Swedish Institute for Social Research (SOFI)

Stockholm University

WORKING PAPER 7/2017

ON THE ORIGINS OF ENTREPRENEURSHIP: EVIDENCE FROM SIBLING CORRELATIONS

by

Matthew J. Lindquist, Joeri Sol, C. Mirjam van Praag and Theodor Vladasel

On the Origins of Entrepreneurship: Evidence from Sibling Correlations*

Matthew J. Lindquist† Joeri Sol‡ C. Mirjam van Praag§ Theodor Vladasel¶

October 12, 2017

Abstract

We assess the broad importance of family and community background for entrepreneurship outcomes. We go beyond traditional, intergenerational associations by estimating sibling correlations in unincorporated and incorporated entrepreneurship using register data from Sweden. Sibling correlations range from 20% to 50%. They are consistently higher for more committed and incorporated entrepreneurship than for less committed or unincorporated entrepreneurship; they are also higher for brothers than sisters. We then assess what factors drive these correlations: parental entrepreneurship, neighborhoods, shared genes and financial resources help explain these high correlations, whereas immigration status, family structure and sibling peer effects have a limited contribution. The higher correlation for incorporated versus unincorporated entrepreneurship is explained mainly by the type of parental entrepreneurial engagement and financial resources, while the gap between brother and sister correlations in unincorporated entrepreneurship is largely driven by the geographic concentration of male dominated industries.

JEL Classification: D13, J62, L26.

Keywords: Entrepreneurship; Family Background; Intergenerational Persistence; Neighborhood Effects; Occupational Choice; Sibling Correlations.

* We thank seminar and workshop participants at the University of Bordeaux, University Institute Lisbon, Stockholm University, Carlos III University of Madrid, Barcelona Graduate School of Economics, University of Sevilla, DRUID, the Third CEPR Workshop on Entrepreneurship Economics, the 24th CCC Doctoral Conference, the 2017 Academy of Management Meeting, as well as Anders Björklund, Saul Estrin and Markus Jäntti for insightful comments.

† Swedish Institute for Social Research (SOFI), Stockholm University, matthew.lindquist@sofi.su.se

‡ University of Amsterdam, J.Sol@uva.nl

§ Copenhagen Business School, University of Amsterdam, CEPR, IZA, and TI, mvp.ino@cbs.dk

¶ Copenhagen Business School and Yale University, tvl.ino@cbs.dk

1 Introduction

Entrepreneurship is often hailed as a driver of innovation, job creation, and growth. However, the origins of (successful) entrepreneurial behavior are not yet fully understood. Individual preferences, ability, education, and financial resources, all feature as potential dispositional determinants of entrepreneurship (Parker, 2009). More recently, the contextual influences of universities, organizations, or neighborhoods have also been studied.[1] While each of these contextual effects has been convincingly documented, they stem partly from the selection of individuals into such environments, based on ability and preferences (Özcan and Reichstein, 2009; Elfenbein et al., 2010; Roach and Sauermann, 2015; Tåg et al., 2016). This implies that the source of entrepreneurial behavior should be investigated at an earlier stage in individuals' lives. We argue that a natural starting point for such an inquiry is provided by an individual's family and community background. To this end, we conduct a systematic assessment of the importance of family and community background as determinants of entrepreneurship.

The pervasive and long-lasting impact of childhood environment on economic outcomes is widely recognized (Solon, 1999). Indeed, this environment is a strong determinant of many entrepreneurial antecedents, such as (non-) cognitive ability and education (Black and Devereux, 2011; Grönqvist et al., 2016; Levine and Rubinstein, 2017), job values and preferences (Halaby, 2003; Roach and Sauermann, 2015), and the availability of resources and learning opportunities (Sørensen, 2007b; Guiso et al., 2015; Lindquist et al., 2015).[2] Regardless of the proximate predispositional and contextual pathways, family and community background are inextricably linked to entrepreneurship outcomes (Hout and Rosen, 2000).

More generally, the family represents a focal environment when individual preferences are formed. Notwithstanding the impact of family background in both childhood and adulthood, evidence suggests that preferences for entrepreneurship may be formed at a relatively young age. Entrepreneurship education has, so far, only been shown to influence the entrepreneurship relevant skills (Huber et al., 2014) and future entrepreneurial performance (Elert et al., 2015) of relatively young pupils (in their early teens), but not of individuals in tertiary education

[1] Stuart and Ding (2006) and Roach and Sauermann (2015) study the effect of academic environments; Nanda and Sørensen (2010), Kacperczyk (2013) and Lerner and Malmendier (2013) focus on the role of workplace and university peers; Dobrev and Barnett (2005), Sørensen (2007a), Özcan and Reichstein (2009), Elfenbein et al. (2010), Sørensen and Sharkey (2014), Tåg et al. (2016) study the role of organizational bureaucracy, size, and hierarchy in spawning entrepreneurs; Giannetti and Simonov (2009), Dahl and Sorenson (2012), and Guiso et al. (2015) examine the effects of an entrepreneurial network, local embeddedness, and youth exposure to regional entrepreneurial density, respectively.

[2] Family background is also important in generating inventors, especially through parental income, and mediated by individual education (Bell et al., 2016; Aghion et al., 2017). However, parental education, patenting, and neighborhood role models also contribute to generating inventors (similar to our paper, these are correlations rather than causal relations). As inventors may ultimately become entrepreneurs (Gambardella et al., 2015), this represents another pathway from family background to entrepreneurship.

(Oosterbeek et al., 2010) or adults (Fairlie et al., 2015). In addition, exposure to a dense entrepreneurial environment during formative years also increases the likelihood of entry into entrepreneurship (Guiso et al., 2015). Thus, family and community background may ultimately be responsible for a large share of individuals' entrepreneurship choices and outcomes.

In assessing the role of family background in entrepreneurship, the emphasis is usually placed on parental entrepreneurship (Blanchflower and Oswald, 1998; Dunn and Holtz-Eakin, 2000; Colombier and Masclet, 2008; Andersson and Hammarstedt, 2011; Hoffmann et al., 2015). While its impact on individual entrepreneurship has been convincingly documented, working through genes or role-modeling (Sørensen, 2007b; Nicolaou et al., 2008, 2017; Lindquist et al., 2015), parental entrepreneurship is only one of many ways through which parents potentially influence children's choice to become an entrepreneur. Parents pass on genetic endowments, may provide an extended family, resources and a home environment, as well as the social contexts in which children grow up, including neighborhoods, schools and churches. All of these factors may combine in different ways to encourage or discourage an individual's choice to become an entrepreneur as an adult.

We, therefore, argue that intergenerational correlations in entrepreneurship should be viewed as narrow and insufficient measures of the overall importance of family background for entrepreneurship. We propose instead to use a variance decomposition technique, sibling correlations, as an omnibus measure of the importance of family background effects in determining entrepreneurship. Intuitively, sibling correlations measure the similarity of siblings relative to individuals drawn randomly from the population, which is interpreted as the importance of family and community background (Solon, 1999; Black and Devereux, 2011).

The sibling approach allows us to make two original contributions to the literature on the determinants of entrepreneurship. First, it allows us to quantify the *overall* importance of family and community background as determinants of entrepreneurship. Our results indicate these influences are substantial and larger than was assumed based on parent-child transmission studies. As we later show, sibling correlations in entrepreneurship vary between 20% and 50%, depending on the measure of entrepreneurship and the gender of siblings. To put these estimates in perspective, sibling correlations for physical traits such as height or weight are typically around 50% (see, e.g. Björklund and Jäntti, 2012). Second, the sibling approach allows us to discuss the *relative* importance of various determinants discussed in the previous literature within a single, unified framework. What is it that parents do that makes their children so similar? Which background characteristics influence entrepreneurial outcomes the most? By answering these questions we provide empirical evidence that the influence of family

and community background stretches further than parental entrepreneurship.

To compute sibling correlations in entrepreneurship, we use detailed data drawn from Sweden's Multigenerational Register. Our data set is based on a 70 percent sample of the Swedish population and includes nearly 700,000 children born between 1960 and 1970. For the years 1993-2012 we have detailed information from the Swedish tax authority concerning firm ownership for all these individuals and their parents. We also have extensive data on individual and family socio-economic variables, including information on education, income, family structure, immigration status and parish of residence. For most brothers in our sample, we have measures of cognitive and non-cognitive skills at age 18 taken from their military draft records.

We classify individuals as entrepreneurs in any given year if they receive the majority of their labor earnings from a company they own in full or in part. We then define two different types of entrepreneurs: those who own and operate unincorporated firms, i.e. the self-employed, are distinguished from those who own and manage incorporated (non-listed, limited liability) firms. We make this distinction for several reasons. Unincorporated firms are typically small, owner-operated firms with no employees; by contrast, incorporated firms have, on average, more employees (Åstebro and Tåg, 2015), a higher likelihood of attaining growth and IPOs (Guzman and Stern, 2016), and create more income for the entrepreneur (van Praag and Raknerud, 2014; Levine and Rubinstein, 2017; Humphries, 2017). Therefore, the entrepreneurship literature is currently debating whether self-employment is a good proxy for Schumpeterian entrepreneurial firms (Henrekson and Sanandaji, 2014), and incorporated entrepreneurship has been suggested as a better proxy for growth oriented entrepreneurship (Åstebro and Tåg, 2015; Levine and Rubinstein, 2017; Tåg et al., 2016). In terms of antecedents, most studies show different backgrounds and characteristics for incorporated relative to unincorporated entrepreneurs: their parents have higher education and incomes, they are more educated, and score higher on aptitude tests (Åstebro and Tåg, 2015; Levine and Rubinstein, 2017; Tåg et al., 2016). These differences can be substantial, consistent with entrepreneurs being drawn from the tails of the ability distribution (Åstebro et al., 2011).

To enable comparisons with previous literature defining entrepreneurship as self-employment and to follow recent developments, we estimate sibling correlations for both unincorporated and incorporated entrepreneurs. Moreover, we are primarily interested in 'higher commitment' entrepreneurship: entrepreneurs who have a long term horizon. We therefore create our two main outcome measures by excluding unincorporated and incorporated entrepreneurs who have been in this state for less than the median number of years (4 for *Unincorporated*, 5 for *Incorporated*), and might still be in the experimentation phase (Folta et al., 2010; Manso, 2016).

Our findings indicate that sibling correlations are larger for *Incorporated* ≥ 5 *years* (48% for brothers) than for *Unincorporated* ≥ 4 *years* (35% for brothers). For our definitions of less committed entrepreneurship, these numbers are consistently lower; the same is true for sister correlations. We conclude that family background is a major determinant of entrepreneurial activity: its quantitative importance may actually be up to five times larger than the explanatory power of parental entrepreneurship alone.

We then go on to explore three questions that arise when trying to understand these large sibling correlations. First, what is it that families and communities give children that make them so similar in terms of their entrepreneurial outcomes? Second, why are sibling correlations in incorporated entrepreneurship larger than their unincorporated equivalents? Third, why are brother correlations larger than sister correlations, especially for unincorporated businesses? To answer these questions, we examine the roles played by (i) neighborhood effects, (ii) parental characteristics, including income, education, immigration, entrepreneurship, and family structure, (iii) sibling peer effects, and (iv) shared genes. We also explore what traits shared by siblings can provide pathways for family influence by analyzing the role of cognitive and non-cognitive ability.

By focusing on family and community background as determinants of entrepreneurship, we achieve several objectives. First, the family represents the first context individuals encounter, one that molds their personalities and preferences, and is antecedent to other contexts. Thus, we directly assess the 'origins' of entrepreneurship. Second, to answer our research question, we introduce a novel method to the study of entrepreneurship: sibling correlations provide a broader measure of the importance of family and community than single-trait intergenerational correlations, and are sufficiently flexible to incorporate a series of extensions. Third, we collect a wide, yet disparate, literature on family and community factors affecting entrepreneurial selection: we put previous results in perspective and examine the relative importance of specific background characteristics. Finally, we contribute to the disposition-context debate by analyzing elements of families and neighborhoods that reflect aspects of both.

The remainder of this paper unfolds as follows. Section 2 describes the data and our empirical strategy, including a comparison of sibling correlations and intergenerational associations. We report the sibling correlations in Section 3. In Section 4 we investigate the mechanisms that drive sibling similarities. Section 5 summarizes our findings, discusses limitations and concludes.

2 Data and Method

2.1 Data

We use a 70% sample from Sweden's Multigenerational Register, which includes all persons born from 1932 onwards who have lived in Sweden at any time since 1961. All family ties (biological and adoptive) are recorded in this register. We define siblings (and hence families) as those sharing the same biological or adoptive mother.[3] Individuals in our sample can be matched to various official data sources using their unique personal identification numbers. Given the years for which entrepreneurship data is available (1993-2012), we restrict our sample to those born between 1960 and 1970. Thus, we follow the oldest cohort from age 33 to 52, and the youngest cohort from age 23 to 42. Those who died or left Sweden before 1993 are dropped from the sample. These cohort restrictions imply that siblings are born at most 10 years apart and that some individuals have siblings who are not included in our sample.[4]

Consistent with the Swedish tax authorities, we define individuals as entrepreneurs when they derive the majority of their taxable labor income from a business they own in full or in part. Furthermore, for reasons discussed above, we differentiate between two types of entrepreneurs.[5] For the years 1993 to 2012, we know if a person received the majority of his or her taxable labor income from an unincorporated or incorporated enterprise they own in part or in full (and possibly employing personnel).[6] An incorporated business in our data is a privately owned, non-listed, limited liability stock company.

Our first measure of entrepreneurship, *Unincorporated*, is a dichotomous variable equal to 1 if the individual is ever categorized as self-employed in an unincorporated business that they own in full or in part, and zero otherwise. Our second measure of entrepreneurship, *Incorporated*, is equal to 1 if the individual has ever been incorporated, and zero otherwise. In any given year, no individual is classified as both *Unincorporated* and *Incorporated*.[7] We create two higher commitment measures of entrepreneurship by using the median number of years individuals spend as incorporated (5 years) or as unincorporated (4 years) entrepreneurs as a

[3] In rows (4)-(6) of Appendix Table A.2 we show that our results are robust to alternative family definitions.

[4] We impose these restrictions so that we observe the occupational choices of individuals and parents for a longer period. In row (9) of Appendix Table A.2 we show similar results for a smaller sample of complete families.

[5] Åstebro and Tåg (2015), Tåg et al. (2016), and Humphries (2017) also distinguish between these types of entrepreneurs in Sweden; Berglann et al. (2011), and van Praag and Raknerud (2014) do so for Norway.

[6] Data on unincorporated business ownership is available from 1985 onwards and is used to calculate parental unincorporated business ownership. We only use data from 1993 onwards for children in order to make the results comparable to those for incorporation; results are robust to using all years (see row (2) of Appendix Table A.2).

[7] Many (male dominated) occupations, such as farmers and craftsmen, are over-represented among unincorporated firms, especially in rural areas, whereas incorporated firms are spread across industries more evenly. Statistics Sweden includes farmers in its business owner definition, since farms are run as companies (unincorporated or incorporated). In our sample of unincorporated (incorporated) firms, 16% (4%) are farmers. Sibling correlations are robust to excluding families where parents were farmers (see row (12) of Appendix Table A.2).

threshold value. In our sample, $Unincorporated \geq 4y$ takes a value of 1 for individuals who have been *Unincorporated* for at least of 4 years, and $Incorporated \geq 5y$ equals 1 for individuals who have been *Incorporated* for a minimum of 5 years.[8] We view these higher commitment variables as the main outcome measures in our study, while acknowledging that entrepreneurial survival does not always constitute success (Arora and Nandkumar, 2011). However, this measure of higher commitment entrepreneurship excludes short and potentially unsuccessful experimentation periods (Folta et al., 2010; Manso, 2016) and is likely to capture entrepreneurship that is oriented towards the longer term, while pursuing growth or an entrepreneurial lifestyle.

We have also created a set of family-wide background variables to use in our accounting exercises aimed at quantifying the factors underlying sibling correlations. We define parental entrepreneurship in incorporated or unincorporated firms in the same way we do for their children. We have information on parental education, immigrant status and income. Parental education is measured in seven different levels spanning the old minimum, seven-year compulsory level, to graduate school. These indicate the highest degree completed in Sweden, and as such, it is missing for older immigrants who have not attended school in Sweden.[9] Parental income is defined as the log of the average of a parent's pre-tax total factor income for all available years from 1968 to 2012, calculated separately for mothers and fathers. While we have no direct measure of parental wealth, total factor income captures both labor earnings and returns on capital (financial wealth and/or rental property and/or other rental assets); thus, total factor income is strongly correlated with wealth (Lefgren et al., 2012). In our empirical specification in Section 4 we introduce total factor income as a set of dummy variables for deciles of the distribution, as well as additional dummies for the top 5 percent and top 1 percent. These dummies capture the skewed nature of income and wealth distributions, and are thus likely to be significant predictors of entrepreneurship choices (Hurst and Lusardi, 2004).

