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Family, Gender, and the Inheritance of Entrepreneurial Spirit: Exploring Sibling Influences*

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Abstract

This study explores the intergenerational transmission of entrepreneurship through the lens of gender and sibling dynamics, using Danish administrative data. I find that for first-born daughters, having a younger brother instead of a sister significantly alters how parental entrepreneurial experience increases their likelihood of founding an limited liability company (parental LLC transmission) though does not affect their likelihood of starting a sole proprietorship (SP). Specifically, I find that having a brother doubles the effect of maternal LLC transmission and reduces paternal LLC transmission by almost three-quarters compared to sister-only households. I take this as evidence that parents of first-born daughters engage in costly investment in their children that is potentially crowded out by younger siblings, and that this investment is parent-child sex specific. I explore what type of resources may be redirected away from the oldest daughter, financial or human capital, and find the strongest evidence that it is entrepreneurial human capital that is being crowded out, in particular for the mother-daughter LLC transmission channel. Given the importance of this entrepreneurial human capital on founding an LLC as opposed to SP, exposure to skills such as business leadership could be an important component of the maternal transmission. On the other hand, for first-born sons, the sex of a younger sibling does not significantly influence how parental entrepreneurial experience affects them. Counterfactual analyses suggest that optimizing sibling gender configurations in households with maternal entrepreneurship could increase the rate at which first-born women found LLCs by 17 percent, while doing so for all households would increase that rate by about 5 percent, translating to a very modest improvement in the entrepreneurship gender gap.

Keywords: Entrepreneurship, gender, intergenerational transmission, sibling peer effects
JEL classifications: L26, J16, J62

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1 Introduction

Women continue to be significantly underrepresented in self-employment and entrepreneurship (e.g., Mishkin, 2021; Rocha & Van Praag, 2020; Caliendo et al., 2015; Bönte & Piegeler, 2013): Self-employment rates among men exceed those among women in all OECD countries (OECD, 2021). This disparity is particularly pronounced in Scandinavian nations, which, despite their reputation for gender egalitarianism, exhibit highly gender-segregated labor markets (Charles & Bradley, 2009). In these countries, men are approximately twice as likely as women to be self-employed (OECD, 2021), part of which may be explained by the fact that, as found by Tonoyan et al. (2020), the gender gap in the perceived ease of starting a business venture was largest in these countries.

There are many reasons that this persistent gap in entrepreneurship is of concern. Business owners, especially those who employ others, hold influential roles in our societal framework. Moreover, evidence suggests that the pecuniary returns to entrepreneurship can be significantly larger than alternatives (e.g., Levine & Rubinstein, 2017), contributing the gender earnings gap. To achieve a more balanced gender representation in leadership roles and narrow the earnings gap, it is crucial to understand and potentially address the factors contributing to the relatively low rate of female entrepreneurship.

An extensive body of literature examines the determinants of the entrepreneurship gap, which can be understood as functioning at both individual and contextual levels. Key individual determinants include preferences, abilities, education, financial resources, life-cycle position, and self-perceptions (Parker et al., 2005; Vladasel et al., 2021; Caliendo et al., 2015; Thébaud, 2010; Bönte & Piegeler, 2013; Bigelow et al., 2014; Thébaud, 2010, e.g.,). Contextual determinants include the effect of sibling peers (Mishkin, 2021; Dudek et al., 2022; Vladasel, 2023, e.g.,), school peers (Markussen & Røed, 2017), parents (Dunn & Holtz-Eakin, 2000; Hoffmann et al., 2015), parents of peers (Mertz et al., 2024), coworkers (Rocha & Van Praag, 2020) and neighborhoods (Vladasel et al., 2021).

As both parental self-employment experience and peer influences emerge from this literature as strong predictors of a child's future entrepreneurial activity, it is natural to look toward the parental transmission of entrepreneurship—and how this varies with the gender composition of children—for explanations of the gender gap in entrepreneurship. Recognizing that the parental transmission of entrepreneurship may have different effects depending on the type of new business founded by the child, incorporated or incorporated, is crucial. Incorporated entrepreneurs are more likely to use leadership skills, have financial capital, use non-routine cognitive abilities, have higher self-esteem, engage in more illicit activities as teens and reap greater financial rewards (Rubinstein & Levine, 2020; Levine & Rubinstein, 2017; Vladasel et al., 2021, e.g.,). Indeed,

evidence suggests that pathways to entrepreneurship differ based on the type of entrepreneurship and gender, that, for instance, role models play a more significant role in facilitating entry into limited liability companies (LLCs), and that female entrepreneurs in LLCs face greater financial barriers compared to their male counterparts (Vladasel et al. (2021)).

Using data on Danish first-born (FB) men and women, I separately estimate the effect of having a younger brother versus a younger sister on the likelihood of founding a LLC or sole proprietorship (SP), and how this effect interacts with paternal and maternal entrepreneurial transmission. Conditional on having a second child and the sex of the first child, the sex of the second child is random implying that the effects of the sibling sex can be attributed to the sibling's sex, and nothing else (e.g. parental attitudes). Importantly, this specification allows me to estimate the proportion of parental transmission of entrepreneurialism that is affected by having a brother, a very similar identification strategy to that used in Mishkin (2021) and Brenøe (2022).[1] To the best of my knowledge, I am the first to estimate how the sex of one's sibling affects the paternal transmission of entrepreneurialism on the probability of opening an LLC, and also the first to estimate how the sex of one's sibling impacts maternal transmission of entrepreneurialism on the likelihood of starting either an LLC or a Sole Proprietorship.

I find that the intergenerational transmission of entrepreneurialism to first-born women is significantly influenced by the sex of their younger sibling when considering their likelihood of opening an LLC. Having a younger brother substantially boosts maternal LLC transmission (more than 2 times) and severely dampens paternal LLC transmission (by almost three quarters). There is no significant evidence that such a moderating effect is operating for first-born women when SP entry is considered. This is true more generally for men; the sex of younger siblings has no significant influence on intergenerational transmission of entrepreneurialism, regardless of the type of entrepreneurial entry considered. These results are robust to alternate samples and specifications, including when a sample composed of families with more than two children is considered. For brevity I will refer to the effect of parental self-employment on the child's likelihood of founding an LLC (or SP) as the parental transmission of LLC (SP) entrepreneurship.[2]

To better understand how the entrepreneurship gap is affected by parental transmission moderated by sibling effects, I follow Mishkin (2021) and construct counterfactual scenarios to explore how the rate at which women found LLCs would change under optimal sibling configurations. I calculate that if all first-born women in two-child households of self-employed mothers experienced the brothers-only effect, the entrepreneurship gap for this group would drop by about 17 percent, from 4.68 percentage points to 3.88 percentage points. First-born daughters also benefit,

[1] As discussed in the main results section, results with families of more than 2 children are presented in the Appendix Figure A.4, the main results do not change

[2] A more accurate but lengthy term would be the effect of parental self-employment experience on the child's likelihood of becoming an LLC (SP) entrepreneur.

to a lesser extent, from having a brother when neither or both of their parents are self-employed. Having a brother relative to a sister increases the likelihood of founding an LLC in all family types except when only the father is self-employed. In these families, if first-born women experienced the sister-only effect, the entrepreneurship gap for this group would modestly drop by about 3 percent. Assigning the best-case counterfactual for each family type yields an LLC founding rate that is almost 5 percent higher than the raw LLC creation rate for the first-born women considered. However, this increase does not translate into a sizable reduction in the overall entrepreneurship gap for first-born women: the gap drops only slightly from 5.16 percentage points to 5.09 percentage points.

Moving into the discussion of mechanisms, it will be helpful to refer to the four takeaways from the core analysis: having a younger brother rather than a younger sisters negatively affects fathers' transmission of LLC entrepreneurship to first-born (FB) daughters (T1); having a younger brother rather than younger sisters positively affects mothers' LLC transmission to FB daughters (T2); the parental LLC transmission to FB sons appears unaffected by the sex of the second child (T3) and parental SP transmission is unaffected by the sex of the younger child (T4).

What mechanisms may be driving the first two of these results? As the sex of the younger child is conditionally random, parental genetic transmission, and gender attitudes can be ruled out. Moreover, one clear path of intergenerational transmission—passing on the family business directly—is excluded, as the focus here is on children's formation of entirely new businesses.[3] Two possibilities remain: the sex of the younger sibling may affect the allocation of rivalrous resources to the first-born due to sex-specific parenting practices and/or sibling peer effects that may be magnified according to the sex of the self-employed parents.

To start, I try to understand whether younger siblings are crowding-out or crowding-in the parent-daughter LLC transmission channel. That is, I try to understand if these results are driven by "having" a brother or by "not having" a sister. For instance, result T2, that having a brother boosts the LLC mother-daughter transmission, could be due to the fact that brothers are particularly beneficial in maternal entrepreneurial households. On the other hand, the result could be driven by the fact the value of having a brother lies in not having to compete with a sister. To try to disentangle these two possibilities, I estimate the effects of having a younger brother versus a younger sister relative to being an only child, and how this interacts with the self-employment status of parents on the likelihood of founding an LLC and SP. With the caveat that the results of this exercise can not be interpreted as causal as factors affecting family size could be correlated with entrepreneurship of children and parents, the results suggest that first-born daughters of self-employed mothers are in competition with their sisters but not with their brothers and that

[3] As discussed in the data section, the measure of new LLCs and new SPs are designed by Statistics Denmark to capture truly new enterprises.

this sisterly competition appears stronger for resources that are beneficial for founding an LLC as compared to a Sole-proprietorship. I conclude from this that sororal competition seems to be driving the positive effects of brothers on the mother-daughter LLC transmission found in the main results, e.g. FB daughters with younger brother benefit from not having to compete with sisters.[4] On the other hand, the exercise suggests that in households with self-employed fathers, sisters compete with their brothers but not with their sisters implying that it is this fraternal competition, rather than positive effects from having a sister, that drives the negative effect of brothers on the father-daughter LLC transmission.

A possible explanation for these findings is that parents of first-born daughters act in a homophilic manner, encouraging same-sex children to follow in their footsteps, perhaps stemming from adherence to gender norms regarding the type of work that men and women should perform. Mothers do not redirect resources away from their eldest daughter if the second-born child is male, but perhaps owing to a stronger sense of fairness among two daughters, does so when the second-born is a daughter (supporting T2). Fathers behaving in such a homophilic manner may also redirect resources away from their eldest daughter if the youngest is male, when issues of fairness between same-sex children are absent (supporting T1).

Meanwhile, sibling composition appears to be a less significant factor in the transmission of entrepreneurship to first-born sons (T3), suggesting that primogeniture rather than fairness among same-sex siblings holds greater importance for male children than for female children conditional on family size, regardless of parental entrepreneurial experience. That is, a disproportionate sense of fairness among two sons (relative to two daughters) appears not be a factor for self-employed parents, and preferences toward younger daughters relative to first-born sons is not a factor for self-employed mothers implying the importance of primogeniture conditional on family size. The importance of birth order also seems to be the dominant consideration in the parent-child SP transmission mechanism, especially when the father is self-employed (supporting T4).

Taking these results in hand, I next try to find some clarity regarding how younger sisters crowd-out their older sisters in maternal entrepreneurial households and how younger brothers crowd-out their older sisters in paternal entrepreneurial households. In particular, I will examine the various channels through which parents may preferentially pass on their entrepreneurialism, first focusing on the roles of human capital then turning to wealth transfers.

The transmission of entrepreneurial human capital—the skills, knowledge, and experiences that enhance business acumen—is a critical factor in the intergenerational transfer of entrepreneurship. Prior research underscores the importance of active, hands-on exposure to family business activities as a primary mechanism for passing entrepreneurial skills to children. Unlike the "din-

[4]Smaller and insignificant effects are observed for SP transmission

ner table" transmission of entrepreneurial knowledge discussed in Hvide & Oyer (2018), on-the-job human capital transmission is often rivalrous; training and supervision require significant parental time, a limited resource, as Mishkin (2021) notes. To explore whether this mechanism is at play, I investigate how the self-employment status of mothers and fathers affects the probability that a child will formally working with a parent before the age of 21, and how this is moderated by the sex of their sibling.[5] I find that having a same-sex younger sibling reduces the likelihood that a first-born child will formally work with their same-sex self-employed parent: sisterly competition crowds out the first-born daughter's likelihood of working with her mother, while brotherly competition crowds out the first-born son's likelihood of working with his father. In contrast, no such crowding-out effect is observed for first-born children with same-sex siblings when working with opposite-sex parents. One interpretation of this finding is that mothers may aim to be "more fair" with their daughters in bringing them to work, just as fathers do with their sons, but that they prioritize fairness less when their children are of the opposite sex. That is, mothers (fathers) may be less concerned with treating two sons (daughters) equitably when choosing which one to bring to work.

While this mechanism may partially explain the crowding-out effect of younger sisters on maternal LLC transmission to first-born daughters, the magnitude of this work-with-mom crowding-out effect is relatively small, suggesting it may not be a primary explanation. Similarly, father's choosing to take their youngest son to work rather than their eldest daughter does not seem to be the driving force behind the crowding-out effect of younger brother on father-daughter LLC transmission. It is important to note, however, that only formal work arrangements are considered in this analysis; informal mechanisms for bringing children to work may be significant, particularly for self-employed mothers.

First-born children who are crowded out of entrepreneurial human capital learned on the job from parents may try to substitute it with more traditional human capital accumulation. To investigate this possibility, I estimate the effects of parental self-employment experience, sibling sex composition, and their interaction on the number of years of schooling. Consistent with previous research (e.g., Mishkin, 2021; Brenøe, 2022), I find a relatively small (and statistically significant) "brother penalty" on the total years of schooling for first-born daughters, regardless of parental entrepreneurial experience. Given the small magnitude of the effect — less than a month —total educational attainment is unlikely to be a major factor in explaining the crowding-out of father-daughter LLC transmission by younger brothers or in offsetting the crowding-out of mother-daughter LLC transmission by younger sisters.

Following Hvide & Oyer (2018), in order to better understand the importance of active, albeit informal, paternal involvement and potential business succession in the transmission of en-

[5]By "formally", I mean employment registered with the Danish tax authority.

trepreneurialism, I compare the mechanisms of entrepreneurial transmission and its relationship with siblings sex composition found in the main results to those obtained when considering only first-born children whose father died prior to the founding date of the child's new LLC.[6] By examining first-born children whose father died before the founding date of their own LLC, I can determine the extent to which direct paternal involvement is a mechanism through which entrepreneurialism is passed on. Further, by focusing on first-born children whose father died more than four years before the founding of their first new LLC, I eliminate direct succession as a transmission pathway where children might take over an existing business and simply rename it and register it as their own (although this latter mechanism ought to be ruled out by how Statistics Denmark defines new businesses).

The analysis suggests that while a father's involvement in his daughter's business may be a valuable transmission mechanism, it is not crowded out by a younger brother and thus does not explain why brothers interfere with father-daughter LLC transmission (T1). The heightened sororal competition for maternal entrepreneurial transmission in households where the father has died provides insight into why having a younger brother, rather than a younger sister, positively influences mothers' LLC transmission to first-born daughters (T2). A mechanism consistent with these results could be the importance of wealth transfers over human capital transfers: households become more financially constrained when the father dies and the mother is self-employed. This financial pressure, combined with mothers' tendency to split wealth equitably among same-sex siblings, may lead to younger sisters crowding out the first-born daughter's access to wealth, thereby reducing her likelihood of starting an LLC due to the financial constraints disproportionately faced by women.

Parents may pass on expertise that may be specific to a particular industry or occupation (e.g. Dunn & Holtz-Eakin (2000)) through "dinner table human capital" (e.g. Hvide & Oyer (2017)). As in Mishkin (2021), I find that the vast majority—a minimum of 85 percent—of LLC founders work in industries different from those of their parents suggesting that industry-specific transmission is not a large piece of the sibling crowd-out puzzle. I confirm this by estimating how a younger sibling's sex moderates the effect of parent's self-employment experience on the likelihood that first-born children will work in their parents' (1-digit) industry and finding so no significant effects: I do not find that first-born daughters with self-employed fathers are more likely to follow in their father's industry if their younger sibling was a sister rather than a brother, nor do I find that first-born daughters of self-employed mothers are less inclined to follow in their mother's industrial footprint if she has a younger sister rather than a younger brother. Moreover, when I exclude first-born children who have experience in the same industry as their parent and re-estimate the main specification, the main results still hold. Summing up, these results imply that

[6]The number of maternal deaths prior to founding is too small to allow for a similar analysis.

simple competition for this type of industry-specific expertise is not a mechanism that can explain the crowding out of first-born daughters into LLC entrepreneurship by their siblings.

