Learning via the Band of Brothers: Evidence of Entrepreneurial Spillover*

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Abstract

We study whether and how entrepreneurial exposure to weak social ties—peers' entrepreneurial parents—shapes entrepreneurial entry and performance for young adults. Our empirical setting exploits entrepreneurial exposure variation across randomly assigned peer groups during compulsory military service. We find that raising the share of peers' entrepreneurial parents by one standard deviation increases individuals' propensity to become entrepreneurs by 20 percent. The effect is stronger in smaller groups, where interaction is easier, and among individuals who would otherwise lack entrepreneurial connections. We show that the effect is primarily driven by successful peers' parents and comprises a significant within-industry component, suggesting a knowledge spillover channel. Consistent with this notion, peers' successful parents also lead to better performance in post-service entrepreneurship.

Keywords: entrepreneurial exposure, entrepreneurial spillover, randomized social groups, social finance, weak social ties, knowledge spillover

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1. Introduction

Entrepreneurial firms drive job creation and economic growth (Haltiwanger, Jarmin, and Miranda 2013, Klenow and Li 2021), yet academics and policy makers still struggle to understand factors that channel would-be founders towards viable start-ups (Lerner 2009). In particular, exposure to successful entrepreneurs in social settings has been documented as an important channel for entrepreneurial spillover (Parker 2018).[1] There is now much evidence of entrepreneurial spillover effects via close social ties such as classmates, coworkers, or own family (Lerner and Malmendier 2013, Lindquist et al. 2015, Wallskog 2024). However, we know far less about whether and how individuals learn from more distant, weak ties.[2]

In this paper, we explore a novel social channel that plausibly leads to entrepreneurship for young adults: exposure to peers' entrepreneurial parents. Such social link is a type of weak tie—similar to acquaintances or friends' friends—that provides access to more diverse backgrounds and perspectives compared to one's immediate clique (Granovetter 1973, 1983). Weak ties lead to diffusion of new ideas through the social network. Hong, Kubik, and Stein (2004), for example, show that informative interactions with casual acquaintances lead to stock market participation. In our context, for young adults without entrepreneurial family backgrounds, peers' entrepreneurial parents serve as natural candidates from whom they can gain inspiration and knowledge.[3]

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[1] Prior evidence suggests social interactions driving entrepreneurship in the contexts of workplace (Gompers, Lerner, and Scharfstein 2005, Nanda and Sørensen 2010, Wallskog 2024), local community (Giannetti and Simonov 2009, Guiso, Pistaferri, and Schivardi 2021), classroom (Falck, Heblich, and Luedemann 2012, Lerner and Malmendier 2013, Kacperczyk 2013, Shue 2013, Hacamo and Kleiner 2024, Mertz, Ronchi, and Salvestrini 2024), family members (Lindquist, Sol, and Van Praag 2015, Hvide and Oyer 2020), entrepreneurial training (Karlan and Valdivia 2011, Field, Jayachandran, Pande, and Rigol 2016, Eesley and Wang 2017, Chatterji, Delecourt, Hasan, and Koning 2019, Hasan and Koning 2019), or academic research (Marx and Hsu 2022). For a review, see Parker (2018).

[2] More generally, social interactions have been shown to lead to technology adoption (Foster and Rosenzweig 1995, Conley and Udry 2010), investor behavior spillover (Hong, Kubik, and Stein 2004, 2005, Brown, Ivković, Smith and Weisbenner 2008), or academic contagion (Sacerdote 2001).

[3] Founder anecdotes point to the role of weak ties in early-life entrepreneurship. Travis Kalanick, co-founder of Uber, did not grow up in an entrepreneurial family and started his first business called New Way Academy with the father of a classmate at 18. Robert Morcos, founder and CEO of Social Mobile, credited his entry into the mobile technology field to visits to his friend's father's cellphone repair and resale business. Social Mobile now employees about 100 employees with close to USD40 million annual revenue.

Exploring the role of entrepreneurial exposure in a social setting presents at least two empirical challenges. The first is that social group membership is endogenous; that is, individuals with similar family characteristics may self-select into the same social group, workplace, or location. Thus, a positive correlation between individual entrepreneurship and the presence of peers' entrepreneurial parents does not permit causal inferences (Manski 1993, Angrist 2014, Sacerdote 2014, Kuchler and Stroebel 2021).

A related issue is that even random social group assignments are often among individuals who choose to enroll in a school, join a firm, or move to a community.[4] These choices are plausibly dependent on individuals' expectations of their future peers, leading to a form of self-selection bias even in random assignment designs. An empirical setting where individuals do not have the liberty to choose to participate mitigates this concern.

A second empirical challenge is that limited access to detailed personal and financial information constrains prior studies to examine start-up performances.[5] Social interactions may lead to knowledge spillover or cheaper capital that promote better outcomes (Kacperczyk 2013, Hvide and Oyer 2020, Guiso et al. 2021, Mertz et al. 2024). Alternatively, exposure to entrepreneurship may simply raise awareness to this career choice and lowers the fear and uncertainty associated with entrepreneurship (Portyanko et al. 2023). This latter mechanism leads to mediocre or inferior startups.[6] Without detailed financial information on follow-up startups, one is limited from examining which mechanisms are borne out of data.

To address these challenges, we develop an empirical setting that leverages random assignments of Taiwanese male citizens to military peer groups as part of their compulsory military service. In Taiwan, all male citizens above eighteen years of age are legally required to

[4] Homophily leads to individuals disproportionally associating with similar others (Hong and Page 2004, Golub and Jackson 2012, Jackson 2024).
[5] Two recent exceptions are Wallskog (2024) and Mertz et al. (2024). The former shows that entrepreneurial exposure at workspace leads to worse startups on average. The latter finds that entrepreneurial exposure during adolescence leads to more entry and better performance in entrepreneurship among women.
[6] For example, the latter mechanism may induce biased beliefs about own entrepreneurial abilities (Cooper, Woo, and Dunkelbert 1988, Camerer and Lovallo 1999, Arabsheibani et al. 2000).

serve for twelve months, mitigating the choice of participation concern. Importantly, assignments to military units are based on public lotteries with little room for manipulation, leading to randomized social groupings. In addition, our data covers five consecutive draft years with close to 350,000 draftees and 1,310 identified peer groups. The scope of our data renders our findings and magnitude estimates more generalizable and applicable for policy considerations. Finally, we also have detailed information on personal demographics and private company financials that allows us to understand better the nature of entrepreneurial exposure and measure, if any, the scope of learning therein. This feature also enables us to speak to productivity and labor market implications.

Our first set of findings concern the effect of weak tie exposure—specifically, exposure to peers' entrepreneurial parents—on entrepreneurial entry. We find that, relative to the sample average, individuals are approximately 20 percent more likely to become entrepreneurs post-service if the fraction of their peers' parents with pre-service entrepreneurial experience increases by one standard deviation. The implied economic significance from our estimates is considerably larger than prior studies of social interactions.[7] In addition to differences in empirical settings and plausibly causal identification, we believe the larger economic effect speaks to the importance of weak ties in entrepreneurial spillovers.

Next, we investigate cross-sectional variations along the line of group size. Individuals from smaller groups are more likely to participate in social activities and interact with each other repeatedly (Levine and Moreland 1990, Hvide and Östberg 2015).[8] Given the risk and complexity of entrepreneurial entry, frequent peer interactions validate and reinforce information from peers' entrepreneurial parents (Centola and Macy 2007). Consistent with expectation, our

[7] For example, Nanda and Sørensen (2010), using data from Denmark, find that a one standard deviation increase in coworkers' entrepreneurial experience leads to a 4% increase in future entrepreneurship. Guiso, Pistaferri, and Schivardi (2021) show that a one standard deviation increase in local firm density in Italy leads to an 8% increase in future entrepreneurship. Similarly, Giannetti and Simonov (2009) use Swedish data and find that a one standard deviation increase in local entrepreneurship leads to a 5.7% increase in future entrepreneurship.

[8] Hvide and Östberg (2015) study peer effects in stock investment among coworkers. Similar to our finding, they show that peer effects are stronger in smaller workplaces. More generally, Hwang (2023) provides a literature review of the role of word-of-mouth communication in investing decisions.

results show that the effect of entrepreneurial exposure is largely concentrated among small peer groups.

To provide corroborating evidence, we first explore conditions under which weak ties are expected to yield greater marginal benefits. We find that peers' entrepreneurial parents have greater impact on individuals with lower education attainment or family wealth. These results are consistent with prior studies that find individuals with lower social-economic status lack connections that truly bridge them to distinct social groups with high-status individuals (Lin, Vaughn, and Ensel 1981, Granovetter 1983, Bailey, Cao, Kuchler, and Stroebel 2018, Chetty et al. 2022). The cross-sectional variation in educational attainment also implies that entrepreneurial training from schooling is a substitute for entrepreneurial exposure in a social setting (Nanda and Sørensen 2010).[9]

We explore further the nature of exposure. We find that our main effect has a strong within-industry component, suggesting that entrepreneurial exposure entails industry knowledge spillover. Given the complex and highly uncertain nature of entrepreneurial entry, behavioral changes require social reinforcement and verification through redundant ties that deepen knowledge spillovers (Centola and Macy 2007, Centola 2010, Beaman et al. 2021). Consistent with this view, we find that industry diversification leads to more entrepreneurial entry only when there are very few entrepreneurial parents.