We include several measures of family type and family structure. We have created a variable for the mother's age at the birth of her first child (including those born before 1960 that do not appear in our sample of siblings). Similarly, we also create correct variables for the number of children in a family and a dummy for whether a sibling is the first born child or not. We create a dummy variable indicating if the father is unknown and a variable for family structure at age 15, possibly varying across siblings from the same family. This variable is based on information we have about actual cohabitation; it contains six categories: missing, both parents present, single mother, single father, mother with new husband, father with new wife. We have also constructed two other family structure variables, namely the mother's partner count (i.e. the number of

[8] Note that our measure of entrepreneurial persistence could consist of separate, but consecutive, spells.
[9] In some cases, their education is still included if it has been recorded by the immigration authorities.

individuals she has conceived children with) and whether the household includes both biological and adoptive children. Lastly, we define neighborhoods by using the most precise information available, namely on the parishes siblings live in at age 15.[10]

2.2 Descriptive Statistics

Appendix Table A.1 shows the number of families with different sibship sizes. Our sample consists of 696,231 individuals (356,847 men and 339,384 women) from 430,935 families, defined through the mother. In our sample, nearly 33% of individuals are singletons (i.e. they have no siblings included in the sample – by contrast, we only have 6% 'true' singletons).[11]

Table 1 presents descriptive statistics. Panel A shows that 12.8% of the individuals in our sample have been *Unincorporated* at least once, while 8.4% have been *Incorporated* at least once. The average (median) number of years spent as unincorporated and incorporated are 5.9 (4) and 5.8 (5), respectively. Turning to higher commitment entrepreneurship, 6.9% of the sample have been *Unincorporated* $\geq 4y$, while 4.3% have been *Incorporated* $\geq 5y$.[12] Descriptive statistics for parents are shown in panel B of Table 1; 15% of mothers and 24% of fathers have been unincorporated at least once, while 3.1% of mothers and 6.3% of fathers have been incorporated. Mothers and fathers have similar incomes and education levels; fathers are slightly more likely to be Swedish natives.

Panel C of Table 1 shows the father is unidentified for 1.5% of our sample; 2.1% of individuals are twins and 1.4% have been adopted; only 0.6% of households include both biological and adoptive children. The average number of children is 2.8 per family, of which we capture 1.6 children per family on average in our sample. Mothers tend to give birth in their mid-20's, and are unlikely to conceive children with more than one man (only 3% do so). Our family structure variable reveals that the majority of families consists of intact families – almost 70%. Single mothers represent the second most frequent family type (18.7%), followed by mothers with a new husband (5%), single fathers (3.7%), and fathers with a new wife (1.7%). This variable is missing for 1.3% of our sample. Panel D shows that our average parish, out of a total of 2,650

[10] We thus estimate parish correlations; other definitions of neighborhood (schools or statistical metropolitan areas) are unlikely to induce large changes in these correlations (Raaum et al., 2006; Lindahl, 2011). Moreover, in our data, correlations estimated for wider definitions of neighborhoods (municipalities and counties) are lower than parish correlations.

[11] We include singletons to increase the precision of the estimate of between-family variation, although our results are not sensitive to their inclusion or exclusion (see row (1) of Appendix Table A.2).

[12] In the data, 21.2% of unincorporated entrepreneurs have also been incorporated, and 32.3% of incorporated entrepreneurs have also been unincorporated. Out of the 18,867 individuals with experience in both types of entrepreneurship, 78.7% have first experienced unincorporated entrepreneurship. In principle, this is consistent with a conceptual model where individuals first experience a less committed type of entrepreneurship, learn about their potential quality as entrepreneurs, and then decide whether to launch a growth-oriented, incorporated business (see also Folta et al., 2010; Manso, 2016). While our paper focuses on the differences between the types of entrepreneurship, we acknowledge that one type (unincorporated) may also lead to the other (incorporation).

parishes, comprises 259 individuals, while the largest includes 5,286 individuals.[13]

In Table 2, we examine differences in the observable characteristics of employees, unincorporated and incorporated entrepreneurs. Employees are defined as those labor market participants who have never been unincorporated or incorporated. As we expected, the incorporated have (on average) higher incomes and more education than the other two groups, while the unincorporated have (on average) lower incomes and less education. The parents of incorporated entrepreneurs also have higher educations and income levels (on average) than the parents of the other two groups. Furthermore, the unincorporated are more likely to have parents who owned an unincorporated firm (but not incorporated firm) than those in the other two groups. Similarly, the incorporated are more than three times as likely to have parents who were incorporated compared with the other two categories. Clearly, incorporated and unincorporated entrepreneurs differ in terms of their observable characteristics and family backgrounds, including the type of entrepreneurial experiences they were exposed to as children. These differences are very much in line with those noted by Levine and Rubinstein (2017), Åstebro and Tåg (2015), Tåg et al. (2016), and Humphries (2017).[14] In addition, the differences between employees and the incorporated are larger than those between employees and the unincorporated, implying that employees and the unincorporated may be more substitutable than employees and the incorporated, which would translate into larger sibling correlations in being incorporated than in being unincorporated.

2.3 Sibling Correlations

Entrepreneurship, E_{if}, for sibling i from family f can be modeled as:

$$E_{if} = X'_{if}\beta + \epsilon_{if}, \tag{1}$$

where X'_{if} includes individuals' birth year and a gender dummy for individual i from family f. The residual term, ϵ_{if}, is an individual-specific component representing a person's position in the overall distribution of entrepreneurship, whose population variance is given by σ^2_ϵ. Following Solon (1999), the individual variance component, ϵ_{if}, is assumed to be comprised of two linearly additive and independent variance components:

$$\epsilon_{if} = a_f + b_{if}. \tag{2}$$

The first part, a_f, is a permanent component shared by all siblings in family f. This is

[13] These numbers reflect the size of our sample in each parish, not true parish size. A Swedish parish is roughly similar in size to a U.S. Census tract, with a median parish size of just under 3,000 inhabitants (in 2000).

[14] In section 4.5 we provide further evidence on the differences in cognitive and non-cognitive ability between unincorporated and incorporated entrepreneurs.

what makes siblings similar. The second component, b_{if}, is the permanent component unique to sibling i in family f. The variance of ϵ_{if} can be expressed as the sum of the stationary population variances of the permanent family and individual components:

$$\sigma_\epsilon^2 = \sigma_a^2 + \sigma_b^2. \tag{3}$$

The share of the variance in an individual's long-run probability of being an entrepreneur (or in his or her innate propensity to choose entrepreneurship over wage employment) that can be attributed to family background effects is:

$$\rho = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_b^2} \equiv \text{corr}(\epsilon_{if}, \epsilon_{i'f}). \tag{4}$$

This share coincides with the correlation in entrepreneurship of randomly drawn pairs of siblings, which is why ρ is called a sibling correlation. This sibling correlation can be thought of as an omnibus measure of the importance of family and community effects. It includes family-wide influences that are shared by siblings, such as parental entrepreneurship, parental income, parental aspirations, cultural inheritance, genes, etc. However, it also includes shared influences that are not directly experienced in the home, such as school, church, and neighborhood effects. Genetic traits not shared by siblings, differential treatment of siblings, time-dependent changes in neighborhoods, schools, etc., are captured by the individual component b_{if}. If such non-shared factors are relatively more important than shared factors for determining entrepreneurship, the variance of the family effects will be small relative to the variance of the individual effects and the sibling correlation will be low; in other words, the more important the effects of factors that siblings share are, the larger the sibling correlation will be.[15]

An estimate of the sibling correlation in entrepreneurship, ρ, can be constructed using estimates of the between-family variation, σ_a^2, and the individual (within-family) variation, σ_b^2. These can be obtained by estimating the following latent linear response model:

$$E_{if}^* = \mathbf{X}'_{if}\beta + a_f + b_{if}, \tag{5}$$

where we only observe $E_{if} = I(E_{if}^* > 0)$ (i.e. the dependent variable is dichotomous). We estimate equation (5) using Stata's *xtlogit* command under the assumption that the random effect a_f is a realization from a normal distribution with mean zero and constant variance, while

[15] The existence of non-shared family factors, such as differential treatment based on birth order and/or gender, implies that the sibling correlation should be viewed as a lower bound on the importance of family background and neighborhood effects. Björklund and Jäntti (2012) discuss this issue and provide a quantitative example for the case of birth order. In particular, they examine the size of the advantage that first born children have over their younger siblings in terms of cognitive and non-cognitive skills, height, schooling, and earnings, and find only minor effects.

the individual variance component, b_{if}, is drawn from the logistic distribution with mean zero and variance $\pi^2/3$. Stata's *xtlogit* command reports ρ (along with a 95% confidence interval) as part of its standard output.

2.4 The Relationship between Sibling and Intergenerational Correlations

Solon's (1999) derivation of the sibling correlation nicely demonstrates the analytical relationship between the intergenerational (e.g. parent-offspring) correlation, which we will call γ, and the sibling correlation, ρ. Let the permanent family component, a_f, be defined as the sum of parental entrepreneurship (times γ), $\gamma\epsilon_f$, and a set of other parental factors that are orthogonal to ϵ_f. Call these factors z_f. We then have:

$$a_f = \gamma\epsilon_f + z_f. \tag{6}$$

Taking the variance of both sides of Equation 6 and dividing through by $\sigma^2_{\epsilon_{if}}$ gives us:

$$\frac{\sigma^2_{a_f}}{\sigma^2_{\epsilon_{if}}} = \rho = \frac{\gamma^2\sigma^2_{\epsilon_f}}{\sigma^2_{\epsilon_{if}}} + \frac{\sigma^2_{z_f}}{\sigma^2_{\epsilon_{if}}}. \tag{7}$$

If $\sigma^2_{\epsilon_f} \approxeq \sigma^2_{\epsilon_{if}}$, then we obtain:

$$\rho = \gamma^2 + \frac{\sigma^2_{z_f}}{\sigma^2_{\epsilon_{if}}}. \tag{8}$$

In words, the sibling correlation is equal to the intergenerational correlation in entrepreneurship squared plus all parental factors that are uncorrelated with parental entrepreneurship. What we will show (in Section 4.2) is that the total effect of parental factors that are uncorrelated with parental entrepreneurship dwarf the importance of parental entrepreneurship when accounting for the sibling correlation. Thus, focusing attention solely on the intergenerational correlation in entrepreneurship will result in a rather narrow indication of the overall importance of family background as a determinant of entrepreneurship.

3 Results

Sibling correlations are reported in Table 3. In column (1), we observe that family background and community influences account for 21% of the total variation in *Unincorporated* for all siblings. For brothers, this share rises to 29%; for sisters the variation is 21%. Mixed gender siblings appear to share fewer *common* family and community factors, resulting in a somewhat lower mixed gender sibling correlation of 0.18. Sibling correlations in *Incorporated* reported in column (3) of Table 3 are substantially larger than those for *Unincorporated*. Brother and sister correlations are 0.40 and 0.35, respectively. For all siblings combined, we see that 34% of

the total variation in the likelihood of ever being *Incorporated* can be explained by factors that siblings share. Once again, the mixed gender sibling correlation is the smallest. In columns (2) and (4) of Table 3, we report sibling correlations in higher commitment entrepreneurship: 26% of total variation in *Unincorporated* $\geq 4y$ and 42% of total variation in *Incorporated* $\geq 5y$ can be attributed to family-wide influences that siblings share. For brothers, these shares are even higher: 35% for *Unincorporated* $\geq 4y$ and 48% for *Incorporated* $\geq 5y$. For sisters, these shares are 25% and 45%, while for mixed gender siblings they are 21% and 38%.

Overall, these correlations paint the following picture: for measures of entrepreneurship that show higher commitment, and especially for growth oriented (incorporated) entrepreneurs, family and community background become more important. These patterns are consistent for brothers, sisters, and mixed gender siblings.

In Appendix Table A.2, we show that our estimates of sibling correlations are robust to (1) excluding singletons, (2) using data from 1985 onwards for unincorporated outcomes, (3) using data only on individual careers between ages 25 and 40, (4) defining the family through the father, (5) excluding families with an adoptive father, (6) excluding families with an adoptive mother, (7) restricting the sample to non-twin pairs, (8) restricting the sample to closely spaced non-twin pairs (born 12 to 24 months apart), (9) restricting the sample to families captured in their entirety, (10) families for which data on parental characteristics is complete, (11) including an age cubic for the individual, as well as parental cohort dummies, (12) excluding families where the parents were farmers, and (13) a placebo test whereby we replicate the original cluster structure of our data and randomly assign individuals to these clusters.

With these robust numbers in hand, the remainder of the paper will be focused on answering the following questions:

1. What is it that parents give their children that make them so similar in terms of their entrepreneurial outcomes, *Unincorporated* $\geq 4y$ and *Incorporated* $\geq 5y$?

2. Why are sibling correlations in *Incorporated* $\geq 5y$ larger than sibling correlations in *Unincorporated* $\geq 4y$?

3. Why is the brother correlation in *Unincorporated* $\geq 4y$ so much larger than the sister correlation in *Unincorporated* $\geq 4y$?

4 Accounting for Sibling Similarities

What is it that makes the outcomes of siblings so similar? In this section, we investigate the extent to which our sibling correlation can be accounted for by (i) neighborhoods, (ii) observable

parental characteristics, (iii) sibling peer effects, and (iv) shared genes. We also examine one of the potential pathways (children's traits) through which parents may transmit entrepreneurship: their levels of cognitive and non-cognitive abilities. While this accounting exercise does not allow for a causal interpretation of the determinants of entrepreneurship, it provides clues about what is potentially important in explaining sibling similarities in entrepreneurship.

4.1 Neighborhoods

In his review of the determinants of entrepreneurship, Parker (2009) notes that "[a]ll major economies exhibit regional differences in rates of entrepreneurship" (p. 147). Indeed, Giannetti and Simonov (2009) show that between-municipality variance in Sweden is almost ten times the within-municipality variance in entrepreneurship, and that a standard deviation increase in the proportion of entrepreneurs in the local labor market is associated with 25% more entry into entrepreneurship. In Italy, Guiso et al. (2015) find a positive effect of local firm density in individuals' province of residence at age 18 on entrepreneurial entry;[16] they also show that this density leads to higher income in entrepreneurship and the adoption of better management practices, which suggests exposure to entrepreneurship when young aids learning.

Our sibling correlations include these kinds of neighborhood and community effects. The question here is: what share of the sibling correlation can be accounted for by influences experienced outside of the home, but still shared by siblings? To answer this question, we estimate neighborhood correlations in entrepreneurship, using data on the parish an individual resided in at age 15 (parishes are the smallest geographical units we observe in our data). These correlations put an upper bound on the potential causal impact of community-wide factors influencing the choice to become an entrepreneur. An estimate of the neighborhood correlation in entrepreneurship, ρ_n, can be constructed by using estimates of the between-neighborhood variation, σ_n^2, and the individual (within-neighborhood) variation, σ_b^2, which (similar to before) can be obtained by estimating the following latent linear response model:

$$E_{in}^* = \mathbf{X}'_{in}\beta + c_n + b_{in}, \tag{9}$$

where c_n is a permanent community factor and we only observe $E_{in} = I(E_{in}^* > 0)$. The main difference here is that we also include a set of parental characteristics in $\mathbf{X}'_{in}$ in order to correct for parental sorting into neighborhoods (Solon et al., 2000). Correcting for sorting provides a tighter

[16] By contrast, contemporaneous learning from local entrepreneurs does not seem to play a role (Michelacci and Silva, 2007; Guiso et al., 2015). The contemporaneous effect in Giannetti and Simonov (2009) reflects social status concerns rather than learning, while Dahl and Sorenson (2012) show that entrepreneurs tend to locate close to 'home', exploiting regionally embedded social capital. Additionally, Bell et al. (2016) show that exposure to inventors in the community where they grew up is a strong determinant of individuals becoming inventors, with role-modeling (rather than genetic transmission) as the main channel of influence.

upper bound on the potential causal effect of neighborhoods on outcomes. With these new variance components, the neighborhood correlation is then calculated as:

$$\rho_n = \frac{\sigma_c^2}{\sigma_c^2 + \sigma_b^2}. \tag{10}$$

Neighborhood correlations for brothers and for sisters, and for *Unincorporated* $\geq 4y$ and *Incorporated* $\geq 5y$, are reported in Table 4.[17] In panel A, we do not correct for selection into neighborhoods, i.e. we do not control for parental characteristics. The neighborhood correlation in *Unincorporated* $\geq 4y$ is 0.06 for brothers (16% of the brother correlation) and 0.02 for sisters (8% of the sister correlation). Thus, while neighborhoods are clearly important for explaining entrepreneurship, family influences appear to be larger. We also see this in the neighborhood correlations in *Incorporated* $\geq 5y$, which are 0.02 for both brothers and sisters. They account for 5% of the sibling correlations in *Incorporated* $\geq 5y$ reported in Table 3.

In panel B, we control for parental sorting into neighborhoods by controlling for a large set of parental characteristics such as income and education, but not controlling for parental entrepreneurship. As these measures capture both direct and indirect neighborhood effects in entrepreneurship, we view them as our preferred baseline neighborhood correlations: they are only somewhat smaller than those in panel A. In panel C, we also add controls for parental entrepreneurship. Parents clearly select into and/or are shaped by the local community environment. Controlling for parental entrepreneurship lowers our estimated neighborhood correlations substantially. We interpret the remaining neighborhood correlations to be tight upper bounds on the causal effect of neighborhoods (as defined by parish at age 15).

