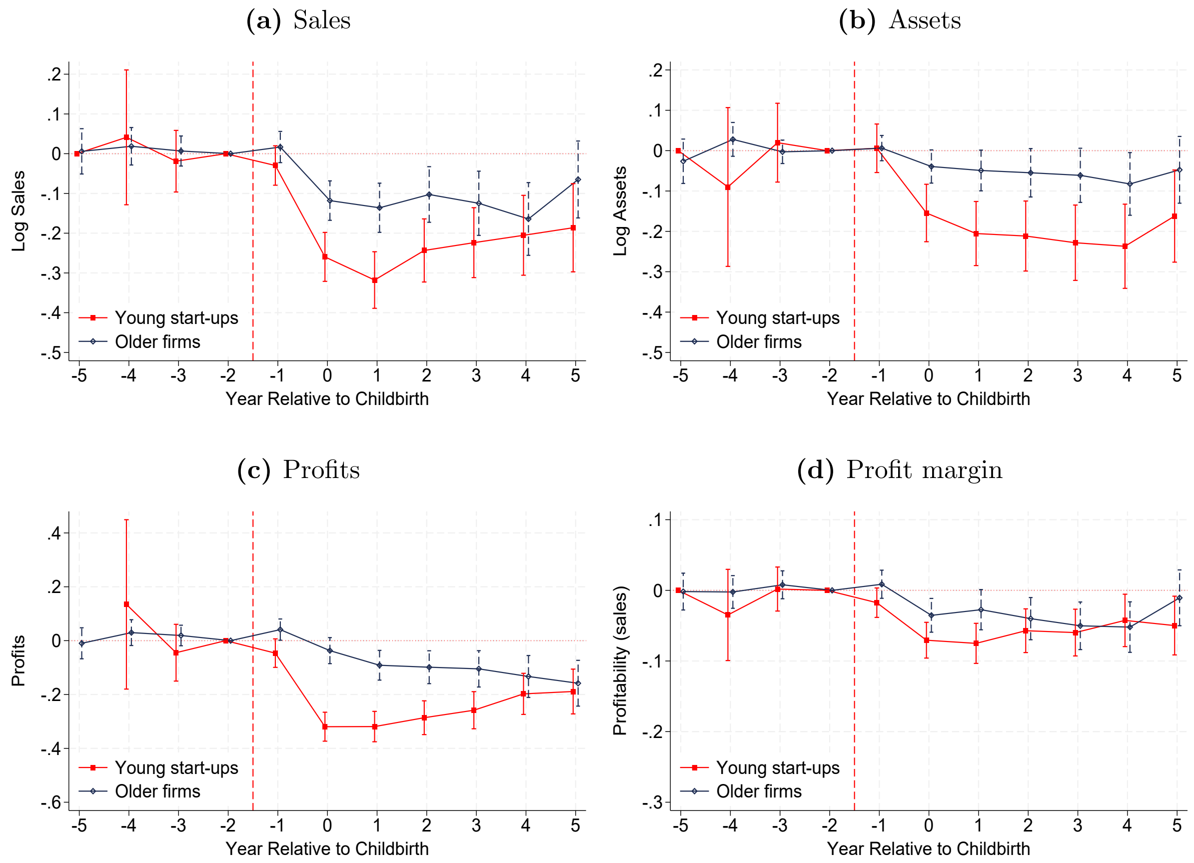

*Notes:* The graphs show event-study estimates obtained by fitting equation 2 on an indicator variable for firm survival. Year 0 is when the first childbirth event takes place. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

**Figure 6: Firm outcomes: mothers vs. fathers**



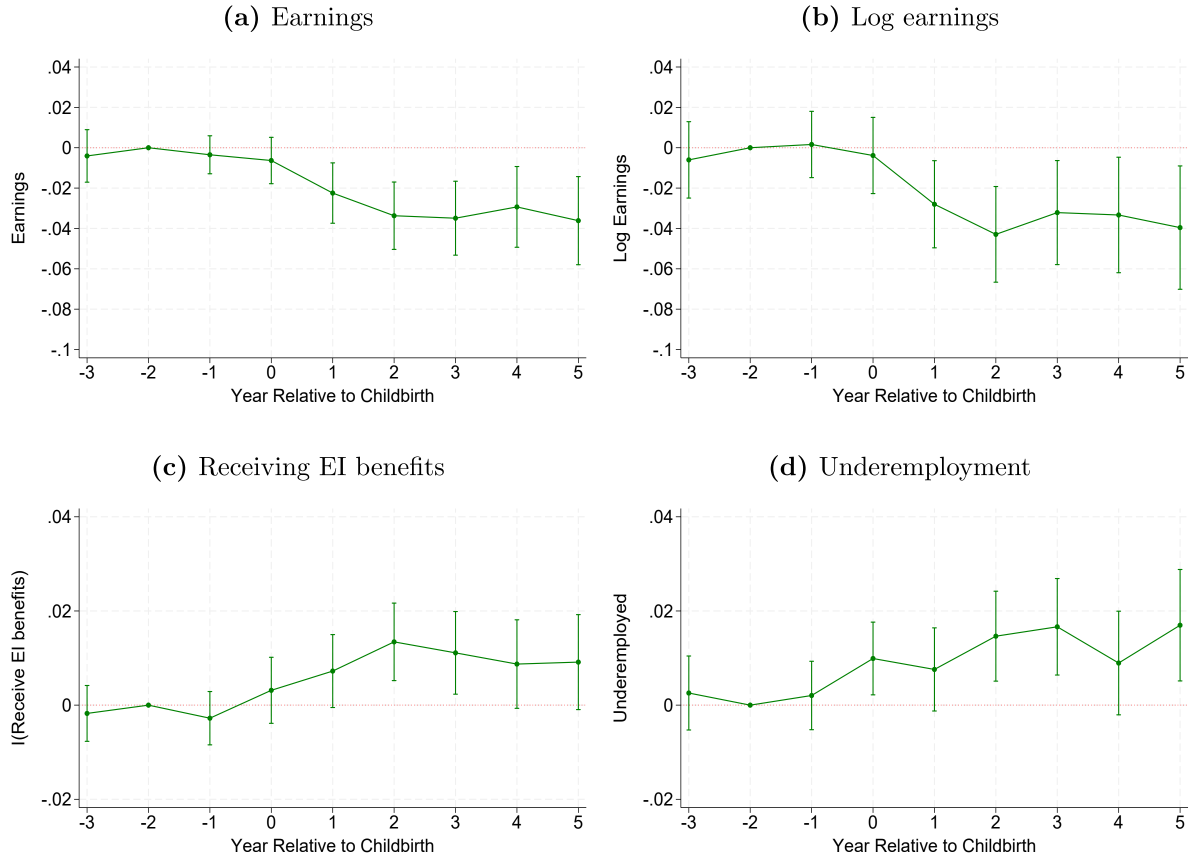

*Notes:* The graphs show event-study estimates obtained by fitting equation 5 on log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)), separately for mothers and fathers. Year 0 is when the first childbirth event takes place. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

**Figure 7: Firm outcomes by firm's life cycle**




*Notes*: The graphs show event-study estimates obtained by fitting equation 2 on log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)), separately by firm age. Young start-ups are firms that experienced the entrepreneur's first childbirth when they were at most 5 years old. Older firms are defined as firms that were older than 5 when the entrepreneur had her first child. Year 0 is when the first childbirth event takes place. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

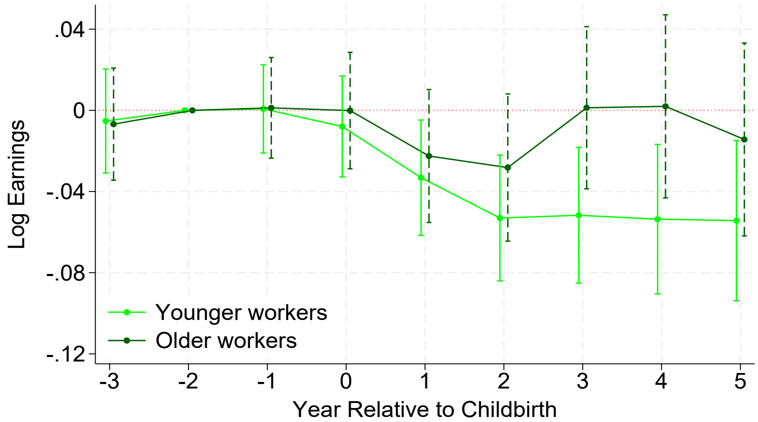
**Figure 8: Worker outcomes**



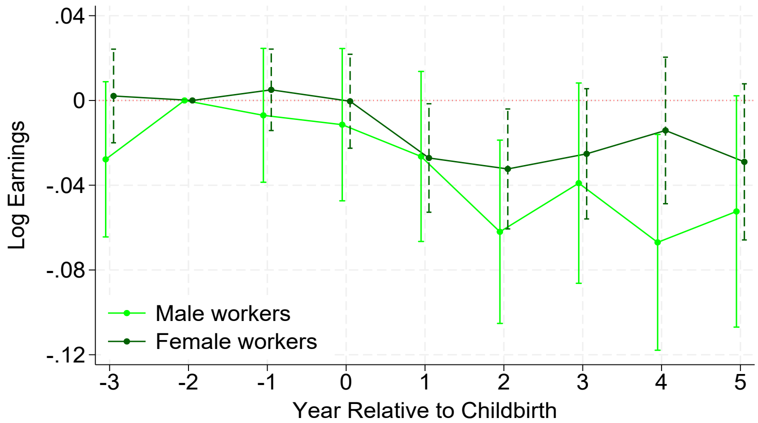

*Notes:* The graphs show event-study estimates obtained by fitting equation 3 on total earnings (panel (a)), log earnings (panel (b)), the probability of receiving EI benefits (panel (c)), and underemployment (panel (d)). Year 0 is when the entrepreneur's first childbirth event takes place. The treated group include workers employed in firms in which the entrepreneur had a child, compared to a control group of workers employed in a matched sample of firms owned by women with zero observed fertility. In panel (a), earnings refer to total employment income in year *t* and coefficients are expressed as a percentage deviation from the counterfactual earnings trajectory in the absence of childbirth. In panel (c), receiving EI benefits is an indicator equal to 1 if the individual reports positive income from unemployment insurance. In panel (d), underemployment is an indicator equal to 1 if the individual earns in one year less than an amount equivalent to 12 weeks of full-time employment at minimum wage. Control variables include indicators for worker age. Worker and year fixed effects are included. Confidence intervals are shown at the 95% level, with standard errors clustered at the worker level.

**Figure 9: Worker outcomes: age and sex**

**(a)** Worker age



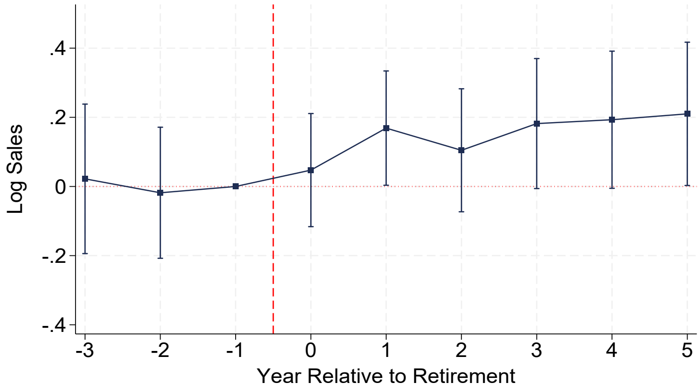

**(b)** Worker sex



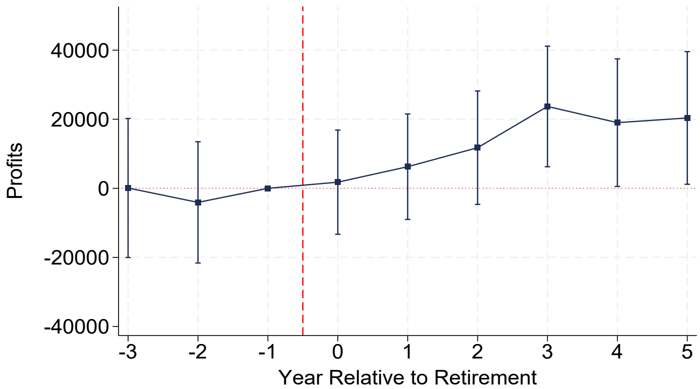

*Notes:* The graphs show event-study estimates obtained by fitting equation 3 on log earnings by worker age and sex. Year 0 is when the entrepreneur's first childbirth event takes place. The treated group include workers employed in firms in which the entrepreneur had a child, compared to a control group of workers employed in a matched sample of firms owned by women with zero observed fertility. Panel (a) shows results for workers who were above or below the median age of 33 when the entrepreneur had a child. Panel (b) shows the earnings effects for male vs. female workers. Control variables include indicators for worker age. Worker and year fixed effects are included. Confidence intervals are shown at the 95% level, with standard errors clustered at the worker level.