The crowding-out effect of daughters working with their mothers, combined with the absence of crowding-out in industry-specific expertise, suggests that younger sisters limit older sisters' exposure to their mother's business acumen. In contrast, younger brothers do not restrict first-born daughters from on-the-job collaboration with their fathers or acquiring entrepreneurial and industry-specific knowledge. Additionally, sibling sex composition does not affect the accumulation of formal human capital, in the form of the length of education, in families with self-employment experience compared to those without. Finally, there is no evidence that younger brothers impede active paternal support for their oldest daughters in establishing businesses.

Turning next to financial rather than human capital transfers, I first examine a common mechanism by which parents pass wealth on to children, by transferring property. In Denmark, parents can sell property to their children at a price up to 15 percent below the property's public valuation. I find large effects of having self-employed parents on the likelihood of owning a property owned in the past by a parent for first-born sons, and to a lesser extent to first-born daughters. However, I find no significant effects from the interactions between parental self-employment and sibling sex mix on the likelihood of owning a property that was owned by a parent in the past. Similarly, I find no significant effects of parental self-employment experience and its interaction with sibling sex composition and on the net worth of first-born children at age 19, though the estimates are quite noisy. The only suggestive evidence for the importance of wealth transfers in explaining the sibling crowding-out effects comes from families where the father died before the children started their businesses. As discussed earlier, in such households where the mother has self-employment experience, sisterly competition actually intensifies while the main effect of maternal self-employment experience on her daughter's likelihood of transmission remains unchanged suggesting that in maternal entrepreneurial families under financial pressure, younger sisters may limit the first-born daughter's access to financial resources, thereby reducing her likelihood of starting an LLC due to financial constraints due to their mother's desire to be fair.

Are women better or worse off when they have to compete with their brothers in paternal households or their sisters in maternal households? First-born daughters in daughters-only households with entrepreneurial fathers, as well as first-born daughters with younger brothers in maternal entrepreneurial households, are more likely to launch an LLC, suggesting that these women prefer entrepreneurship over regular employment. Compared to women who are crowded out by siblings, these women have a broader set of career choices that includes entrepreneurship, and thus they must be at least weakly better off, as pointed out by Mishkin. While the transmission of entrepreneurial human capital could potentially crowd out traditional human capital, making these women worse off, I find no strong evidence to support this effect. Moreover,

Levine & Rubinstein (2017) find a large premium for incorporated entrepreneurship, suggesting that the accumulation of entrepreneurial human capital particularly relevant for opening one's own LLC could lead to significant financial gains, in addition to possible non-pecuniary benefits of running one's own business Hurst & Pugsley (2011) and the option value of attempting entrepreneurship (Manso (2016), Dillon & Stanton (2017), Daly (2015)). To offset the loss of such benefits resulting from sibling competition, policy aimed at exposing young women and girls to hands-on business experience and mentoring, rather than industry-specific knowledge, in an environment mimicking that of entrepreneurial households would be valuable.

The paper proceeds as follows. Section 2 presents the data, and Section 3 contains the methodology. Section 4 presents the main results, and Section 5 discusses the potential mechanisms underlying these results. Section 6 concludes.

2 Data

2.1 Sample Selection

Denmark offers an ideal setting for this analysis due to its high-quality, population-level administrative data that covers demographics, detailed work histories, and family linkages from beginning in 1980. From these population registers, oldest children born between 1961-1971 are selected as the primary unit of analysis. Only those who are Danish, whose parents are Danish, whose parents are identified, and whose parental ages are known are included. First and second-born twins are excluded. The main estimation samples focus on oldest children with one sibling, but robustness checks are also considered using families with more than two children. Finally, only families in which the second oldest sibling is born within 4 years of the eldest are considered following Brenøe (2022). The resulting dataset is the main estimation dataset.

Table 1 presents summary statistics of the estimation sample. The first two columns display the means and standard deviations for first-born men in families with more than two children. The third and fourth columns provide the same statistics for first-born women in these larger families. Columns five and six present analogous information for first-born men in two-child households, while columns seven and eight do so for first-born women in two-child households. As expected, the differences in predetermined parental characteristics between first-born men and women are negligible, regardless of family size, since the sex of the first-born is random.

The table highlights that first-born children from smaller families tend to have older and more educated parents with slightly less entrepreneurial experience but more management and paid-employment experience. Gender differences are pronounced in the first-borns' entrepreneurial outcomes: first-born men are more than three times as likely to start an LLC and about 1.5 times as likely to start a SP compared to first-born women. A small fraction of men engage in both forms of

entrepreneurship, while virtually no women do so. First-born children from two-child households have higher rates of entry into LLCs but are less likely to start a sole proprietorship, suggesting a correlation between the number of younger siblings and the type of entrepreneurship in which the individual engages. However, the overall level of entrepreneurship appears unaffected by family size.

2.2 Variable Construction

The Statistics of New Enterprises identifies all firm start-ups in Denmark from 2001 and forward, this anylsis focuses on all firm start-up between 2001 and 2019 to avoid issues related to the pandemic. For the majority of the new firms, Statistics Denmark has been able to identify the founder. For sole proprietorships, identification is straightforward: the entrepreneur is simply identified as the owner of the firm.[7] For incorporated firms, Statistics Denmark uses a prioritized list of criteria to identify the principal entrepreneur. Firms in the databases are considered "truly active," implying that the firms must have either 0.5 employees or a minimum annual sales of approximately $30,000 to $75,000, depending on the industry.[8] Statistics Denmark has also undertaken extensive efforts to identify organic start-ups; their scrutiny of firms has eliminated those that could be the result of spinoffs or restructurings. From these registers, an indicator is created to capture whether the individual founded an LLC or SP during the period 2001-2019. These indicator variables will be used in the following analysis.[9] This implies that for the cohorts analyzed, I observe whether individuals open an enterprise between the ages of 30 and 58, covering approximately the middle 80 percent of the age distributions for LLC and sole proprietorship founders.

Parental indicators of self-employment, paid employment, and management experience are created based on whether parents held these jobs while their oldest child was between 9 and 20 years old. Parents will be considered as having self-employment experience if they are the sole owner of a non-incorporated business or if they receive income as a working spouse is an unincorporated business. This does not capture all self-employment experience of parents as parents could also be owners of incorporated businesses. However this measure captures the majority of the parents who are engaged in self-employment. Ongoing work investigates incorporating a proxy for such parental LLC experience.[10]

[7] The IVPE register is used

[8] The IVPS register is used.

[9] In the years after 2013 there is information about several founders per company. The main founder is defined by using IVPS number = 1. I consider an individual a founder of an LLC if they are on the IVPS register prior to 2014 and/or if their IVPS nummer==1 on the IVPS register after 2014.

[10] I Use "Employment Status" (*beskst*) of parents to define their experience in self-employment (1,2,3) or paid employment (4,5) and DISCO codes to define management experience.

3 Methodology

The following regression is estimated separately for first-born men and women of two child households. Note that the subscript for the men/women has been dropped for clarity:

$$y_i = \sum_{j \in M,D} [\gamma^j SE_i^j + \theta Brother_i + \beta^j SE_i^j \times Brother_i] + X_i\delta + \epsilon_i \quad (1)$$

where SE^M(SE^D) takes the value of 1 if the mother (father) had self-employment experience when individual i was between 9 and 20 years old, $Brother$ takes the value of 1 if the second-born child is a male, X_i contains the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and management experience, birth month-year fixed effects, and indicators for the field of the parents' highest education.[11] In the main specifications, y will either be an indicator for whether an individual founds an LLC or founds a SP. [12]

γ^j is the effect of self employment status of parent j for oldest children with a younger sister. θ is the effect of having a brother for those whose parents are not self-employed, and $\gamma^j + \beta^j$ is the effect of self-employment status of parent j for oldest children with a younger brother. β^j, the main coefficient of interest is the effect of a brother on the entrepreneurial transmission of parent j.

Conditional on having a second child and the sex of the first child, the sex of the second child is random implying that the effects of the sibling sex can be attributed the sibling's sex, and nothing else (e.g. parental attitudes). However, the effect of parental self-employment status can be interpreted as causal only if one is willing to assume selection only on observables. Many unobserved factors may affect the likelihood of becoming an entrepreneur for both the parent and the child the (e.g. genetic traits). Some of these factors are proxied by the rich set of parental covariates included in the specification discussed above. Regardless, this specification allows me to estimate the proportion of (perhaps biased) parental transmission of entrepreneurialism that is affected by having a brother. This empirical strategy follows that of Mishkin (2021) and Brenøe (2022). Importantly, the main results are externally valid only for first-born children.

4 Main Results

Figure 1 presents the results of estimating equation 1 separately for first-born men (shown in blue) and women (shown in red). The left panel displays the effects on founding a new LLC and the right panel displays the effects on founding a new SP. Appendix Table A.1 presents these results in a tabular format.

[11] For example, a field might be "Bachelor's degree in Humanities", or "nursing", etc. Appendix Figure A.5 shows the results without parental field indicators, they are extremely similar to main results

[12] For clarity, we do not present the model with an interaction between mother and father self-employment experience. These results are presented in Appendix Figure A.6, the point estimates remain effectively the same, but are generally more precisely estimated.

Consistent with the literature, the results suggest that parental self-employment experience has large and significant effects on entrepreneurship for men (e.g., Dunn & Holtz-Eakin, 2000). The father-son transmission is particularly large. Fathers significantly increase their FB son's likelihood of starting a SP by 0.018 if their second child is a girl, an increase of about 28 percent of the mean SP entry rate for men. Fathers have an even larger effect on increasing the likelihood that their FB son will open an LLC if their second child is a girl, raising that probability by 0.029, about 42 percent of men's average LLC founding rate. Although not as large as the paternal effects, maternal self-employment also has large and significant effects for FB men with younger sisters which are approximately 60 (40) percent the size of the analogous paternal transmission rates to new LLC (SP) entry.

For FB women with younger sisters, the point estimates of parental entrepreneurial transmission are positive in all cases, but the only statistically significant when considering father's transmission on the likelihood of his daughter founding a new LLC. This effect is large, more than half the size of the mean incidence of founding an LLC for women.[13]

The main estimates of interest involve the effects of a younger sibling's sex—both directly and in how it moderates the intergenerational transmission of entrepreneurialism. The first effect is captured by the main effect, and the latter by the interaction between having a parent with self-employment experience and whether the next sibling is a brother. The figure highlights that for first-born sons, there are no significant main effects of the arrival of a second-born son and that the parental transmission of entrepreneurialism is not statistically significantly affected by the arrival of a second-born son, regardless of the type of entrepreneurial entry considered.[14] However, the story is very different for women.

Having a younger brother significantly decreases the effect of having a self-employed father on a woman's probability of becoming a founder of an LLC by 0.008. This is a very large effect equal to about 44 percent of the average rate of LLC entry for women. Moreover, relative to FB women with younger sisters, 72 percent of the paternal transmission is crowded out by having a brother. On the other hand, the arrival of a younger brother significantly *increases* the effect of having a self-employed mother on a FB daughter's likelihood of becoming the founder of an LLC. Again, this effect is large, about 0.009 or 50% of the average rate at which women found new LLCs.

Finally, there is statistically marginal evidence that when neither parent is self-employed, having a younger brother rather than a younger sister increases FB women's likelihood of founding an LLC, whereas there is no effect for men. This increase is 0.002, or about 10 percent of the average founding rate of women, as compared to those with younger sisters.[15][16] No significant effects are detected on the founding of a SP.

[13] As discussed in an earlier footnote, including an interaction between father and mother self-employment experience (and additionally the interaction of that with having a brother) increases precision such that all parental effects for oldest daughters with sisters become significant, see appendix figure A.4.

[14] See the bottom panels of Appendix Figures A.4 and A.5 for the marginal effects of having a brother on first-born men. Across all types of parental self-employment experience, the marginal effects of having a brother are insignificant, except when both parents have self-employment experience. In this case, having a younger brother increases the likelihood that older brothers will start a sole proprietorship.

[15] Mishkin (2021) also detects a marginally significant effect.

[16] Note that when all younger siblings are considered, this sibling effect disappears for FB women despite the increase in power, see figure A.4

Having a brother does not have a significant effect on entrepreneurial entry for FB sons of parents without self-employment experience.

Using American data, Mishin also finds that when sons are present, three-quarters of the effect of a father's self-employment experience on a daughter's likelihood of entrepreneurial outcomes is eliminated. However, she examines these effects using a pooled measure of self-employment, encompassing both sole proprietors and owners of incorporated firms. My results suggest that this sibling mediation of father-daughter self-employment transmission is particularly significant when considering LLC entry rather than sole proprietorship (SP) entry. This implies that exposure to skills more valuable for running LLCs—such as business leadership—may be crucial.

For ease of reference, the top panels of Appendix Figures A.1 present the marginal effects of having a brother on the likelihood of founding an LLC for first-born women. Women with a self-employed mother and a non-self-employed father show a highly significant 1.1 percentage point increase in the likelihood of founding an LLC if they have a younger brother rather than a younger sister—an increase of about one-third relative to the raw LLC creation rate for women with the same parental background. Similarly, the marginal effects of having a brother are positive, though less than half the size, for women whose parents are either both or neither self-employed; however, this effect is only significant in the latter case. As shown in Appendix Figure A.2, the marginal effects of having a brother on founding a sole proprietorship are all positive and generally large, but are significant only when both parents are self-employed.

Summing up, first-born men and women of *paternal* entrepreneurs who have a younger sister experience large, significant, positive effects on opening an LLC. The father-son transmission is not affected by whether the youngest child is a brother rather than a sister. On the other hand, almost three quarters of the father-daughter transmission is lost if the youngest is a brother rather than a sister. An implication of this is that at most one-quarter of the father-daughter transmission could be coming from non-rival factors (e.g., genetics), implying that rival intergenerational transmission is an important mechanism for father-daughter transmission when considering LLC entry. Interestingly, this is the same value that Mishkin (2021) finds, though her work considers effects on being self-employed regardless of whether the business is incorporated and unincorporated, or whether or the business is a new venture. First-born men and women of *maternal* entrepreneurs who have a younger sister experience large (significant for boys), positive effects on opening an LLC (about a 60 percent of the size of paternal effects). The mother-son transmission is not affected by the sex of the youngest child. However, the mother-daughter transmission is: women with younger brothers experience a large bump in their likelihood of starting a LLC that more than doubles the maternal entrepreneurial transmission relative to women with younger sisters.

In summary, the intergenerational transmission of entrepreneurialism to women is significantly influenced by the sex of their younger sibling when considering their likelihood of opening an LLC. Having a younger brother substantially boosts LLC maternal transmission (more than 2 times) and severely dampens paternal LLC transmission (by almost three quarters). Generally speaking, the sex of the younger sibling has no effects on the likelihood of starting a SP regardless of whether one considers FB men or women, emphasizing the importance of separately studying the effects of intergenerational transmission

of entrepreneurialism on opening an LLC versus an SP.

The results are robust to alternate samples and specifications: see Appendix Figure A.4 for estimation results for families with more than 2 children and Appendix Figure A.5 for estimation results when no parental education fields are included. Appendix Figure A.6 presents the estimation results when an interaction between mother and father self-employment experience is included along with and interaction of both parents working and having a younger brother. The main results remain unchanged, verifying that the maternal effects detected are not solely operating through families in which both parents are self-employed. Finally, Appendix Figure A.8 presents the main estimates separately for first-born children born between 1961 and 1966 and those born between 1967 and 1971; the LLC parent-daughter transmission mechanism is effectively identical across these two time periods.