The question remains, however, which shared community-wide factors actually drive these correlations. In panel D, we show that the share of adult entrepreneurs in one's parish (other than one's own parents) explains most of the residual neighborhood effect that was not explained by one's parents' entrepreneurship. The importance of growing up in a neighborhood with a high density of entrepreneurs can also be seen in the odds ratios reported in Table 4.

Panels A to D show, as expected, that the more controls are included, the lower the remaining neighborhood correlation is. These neighborhood effects can account for a large share of the gender difference in sibling correlations in *Unincorporated* $\geq 4y$. Our hypothesis is that regional differences in male-dominated occupations, such as farming and construction, which (in Sweden) are typically organized as unincorporated companies, account for the lion's share of the gender

[17] Appendix Table A.3 shows neighborhood correlations in all four outcomes for all siblings, brothers, and sisters. Table A.4 restricts the analysis to parishes with more than 100 observations, with similar results.

difference in *Unincorporated* $\geq 4y$.[18,19] A second, smaller, neighborhood effect is related to the kind of mechanisms that are typically discussed in the literature, such as the existence of a local entrepreneurial spirit and/or role modeling (see, e.g., Giannetti and Simonov, 2009; Guiso et al., 2015). In sum, both industrial structure and a higher responsiveness of males to role models may explain gender differences in *Unincorporated* $\geq 4y$.

4.2 Parental Characteristics

Which parental characteristics are mainly responsible for generating sibling similarities in entrepreneurship? We study this question by including a set of family-wide variables suggested by the literature, either one at a time or simultaneously, as control variables in our logistic regressions. For example, consider the inclusion of mothers' and fathers' entrepreneurship in $\mathbf{X}'_{if}$. These two additional variables should reduce the residual variation in the outcome variable and produce a lower estimate of the between-family variation, σ_a^{2*}, than the estimate produced without the added controls. We can interpret the difference between these two estimates, $\sigma_a^2 - \sigma_a^{2*}$, as an upper bound on the amount of the variance in the family component that can be explained by parental entrepreneurship. It is viewed as an upper bound since it includes other factors affecting children's entrepreneurship that are correlated with parental entrepreneurship (for instance, education, occupation, residence). This exercise also produces a new sibling correlation, ρ^*. From what we know about the relationship between parents' and children's entrepreneurship (Lindquist et al., 2015), we expect this new sibling correlation to be substantially lower.

The degree to which any particular control variable lowers the sibling correlation after being included provides a metric for judging its importance in explaining sibling similarities (Mazumder, 2008; Björklund et al., 2010), but does not allow for a causal interpretation.[20] Specifically, we explore the potential roles played by: (i) parental education, (ii) parental income, (iii) parental entrepreneurship, (iv) parents' immigration status, and (v) family structure. We will also report the odds ratios associated with each of these control variables.[21]

[18] For example, 16% of our sample of unincorporated entrepreneurs are farmers, compared to 4% of our sample of incorporated entrepreneurs.

[19] Our argument is similar to that of Page and Solon (2003). They argue that much of the neighborhood correlation in earnings seen in the U.S. is due to the persistence with which urban born boys (and their brothers) tend to live and work in urban areas as adults. This geographical persistence means that urban boys tend to live in areas with similar economic structures, price levels, and wage levels as adults (see also Løken et al., 2013). Thus, part of the brother correlation, and much of the neighborhood correlation, is generated by this geographical persistence. A related argument is provided by Chetty et al. (2016), who suggest that neighborhoods matter more for boys in the U.S. especially because of regional patterns of poverty and incarceration.

[20] In addition, one could be concerned with a mechanical decrease in the sibling correlation as controls are added, similar to the mechanical increase in R^2. In order to ensure this is not the case, we generated a set of (20 or 100) noisy random variables at both the individual level and the family level, and included them as controls. Appendix Table A.5 shows that the decrease is not mechanical: these random variables explain at most 0.74% of the sibling correlation (and often explain nothing at all).

[21] Table 5 reports the results for *Unincorporated* $\geq 4y$ and *Incorporated* $\geq 5y$, together with odds ratios. In

Previous research has suggested an important role of parental education, income, and wealth (Lentz and Laband, 1990; Blanchflower and Oswald, 1998; Fairlie and Robb, 2007a). Parental education is often seen as a proxy for the transfer of general (non-entrepreneurial) human capital (Lindquist et al., 2015), while finding a large role for parental income and wealth would be consistent with the existence of capital constraints (Holtz-Eakin et al., 1994; Blanchflower and Oswald, 1998). Parental ownership of an unincorporated or incorporated business is likely to influence the occupational preferences of individuals, not only through the acquisition of general or specific business human or social capital, but also through role-modeling (Lentz and Laband, 1990; Dunn and Holtz-Eakin, 2000; Fairlie and Robb, 2007b; Sørensen, 2007b; Colombier and Masclet, 2008; Parker, 2009; Hoffmann et al., 2015; Lindquist et al., 2015).[22]

Ethnicity and parental immigration are also likely to play a role in entrepreneurship decisions – in terms of the location of new immigrants and their subsequent choice of business (Dunn and Holtz-Eakin, 2000; Edin et al., 2003; Andersson and Hammarstedt, 2010; Kerr and Mandorff, 2015). Finally, although family structure is potentially associated with personality developments affecting entrepreneurial decisions, it has been understudied as a determinant of entrepreneurship, mainly given a lack of reliable data. Previous studies find only a limited association of family structure with entrepreneurship or entrepreneurial values (De Wit and Van Winden, 1989; Dunn and Holtz-Eakin, 2000; Hout and Rosen, 2000; Halaby, 2003; Hundley, 2006; Tervo, 2006), although the incorporated in Levine and Rubinstein (2017) are more likely to come from a two-parent family. Controlling for these observables one by one and then jointly, we can assess both their relative and their total contribution to entrepreneurial variance.

In columns (1)-(4) of panel A in Table 5, we see that parents' years of schooling appear to explain a limited part of the variance in entrepreneurship. Odds ratios range from 0.94 to 1.07, and parental education only lowers the sibling correlations in *Unincorporated* $\geq 4y$ by (at most) 1.5%. Sibling correlations in *Incorporated* $\geq 5y$ are left unchanged. Thus, despite the existence of strong intergenerational correlations in education in Sweden (Holmlund et al., 2011), the transfer of general human capital from parents to their children does not appear to explain why siblings are so similar in terms of their entrepreneurial outcomes.

Appendix Table A.6 we report the explanatory power of these variables for all four outcomes, as well as their joint contribution to the sibling correlation (panel D).

[22] One could be concerned with the association being driven by business inheritance. Lindquist et al. (2015), using Swedish register data, find that only 2.2% of entrepreneurs enter for the first time in the same industry and the same year as their parent exits entrepreneurship. Once they include offspring that become an entrepreneur one year before or after their parents' exit, then the number rises to 4.4%. Using similar data from Denmark, Sørensen (2007b) finds that almost 8% of children's entries into self-employment occur at the same time and in the same industry as their parents' industry, while Dahl and Sorenson (2012) note that less than 5% of entrepreneurs (with at least 1 employee) enter an industry where their parents have experience. Other studies (Lentz and Laband, 1990; Aldrich et al., 1998; Fairlie and Robb, 2007a) also show that a low share of children actually take over their parents' company, usually between 5.5 and 14% for U.S. and Canada.

We control for parental income (the sum of mother's and father's total factor income) through a set of dummies for deciles of the distribution of income, as well as for the top 5 and top 1 percent. High parental income lowers the odds of being *Unincorporated* $\geq 4y$ for men but raises the odds for women (columns (5)-(8) of panel A in Table 5). It does not, however, explain much of the sibling correlations in *Unincorporated* $\geq 4y$ (less than 1.6%). By contrast, parental income consistently raises the odds of being *Incorporated* $\geq 5y$ for both brothers and sisters. This relationship is more pronounced at the top of the distribution, with parental incomes in the top 1 percent increasing the odds of becoming *Incorporated* $\geq 5y$ 6.5 times for brothers and 8.5 times for sisters. Our measure of parental financial resources accounts for around 3% and 6% of the brother and sister correlations in *Incorporated* $\geq 5y$, respectively. Thus, parental resources do matter, especially with regards to incorporation and sisters, perhaps due to liquidity constraints.

Following the literature on intergenerational associations in entrepreneurship, we expect parental entrepreneurship to be both a strong predictor of individual entrepreneurship, and to explain a large share of sibling correlations. Indeed, columns (1)-(4) of panel B suggest that having entrepreneurial parents raises the likelihood of individual entrepreneurship. Moreover, same-sex associations are stronger, and associations are stronger for *Incorporated* $\geq 5y$, fully consistent with Lindquist et al. (2015). The latter pattern is reflected in the contribution to the sibling correlations: parental entrepreneurship explains 5-9% of *Unincorporated* $\geq 4y$ and 13% of *Incorporated* $\geq 5y$. On the one hand, this implies that parental entrepreneurship is the most important driver of sibling correlation, given that its explanatory power is larger than that of other family background factors (and similar with that of neighborhoods); on the other hand, as we discussed in Section 2.4, it suggests that focusing attention solely on parental entrepreneurship leads to an overly narrow approach, which leaves out a wide array of family background factors that impact entrepreneurship.

Having non-native parents does not explain much of the sibling correlations, usually less than 0.23%. However, columns (7) and (8) in panel B suggest that the children of immigrants are less likely to become incorporated. The strongest relationships are between immigrant fathers and their sons, similar to Andersson and Hammarstedt (2010). Columns (1)-(4) of panel C in Table 5 report the effect of controlling for family structure on entrepreneurship outcomes and sibling correlations. In contrast with Levine and Rubinstein (2017), coming from a family with a single mother or father raises the odds of engaging in both types of entrepreneurship somewhat, potentially by enhancing individuals' independence; however, their explanatory power is limited: less than 1% of sibling correlations can be explained by family structure. Other elements of

family structure, such as family size or the presence of step- and adopted siblings have generally negative effects on being *Incorporated*$\geq 5y$, although explanatory power is again limited. Our results thus echo those that Björklund et al. (2007) obtain for schooling and earnings. Overall, family structure does not appear to drive the sibling correlations (see also Appendix Table A.6.)

In panel D of Appendix Table A.6, we estimate brother and sister correlations controlling for all the variables above. Their joint contribution to the sibling correlations hovers around 10% of unincorporated business ownership outcomes, and around 15-17% for incorporation. To sum up: parental education, family structure, and immigrant status account for minor shares of the sibling correlations in entrepreneurship; whether parents were unincorporated, however, explains a large share of the sibling correlations in unincorporated business ownership (but not incorporation); parental incorporation explains a large share of the sibling correlations in incorporation (but not in being unincorporated); finally, parental income and wealth explain a fair share of correlations in incorporation, especially for sisters.

4.3 Sibling Peer Effects

Sibling correlations also capture inter-sibling interactions; while these could be treated as a nuisance in estimating the impact of shared family background, we consider such sibling peer effects to be an integral part of shared environments. The entrepreneurship literature has convincingly identified peer effects within the workplace (Nanda and Sørensen, 2010) and universities (Lerner and Malmendier, 2013; Kacperczyk, 2013), based on the quasi-random assignment of employees to workplaces or students to classes. In addition, role-modeling has been proposed as a mechanism for intergenerational associations in entrepreneurship (Sørensen, 2007b; Lindquist et al., 2015; Hoffmann et al., 2015).

Here, we assess the potential role of sibling peer effects in generating sibling correlations. We first examine sibling correlations at different birth spacings based on month of birth data, from twins (zero spacing), through siblings born at least 12 months apart in rolling intervals of 12 months, and up to sibling spacings of 120 months.[23] There are two competing expectations about sibling peer effects based on the relationship between spacings and sibling correlations (Eriksson et al., 2016). On the one hand, siblings born closer together interact more intensively, which should lead to higher sibling correlations at low birth spacings; closely spaced siblings may also share a more similar family environment while growing up. On the other hand, much older siblings may act as stronger role models. Thus, depending on the relative strength and

[23] We omit spacings between 1 and 11 months, and larger than 120 months as these are quite rare. Labels in Figure 1 imply 12-month rolling intervals, i.e. the label 12 months covers spacings between 12 and 24 months. In addition, we restrict the non-twins to full siblings in families with 2 children in our sample. Sibling correlations for this sample, reported in row (7) of Appendix Table A.2 are the same as the baseline sibling correlations.

non-linearities of each effect, sibling correlations may increase or decrease with sibling spacing, may be non-linear, or even zero.

Results for unincorporated and incorporated outcomes in Figure 1 suggest that while twin correlations are higher than non-twin correlations, the latter do not display an evident relationship with birth spacing (a pattern common across outcomes and gender, see also Appendix Figures A.1 and A.2). This is notable, given that in the bulk of the sibling correlation literature, the outcomes of closely spaced siblings are typically much more similar than those of widely spaced siblings (see, e.g., Eriksson et al., 2016). Before drawing any conclusion, we turn to a more formal peer effects exercise.

While we lack a formal randomization process, by exploiting differences in the timing of entrepreneurial entry for sibling pairs, we gain information about spillovers from one sibling to the other. A method for exploring causal peer effects has been proposed by Altonji et al. (2016), who apply it to the study of illegal substance abuse, and has subsequently been used by Eriksson et al. (2016) to look at criminal activity. The method relies on the relatively strong assumptions that only older siblings can influence younger siblings and that parental influences are not a mediating channel. While their method is intuitively applicable to situations where peer effects are likely to dominate other causes and where individuals are actively involved (in the outcome under study) when young, entrepreneurship represents an occupational choice usually made after the individual has left the household. In addition, it is not clear that older siblings necessarily engage in entrepreneurship earlier than younger siblings.[24]

Our exercise focuses on explaining the variance of entrepreneurial outcomes due to the influence of sibling peers rather than on identifying causal effects. We thus take an agnostic approach to applying the Altonji et al. (2016) model. Focusing on the subsample of sibling pairs, we estimate both the effect of the older sibling on the younger one, and of the younger sibling on the older one, subsequently converting the results into correlations to assess the potential contribution of peer effects to the sibling correlation (Bonett, 2007). A more detailed description of our empirical strategy is provided in Appendix B, together with a full set of results. Table 6 summarizes the results of this exercise, with panel A referring to being unincorporated and panel B to being incorporated. Column (1) shows how much the impact of the older sibling's entrepreneurship status at time $t-1$ on the younger sibling's entrepreneurship status at time t contributes (at most) to the baseline sibling correlation, and column (2) does so while controlling for contemporaneous effects. Columns (3) and (4) do the same for the impact of the younger sibling on the older sibling. The lagged effect of the older sibling's unincorporated status on

[24] However, older siblings enter the labor market earlier, and are statistically more likely to become entrepreneurs before the younger siblings, especially at large birth spacings.

the younger sibling represents at most 5% of the baseline sibling correlation. Conversely, the effect of the younger sibling on the older one appears largely negative; implying that peer effects may actually generate sibling dissimilarity. However, only brother peer effects are significant, and explain around 7% of the sibling correlation. For other sibling types and incorporation, most peer effects are not significant, which contributes to our understanding of why the brother correlations for unincorporated outcomes are larger than sister outcomes.

The results from these two analyses of sibling peer effects paint the following picture. The absence of a negative relationship between sibling spacing and sibling correlations suggests that i) time-varying, family-wide factors do not appear to be important, and ii) close (day-to-day) interactions between (non-twin) siblings may not be important. The largely non-significant peer effects estimated in our second, more formal peer effects exercise imply that the lack of a negative relationship between sibling spacing and sibling correlation may, in fact, substantiate the claim of limited sibling peer effects we made based on the first exercise, rather than the alternative explanation of two potentially opposing strong effects. Notably, the exception is for brothers, who experience sibling peer effects in unincorporated entrepreneurship.

4.4 Shared Genes

Several studies have shown that entrepreneurial outcomes are influenced by genes (Nicolaou et al., 2008; Zhang et al., 2009; Lindquist et al., 2015; Nicolaou et al., 2017). Since most siblings share at least part of their genetic endowment, shared genes may be an important contributor to our estimated sibling correlations (and Figure 1 shows that twin correlations are larger than non-twin correlations). The question we address in this section is the following: How much of the brother and sister correlations in our two main outcomes, *Unincorporated* $\geq 4y$ and *Incorporated* $\geq 5y$, can (at most) be attributed to shared genes?

We re-estimate sister and brother correlations in entrepreneurship for four different sibling types: adopted siblings, half siblings, full siblings, and twins. These four sibling types share (approximately) zero, 25, 50, and, respectively, 75% of their genes.[25] In each panel of Figure 2, these four different sibling correlations are plotted against the y-axis, while the average percentage of genes shared is plotted along the x-axis. The estimated sibling correlations are reported in Appendix Table A.7, along with the associated standard errors and sample sizes.