By contrast, we show that the effect on entrepreneurial entry is not significantly different when we separate out entrepreneurial exposure due to peers' fathers or mothers. This stands in interesting contrast with evidence for role modeling in the context of strong social ties such as within-family intergenerational exposure.[10]

[9] Advanced schooling provides training that enhances an individual's managerial ability that promotes entrepreneurship (Lucas 1978, Calvo and Wellisz 1980), leading to a positive relation between education attainment and entrepreneurship (e.g., Borjas and Bronars 1989, Evans and Leighton 1989).
[10] For example, Sørensen (2007) and Lindquist et al. (2015) find support for gender role modeling in entrepreneurial spillover in families.

Our second set of tests attempt to understand the nature of spillover through the prism of post-military entrepreneurial outcomes. We find that peers' entrepreneurial parents tend to elicit successful post-service start-ups relative to unsuccessful ones. These findings suggest that, on average, entrepreneurial exposure from peers' parents entails some scope of learning. A one standard deviation increase in the share of entrepreneurial parents increases the share of successful entrepreneurs by 32 percent compared to the sample mean. Across 1,310 peer groups, this translates to 14,145 more employees hired by entrepreneurs in our sample. Our results stand in interesting contrast to studies focusing on workspace peer spillover that tend to find little evidence on learning (Wallskog 2024). One potential explanation is that peer spillover driven by homophily (i.e., individuals that choose to work for the same firm) entails primarily career choice awareness. Importantly, these results quantify and speak to the cost of talent misallocation in canonical span-of-control models (Lucas 1978, Hsieh and Klenow 2009).

Taking a step further, we partition entrepreneurial parents' businesses into successful and unsuccessful ones and investigate their influences on subsequent post-service entrepreneurs. In general, we find that the fraction of successful entrepreneurial parents, relative to unsuccessful ones, leads to more post-service entrepreneurship by their offspring's peers. Importantly, the fraction of successful entrepreneurial parents also leads to significantly more successful post-service entrepreneurs. By contrast, the fraction of unsuccessful entrepreneurial parents does not predict successful post-service entrepreneurship.

Our paper contributes to the literatures in several ways. First and foremost, our paper relates to the literature on the social aspects of entrepreneurial activities (Parker 2018). Specifically, we highlight a novel weak tie channel of entrepreneurial exposure from peers' parents. This channel differentiates our paper from the literature that largely examines entrepreneurial exposure in the context of one's immediate social circles. In this regard, our study is closest to Mertz et al. (2024), who show that more adolescent girls become future entrepreneurs if more of their female schoolmates have entrepreneurial parents. Aside from the evident differences in gender and age, our study differs from theirs in that individuals in our sample have little control over randomized

group assignments. More broadly, our channel is consistent with studies that highlight the role of peers' parents in adolescent students' education and labor market performance.[11]

Second, we contribute to this literature by identifying the scope of learning via entrepreneurial exposure which, in turn, speaks to policy considerations. We highlight the importance of repeated within-industry exposure in entrepreneurial spillovers. In our setting, the typical social group will benefit more along the extensive margin with more depth to knowledge spillovers. In addition, our intensive margin evidence highlights the role of entrepreneurial exposure in fostering start-ups that employ more labor and create more value. In this respect, our study contributes to the literature that emphasizes the importance of efficient talent allocation of entrepreneurs and its impact on innovation and economic growth (Lucas 1978, Neumark, Wall, and Zhang 2011, Haltiwanger et al. 2013, Klenow and Li 2021).

Finally, we contribute to the growing literature on the role of social interactions in economic and social outcomes (Manski 2000, Kuchler and Stroebel 2021). The empirical setting of many studies in this field are based on elementary or secondary schools, in which researchers can exploit randomized classroom assignments, acceptance/reject decisions, roommate assignments, or explicit experiments (Sacerdote 2014). As Sacerdote concludes, however, the size and nature of social interactions are highly context-specific. In this regard, we differ from prior literature by exploring a compulsory non-academic setting that affords causal identification of social interactions in entrepreneurial career choices and performances.

Methodologically, empirical settings with randomized social group assignments that balance both internal and external validities are few and far between. Indeed, studies with clean identification in the entrepreneurial spillover literature typically exploit small-scale quasi-experiments in a university context.[12] Notably, Lerner and Malmendier (2013) exploit random

[11] See, for example, Bifulco, Fletcher, and Ross (2011), Black, Devereux, and Salvanes (2013), Chung (2020), Olivetti, Patacchini, and Zenou (2020).

[12] Similarly, Karlan and Valdivia (2011), Field, Jayachandran, Pande, and Rigol (2016), Chatterji, Delecourt, Hasan, and Koning (2019), and Hasan and Koning (2019) exploit small-scale field experiments in entrepreneurial training programs to identify various aspects of social effects. Eesley and Wang (2017) use randomized student-mentor pairs to show entrepreneur mentors increases students' penchant to become entrepreneurs.

assignments of Masters of Business Administration (MBA) students into sections upon enrollment at Harvard Business School (HBS). In contrast to stylized findings, they show that entrepreneurial peers *reduce* entrepreneurship propensity.[13] While these studies cleverly isolate the effect of entrepreneurial exposure, it is unclear the extent to which one could generalize the inferences based on relatively small and specialized social contexts. Our empirical setting provides a fertile testing ground that could help foster a consensus in the literature.

The rest of the paper is organized as follows. Section 2 describes our empirical strategy and data. We report results on entrepreneurial exposure on entrepreneurial entry in Section 3. In Section 4, we examine the role of entrepreneurial exposure in the performance of start-ups. We conclude the paper in Section 5.

2. Empirical strategy and data

2.1. Institutional background

We exploit the random allocation to military units in the mandatory military service system. In Taiwan, all male citizens no longer in school will receive conscription notices in the year after their eighteenth birthday (conscription age). Those who pursue further education after the conscription age can defer conscription until graduation. In our sample period, draftees are required to perform twelve months of active duty military service.[14,15] By law, attempts to avoid military service may be sentenced to up to five years of imprisonment.[16]

All draftees are required to draw lots publicly to determine their assigned armed forces (i.e., Army, Navy, Air Force, or Marine Corps) before they formally start their active duty service with

[13] With the same HBS MBA student data, Shue (2013) and Hacamo and Kleiner (2024) explore peer effects in terms of corporate policies and confidence, respectively.
[14] Starting in 2014, Taiwanese male citizens born after January 1994 receive four months of military training to fulfill the statutory military service obligation.
[15] Male citizens may apply for substitute military service due to health/religious conditions or specialized STEM backgrounds. In 2009, 8% of draftees qualify for substitute military service. Alternatively, college graduates (and above) can obtain reserved officer status upon passing a selective written exam, accounting for 2.2% of all draftees. We exclude these draftees from our sample.
[16] *Punishment Act for Violation to Military Service System*.

five weeks of basic training. Towards the end of their basic training, they are required again to draw lots publicly to decide the specific military unit that they will be assigned to for the remainder of their service. In these lots, the number of positions for each unit is fixed and pre-announced publicly, leaving little room for manipulation.[17] Effectively, military draftees are assigned to military units with randomized peers by design. Next, we describe peer group identification and group characteristics.

2.2. Sample and data

From the Financial Information Agency (FIA) of the Ministry of Finance, we obtain tax filings and wealth information of all individuals in Taiwan from 2006 to 2021. For our purpose, we can observe and measure an annual panel of individual information including demographics (e.g., age, education, marital status, and detailed kinship), income, personal wealth (e.g., housing, land, vehicles, liquid assets), pseudonymous employer ID, etc.

Our identification of individuals initiating businesses relies on business tax status information from the FIA database, encompassing information about all registered firms (both public and private, active and inactive) in Taiwan. For this paper, FIA's firm-level information includes owner identification, founding/defunct dates, detailed financial statements, and industry classifications. This information helps us identify individual-level entrepreneurial activities and performances.

In this paper, an individual is classified as an entrepreneur if they have served as the Chief Representative of a registered firm that filed corporate tax from 2006 to 2021. A compulsory military serviceman is considered to have entrepreneurial parents if either his father or mother was an entrepreneur prior to his service. In addition, a compulsory military serviceman is identified as a post-service entrepreneur if he does not have entrepreneurial parents, is not an

[17] Pursuant to the *Punishment Act for Violation to Military Service System*, personnel responsible for draftee assignments can be sentenced to no less than three years and up to ten years if found guilty for obstructing the fairness of the process (e.g., accepting a bribe).

entrepreneur before his service, and subsequently becomes the Chief Representative of a newly registered firm that files corporate tax after his service.