## Figure 10: Grandmother retirement and firm outcomes

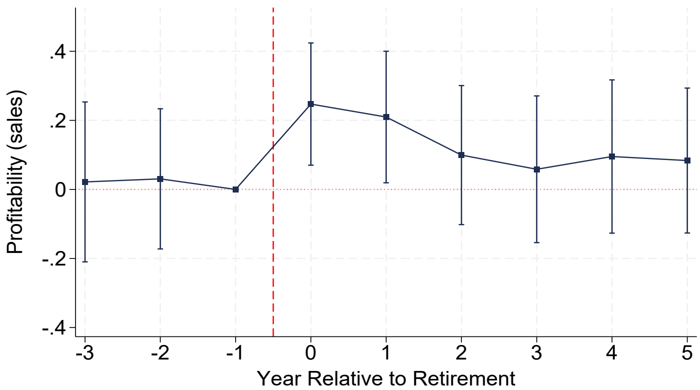
**(a)** Sales




**(b)** Profits




**(c)** Profit margin




*Notes:* The graphs show event-study estimates around grandmother's retirement for log sales (panel (a)), profits (panel (b)), and profit margin (panel (c)). Year 0 is when the grandmother retires. The sample includes mother entrepreneurs who can be matched to their own family of origin through tax files. The treated group includes women who live in the same municipality as their mother, compared to a control group of women whose mother lives in a different municipality. Coefficients for profits are reported in real terms (2012 CPI). Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, a polynomial for entrepreneur's age, and indicators for whether or not a grandfather is also retired and lives in the same municipality. Firm and industry *times* year fixed effects are included. Confidence intervals are shown at the 95% level, with standard errors clustered at the firm level.

# Tables

### Table 1: Descriptive statistics

*Panel A: firms*

| **Variables** | | **Raw** | **Treated** | **Control** | **Standardized difference** | **Variance ratio** |
|---|---|---|---|---|---|---|
| Firm age | mean | | | | | |
| | SD | | | | | |
| No. owners | mean | 1.53 | 1.48 | 1.40 | 0.09 | |
| | SD | 0.89 | 0.76 | 0.78 | | 0.95 |
| Equity share | mean | 78.20 | 80.42 | 83.22 | -0.10 | |
| | SD | 29.09 | 28.14 | 26.78 | | 1.10 |
| Sales (log) | mean | | | | | |
| | SD | | | | | |
| Assets (log) | mean | 10.78 | 11.00 | 10.93 | 0.03 | |
| | SD | 2.68 | 2.47 | 2.46 | | 1.01 |
| Net income (000) | mean | 30.54 | 40.70 | 40.03 | 0.01 | |
| | SD | 82.44 | 90.85 | 90.43 | | 1.01 |
| N | | 20,233 | 11,292 | | | |

*Panel B: entrepreneurs*

| **Variables** | | **Raw** | **Treated** | **Control** | **Standardized difference** | **Variance ratio** |
|---|---|---|---|---|---|---|
| Age | mean | | | | | |
| | SD | | | | | |
| Total income (000) | mean | 64.46 | 71.13 | 70.57 | 0.01 | |
| | SD | 115.97 | 111.63 | 98.54 | | 1.28 |
| Family income (000) | mean | 127.71 | 133.58 | 132.46 | 0.01 | |
| | SD | 205.50 | 190.19 | 234.70 | | 0.66 |
| Married | % | 65 | 59 | | | |
| N | | 20,865 | 11,484 | | | |

*Notes*: This table presents summary statistics for start-ups (Panel A) and entrepreneurs (Panel B) for the full sample of entrepreneurs who are mothers, for the treated sample, and for the control sample. To construct the control sample, I match mothers at the earliest available date between $t-2$ and $t-1$ to never-mothers using caliper matching. The algorithm performs exact matching on the 4-digit industry classification, marital status, and year and fuzzy matching on firm age, entrepreneur's total income, family income, and age. Summary statistics are reported at the earliest between $t-2$ and $t-1$. The last two columns report the standardized mean difference between the treated (T) and the control (C) samples, calculated as $\frac{\bar{x}_T - \bar{x}_c}{\sigma}$, and the variance ratio, calculated as $\frac{\sigma_T^2}{\sigma_C^2}$.

**Table 2: Top-performing firms**

*Notes*: **These results have not yet been released by Statistics Canada.** This table examines outcomes for the top quintile of the firm distribution. Controls include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Standard errors are reported in parenthesis and are clustered at the firm level.

**Table 3: Firm risk taking**

| | (1) $\sigma$**(ROA)** | (2) $\sigma$**(Profits)** | (3) **Leverage** |
|---|---|---|---|
| Post × Parent | 0.019<br>(1.017) | 661<br>(837) | 0.025<br>(0.011) |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Industry × province × year FE | Yes | Yes | Yes |
| N | 157,470 | 157,470 | 157,470 |

*Notes*: This table examines the impact of childbirth on firm risk-taking. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Post is an indicator equal to 1 in the year of birth of the first child or after. The dependent variable in column (1), $\sigma$(ROA), is the standard deviation of the return on assets, computed separately before and after childbirth. The dependent variable in column (2), $\sigma$(Profit), is the standard deviation of net income, calculated separately before and after childbirth. The dependent varaible in column (3), Leverage, is the ratio of total long term liabilities to total assets, reflecting the firm's reliance on debt financing. Control variables iinclude firm age, the number of owners, and marital status. Standard errors are clustered at the firm level.

**Table 4: Financing constraints and firm outcomes**

| | All First Births | | | | First Births During the Great Recession | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| | **Log Sales** | **Log Assets** | **Profits** | **Profit Margin** | **Log Sales** | **Log Assets** | **Profits** | **Profit Margin** |
| Post × Parent | -0.269 | -0.223 | -24,034 | -0.068 | -0.176 | -0.229 | -14,712 | -0.091 |
| | (0.025) | (0.023) | (1,556) | (0.009) | (0.053) | (0.046) | (3,210) | (0.022) |
| Post × Parent × Low financial constraints | 0.182 | 0.119 | 19,170 | 0.035 | 0.174 | 0.224 | 12,675 | 0.097 |
| | (0.042) | (0.039) | (2,129) | (0.016) | (0.089) | (0.077) | (5,379) | (0.037) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry × Province × Year FE | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 153,215 | 153,215 | 153,215 | 153,215 | 19,010 | 19,010 | 19,010 | 19,010 |

*Notes*: This table presents regression estimates examining variation in mothers' firm outcomes depending on financing constraints. The treated group is a sample of firms owned by female entrepreneurs for at least two years before the birth of their first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Panel A shows results for all entrepreneurs, while Panel B focuses on entrepreneurs who had their first child in 2007 or 2008. "Post" is an indicator equal to 1 in the year of birth of the first child or after. "Low financial constraints" is an indicator equal to 1 for firms that had a ratio of tangible capital to total assets higher than the median before childbirth. Control variables include firm age, number of owners, and marital status. Standard errors are reported in parentheses and are clustered at the firm level.

**Table 5: Cultural norms and firm outcomes**

| | Mothers (founders) | | | Mothers (all firm owners) | | | Fathers (founders) | | |
|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| | **Log Sales** | **Profits** | **Profit Margin** | **Log Sales** | **Profits** | **Profit Margin** | **Log Sales** | **Profits** | **Profit Margin** |
| *Post* × *Traditional* | -0.256 | -34,205 | -0.141 | -0.253 | -18,000 | -0.081 | 0.176 | -1,953 | 0.027 |
| | (0.123) | (4,705) | (0.061) | (0.088) | (3,582) | (0.028) | (0.070) | (5,718) | (0.033) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry × year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Province × year effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.800 | 0.762 | 0.680 | 0.822 | 0.812 | 0.652 | 0.793 | 0.703 | 0.600 |
| Number of observations | 8,525 | 9,475 | 8,525 | 15,670 | 18,020 | 15,670 | 31,430 | 34,845 | 31,430 |

*Notes*: This table presents regression estimates examining variation in mothers' and fathers' firm outcomes depending on cultural norms. The sample includes parents who are second-generation immigrant entrepreneurs, i.e., individuals born in Canada from foreign-born parents. "Post" is an indicator equal to 1 in the year of birth of the first child or after. "Traditional" is an indicator equal to 1 if the entrepreneur's parents immigrated from a country with traditional gender norms. The construction of the gender norms index is detailed in Appendix C. Columns 1-3 show results for mothers who are founders; columns 4-6 for all mothers who are business owners. columns 7-9 shows results for fathers who are founders. Controls include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Standard errors are reported in parentheses and are double-clustered at the firm and country of origin level.

**Table 6: Specialization within the household**

*Panel A: firm outcomes*

| | Raw | | | Inverse Probability Weighting | | |
|---|---|---|---|---|---|---|
| | (1) **Log Sales** | (2) **Profits** | (3) **Profit Margin** | (4) **Log Sales** | (5) **Profits** | (6) **Profit Margin** |
| Post × Mother | -0.345 | -16,486 | -0.078 | -0.348 | -22,310 | -0.077 |
| | (0.034) | (1,523) | (0.012) | (0.035) | (2,016) | (0.011) |
| Post × Mother × Main earner | 0.153 | -5,987 | 0.021 | 0.143 | 1,111 | 0.014 |
| | (0.045) | (2,516) | (0.016) | (0.048) | (2,704) | (0.017) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry × province × year effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.800 | 0.770 | 0.658 | 0.800 | 0.768 | 0.657 |
| Number of observations | 86,110 | 93,745 | 86,110 | 80,125 | 83,945 | 80,125 |

*Panel B: income*

| | (1) **Household income** | (2) **Individual income** | (3) **Spouse income** | (4) **Breadwinner** |
|---|---|---|---|---|
| Post × Mother | 0.073 | -0.069 | 0.122 | -0.070 |
| | (0.016) | (0.039) | (0.017) | (0.009) |
| Post × Mother × Main earner | -0.067 | -0.130 | 0.022 | -0.064 |
| | (0.024) | (0.047) | (0.028) | (0.013) |
| Controls | Yes | Yes | Yes | Yes |
| Individual effects | Yes | Yes | Yes | Yes |
| Province × year effects | Yes | Yes | Yes | Yes |
| $R^2$ | 0.522 | 0.454 | 0.626 | 0.522 |
| Number of observations | 227,195 | 225,440 | 133,570 | 137,350 |

*Notes*: This table examines variation in firm and individual-level outcomes depending on household specialization using a triple-differences design. The sample is restricted to entrepreneurs who were married or cohabiting the year before giving birth to their first child. "Post" is an indicator equal to 1 in the year of birth of the first child or after. "Main earner" is an indicator equal to 1 if the mother earned more than 50% of the household income the year before childbirth. Panel A examines firm outcomes for main vs. secondary earners. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. In columns 4-6, observations are reweighted to achieve a balanced distribution of firm characteristics between main and secondary earners. Controls include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Panel B examines the effect on future income. The control group includes the entrepreneurs who own the matched firms and their spouses, conditional on staying married to the entrepreneur. Controls include a polynomial for individual age, and interaction between main earner status and marital status to account for potential marriage dissolution. Standard errors are reported in parenthesis and are clustered at the firm level (Panel A) and at the individual level (Panel B).

**Table 7: Informal childcare**

*Panel A: mothers*

| | (1) Sales | (2) Profits | (3) Profit margin |
|---|---|---|---|
| Post × Close to grandparents | 0.133 | 5,728 | 0.071 |
| | (0.035) | (2,287) | (0.024) |
| Controls | Yes | Yes | Yes |
| Industry × province × year effects | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes |
| $R^2$ | 0.803 | 0.756 | 0.598 |
| Number of observations | 49,770 | 54,820 | 49,770 |

*Panel B: fathers*

| | (1) Sales | (2) Profits | (3) Profit margin |
|---|---|---|---|
| Post × Close to grandparents | 0.019 | -3,748 | 0.007 |
| | (0.019) | (1,338) | (0.012) |
| Controls | Yes | Yes | Yes |
| Industry × province × year effects | Yes | Yes | Yes |
| Firm effects | Yes | Yes | Yes |
| $R^2$ | 0.766 | 0.670 | 0.496 |
| Number of observations | 236,635 | 259,890 | 236,635 |

*Notes*: This table presents regression estimates examining variation in mothers' and fathers' firm outcomes depending on proximity to grandparents. Post is an indicator equal to 1 in the year of birth of the first child or after. Close to grandparents is an indicator equal to 1 if the grandparents live in the same municipality as the parent, as a proxy for the availability of informal childcare through family networks. Panel A shows results for firms owned by mothers; Panel B for firms owned by fathers. The sample includes mother and father entrepreneurs who can be matched to their own family of origin through tax files. Controls include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Standard errors are reported in parenthesis and clustered at the firm level.

**Table 8: Grandmother retirement and center-based childcare**

| | **Sales** | **Profits** | **Profit margin** |
|---|---|---|---|
| Post × Close to grandma | 0.217 | 16,016 | 0.144 |
| | (0.065) | (6,354) | (0.071) |
| Post × Close to grandma × High childcare | -0.176 | -16,515 | -0.212 |
| | (0.073) | (7,149) | (0.080) |
| Controls | Yes | Yes | Yes |
| Firm FE | Yes | Yes | Yes |
| Industry × year FE | Yes | Yes | Yes |
| Municipality × year FE | Yes | Yes | Yes |
| N | 37,190 | 37,190 | 37,190 |

*Notes*: This table examines the effect of grandmother retirement on business performance, using a triple difference design. Post is an indicator equal to 1 in the year of retirement or after. Close to grandparents is equal to 1 if the grandparents live in the same municipality as the parent. High Childcare and Low Childcare refer to municipalities with above or below median center-based childcare provision, respectively. Controls include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status.