In each panel of Figure 2, we plot a regression line based on these 4 data points (estimated sibling correlations), where each point is weighted by the inverse of its standard error. Non-weighted regression lines, however, are quite similar. The slope of this weighted least squares

[25] While we do not know if our twins are mono- or dizygotic, we do know from previous research that the split between these two types of twins is roughly 50/50 (Polderman et al., 2015).

regression line measures the increase in the sibling correlation associated with sharing an additional 1% of genetic material. For example, the slope of the regression line for the brother correlation in *Unincorporated* $\geq 4y$ is equal to 0.0066. Thus, a 1% increase in shared genes leads to an increase of 0.0066 in the brother correlation. In all four panels there is a positive association between genes shared and the sibling correlation. Note, however, that this positive slope should be viewed as an upper bound on the role played by genes in producing sibling correlations. This caveat is common to all twin studies: part of this positive association may be due to the fact that genetically more similar siblings may also share a more similar environment, or that gene-environment interaction effects exist.

Based on these regression slopes, we can calculate an upper bound on the share of the sibling correlation that is due to shared genes. For full brothers who share 50% of their genes (on average), shared genes alone would generate a sibling correlation of $50 \times 0.0066 = 0.33$, whereas the actual correlation is 0.358. Thus, up to 93% ($= 100 \times 0.33/0.358$) of the actual full brother correlation in *Unincorporated* $\geq 4y$ may be due to shared genes. For full sisters, at most 46% ($= 100 \times (50 \times 0.0024)/0.262$) of the full sister correlation in *Unincorporated* $\geq 4y$ may be attributed to the role of shared genes. For *Incorporated* $\geq 5y$, shared genes may account for up to 31% ($= 100 \times (50 \times 0.003)/0.481$) of the full brother correlation and 19% ($= 100 \times (50 \times 0.0015)/0.396$) of the full sister correlation.

We conclude, perhaps unsurprisingly, that shared genes likely play a large role in generating sibling similarities (Polderman et al., 2015). However, we do find that the potential scope for genes to generate sibling similarities is much larger for *Unincorporated* $\geq 4y$ than for *Incorporated* $\geq 5y$, although we can not rule out the possibility that the results from our gene exercise for this outcome suffer from a larger upward bias. In addition, genes play a smaller role for women, for whom environmental influences are stronger, consistent with Zunino (2016).

4.5 Cognitive and Non-Cognitive Abilities

In the previous subsection, we argued that children may inherit traits from their parents that are important for explaining entrepreneurial choices, but we were silent on what specific traits might matter. Here, we address the potential role of two such traits, cognitive and non-cognitive skills, which have been shown to be determined both by genes and by social and environmental factors (Polderman et al., 2015; Grönqvist et al., 2016). These heritable skills are important for labor market outcomes in general and entrepreneurship in particular (Lindqvist and Vestman, 2011; Levine and Rubinstein, 2017).[26] To what extent can sibling similarities in cognitive and

[26] Zhang et al. (2009) also note that extroversion and neuroticism may partially mediate genetic influences in entrepreneurship.

non-cognitive skills help explain sibling similarities in entrepreneurship?

For most male Swedish citizens in our sample we have formal tests of cognitive and non-cognitive skills taken from their military draft records (Lindqvist and Vestman, 2011; Grönqvist et al., 2016). We have tests of language and logic, spatial, and technical ability, as well as a measure of leadership skills constructed from a structured interview with a psychologist, which was used to help select young men into officer training. Brother correlations in these five test scores are reported in column (1) of Table 7, along with brother correlations in height, weight and BMI, which are also taken from each brother's military draft record.[27] Brother correlations in height, weight and BMI at age 18 are 53%, 43%, and 40%, respectively, while those in cognitive test scores range from 25% for technical ability to 30% for language and logic, and 32% for leadership skills.[28] Additionally, in columns (2) and (3), we reestimate the brother correlations in *Unincorporated* $\geq 4y$ and *Incorporated* $\geq 5y$ for this new sample. These correlations are 32% and 44%, respectively, similar to their baseline counterparts from Table 3.

When controlling for this battery of test scores in our logistic regressions in columns (4) and (5), we find that although they are significant predictors of the two main entrepreneurial outcomes, they do not appear to be quantitatively important predictors: they explain 3.9% of the correlation for *Unincorporated* and 1.8% of the correlation for *Incorporated*. The odds ratios are all quite close to 1, and both types of entrepreneurs have slightly lower language and logic scores and slightly higher spatial and technical abilities. These results do not change if we, instead, control for the nine levels of these (stanine) test scores as dummies.

The odds ratios on leadership skills, by contrast, tell quite a different story. Scoring well on this test is not correlated with becoming *Unincorporated* $\geq 4y$. In stark contrast, leadership skills are strong predictors of becoming *Incorporated* $\geq 5y$: scoring above the median on this test raises the probability of becoming *Incorporated* $\geq 5y$ by a factor of 3.5 to 5. Importantly, these skills are also highly correlated across brothers (32%), which implies that they depend in part on having a shared family origin and help us to understand why the sibling correlation in *Incorporated* $\geq 5y$ is greater than the sibling correlation in *Unincorporated* $\geq 4y$.

5 Discussion and Conclusion

In this paper we have studied how much, and what particular elements of, family and community background matter as determinants of entrepreneurship. Extending the literature on parent-child transmission, we have argued that, while undoubtedly important, parental en-

[27] The brothers in this sample belong to families with male only and different gender children. Correlations for brothers in male only families, reported in Appendix Table A.8, are very similar.

[28] These correlations are similar to the ones estimated by Björklund and Jäntti (2012) for Sweden, and slightly lower than those estimated by Anger and Schnitzlein (2017) for Germany.

trepreneurship is only one of many ways through which parents pass on entrepreneurship. Hence, intergenerational correlations in entrepreneurship should be viewed as a rather narrow measure of the importance of family background. Instead, the sibling correlations approach, which is novel to the study of entrepreneurship choices and outcomes, provides an omnibus measure of the importance of family and community background.

Our results indicate the influence of family background is sizable, and substantially larger (up to five times larger) than was inferred based on parent-child transmission studies. Sibling correlations in entrepreneurship vary between 20% and 50% depending on the measure of entrepreneurship and the gender of siblings, and can be as large as those for physical traits such as height or weight. The measurement of sibling correlations in entrepreneurship turns out to be a highly relevant innovation and is the main contribution of this study.

To gain insights into sources of heterogeneity in sibling correlations, we have estimated gender-specific sibling correlations for various definitions of entrepreneurs. Our analyses speak to both the literature on gender differences in entrepreneurship and the current debate about who is likely to be a Schumpeterian entrepreneur. In particular, our analyses separate unincorporated and incorporated entrepreneurs, as the latter are, on average, more growth-oriented and more likely to achieve success. For similar reasons, we are primarily interested in 'higher commitment' entrepreneurship: entrepreneurs beyond the experimentation phase. We found that family and community background are consistently more important for higher commitment, and especially growth oriented, incorporated entrepreneurs. Moreover, brother correlations are consistently higher than sister correlations, especially for entrepreneurship forms that we claim are not necessarily high commitment or growth oriented.

Having revealed these robust patterns in the sibling correlations, three questions remain. First, what is it that families and communities give children that make them so similar in terms of entrepreneurial outcomes? Second, why are sibling correlations in incorporated and committed entrepreneurship larger than their unincorporated and less committed equivalents? Third, why are brother correlations larger than sister correlations, especially for unincorporated business ownership? Here, we discuss the answers to each of these three questions.

With regards to what makes the outcomes of siblings so similar, our accounting exercise showed that, as expected, parental characteristics play a dominant role. Their joint contribution to the sibling correlations hovers around 10% of unincorporated and around 15-17% of incorporated entrepreneurship. The most important underlying factor is parental entrepreneurship. Interestingly, unincorporated parental entrepreneurship explains a large share of the sibling correlations in unincorporated business ownership (but not incorporation), whereas parental

incorporation explains a large share of the sibling correlations in incorporation (but not in being unincorporated). An additional fair share of the sibling correlations in incorporated entrepreneurship, i.e. the most capital-intensive form, is explained by parental income, especially for sisters. By contrast, parental education, family structure, and immigrant status account for negligible shares of the sibling correlations in entrepreneurship.

In addition to parental characteristics, we observe a strong role of neighborhoods on entrepreneurship choices (second only to parental entrepreneurship) based on two mechanisms: first, industry structures that vary geographically and are correlated with (unincorporated) entrepreneurship and, second, other parents in the neighborhood who run (incorporated) businesses contribute to entrepreneurship choices (in addition to the contribution of one's own parents). Sibling peers play a negligible role, except for brother correlations in unincorporated entrepreneurship. Last but not least, and not surprisingly, shared genes likely play a large role in generating sibling similarities, in particular for brothers and unincorporated entrepreneurship.

The answer to this first question strongly supports the idea that the influence of family and community background stretches further than parental entrepreneurship. Parental entrepreneurship remains the most important (observable) driver of sibling correlations, given that its explanatory power is larger than that of other family background factors (and similar to that of neighborhoods). Nevertheless, the implication is that focusing attention solely on parental entrepreneurship is unrealistically restrictive and leaves out a wide array of family and community background factors that impact entrepreneurship.

The second question we address is related to the stark and consistent difference between sibling correlations in incorporated and committed entrepreneurship vis-à-vis unincorporated and less committed equivalents. The magnitude of this difference supports the idea that growth oriented and committed entrepreneurship are indeed different phenomena than independent or self-employed work in an unincorporated business. Additional evidence for the distinction between the different types of entrepreneurship is provided by the finding that unincorporated parents have explanatory power for sibling correlations in unincorporated business ownership (but not incorporation), whereas parental incorporation explains a large share of the sibling correlations in incorporation (but not in being unincorporated). This suggests that role-modeling may be specific to the type of entrepreneurship pursued by parents, and also represents the main factor contributing to higher sibling correlations in incorporation. Moreover, the higher explanatory power of parental income for incorporation (especially for women) points towards the existence of capital constraints to establishing (and growing) an incorporated business.[29]

[29] By contrast, several forces actually enlarge sibling correlations for unincorporated entrepreneurship compared to incorporation, namely neighborhood effects and genetic composition. Hence, parental incorporation and

Finally, why are sibling correlations for unincorporated entrepreneurship substantially larger for brothers than for sisters? Our analyses point to four factors. The most prominent is industry structure: industries with the largest variation across regions, such as farming and construction, are male-dominated and (in Sweden) typical of the unincorporated legal form. This accounts for the largest share of the gender difference in unincorporated entrepreneurship. Two other factors are associated with stronger brother than sister correlations in this outcome: sibling peer effects and the effect of parental entrepreneurship. These two stronger effects for brothers than for sisters might be related to the fact that such positive contextual factors may have a stronger and more consistent effect on boys than on girls for stereotypically male activities such as entrepreneurship. Finally, genetic endowments contribute to this gender difference, potentially related to the stronger role of (negative or hindering) environmental factors for female entrepreneurship than for male entrepreneurship. Indeed, we have found that parental income plays a larger role for female than male incorporated entrepreneurship.

The exercises presented in this paper are not without limitations. First and foremost, when 'explaining' the determinants of sibling similarities, we cannot claim that we have presented a set of precise causal estimates. Instead, we view our results as part of an exploratory accounting exercise that can point us towards those factors which can potentially explain the largest share of sibling similarities. Second, since we measure the degree to which siblings are similar, we cannot exclude the possibility that single-child families operate in a different manner and that lone children are influenced in different ways by family and community-wide factors.[30] Third, our results pertain to a highly developed economy, with specific cultural and economic traits, and notably egalitarian policies. Our results may likely hold in the other Nordic countries, since we observe similar sibling correlations in other outcomes such as income and education across these countries (Solon, 1999; Björklund and Jäntti, 2011; Black and Devereux, 2011), but they may not apply in other countries. Tracking changes over time (Björklund et al., 2009) and across countries (Schnitzlein, 2014) in sibling correlations in entrepreneurship would help us to decide whether the sibling correlations that we have documented should be considered relatively large or relatively small, and whether these numbers are constant across time and space.

There may, of course, be factors other than those we address here that contribute to sibling similarities. These may include parents' managerial ability, risk and time preferences, or

income must have a strong (and potentially overriding) impact, in addition to unobserved factors, otherwise we could not explain the large size differences in the sibling correlations of these different forms of entrepreneurship.

[30] In unreported models, the intergenerational association between parents and children in unincorporated and incorporated entrepreneurship in single- and multiple- child families was very similar (i.e. 0.068 vs. 0.072 in unincorporated entrepreneurship, and 0.132 and 0.102 in incorporated entrepreneurship, and with very similar explanatory power). This suggests that the parental entrepreneurship is broadly as important for children in single- and multiple- child families.

a wider set of family values. Capturing such variation would be an interesting avenue for future research, although parts of these effects are arguably captured by the various observable parental characteristics we account for (e.g. parental risk preferences may determine parental entrepreneurship) and may have a genetic component as well. More generally, future research should attempt to understand the particular pathways of influence: how much do similarities in cognitive and non-cognitive ability (which we touch upon), in educational achievement, in choice of organizational hierarchies, in obtaining a patent, etc., between brothers and sisters explain the sibling correlation in unincorporated and incorporated business ownership? This would offer a more nuanced understanding of the sources of similarity between siblings, as well as provide a way of synthesizing the literature on contextual antecedents of entrepreneurship in a unified framework. In addition, a future reconciliation of heritability and sibling correlations could shed more light on the importance of (shared) genes in generating sibling similarity.

We tend to view our findings optimistically. We do not believe that the existence of substantial, pre-determined family-wide factors means that policy is doomed to fail. A large share of the variation in entrepreneurship is, in fact, individual-specific and not solely determined by genes. Furthermore, children appear to be able to 'learn' about entrepreneurship through their family and community environment, which implies that it may be possible to 'teach' entrepreneurship to young people. Policy may even generate a social multiplier effect if the behavior of a successfully treated person also affects the behavior of her untreated family members. At the same time, one can not ignore the large role of family background in determining entrepreneurial outcomes. It is not clear that all young people with similar entrepreneurial skills have the same chances and opportunities to actually develop into entrepreneurs. As such, there may be a pool of entrepreneurial talent that society could dip into and develop; and in doing so increase both equality of opportunity and economic efficiency.

References

Aghion, P., Akcigit, U., Hyytinen, A., and Toivanen, O. (2017). Living the American Dream in Finland: The Social Mobility of Inventors. *Working Paper*.

Aldrich, H. E., Renzulli, L. A., and Langton, N. (1998). Passing on Privilege: Resources Provided by Self-Employed Parents to Their Self-Employed Children. *Research in Social Stratification and Mobility*, 16:291–318.

Altonji, J. G., Cattan, S., and Ware, I. (2016). Identifying Sibling Influence on Teenage Substance Use. *Journal of Human Resources*, forthcoming.

Andersson, L. and Hammarstedt, M. (2010). Intergenerational Transmissions in Immigrant Self-Employment: Evidence from Three Generations. *Small Business Economics*, 34(3):261–276.

Andersson, L. and Hammarstedt, M. (2011). Transmission of Self-Employment across Immigrant Gen-

erations: The Importance of Ethnic Background and Gender. *Review of Economics of the Household*, 9(4):555–577.

Anger, S. and Schnitzlein, D. D. (2017). Cognitive Skills, Noncognitive Skills, and Family Background: Evidence from Sibling Correlations. *Journal of Population Economics*, 30(2):591–620.

Arora, A. and Nandkumar, A. (2011). Cash-Out or Flameout! Opportunity Cost and Entrepreneurial Strategy: Theory, and Evidence from the Information Security Industry. *Management Science*, 57(10):1844–1860.

Åstebro, T., Chen, J., and Thompson, P. (2011). Stars and Misfits: Self-Employment and Labor Market Frictions. *Management Science*, 57(11):1999–2017.

Åstebro, T. and Tåg, J. (2015). Entrepreneurship and Job Creation. *IFN Working Paper*.

Bell, A., Chetty, R., Jaravel, X., Petkova, N., and Reenen, J. V. (2016). The Lifecycle of Inventors. *Working Paper*.

Berglann, H., Moen, E. R., Røed, K., and Skogstrøm, J. F. (2011). Entrepreneurship: Origins and Returns. *Labour Economics*, 18(2):180–193.

Björklund, A., Ginther, D. K., and Sundström, M. (2007). Family Structure and Child Outcomes in the USA and Sweden. *Journal of Population Economics*, 20(1):183–201.

Björklund, A. and Jäntti, M. (2011). Intergenerational Income Mobility and the Role of Family Background. In Nolan, B., Salverda, W., and Smeeding, T., editors, *The Oxford Handbook of Economic Inequality*, pages 1–21. Oxford University Press, Oxford.

Björklund, A. and Jäntti, M. (2012). How Important is Family Background for Labor-Economic Outcomes? *Labour Economics*, 19(4):465–474.

Björklund, A., Jäntti, M., and Lindquist, M. J. (2009). Family Background and Income During the Rise of the Welfare State: Brother Correlations in Income for Swedish Men Born 1932-1968. *Journal of Public Economics*, 93(5-6):671–680.