To better understand how the entrepreneurship gap is affected by parental transmission moderated by sibling effects, I follow Mishkin (2021) and construct counterfactual scenarios to explore how the rate at which women found LLCs would change under optimal sibling configurations. For instance, for first-born daughters of self-employed fathers, the counterfactual assumes they experience the "sisters-only" transmission effect. Conversely, for daughters of self-employed mothers, the counterfactual considers the "brothers-only" transmission effect. Figure 2 displays the raw average LLC creation rates for first-born women based on their parents' self-employment status, shown as maroon bars. The pink bars represent the raw average LLC creation rates for women with only sisters, which serve as the counterfactual for 'sisters-only' effects, while the blue bars represent the raw average LLC rates for those with only brothers, serving as counterfactual cases simulating scenarios where 'brothers-only' sibling effects are expressed. For example, for first-born daughters of self-employed fathers, the counterfactual average of interest is shown by the height of the pink bar. For daughters of self-employed mothers, the relevant counterfactual value is represented by the blue bar, and so on.

Above each bar, the figure indicates how much higher that particular LLC creation rate is relative to the baseline case where neither parent is self-employed. For example, the leftmost bar shows that approximately 3 percent of first-born daughters of self-employed mothers founded an LLC, which is about 2.1 times higher than the rate for their counterparts with non-self-employed parents. At the top of the figure, the gender gap in percentage points is provided for each group. For instance, about 7.68 percent of first-born sons of self-employed mothers founded an LLC (equal to 3% + 4.68%).

Several key observations emerge from this figure. First, among first-born women, those with self-employed mothers are the most likely to found an LLC. Within this group, women with younger brothers are even more likely – 2.6 times more likely than the average LLC founding rate of women without self-employed parents. If all FB women of self-employed mothers experienced the brothers-only effect, the entrepreneurship gap for this group would drop by about 17 percent. FB daughters also benefit, to a lesser extent, from having a brother when neither or both of their parents are self-employed.

Second, having a brother relative to a sister increases the likelihood of founding an LLC in all family types except when only the father is self-employed. In these families, first-born daughters with brothers are only 1.4 times more likely to found an LLC compared to those with non-self-employed parents, whereas

daughters with sisters are 1.7 times more likely. If all women of self-employed fathers had only sisters, the entrepreneurship gap would drop, but by a modest amount of about 3 percent.

Calculating a weighted average of the best-case counterfactual for each family type yields a founding rate of about 1.83 percent, shown in the rightmost gray bar of the figure. This is almost 5 percent higher than the raw LLC creation rate for first-born women in the estimation sample. However, this increase does not translate into a sizable reduction in the overall entrepreneurship gap for first-born women: the gap drops only slightly from 5.16 percentage points to 5.09 percentage points.

Going forward, for brevity I will refer to the effect of parental self-employment on the child's likelihood of becoming an LLC (or SP) entrepreneur as the parental transmission of LLC (SP) entrepreneurship, although a more accurate but lengthy term would be effect of parental self-employment experience on the child's likelihood of becoming an LLC (SP) entrepreneur. I will also focus more heavily on understanding the mechanisms underlying the effects of parents and siblings on women's entry into LLC entrepreneurship.

5 Mechanisms

The main results in Section 4 establish a strong link between sibling gender composition and the intergenerational transmission of LLC entrepreneurship to first-born daughters. This raises the question of what mechanisms drive these effects. I begin by investigating whether the presence of brothers or sisters differentially crowds out or crowds in parental transmission of entrepreneurship. By comparing the effects of having a younger brother or sister relative to being an only child, I shed light on whether the main results are driven by competition or positive spillovers from siblings. Building on these findings, I explore several potential channels through which sibling dynamics may operate, focusing on the transmission of entrepreneurial human capital and financial resources within families.

First, I examine whether the presence of brothers or sisters differentially affects children's direct exposure to their parents' businesses through work relationships. Second, I analyze whether formal educational choices, which may be influenced by sibling dynamics, play a role in shaping entrepreneurship outcomes. Third, I explore the impact of parental death on parent-child transmission and its relationship with siblings, shedding light on the importance of continued parental involvement and how it may be affected by sibling dynamics. Fourth, I consider industry-specific human capital, testing whether sibling gender affects children's propensity to enter the same industries as their parents depending on their self-employment experience. Finally, I investigate financial channels, studying how sibling composition shapes the transfer of ownership of parental proprety and children's accumulation of wealth.

5.1 Crowding-in vs. Crowding-out

To better understand whether the presence of brothers or the absence of sisters is driving the crowding-out effects experienced by older daughters, I estimate the effects of having a younger brother versus a younger

sister, relative to being an only child, and how this interacts with parental self-employment status on the likelihood of founding an LLC or SP.[17] Figure 3 presents these results.

Focusing on the left most panel, one can see the effect of the Mother-Daughter LLC transmission interacted with having a younger sister has effectively the same magnitude, but opposite sign as the Mother-Daughter LLC transmission interacted with having a younger brother shown in the main results. The effect of the Mother-Daughter LLC interacted with a younger brother is effectively zero. The take-way is that older sisters are crowded out by their younger sisters, rather than benefiting from crowding in from their brothers. Similarly, the estimated effect of the Father-Daughter LLC transmission interacted with having a brother is almost as large as the analogous effect in the main results, suggesting that younger brothers are primarily responsible for crowding their older sisters out.

As an additional check, I also examine one obvious way in which crowding-in may operate in the context of self-employment: siblings can increase entrepreneurial proclivity by providing a natural partner with whom to start a business. Specifically, I will investigate the degree to which the sex of one's sibling affects the likelihood of starting a business together in families with self-employed parents. One explanation for the boost in the maternal LLC-transmission that occurs for FB women with brothers relative to sisters is that perhaps starting an LLC is easier with a partner - perhaps even more so with a sibling - and even more so with a brother rather than a sister. To investigate this possibility, Appendix Figure A.8 present the results from estimating equation 1 using an indicator as to whether the FB child found an LLC with a sibling as a dependent variable. For this exercise, the subsample of founders who opened an LLC in 2014 to 2019 is considered as only during that period can one determine other founding members of the company.

It is immediately evident that FB boys are more likely to found an LLC with a sibling if that sibling is a brother, regardless of whether their parents are self-employed. However, simply having self-employed parents has no effect on this likelihood. For FB girls, no significant effects are observed. Specifically, the effect of having a brother for daughters of self-employed mothers is negative (though not statistically significant); having a brother makes these women less likely, rather than more likely, to open a business with a sibling. This corroborates the explanation of crowding-out, rather than crowding-in, discussed above. [18]

Building on these findings, I turn next to exploring how younger sisters may crowd out their older sisters in households with entrepreneurial mothers, while younger brothers may do the same in households with entrepreneurial fathers. I first consider human capital transmission then wealth transfers.

[17] All controls are the same as those used in the main regression.

[18] A natural extension would be to look at the extent to which children open new businesses more formally with their parents. Our data prohibits us from answering that directly for our estimation sample as we only observe co-founders during the period of 2014-2019, at which point parents are at or past the age of retirement

5.2 Human Capital transfers

5.2.1 Bringing kids to work

The transmission of entrepreneurial human capital is an important factor in the intergenerational transfer of entrepreneurship, and in particular, hands-on exposure to family business activities as a mechanism through which such skills are passed down to children. Figure O.4 presents the results of estimating equation 1 with a dependent variable capturing whether or not the the FB daughter and son worked with their self-employed father (left panel) or self-employed mother (right panel) before the age of 21.[19] Immediately noticeable is that FB children of self-employed parents are more likely to work with their parents regardless of the sex of the child or which parent has self-employment experience. The magnitudes of these effects are largest when the outcome considered is working with the parent who has self-employment experience. That is, the effect of having a self-employed mother (father) on the likelihood of working with a parent is largest when that parent is the mother (father). The effects are even larger when the same-sex child of the parental entrepreneur is considered: the largest effect of having a self-employed mother (father) on the probability of working with mom (dad) occurs when considering FB daughters (sons) revealing strong homophilic sex-specific parenting in this type of human capital transmission.

The primary question is whether having a younger brother, relative to a younger sister, affects this type of human capital transmission. As shown in the leftmost panel of the figure, there is no evidence that younger brothers reduce the likelihood of older sisters working with their self-employed father. However, younger brothers do appear to slightly reduce the likelihood for older brothers, with an effect size of approximately 2 percentage points. Compared to FB men with younger sisters who experience a 26 percentage point increase in their likelihood of going to work, FB sons with younger brothers crowd out their older brother by about 7 percent.

On the other hand, younger brothers increase the likelihood that older daughters will work with their mom by 2 percentage points, a 10 percent boost relative to the FB daughter with younger sisters. There is an interesting symmetry of these finding with those of the FB boys working with fathers. "Receiving" a sibling of the opposite sex boosts the likelihood that a FB child works with their same-sex self-employed parent. One explanation for this could be that in 2-children households in which one child is female and the other is male, families form stronger lines of human capital transmission along gender lines than they would otherwise.

This mechanism may partially explain the crowding-out effect by younger sisters on the maternal LLC transmission to first-born daughters, as shown in Figure 1. However, the magnitude of this work-with-mom crowding-in effect (10%) is relatively small compared to the LLC crowding-in effect (more than double at over 200%), making it unlikely to be a primary explanation.[20]

The main results regarding working with parents do not change when we consider alternative mea-

[19] Firm identifiers are not available during this early period, but time consistent workplace identifiers are available and are used.

[20] Appendix Figure A.9 presents the results of estimating equation 1 with *work with mom* and *work with dad* as mediators. As expected, the main results of 1 are not affected.

sures of working with a parent: working with a parent regardless of whether that parent is self-employed, working only with a self-employed mother or only working with a self-employed father. See online Appendix Figures O.2 and O.3 for these results.

5.2.2 Formal Education

Formal human capital acquisition may be influenced by parental self-employment experience and the sibling sex composition (e.g., Mishkin, 2021; Brenøe, 2022). Figure 5 presents estimates of these effects on the number of years of schooling. Consistent with previous research, there is a relatively small (though statistically significant) penalty on the total years of schooling for first-born daughters, regardless of parental entrepreneurial experience. However, given the small magnitude—less than a month—total educational attainment is unlikely to be a major factor. Nonetheless, as Brenøe (2022) finds, the type of education that first-born women pursue may be impacted by the presence of a younger brother. Specifically, Brenøe's study indicates that having a younger brother negatively affects the likelihood of enrolling in and completing STEM degrees. In this context, it is of interest to look at these effects on the likelihood of attending business school as such attendance does impact the likelihood of subsequently founding an LLC (e.g. Daly & Sørensen (2024)).[21]

5.2.3 Paternal Death

To understand the role of active, but informal, paternal involvement and potential business succession in the transmission of entrepreneurialism, I will compare the estimated mechanisms of entrepreneurial transmission (and the influence of siblings) across three sets of FB children: all FB children (main results presented in Figure 1), FB children whose father died prior to the founding date of the child's new LLC, and FB children whose father died more than four years prior to the founding of the child's LLC.[22]

By examining FB children whose father died before the founding date of their child's LLC, we can rule out direct paternal involvement as a mechanism through which entrepreneurialism is passed on. Further, by focusing on FB children whose father died more than four years before the founding of the child's first new LLC, we eliminate direct succession—where children might take over an existing business, simply renaming and registering it as their own—as a transmission pathway.

Figure 6 presents these results, with FB men shown in the leftmost panel and FB women in the rightmost panel. The main effect of a father's self-employment on his first-born daughter's likelihood of founding an LLC decreases for those whose father died prior to the firm's founding, reducing the father's influence almost to zero, whereas there is no strong effect for first-born sons. Notably, the timing of the father's death—whether any time before founding or more than four years prior—does not alter this effect, suggesting that fathers are actively involved in their daughters' establishment of new LLCs. There is no strong evidence that the sex of the eldest daughter's sibling affects this mechanism, suggesting that

[21] This is a subject of ongoing work.

[22] The number of maternal deaths prior to founding is too small to allow for a similar analysis.

this type of active paternal influence is not what is being crowded out by younger brothers causing the crowding out of father-daughter LLC transmission observed in the main results (T1).

Moreover, the results suggest that same-sex sibling competition for maternal entrepreneurial transmission is stronger in households where the father has died, for both first-born sons and daughters. For first-born daughters, this does not seem to be due to a reduction in the amount of time mothers can spend with their children, as the main effect of maternal self-employment is not affected by paternal death. One possible explanation is that household finances become more constrained in households with self-employed mothers following the father's death, perhaps because the loss of the father's income places greater financial pressure on the family. This financial constraint, combined with a maternal desire to be "more fair" in splitting wealth among two children of the same sex—as compared to mixed-sex siblings—and the fact that new LLC entrepreneurs face financial constraints when opening a business, could explain why same-sex sibling competition for maternal entrepreneurial transmission is stronger in households where the father has died. A natural explanation for this behavior may be that mothers have a harder time rationalizing inheritance based on primogeniture when two siblings are of the same sex.

5.2.4 Expertise in Industry

Parents my pass on expertise that may be specific to a particular industry or occupation, or it may encompass general knowledge on how to run a business. Early work by Dunn & Holtz-Eakin (2000) found that having a self-employed father increased a son's likelihood of self-employment, and that the effect was much stronger for sons of successful self-employed fathers, even after controlling for preferences and tastes. This finding, along with their observation that most sons entered industries and occupations different from their fathers, led the authors to conclude that entrepreneurial expertise is passed down from fathers to sons. Recent work by Hvide & Oyer (2017) finds that sons are much more likely to start a business in the same industry in which his father works (regardless of whether the father is an entrepreneur himself) and that sons who follow in their father's footsteps in industry tend to open businesses with greater value. They provide convincing evidence that the mechanism for this transmission is "dinner table human capital".

Hvide & Oyer (2017) finds that boys' early exposure to fathers' industry increases the likelihood of (successful) entrepreneurship in that (very specific) industry (more so for low ability) implying transmission of human capital rather than genetic or role model effects. On the other hand, Mishkin (2021), Dunn & Holtz-Eakin (2000) find that children are more likely to work in their father's occupations, the large majority work in occupations not the same as fathers, implying that at least some of what is going is being driven by "entrepreneurial" human capital transmission. As shown in Appendix Figure A.10, the vast majority – a minimum of 85 percent– of LLC founders work in industries that are different than their parents.[23] This finding suggests that industry-specific transmission is not a large piece of the sibling crowd-out puzzle.

To better understand the effect of parental transmission of industrial preference, Equation 1 is esti-

[23]The figure pools FB men and women due to data confidentiality restrictions imposed by Statistics Denmark, though the conclusion remains valid if FB men and women are considered separately

mated using an indicator for whether or not a child works in the same industry as their parent, the results of which are presented in 7.[24] Clear from the figure is that there are significant effects of having a self-employed parent on entering in the same industry as that parent, but there is no evidence that sex on one's younger sibling moderates this transmission. To make this clearer, Appendix Figure A.11 presents the main estimation (analogous to Figure 1) excluding individuals who share industrial experience with a parent. Aside from the expected decrease in precision, the results are the same as in the main specification.

5.3 Financial Transfers

I first examine a common mechanism by which parents pass wealth to children: the transfer of property. In Denmark, parents can sell property to their children at a price up to 15 percent below the property's public valuation. This practice is commonly referred to as a "family transfer" (familieoverdragelse).

Figure **??** presents the effects of parental self-employment and sibling sex mix on the likelihood of owning property previously owned by parents. Immediately noticeable are the large effects stemming from having self-employed parents: about a 4 percentage point increase for FB sons, regardless of which parent has the self-employment experience. Given that the average rate at which FB sons own property previously held by their parents is around 10 percent this is a considerable effect.

The same is true, though to a lesser extent, for FB daughters whose likelihood of owning parental property increases by about 3 percentage points (slightly more if the mother has self-employment experience and slightly less if the father does). Given the overall lower rate of owning the same property for FB daughters, around 8 percentage points, the relative effects are quite similar for both FB men and women.

Having a younger brother appears to slightly increase the likelihood (by less than 1 percentage point) of FB daughters owning property previously owned by their parents, though there is no effect on FB men. There are no significant interactions between parental self-employment and sibling sex mix. Taken together, these results suggest that differential property pass-down rates may contribute to the entrepreneurship gap but do not generate the mechanism underlying the brotherly crowding observed in the main results.

