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Early life shocks and entrepreneurship: Evidence from the Vietnam War

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ABSTRACT

We examine the impact of adverse shocks in childhood on entrepreneurship in adulthood. We focus on the Vietnam War, which represents one of the most intense conflicts in history. Using data from the 1997/1998 Vietnam Living Standard Survey (VLSS) and bombing intensity data, we find that bombing intensity is associated with a higher probability of being an entrepreneur. Specifically, our results suggest that a 10% increase in bombing intensity generates a 4.8 percentage point increase in the probability of being self-employed in the last seven days, and a 2.3 percentage point increase in the probability of being self-employed in the last 12 months. This finding is robust to a suite of robustness checks. We explore economic growth, education, health infrastructure, prevalence of wage-earning opportunities and social capital as potential mechanisms and find that social capital mediates the relationship between the War and entrepreneurship in Vietnam.

1. Introduction

A large literature has examined the impact of early childhood shocks on a range of outcomes in adulthood including human capital, physical and mental health and labour market outcomes (see, e.g., Akresh et al., 2012; Alderman et al., 2006; Almond & Mazumder, 2011; Beegle et al., 2010; Dercon & Porter, 2014; Haldrup & Winter-Ebmer, 2014; Rosales-Rueda, 2018; Schaal & Elbert, 2006; Shah & Steinberg, 2017). At the same time, there is an increasing number of studies that have examined the determinants of entrepreneurship. This literature has examined the role of myriad factors including psychological factors and personality traits, demographic factors, as well as economic and institutional factors, among others (see, e.g., Asante & Affum-Osei, 2019; Herrera-Echeverri et al., 2014; Koellinger et al., 2007; Langowitz & Minniti, 2007; Moa-Liberty Alausa et al., 2016; Simón-Moya et al., 2014).

We know little, though, about the effect of exposure to early life shocks on propensity to become an entrepreneur later in life. While there is anecdotal evidence from entrepreneurs that poverty, and other adversity, experienced during childhood contributed to their decision to later become entrepreneurs, empirical evidence is scant (Zhang & Alon, 2009). The only studies of which we are aware that look at this issue examine early life exposure to the Chinese Great Famine (1959–61) on

the likelihood of becoming an entrepreneur later in life. Chu et al. (2019) examine whether counties that experienced high rates of famine during the Chinese Great Famine had higher rates of entrepreneurship three decades later. Cheng et al. (2021) examine whether individuals from birth cohorts exposed to more severe famine *in utero* and childhood during the Chinese Great Famine are more likely to become entrepreneurs in adulthood.

We add to these studies by examining the impact of being exposed to the Vietnam War in early childhood on whether one becomes an entrepreneur later in life. While Vietnam has experienced several wars, the use of the Vietnam War is apt for at least two reasons. One reason is that it is recognized as one of the most intense conflicts of the twentieth century (Clodfelter, 1995) that spanned two decades and, thus, represents a significant shock. To put this in perspective, the bombs dropped by the United States during the Vietnam War were more than double those dropped during World War II and the Korean War put together (Clodfelter, 1995; Miguel & Roland, 2011). Second, as a practical consideration, data on bombing intensity which facilitates identification, makes the Vietnam War an excellent case study.

Past events or shocks, such as the Vietnam War, can influence contemporaneous outcomes via multiple channels. An extensive body of literature has demonstrated that the effects of war persist and can even influence generations that have not experienced the war (see e.g.,

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Akresh et al., 2012; Islam et al., 2016). In the case of Vietnam, bombings and defoliants used during the Vietnam War have been found to have significant effects on a range of outcomes including health and human capital development several decades after the War (see, e.g., Bundervoet et al., 2009; Palmer et al., 2019; Singhal, 2019). The effects of shocks from the Vietnam War can influence entrepreneurial outcomes through various channels that persist over time. Specifically, we examine the role of economic growth, health, human capital formation, infrastructure, prevalence of wage-earning opportunities and social capital as potential channels through which the War affected propensity to become an entrepreneur.