Björklund, A., Lindahl, L., and Lindquist, M. J. (2010). What More Than Parental Income, Education and Occupation? An Exploration of What Swedish Siblings Get from Their Parents. *The B.E. Journal of Economic Analysis & Policy*, 10(1).

Black, S. E. and Devereux, P. J. (2011). Recent Developments in Intergenerational Mobility. In Ashenfelter, O. and Card, D., editors, *Handbook of Labor Economics*, volume 4B, pages 1487–1541. Elsevier B.V., Amsterdam.

Blanchflower, D. G. and Oswald, A. J. (1998). What Makes an Entrepreneur? *Journal of Labor Economics*, 16(1):26–60.

Bonett, D. G. (2007). Transforming Odds Ratios into Correlations for Meta-Analytic Research. *American Psychologist*, 62(3):254–255.

Chetty, R., Hendren, N., Lin, F., Majerovitz, J., and Scuderi, B. (2016). Childhood Environment and Gender Gaps in Adulthood. *American Economic Review*, 106(5):282–288.

Colombier, N. and Masclet, D. (2008). Intergenerational Correlation in Self Employment: Some Further Evidence from French ECHP Data. *Small Business Economics*, 30(4):423–437.

Dahl, M. S. and Sorenson, O. (2012). Home Sweet Home: Entrepreneurs' Location Choices and the Performance of Their Ventures. *Management Science*, 58(6):1059–1071.

De Wit, G. and Van Winden, F. A. A. M. (1989). An Empirical Analysis of Self-Employment in the Netherlands. *Small Business Economics*, 1(4):263–272.

Dobrev, S. D. and Barnett, W. P. (2005). Organizational Roles and Transition To Entrepreneurship. *Academy of Management Journal*, 48(3):433–449.

Dunn, T. and Holtz-Eakin, D. (2000). Financial Capital, Human Capital, and the Transition to Self-Employment: Evidence from Intergenerational Links. *Journal of Labor Economics*, 18(2):282–305.

Edin, P. A., Fredriksson, P., and Åslund, O. (2003). Ethnic Enclaves and the Economic Success of Immigrants: Evidence from a Natural Experiment. *Quarterly Journal of Economics*, 118(1):329–357.

Elert, N., Andersson, F. W., and Wennberg, K. (2015). The Impact of Entrepreneurship Education in High School on Long-Term Entrepreneurial Performance. *Journal of Economic Behavior and Organization*, 111(1):209–223.

Elfenbein, D. W., Hamilton, B. H., and Zenger, T. R. (2010). The Small Firm Effect and the Entrepreneurial Spawning of Scientists and Engineers. *Management Science*, 56(4):659–681.

Eriksson, K. H., Hjalmarsson, R., Lindquist, M. J., and Sandberg, A. (2016). The Importance of Family Background and Neighborhood Effects as Determinants of Crime. *Journal of Population Economics*, 29(2):219–262.

Fairlie, R., Karlan, D., and Zinman, J. (2015). Behind the GATE Experiment: Evidence on Effects of and Rationales for Subsidized Entrepreneurship Training. *American Economic Journal: Economic Policy*, 7(2):125–161.

Fairlie, R. W. and Robb, A. M. (2007a). Families, Human Capital, and Small Business: Evidence From the Characteristics of Business Owners Survey. *Industrial and Labor Relations Review*, 60(2):225–245.

Fairlie, R. W. and Robb, A. M. (2007b). Why Are Black-Owned Businesses Less Successful than White-Owned Businesses? The Role of Families, Inheritances, and Business Human Capital. *Journal of Labor Economics*, 25(2):289–323.

Folta, T. B., Delmar, F., and Wennberg, K. (2010). Hybrid Entrepreneurship Hybrid Entrepreneurship. *Management Science*, 56(2):253–269.

Gambardella, A., Ganco, M., and Honoré, F. (2015). Using What You Know: Patented Knowledge in Incumbent Firms and Employee Entrepreneurship. *Organization Science*, 26(2):456–474.

Giannetti, M. and Simonov, A. (2009). Social Interactions and Entrepreneurial Activity. *Journal of Economics & Management Strategy*, 18(3):665–709.

Grönqvist, E., Öckert, B., and Vlachos, J. (2016). The Intergenerational Transmission of Cognitive and Noncognitive Abilities. *Journal of Human Resources*, forthcoming.

Guiso, L., Pistaferri, L., and Schivardi, F. (2015). Learning Entrepreneurship from Other Entrepreneurs? *NBER Working Paper*, 21775.

Guzman, J. and Stern, S. (2016). The State of American Entrepreneurship: New Estimates of the Quantity and Quality of Entrepreneurship for 15 US States, 1988-2014. *NBER Working Paper*, 22095.

Halaby, C. N. (2003). Where Job Values Come from: Family and Schooling Background, Cognitive Ability, and Gender. *American Sociological Review*, 68(2):251–278.

Henrekson, M. and Sanandaji, T. (2014). Small Business Activity Does Not Measure Entrepreneurship. *Proceedings of the National Academy of Sciences*, 111(5):1760–1765.

Hoffmann, A., Junge, M., and Malchow-Møller, N. (2015). Running in the Family: Parental Role Models in Entrepreneurship. *Small Business Economics*, 44(1):79–104.

Holmlund, H., Lindahl, M., and Plug, E. (2011). The Causal Effect of Parents' Schooling on Children's Schooling: A Comparison of Estimation Methods. *Journal of Economic Literature*, 49(3):615–651.

Holtz-Eakin, D., Joulfaian, D., and Rosen, H. S. (1994). Sticking it Out: Entrepreneurial Survival and Liquidity Constraints. *Journal of Political Economy*, 102(1):53–75.

Hout, M. and Rosen, H. (2000). Self-Employment, Family Background, and Race. *Journal of Human Resources*, 35(4):670–692.

Huber, L. R., Sloof, R., and Van Praag, M. (2014). The Effect of Early Entrepreneurship Education: Evidence from a Field Experiment. *European Economic Review*, 72:76–97.

Humphries, J. E. (2017). The Causes and Consequences of Self-Employment Over the Life Cycle. *Working Paper*.

Hundley, G. (2006). Family Background and the Propensity for Self-Employment. *Industrial Relations*, 45(3):377–392.

Hurst, E. and Lusardi, A. (2004). Liquidity Constraints, Household Wealth, and Entrepreneurship. *Journal of Political Economy*, 112(2):319–347.

Kacperczyk, A. J. (2013). Social Influence and Entrepreneurship: The Effect of University Peers on Entrepreneurial Entry. *Organization Science*, 24(3):664–683.

Kerr, W. R. and Mandorff, M. (2015). Social Networks, Ethnicity, and Entrepreneurship. *NBER Working Paper*, 21597.

Lefgren, L., Lindquist, M. J., and Sims, D. (2012). Rich Dad, Smart Dad: Decomposing the Intergenerational Transmission of Income. *Journal of Political Economy*, 120(2):268–303.

Lentz, B. F. and Laband, D. N. (1990). Entrepreneurial Success and Occupational Inheritance among Proprietors. *The Canadian Journal of Economics*, 23(3):563–579.

Lerner, J. and Malmendier, U. (2013). With a Little Help from My (Random) Friends: Success and Failure in Post-Business School Entrepreneurship. *Review of Financial Studies*, 26(10):2411–2452.

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

Lindahl, L. (2011). A Comparison of Family and Neighborhood Effects on Grades, Test Scores, Educational Attainment and Income-Evidence from Sweden. *Journal of Economic Inequality*, 9(2):207–226.

Lindquist, M. J., Sol, J., and van Praag, C. M. (2015). Why Do Entrepreneurial Parents Have Entrepreneurial Children? *Journal of Labor Economics*, 33(2):269–296.

Lindqvist, E. and Vestman, R. (2011). The Labor Market Returns to Cognitive and Noncognitive Ability: Evidence from the Swedish Enlistment. *American Economic Journal: Applied Economics*, 3(1):101–128.

Løken, K. V., Lommerud, K. E., and Lundberg, S. (2013). Your Place or Mine? On the Residence Choice of Young Couples in Norway. *Demography*, 50(1):285–310.

Manso, G. (2016). Experimentation and the Returns to Entrepreneurship. *Review of Financial Studies*, 29(9):2319–2340.

Mazumder, B. (2008). Sibling Similarities and Economic Inequality in the US. *Journal of Population Economics*, 21(3):685–701.

Michelacci, C. and Silva, O. (2007). Why So Many Local Entrepreneurs? *The Review of Economics and Statistics*, 89(4):615–633.

Nanda, R. and Sørensen, J. B. (2010). Workplace Peers and Entrepreneurship. *Management Science*, 56(7):1116–1126.

Nicolaou, N., Patel, P. C., and Wolfe, M. T. (2017). Testosterone and Tendency to Engage in Self-Employment Testosterone and Tendency to Engage in Self-Employment. *Management Science*, forthcoming.

Nicolaou, N., Shane, S., Cherkas, L., Hunkin, J., and Spector, T. D. (2008). Is the Tendency to Engage in Entrepreneurship Genetic? *Management Science*, 54(1):167–179.

Oosterbeek, H., van Praag, C. M., and Ijsselstein, A. (2010). The Impact of Entrepreneurship Education on Entrepreneurship Skills and Motivation. *European Economic Review*, 54(3):442–454.

Özcan, S. and Reichstein, T. (2009). Transition to Entrepreneurship from the Public Sector: Predispositional and Contextual Effects. *Management Science*, 55(4):604–618.

Page, M. E. and Solon, G. (2003). Correlations between Brothers and Neighboring Boys in Their Adult Earnings: The Importance of Being Urban. *Journal of Labor Economics*, 21(4):831–855.

Parker, S. (2009). *The Economics of Entrepreneurship*. Cambridge University Press, Cambridge, UK.

Polderman, T. J. C., Benyamin, B., Leeuw, C. A. D., Sullivan, P. F., Bochoven, A. V., Visscher, P. M., and Posthuma, D. (2015). Meta-Analysis of the Heritability of Human Traits Based on Fifty Years of Twin Studies. *Nature Genetics*, 47(7):702–709.

Raaum, O., Salvanes, K. G., and Sørensen, E. Ø. (2006). The Neighbourhood Is Not What It Used to Be. *Economic Journal*, 116(1):200–222.

Roach, M. and Sauermann, H. (2015). Founder or Joiner? The Role of Preferences and Context in Shaping Entrepreneurial Orientations. *Management Science*, 61(9):2160–2184.

Schnitzlein, D. D. (2014). How Important Is the Family? Evidence from Sibling Correlations in Permanent Earnings in the USA, Germany, and Denmark. *Journal of Population Economics*, 27(1):69–89.

Solon, G. (1999). Intergenerational Mobility in the Labor Market. In Ashenfelter, O. and Card, D., editors, *Handbook of Labor Economics*, volume 3, pages 1761–1800. Elsevier, Amsterdam.

Solon, G., Page, M. E., and Duncan, G. J. (2000). Correlations between Neighboring Children in Their Subsequent Educational Attainment. *Review of Economics and Statistics*, 82(3):383–392.

Sørensen, J. B. (2007a). Bureaucracy and Entrepreneurship: Workplace Effects on Entrepreneurial Entry. *Administrative Science Quarterly*, 52(3):387–412.

Sørensen, J. B. (2007b). Closure and Exposure: Mechanisms in the Intergenerational Transmission of Self-Employment. *Research in the Sociology of Organizations: The Sociology of Entrepreneurship*, 25:83–124.

Sørensen, J. B. and Sharkey, A. J. (2014). Entrepreneurship as a Mobility Process. *American Sociological Review*, 79(2):328–349.

Stuart, T. E. and Ding, W. W. (2006). When Do Scientists Become Entrepreneurs? The Social Structural Antecedents of Commercial Activity in the Academic Life Sciences. *American Journal of Sociology*, 112(1):97–144.

Tåg, J., Åstebro, T., and Thompson, P. (2016). Hierarchies and Entrepreneurship. *European Economic Review*, 89(1):129–147.

Tervo, H. (2006). Regional Unemployment, Self-Employment and Family Background. *Applied Economics*, 38(9):1055–1062.

van Praag, C. M. and Raknerud, A. (2014). The Entrepreneurial Earnings Puzzle. Evidence from Matched Person-Firm Data. *Working Paper*.

Zhang, Z., Zyphur, M. J., Narayanan, J., Arvey, R. D., Chaturvedi, S., Avolio, B. J., Lichtenstein, P., and Larsson, G. (2009). The Genetic Basis of Entrepreneurship: Effects of Gender and Personality. *Organizational Behavior and Human Decision Processes*, 110(2):93–107.

Zunino, D. (2016). Are Genetics and Environment Substitutes or Complements in Affecting Entrepreneurial Choice? *Working Paper*.

Figures and Tables

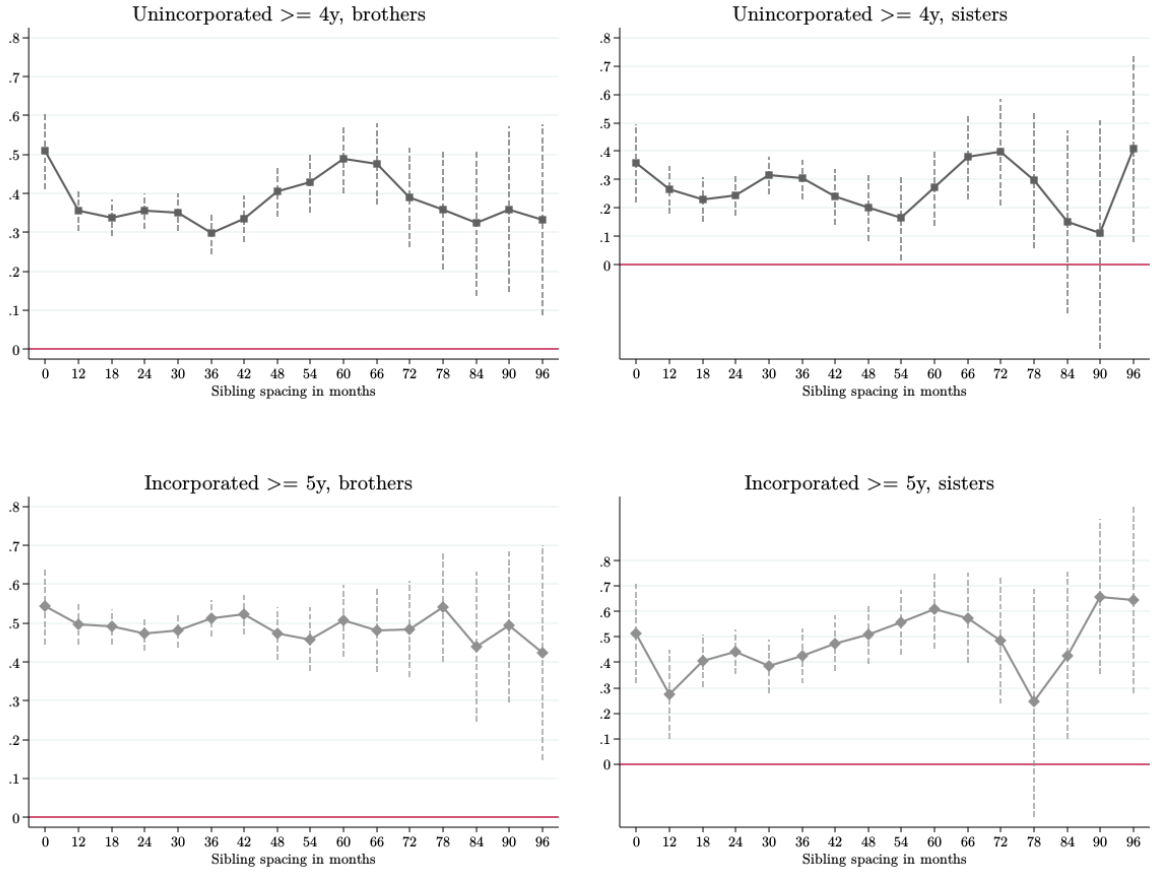

Figure 1: Twin and sibling correlations in entrepreneurship by sibling spacing and gender.