2.2.1. Identifying military units and compulsory military draftees

With each individual's pseudonymous employer ID in our sample, we can precisely identify each individual's military peers. While the FIA data does not reveal which employer IDs are military units, an individual's income level allows us to identify potential candidates serving their compulsory military service. In particular, compulsory military draftees receive monthly wages between NT$5,890 to NT$6,630 in 2011, which is significantly lower than the statutory minimum monthly wage of NT$17,880.[18] We leverage this distinction in income levels, along with other demographic information and employee characteristics to identify military units and individuals in military service.

Specifically, we first classify an individual in our sample as a candidate potentially fulfilling compulsory military service with the following demographics filters: (1) birth year < 1994, (2) age between 18 and 25, and (3) annual income between NT$5,890 to NT$100,000.[19] Next, we identify military units among salary-paying institutions with the following filters: (1) public sector, (2) employs more than ten potential candidates, (3) candidate male ratio > 80%, and (4) total employee male ratio > 70%. Finally, we identify individuals as serving their military service that satisfy the following criteria: (1) one must be a candidate from the first set of filters, (2) one must be male, (3) one only serves in the military unit we identify in the second set of filters for no more than two consecutive years. With this approach, we are able to identify 25 military units and 349,561 individuals drafted between 2011 to 2015. Our final sample accounts for approximately 75% of all Taiwanese citizens eligible for compulsory military service during this period.

[18] Equivalent to US$615 in 2011.
[19] Military draftees receive a monthly NT$1,000 to NT$2,000 raise each month if they serve in extremely rural areas or outlying islands.

To get a sense of the validity of our filters, we compare the distribution of employment duration and employee age between the identified military units (including both identified draftees and other professional military staff) and other institutions in the FIA database. Figure IA.1 in the Internet Appendix shows that distributions of employment duration is distinctly different across these two types of institutions. The majority of employees from the identified military units serve for less than two years (average 2.55 years), while the average employment duration in other institutions is 3.5 years. Figure IA.2 shows that the age distributions are likewise significantly different between the two. The average employee age of the identified military units is 30.09, while average age of other institutions is a significantly higher 40.53. Overall, Figures IA.1 and IA.2 provide validity checks for the filters we adopt to identify military units in the FIA database.

2.2.2. K-Means clustering

The average size of military units we are able to identify with the filters in Section 2.2.1 is fairly large, making it difficult to credibly measure and infer effects of entrepreneurial exposure.[20] To address this concern, we employ a machine learning approach to further partition the identified military units into finer peer groups based on within-year draft waves as implied by annual income of draftees in our sample.

As we discussed in Section 2.1, all male citizens will receive conscription notifications in the year after their conscription age or after graduation from school, whichever is later. Instead of reporting to military service in one large wave per year, draftees are required to start their military service in multiple waves in the months after they have eligibility. Accordingly, total annual income a military draftee receives can help us determine whether he is drafted earlier or later in his draft year.

Specifically, we partition each military unit-year cohort into K peer groups based on their annual income in the draft year using the K-means clustering method (Hartigan and Wong 1979).

[20] 349,561 draftees over five draft years assigned to 25 military units imply that the average size of these military units is close to 2,800 men.

To determine the number of peer groups (K), we follow the suggestion of Athey and Imbens (2019) that the choice should be based on the institutional context. Therefore, we restrict potential Ks to be 2, 3, 4, 6, or 12; that is, the choices coincide with annual draft waves in Taiwan that occur every 6 months, 4 months, 3 months, 2 months, or 1 month. Next, we choose an optimal K of 12 that leads to the most significant reduction in the within-cluster sum of squares following Agness et al. (2022). Effectively, we partition each military unit-year cohort into twelve peer groups.

With this approach, we partition the unit-by-year groups with more than 50 military draftees into twelve peer groups, yielding a final sample of 349,561 individuals across 1,310 randomized peer groups over five draft years from 2011 to 2015. The average (median) peer group size is approximately 267 (140).

2.3. Main variables and summary statistics

To investigate the effects of entrepreneurial exposure to peers' parents, we first focus our analysis on the peer group level. Our main right-hand-side variable is the share of group members who have entrepreneurial parents. Specifically, we classify an individual as having entrepreneurial parent(s) if either his father or mother was an entrepreneur in any year prior to the service year. We then calculate, for each group, the share of pre-service entrepreneurial parents by dividing the number of individuals with entrepreneurial parents by the total number of individuals. Importantly for identification, we avoid the common shocks concern of identification by focusing on pre-determined characteristics (Lerner and Malmendier 2013, Wallskog 2024). In other words, the correlation between pre-service peers' parents' experience and post-service entrepreneurial activity is unlikely driven by common shocks affecting the peer group.

The premise of our measure is that secondary relationships bridge individuals to external social groups of entrepreneurs. A large body of work in economics, management, and sociology supports using secondary relationships (e.g., friends-of-friends, friends' parents, etc.) as proxies for social weak ties. Overall, these studies find that weak ties play a crucial role in diverse

contexts—including job searches on LinkedIn (Rajkumar et al. 2022), venture-capital financing (Shane and Cable 2002), and youth crime (Patacchini and Zenou 2008), among others.

Our main left-hand-side variable is the post-service share of entrepreneurs. For each individual in each peer group, we track his career choices after completing military service to determine whether they eventually start a new business. The post-service share of entrepreneurs is calculated as the ratio of individuals who become entrepreneurs to the total number of individuals in each group as follows:

$$\frac{\text{\# of post-service entrepreneurs without pre-service entrepreneurial parents}}{\text{\# of servicemen without pre-service entrepreneurial parents}}. \quad (1)$$

Following Lerner and Malmendier (2013), we exclude those individuals with entrepreneurial parents from the outcome variable. This approach helps tease out the effects due to entrepreneurial exposure from an individual's own inclinations to entrepreneurship.

Table 1 reports the summary statistics for these variables. For all variable definitions and details of their construction, see Appendix A. Across all 1,310 peer groups, the average share of pre-service share of entrepreneurial parents is 18.5% with a standard deviation of 7.3%. The average post-service share of entrepreneurs is 2.7%, and the standard deviation is 3.4%. For later analyses we separately measure the share of pre-service entrepreneurial fathers and mothers, respectively. The average shares of entrepreneurial fathers and mothers are 13.8% and 7.1%, respectively. This is consistent with stylized fact that male entrepreneurs outnumber their female counterparts.

We also report summary statistics for the individual-level demographic variables, measured in the service year. The average individual in our sample is 22.7 years old with average annual total income and wealth of NT$68,185 and NT$414,746, respectively. A large majority of individuals have obtained college degrees at the time of his service year (85.3%), with 14.4% and 2.8%

graduating from public and top 5 universities in Taiwan.[21] In addition, 9% of military draftees majored in finance-related disciplines in college. Given the relatively young age, only 0.5% of individuals in our sample are married upon their service year.

2.4. Random assignment of military draftees

Importantly, we can check the validity of randomized group assignments along observable characteristics since our data affords detailed demographic information on each individual in our sample. If assignments to peer groups are truly randomized, it follows that pre-service characteristics among those in the same peer group should be uncorrelated. In principle, one can regress each individual's pre-service characteristics on his peer-group's leave-one-out average pre-service characteristics. If group assignments are random, then there should be little relationship between the individual's background and that of his peers (i.e., the regression coefficient estimate should be close to zero).

However, Guryan, Kroft, and Notowidigdo (2009) show that this naïve test of randomness tends to give downward-biased coefficient estimates because an individual cannot be his own peer; that is, individuals with high values of a particular characteristic tend to have peers with relatively low values of that particular characteristic, and vice versa. Consequently, positively correlated grouped peers may appear randomly assigned. Therefore, we correct this bias following the methodology of Jochmans (2023), which essentially measures the total within-group variation of the characteristics' values.

In Table 2, we report group-level characteristics (age, college degrees, college degrees from public universities, finance-related majors, marital status, and the fraction of peers with pre-service entrepreneurial experience) and test the randomness of group assignments. The first seven columns report the summary statistics of these characteristics across the 1,310 peer groups. The mean (median) peer group size is 267 (140). The following demographics variables mostly

[21] In Taiwan, there is a prevailing notion that public (national) universities are academically more competitive than private universities. There is wide consensus that the top five public universities are National Taiwan University, National Tsing Hua University, National Yang Ming Chiao Tung University, National Cheng Kung University, and National Chengchi University.

reflect distributional patterns similar to those at the individual-level as reported in Table 1. Also note that the mean (median) fraction of individuals with pre-service entrepreneurial experience is a very low 0.3% (0%). This is not surprising given the young age of our sample individuals. This lack of entrepreneurial experience implies that entrepreneurial spillover directly from military peers is not plausible in our setting.