These channels, discussed in more detail in Section 2, theoretically represent mechanisms through which the early life adversity can influence entrepreneurship. Miller and Le Breton-Miller (2017) propose the underdog theory of entrepreneurship, which states that “negative personal circumstances of an economic, sociocultural, cognitive, and physical/emotional nature may have a ... powerful role to play in getting people to become effective entrepreneurs” Miller and Le Breton-Miller (2017, p.3). Cheng et al. (2021) note that while Miller and Le Breton-Miller (2017) posit that underdogs are more likely to become entrepreneurs, they assume the existence of their “negative personal circumstances” and do not offer an explanation as to how they arise. We follow Cheng et al. (2021) in extending the Miller and Le Breton-Miller (2017) framework by drawing on the literature in economics, medicine and related disciplines that shows that disadvantages experienced later in life stem from adversity in early life.

In our main analysis, we combine bombing intensity data from Miguel and Roland (2011) with data from the 1997/1998 Vietnam Living Standard Survey (VLSS). We follow the existing literature and measure entrepreneurship using information on respondents’ main economic activity in the last seven days or 12 months prior to the date they were interviewed for the survey (see, e.g., Dabić et al., 2020; Hessels et al., 2020; Schneck, 2014; Van Praag et al., 2013). The VLSS is our preferred dataset because it provides information on respondents’ place of birth which allows us to control for migration. A limitation of the VLSS is that it does not contain data on social capital. To examine social capital as a channel, we use five waves of the Vietnam Access to Resources Household Survey (VARHS) and a similar measure of entrepreneurship based on economic activity in the last 12 months prior to the survey.

Our identification strategy is based on an instrumental variable analysis that instruments for the intensity of bombing using the distance from the district in which the bombing occurred to the 17th parallel north latitude, which was the border between North and South Vietnam. This identification strategy has been widely employed in previous studies examining the long-term implications of the Vietnam War (Miguel & Roland, 2011; Palmer et al., 2019; Singhal, 2019; Awaworyi Churchill et al., 2020). We find that exposure to war increases the probability of being an entrepreneur. Our two stage least squares (2SLS) results suggest that a 10% increase in bombing intensity generates a 4.8 percentage point increase in the probability that a respondent was self-employed in the last seven days and 2.3 percentage point increase in the probability that they were self-employed in the last 12 months. We find that social capital mediates the relationship between early life exposure to the War and becoming an entrepreneur.

Our findings contribute to the extant scant literature on the effect of early life adversity on proclivity to become an entrepreneur in important ways. The first is the context. While both famine and war are shocks, one would expect the channels through which early life adversity might lead one to become an entrepreneur would be different if one was exposed to famine or war. For example, bombing in the War resulted in the widespread destruction of infrastructure that reduced employment opportunities, that does not occur in a famine. The second is in terms of our focus. Chu et al. (2019) examine whether the severity of famine in a given county affects the subsequent growth of private enterprises (up to a certain size) – what they term an ‘entrepreneurial firm’ – in that

county. They do not examine how an individual’s early life exposure to a shock affects whether that individual subsequently becomes an entrepreneur, which is what we do. Cheng et al. (2021) do examine whether an individual’s early life exposure to famine influences whether that individual becomes an entrepreneur. In this sense, that study is much closer to what we do. We differ from Cheng et al. (2021) in at least two main ways. The first is that they focus specifically on propensity for migrant entrepreneurship, while we consider propensity for entrepreneurship in general. Second, Cheng et al. (2021) do not systematically explore the mediators through which early life adversity affects propensity to become an entrepreneur in adulthood, which is an important contribution of our study.

The remainder of the paper is organized as follows. Section 2 discusses the related literature and presents hypotheses to guide the study. Section 3 discusses the data. Section 4 presents the empirical strategy. Section 5 presents the results. Section 6 concludes.