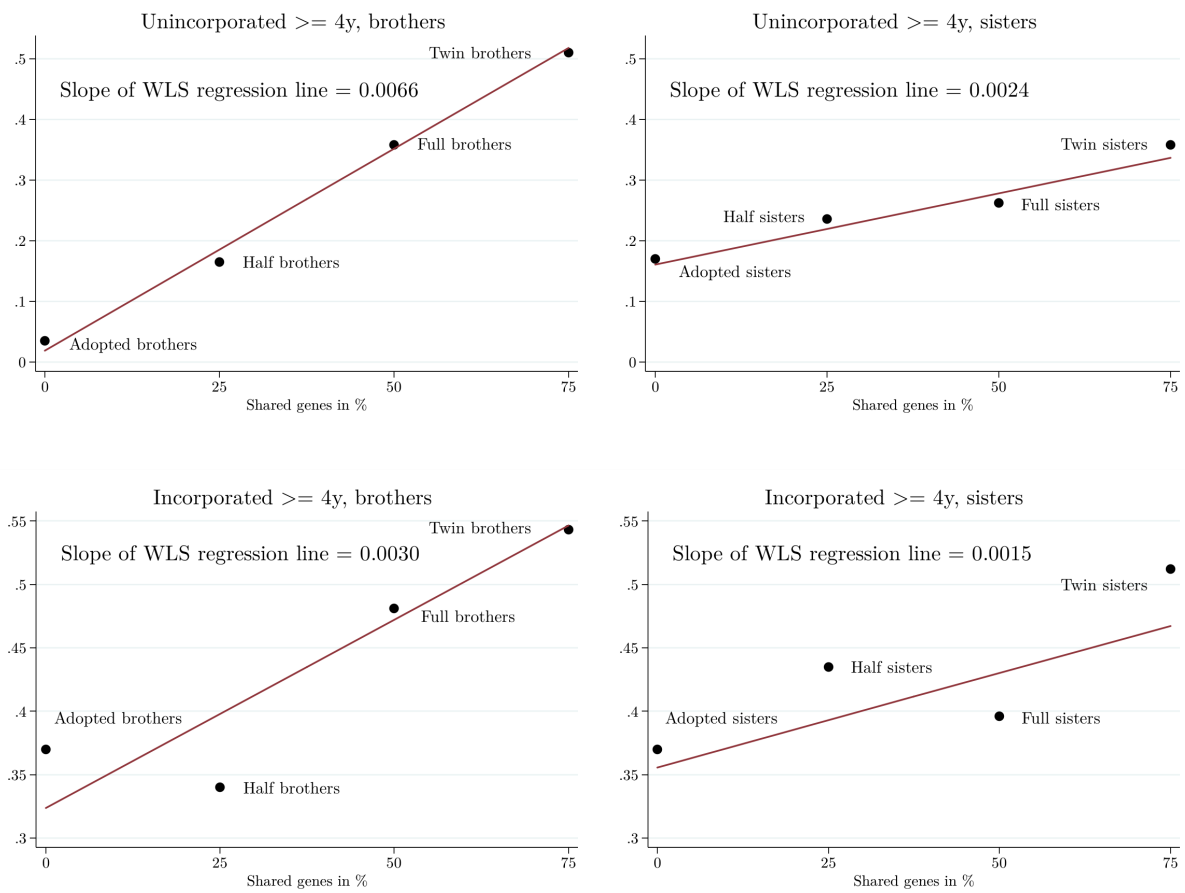

Figure 2: Sibling correlations and shared genes.

Table 1: **Descriptive Statistics**

	Mean	S.D.	N	Min	Max
A. Entrepreneurial outcomes					
Unincorporated	0.128	(0.334)	696,231	0	1
Incorporated	0.084	(0.277)	696,231	0	1
Unincorporated $\geq 4y$	0.069	(0.254)	696,231	0	1
Incorporated $\geq 5y$	0.043	(0.202)	696,231	0	1
B. Parental characteristics [a]					
Mother unincorporated	0.148	(0.355)	430,935	0	1
Father unincorporated	0.243	(0.429)	421,548	0	1
Mother incorporated	0.031	(0.174)	430,935	0	1
Father incorporated	0.063	(0.244)	421,548	0	1
Mother log income	11.603	(0.828)	429,550	0	17.1
Father log income	12.174	(0.670)	418,670	0	17.3
Mother years of schooling	10.023	(2.787)	423,737	7	19
Father years of schooling	9.985	(3.012)	406,914	7	19
Mother immigrant	0.103	(0.304)	430,935	0	1
Father immigrant	0.086	(0.280)	421,548	0	1
C. Family structure					
Male	0.513	(0.499)	696,231	0	1
Twins	0.021	(0.143)	696,231	0	1
Adopted	0.014	(0.119)	696,231	0	1
Father unknown	0.015	(0.122)	696,231	0	1
Family size, total [a]	2.803	(1.306)	430,935	1	18
Family size, in sample [a]	1.616	(0.767)	430,935	1	8
Mother's partner count [a]	1.031	(0.183)	430,935	1	5
Adoptive and biological children [a]	0.006	(0.077)	430,935	0	1
Mother's age at first birth [a]	23.241	(4.421)	430,935	13	55
Sibship type [a]					
Brothers	37.83%		163,041		
Sisters	35.46%		152,828		
Mixed	26.70%		115,066		
Family structure at age 15 [a]					
Both parents	69.54%		299,657		
Single mother	18.69%		80,548		
Single father	3.74%		16,118		
Mother with new husband	4.98%		21,454		
Father with new wife	1.73%		7,452		
Missing	1.32%		7,506		
D. Neighborhood characteristics					
Parish size	259.365	(475.779)	2,650	1	5,286
Ever unincorporated	0.162	(0.369)	2,650	0	1
Ever incorporated	0.074	(0.262)	2,650	0	1
% Other parents unincorporated	0.307	(0.138)	2,642	0	1
% Other parents incorporated	0.043	(0.036)	2,642	0	0.5

[a] Variables calculated at the family level to avoid overweighting large families.

Table 2: **Descriptive Statistics by Entrepreneurial Status**

	Employee (1)	Unincorporated (2)	Incorporated (3)	(2)-(1) (4)	(3)-(1) (5)	(3)-(2) (6)
Years of schooling	12.309	11.945	12.305	-0.364	-0.004	0.360
	(2.184)	(2.072)	(2.109)	***		***
Log income	11.864	11.731	12.222	-0.084	0.357	0.491
	(0.635)	(0.497)	(0.466)	***	***	***
Mother unincorporated	0.137	0.230	0.202	0.093	0.065	-0.028
	(0.344)	(0.421)	(0.402)	***	***	***
Father unincorporated	0.231	0.355	0.319	0.123	0.088	-0.035
	(0.422)	(0.478)	(0.466)	***	***	***
Either parent uninc.	0.301	0.443	0.397	0.142	0.096	-0.046
	(0.459)	(0.497)	(0.489)	***	***	***
Mother incorporated	0.024	0.032	0.120	0.008	0.095	0.087
	(0.154)	(0.177)	(0.325)	***	***	***
Father incorporated	0.053	0.065	0.195	0.012	0.142	0.131
	(0.224)	(0.246)	(0.396)	***	***	***
Either parent inc.	0.077	0.094	0.235	0.017	0.158	0.141
	(0.267)	(0.292)	(0.424)	***	***	***
Mother log income	11.591	11.586	11.736	-0.005	0.145	0.150
	(0.819)	(0.822)	(0.686)		***	***
Father log income	12.166	12.126	12.355	-0.040	0.189	0.229
	(0.649)	(0.722)	(0.635)	***	***	***
Mother schooling	9.996	10.141	10.372	0.144	0.375	0.231
	(2.785)	(2.842)	(2.859)	***	***	***
Father schooling	9.940	10.039	10.341	0.099	0.400	0.301
	(3.031)	(3.067)	(3.120)	***	***	***
Mother immigrant	0.110	0.120	0.087	0.010	-0.023	-0.033
	(0.312)	(0.325)	(0.282)	***	***	***
Father immigrant	0.091	0.101	0.075	0.010	-0.016	-0.026
	(0.288)	(0.301)	(0.263)	***	***	***
Intact family	0.705	0.700	0.772	-0.006	0.066	0.072
	(0.456)	(0.458)	(0.420)	***	***	***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parentheses. Note that some individuals have been both unincorporated and incorporated at different points in time. They are omitted from this analysis, but the results in columns (4) and (5) are similar if they are counted both as *Unincorporated* and as *Incorporated*.

Table 3: **Sibling Correlations in Entrepreneurship**

	Unincorporated (1)	**Unincorporated** $\geq 4y$ (2)	Incorporated (3)	**Incorporated** $\geq 5y$ (4)
All	0.212	**0.255**	0.341	**0.424**
(N=696,231)	(0.004)	(0.006)	(0.005)	(0.006)
Brothers	0.292	**0.353**	0.401	**0.479**
(N=217,129)	(0.008)	(0. 010)	(0.008)	(0.010)
Sisters	0.211	**0.254**	0.350	**0.448**
(N=200,626)	(0.012)	(0.017)	(0.015)	(0.021)
Mixed	0.180	**0.211**	0.305	**0.379**
(N=278,476)	(0.005)	(0.007)	(0.007)	(0.009)

Standard errors in parentheses.

Table 4: **Neighborhood Correlations in Entrepreneurship**

	Unincorporated $\geq 4y$		Incorporated $\geq 5y$	
	Brothers	Sisters	Brothers	Sisters
	(1)	(2)	(3)	(4)
A. No controls				
	0.057	0.022	0.024	0.021
	(0.004)	(0.003)	(0.003)	(0.005)
	16.25%	8.74%	4.95%	4.76%
N	214,081	197,999	214,081	197,999
B. Parental controls (excl. entrepreneurship)				
	0.051	0.020	0.022	0.014
	(0.004)	(0.003)	(0.003)	(0.005)
	14.55%	7.77%	4.63%	3.24%
N	203,184	187,635	203,184	187,635
C. Parental controls (incl. entrepreneurship)				
	0.032	0.015	0.012	0.010
	(0.003)	(0.002)	(0.002)	(0.004)
	9.08%	5.76%	2.49%	2.20%
N	203,184	187,635	203,184	187,635
D. All controls (incl. share of entrepreneurs in neighborhood)				
	0.023	0.010	0.008	0.008
	(0.002)	(0.002)	(0.002)	(0.004)
	6.39%	4.03%	1.65%	1.89%
N	203,182	187,631	203,182	187,631
Odds ratios:				
% Other parents uninc.	5.517***	2.276***	1.796***	1.540***
% Other parents inc.	4.512***	16.924***	34.715***	7.097***

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parentheses. The percentages indicate the contribution of the neighborhood correlation to the corresponding sibling correlations in Table 3. Panel D also displays the odds ratios of the share of parents of individuals in the same parish who have been unincorporated or incorporated (leaving out the focal individual's own parents).

Table 5: **Accounting Exercise: Parental Characteristics**

	Unincorporated $\geq 4y$		Incorporated $\geq 5y$		Unincorporated $\geq 4y$		Incorporated $\geq 5y$	
	Brothers	Sisters	Brothers	Sisters	Brothers	Sisters	Brothers	Sisters
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Parental education and income								
Mother schooling	1.016**	1.052***	1.066***	1.044***				
Father schooling	0.941***	1.044***	1.001	1.080				
Parental income: [a]								
Pct. 10-20					0.921***	0.967	1.283***	1.115
Pct. 20-30					0.717***	0.940	1.444***	1.254***
Pct. 30-40					0.671***	0.927	1.549***	1.466***
Pct. 40-50					0.591***	0.871***	1.667***	1.464***
Pct. 50-60					0.580***	0.908*	1.661***	1.582***
Pct. 60-70					0.585***	0.899**	1.950***	1.700***
Pct. 70-80					0.606***	0.978	2.323***	1.980***
Pct. 80-90					0.576***	1.115**	2.912***	2.585***
Pct. 90-95					0.542***	1.178***	3.347***	3.309***
Pct. 95-99					0.546***	1.426***	4.241***	4.530***
Pct. 99-100					0.600***	1.822***	6.499***	8.468***
ρ^*	0.350	0.250	0.480	0.448	0.347	0.252	0.466	0.422
	(0.010)	(0.017)	(0.011)	(0.022)	(0.010)	(0.017)	(0.011)	(0.023)
	0.74%	1.50%	0.00%	0.03%	1.59%	0.84%	2.76%	5.80%

continued

Table 5 (cont'd): **Accounting Exercise: Parental Characteristics**

	Unincorporated $\geq 4y$		Incorporated $\geq 5y$		Unincorporated $\geq 4y$		Incorporated $\geq 5y$	
	Brothers (1)	Sisters (2)	Brothers (3)	Sisters (4)	Brothers (5)	Sisters (6)	Brothers (7)	Sisters (8)
B. Parental entrepreneurship and immigration status								
Mother unincorporated	1.736***	1.754***	1.384***	1.282***				
Father unincorporated	2.182***	1.403***	1.391***	1.152***				
Mother incorporated	0.850***	1.263***	3.205***	4.428***				
Father incorporated	0.789***	1.141***	4.333***	2.259***				
Mother immigrant					1.055	1.031	0.772***	0.873*
Father immigrant					1.117***	1.045	0.823***	0.942
ρ^*	0.322	0.240	0.415	0.387	0.353	0.255	0.478	0.447
	(0.011)	(0.017)	(0.011)	(0.024)	(0.010)	(0.017)	(0.010)	(0.021)
	8.77%	5.45%	13.31%	13.58%	0.08%	0.00%	0.15%	0.23%
C. Family structure								
Single mother [b]	1.101**	1.113*	1.277***	1.036				
Single father [b]	1.015	1.031	1.516***	1.393***				
Mother, new husband [b]	0.933	1.073	0.929	1.204*				
Father, new wife [b]	0.941	0.968	0.622	0.741*				
Family size					1.043***	0.990	0.960***	0.942***
Mother age at first birth					1.005**	1.009***	0.999	1.000
Mother partner count					0.890**	0.929	0.675***	0.550***
Adoptive children present					0.861	1.019	0.940	0.892
ρ^*	0.353	0.254	0.474	0.445	0.353	0.253	0.476	0.442
	(0.010)	(0.017)	(0.010)	(0.021)	(0.010)	(0.017)	(0.010)	(0.021)
	0.04%	0.10%	0.97%	0.68%	0.03%	0.51%	0.56%	1.26%

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parentheses. The percentages indicate the contribution of parental characteristics to the corresponding sibling correlations in Table 3. For parental income, the reference category is the bottom decile of parental income distribution; for family structure, the reference category is the intact family. The sample size varies slightly with the availability of information on parental characteristics. Results are very similar when restricting the analysis to individuals with complete data on parental characteristics.

Table 6: **Upper Bounds on Peer Effects Contribution to Sibling Correlations**

	Effect on younger sibling		Effect on older sibling	
	(1)	(2)	(3)	(4)
A. Unincorporated				
All sibling types	5.11	5.05	-2.07	-3.71
Males	7.24**	7.82**	-1.19	-1.97
Females	10.29	9.78	4.04	-0.55
Mixed (younger brother)	-9.99	-8.36	-2.68	-3.70
Mixed (younger sister)	0.72	-1.84	-12.02	-14.52
B. Incorporated				
All sibling types	-2.78	-1.37	2.12	2.85*
Males	-0.61	0.86	0.20	1.45
Females	-8.93*	-7.12	1.61	1.92
Mixed (younger brother)	-5.86	-4.70	7.51	7.73
Mixed (younger sister)	-6.15	-4.36	7.76	7.33
Contemporaneous effect	No	Yes	No	Yes

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All numbers are in percentages, representing the share of the sibling correlation explained by the lagged entrepreneurship status of the older sibling, columns (1) and (2), and the younger sibling, columns (3) and (4), once controls are added and correlated random effects are accounted for. For the full set of results see Appendix Tables B.1-B.5 (the results in this table are based on columns (3), (4), (8) and (9) in those tables). Note that applying a Bonferroni correction for testing multiple hypotheses (i.e., given that we estimate 40 different models, requiring a p-value below $0.00125 = 0.05/40$) would render all estimates insignificant.

Table 7: **Accounting for Cognitive and Non-Cognitive Characteristics**

	Outcome (1)		Uninc. $\geq 4y$ (2)	Inc. $\geq 5y$ (3)	Uninc. $\geq 4y$ (4)	Inc. $\geq 5y$ (5)
Sibling correlation			0.315	0.440	0.302	0.432
			(0.018)	(0.017)	(0.018)	(0.017)
					3.93%	1.79%
	Sibling correlations				**Odds ratios**	
Height	0.533	(0.005)			0.994	1.015
Weight	0.428	(0.006)			1.010	0.984
BMI	0.400	(0.006)			0.983	1.058
Language/logic score A	0.290	(0.006)			0.903***	0.984*
Language/logic score B	0.298	(0.006)			0.906***	0.876***
Spatial ability score	0.261	(0.006)			1.025***	1.007
Technical ability score	0.248	(0.006)			1.033***	1.047***
Leadership score	0.315	(0.006)				
2					1.111	1.363
3					1.094	1.772***
4					1.100	2.509***
5					1.076	3.222***
6					0.962	3.481***
7					0.919	4.160***
8					0.890	4.119***
9					0.959	5.131***
					[0.000]	[0.000]

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parentheses and p-values for the joint significance of the leadership scores in brackets. The percentages indicate the contribution of non-cognitive skills to the corresponding sibling correlations in entrepreneurship in columns (1) and (2). The sample comprises 164,390 men in 144,306 families (of all types), given data availability on all non-cognitive characteristics.