**Table 9: Formal childcare expansion**

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

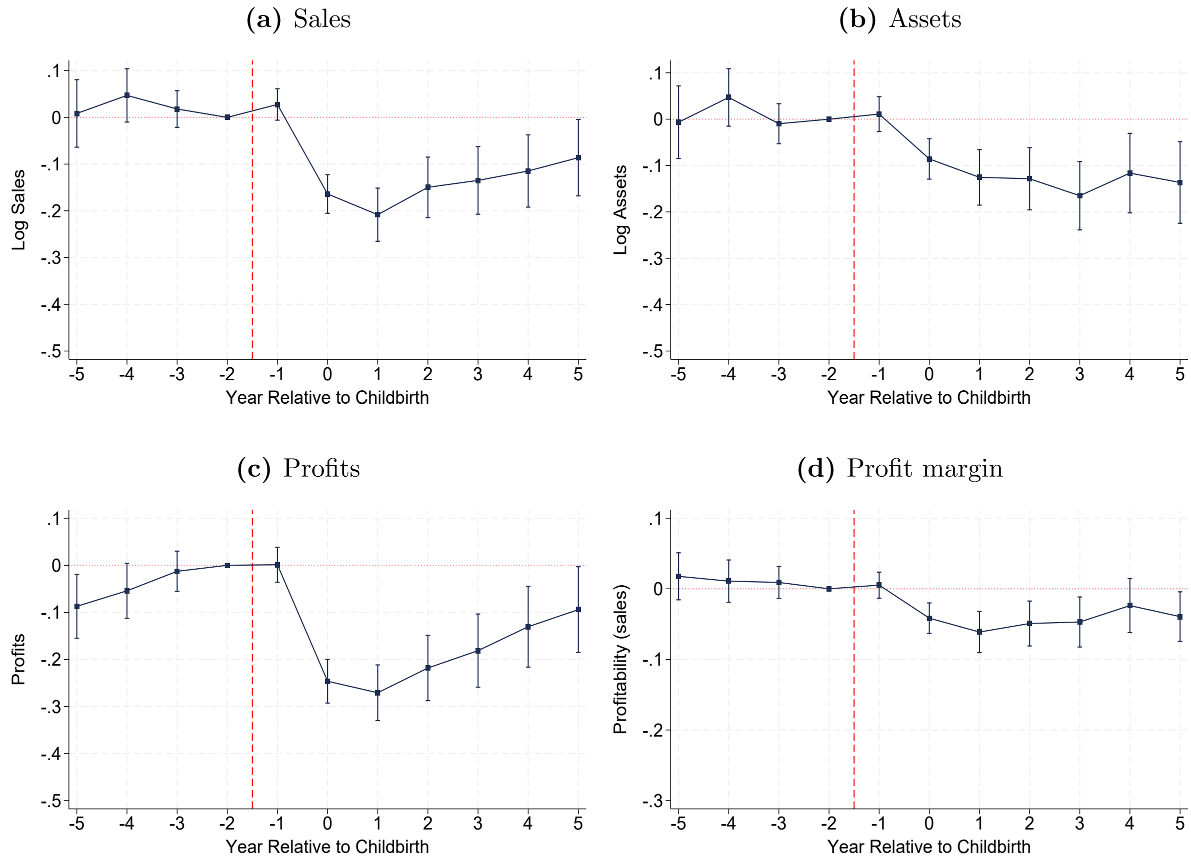
*Notes*: This table examines the effect of formal childcare expansion on firm outcomes. The key variables of interest are the interactions between the timing of the childcare expansion (Post), parent status (Parent), and whether the mother has a young child (Young Child). The coefficient on Post × Parent captures the average effect of being a parent post-expansion, while Post × Parent × Young Child measures the differential effect for mothers with young children (under 2 years old) at the time of expansion. Controls include indicators for firm age, the number of firm owners, a polynomial for individual age, marital status, and indicators for the number of children under 3 years old in the household. Standard errors are double clustered at the firm and municipality level.

# Appendix Materials

# A Additional Figures and Tables

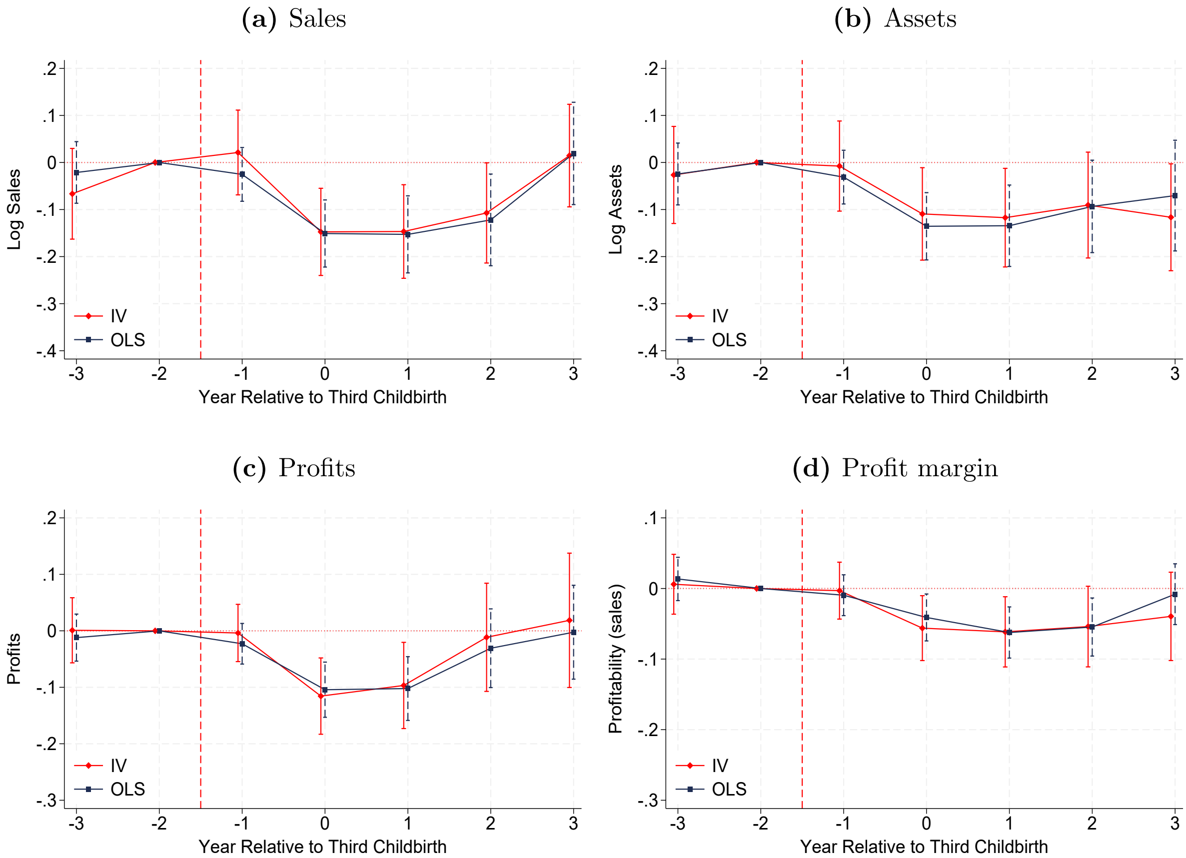
## A.1 Figures

**Figure A.1: Firm outcomes: control group with randomly assigned births**



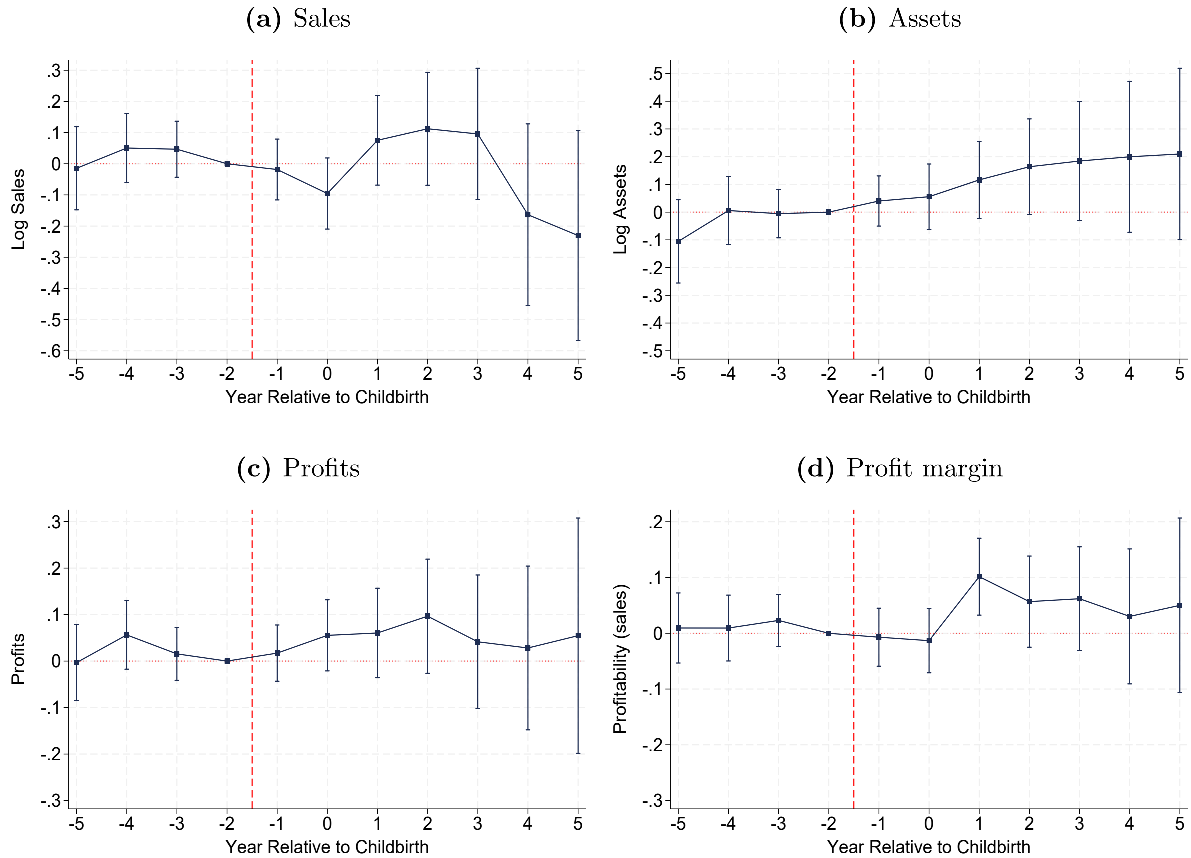

*Notes:* The graphs show event-study estimates obtained by fitting equation 2 on log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)). Year 0 is when the first childbirth event takes place. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a sample of firms owned by women with zero observed fertility. The control group was randomly assigned births based on the observed distribution of age at first child among mothers. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry $\times$ province $\times$ year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

**Figure A.2: Firm outcomes: sibling sex mix IV vs. OLS**



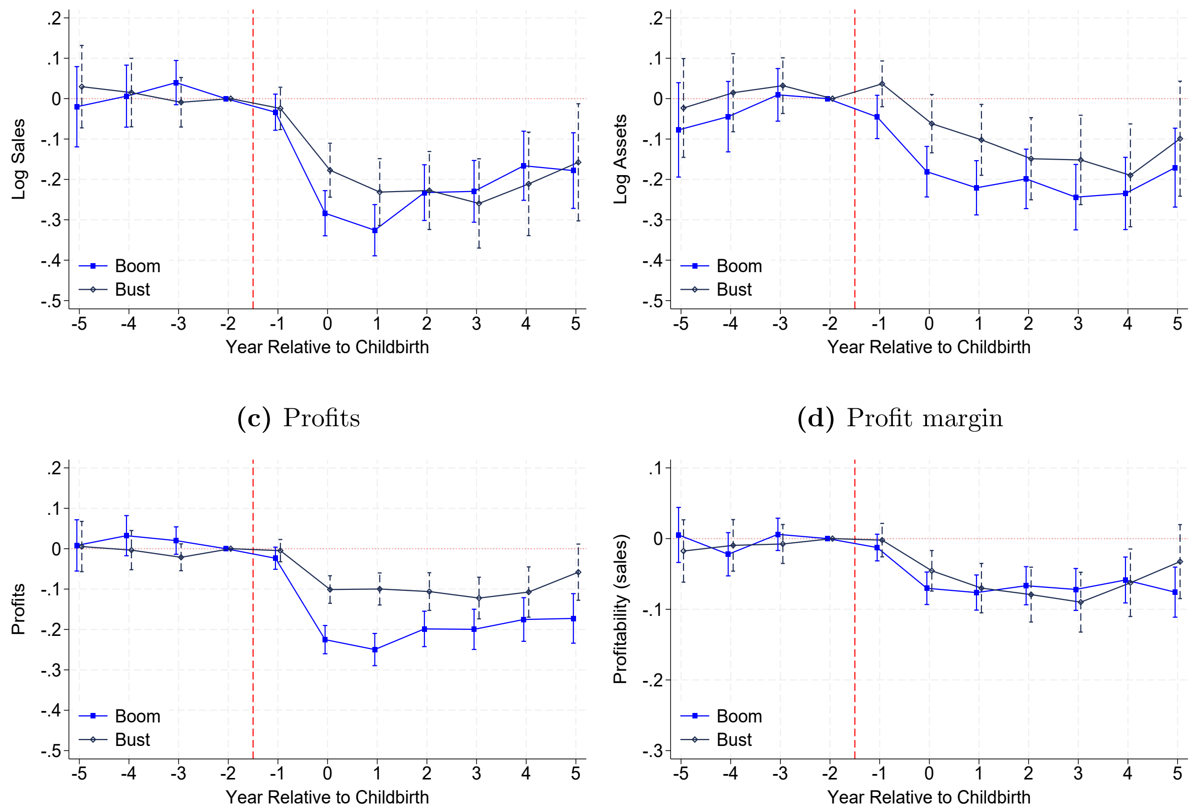

*Notes:* The graphs compare event-study estimates around third childbirth using an instrumental variable and OLS. The dependent variables are log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)). Year 0 is when the first childbirth event takes place. For the IV design, I report event time coefficients $\alpha_\tau$ estimated from equation 7. The instrumental variable specification is based on the sex mix of the first two children as instrument for the birth of a third child. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, marital status, a dummy to indicate whether the individual already had their first child, and binned event time dummies with respect to the second child. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