The final three columns report the *t*-statistics and corresponding *p*-values from tests of group assignment randomness. For all the observable demographic characteristics in this table, we cannot reject the null hypothesis that the peer groups are randomly assigned. This evidence is consistent with the institutional design that peer group assignments are randomly determined by drawing lots. To be clear, absence of evidence based on observable characteristics is not definitive evidence of absence. Correlations in unobservable characteristics are ultimately untestable. Our tests should be interpreted with this caveat in mind.

3. Entrepreneurial exposure and entrepreneurial entry

3.1. Baseline results

We begin our empirical analysis by examining whether the share of pre-service entrepreneurial parents leads to the share of post-service entrepreneurs across randomly assigned peer groups. Our regression specification is as follows:

$$\textit{Share of Post-Service Entrepreneurs}_i = \alpha + \beta \textit{Share of Pre-Service Entrepreneurial Parents}_i + \gamma \mathbf{X}_i + c_y + c_l + \varepsilon_i, \quad (2)$$

where $\textit{Share of Post-Service Entrepreneurs}_i$ for group i is the ratio of group members who become entrepreneurs after military service; $\textit{Share of Pre-Service Entrepreneurial Parents}_i$ is the ratio of group members with at least one parent with entrepreneurial experience before military service; $\mathbf{X}_i$ includes group-level characteristics controls; and c_y and c_l are draft year and location

fixed effects.[22] The standard errors are clustered at the peer group level. A positive estimate of coefficient β implies that entrepreneurial exposure to peers' parents leads to more entrepreneurs.

In our baseline specification, we control of group size, draft year fixed effects, and location fixed effects. First, controlling for group size is motivated by stronger social interactions among smaller groups, which help to validate and reinforce acquired information (Levine and Moreland 1990, Centola and Macy 2007, Hvide and Östberg 2015). Second, our sample consists of individuals drafted across five consecutive years (2011-2015). Since our sample period ends in 2021, those drafted earlier are, on average, older and have more time for career development. The draft year fixed effects thus control for variations in post-service entrepreneurial activities across draft years. Third, although the assignment to military units is random by design, an individual may still have a higher likelihood of being assigned to a unit closer to their place of residence.[23] The location fixed effects account for potential commonalities if individuals with similar geographic origins are assigned to the same units.[24]

Table 3, Panel A reports the regression results. In column (1), we control for the draft year fixed effects. Column (2) controls for both the draft year fixed effects and the location fixed effects. In column (3), we include both fixed effects and control for group size. We find that the coefficient estimates for β are consistently positive with strong statistical significance, with the point estimates ranging from 0.073 to 0.075. These effects are also economically meaningful. A one-standard-deviation increase in the share of pre-service entrepreneurial parents corresponds to an increase of 0.54 to 0.55 percentage points in the share of post-service entrepreneurs within a peer group. These estimates represent a relative increase of approximately 20 percent compared

[22] For detailed variable definitions, see Section 2.3 and Appendix A.

[23] When compulsory military servicemen receive their draft notice, they are first assigned to an armed force and then allocated to a military corps near their residence. For example, in the Army, there are three major military corps located in the northern, central, and southern regions of Taiwan. The servicemen then undergo a five-week military training program. After completing the training, they participate in a second round of random assignment to specific military units. Although the unit assignment process is entirely random and free from manipulation, the units within each corps are generally located near the corps' regional headquarters, which may still result in some geographic correlation.

[24] During our sample period, Taiwan comprises 6 municipalities, 13 counties, and 3 cities. The classification of these 22 administrative divisions is much finer compared to the coarser distribution of military corps across the country.

to the sample mean of 2.74 percentage points. Put differently, for a standard group size of 267 individuals, a 20 percent increase translates into 1.46 more entrepreneurs or 1,914 more entrepreneurs across all peer groups. These findings are consistent with our hypothesis that entrepreneurship can spill over through weak social ties from parents to randomly assigned peers of their children.

In Panel B, we control for additional group level characteristics to explore robustness of our baseline specification. We separately control for the share of college degree, public school degree, finance-related majors, marital status, and average age in columns (1) to (5). In column (6), we include all control variables. Overall, the regression results are not sensitive to these additional controls. The estimates of β are very consistent across specifications in both statistical and economic significance. The point estimates range from 0.073 to 0.077, close to the estimates in Panel A. The consistency across Panels A and B speaks to the nature of random group assignment in our design. In our following analyses, we focus on the parsimonious baseline specification.

3.2. The role of group size

Next, we explore if the baseline effect in Table 3 varies predictably across group sizes. The literature typically asserts that smaller social groups better facilitate more frequent social interactions and thus stronger social effects (Levine and Moreland 1990, Hvide and Östberg 2015). Given the risky nature of entrepreneurial entry, smaller group size also enables easier peer affirmation and reinforcement that leads to successful spillover via weak ties (Centola and Macy 2007, Aral and Van Alstyne 2011). Thus, we partition our peer groups into size quintiles and report their summary stats in Table 4, Panel A. The average sizes of the smallest to largest quintiles are 16.9, 58.1, 144.4, 309.1, and 806.1, respectively.

In Table 4, Panel B, we rerun our baseline specification (without size control) separately for the five quintiles and report the regression estimates. Columns (1) to (5) correspond to the smallest and largest size quintiles. As expected, the effect of entrepreneurial exposure to peers' parents is concentrated in the bottom two quintiles where group sizes are 92 or fewer. The β

coefficient estimates from columns (1) and (2) are 0.072 and 0.063, respectively. Both estimates are statistically significant at the 5 percent level. By contrast, the β coefficient estimate in column (3) is a statistically insignificant 0.030, about half in magnitude compared to that in column (2). For even larger social groups in columns (4) and (5), the entrepreneurial exposure effect disappears entirely. Overall, the results in Table 4 are consistent with expectation: the effect of entrepreneurial exposure is more prominent in small social groups.

3.3. Entrepreneurial exposure: individual characteristics

In this section, we turn to individual-level analysis to explore whether the effect on entrepreneurial entry is strongest for those who would benefit the most from weak ties. Prior literature shows that individuals with lower social-economic status underutilize weak ties because theirs are often not true bridges between distinct social groups that provide connections to high-status contacts (Lin, Vaughn, and Ensel 1981, Beiley et al. 2018, Chetty et al. 2022). Relatedly, Granovetter (1983) argues that lower social-economic status often leads to stronger urgency in job search, leading to more reliance on contacts in one's immediate social circle. Along similar lines, we also expect stronger entrepreneurial exposure benefits for those with lower education attainment. If entrepreneurial exposure in our setting entails transmission of business knowledge and management skills, then entrepreneurial training from schooling should be a substitute.[25]

We first partition all individuals in our sample by education attainment. To measure an individual's level of education attainment, we obtain detailed personal education information through the FIA dataset.[26] We classify an individual with high education attainment if he has a bachelor's degree from elite universities (public universities or top 5 universities). Next, we regress an indicator variable if an individual becomes an entrepreneur post-service on the share

[25] This intuition is consistent with the positive correlation between education attainment and entrepreneurship (Borjas and Bronars 1989, Evans and Leighton 1989).

[26] Expenses related to children's education can qualify as a tax deduction item. Parents utilizing this deduction are required to provide detailed schooling information for their children, including the names of schools and majors pursued. With access to FIA data from 2003 onwards, we are able to observe detailed college enrollment information (if any) for all compulsory military servicemen drafted between 2011 and 2015 in our sample.

of pre-service entrepreneurial parents. As in the baseline specification, we include draft year and location fixed effects and cluster standard errors at the group location level. Finally, we restrict our sample to individuals from the bottom two group size quintiles (i.e., less than or equal to 92). There are mechanically much more individuals from large groups where we find weak entrepreneurial exposure effects (see Table 4).

The regression results are reported in Table 5. Columns (1) and (2) (columns (3) and (4)) use public school (top 5 school) degrees as the measure of education attainment. Consistent with expectation, we find that the effect of entrepreneurial exposure is concentrated among those without elite school degrees. For example, for those without public school degrees, the coefficient estimate in column (2) is 0.045 with strong statistical significance. By contrast, the estimate is a statistically insignificant 0.023 in column (1). These results also suggest that entrepreneurial spillover through weak ties in our setting entails knowledge transmission.

In columns (5) and (6), we partition our sample by family wealth. As expected, we find that the effect of weak ties on entrepreneurial entry is significantly stronger among those with lower family wealth. The coefficient estimate in column (6) for the low family wealth partition is a statistically significant 0.068. For those with high family wealth, the β coefficient estimate is indistinguishably different from zero.