2. Related literature and hypotheses

The existing literature discusses two types of entrepreneurs; namely, opportunity entrepreneurs and necessity entrepreneurs. Opportunity entrepreneurs are ‘pulled’ into entrepreneurship solely to take advantage of certain business opportunities (Carter et al., 2003; Feldman & Bolino, 2000; Kirkwood, 2009; Williams & Round, 2009), while necessity entrepreneurs are forced or ‘pushed’ into entrepreneurship due to life circumstances and lack of other options (Block & Wagner, 2010; Langevang et al., 2012; Mühlböck et al., 2018; Parker, 2004; Zwan et al., 2016). Factors that trigger necessity entrepreneurship may include economic downturns, bad labour market conditions and childhood adversity including personal tragedies, family financial problems, poverty and war, among others (see, e.g., Deli, 2011; Fairlie, 2013; Galdo, 2013; Miller & Le Breton-Miller, 2017; Røed & Skogstrøm, 2014; Thompson, 2011).

The literature on the factors that trigger necessity entrepreneurship suggest that exposure to adversity increases the likelihood of becoming an entrepreneur. Miller and Le Breton-Miller (2017) review several such studies of how adversity in adulthood is associated with proclivity to become a necessity entrepreneur, proposing an ‘underdog entrepreneur’ framework. Cheng et al. (2021) explicitly extend the underdog entrepreneur framework to examine how adversity in early life impacts on the likelihood of becoming an entrepreneur.

More generally, early life shocks put an individual at a disadvantage in terms of securing wage employment later in life. Some of these disadvantages will be reflected in the effect of the shock on the specific circumstances of the individual, such as loss of human capital or persistent poor health later in life. Others will be related to the more general adverse labour market conditions due to the long-term effect of the war on growth and infrastructure. At the same time, the literature on the determinants of entrepreneurship suggest that exposure to adverse childhood events could make individuals more self-reliant (Bonanno, 2004), resourceful and effective in handling failures (Baker & Nelson, 2005; Bonanno, 2004), resilient (Bullough et al., 2014), and more risk-taking (Haushofer & Fehr, 2014); all of which are important attributes for entrepreneurship (Ayala & Manzano, 2014; Cope, 2011; Hayward et al., 2010).

The dual effect of the early life shock on reducing opportunities to secure wage employment on the one hand, but giving the individual the character, resilience and skills to branch out on their own, on the other, leads us to formulate our first hypothesis is as follows:

Hypothesis 1: The more severe the bombing intensity experienced during early-life exposure to the Vietnam War, the more likely individuals will become entrepreneurs.

We next discuss a number of potential transmission mechanisms through which adversity experienced in early life during the Vietnam War could work to influence entrepreneurship. We link our arguments to the underdog entrepreneur framework (Miller & Le Breton-Miller,

2017), which suggests that out of necessity, victims will turn to entrepreneurship.

2.1. Human capital & health

War has a negative effect on human capital (see, e.g., Chamarbagwala & Morán, 2011; Islam et al., 2016; Kecmanovic, 2013; Lai & Thyne, 2007; Merrouche, 2011; Shemyakina, 2011; Weldeegzie, 2017) and health outcomes (see, e.g., Bundervoet et al., 2009; Palmer et al., 2019; Singhal, 2019). Specifically, war undermines health and educational systems (Shemyakina, 2011), reduces education enrolment (Lai & Thyne, 2007) and results in diversion of public education and health funds (Cappelen et al., 1996; Lai & Thyne, 2007). War often forces people into overcrowded accommodation, exposing them to various diseases (Ghobarah et al., 2003). War also destroys transport networks, compromising the movement of relief supplies, medical staff, food, clean water and medicine, all of which adversely affect health and increase the probability of long-term disability (Gates et al., 2012; Ghobarah et al., 2003).