**Figure A.3: Placebo test: angel investors**




*Notes:* The graphs show event-study estimates obtained by fitting equation 2 on log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)). The sample includes angel investors, defined as firm owners who are not founders and are never actively involved in the firm. Year 0 is when the first childbirth event takes place. The treated group is a sample of firms with an angel investor who owned shares in the firm for at least two years before she had her first child. The control group is a matched sample of firms with an angel investor with zero observed fertility. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

**Figure A.4: Firm outcomes by business cycle**




**(a)** Sales

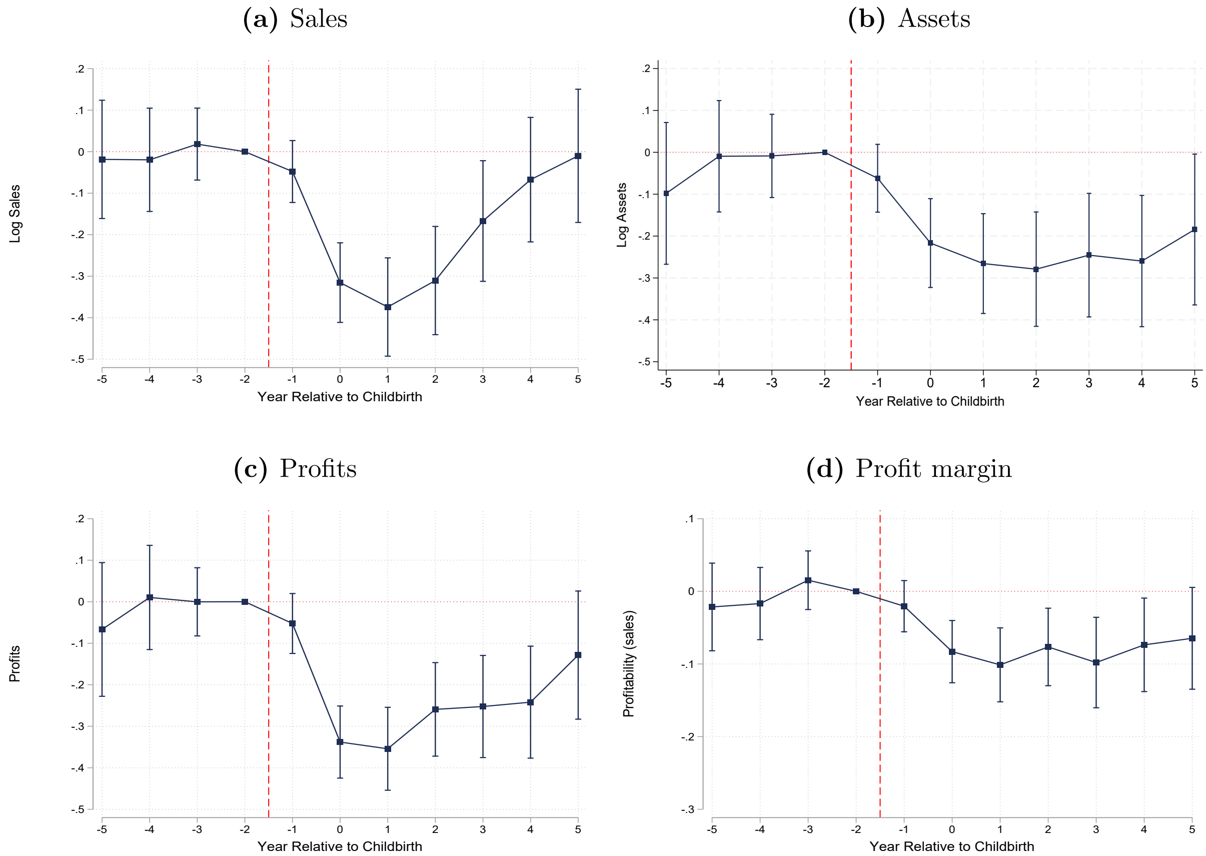
**(b)** Assets

**(c)** Profits

**(d)** Profit margin

*Notes:* The graphs show event-study estimates obtained by fitting equation 2 on log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)), separately by industry performance in the year of the first childbirth. Booms are periods in which industry sales growth ranks in the upper tercile of all industry-years, while busts are periods of growth in the lower tercile. Only firms owned by male entrepreneurs are used to construct the terciles. Year 0 is when the first childbirth event takes place. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

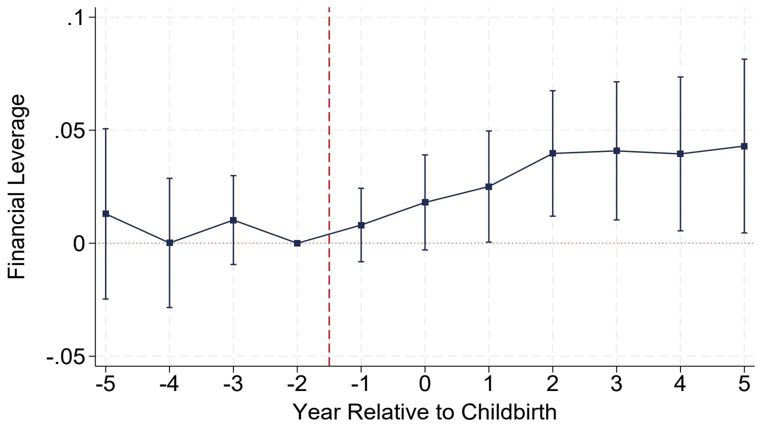
**Figure A.5: Firm outcomes: women over 35**



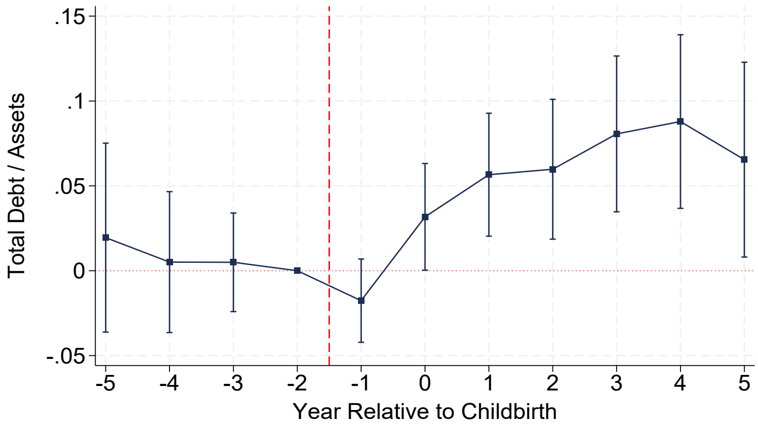

*Notes:* The graphs show event-study estimates obtained by fitting equation 2 on log sales (panel (a)), log assets (panel (b)), profits (panel (c)), and profit margin (panel (d)). The sample is restricted to women who had their first child at 35 or after and were single (not married or cohabiting) when they started their firm. Year 0 is when the first childbirth event takes place. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Profit margin is the ratio of profits to sales. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

## Figure A.6: Financial leverage

**(a)** Financial leverage



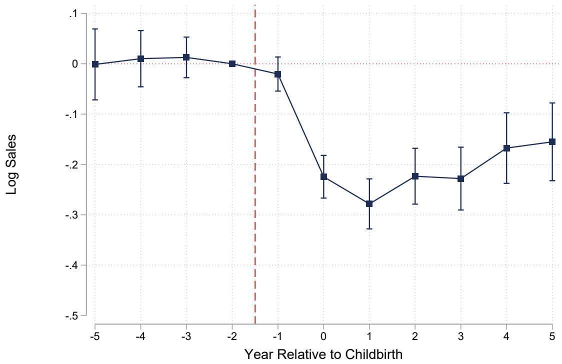

**(b)** Total debts / Assets



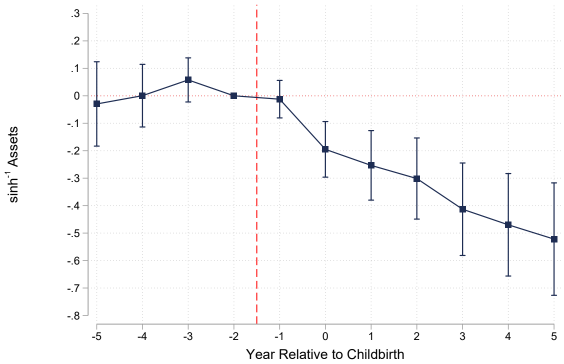

*Notes:* The graphs show event-study estimates obtained by fitting equation 2 on financial leverage (panel (a)) and the ratio of total debt to total assets (panel (b)). Financial leverage is the ratio of long term liabilities to total assets. Total debt is the difference between total assets and total equity. Year 0 is when the first childbirth event takes place. The treated group is a sample of firms owned by a female entrepreneur for at least two years before she had her first child. The control group is a matched sample of firms owned by female entrepreneurs with zero observed fertility. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors clustered at the firm level.