3.4. Entrepreneurial exposure: depth versus breadth

If weak ties bring about knowledge transmission, entrepreneurial exposure to peers' parents can potentially lead to transmission of specific knowledge or skills. In the context of entrepreneurial spillover, prior literature shows that there is evidence of industry knowledge transmission within a family (Hvide and Oyer 2020).[27] We test the within-industry spillover channel by decomposing the dependent and independent variables into industry-group levels; that is, we explore whether the share of pre-service entrepreneurial parents in an industry leads to a higher fraction of entrepreneurs in that industry. With 20 industries and 1,310 peer groups, our

[27] Similarly, there is evidence of intergenerational knowledge transmission of inventive ability (Bell et al. 2019) and education attainment (Kalil et al. 2016).

regression has 26,200 observations. In addition to the baseline specification controls, we further include industry fixed effects and cluster standard errors at the location and industry levels.

The results are reported in Table 6, Panel A. We find that industry affiliation of peers' entrepreneurial parents leads to more share of future entrepreneurs in that industry. For example, the coefficient estimate in column (2) is a statistically significant 0.008. The point estimate implies that a one standard deviation increase in the explanatory variable leads to a 18.7% increase in the dependent variable relative to the sample mean. In column (3), we further control for group size and obtain a virtually identical point estimate. These results imply that individuals may learn and acquire industry knowledge through weak ties exposure, leading to more entrepreneurial entry in the same industry.[28] Put differently, there is a "depth" component to entrepreneurial entry decisions. Repeated exposure to the same line of business reinforces a person's decision to build a start-up.

To further explore this notion, we revisit our baseline group-level results and examine the effects of entrepreneurial parents' industry diversification, defined as the quintile rank of one minus the industry concentration Herfindahl-Hirschman Index (HHI). The results are reported in Table 6, Panel B. In column (1), we reproduce the baseline result from Table 3. In columns (2) and (3), we further include industry diversification and its interaction with the share of entrepreneurial parents. While more industry diversification leads to diverse social groups and knowledge pool, it may dilute reinforcement and verification necessary for potential entrepreneurs to take action.

The results paint a more nuanced picture of entrepreneurial exposure. Coefficient estimates in column (3) imply that the marginal effect of increasing the share of entrepreneurial parents is stronger when their industry diversification is low. This is consistent to the implication from Panel A; that is, repeated exposure to the similar industry experience is important for entry

[28] Nevertheless, we cannot rule out the possibility that individuals are simply inspired by peers' parents' industry choices without knowledge transmission. We turn to the role of education attainment to shed more light on the nature of entrepreneurial exposure in out setting.

decisions in our setting. Taking these point estimates at face value, the marginal effect of more entrepreneurial parents is mostly positive for most industry diversification levels but weakens to close to zero at the highest industry diversification quintile. Likewise, the marginal effect of industry diversification on becoming an entrepreneur is positive when there are very few entrepreneurial parents. For a group with average level of entrepreneurial parents (0.185), the marginal effect of industry diversification is close to zero in column (2).

Overall, Table 6 illustrates the importance of repeated exposure through the lens of industry effects. These results suggest the exposure effect we document entail knowledge spillover and also speak to the importance of social reinforcement and verification in entrepreneurial adoption.

3.5. Alternative mechanism: gender role-modeling

By contrast, one common explanation of entrepreneurial exposure is role-modeling; that is, others' entrepreneurial parents may set examples to be emulated (Parker 2018). An entrepreneurial role model may, for example, inspire an individuals' awareness of entrepreneurship as a career option or the preference for an autonomous lifestyle (Carroll and Mosakowski 1987, Lindquist et al. 2015).

An important theoretical motivation for role-modeling is homophily; that is, individuals tend to associate themselves with similar others (McPherson, Smith-Loving, and Cook 2001). In the context of entrepreneurial exposure, prior empirical research points to the role of homophily in role-modeling (Ruef, Aldrich, and Carter 2003, Sørensen 2007, Parker 2018). Specifically, gender role-modeling has been suggested to drive entrepreneurship (Bosma et al. 2012, Lindquist et al. 2015).

Following this intuition, we separately measure the shares of peers' entrepreneurial fathers and entrepreneurial mothers and examine their effects on future entrepreneurship. We report the results in Table 7. Column (1) reproduces the baseline result from Table 3. In column (2), the β coefficient estimate is positive but statistically insignificant. Column (3) shows that the β coefficient estimate is a statistically significant 0.102. These results imply that, if anything, peers' entrepreneurial mothers drive more future entrepreneurship. In column (4), we include

both regressors and find similar results.[29] Overall, we do not find support for gender role modeling in our setting. This is consistent with the literature that finds weaker gender role-modeling among males (Bosma et al. 2012) and the importance of peers' mothers' education attainment (Bifulco et al. 2011, Olivetti et al. 2020).[30]

Overall, Table 7 shows that entrepreneurial exposure in our setting is not merely inspirational in nature.

4. Entrepreneurial peer effects and performance

If entrepreneurial exposure is simply raising awareness, transmitting institutional knowledge (e.g., the administrative steps to establish a firm), or reducing fear and uncertainty, then exposure arguably leads to mediocre or inferior start-ups because these mechanisms merely lower entry costs of entrepreneurship. By contrast, if spillover involves learning entrepreneurial skills such as industry knowledge or managerial know-hows, then spillover should lead to relatively better outcomes. To this end, we leverage corporate outcome information from the FIA database. Our goal is first to test if exposure tends to lead to more successful or unsuccessful entrepreneurs. Taking a step further, we next examine separately how successful and unsuccessful peers' parents affect individual's future entrepreneurial performance.

We define success based on three corporate outcomes: number of employees, return on assets, and gross profit (Novy-Marx 2013). Specifically, we use the maximum value of the performance variables if the firm operated for more than one year. For instance, if a parent manages a business for several years before their child's military service, we take the highest recorded value of the performance variables. Similarly, for a post-service entrepreneur running a business for multiple

[29] Wald tests (untabulated) show that the difference between coefficient estimates from fathers and mothers is not statistically significant.
[30] Similarly, Mertz et al. (2024) do not find evidence of gender role modeling in entrepreneurial exposure among adolescent girls.

years after service, we use the highest value of the performance variables. This approach allows us to compare the best possible entrepreneurial knowledge an individual may demonstrate.[31]

Table 8, Panel A reports the summary statistics of the performance variables of successful/unsuccessful firms. Panel B reports the summary statistics of the shares of successful/unsuccessful pre-service entrepreneurial parents as well as the shares of successful/unsuccessful post-service entrepreneurs.

At the peak of their performance, successful entrepreneurial parents, on average, employ 34.07 employees. In terms of profitability, the average return on assets and gross profit are 56% and 323%, respectively. By contrast, unsuccessful entrepreneurial parents, on average, employ just 1.51 employees. The average return on assets and gross profit are 3% and 27%, respectively. For post-service entrepreneurs, the successful ones, at their peaks, hire on average 13.85 employees. The average return on assets and gross profit are 59% and 432%. The unsuccessful entrepreneurs hire, on average, 0.25 employees with close to zero return on assets and 11% gross profit. At the group level, the average share of successful (unsuccessful) entrepreneurial parents ranges between 9.4 to 9.5 percent (9.0 percent to 10.1 percent) across the three performance metrics. The average share of successful (unsuccessful) post-service entrepreneurs ranges between 9 to 12 percent (12 to 16 percent).

Table 9 presents the association between the shares of successful/unsuccessful pre-service entrepreneurial parents and the shares of successful/unsuccessful post-service entrepreneurs across each peer groups. In Panels A, B, and C, success is defined by the number of employees, return on assets, and the gross profit, respectively. Column (1) in three panels reproduce the result from our baseline specification (column (3) in Table 3, Panel A).

Focusing on the first row of Panel A, we find that exposure to peers' entrepreneurial parents tend to lead to successful future entrepreneurs. In column (4), the coefficient estimate is a statistically significant 0.04. This magnitude implies that a one standard deviation (7.3 percent)

[31] We also conducted analyses using average and most recent values for performance variables, and all results remained consistent with the findings presented.

increase in the share of entrepreneurial parents will increase the share of successful entrepreneurs by 32 percent relative to the mean (0.9 percent). Put differently, this increase is equivalent to 0.8 more successful entrepreneur for the average group size, or 14,145 more employees across 1,310 peer groups. To put these figures in perspective: there are approximately 1.28 million small and medium-sized enterprises (SME) with 8.34 million employees, translating into 6.5 employees on average for an SME. Therefore, 14,145 more employees is equivalent to 2,176 more SMEs. These results imply that entrepreneurial exposure leads to knowledge transmission on average.