Wealth may also be directly passed down to children. To examine this possibility, I estimate equation 1, this time using the net worth of FB children at age 19 as the outcome variable. Appendix Figure A.12 presents the results. The estimates are noisy, and no significant effects are detected for women. FB sons of entrepreneurial parents are wealthier than sons of non-entrepreneurial parents by about $1,000 to 1,500$ USD. The estimated wealth effects for FB sons of entrepreneurial fathers are similar to those for FB daughters. However, having an entrepreneurial mother does not benefit FB daughters to the same extent as it does FB sons, though the difference between the two is not statistically significant.

Additionally, the gender of the younger sibling does not significantly affect the wealth of FB children at age 19. Overall, there is no strong evidence that this type of direct wealth transfer—at least at this age—is

[24]The measures used by Statistics Denmark to identify industry have changed over time. I create a mapping across these measures which is only possible at an aggregated (1 digit) level. See Online Appendix Table O.1 for this mapping.

contributing to the entrepreneurship gap or to the observed "brotherly crowding" effect that may influence the maternal transmission of entrepreneurship.

6 Conclusion

Using Danish administrative data, this study sheds new light on how family dynamics shape the intergenerational transmission of entrepreneurship, particularly how younger siblings' sex influences parents' transmission of LLC-relevant and SP-relevant entrepreneurial experience to their first-born children. The findings suggest that this transmission involves active investment which can be crowded out by siblings, rather than just passive mechanisms like inherited ability.

Specifically, sisterly competition substantially decreases maternal entrepreneurial transmission to first-born daughters, reducing their likelihood of opening an LLC. This may be due to mothers' desire for fairness among same-sex daughters, or because girls interact differently with their mother when they have a sister rather than a brother. Conversely, brotherly competition leads to a large reduction in paternal LLC transmission to first-born daughters, potentially because fathers are less concerned with fairness among mixed-sex children, or because daughters interact differently with fathers when a brother is present. Notably, younger siblings do not affect entrepreneurship transmission to first-born men, suggesting primogeniture outweighs same-sex sibling fairness for men. Additionally, I find no significant evidence that younger siblings affect parental SP transmission.

These findings indicate that parents of first-born daughters engage in costly, gender-specific investment that can be crowded out by younger siblings. When exploring whether financial or human capital resources are being redirected, the strongest evidence points to entrepreneurial human capital being crowded out in mother-daughter LLC transmission. Given the importance of this entrepreneurial human capital for founding an LLC versus an SP, exposure to skills such as business leadership appears to be a crucial component of maternal transmission.

Counterfactual analyses suggest that optimizing sibling gender configurations in households with maternal entrepreneurship could increase first-born women's LLC founding rate by 17 percent, while doing so for all households would increase that rate by about 5 percent—translating to a modest improvement in the entrepreneurship gender gap.

What are the welfare implications of the observed crowding out? Women with no brothers in paternal households or no sisters in maternal households are more likely to launch an LLC, indicating a preference for entrepreneurship over regular employment. This broader career choice set suggests they are at least as well off as women not crowded out by siblings. While entrepreneurial human capital might potentially crowd out traditional human capital, there is no evidence to support this. Moreover, the significant financial gains associated with incorporated entrepreneurship, along with the non-pecuniary benefits of running one's own business and the potential option value of entrepreneurial experimentation, highlight the potential welfare losses experienced by first-born daughters being crowded out of entrepreneurial human capital. Such losses could potentially be mitigated by exposing young women and girls to hands-on

business experience and mentoring, rather than industry-specific knowledge, in an environment mimicking that of entrepreneurial households through internships in small businesses.

Several caveats warrant mention. The effects of business exposure in this analysis are estimated only through formal work relationships recorded by the Danish Tax Authority or deduced through father mortality. Future research would benefit from considering more extensive measures of business exposure and further investigating paternal inheritance crowding out in households with self-employed mothers where the father dies. Additionally, while sibling gender composition does not appear to affect the accumulation of formal human capital in terms of education length, future research could explore how the interaction between self-employed parents and gender composition affects higher education choices. This could provide valuable insights into the role of education in perpetuating or mitigating gender disparities in entrepreneurship.

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Tables

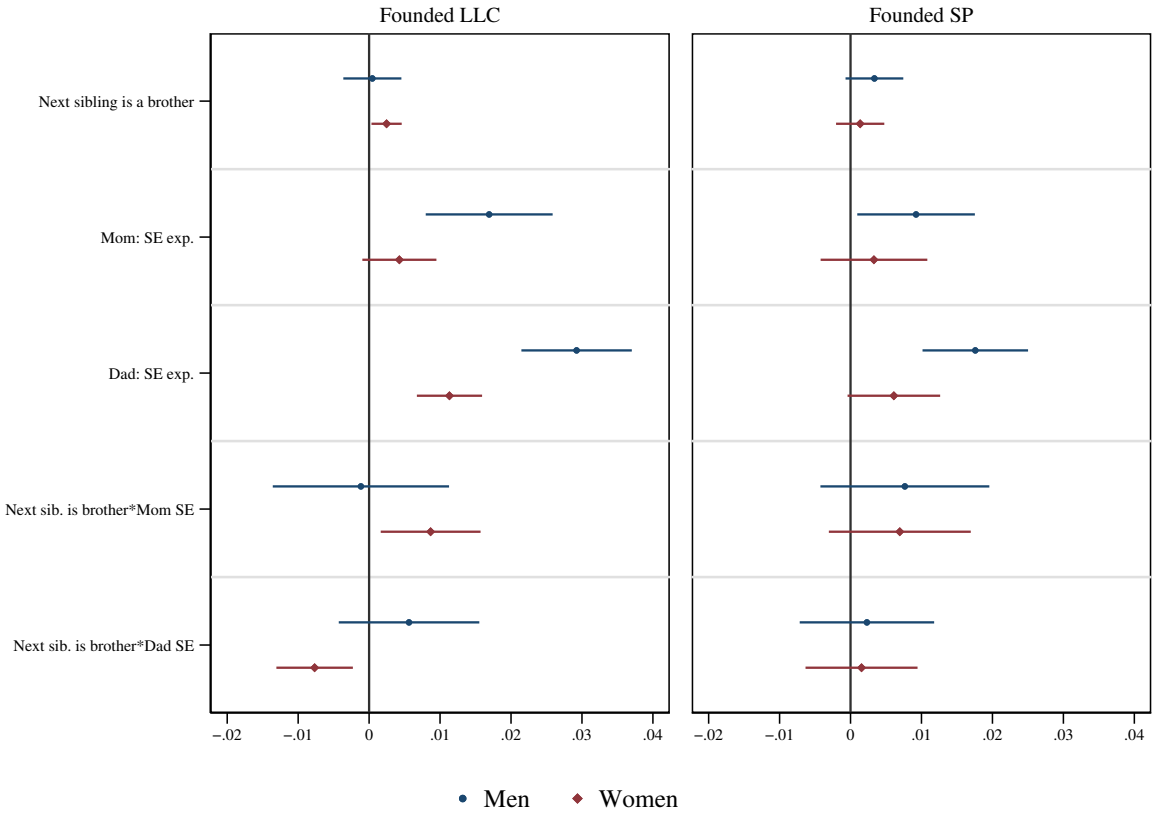
Table 1: Summary statistics

	More than 1 sibling				One sibling			
	FB Men		FB Women		FB Men		FB Women	
Gap in months between oldest and next born	-29.979	(9.761)	-29.990	(9.811)	-32.057	(9.417)	-32.094	(9.442)
Number of siblings	1.613	(0.792)	1.604	(0.799)	1.000	(0.000)	1.000	(0.000)
Dad:								
Age at first birth	25.858	(4.606)	25.830	(4.621)	26.445	(4.755)	26.412	(4.793)
Any SE exp.	0.316	(0.465)	0.315	(0.465)	0.282	(0.450)	0.279	(0.449)
Any management exp.	0.194	(0.396)	0.195	(0.397)	0.219	(0.414)	0.220	(0.414)
Any PE exp.	0.784	(0.411)	0.787	(0.409)	0.819	(0.385)	0.825	(0.380)
General HS or lower	0.356	(0.479)	0.358	(0.479)	0.303	(0.460)	0.303	(0.460)
Vocational HS	0.346	(0.476)	0.345	(0.475)	0.399	(0.490)	0.397	(0.489)
Short/int. higher ed.	0.142	(0.349)	0.145	(0.352)	0.151	(0.358)	0.152	(0.359)
Bachelor degree or higher	0.060	(0.237)	0.059	(0.235)	0.059	(0.236)	0.059	(0.236)
Mom:								
Age at first birth	23.030	(3.709)	22.988	(3.712)	23.797	(3.888)	23.738	(3.882)
Any SE exp.	0.183	(0.387)	0.180	(0.385)	0.159	(0.366)	0.155	(0.362)
Any management exp.	0.031	(0.175)	0.032	(0.176)	0.036	(0.187)	0.037	(0.190)
Any PE exp.	0.810	(0.392)	0.814	(0.389)	0.843	(0.364)	0.848	(0.359)
General HS or lower	0.471	(0.499)	0.469	(0.499)	0.413	(0.492)	0.413	(0.492)
Vocational HS	0.426	(0.495)	0.421	(0.494)	0.470	(0.499)	0.468	(0.499)
Short/int. higher ed.	0.158	(0.365)	0.160	(0.367)	0.161	(0.367)	0.164	(0.371)
Bachelor or higher	0.018	(0.132)	0.017	(0.130)	0.019	(0.135)	0.018	(0.132)
Both parents have SE experience	0.140	(0.347)	0.138	(0.345)	0.117	(0.321)	0.112	(0.316)
Oldest Born:								
Founded a LLC	0.067	(0.251)	0.017	(0.128)	0.069	(0.254)	0.018	(0.131)
Founded a SP	0.067	(0.251)	0.043	(0.202)	0.065	(0.246)	0.042	(0.201)
Founded a LLC and SP	0.011	(0.105)	0.003	(0.055)	0.011	(0.104)	0.003	(0.057)
Observations	96,674		91,485		51,773		49,854	

Note: The table displays summary statistics for first-born (FB) children born first, between the years of 1961 to 1971 whose next sibling is born within four years. The first 4 columns show these statistics for first-born children of families with more than 2 children, and the last four columns show these statistics for first-born children of families with 2 children. Standard deviation in parentheses.

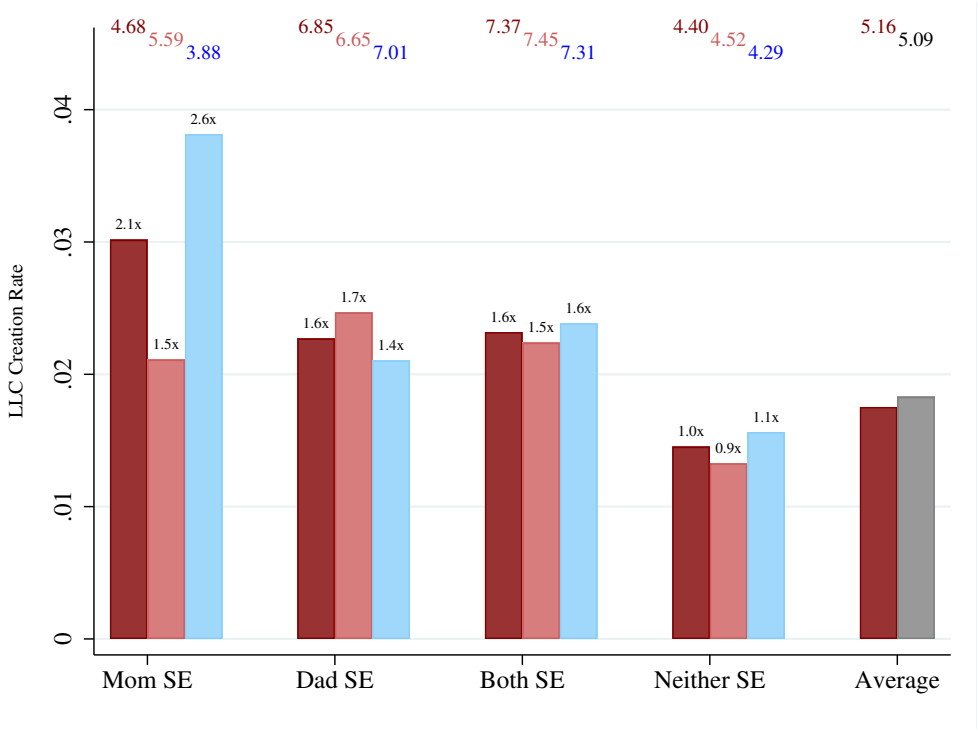
Figures

Figure 1: Effects of having a next-born brother on starting an LLC or SP



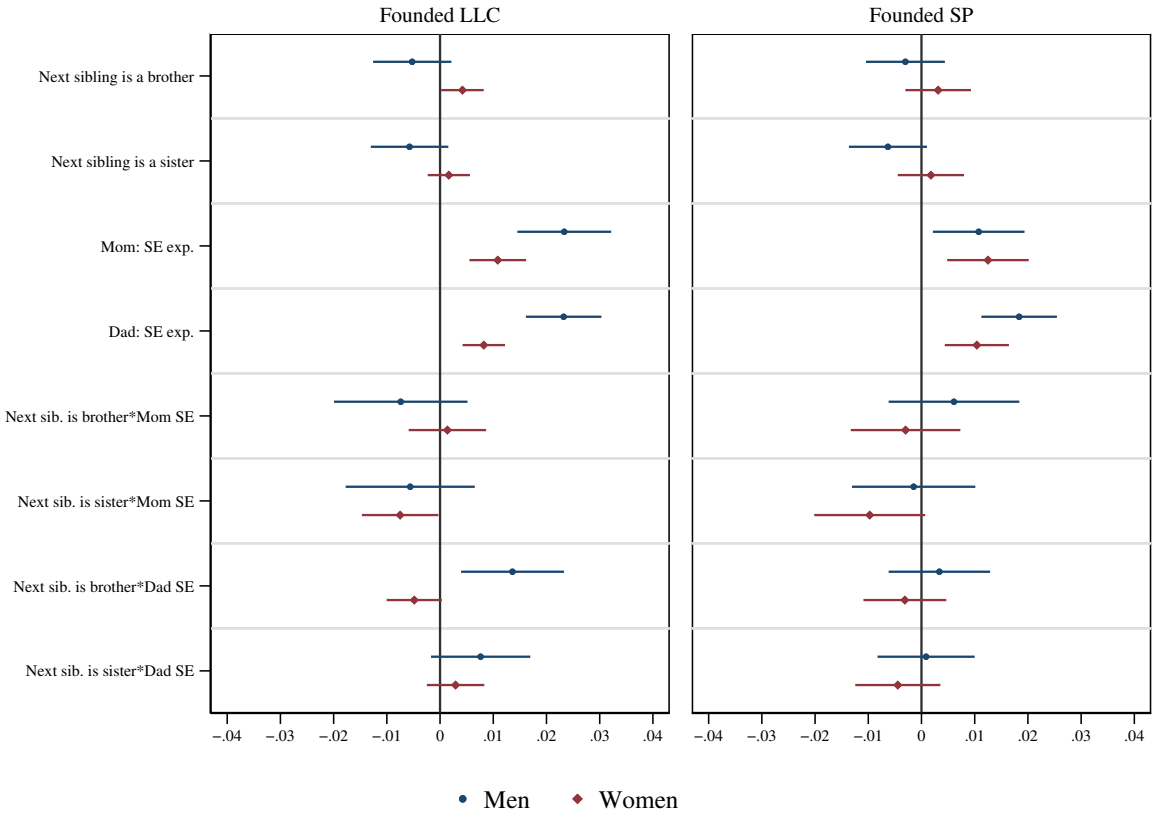
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure 2: Counterfactual gender gaps in LLC creation rates