## Figure A.7: Firm outcomes without conditioning on survival

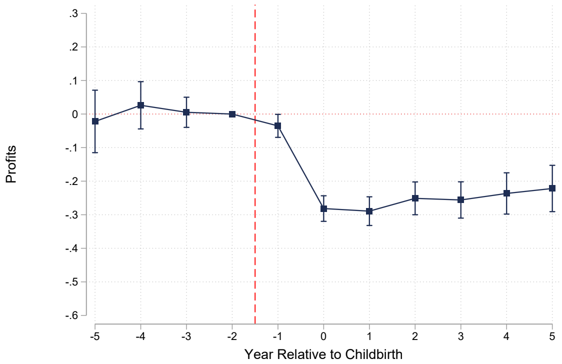
**(a)** Sales



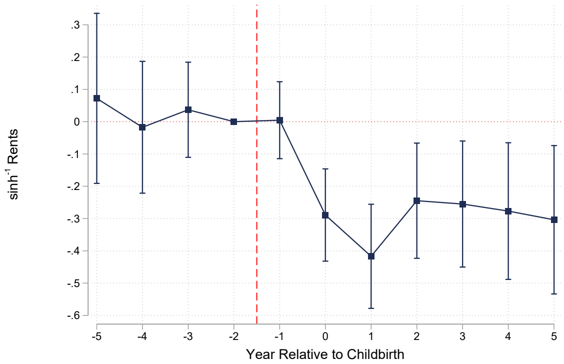

**(b)** Assets



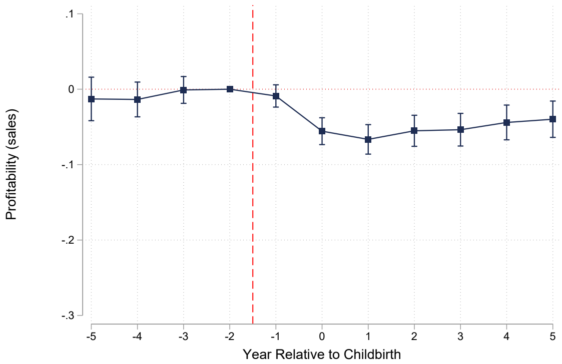

**(c)** Profits



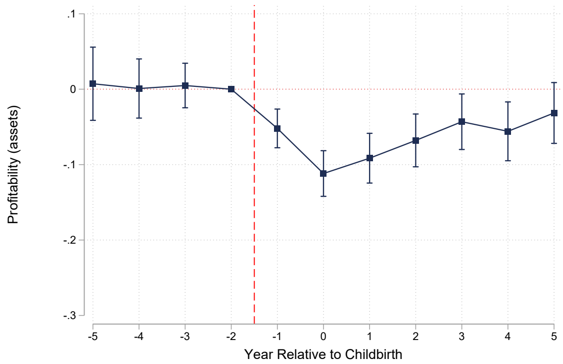

**(d)** Entrepreneurial rents




**(e)** Profit margin



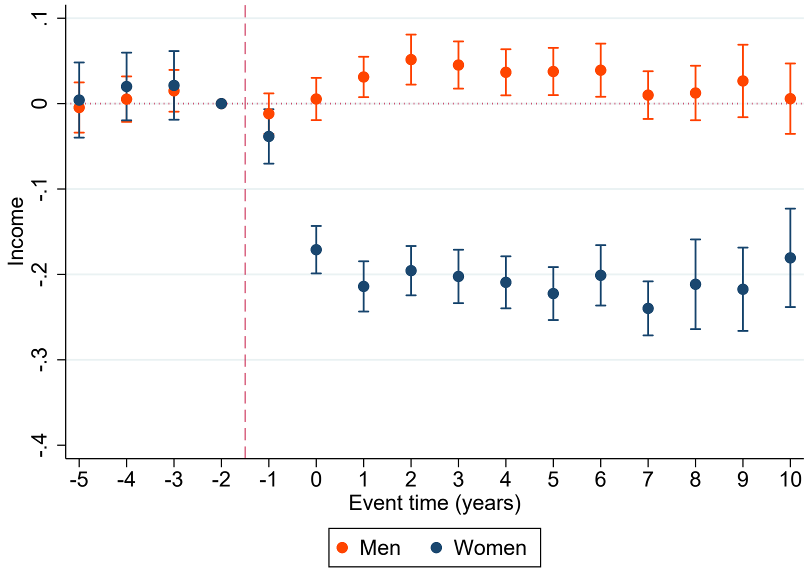

**(f)** ROA



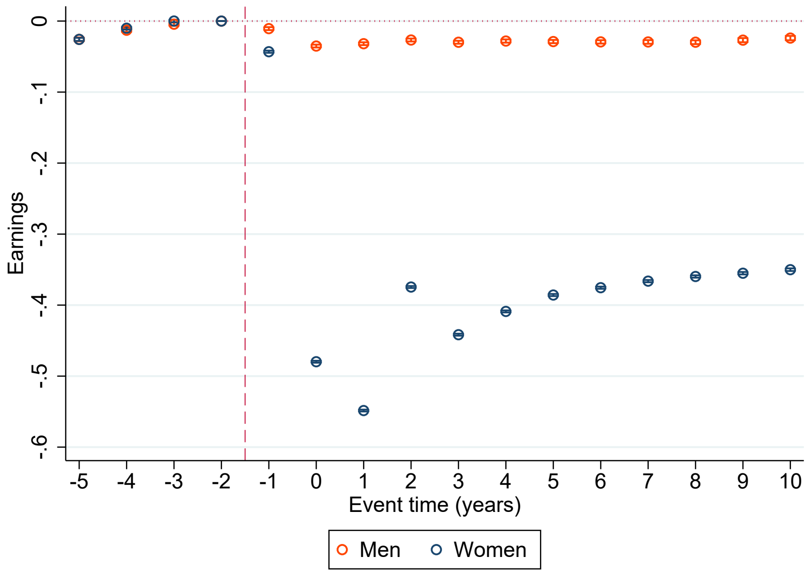

*Notes:* The graphs show event time coefficients $\beta_\tau$ estimated from equation 2, without conditioning on firm survival. Firms that go out of business remain in the sample and their outcomes are set to 0. Logs are replaced by inverse hyperbolic sine. The control group is a matched sample of firms owned by women with zero observed fertility. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors which are clustered at the firm level.

## Figure A.8: Income: entrepreneurs vs. workers

**(a)** Entrepreneurs

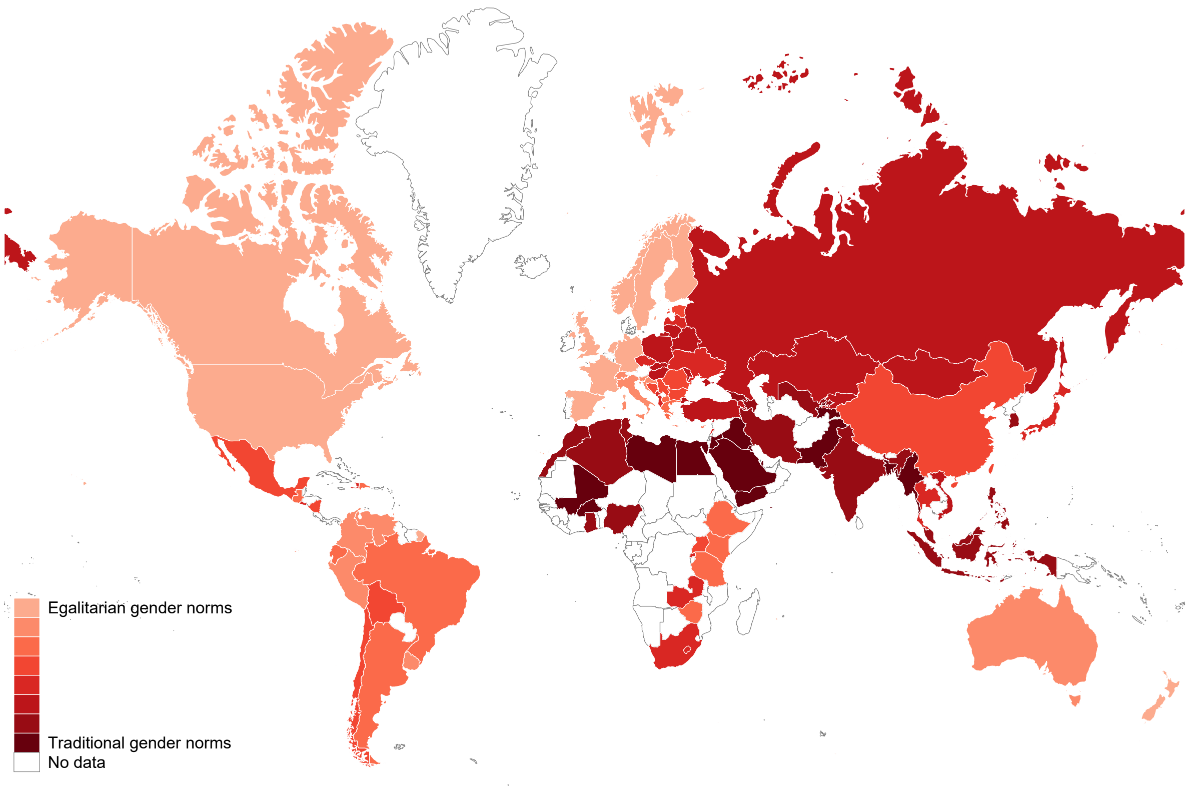



**(b)** Workers




*Notes:* This figure reports the evolution of individual income for individuals who were entrepreneurs before childbirth in Panel (a) and earnings for individuals who were workers before childbirth in Panel (b).

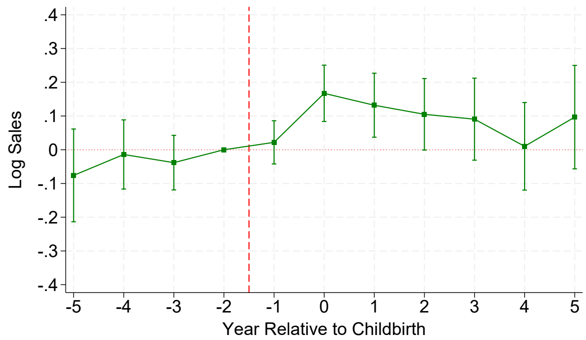
**Figure A.9: Gender norms**



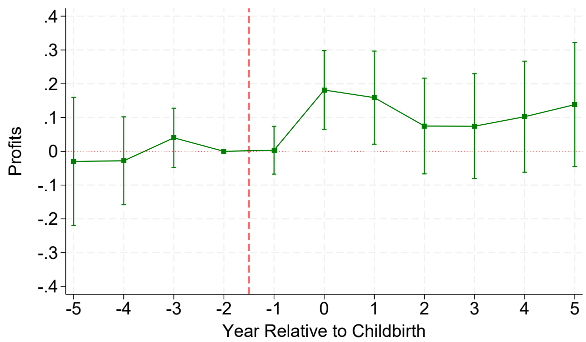

*Notes:* This figure depicts values of a gender progressivity index calculated using values from the World Values Survey. See Appendix C for details on index construction.

**Figure A.10: Informal childcare: event study**

**(a)** Sales



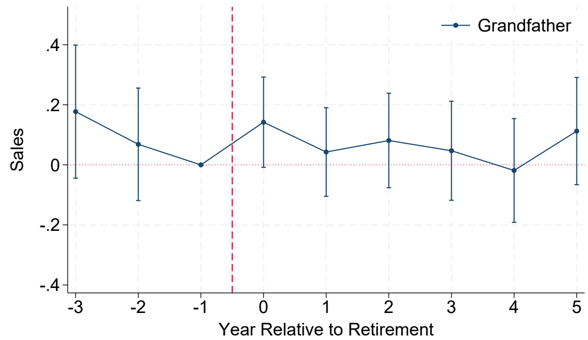

**(b)** Profits



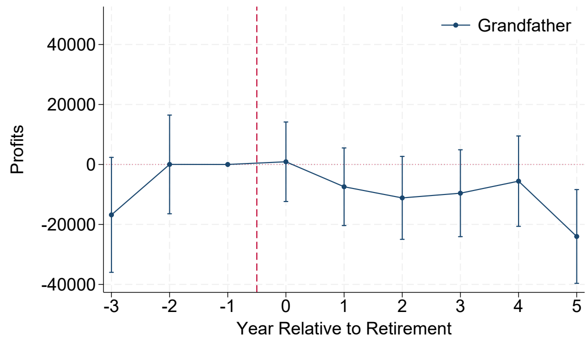

*Notes:* This figure depicts coefficients for the interaction of event time dummies and an indicator for proximity to grandparents, showing dynamic effects for the specification in Table 7. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors which are clustered at the firm level.

**Figure A.11: Grandfather retirement and firm outcomes**

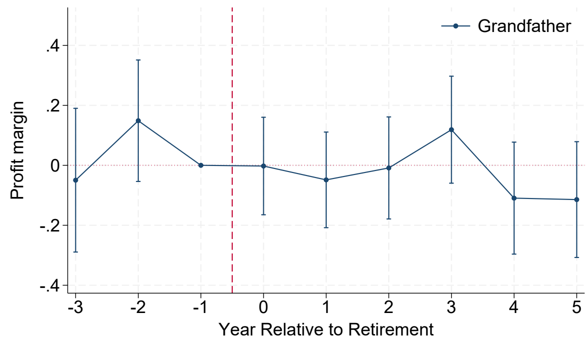
**(a)** Sales




**(b)** Profits



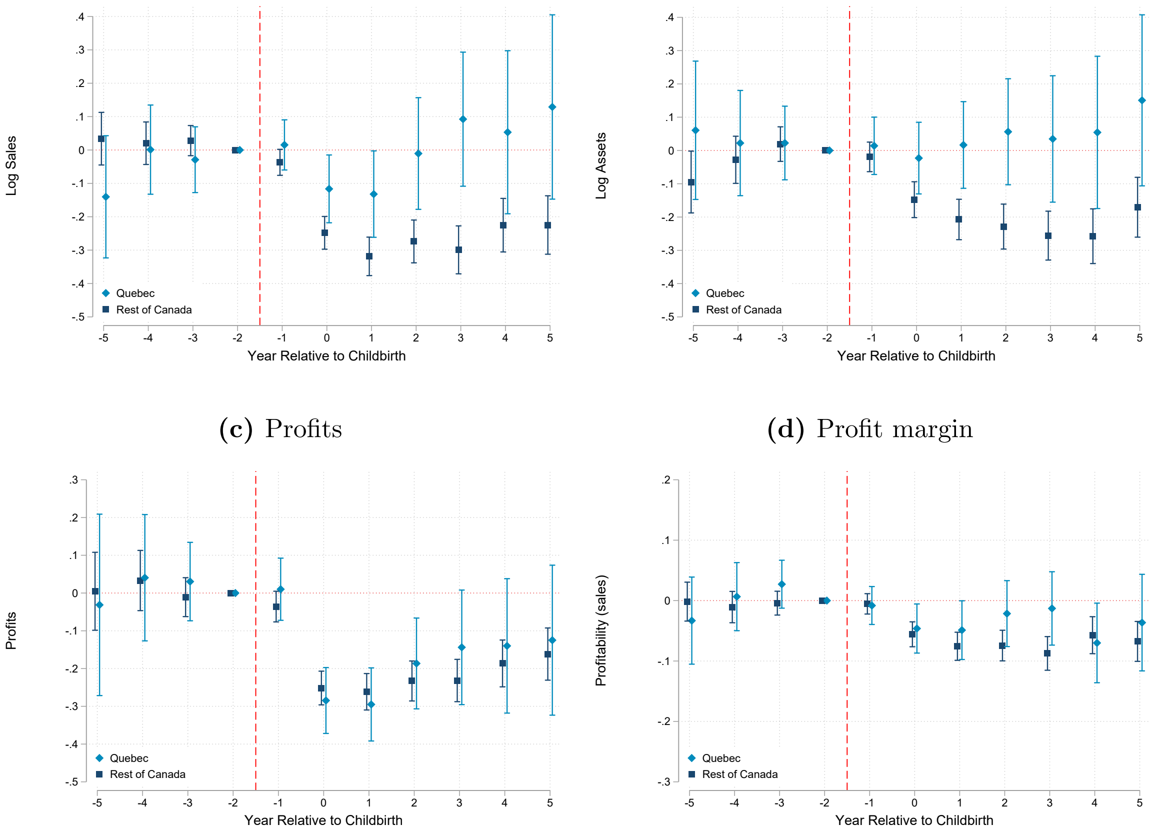

**(c)** Profit margin




*Notes:* These graphs present event time coefficients relative to grandfather's retirement. The treated group include women entrepreneurs who live in the same municipality as their father, compared to a control group of women whose father lives in a different municipality. Control variables include indicators for firm age, a polynomial for entrepreneur's age, and indicators for whether or not a grandmother living in the same municipality is also retired. Firm and industry *times* year fixed effects are included. Confidence intervals are shown at the 95% level, with standard errors clustered at the firm level.