Taking a step further, the next two rows of Panel A separately examine the effect of successful and unsuccessful peers' parents on future performance. Column (2) shows that the share of successful peers' parents has an economically significant, albeit statistically weak, effect on future entrepreneurs. Importantly, the share of successful parents leads to more (fewer) successful (unsuccessful) post-service entrepreneurs. From column (5), a one standard deviation increase in the share of successful parents corresponds to a 41.8 basis points increase, or 46.4 percent relative to the mean, in the share of successful post-service entrepreneurs. From column (8), a one standard deviation increase in the share of successful parents leads to a 24 basis points *decrease*, or 15% relative to the mean, in the share of unsuccessful post-service entrepreneurs. In sharp contrast, the share of unsuccessful parents shows no significant relationship with either the share of successful or unsuccessful entrepreneurs.

Panels B and C examine return on assets (ROA) and gross profit margin as metrics of success. By and large, these results show similar patterns as in Panel A. In both analyses, the shares of successful parents are positively and significantly associated with the shares of successful post-service entrepreneurs across peer groups. Conversely, the shares of unsuccessful parents have negligible.

Overall, the results in Table 8 suggest that knowledge and skill from successful entrepreneurs can transmit through social channels to encourage (discourage) future successful (unsuccessful) entrepreneurs.

5. Conclusions

We provide plausible causal evidence that peers' entrepreneurial parents significantly increase entrepreneurial entry and enhance startup performance. The effect we identify is a contextual peer effect in the terminology of Manski (1993). Relative to prior studies that document entrepreneurial spillover through strong social ties in the contexts of workspace, schools, community, and family, our results underscore a novel channel through weak social ties. Broadly construed, our results speak to the notion of "the strength of weak ties" in Granovetter (1973).

In addition, our empirical setting addresses two fundamental questions that are challenging to address in one setting. First, we exploit an institutional feature (i.e., compulsory military drafts) that leads to random social group assignments, which significantly promotes plausible causal interpretations. While our paper is not the first to study random group assignments, our empirical setting is also much larger, generating estimates that have arguably broader implications. Overall, we find that exposures to entrepreneurial peers increases an individual's propensity to also become an entrepreneur. That being said, we acknowledge that our results remain context-specific, echoing the nature of peer effect research in social sciences (Sacerdote 2014). Our sample individuals, though large in terms of number, are male citizens who are in their early twenties. Readers are encouraged to interpret our results with these characteristics in mind.

Second, our empirical setting enables us to study consequences of entrepreneurial exposure; that is, the nature of whether there is learning through social interactions. This aspect is often lacking in existing literature due to data limitations. Our finding that social interactions may lead to positive entrepreneurial performance has direct policy implications.

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Table 1
Summary Statistics

This table presents summary statistics for the main variables. The sample consists of 349,561 compulsory military servicemen from 2011 to 2015. 1,310 military peer groups are identified with the K-means clustering method (Hartigan and Wong 1979). The dependent and independent variables are reported at the peer group level. Demographic variables are reported at the individual level and measured before military service. For variable definitions and details of their construction, see Appendix A.

	N	Mean	Std.	Min	p25	p50	p75	Max
Dependent/Independent Variables (group level)								
Share of Pre-Service Entrepreneurial Parents								
	1,310	0.185	0.073	0	0.147	0.181	0.217	0.625
Share of Pre-Service Entrepreneurial Fathers								
	1,310	0.138	0.063	0	0.107	0.135	0.165	0.625
Share of Pre-Service Entrepreneurial Mothers								
	1,310	0.071	0.041	0	0.051	0.067	0.085	0.400
Share of Post-Service Entrepreneurs								
	1,310	0.027	0.034	0	0.008	0.024	0.036	0.500
Demographic Variables (individual level)								
Age	349,561	22.696	1.898	18	22	23	24	37
Income	349,561	68,185	100,557	0	0	24,000	107,323	1.5E+07
Wealth	349,561	414,746	3,148,188	0	0	0	0	7.4E+08
College	349,561	0.853	0.354	0	1	1	1	1
Public school	349,561	0.144	0.351	0	0	0	0	1
Top5	349,561	0.028	0.164	0	0	0	0	1
Finance	349,561	0.090	0.286	0	0	0	0	1
Marriage	349,561	0.005	0.069	0	0	0	0	1

Table 2
Average Peer Group Characteristics and Test of Randomness

This table provides summary statistics group-level characteristics and the Jochmans (2023) test for random assignment. The sample consists of 349,561 compulsory military servicemen from 2011 to 2015. 1,310 military peer groups are identified with the K-means clustering method (Hartigan and Wong 1979). The first seven columns report statistics of group characteristics distributions. In the final three columns, we report *t*-statistics and corresponding *p*-values from the Jochmans (2023) random assignment tests. The null hypothesis is that individuals are randomly assigned into groups. For variable definitions and details of their construction, see Appendix A.

	Distribution of peer group characteristics							Tests for randomness		
	Mean	SD	min	p25	p50	p75	Max	*t*-statistic	*p*-value (two-tail)	*p*-value (right-tail)
Group size	266.84	336.20	5.000	42.00	139.5	365.0	3,191			
Age	22.94	0.99	19.81	22.50	22.90	23.32	28.30	−0.929	0.3530	0.8235
College	0.862	0.172	0.174	0.797	0.927	1.000	1.000	−0.668	0.5039	0.7480
Public school	0.155	0.113	0.000	0.088	0.138	0.194	0.810	0.085	0.9324	0.4662
Finance	0.087	0.055	0.000	0.018	0.054	0.114	0.455	0.757	0.4492	0.2246
Marriage	0.007	0.023	0.000	0.000	0.000	0.006	0.286	0.453	0.6504	0.3252
Share of pre-service entrepreneurs	0.003	0.007	0.000	0.000	0.000	0.004	0.100	0.701	0.4836	0.2418

Table 3
The Effect of Entrepreneurial Exposure on Entrepreneurship

This table reports OLS regression estimates of the effect of the share of individuals with pre-service entrepreneurial parents on the share of post-service entrepreneurs without entrepreneurial parents. In panel A, control variables include group size, draft year fixed effects, and location fixed effects. In panel B, we include additional group-level characteristics: shares of individuals with college degree, public school degree, finance-related degree, married men, and average age. The sample comprises 1,310 randomly assigned military peer groups from 2011 to 2015. For variable definitions and details of their construction, see Appendix A. *t*-statistics are shown in italics underneath the coefficient estimates with standard errors clustered at the peer group location level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A

	Share of post-service entrepreneurs		
	(1)	(2)	(3)
Share of pre-service entrepreneurial parents	0.073**	0.075**	0.075**
	2.79	*2.63*	*2.66*
Group size control			yes
Draft year fixed effects	yes	yes	yes
City/county fixed effects		yes	yes
Observations	1,310	1,310	1,310
Adj. R-squared	0.050	0.052	0.054

Panel B

	Share of post-service entrepreneurs					
	(1)	(2)	(3)	(4)	(5)	(6)
Share of pre-service entrepreneurial parents	0.073**	0.076**	0.075**	0.078**	0.076**	0.077**
	2.56	*2.63*	*2.61*	*2.71*	*2.76*	*2.67*
Share of college degree control	yes					yes
Share of public school degree control		yes				yes
Share of finance degree control			yes			yes
Share of married men control				yes		yes
Average age control					yes	yes
Group size control	yes	yes	yes	yes	yes	yes
Draft year fixed effects	yes	yes	yes	yes	yes	yes
City/county fixed effects	yes	yes	yes	yes	yes	yes
Observations	1,310	1,310	1,310	1,310	1,310	1,310
Adj. R-squared	0.054	0.057	0.050	0.055	0.056	0.060

Table 4
The Effect of Entrepreneurial Exposure on Entrepreneurship: Peer Group Size

This table reports test results of the role of peer group size on the effect of entrepreneurial exposure. In panel A, we partition all peer groups into size quintiles and report the group size statistics. In panel B, we report the OLS regression estimates of the effect of the share of individuals with pre-service entrepreneurial parents on the share of post-service entrepreneurs without entrepreneurial parents across the size quintiles. Columns (1) to (5) correspond to group sizes of 5–31, 32–92, 93–211, 212–454, and 455–3,191, respectively. Control variables include draft year fixed effects and location fixed effects. The sample comprises 1,310 randomly assigned military peer groups from 2011 to 2015. For variable definitions and details of their construction, see Appendix A. *t*-statistics are shown in italics underneath the coefficient estimates with standard errors clustered at the peer group location level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A

Peer Group Size Quintiles	1	2	3	4	5
Peer Group size range	5–31	32–92	93–211	212–454	455–3,191
Peer Group size average	16.9	58.1	144.4	309.1	806.1

Panel B

	Share of post-service entrepreneurs				
	(1)	(2)	(3)	(4)	(5)
Share of pre-service entrepreneurial parents	0.072**	0.063*	0.030	−0.002	−0.010
	2.27	*2.02*	*0.79*	*−0.07*	*−0.38*
Draft year fixed effects	yes	yes	yes	yes	yes
City/county fixed effects	yes	yes	yes	yes	yes
Observations	264	262	260	262	262
Adj. R-squared	0.044	0.074	0.132	0.255	0.543