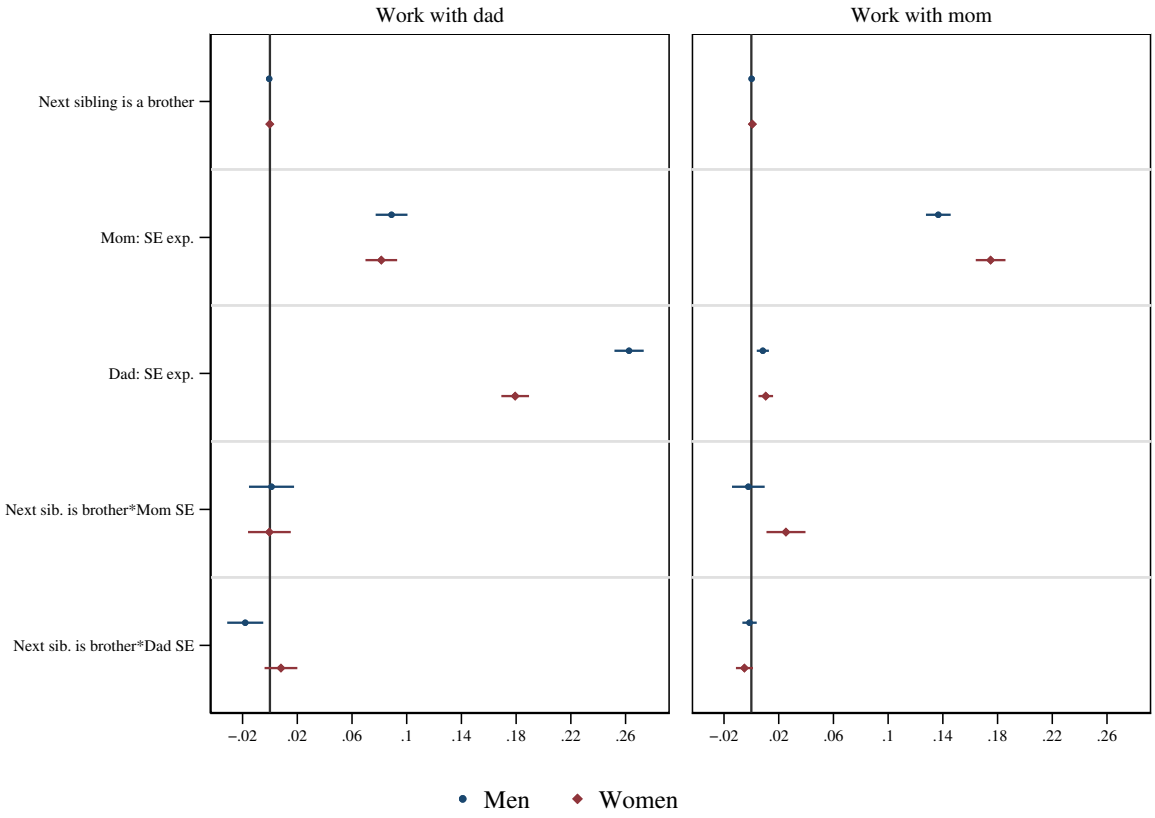
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The maroon bars display the raw average rates at which women found a new LLC during 2001-2019. The pink bars display the actual LLC creation rate for women who have a younger sister and the blue bars display the actual rates for women who have a younger brother. The relative magnitude of each LLC creation rate relative to not having self-employed parents is shown immediately above the bars in black. The gray bar at the right of the figure is a "best case" scenario in a coutnerfactual is constructed by creating a weighted average from the blue and pink coutnerfactuals, see the text for details. The gender gap, in percentage points, is displayed at the top of the figure.

Figure 3: Effects of having a next-born brother versus sister on starting an LLC or SP



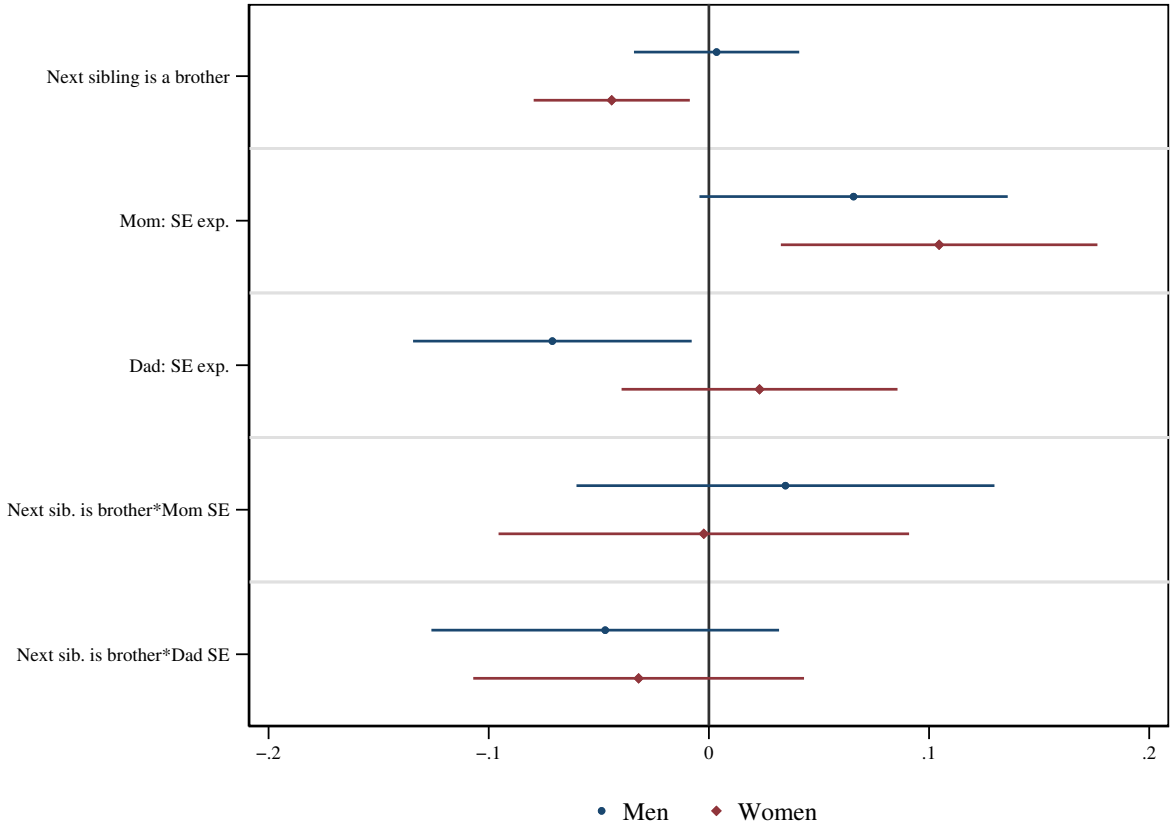
Notes: Estimation sample contains children first-born between 1961-1971 are either only children or who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure 4: Effects of having a next-born brother on going to work with self-employed parents



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual worked in the same workplace (regardless of parental self-employment status) as his or her father (mother) while 20 years old or younger on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure 5: Effects of having a next-born brother on number of years of schooling



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing number of years of education on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure 6: Comparing main results to a sub-sample in which the father died prior to the founding

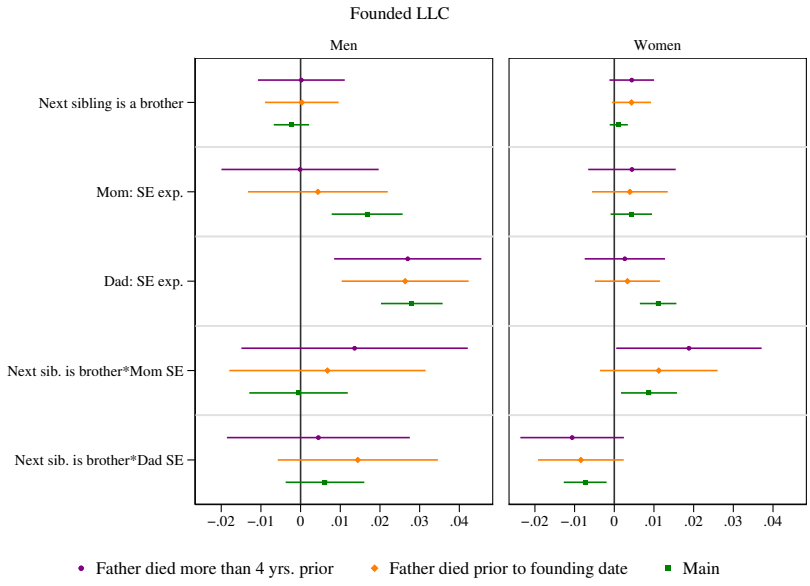
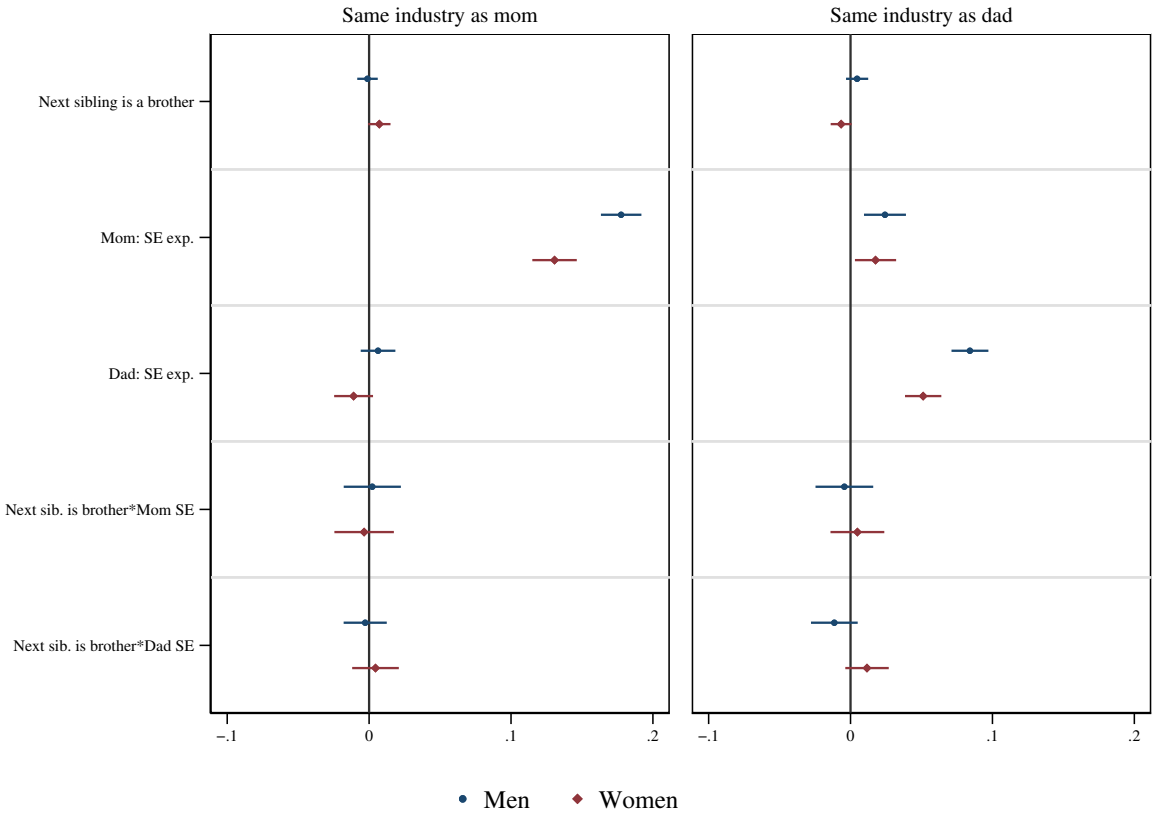
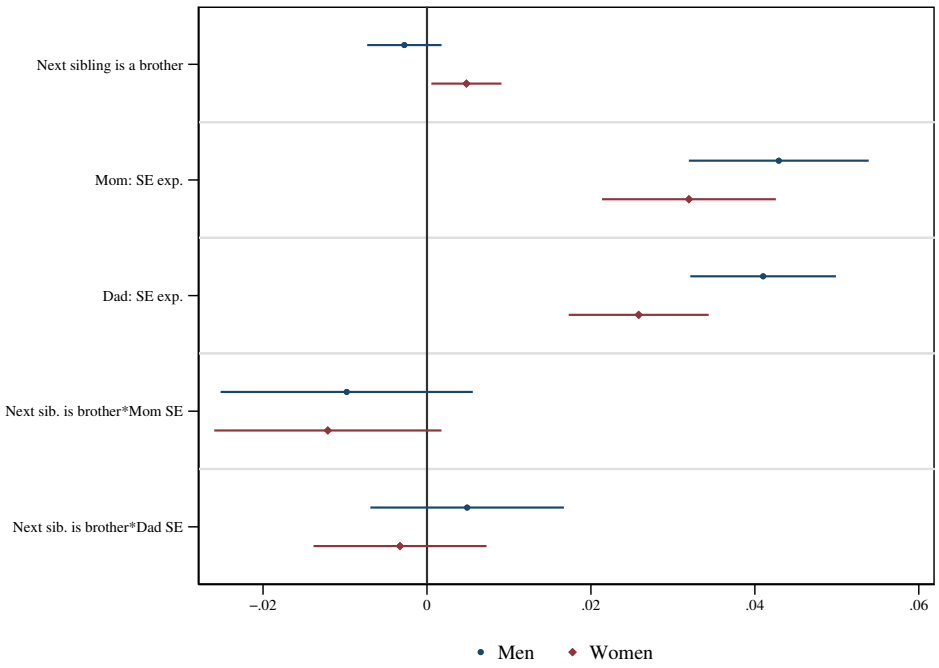


Figure 7: Effects of having a next-born brother on working in the same industry as your parent



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure 8: Effects of having a next-born brother on ownership of property previously owned by parents



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The figure displays the results of regressing an indicator as to whether the individual owns a property that was owned by his/her parents in the past on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

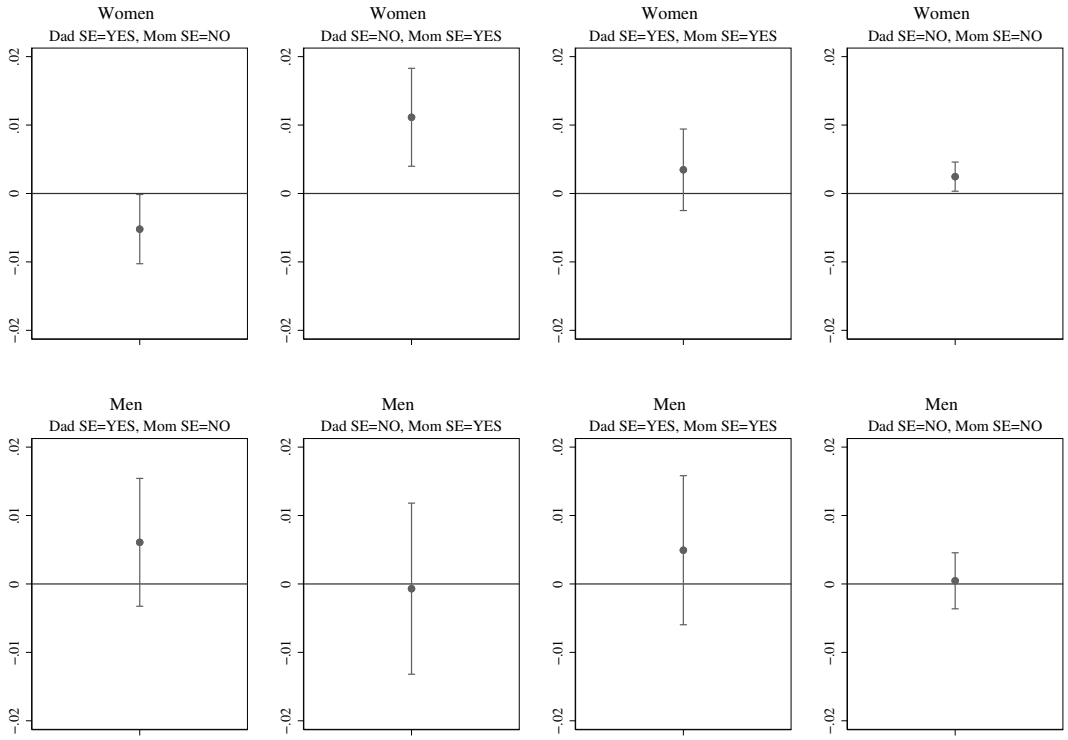
Appendix

Table A.1: Main Regression Results

VARIABLES	(1) LLC	(2) LLC	(3) SP	(4) SP	(5) LLC	(6) LLC	(7) SP	(8) SP
Next sibling is a brother	0.002*	0.001	0.001	-0.001	0.000	0.002	0.003	0.003
	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Mom: SE exp.	0.004	0.004	0.003	0.007	0.017***	0.021***	0.009*	0.012*
	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.006)
Dad: SE exp.	0.011***	0.012***	0.006	0.013***	0.029***	0.036***	0.018***	0.022***
	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Next sib. is brother*Mom SE	0.009**	0.007**	0.007	0.004	-0.001	-0.003	0.008	-0.001
	(0.004)	(0.003)	(0.006)	(0.004)	(0.008)	(0.005)	(0.007)	(0.005)
Next sib. is brother*Dad SE	-0.008**	-0.005**	0.002	0.000	0.006	0.003	0.002	-0.001
	(0.003)	(0.002)	(0.005)	(0.003)	(0.006)	(0.004)	(0.006)	(0.004)
Siblings		0.000		0.001		-0.001		0.004***
		(0.001)		(0.001)		(0.001)		(0.001)
Siblings*Mom SE		-0.001		0.001		-0.002		0.001
		(0.002)		(0.002)		(0.003)		(0.003)
Siblings*Dad SE		-0.002*		-0.002		-0.005*		-0.003
		(0.001)		(0.002)		(0.003)		(0.003)
Observations	49,854	91,485	49,854	91,485	51,773	96,674	51,773	96,674
Number of siblings	1		>=1	1	>=1	1	>=1	1
first-born Sex	Daughter	Daughter	Daughter	Daughter	Son	Son	Son	Son

Note: The table displays the regression results obtained from estimating equation 1. Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019, as indicated in column headings, on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are shown in parentheses.