## Figure A.12: Firm outcomes: Quebec vs. other Canadian provinces

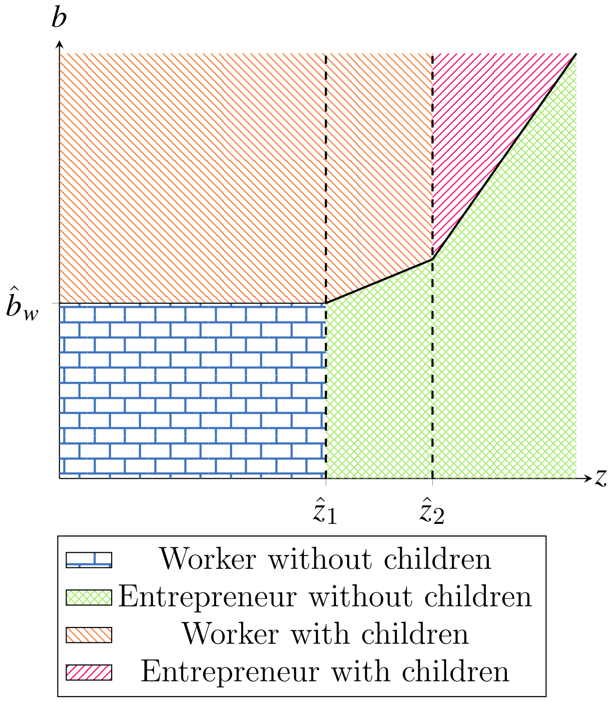
**(a)** Sales **(b)** Assets **(c)** Profits **(d)** Profit margin



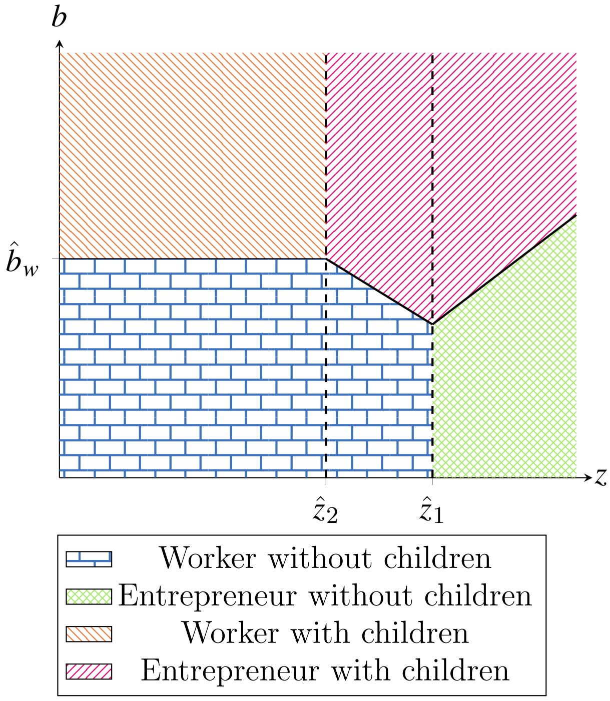

*Notes:* The graphs show event time coefficients $\beta_\tau$ estimated from equation 2 separately for mothers in Quebec and in the rest of Canada. The control group is a matched sample of firms owned by women with zero observed fertility. Coefficients for profits are reported as a percentage of the counterfactual outcome absent children. Control variables include indicators for firm age, the number of firm owners, a polynomial for individual age, and marital status. Firm effects and industry × province × year fixed effects are included. I report 95% confidence intervals based on standard errors which are clustered at the firm level.

**Figure A.13: Model equilibrium**

**(a)** Example of equilibrium with $\hat{z}_2 > \hat{z}_1$

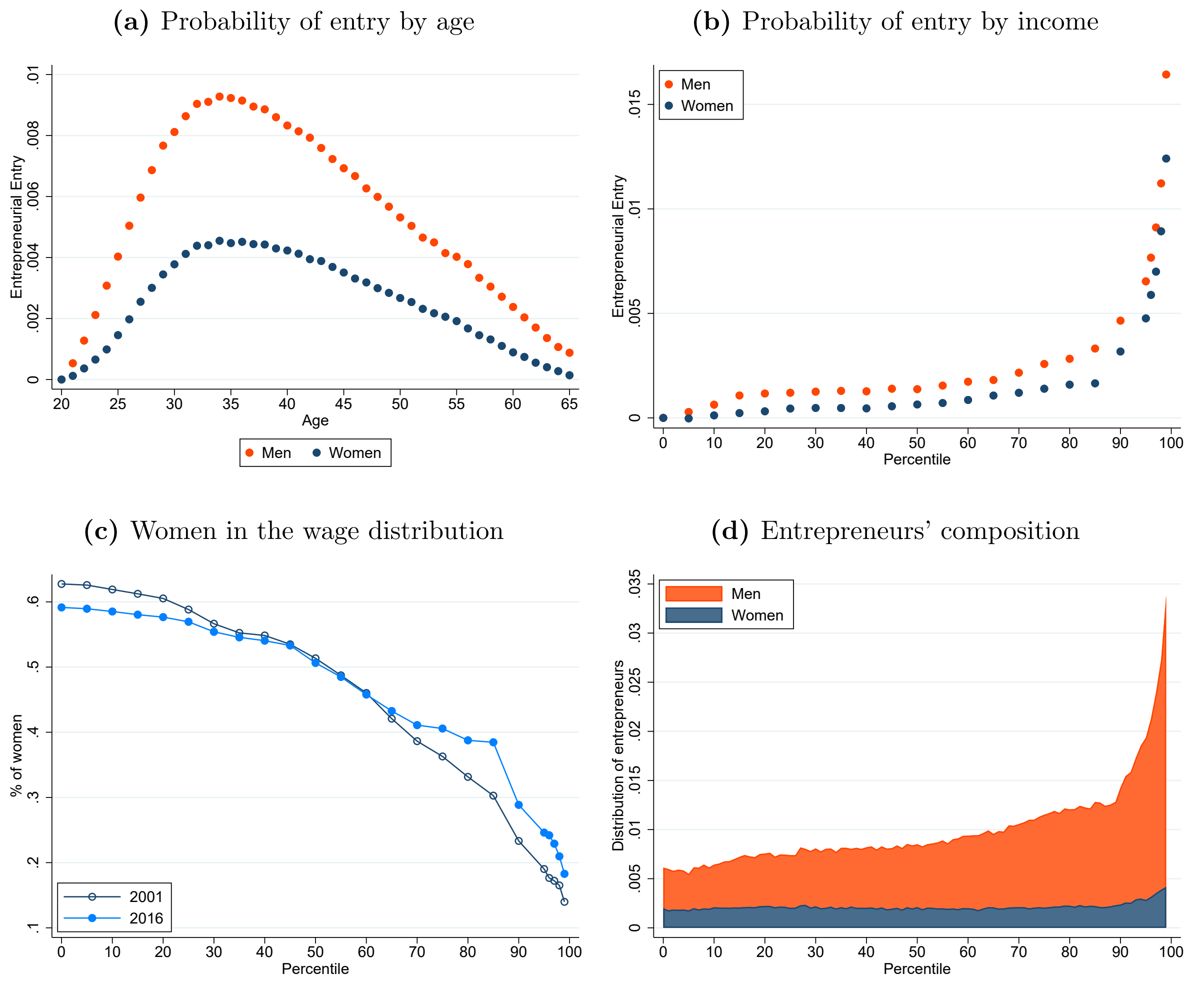



**(b)** Example of equilibrium with $\hat{z}_2 < \hat{z}_1$




*Notes:* The graphs depict the possible equilibria for the model of occupational choice with children.

## Figure A.14: Entrepreneurs' selection




*Notes:* This figure reports the probability that an individual starts a firm in a given year by age in Panel (a) and by percentile of the income distribution in Panel (b), for men and women respectively . Panel (c) depicts the share of women across the income distribution. Panel (d) despicts composition of entrepreneurs by percentile and gender.

## A.2 Tables

**Table 1: Children's sex mix and family size**

*Panel A: family size*

| | (1) Third child | (2) Third child | (3) Third child | (4) 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 × year effects | Yes | Yes | Yes | Yes |
| $R^2$ | 0.020 | 0.020 | 0.042 | 0.207 |
| Number of observations | 77,260 | 77,260 | 253,500 | 253,500 |

*Panel B: descriptive statistics*

| | | (1) Same sex | (2) Different sex |
|---|---|---|---|
| Married | % | 84.0 | 83.9 |
| Age | mean | 33.8 | 33.7 |
| | SD | 5.0 | 5.0 |
| Age at first childbirth | mean | 30.0 | 30.0 |
| | SD | 3.1 | 3.1 |
| Age at second childbirth | mean | 32.8 | 32.8 |
| | SD | 3.3 | 3.2 |
| Individual income | mean | 68,911 | 69,624 |
| | SD | 99,975 | 126,787 |
| Family income | mean | 155,693 | 160,529 |
| | SD | 211,794 | 324,260 |
| Number of observations | | 62,760 | 63,370 |

*Notes*: This table provides evidence on the same-sex instrumental variable. Panel A presents regression estimates examining the effect of children's sex mix on family size. Column (1) shows the effect of having two children of the same sex on the probability of having a third child, for a sample of female entrepreneurs with at least two children. Column (2) decomposes the the effect in column (1) into the effect of having two sons vs. two daughters. Column (3) and (4) show the effect of having a first-born daughter on the probability of having a third and second child, respectively, for the whole sample of female entrepreneurs who are mothers. Controls include marital status and a polynomial for age. Standard errors are reported in parenthesis and are clustered at the individual level. Panel B shows descriptive statistics for the sample of women with two children, separately by the sex mix of the first two children. Individual and family income are reported in real terms (2012 CPI).

# B Theoretical framework

## Model of occupational choice

From the production function we can derive the profit-maximizing first-order conditions (FOC) for firm inputs:

$$f_n(z,h,n) = W$$
$$f_h(z,h,n) = (H-h)^{-\gamma}.$$

Given the FOC on labor demand, if $f_n(z,h,n)$ is strictly decreasing and continuous in $n$, then we can invert $f_n$ to obtain the unique $n$ that solves the first order condition:

$$n(h;z,W) = f_n^{-1}(W,z,h).$$

The implicit function theorem applied to the first order condition for $n$ shows that $n_z$ is positive:

$$\frac{\partial n(h;z,W)}{\partial z} = -\frac{\frac{\partial(f_n(z,h,n)-W)}{\partial z}}{\frac{\partial(f_n(z,h,n)-W)}{\partial n}} = \frac{-f_{nz}(n,z,h)}{f_{nn}(n,z,h)} > 0$$

Substituting this function $n(\cdot)$ into the FOC for $h$, we obtain:

$$G(h,z,W) \equiv f_h(h,n(h;z,W),z) - (H-h)^{-\gamma} = 0.$$

The solution to this equation — the optimal $h^*$ — is unique if $f_h$ crosses $(H-h)^{-\gamma}$ from above[18].

Entrepreneurs face a trade-off between profits and leisure. Higher productivity increases entrepreneurial labor supply $h^*$: the substitution effect prevails over the income effect.

To see that entrepreneurs' hours worked are increasing in productivity, we apply the implicit function theorem to $G$ to get:

$$\frac{\partial h^*}{\partial z} = -\frac{\frac{\partial G}{\partial z}}{\frac{\partial G}{\partial h^*}} = \frac{-f_{hz}(n(h;z,W),z,h) - f_{hn}(n(h;z,W),z,h)\frac{\partial n(h;z,W)}{\partial z}}{f_{hh}(n(W;z,h),z,h) - \gamma(H-h)^{-\gamma-1} + f_{hn}(n(h;z,W),z,h)\frac{\partial n(h;z,W)}{\partial h}}.$$

The assumption that all inputs and idiosyncratic productivity are complementary implies the numerator is negative. The first two terms of the denominator are negative by

[18]Since $G$ is decreasing in $h$ (see the next paragraph) and $(H-0)^{-\gamma} < +\infty$, a standard Inada condition on $f_h$ ($\lim_{h\to 0^+} f_h = +\infty$) is sufficient here.

previous assumptions, while the last term is positive: by the implicit function theorem, we have

$$n_h = \frac{-f_{nh}}{f_{nn}} > 0 \to f_{hn}(n(h;z,W),z,h)\frac{\partial n(h;z,W)}{\partial h} = f_{hn}n_h = \frac{-(f_{nh})^2}{f_{nn}} > 0.$$

Using the fact that $f_{nn}f_{hh} - f_{hn}f_{nh} = f_{nn}f_{hh} - (f_{hn})^2 > 0$, we obtain $f_{hh} - \frac{(f_{nh})^2}{f_{nn}} < 0$ because $f_{nn} < 0$. Both the numerator and the denominator are therefore negative and so $\dfrac{\partial h^*}{\partial z} > 0$.