Table 5
The Effect of Entrepreneurial Exposure on Entrepreneurship: Education Attainment and Wealth

This table reports OLS regression estimates of the share of pre-service entrepreneurial parents in a peer group on an individual's propensity to enter entrepreneurship post-service, conditioning on an individual's level of education attainment and wealth. The sample includes individuals in peer group size quintiles 1 and 2 (i.e., less than or equal to 92 individuals) following Table 4. First, the sample is partitioned by two measures of education attainment: (1) having a bachelor's degree from a public university (columns (1) and (2)), and (2) having a bachelor's degree from one of the top five universities in Taiwan (columns (3) and (4)). Next, the sample is partitioned by family wealth above or below the median (columns (5) and (6)). For variable definitions and details of their construction, see Appendix A. *t*-statistics are shown in italics underneath the coefficient estimates with standard errors clustered at the peer group location level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Post-service entrepreneurship					
	Public schools		Top5 schools		Family wealth	
	Y	N	Y	N	H	L
	(1)	(2)	(3)	(4)	(5)	(6)
Share of pre-service entrepreneurial parents	0.023	0.045***	0.025	0.041***	0.012	0.068**
	0.61	*3.41*	*0.45*	*3.07*	*0.52*	*2.43*
Draft year fixed effects	yes	yes	yes	yes	yes	yes
City/county fixed effects	yes	yes	yes	yes	yes	yes
Observations	2,566	13,082	846	14,802	7,824	7,824
Adj. R-squared	−0.002	0.002	−0.005	0.002	0.001	0.003

Table 6
The Effect of Entrepreneurial Exposure on Entrepreneurship: Industry

This table reports test results of the mechanisms of entrepreneurial exposure. In panel A, the dependent and independent variables are defined at the peer group-industry level. In panel B, the dependent and independent variables are defined at the peer group level. Industry diversification is measured by the quintile ranking of one minus the Herfindahl-Hirschman index. The sample comprises 1,310 randomly assigned military peer groups from 2011 to 2015. For variable definitions and details of their construction, see Appendix A. *t*-statistics are shown in italics underneath the coefficient estimates with standard errors clustered at the peer group location and industry level for Panel A and at the peer group location level for Panel B. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A: Within-industry exposure

	Share of post-service entrepreneurs in industry		
	(1)	(2)	(3)
Share of pre-service entrepreneurial parents in industry	0.048***	0.008**	0.008**
	2.52	*2.17*	*2.06*
Group size control			yes
Draft year fixed effects	yes	yes	yes
City/county fixed effects	yes	yes	yes
Industry fixed effects		yes	yes
Observations	26,200	26,200	26,200
Adj. R-squared	0.041	0.096	0.097

Panel B: Industry-diversity interaction

	Share of post-service entrepreneurs		
	(1)	(2)	(3)
Share of pre-service entrepreneurial parents	0.075**	0.111**	0.191**
	2.66	*2.18*	*2.91*
Industry diversity		0.003	0.008**
		1.39	*2.64*
Share of pre-service entrepreneurial parents × Industry diversity			−0.040***
			−3.28
Group size control	yes	yes	yes
Draft year fixed effects	yes	yes	yes
City/county fixed effects	yes	yes	yes
Observations	1,310	1,310	1,310
Adj. R-squared	0.054	0.058	0.071

Table 7
The Effect of Entrepreneurial Exposure on Entrepreneurship: Gender Role-Modeling

This table reports test results of the mechanisms of entrepreneurial exposure. We report the OLS regression estimates of the effect on the share of post-service entrepreneurs from pre-service share of entrepreneurial parents, entrepreneurial fathers, and entrepreneurial mothers in columns (1), (2), and (3), respectively. Column (4) includes both the share of entrepreneurial fathers and the share of entrepreneurial mothers. The sample comprises 1,310 randomly assigned military peer groups from 2011 to 2015. For variable definitions and details of their construction, see Appendix A. *t*-statistics are shown in italics underneath the coefficient estimates with standard errors clustered at the peer group location level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

	Share of post-service entrepreneurs			
	(1)	(2)	(3)	(4)
Share of pre-service entrepreneurial parents	0.075**			
	2.66			
Share of pre-service entrepreneurial fathers		0.049		0.036
		1.12		*0.77*
Share of pre-service entrepreneurial mothers			0.102***	0.089**
			3.25	*2.25*
Group size control	yes	yes	yes	yes
Draft year fixed effects	yes	yes	yes	yes
City/county fixed effects	yes	yes	yes	yes
Observations	1,310	1,310	1,310	1,310
Adj. R-squared	0.054	0.040	0.046	0.049

Table 8
Summary Statistics: Performance

This table report summary statistic of entrepreneurship performance variables. We use the sample mediums of three firm-level performance metrics (number of employees, return on assets, gross profit) to define companies as successful or unsuccessful, respectively. Panel A reports summary statistics of these company metrics by successful/unsuccessful entrepreneurial parents, and successful/unsuccessful entrepreneurs. Panel B reports the shares of individuals with pre-service successful/unsuccessful entrepreneurial parents in military peer groups and the shares of individuals who become successful or unsuccessful entrepreneurs after their service. For variable definitions and details of their construction, see Appendix A.

Panel A (sorting variables)

	N	Mean	Std.	p25	p50	p75
Pre-Service						
Companies of successful entrepreneurial parents						
number of employees	29,423	34.07	224.31	7.00	12.00	26.00
return on assets	31,894	0.56	0.48	0.20	0.37	0.76
gross profit	31,894	3.23	3.47	1.19	2.03	3.93
Companies of unsuccessful entrepreneurial parents						
number of employees	34,366	1.51	1.30	0.00	1.00	2.00
return on assets	31,895	0.03	0.07	0.00	0.02	0.06
gross profit	31,895	0.27	0.22	0.06	0.24	0.45
Post-Service						
Companies of successful entrepreneurs						
number of employees	4,613	13.85	87.78	3.00	5.00	12.00
return on assets	6,041	0.59	0.56	0.16	0.38	0.83
gross profit	6,041	4.32	4.56	1.40	2.65	5.61
Companies of unsuccessful entrepreneurs						
number of employees	7,469	0.25	0.43	0.00	0.00	0.00
return on assets	6,041	0.00	0.02	0.00	0.00	0.00
gross profit	6,041	0.11	0.18	0.00	0.00	0.15

Panel B (dependent and independent variables)

	N	Mean	Std.	p25	p50	p75
Pre-Service						
Share of successful entrepreneurial parents						
number of employees	1,310	0.084	0.048	0.059	0.080	0.104
return on assets	1,310	0.095	0.052	0.068	0.090	0.117
gross profit	1,310	0.094	0.052	0.066	0.091	0.116
Share of unsuccessful entrepreneurial parents						
number of employees	1,310	0.101	0.052	0.077	0.098	0.118
return on assets	1,310	0.090	0.050	0.063	0.085	0.113
gross profit	1,310	0.091	0.048	0.070	0.089	0.108
Post-Service						
Share of successful entrepreneurs						
number of employees	1,310	0.009	0.018	0.000	0.005	0.011
return on assets	1,310	0.013	0.024	0.000	0.008	0.016
gross profit	1,310	0.012	0.022	0.000	0.008	0.016
Share of unsuccessful entrepreneurs						
number of employees	1,310	0.016	0.022	0.000	0.012	0.021
return on assets	1,310	0.012	0.017	0.000	0.009	0.016
gross profit	1,310	0.012	0.018	0.000	0.009	0.017

Table 9
Entrepreneurial Exposure and Post-Service Entrepreneurial Performance

This table reports OLS regression estimates of the effect of the share of individuals with pre-service successful/unsuccessful entrepreneurial parents on the share of post-service successful/unsuccessful entrepreneurs. Control variables include group size, draft year fixed effects, and location fixed effects. Successful (unsuccessful) companies are defined as exceeding (falling below) the median of the numbers of employees, return on assets, or gross profit. Panels A, B, and C, report results with numbers of employees, return on assets, and gross profit, respectively. The dependent variable in columns (1)-(3) is the share of all post-service entrepreneurs; the dependent variable in columns (4)-(6) is the share of successful post-service entrepreneurs; the dependent variable in columns (7)-(9) is the share of unsuccessful post-service entrepreneurs. The sample comprises 1,310 randomly assigned military peer groups from 2011 to 2015. For variable definitions and details of their construction, see Appendix A. *t*-statistics are shown in italics underneath the coefficient estimates with standard errors clustered at the peer group location level. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Panel A (success defined by: number of employees)

	Share of post-service entrepreneurs								
	All			Successful entrepreneurs			Unsuccessful entrepreneurs		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of pre-service…									
entrepreneurial parents	0.075**			0.040**			−0.008		
	2.66			*2.31*			*−0.66*		
successful entrepreneurial parents		0.084			0.087**			−0.031*	
		1.46			*2.38*			*−1.87*	
unsuccessful entrepreneurial parents			0.068*			0.001			0.012
			1.78			*0.08*			*0.50*
Group size control	yes	yes	yes	yes	yes	yes	yes	yes	yes
Draft year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
City/county fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310
Adj. R-squared	0.054	0.045	0.042	0.023	0.049	0.001	0.049	0.053	0.049