A Appendix: Additional Figures and Tables

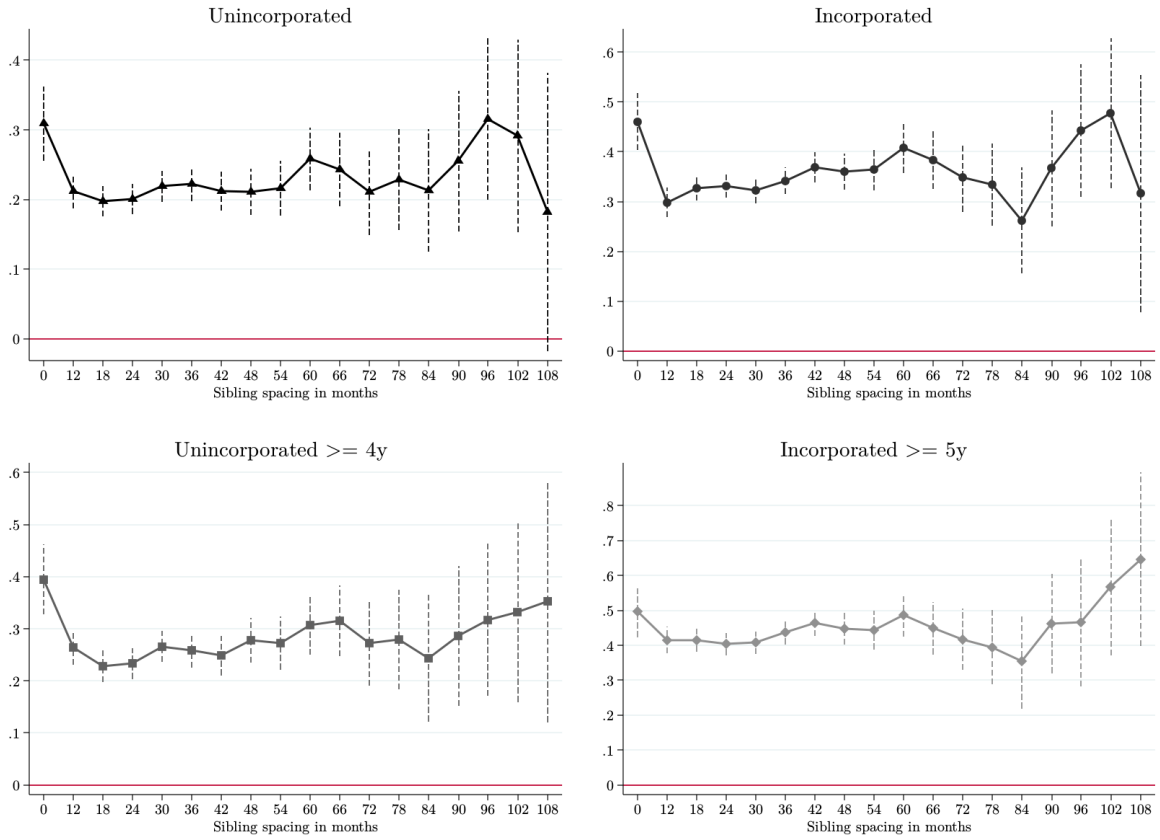

Figure A.1: Twin and sibling correlations in entrepreneurship by sibling spacing.

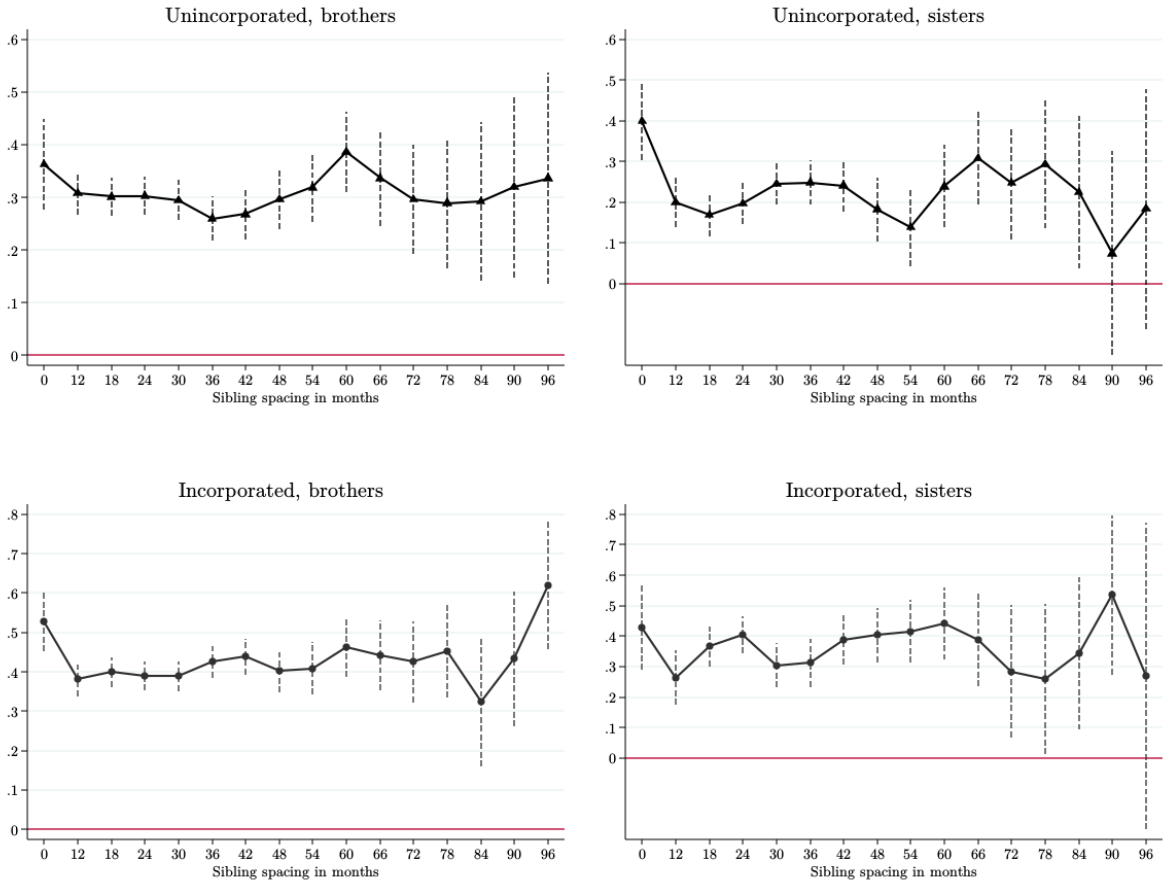

Figure A.2: Twin and sibling correlations in entrepreneurship by sibling spacing and gender.

Table A.1: **Number of Families with *N* Children**

N Children	No. of Families	%	No. of Individuals	%
1	227,860	52.88	227,860	32.73
2	152,050	35.28	304,100	43.68
3	41.818	9.70	125,454	18.02
4	7,592	1.76	30,368	4.36
5	1,312	0.30	6,560	0.94
6	243	0.06	1,458	0.21
7	49	0.01	343	0.05
8	11	0.00	88	0.01
Total	430,935	100.00	696,231	100.00

All children of the same mother are defined as belonging to the same family.

Table A.2: **Sensitivity Analyses**

All siblings	Unincorporated (1)	Incorporated (2)	Uninc. $\geq 4y$ (3)	Inc. $\geq 5y$ (4)
(1) Excl. singletons	0.212	0.342	0.256	0.425
(N=468,371)	(0.004)	(0.007)	(0.006)	(0.006)
(2) Incl. 1985-1992	0.232		0.262	
(N=705,262)	(0.004)		(0.005)	
(3) Outcomes, ages 25-40	0.212	0.368		
(N=705,262)	(0.005)	(0.007)		
(4) Father	0.204	0.331	0.247	0.414
(N=685,727)	(0.004)	(0.005)	(0.006)	(0.007)
(5) Excl. adoptive fathers	0.206	0.332	0.249	0.415
(N=673,203)	(0.004)	(0.005)	(0.006)	(0.007)
(6) Excl. adoptive mothers	0.212	0.342	0.257	0.425
(N=687,710)	(0.004)	(0.005)	(0.006)	(0.006)
(7) Non-twin pairs	0.214	0.336	0.256	0.426
(N=304,100)	(0.006)	(0.007)	(0.008)	(0.009)
(8) Non-twins, 12-24 months	0.208	0.298	0.258	0.416
(N=67,338)	(0.012)	(0.015)	(0.017)	(0.019)
(9) Complete families	0.200	0.341	0.240	0.416
(N=270,290)	(0.006)	(0.007)	(0.008)	(0.009)
(10) Complete parental data	0.208	0.341	0.252	0.423
(N=658,494)	(0.004)	(0.005)	(0.006)	(0.007)
(11) Age cubic, parent cohort	0.211	0.341	0.254	0.423
(N=696,231)	(0.004)	(0.005)	(0.006)	(0.007)
(12) Excl. farmer parents	0.207	0.340	0.250	0.420
(N=635,367)	(0.005)	(0.005)	(0.006)	(0.007)
(13) 'Fake' families	0.002	0.003	0.004	0.006
(N=696,231)	(0.002)	(0.005)	(0.005)	(0.007)

Standard errors in parentheses. Row (1) excludes singletons; row (2) includes data on unincorporated business, 1985-1992; row (3) restricts the outcomes to entrepreneurship activity between the ages of 25 and 40 (data available from 1985 for unincorporated; the stricter definitions are less meaningful and are omitted here); row (4) redefines the family on the basis of the father; row (5) omits families with an adoptive father; row (6) omits families with an adoptive mother; row (7) restricts the analysis to families with two children; row (8) restricts it further to closely spaced non-twin pairs (born 12 to 24 months apart); row (9) restricts the analysis to families completely captured in our sample; row (10) restricts the analysis to observations for which all parental characteristics are observed; row (11) controls for individuals' age in a cubic manner (instead of linear birth year), and also includes parental cohort effects; row (12) drops families where one of the parents is a farmer; finally, row (13) is a placebo test, where the family cluster structure is replicated and individuals randomly allocated to families in a Monte Carlo simulation with 100 replications.

Table A.3: **Neighborhood Correlations in Entrepreneurship**

	Unincorporated (1)	Incorporated (2)	Uninc. $\geq 4y$ (3)	Inc. $\geq 5y$ (4)
A. No controls				
All	0.028	0.020	0.043	0.024
(N=687,318)	(0.001)	(0.001)	(0.002)	(0.002)
	13.02%	5.89%	16.83%	5.66%
Brothers	0.036	0.019	0.057	0.024
(N=214,081)	(0.002)	(0.002)	(0.004)	(0.003)
	12.18%	4.72%	16.25%	4.95%
Sisters	0.018	0.020	0.022	0.021
(N=197,999)	(0.002)	(0.003)	(0.003)	(0.005)
	8.35%	5.68%	8.74%	4.76%
B. Parental controls (excl. entrepreneurship)				
All	0.027	0.016	0.041	0.023
(N=653,738)	(0.001)	(0.001)	(0.002)	(0.002)
	12.77%	4.64%	16.15%	5.41%
Brothers	0.033	0.014	0.051	0.022
(N=203,184)	(0.002)	(0.002)	(0.004)	(0.003)
	11.34%	3.61%	14.55%	4.63%
Sisters	0.015	0.013	0.020	0.014
(N=187,635)	(0.002)	(0.002)	(0.003)	(0.005)
	7.27%	3.68%	7.77%	3.24%
C. Parental controls (incl. entrepreneurship)				
All	0.017	0.010	0.025	0.014
(N=653,738)	(0.001)	(0.001)	(0.002)	(0.001)
	8.14%	3.02%	9.90%	3.22%
Brothers	0.002	0.009	0.032	0.012
(N=203,184)	(0.002)	(0.001)	(0.003)	(0.002)
	7.55%	2.29%	9.08%	2.49%
Sisters	0.011	0.010	0.015	0.010
(N=187,635)	(0.001)	(0.002)	(0.002)	(0.004)
	5.11%	2.79%	5.76%	2.20%
D. All controls (incl. share of entrepreneurs in neighborhood)				
All	0.013	0.006	0.018	0.009
(N=653,738)	(0.001)	(0.001)	(0.001)	(0.001)
	6.19%	1.89%	7.08%	2.14%
Brothers	0.018	0.006	0.023	0.008
(N=203,180)	(0.002)	(0.001)	(0.002)	(0.002)
	6.01%	1.49%	6.39%	1.65%
Sisters	0.007	0.006	0.010	0.008
(N=187,628)	(0.001)	(0.002)	(0.002)	(0.004)
	3.32%	1.76%	4.03%	1.89%

Standard errors in parentheses. The percentages indicate the contribution of the neighborhood correlation to the corresponding sibling correlations in Table 3.

Table A.4: **Neighborhood (≥ 100) Correlations in Entrepreneurship**

	Unincorporated (1)	Incorporated (2)	Uninc. $\geq 4y$ (3)	Inc. $\geq 5y$ (4)
Sibling correlations				
Brothers	0.289	0.395	0.343	0.471
(N=199,386)	(0.009)	(0.009)	(0.011)	(0.11)
Sisters	0.213	0.354	0.256	0.449
(N=188,465)	(0.012)	(0.016)	(0.018)	(0.022)
A. No controls				
Brothers	0.023	0.018	0.031	0.022
(N=196,338)	(0.002)	(0.002)	(0.003)	(0.002)
	7.87%	4.67%	9.00%	4.67%
Sisters	0.016	0.020	0.020	0.021
(N=181,838)	(0.002)	(0.003)	(0.003)	(0.005)
	7.52%	5.61%	7.96%	4.67%
B. Parental controls (excl. entrepreneurship)				
Brothers	0.023	0.013	0.030	0.019
(N=186,345)	(0.002)	(0.002)	(0.003)	(0.002)
	7.83%	3.39%	8.84%	4.03%
Sisters	0.013	0.012	0.017	0.014
(N=172,305)	(0.002)	(0.002)	(0.002)	(0.005)
	5.95%	3.47%	6.60%	3.02%
C. Parental controls (incl. entrepreneurship)				
Brothers	0.018	0.009	0.015	0.008
(N=186,345)	(0.001)	(0.001)	(0.001)	(0.001)
	6.32%	2.30%	6.87%	2.35%
Sisters	0.010	0.010	0.014	0.009
(N=172,305)	(0.001)	(0.002)	(0.002)	(0.004)
	4.66%	2.69%	5.47%	2.09%
D. All controls (incl. share of entrepreneurs in neighborhood)				
Brothers	0.016	0.006	0.020	0.007
(N=186,345)	(0.001)	(0.001)	(0.002)	(0.002)
	5.49%	1.47%	5.70%	1.56%
Sisters	0.007	0.006	0.010	0.008
(N=172,305)	(0.001)	(0.002)	(0.002)	(0.004)
	3.07%	1.56%	3.72%	1.80%

Standard errors in parentheses. The percentages indicate the contribution of the neighborhood correlation to the corresponding sibling correlations. The analysis in this table is restricted to parishes for which more than 100 observations are available.

Table A.5: **Accounting Exercise: Effect of Noisy Random Variables**

	Unincorporated (1)	Incorporated (2)	Uninc. $\geq 4y$ (3)	Inc. $\geq 5y$ (4)
A. Individual level: 20 random variables in (0,1)				
Brothers	0.293	0.402	0.353	0.480
(N=217,129)	(0.008)	(0.008)	(0.010)	(0.010)
	0.02%	0.15%	-0.04%	0.11%
Sisters	0.211	0.350	0.254	0.449
(N=200,626)	(0.012)	(0.015)	(0.017)	(0.021)
	0.05%	-0.12%	0.04%	0.27%
B. Individual level: 100 random variables in (0,1)				
Brothers	0.293	0.402	0.353	0.481
(N=217,129)	(0.008)	(0.008)	(0.010)	(0.010)
	0.05%	0.19%	0.09%	0.24%
Sisters	0.212	0.350	0.254	0.449
(N=200,626)	(0.012)	(0.015)	(0.017)	(0.021)
	0.10%	0.09%	0.07%	0.28%
C. Family level: 20 random variables in (0,1)				
Brothers	0.292	0.401	0.353	0.479
(N=217,129)	(0.008)	(0.008)	(0.010)	(0.010)
	-0.02%	-0.09%	-0.06%	-0.08%
Sisters	0.211	0.349	0.254	0.447
(N=200,626)	(0.012)	(0.015)	(0.017)	(0.021)
	-0.22%	-0.19%	-0.13%	-0.08%
D. Family level: 100 random variables in (0,1)				
Brothers	0.291	0.401	0.352	0.479
(N=217,129)	(0.008)	(0.008)	(0.010)	(0.010)
	-0.35%	-0.17%	-0.42%	-0.12%
Sisters	0.210	0.349	0.252	0.445
(N=200,626)	(0.012)	(0.015)	(0.017)	(0.021)
	-0.72%	-0.32%	-0.74%	-0.56%

Standard errors in parentheses. The percentages indicate the change in the sibling correlations in Table 3 once the noisy random variables are controlled for (a positive percentage change indicates an increase in the sibling correlation, while a negative sign indicates a decrease). In panels A and B, the noisy random variables are generated at the individual level, and the largest change in the sibling correlation is of 0.28%. In panels C and D, the noisy random variables are generated at the family level, such that they are the same for siblings, and should have a higher explanatory power than those generated at the individual level. Even so, they explain at most 0.74% of the sibling correlation. While the number of variables appears inconsequential when variables are generated at the individual level, when they are generated at the family level the decrease is slightly larger when 100 variables are added instead of 20.