Entrepreneurial labour supply from an entrepreneur with productivity $z$ is $h^*(z,W)$ and their labour demand is $n(h^*;z,W) = n^*(z,W)$. Optimal revenue for the entrepreneur is then $f(z,h^*(z,W),n^*(z,W))$ which we rewrite as $f^*(z,W)$.

Given the entrepreneur's optimal policies, returning to the first stage problem, individuals solve:

$$\begin{aligned} V(z,W) = \max_{x\in\{0,1\}} \Bigg\{ &(1-x)\left[W + \frac{(H-h_w)^{1-\gamma}}{1-\gamma}\right] \\ &+x\left[f^*(z,W) - Wn^*(z,W) + \frac{(H-h^*(z,W))^{1-\gamma}}{1-\gamma}\right]\Bigg\}. \end{aligned}$$

Entrepreneurship is optimal if and only if:

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

**Proof of Proposition 1**. It suffices to show that entrepreneurs' utility is monotonically increasing in $z$. We need to verify that:

$$f_z^*(z,W) - Wn_z^*(z,W) - (H-h^*(z,W))^{-\gamma}h_z^* > 0.$$

From the result we derived earlier, we know that entrepreneurial labour supply is increasing in $z$, so the third term is negative. Now we need to differentiate the first two terms, which are similar but subtly different to what we did above. By the chain rule, if we expand the first term we get:

$$f_z^*(z,W) = f_z(h^*,n^*,z) + f_n(h^*,n^*,z)n_z^* + f_h(h^*,n^*,z)h_z^*.$$

The second and third terms cancel with the second and third terms above because they are exactly the first order conditions (this is the envelope theorem), so we end up with:

$$f_z^*(z,W) - Wn_z^*(z,W) - (H-h^*(z,W))^{-\gamma}h_z^* = f_z(h^*,n^*,z) > 0.$$

That is, revenue from an entrepreneurial business is increasing in productivity, which is true by assumption.

Alternatively, consider that the first order conditions are sufficient to solve for the optimal combination of $h'$ and $n'$ with a concave objective. Then, holding $h$ and $n$ fixed, the entrepreneur's utility is strictly increasing in $z$ through $f$. We can make a simple argument to show that the maximized utility is strictly increasing in $z$. Pick an arbitrary pair of distinct $z_L$ and $z_H$ with $z_L < z_H$. Then we have:

$$\begin{aligned}
&f(h'(z_L, W), z_L, W) - Wn(h'(z_L, W); z_L, W) + \frac{(H - h'(z_L, W))^{1-\gamma}}{1-\gamma} < \\
&f(h'(z_L, W), z_H, W) - Wn(h'(z_L, W); z_L, W) + \frac{(H - h'(z_L, W))^{1-\gamma}}{1-\gamma} \leq \\
&f(h'(z_H, W), z_H, W) - Wn(h'(z_H, W); z_H, W) + \frac{(H - h'(z_H, W))^{1-\gamma}}{1-\gamma}
\end{aligned}$$

The first inequality follows from the definition of $f(\cdot)$, and the second inequality follows from the optimality of $h'(\cdot)$ and $n(h'(\cdot); ...)$. Since this holds for all $z_L$ and $z_H$, the value function of an entrepreneur with children is strictly increasing in $z_L$ and $z_H$. Thus there is a unique $\hat{z}(W)$.

## Model with children

In order to exclude several problematic edge cases I make the following assumption. Since workers are unable to modulate their work hours, it is possible that $h_2$ achieves a sufficiently better trade-off between labour and leisure that all workers have children. In order to prevent this, I assume that a worker with the minimum possible benefit $\underline{b}$ would not want children:

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

Note that this inequality depends upon $w$, which is an endogenous variable, so we are constraining the set of possible equilibria by making this assumption[19].

If entrepreneurs decide to have children, they manage the firm optimally *given the*

[19]This adds another restriction upon the range of feasible $W$ in equilibrium (see previous footnote). This inequality is equivalent to:

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

. Combining this and the preceding restriction implies $\underline{b} < \phi(h_1)$.

*presence of children.* So, they decide their labor supply to the firm $h'$ using their new first order condition:

$$f_h(h, n, z) - (H - h)^{-\gamma} - \phi_h(h) = 0.$$

I show that entrepreneurial labour supply decreases—given $z$ and $W$—if the entrepreneur chooses to have children, so that $h' < h^*$. The same result obtains if instead of an additional cost of hours worked $\phi(h)$ we assume that total hours available are reduced to $H' < H$ due to childcare responsibilities[20]. With that in mind, in this section I restrict attention to the case with the additive disutility term $-\phi(h)$. In addition, I show that $h'$ is increasing in $z$ as before.

We can show that entrepreneurial labor supply decreases in the presence of children under the assumption that women incur an additional disutility of work $\phi(h')$ or that total hours available are reduced to $H' < H$.

**Case 1, additional disutility of work $\phi(h')$**: Since $\phi(h)$ is assumed to be weakly convex and strictly increasing, $-\phi(h)$ maintains the concavity of the overall objective and the first order conditions remain sufficient.

The FOC for labor demand is

$$f_n(z, h, n) = W.$$

For labour demand, the first order conditions are identical with and without children, and we again use the concavity of $f$ in $n$ to obtain:

$$n(h; z, W) = f_n^{-1}(h; z, W).$$

And similarly substitute this into the new first order condition for $h'$:

$$G'(h'; z, W) \equiv f_h(h', n(h'; z, W), z) - (H - h')^{-\gamma} - \phi_h(h') = G(h'; z, W) - \phi_h(h') = 0.$$

By a similar argument to before, $h'$ is the unique optimum if $G'$ is monotonically decreasing—it equals 0 at most once for any given $W$ and $z$. Since $G$ is monotonically decreasing, a sufficient (although not necessary) condition for $G'$ to be strictly decreasing is that

[20] In fact, reduced total available hours can be seen as a special case of adding the additional disutility term $-\phi(h)$, where

$$-\phi(h) = -\frac{(H - h)^{1-\gamma}}{1 - \gamma} + \frac{(H' - h)^{1-\gamma}}{1 - \gamma}$$

with

$$\phi_h(h) = (H - h)^{-\gamma} - (H' - h)^{-\gamma} > 0.$$

$-\phi_h(h')$ is non-increasing, implying that $\phi(h')$ is weakly convex. If $\phi(h')$ is not linear, we cannot directly employ implicit differentiation to determine that $h'$ is lower than $h^*$, though, so we work with $G'$ and $G$ directly.

If we substitute in the solution for the entrepreneur without children, $h^*$:

$$G'(h^*; z, W) = f_h(h^*, n(h^*; z, W), z) - (H - h^*)^{-\gamma} - \phi_h(h^*) = 0 - \phi_h(h^*) < 0.$$

Since $\phi_h(\cdot) > 0$ for all $h > 0$, $h^*$ exceeds the optimum $h'$ in the presence of children because of the additional marginal dis-utility of entrepreneurial work. Since $G'$ is monotonically decreasing, $h' < h^*$.

**Case 2, reduced total hours available $H' < H$:** In this case, we can similarly define the new $G'$ as follows:

$$G'(h'; z, W) \equiv f_h(h', n(h'; z, W), z) - (H' - h')^{-\gamma} = G(h'; z, W) - (H' - h')^{-\gamma} + (H - h')^{-\gamma} = 0.$$

$G'$ is strictly decreasing if and only if $G$ is (at least for $h' < H'$), so it has a unique optimal solution $h'$. However, $h^* > h'$ because at $h^*$ the marginal disutility of work is too high.

$$\begin{aligned} G'(h^*; z, W) = f_h(h^*, n(h^*; z, W), z) - (H' - h^*)^{-\gamma} = G(h^*; z, W) - (H' - h^*)^{-\gamma} \\ + (H - h^*)^{-\gamma} = -(H' - h^*)^{-\gamma} + (H - h^*)^{-\gamma} < 0. \end{aligned}$$

The last inequality follows since:

$$(H' - h^*)^{-\gamma} > (H - h^*)^{-\gamma} \quad \Leftrightarrow \quad (H' - h^*)^{\gamma} < (H - h^*)^{\gamma} \quad \Leftrightarrow \quad H' < H$$

and $\gamma > 0$.

To show that $h'$ is increasing in $z$ as in the model without fertility decisions, again we use the implicit function theorem on $G'$:

$$\frac{\partial h'}{\partial z} = -\frac{\frac{\partial G'}{\partial z}}{\frac{\partial G'}{\partial h'}} = \frac{-f_{hz}(n(h; z, W), z, h) - f_{hn}(n(h; z, W), z, h)\frac{\partial n(h;z,W)}{\partial z}}{f_{hh}(n(W; z, h), z, h) - \gamma(H - h)^{-\gamma-1} + f_{hn}(n(h; z, W), z, h)\frac{\partial n(h;z,W)}{\partial h} - \phi_h(h)}.$$

The numerator is negative for exactly the same reasons as before. The denominator is also negative, since we add $-\phi_h(h)$ to an already negative expression. Thus, $h'$ is strictly increasing in $z$.

The optimal threshold $\hat{z}(W)$ will also change once an potential entrepreneur has the choice of having children. If, in the second period, a woman chooses not to have children, she becomes an entrepreneur if $z \geq \hat{z}(W)$. We relabel $\hat{z}(W)$ as $\hat{z}_1(W)$, because we will show that there is a similar threshold if a woman chooses to have children.

In the second period, a woman with children chooses to become an entrepreneur if and only if:

$$\begin{aligned} wh_2 + \frac{(H-h_2)^{1-\gamma}}{1-\gamma} - \phi(h_2) \leq & f(h'(z,w),z,w) - wn(h'(z,w);z,w) \\ & + \frac{(H-h'(z,w))^{1-\gamma}}{1-\gamma} - \phi(h'(z,w)) \end{aligned}$$

**Proof of Proposition 2**. We need to show that the utility derived from being an entrepreneur with children, relative to a worker with children, is strictly increasing in $z$. Since $b$ is constant in terms of $z$, the utility directly from children has no impact on the threshold. Writing $n'(z,W) = n(h'(z,W);z,W)$ and $f'(z,W) = f(h'(z,W),n'(z,W),z)$ we need to show that:

$$f'_z(z,W) - Wn'_z(z,W) - (H-h'(z,W))^{1-\gamma}h'_z(z,W) - \phi_h(h'(z,W))h'_z(z,W) > 0$$

The first term's chain rule expansion is:

$$f'_z(z,W) = f_z(h',n',z) + f_n(h',n',z)n'_z + f_h(h',n',z)h'_z$$

Because $h'$ and $n'$ satisfy the first order conditions, we can use the envelope theorem to cancel their matching terms in the main expression, so we get:

$$f_z(h',n',z) > 0.$$

Alternatively, using the same argument as in Preposition 1, pick an arbitrary pair of distinct $z_L$ and $z_H$ with $z_L < z_H$. We have:

$$\begin{aligned} & f(h'(z_L,W),z_L,W) - Wn(h'(z_L,W);z_L,W) + \frac{(H-h'(z_L,W))^{1-\gamma}}{1-\gamma} - \phi(h'(z_L,W)) < \\ & f(h'(z_L,W),z_H,W) - Wn(h'(z_L,W);z_L,W) + \frac{(H-h'(z_L,W))^{1-\gamma}}{1-\gamma} - \phi(h'(z_L,W)) \leq \\ & f(h'(z_H,W),z_H,W) - Wn(h'(z_H,W);z_H,W) + \frac{(H-h'(z_H,W))^{1-\gamma}}{1-\gamma} - \phi(h'(z_H,W)) \end{aligned}$$

Since this holds for all $z_L$ and $z_H$, the value function of an entrepreneur with children is strictly increasing in $z_L$ and $z_H$. Thus there is a unique $\hat{z}_2(W)$.