Figure A.1: Marginal effects of having a younger brother on becoming a LLC



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within 4 years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

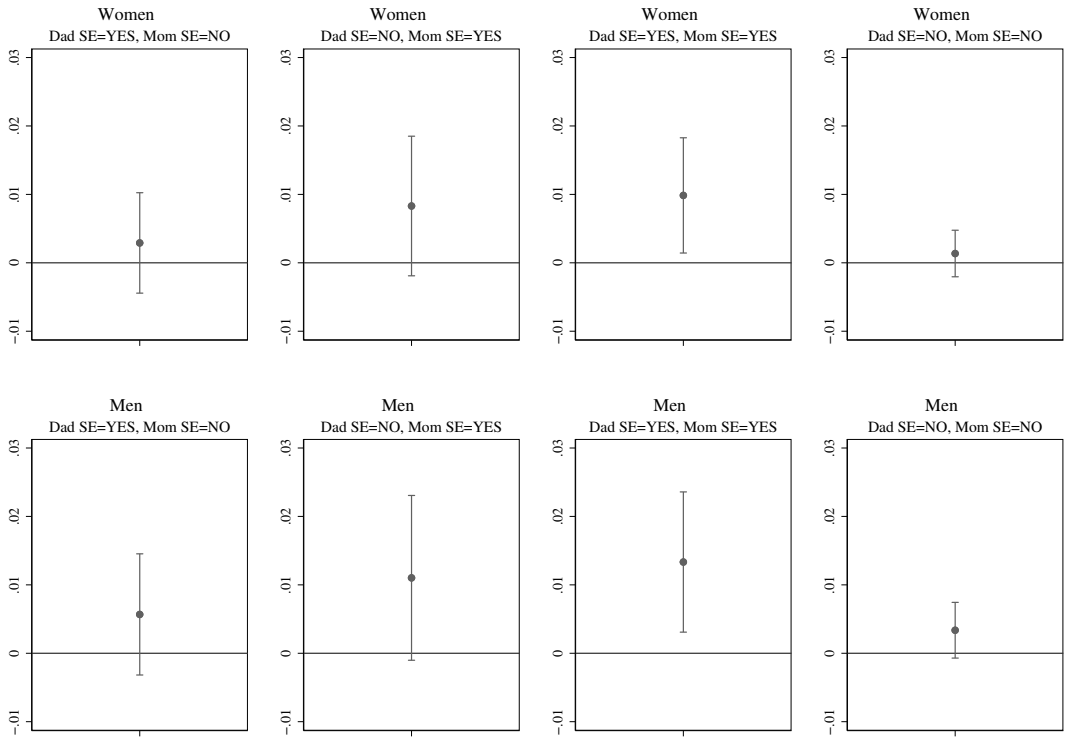
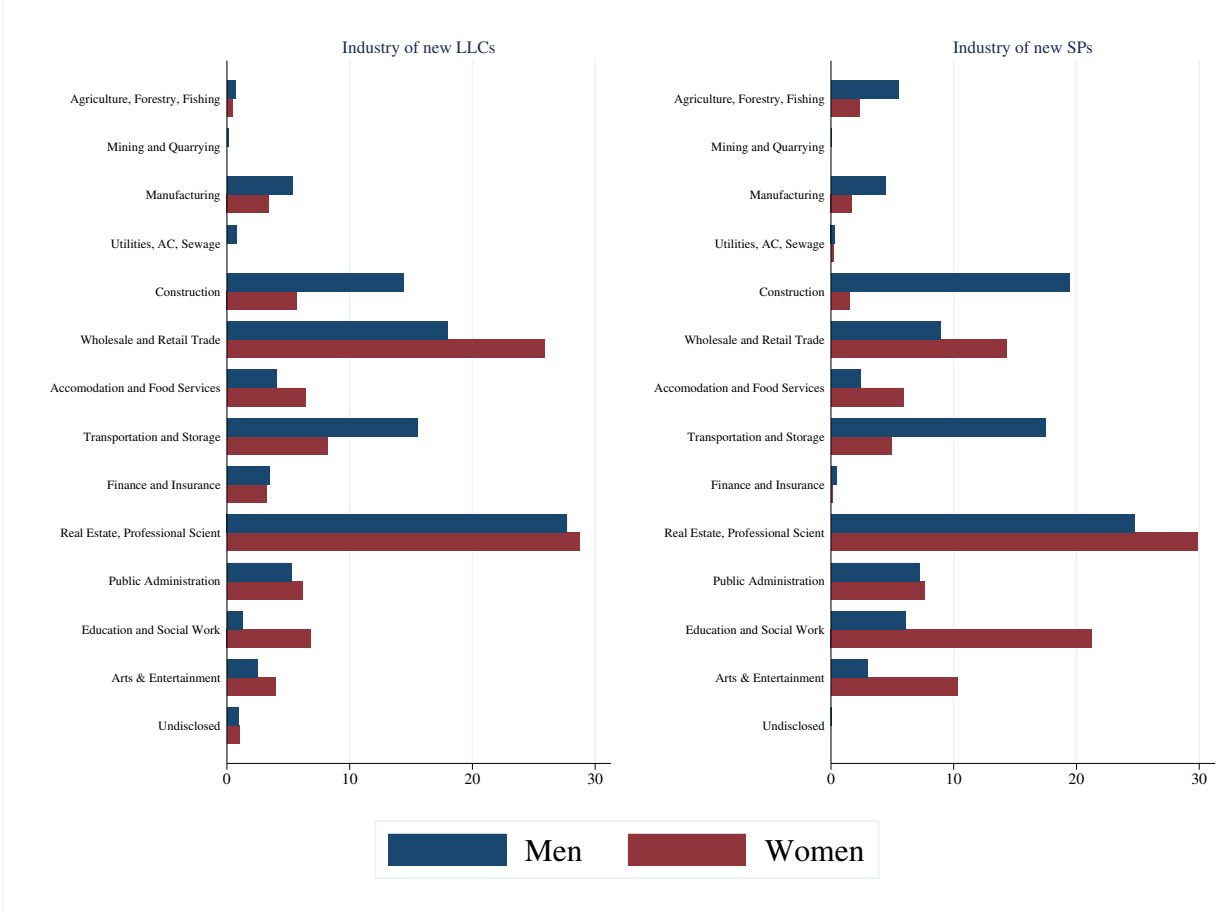


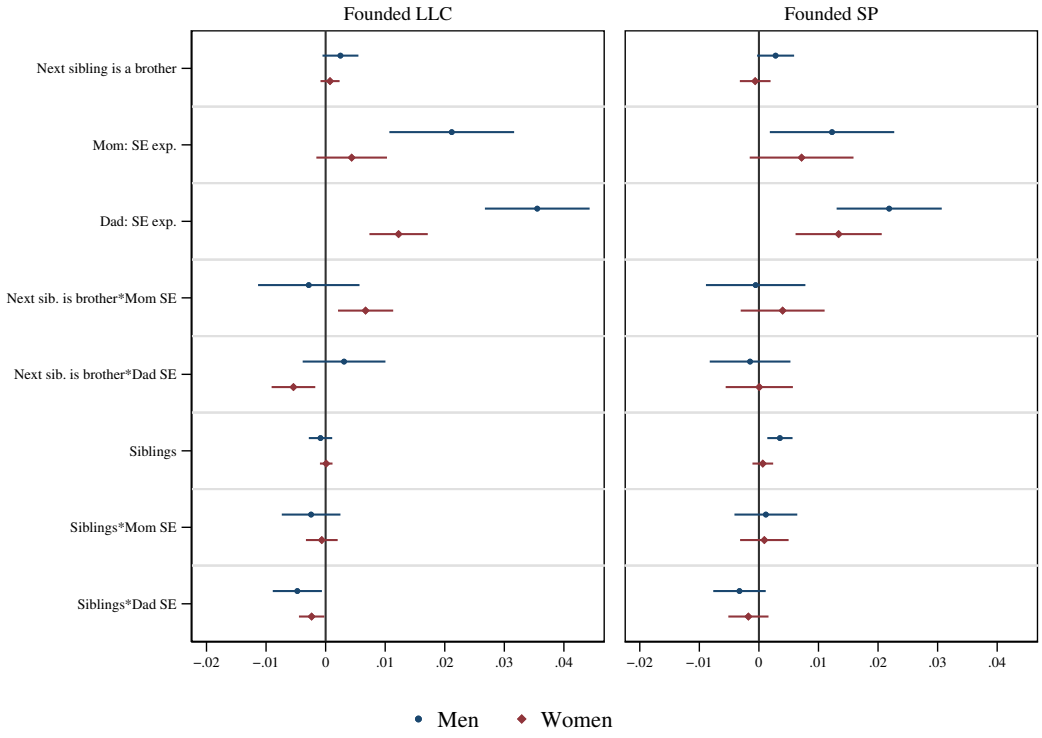
Figure A.2: Marginal effects of having a younger brother on becoming a SP

Figure A.3: Industry of new founders of LLCs and SP



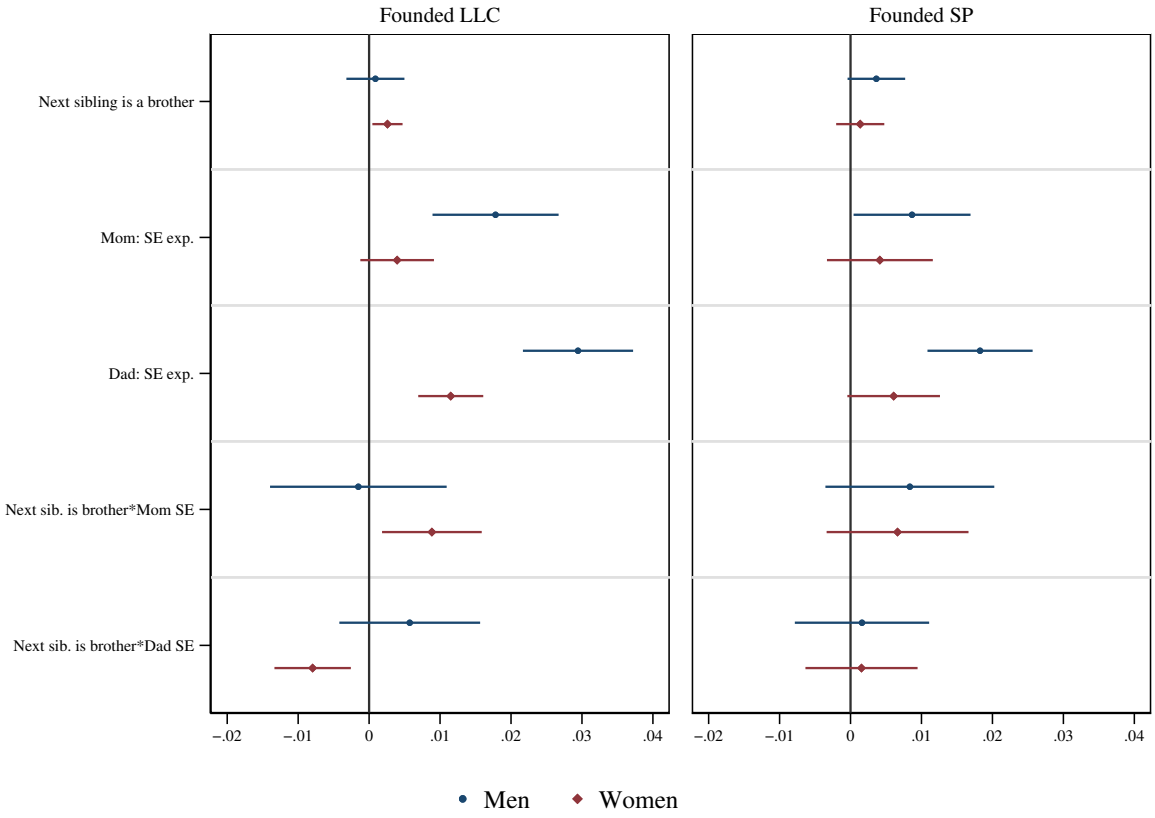
Notes: .