Such adverse health and education shocks associated with war can have significant implications for labour market outcomes in the future. In particular, by limiting education and promoting poor health, children who experience adverse childhood events, like war, have poorer future prospects in the labour market with lower probabilities of securing wage-earning employment (Akbulut-Yuksel, 2014; Blattman & Annan, 2010). The underdog framework of entrepreneurship suggests that as a result of necessity engendered by the inability to find desirable employment, victims of childhood adversity who have had their education and health adversely affected, are more likely to turn to entrepreneurship as a way of maintaining their livelihood (Galdo, 2013; Miller & Le Breton-Miller, 2017; Mühlböck et al., 2018).

According to the underdog theory of entrepreneurship, *challenging backgrounds* lead to certain *conditions and experiences* that necessitate the acquisition of *coping or adaptive skills* conducive to *entrepreneurship* (Miller & Le Breton-Miller, 2017). In the context of our study, the challenging background is growing up in the war and the resulting conditions are poor human capital and health. How does poor health result in adaptive skills? Evidence suggests that poor health tends to trigger coping mechanisms and resilience associated with the entrepreneurial process and, thus, poor health influences individual to prefer entrepreneurship (Wiklund et al., 2018). The psychology literature also links various medical conditions to originality, risk tolerance, creativity, and perseverance, all of which are relevant for entrepreneurial success (see, e.g., Baron-Cohen et al., 2009; Hayden et al., 2008; Tafti et al., 2009). Indeed, research has found a positive association between adverse health conditions and entrepreneurship (see, e.g., Johnson et al., 2018; Logan, 2009; Wiklund et al., 2017).

This leads to our second hypothesis as follows:

Hypothesis 2: Human capital and health mediate the relationship between early-life exposure to bombing during the Vietnam War and the likelihood of becoming an entrepreneur in later life.

2.2. Business environment

War can be expected to influence economic growth, infrastructure and wage-earning opportunities, all of which shape the business environment and influence entrepreneurial decisions. We discuss these components of the business environment in turn.

3. Economic growth

War undermines long-term economic growth in many ways. It creates uncertainty about property rights, encourages rent-seeking behaviour and generates conflict traps (Azariadis & Drazen, 1990; Collier & Sambanis, 2002; Polachek & Sevastianova, 2012); all of which tend to impede long-term economic development. During wars, productive

assets are destroyed (Gates et al., 2012) and resources are diverted to the communities and regions of those in power; thus, undermining the operations of many critical economic institutions that can promote economic growth (de Imus et al., 2017). Low economic growth is often associated with high rates of unemployment (Aghion & Howitt, 1992; Villaverde & Maza, 2009).

Due to the long-term adverse effects of war on economic growth and the lack of employment opportunities associated with it, children who were exposed to the war, who have been able to build resilience and other attributes suitable for entrepreneurship, may be forced to become entrepreneurs to generate income (Andersson & Wadensjö, 2007; Berglann et al., 2011; Evans & Leighton, 1989; Røed & Skogstrøm, 2014). This line of argument is consistent with what the underdog entrepreneur framework would predict; namely, a shock like war, which lowers growth and consequent opportunities for wage-earning employment will engender necessity entrepreneurship or force victims of war into becoming entrepreneurs in the future.

4. Infrastructure and wage-earning opportunities

War destroys infrastructure, including manufacturing businesses, hospitals and schools (Cervantes & Fernández Cano, 2016; de Imus et al., 2017; Sowers et al., 2017). In addition to the effects of destroyed infrastructure on health and human capital accumulation, lack of infrastructure hinders economic development, contributing to the lack of wage-earning opportunities from formal employment. Importantly, without relevant infrastructure, investors are not likely to invest in new factories that increase the availability of wage-earning opportunities. The destruction of transport infrastructure, for instance, could compromise supply chains (Gates et al., 2012; Ghobarah et al., 2003), which hinders investment. War also results in high rates of unemployment that can persist for generations, especially in sectors that have lost infrastructure. Exacerbating unemployment rates among victims of war is that they often also have poorer health and lower levels of education, thus, making them less competitive in the labour market (Akbulut-Yuksel, 2014; Blattman & Annan, 2010).