**Strategy when $\mathbf{\hat{z}_2(W) < \hat{z}_1(W)}$**: when $z \in [\hat{z}_2(w), \hat{z}_1(w))$ and $\hat{z}_2(w) < \hat{z}_1(w)$, the individual becomes an entrepreneur if she has children. Put formally:

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

Between $\hat{z}_2(w) and \hat{z}_1(w)$ the threshold value of $b$ for having children depends on the comparison between being an entrepreneur with children and a worker without children. In this instance:

$$b\big(\hat{z}_2(w) \leq z < \hat{z}_1(w)\big) \equiv wh_1 - \frac{(H-h_1)^{1-\gamma}}{1-\gamma} - f_2(z)$$

This threshold is *decreasing* in $z$. The complete strategy is:

$$(x, y) = \begin{cases} (1,1) & \text{if } z \geq \hat{z}_1(w) \ \& \ b \geq f_1(z) - f_2(z) \\ (1,0) & \text{if } z \geq \hat{z}_1(w) \ \& \ b < f_1(z) - f_2(z) \\ (1,1) & \text{if } z \in [\hat{z}_2(w), \hat{z}_1(w)) \ \& \ b > wh_1 - \frac{(H-h_1)^{1-\gamma}}{1-\gamma} - f_2(z) \\ (0,0) & \text{if } z \in [\hat{z}_2(w), \hat{z}_1(w)) \ \& \ b \leq wh_1 - \frac{(H-h_1)^{1-\gamma}}{1-\gamma} - f_2(z) \\ (0,1) & \text{if } z < \hat{z}_2(w) \ \& \ b \geq w(h_1 - h_2) + \frac{(H-h_1)^{1-\gamma} - (H-h_2)^{1-\gamma}}{1-\gamma} + \phi(h_2) \\ (0,0) & \text{if } z < \hat{z}_2(w) \ \& \ b < w(h_1 - h_2) + \frac{(H-h_1)^{1-\gamma} - (H-h_2)^{1-\gamma}}{1-\gamma} + \phi(h_2) \end{cases}$$

Solution details:

This completes the description of the second period optimal strategy. The complete strategy is:

$$(x, y) = \begin{cases} (1,1) & \text{if } z \geq \hat{z}_2(w) \ \& \ b \geq f_1(z) - f_2(z) \\ (1,0) & \text{if } z \geq \hat{z}_2(w) \ \& \ b < f_1(z) - f_2(z) \\ (1,0) & \text{if } z \in [\hat{z}_1(w), \hat{z}_2(w)) \ \& \ b < f_1 - wh_2 - \frac{(H-h_2)^{1-\gamma}}{1-\gamma} + \phi(h_2) \\ (0,1) & \text{if } z \in [\hat{z}_1(w), \hat{z}_2(w)) \ \& \ b \geq f_1 - wh_2 - \frac{(H-h_2)^{1-\gamma}}{1-\gamma} + \phi(h_2) \\ (0,1) & \text{if } z < \hat{z}_1(w) \ \& \ b \geq w(h_1 - h_2) + \frac{(H-h_1)^{1-\gamma} - (H-h_2)^{1-\gamma}}{1-\gamma} + \phi(h_2) \\ (0,0) & \text{if } z < \hat{z}_2(w) \ \& \ b < w(h_1 - h_2) + \frac{(H-h_1)^{1-\gamma} - (H-h_2)^{1-\gamma}}{1-\gamma} + \phi(h_2) \end{cases}$$

Or more concisely, using the function $b(z)$ piecewise defined above:

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

1. marginal entrepreneur for parents must be indifferent between being an entrepreneur or a worker. There exists $\hat{z}_2$ such that

$$wh_2+\frac{(H-h_2)^{1-\gamma}}{1-\gamma}-\phi(h_2)=\pi(h',n',\hat{z}_2)+\frac{(H-h')^{1-\gamma}}{1-\gamma}-\phi(h')$$

2. marginal entrepreneur for non-parents must be indifferent between being an entrepreneur or not: there exists $\hat{z}_1$ such that

$$wh_1+\frac{(H-h_1)^{1-\gamma}}{1-\gamma}=\pi(h,n,\hat{z}_1)+\frac{(H-h)^{1-\gamma}}{1-\gamma}$$

3. marginal parent for workers must be indifferent between being a parent or not: there exists $\hat{b}_W(z)$ such that

$$\hat{b}_W=w(h_1-h_2)+\frac{(H-h_1)^{1-\gamma}}{1-\gamma}-\frac{(H-h_2)^{1-\gamma}}{1-\gamma}+\phi(h_2)$$

4. marginal parent for entrepreneurs is indifferent between having a child or not. Denoting profits as $\pi(\cdot)$, for each $z$, there exists $\hat{\beta}_E(z)$ such that

$$\hat{b}_E(z)=\pi(h,n,z)+\frac{(H-h)^{1-\gamma}}{1-\gamma}-\pi(h',n',z)-\frac{(H-h')^{1-\gamma}}{1-\gamma}+\phi(h')$$

5. Labor markets clear: number of workers (non-parents + parents) is equal to sum of labor demand from entrepreneurs (non-parents+parents)

$$\int_{\underline{z}}^{\hat{z}_1}\int_{\underline{b}}^{\hat{b}(z)}h_1dF(z)d\Theta(b)+\int_{\underline{z}}^{\hat{z}_2}\int_{\underline{b}}^{\hat{b}(z)}h_2dF(z)d\Theta(b)=\int_{\hat{z}_1}^{\bar{z}}\int_{\underline{b}}^{\hat{b}(z)}n^*(z,w)dF(z)d\Theta(b)$$
$$+\int_{\hat{z}_2(w)}^{\bar{z}}\int_{\hat{b}(z)}^{\bar{b}}n^*(z,w)dF(z)d\Theta(b).$$

## Extension: Dynamic model

Now consider a version of the model in which entrepreneurial exit is not free; entrepreneurs who shut down "prematurely" and go back to wage work incur a cost $c$. The exit cost can be interpreted in several ways: start-ups can take years before they turn a profit, making too-short entrepreneurial spells economically unviable; assets might be specialized, reducing their redeployment value; returning entrepreneurs might face penalties on the labor market. Individuals make their first occupational choice taking into account their second-period decisions about fertility and occupation.

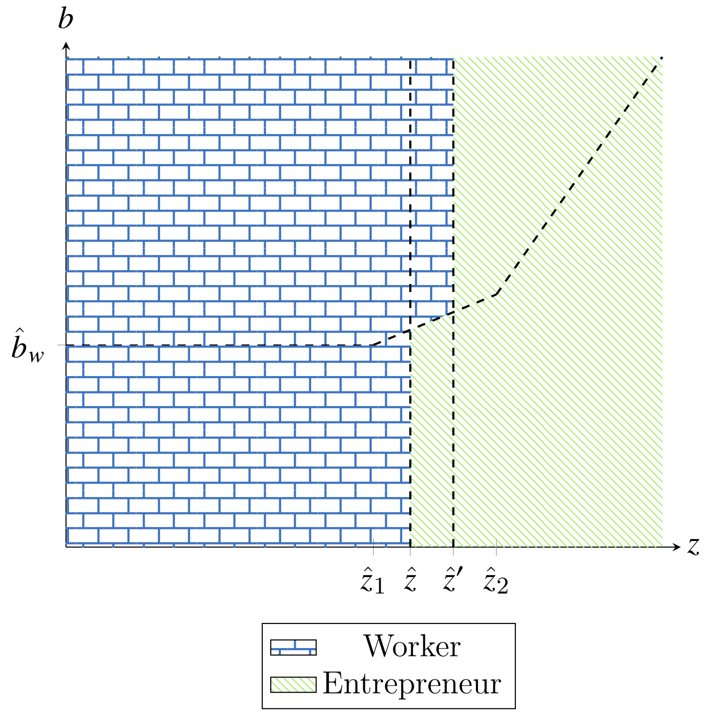
We solve the model by backward induction. Given the solution to the second-period problem, individuals in the first period solve the following problem:

$$V(z,w,w',b) = \max_{x\in\{0,1\}} \left\{(1-x)\left[W + \frac{(H-h_w)^{1-\gamma}}{1-\gamma}\right] + x \max_{n,h} \left[f(z,h,n) - Wn + \frac{(H-h)^{1-\gamma}}{1-\gamma} - c\,\mathbb{I}_{x_1=0}\right]\right\} + \beta V_1^*(z,w',b).$$

The threshold for entrepreneurial entry is now:

$$\hat{z} = \begin{cases} wh_1 + \frac{(H-h_1)^{1-\gamma}}{1-\gamma} = f(\hat{z}) & \text{if } z \geq \hat{z}_2(w) \ \vee \ \hat{z}_1 \leq z < \hat{z}_2 \ \& \ b \leq b(z) \\ wh_1 + \frac{(H-h_1)^{1-\gamma}}{1-\gamma} = f(\hat{z}) - c & \text{if } z < \hat{z}_1(w) \ \vee \ \hat{z}_1 \leq z < \hat{z}_2 \ \& \ b > b(z) \end{cases}$$

**Figure B.1:** Example of first-period equilibrium with $\hat{z}_2 > \hat{z}_1$



It's easy to see that the equilibrium level of entrepreneurship in this case is lower than under the benchmark case: some women, anticipating that they will have children and switch to wage work in the next period, choose wage work in period 1 to avoid paying the cost $c$. Suppose this was not the case, i.e., there are more entrepreneurs now that under the benchmark. Then, labor supply would be lower and labor demand would be higher, increasing equilibrium wages; since the value of being a worker is now higher, the threshold $\hat{z}$ (for individuals who are entrepreneurs next period) would also be higher than before. Since $\hat{z}' > \hat{z} > \hat{z}_{benchmark}$, we run into a contradiction. Note that if $c$ is large enough that $\hat{z}' \geq \hat{z}_2$, the equilibrium in the first period is identical to the equilibrium in the second period. So, there won't be entry or exit dynamic. Also, I assume that there can't be renegotiation: individual can't make the second period choice in order to avoid paying $c$. As such, this solution is not renegotiation-proof.

**THE RENEGOTIATION-PROOF SOLUTION**

In the second period, individuals will want to deviate and choose entrepreneurship if:

$$f_2(z) > wh_2 + \frac{(H - h_2)^{1-\gamma}}{1-\gamma} - c$$

This defines a new threshold for entrepreneurs with children, $\hat{z}_2' < \hat{z}_2$. Anticipating this deviation (the fact that individuals cannot commit to the optimal policy of entrepreneurship in the first period and wage work in the second period), in the first period individuals evaluate whether it is best to choose wage work or entrepreneurship in both periods.

They will choose work in both periods if:

$$wh_w + \frac{(H - h_w)^{1-\gamma}}{1-\gamma} + \beta \left[ wh_2 + \frac{(H - h_2)^{1-\gamma}}{1-\gamma} - \phi(h_2) \right] > f(z) + \beta f_2(z),$$

where $f(z)$ denotes the utility from entrepreneurship in the first period. Denote by $\zeta$ the threshold where the individual is indifferent between wage work in both periods and entrepreneurship in both periods (conditional on becoming a parent); note that $\hat{z} < \zeta < \hat{z}_2$. Three things can happen:

1. $c$ is low $\rightarrow \zeta < \hat{z}_2' < \hat{z}_2$. Then the solution to the first period problem is unchanged relative to the baseline: individuals become entrepreneurs iff $z > \hat{z}$. In the second period, mothers become entrepreneurs iff $z > \hat{z}_2'$. In addition, the threshold for having a child for "switchers" is equal to $\hat{b}(z) + c$.

2. $c$ is moderate $\rightarrow \hat{z} < \hat{z}_2' < \zeta$. In this case, the solution to the first period problem

is as follows:

$$x = \begin{cases} 0 & \text{if } z < \hat{z} \vee \hat{z}_2' < z < \zeta \ \& \ b > \hat{b}(z) \\ 1 & \text{otherwise} \end{cases}$$

The threshold for children is now equal to $\hat{b}(z) + c$ when $\hat{z} < z < \hat{z}_2'$ and $\hat{b}(z) + \frac{1}{\beta}\left(f(z) - wh_w - \frac{(H-h_w)^{1-\gamma}}{1-\gamma}\right)$ when $\hat{z}_2' < z < \zeta$ (this last condition ensures that working both periods and having a child is better than being an entrepreneur both periods and not having a child).

3. $c$ is high $\rightarrow \hat{z}_2' \leq \hat{z}$. In this case everyone who was an entrepreneur in the first period wants to be an entrepreneur also in the second period. the solution to the first period problem is as follows:

$$x = \begin{cases} 0 & \text{if } z < \hat{z} \vee z < \zeta \ \& \ b > \hat{b}(z) \\ 1 & \text{otherwise} \end{cases}$$

And the threshold becomes $\hat{b}(z) + \frac{1}{\beta}\left(f(z) - wh_w - \frac{(H-h_w)^{1-\gamma}}{1-\gamma}\right)$ when $\hat{z} < z < \zeta$. When $c$ is high, the entire effect of the second period in terms on occupational choice is already incorporated in the first period. So there is no entry/exit dynamic between period 1 and 2.

In conclusion, when exiting entrepreneurship is costly, the attractiveness of staying an entrepreneur after having a child increases. This can explain why exit rates are relatively low. In the model, entrepreneurship can be interpreted both as the same start-up in both periods, or starting a different firm in each period.

# C Variables Definition

## C.1 Gender Progressivity Index

The World Values Survey (WVS) includes several questions designed to gauge individuals' attitudes toward gender roles. These questions may ask respondents to agree or disagree with statements related to gender equality, traditional gender roles, and women's roles in society. I consider the following questions or statements:

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?

Not all questions are asked in each survey wave, but all the questions I include were present in at least three waves. To create a single index, I aggregate the answers in several steps. First, I code the answers to all questions so that a higher score represents more egalitarian attitudes. Second, for each wave, I calculate a country's score as the standardized deviation from the average score of that wave. Using the deviation from the average helps account for changes in gender norms over time and ensure fair comparisons between countries surveyed in different years. Finally, for countries surveyed in multiple waves, I average the score across waves.

Cultural values are remarkably stable over time: the correlation of the index across different time periods within country is 86%. I alternatively compute the index only using questions 3, 4, and 5, which were included in each wave except the first. The correlation between the two indexes is 96%.