Table A.6: **Accounting Exercise: Total Effect of Parental Characteristics**

	Unincorporated (1)	Incorporated (2)	Uninc. $\geq 4y$ (3)	Inc. $\geq 5y$ (4)
A. Parental education and income				
Brothers	0.286	0.379	0.344	0.461
(N=204,760)	(0.009)	(0.009)	(0.011)	(0.011)
	2.035%	5.50%	2.29%	3.91%
Sisters	0.205	0.322	0.250	0.418
(N=189,019)	(0.012)	(0.016)	(0.017)	(0.024)
	3.08%	7.92%	1.64%	6.71%
B. Family structure				
Brothers	0.292	0.396	0.353	0.472
(N=217,124)	(0.008)	(0.009)	(0.010)	(0.010)
	0.03%	1.41%	0.06%	1.57%
Sisters	0.210	0.344	0.252	0.440
(N=200,615)	(0.012)	(0.015)	(0.017)	(0.021)
	0.62%	1.63%	0.61%	1.63%
C. Parental entrepreneurship and immigration				
Brothers	0.268	0.345	0.321	0.415
(N=213,511)	(0.008)	(0.009)	(0.011)	(0.011)
	8.49%	14.01%	9.20%	13.45%
Sisters	0.199	0.309	0.239	0.387
(N=197,213)	(0.012)	(0.016)	(0.017)	(0.024)
	6.01%	11.80%	5.83%	13.57%
D. All parental characteristics				
Brothers	0.261	0.332	0.313	0.405
(N=204,756)	(0.009)	(0.009)	(0.011)	(0.012)
	10.69%	17.15%	11.41%	15.62%
Sisters	0.191	0.290	0.232	0.375
(N=189,011)	(0.012)	(0.017)	(0.018)	(0.025)
	9.72%	17.03%	8.48%	16.26%

Standard errors in parentheses. The percentages indicate the contribution of parental characteristics to the corresponding sibling correlations in Table 3.

Table A.7: **Genetic Exercise: Sibling Correlations for Different Sibling Types**

	Unincorporated (1)	Incorporated (2)	Uninc. $\geq 4y$ (3)	Inc. $\geq 5y$ (4)
A. Twin correlations				
Brothers	0.363	0.528	0.510	0.543
(N=4,416)	(0.044)	(0.038)	(0.047)	(0.047)
Sisters	0.399	0.429	0.358	0.512
(N=4,438)	(0.048)	(0.072)	(0.074)	(0.132)
B. Closely spaced sibling correlations				
Brothers	0.306	0.384	0.358	0.481
(N=37,772)	(0.014)	(0.015)	(0.018)	(0.017)
Sisters	0.206	0.355	0.262	0.396
(N=33,288)	(0.020)	(0.027)	(0.054)	(0.042)
C. Half sibling correlations				
Brothers	0.157	0.317	0.165	0.340
(N=5,036)	(0.041)	(0.049)	(0.063)	(0072)
Sisters	0.201	0.130	0.236	0.435
(N=4,746)	(0.056)	(0.122)	(0.083)	(0.133)
D. Adoptee correlations				
Brothers	0.304	0.223	0.035	0.370
(N=1,010)	(0.087)	(0.107)	(0.183)	(0.126)
Sisters	0.105	0.335	0.170	0.370
(N=1,126)	(0.118)	(0.141)	(0.197)	(0.221)

Standard errors in parentheses. We define closely spaced siblings as siblings born 12 to 36 months apart; their correlations closely match the ones for the entire sample.

Table A.8: **Accounting for Cognitive and Non-Cognitive Characteristics, Brothers**

	Uninc. $\geq 4y$ (1)	Inc. $\geq 5y$ (2)	Uninc. $\geq 4y$ (3)	Inc. $\geq 5y$ (4)
Sibling correlation	0.320	0.437	0.308	0.430
	(0.021)	(0.020)	(0.021)	(0.020)
			3.60%	1.58%
	Sibling correlations:		**Odds ratios:**	
Height	0.531	(0.005)	0.995	1.033*
Weight	0.432	(0.007)	1.008	0.961*
BMI	0.407	(0.007)	0.994	1.140*
Language and logic score A	0.290	(0.007)	0.900***	0.978*
Language and logic score B	0.295	(0.007)	0.910***	0.875***
Spatial ability score	0.252	(0.007)	1.029***	1.010
Technical ability score	0.313	(0.007)	1.032***	1.057***
Leadership score	0.315	(0.007)		
2			1.107	1.300
3			1.021	1.743***
4			1.011	2.497***
5			0.987	3.212***
6			0.893	3.532***
7			0.866	3.946***
8			0.824	4.064***
9			0.845	4.906***
			[0.000]	[0.000]

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Standard errors in parentheses and p-values for the joint significance of the leadership scores in brackets. The percentages indicate the contribution of non-cognitive skills to the corresponding sibling correlations in entrepreneurship in columns (1) and (2). The sample comprises 102,206 men in 87,584 male only families, given data availability on all non-cognitive characteristics.

B Appendix: Peer Effects Model

In this appendix, we provide a more formal exposition of the correlated random effects model suggested by Altonji et al. (2016) that we adopt for the purpose of estimating sibling peer effects in entrepreneurship. We begin by estimating the raw association between sibling i's entrepreneurship status (unincorporated or incorporated) at time t, $S_t^{i'}$, and sibling i''s entrepreneurship status at time $t-1$, $S_{t-1}^{i'}$:

$$S_t^i = \beta_0 + \beta_1 S_{t-1}^{i'} + u_t^2, \tag{11}$$

where the family subscript f is suppressed. We then add the set of controls used in the accounting exercise, X^f, and age dummies age_t^i for the focal sibling i:

$$S_t^i = \beta_0 + \beta_1 S_{t-1}^{i'} + X^f + age_t^i + \epsilon_t^2. \tag{12}$$

We estimate equations (11) and (12) (corresponding to columns (1), (2), (6) and (7) in Tables B.1 to B.5) by using the panel structure of our data, limiting the sample to families with two children.[31] We later split the sample into pairs of males, females, and mixed gender pairs, where the younger sibling is male or female. We use logistic regressions in order to maintain consistency with previous estimation techniques, and we report both odds ratios and (approximated) sibling correlations, as explained in the notes to Table B.1.

Part of the effect of sibling i''s entrepreneurial status on sibling i's entrepreneurial status estimated in equation (12), however, may be due to correlated random family effects, rather than direct peer effects. Altonji et al. (2016) suggest the use of a correlated random effects regression to isolate the direct sibling effect, achieving causal inference by assuming one-directional causation (whereas our study does not attempt to directly target causality); they control for the sum of sibling i''s entrepreneurial status at time $t-1$ and $t+1$ to net out the unobservable family component. We can then write:

$$S_t^i = \beta_0 + \beta_1 (S_{t-1}^{i'} + S_{t+1}^{i'}) + \lambda_0 S_{t-1}^{i'} + X^f + age_t^i + age_t^{i'} + \epsilon_t^2, \tag{13}$$

where the direct (lagged) sibling effect is captured by λ_0.[32] Similarly, we can also include a direct contemporaneous sibling influence by including sibling i''s entrepreneurial status at time t, $S_t^{i'}$, in conjunction with an expanded control for correlated random effects:

$$S_t^i = \beta_0 + \beta_1 (S_{t-1}^{i'} + S_t^{i'} + S_{t+1}^{i'}) + \lambda_0 S_{t-1}^{i'} + \lambda_1 S_t^{i'} + X^f + age_t^i + age_t^{i'} + \epsilon_t^2, \tag{14}$$

where λ_1 is the estimate of the contemporaneous effect. This estimate should not be interpreted as a contemporaneous effect, but rather as a transitory and common shock to both siblings in the same family. Hence, we do not sum the lagged and contemporaneous sibling effect when analyzing the contribution of peers to the sibling correlation (in contrast to Eriksson et al., 2016, for instance). Results for equations (13) and (14) are given in columns (3), (4), (8) and (9) of Tables B.1-B.5 below, while columns (5) and (10) present results from a variation of equation (11), where the lagged sibling effect is replaced by the contemporaneous one (this equation being necessary for calibration purposes).

As an example of how these tables should be interpreted, Table B.1 shows the results of our sibling peer effects exercise on the sub-sample of sibling pairs, with panel A referring to unincorporated business ownership and panel B to incorporation; in columns (1) to (5) sibling

[31] Sibling correlations for this sample are reported in row (7) of Appendix Table A.2 and closely match those reported in Table 3; see also footnote 20.

[32] A detailed description of the assumptions and mechanics of this model is provided in Altonji et al. (2016). Importantly, they assume that only older siblings can influence the younger ones (and not the other way around), and that parental treatment of younger siblings does not change upon observing the behavior of older siblings.

i is the younger one, whereas in columns (6)-(10), sibling i is the older one. The results suggest a positive and significant (at 10 percent) impact of the younger sibling's incorporation status at time $t-1$ on the older sibling's incorporation status at time t (Table B.1, column (9)); this translates into a sibling correlation $\rho = 0.009$ as given by the lagged sibling effect, representing 2.85 percent of the baseline sibling correlation (column (4) of Table 6).

Table B.1: **Peer Effects Exercise, All Sibling Types**

	A. Unincorporated									
	Old on young $[\phi_{t-1} = 0.084, \phi_t = 0.082]$					Young on old $[\phi_{t-1} = 0.084, \phi_t = 0.082]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S^{i'}_{t-1}$)	3.096***	2.510***	1.065	1.065		3.067***	2.487***	0.975	0.955	
ρ	0.208	0.166	0.011	0.011		0.208	0.166	-0.004	-0.008	
OR($S^{i'}_{t}$)				1.041	3.185***				0.955	3.185***
ρ				0.007	0.208				-0.007	0.208
	B. Incorporated									
	Old on young $[\phi_{t-1} = 0.068, \phi_t = 0.066]$					Young on old $[\phi_{t-1} = 0.068, \phi_t = 0.066]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S^{i'}_{t-1}$)	7.802***	4.584***	0.936	0.968		0.942***	4.583***	1.052	1.070*	
ρ	0.324	0.231	-0.009	-0.004		0.324	0.229	0.007	0.009	
OR($S^{i'}_{t}$)				1.650***	8.412***				1.632***	8.412***
ρ				0.068	0.324				0.067	0.324
Family background		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i'			Yes	Yes				Yes	Yes	
$S^{i'}_{t-1} + S^{i'}_{t+1}$			Yes					Yes		
$S^{i'}_{t-1} + S^{i'}_{t} + S^{i'}_{t+1}$				Yes					Yes	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. In columns (1)-(5), sibling i is the younger sibling; in columns (6)-(10), sibling i is the older sibling. The odds ratios (OR) are estimated using logistic regressions. Family background variables are those used in the accounting exercise: parental education, income, immigration, ownership of an unincorporated or incorporated business, and the family structure variables. Sibling correlations in columns (1), (5), (6) and (10) are estimated using Stata's *xtlogit* command; those in columns (2)-(4) and (7)-(9) are approximated using the following formula (Bonett, 2007): $\rho \approx (OR^{\phi} + 1)(OR^{\phi} - 1)$, where ϕ is calibrated using the odds ratios and sibling correlations estimated in columns (1) and (6) for lagged effects (ϕ_{t-1}), and (5) and (10) for contemporaneous effects (ϕ_t).

Table B.2: **Peer Effects Exercise, Brothers**

	A. Unincorporated									
	Old on young $[\phi_{t-1} = 0.084, \phi_t = 0.082]$					Young on old $[\phi_{t-1} = 0.084, \phi_t = 0082]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S^{i'}_{t-1}$)	4.530***	3.596***	1.131**	1.142**		4.487***	3.542***	0.980	0.967	
ρ	0.289	0.240	0.021	0.023		0.289	0.238	-0.003	-0.006	
OR($S^{i'}_{t}$)				1.178**	4.723***				1.029	4.723***
ρ				0.027	0.289				0.005	0.289
	B. Incorporated									
	Old on young $[\phi_{t-1} = 0.075, \phi_t = 0.073]$					Young on old $[\phi_{t-1} = 0.075, \phi_t = 0.73]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S^{i'}_{t-1}$)	9.542***	5.754***	0.984	1.023		9.646***	5.730***	1.006	1.040	
ρ	0.405	0.302	-0.002	0.003		0.405	0.300	0.001	0.006	
OR($S^{i'}_{t}$)				1.945***	10.395***				1.821***	10.395***
ρ				0.102	0.405				0.091	0.405
Family background		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i'			Yes	Yes				Yes	Yes	
$S^{i'}_{t-1} + S^{i'}_{t+1}$			Yes					Yes		
$S^{i'}_{t-1} + S^{i'}_{t} + S^{i'}_{t+1}$				Yes					Yes	

See notes to Table B.1. The p-values of the significant odds ratios of $S^{i'}_{t-1}$ in columns (3) and (4) of panel A are 0.045 and 0.034, respectively.

Table B.3: **Peer Effects Exercise, Sisters**

	A. Unincorporated									
	Old on young $[\phi_{t-1} = 0.087, \phi_t = 0.085]$					Young on old $[\phi_{t-1} = 0.088, \phi_t = 0.085]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S_{t-1}^{i'}$)	3.136***	2.668***	1.137	1.130		3.095***	2.629***	1.052	0.993	
ρ	0.221	0.187	0.023	0.022		0.221	0.186	0.009	-0.001	
OR($S_t^{i'}$)				1.120	3.259***				1.023	3.259***
ρ				0.019	0.221				0.004	0.221
	B. Incorporated									
	Old on young $[\phi_{t-1} = 0.062, \phi_t = 0.060]$					Young on old $[\phi_{t-1} = 0.061, \phi_t = 0.060]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S_{t-1}^{i'}$)	11.005***	6.870***	0.776*	0.818		11.509***	7.107***	1.047	1.056	
ρ	0.345	0.269	-0.031	-0.025		0.345	0.268	0.006	0.007	
OR($S_t^{i'}$)				1.428*	11.990***				1.459*	11.990***
ρ				0.043	0.345				0.046	0.345
Family background		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i'			Yes	Yes				Yes	Yes	
$S_{t-1}^{i'} + S_{t+1}^{i'}$			Yes					Yes		
$S_{t-1}^{i'} + S_t^{i'} + S_{t+1}^{i'}$				Yes					Yes	

See notes to Table B.1.

Table B.4: **Peer Effects Exercise, Mixed (Younger Brother)**

	A. Unincorporated									
	Old on young $[\phi_{t-1} =, \phi_t =]$					Young on old $[\phi_{t-1} =, \phi_t =]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S_{t-1}^{i'}$)	2.026***	1.772***	0.927	0.939		2.043***	1.784***	0.980	0.972	
ρ	0.133	0.107	-0.013	-0.011		0.133	0.107	-0.004	-0.005	
OR($S_t^{i'}$)				0.852	2.063***				0.914	2.062***
ρ				-0.027	0.133				-0.015	0.133
	B. Incorporated									
	Old on young $[\phi_{t-1} =, \phi_t = 8]$					Young on old $[\phi_{t-1} =, \phi_t =]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S_{t-1}^{i'}$)	5.491***	3.051***	0.896	0.916		5.587***	3.121***	1.150	1.155	
ρ	0.189	0.120	-0.011	-0.009		0.189	0.121	0.014	0.015	
OR($S_t^{i'}$)				1.351**	5.792***				1.309**	5.792***
ρ				0.030	0.189				0.027	0.189
Family background		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i'			Yes	Yes				Yes	Yes	
$S_{t-1}^{i'} + S_{t+1}^{i'}$			Yes					Yes		
$S_{t-1}^{i'} + S_t^{i'} + S_{t+1}^{i'}$				Yes					Yes	

See notes to Table B.1.

Table B.5: **Peer Effects Exercise, Mixed (Younger Sister)**

	A. Unincorporated									
	Old on young $[\phi_{t-1} = 0.078, \phi_t = 0.078]$					Young on old $[\phi_{t-1} = 0.080, \phi_t = 0.078]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S_{t-1}^{i'}$)	2.230***	1.950***	1.006	0.984		2.178***	1.922***	0.904	0.886	
ρ	0.133	0.110	0.001	-0002		0.133	0.111	-0.016	-0.019	
OR($S_t^{i'}$)				0.915	2.235***				0.793**	2.235***
ρ				-0.014	0.133				-0.035	0.133
	B. Incorporated									
	Old on young $[\phi_{t-1} = 0.054, \phi_t = 0.052]$					Young on old $[\phi_{t-1} = 0.053, \phi_t = 0.052]$				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
OR($S_{t-1}^{i'}$)	4.950***	3.040***	0.898	0.926		5.111***	3.126***	1.147	1.138	
ρ	0.189	0.128	-0.012	-0.008		0.189	0.128	0.015	0014	
OR($S_t^{i'}$)				1.273*	5.286***				1.518***	5.286***
ρ				0.025	0.189				0.044	0.189
Family background		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i		Yes	Yes	Yes			Yes	Yes	Yes	
Age dummies, i'			Yes	Yes				Yes	Yes	
$S_{t-1}^{i'} + S_{t+1}^{i'}$			Yes					Yes		
$S_{t-1}^{i'} + S_t^{i'} + S_{t+1}^{i'}$				Yes					Yes	

See notes to Table B.1.