Figure A.4: Effects of having a next-born brother on starting an LLC or SP , families with at least two children



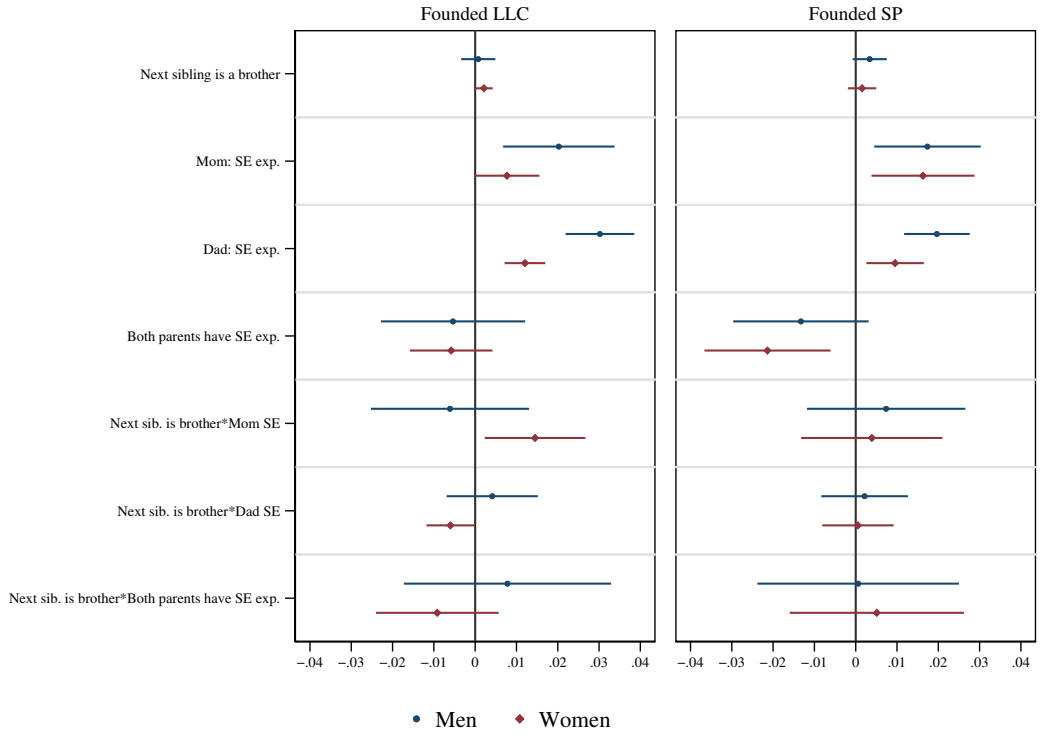
Notes: Estimation sample contains children first-born between 1961-1971 who have at least one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure A.5: Effects of having a next-born brother on starting an LLC or SP, no parental field indicators



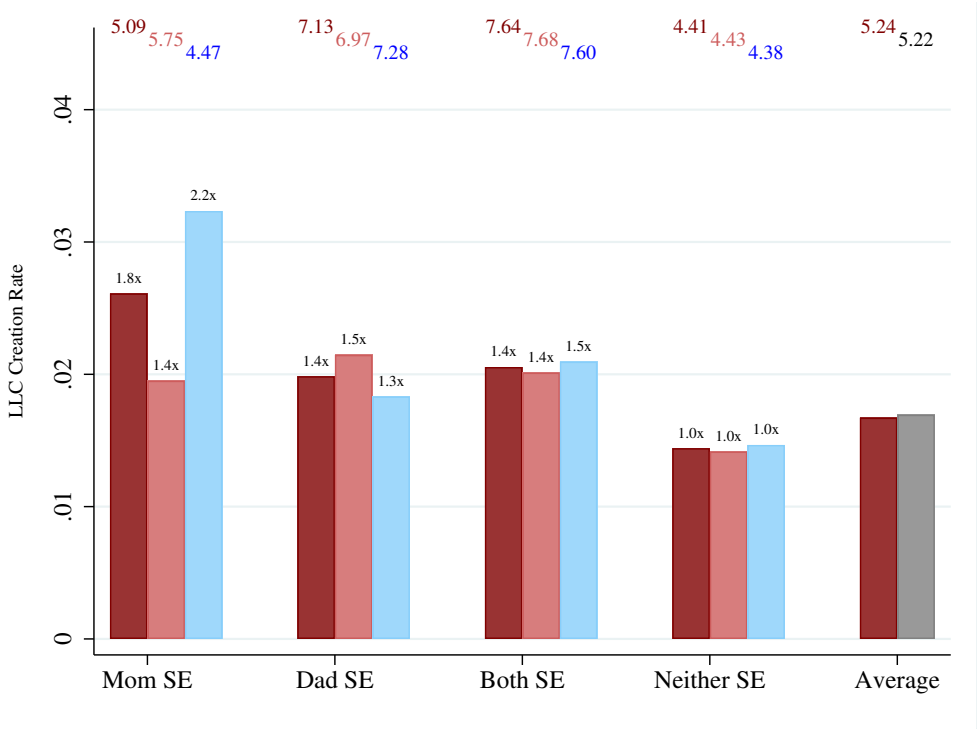
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within 4 years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure A.6: Effects of having a next-born brother on starting an LLC or SP, allowing for an interaction between mom and dad's self-employment status



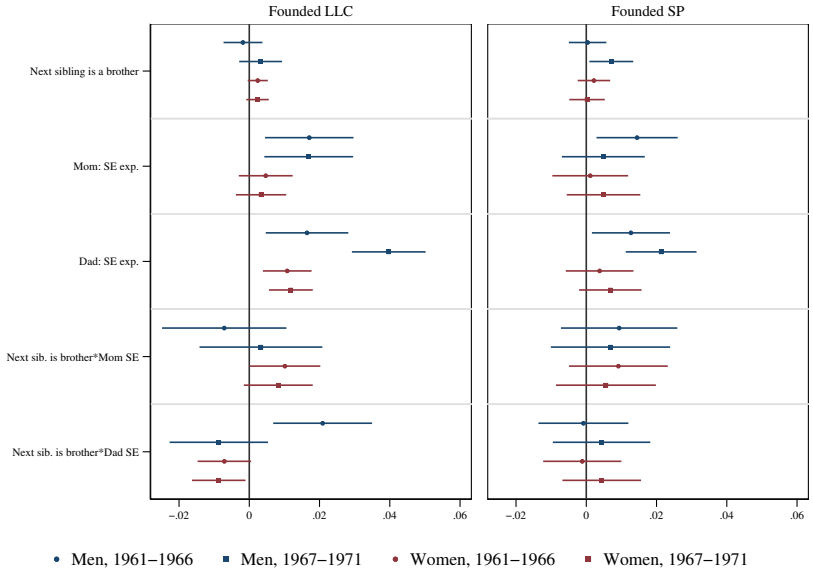
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure A.7: Counterfactual gender gaps in LLC creation rates, individuals with at least one sibling



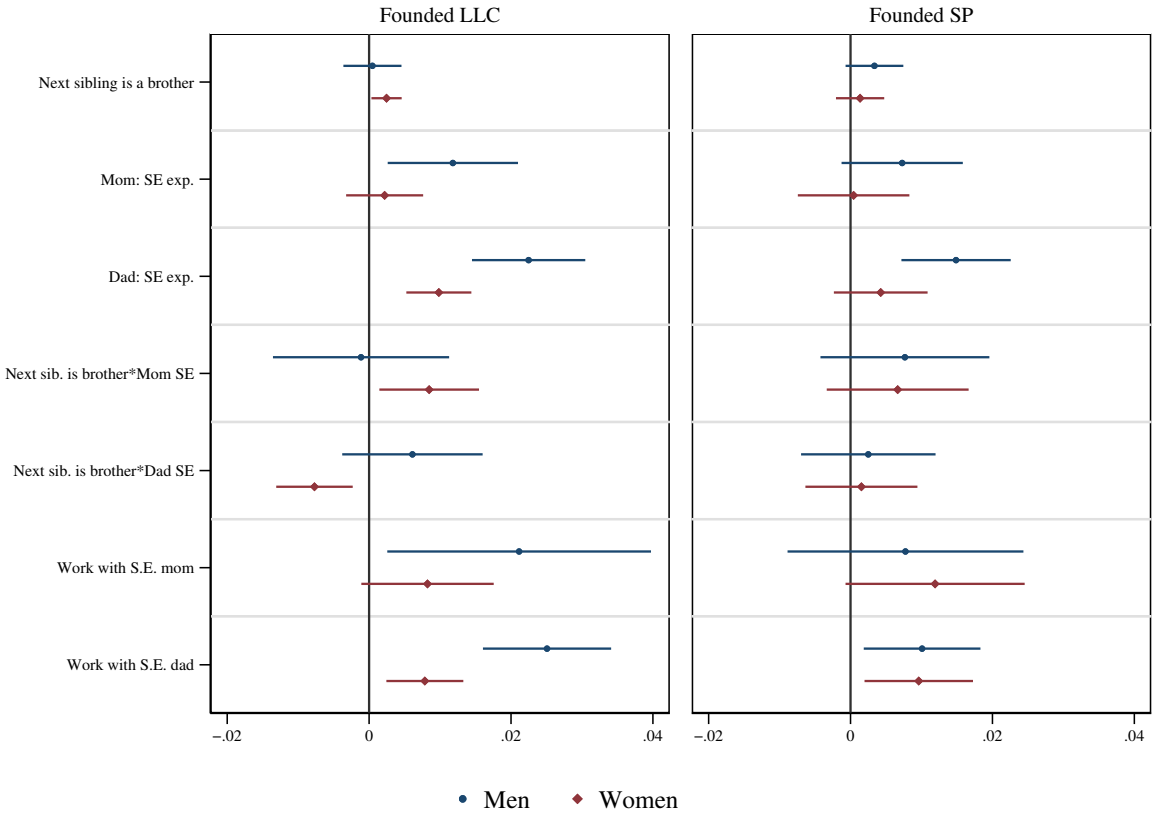
Notes: Sample contains individuals first-born between 1961-1971 whose next born sibling is born within 4 years, individuals with at least 1 sibling are included. The maroon bars display the raw average rates at which women found a new LLC during 2001-2019. The pink bars display the actual LLC creation rate for women who have a younger sister and the blue bars display the actual rates for women who have a younger brother, these serve as the s. The relative magnitude of each LLC creation rate relative to not having self-employed parents is shown immediately above the bars in black. The gray bar at the right of the figure is a "best case" scenario in a coutnerfactual is constructed by creating a weighted average from the blue and pink coutnerfactuals, see the text for details. The gender gap, in percentage points, is displayed at the top of the figure.

Figure A.8: Effects of having a next-born brother on starting an LLC, by cohort



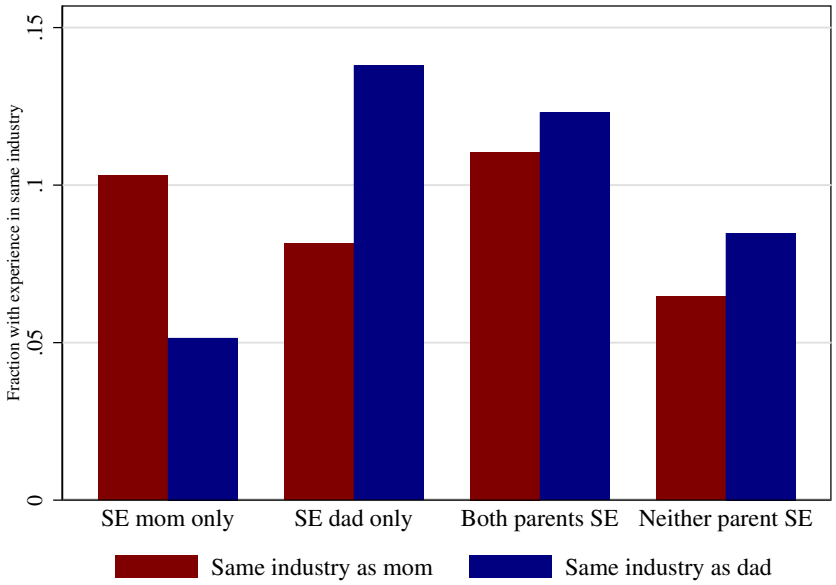
Notes: The figure displays the estimation results from the sample of first-born individuals born between 1961-1971 who have one younger sibling born within 4 years of them. These results are obtained by regressing an indicator of whether the individual founded an LLC or SP on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex, as described in Equation 1 separately for those between 1961 and 1966 and those born between 1967 and 1971. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure A.9: Effects of having a next-born brother on starting an LLC or SP, working with a S.E. parent as mediator



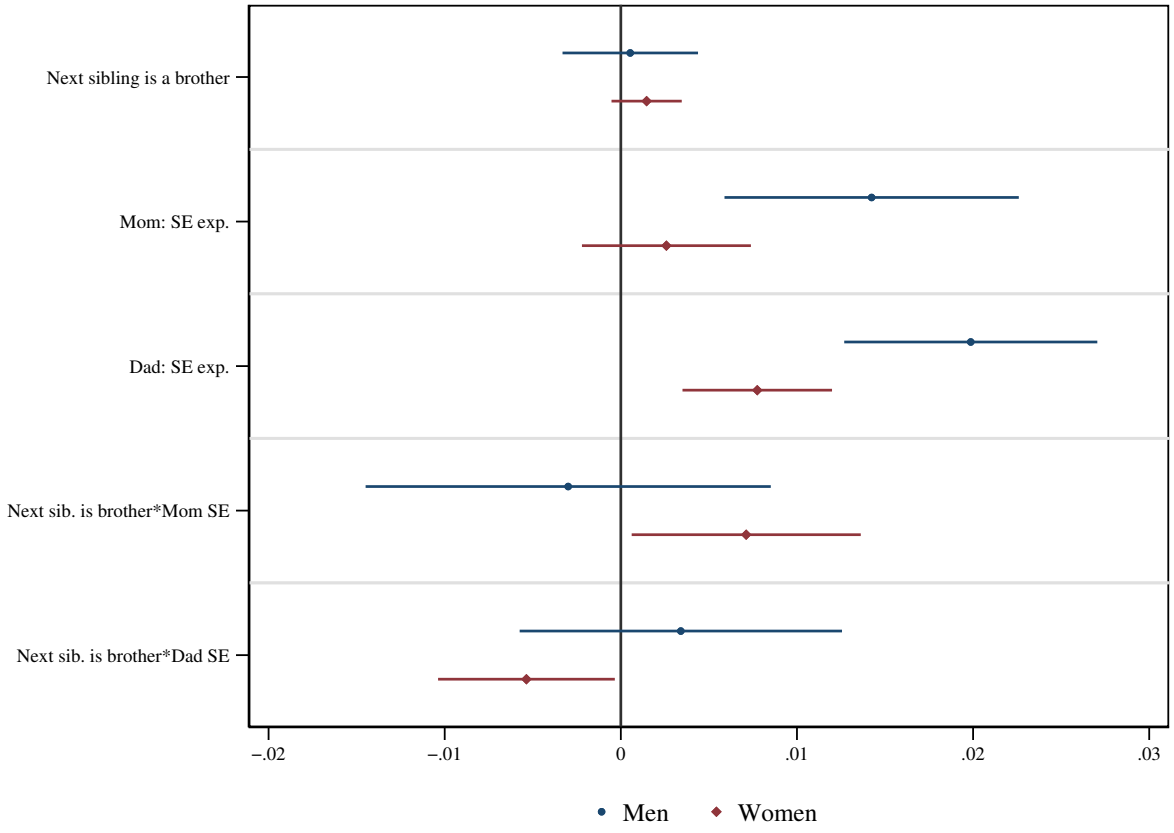
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure A.10: Incidence of LLC founders working in the same industry as their parent



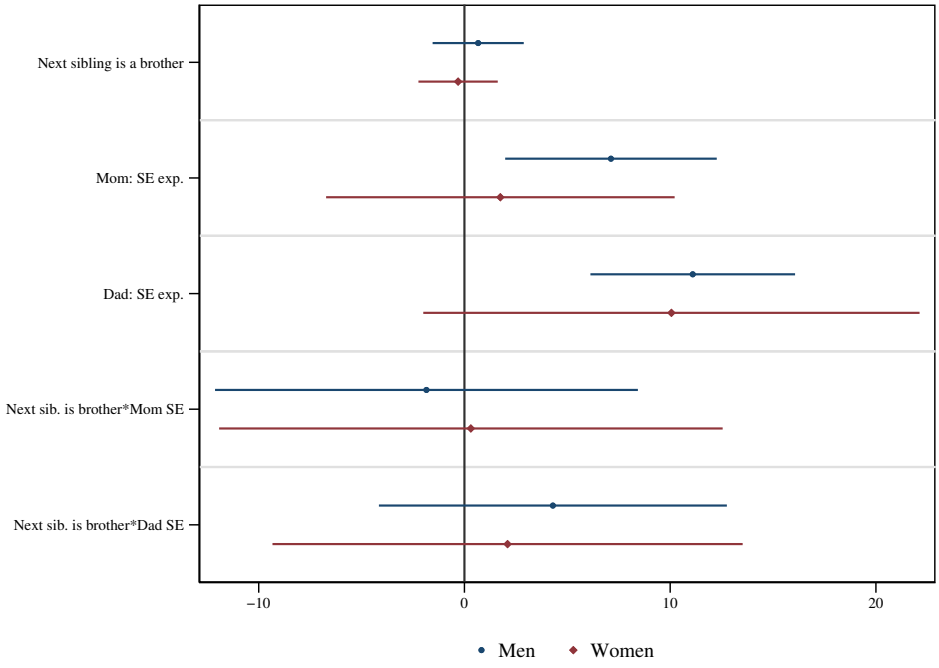
Notes: Figure displays the incidence of LLC founders working in the same industry as their parent. The LLC founders depicted in the figure are a subset of the estimation sample containing children first-born between 1961-1971 who have one younger sibling born within four years of them.: .