Panel B (success defined by: return-on-assets)

	Share of post-service entrepreneurs								
	All			Successful entrepreneurs			Unsuccessful entrepreneurs		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of pre-service…									
entrepreneurial parents	0.075**			0.053***			−0.015		
	2.66			*3.09*			*−1.19*		
successful entrepreneurial parents		0.114***			0.101***			−0.018	
		3.42			*4.40*			*−0.95*	
unsuccessful entrepreneurial parents			0.032			0.002			−0.011
			0.82			*0.06*			*−0.79*
Group size control	yes	yes	yes	yes	yes	yes	yes	yes	yes
Draft year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
City/county fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310
Adj. R-squared	0.054	0.038	0.034	0.036	0.055	0.034	0.025	0.024	0.022

Panel C (success defined by: gross profit)

	Share of post-service entrepreneurs								
	All			Successful entrepreneurs			Unsuccessful entrepreneurs		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Share of pre-service…									
entrepreneurial parents	0.075**			0.049**			−0.015		
	2.66			*2.41*			*−1.14*		
successful entrepreneurial parents		0.105**			0.081***			−0.010	
		2.92			*2.99*			*−0.73*	
unsuccessful entrepreneurial parents			0.042			0.014			−0.021
			1.01			*0.52*			*−0.93*
Group size control	yes	yes	yes	yes	yes	yes	yes	yes	yes
Draft year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
City/county fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Observations	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310	1,310
Adj. R-squared	0.054	0.054	0.036	0.042	0.052	0.021	0.020	0.018	0.020

Appendix A: Variable Definitions.

Dependent and Independent Variables

Post-service entrepreneurship is an indicator variable that equals one if an individual becomes an entrepreneur after military service.

Group size is the number of individuals in a military peer group.

Industry Diversification is the quintile rank of one minus the Herfindahl-Hirschman index of industry concentration among peers' entrepreneurial parents.

Share of post-service entrepreneurs is the fraction of individuals in a military peer group without pre-service entrepreneurial parents who become entrepreneurs of firms established post-service.

Share of pre-service entrepreneurial parents is the fraction of individuals in a military peer group who have either parent as entrepreneurs in any year prior to the service year. We define a person to be an entrepreneur if he or she serves as the Chief Representative of a registered firm that filed corporate taxes from 2006 to 2021.

Share of pre-service entrepreneurial fathers is the fraction of individuals in a military peer group who have their father as an entrepreneur in any year prior to the service year. We define a person to be an entrepreneur if he or she serves as the Chief Representative of a registered firm that filed corporate taxes from 2006 to 2021.

Share of pre-service entrepreneurial mothers is the fraction of individuals in a military peer group who have their mother as an entrepreneur in any year prior to the service year. We define a person to be an entrepreneur if he or she serves as the Chief Representative of a registered firm that filed corporate taxes from 2006 to 2021.

Demographic Variables (individual level)

Age is the difference between an individual's birth year and the year of military service.

Income is labor income of an individual in the year before military service.

Wealth is the sum of assets, savings, real estate, vehicles, and equities, measured in the year before military service. The value of real estate and vehicles are recorded by FIA by the time the transaction takes place. The value of real estate is adjusted yearly according to county-specific public assessment prices (PAP). Savings are imputed using the interest income items in individual tax returns and the corresponding interest rate as in Saez and Zucman (2016). The value of each stock holding is calculated as the product of the number of shares an individual holds and the closing price of the stock before the ex-right dates. If the stock is not public, we simply adapt the book value as the price.

College is an indicator variable that equals one if an individual holds a bachelor's degree in service year.

Public school is an indicator variable that equals one if an individual holds a bachelor's degree from a public university in Taiwan in service year.

Top5 is an indicator variable that equals one if an individual holds a bachelor's degree from one of the top five universities in Taiwan (NTU, NTHU, NYCU, NCKU, and NCCU) in service year.

Finance is an indicator variable that equals one if an individual holds a bachelor's degree with a major in finance, economics, or management before military service in service year.

Marriage is an indicator variable that equals one if an individual is married in service year.

Performance Variables (peer group level)

Share of successful/unsuccessful entrepreneurial parents is the fraction of individuals in a military peer group who have either parent as successful/unsuccessful entrepreneurs prior to the service year. We categorize an entrepreneur to be successful (unsuccessful) if his or her firm's best annual performance falls above (below) the medium of all firms established by peers' parents. Respectively, a firm's annual performance is defined by three metrics: number of employees, return-on-asset, and gross profit.

Share of successful/unsuccessful entrepreneurs is the fraction of individuals in a military peer group without pre-service entrepreneurial parents who become successful/unsuccessful entrepreneurs post-service. We categorize an entrepreneur to be successful (unsuccessful) if his or her firm's best annual performance falls above (below) the medium of all firms established by peers' parents. Respectively, a firm's annual performance is defined by three metrics: number of employees, return-on-asset, and gross profit.

INTERNET APPENDIX

for

Learning from the Band of Brothers: Evidence from Entrepreneurial Spillover

(NOT INTENDED FOR PUBLICATION)

Figure IA.1. Distribution of Employment Duration of Identified Military Units.
This figure shows employees' job duration distribution among general public institutions and institutions that we identify as military units. We report the average employee job duration and *p*-values that test the difference between the two groups.
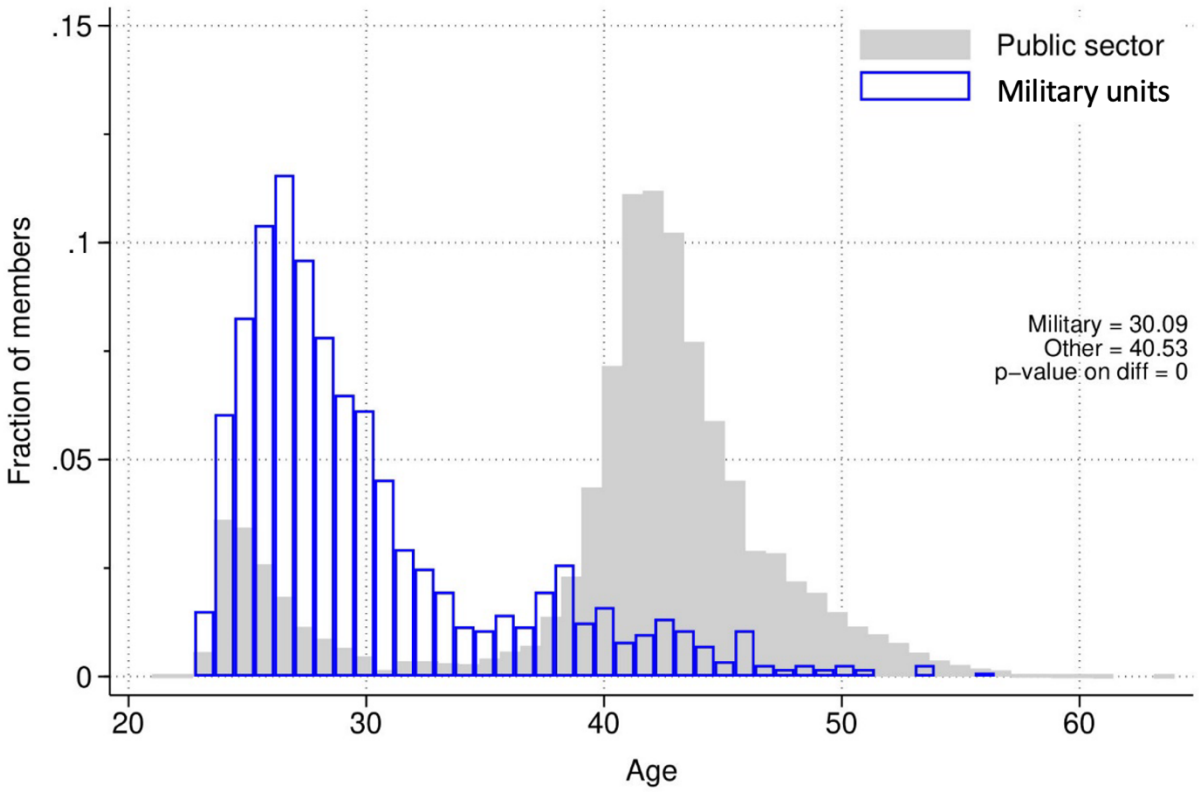
Figure IA.2. Age Distribution of Identified Military Units.
This figure shows employees' age distribution among general public institutions and institutions that we identify as military units. We report average employee ages and *p*-values that test the difference between the two groups.