Figure A.11: Effects of having a next-born brother on founding an LLC, excluding those who enter the same industry as a parent



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual founded an LLC (SP) during 2001-2019 on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure A.12: Effects of having a next-born brother on own wealth at age 19



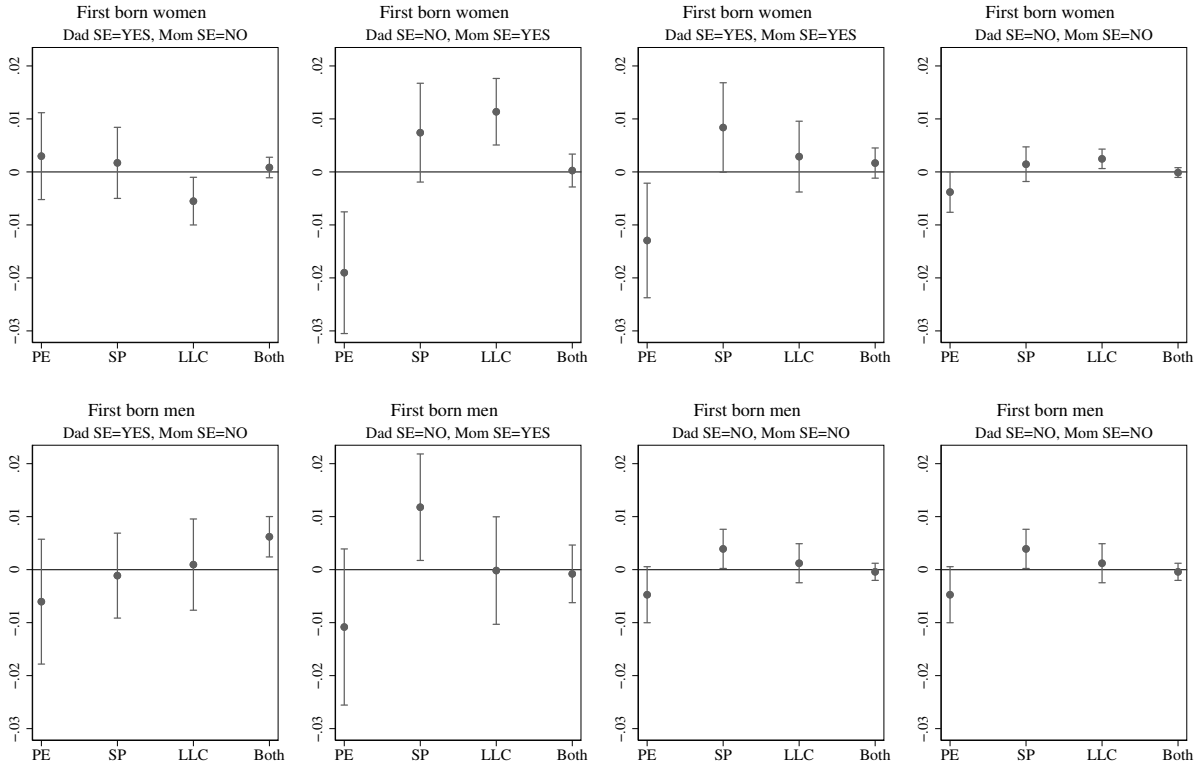
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The figure displays the results of regressing an own wealth at age 19, in 2015 DKK, on measures capturing parental work experience, wealth (in 10,000's of 2015 DKK) and sibling sex composition as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Online Appendix

Table O.1: Updated Branche-77 to NACE Rev. 1 and NACE Rev. 2 (DB07) Mapping Table

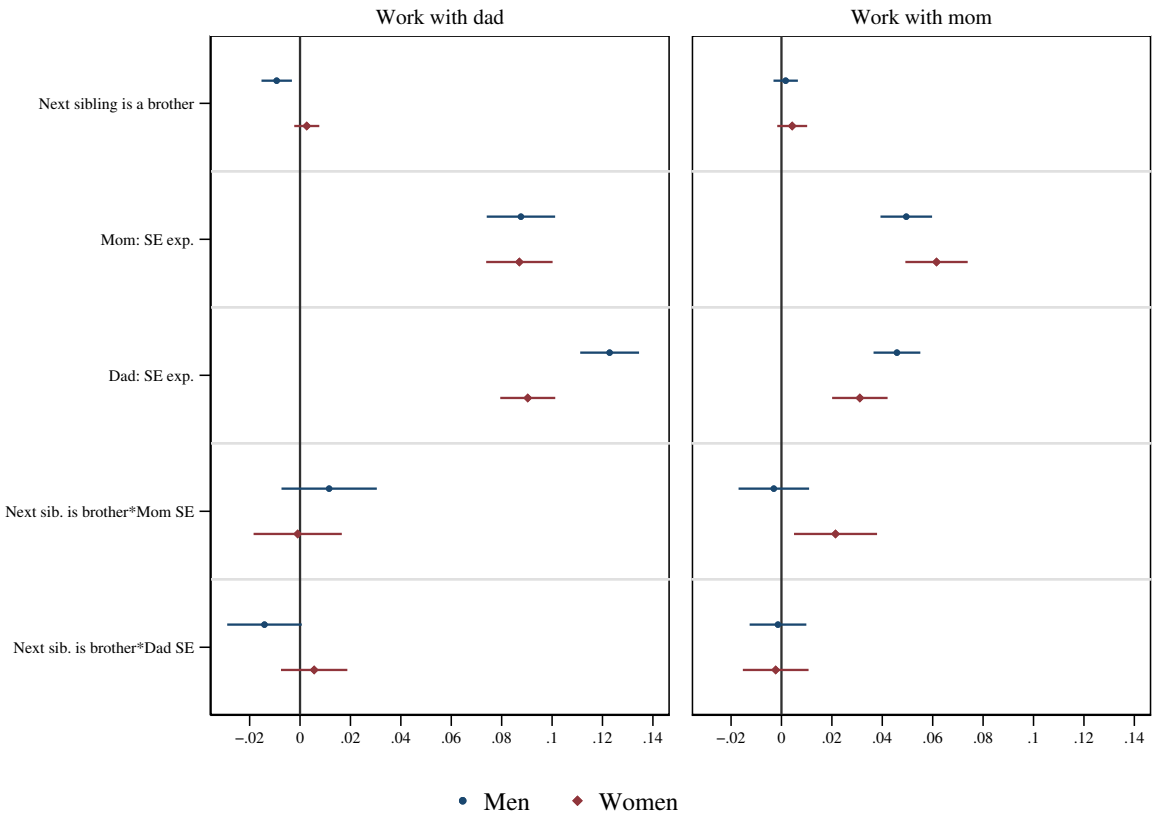
Branche-77 Code Range	Branche-77 Industry Sector	NACE Rev. 1 Code Range	NACE Rev. 1 Description	NACE Rev. 2 / DB07 Code Range	NACE Rev. 2 / DB07 Description
10001 – 13999	Agriculture, Forestry, and Fishing	01–02, 05	Agriculture, Hunting, Forestry, Fishing	01–03	Agriculture, Forestry, and Fishing
21000 – 29999	Mining and Quarrying	10–14	Mining and Quarrying	05–09	Mining and Quarrying
30000 – 39999	Manufacturing	15–37	Manufacturing	10–33	Manufacturing
41000 – 42999	Electricity, Gas, Steam, and Air Conditioning; Water Supply; Sewerage	40–41	Electricity, Gas, and Water Supply	35–39	Electricity, Gas, Steam, and Air Conditioning Supply; Water Supply; Sewerage, Waste Management
50000 – 59999	Construction	45	Construction	41–43	Construction
61000 – 62999	Wholesale and Retail Trade	50–52	Wholesale and Retail Trade; Repair of Motor Vehicles and Personal and Household Goods	45–47	Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles
63000 – 63999	Accommodation and Food Service Activities	55	Hotels and Restaurants	55–56	Accommodation and Food Service Activities
70000 – 72999	Transportation and Storage	60–64	Transport, Storage, and Information and Communications	49–53, 58–63	Transportation and Storage, and Information and Communications
80000 – 82999	Financial and Insurance Activities	65–67	Financial Intermediation	64–66	Financial and Insurance Activities
83000 – 83999	Real Estate Activities; Professional, Scientific, and Technical Activities	70–74	Real Estate, Renting, and Business Activities	68–75	Real Estate Activities; Professional, Scientific, and Technical Activities
91000 – 92999	Public Administration and Defence	75	Public Administration and Defence, Administration and Support Services	84, 77–82	Public Administration and Defence, Administration and Support Services
93000 – 93999	Education; Human Health and Social Work Activities	80, 85	Education; Health and Social Work	85–88	Education; Human Health and Social Work Activities
94000 – 95999	Arts, Entertainment, Recreation, and Other Service Activities	90–93	Other Community, Social, and Personal Service Activities	90–98	Arts, Entertainment, Recreation, and Other Service Activities
96001 – 96002	Activities of Extraterritorial Organizations	99	Extra-Territorial Organizations and Bodies	99	Activities of Extraterritorial Organizations and Bodies
99999	Undisclosed	–	–	–	–

Figure O.1: Marginal effects of having a younger brother from a multinomial probit



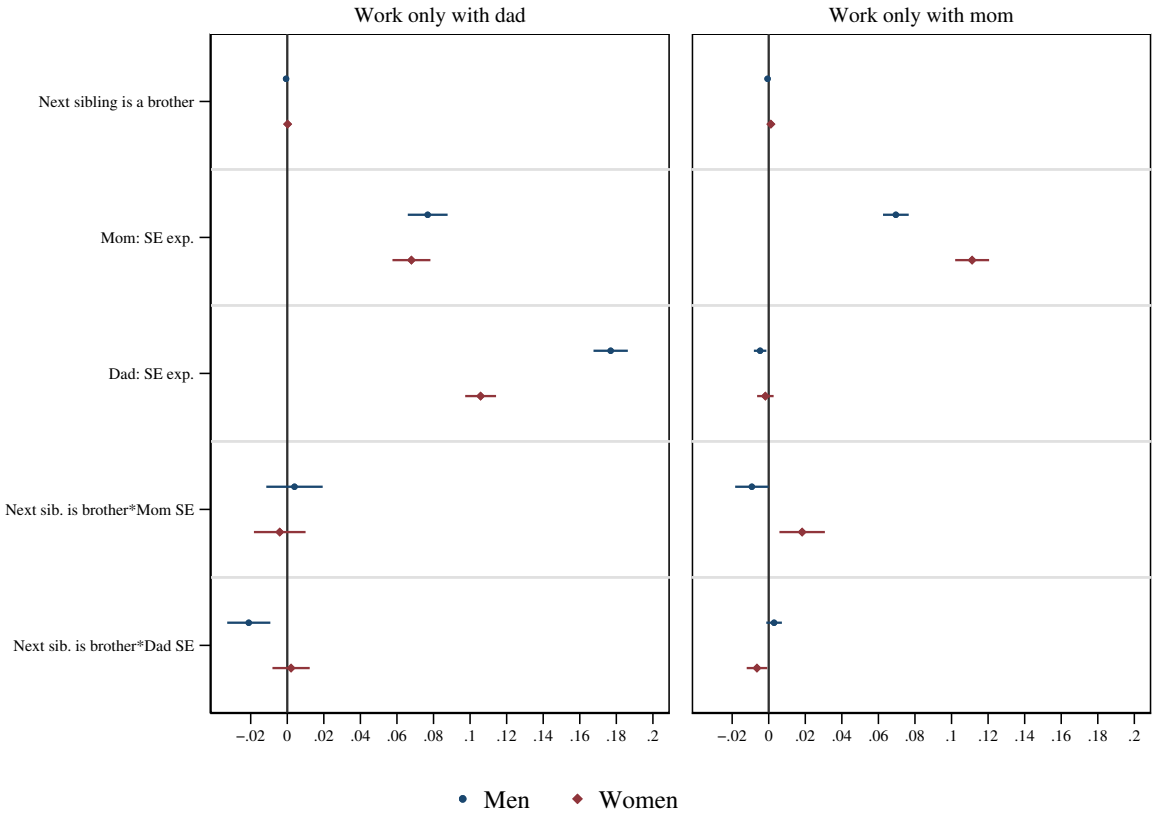
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within 4 years of them. The left (right) panel displays the results of estimating a multionomial probit. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure O.2: Effects of having a next-born brother on going to work with parents, regardless of parental self-employment status



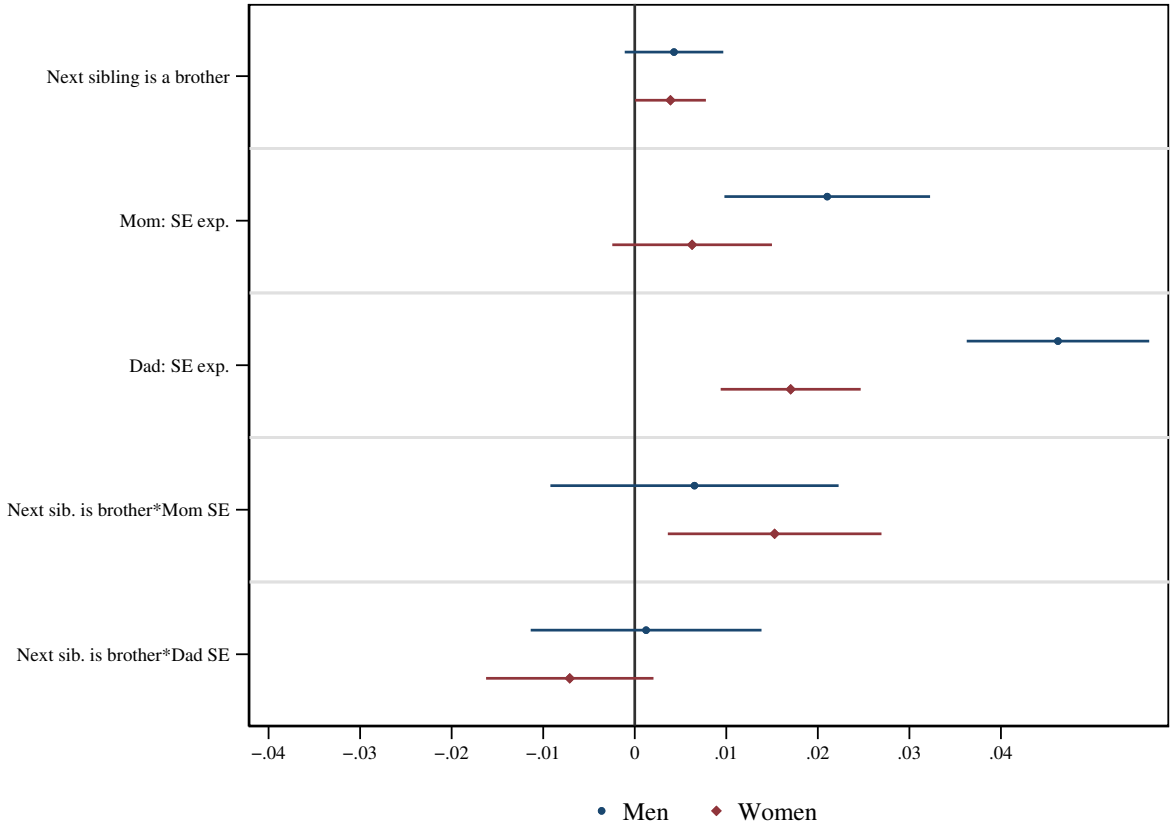
Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual worked in the same workplace (regardless of parental self-employment status) as his or her father (mother) while 20 years old or younger on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure O.3: Effects of having a next-born brother on going to work with self-employed parents



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The left (right) panel displays the results of regressing an indicator of whether the individual worked in the same workplace (regardless of parental self-employment status) as his or her father (mother) while 20 years old or younger on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.

Figure O.4: Effects of having a next-born brother on entrepreneurship entry (SP or LLC)



Notes: Estimation sample contains children first-born between 1961-1971 who have one younger sibling born within four years of them. The figure displays the results of regressing an indicator of whether the individual founded either an LLC or a SP on measures capturing parental work experience, the age at first birth of the mother and father, the gap in months between the first and second born child, indicators as to whether the mother and father had employee experience and/or management experience, indicators for the field of the parents' highest education, birth month-year fixed effects and sibling sex as described in Equation 1. Robust standard errors are used to construct the 90%-confidence interval indicated in the figure.