Post-war reconstruction efforts, on the other hand, could rebuild destroyed infrastructure to pre-war levels or better. Miguel and Roland (2011) posit that war should only have temporary effects and that the economy will return to the steady state in the long run. Yet, estimates suggest that post-war investment, in the best-case scenario, will still take about two decades to rebuild destroyed physical infrastructure (see, e.g., Brakman et al., 2004; Davis & Weinstein, 2002; Miguel & Roland, 2011). The long-term effects of war on infrastructure development, which is intensified because of post-war reconstruction efforts, could generate more wage-earning opportunities. This could also mean a flourishing business environment that will promote entrepreneurial opportunities. A notable policy initiative in promoting the business environment after the War is the 1986 Doi Moi Policy, which was the maiden post-war economic reform in Vietnam. The aim of the Doi Moi policy was to transition to a multi-sector economic system that encouraged private sector growth through promoting small enterprises (Freeman, 1996; Vuong, 2016). This policy provided an important buffer that enabled socioeconomically disadvantaged households, such as those disadvantaged as a result of the Vietnam War, to engage in entrepreneurial activities in order to promote the private sector.

We state our third hypothesis as follows:

Hypothesis 3: The likelihood that bombing intensity experienced during early-life exposure to the Vietnam War, increases the likelihood that they will become entrepreneurs will be mediated by the extent to which the War adversely influenced the long-term business environment; viz. economic growth, infrastructure and the prevalence of wage-earning opportunities.

Given that we deal with more than one mediating variable, we break this down into sub-hypotheses as follows:

Hypothesis 3a: Economic growth mediates the relationship between early-life exposure to bombing during the Vietnam War and the likelihood of

becoming an entrepreneur in later life.

Hypothesis 3b: Infrastructure mediates the relationship between early-life exposure to bombing during the Vietnam War and the likelihood of becoming an entrepreneur in later life.

Hypothesis 3c: Wage-earning opportunities mediate the relationship between early-life exposure to bombing during the Vietnam War and the likelihood of becoming an entrepreneur in later life.

4.1. Social capital

Social capital is an important factor that drives entrepreneurship. Several theories of social capital suggest that social capital is necessary for entrepreneurial success as it opens access to various business resources, including market information, finance and factors of production (Coleman, 1988; Davidsson & Honig, 2003; De Carolis & Saparito, 2006; Greve & Salaff, 2003). Specifically, social capital represents resources that are embedded in personal networks and can enable potential entrepreneurs to identify new business opportunities and share information about them (Awaworyi Churchill, 2017a; Awaworyi Churchill & Smyth, 2017; Bhagavatula et al., 2010; Stam et al., 2014). Privileged information conducive to start-up activities that promotes entrepreneurship tend to exist and circulate more effectively among social networks (Awaworyi Churchill, 2017a, 2017b). Social capital, thus, reduces transaction costs, minimises business risk and offers valuable insights into business opportunities (Davidsson & Honig, 2003; Gedajlovic et al., 2013). Social capital is also an important component of productivity in many communities where groups of families, friends, neighbours and other community collectives work together. In the case of Vietnam, the cooperative commune production method largely relies on social capital (Van Phuong et al., 2020).

War often increases social capital (see, e.g., Bellows & Miguel, 2009; De Luca & Verpoorten, 2015; Jennings & Sanchez-Pages, 2017; Voors et al., 2012). As a way of coping, individuals that have directly experienced war are more likely to participate in community initiatives (Bellows & Miguel, 2009), become more involved in politics (De Luca & Verpoorten, 2015), take more risks and exhibit higher levels of altruism toward each other (Voors et al., 2012). By increasing social capital and enhancing the flow of information about market opportunities, those exposed to the war during early life will have a higher likelihood of starting their own business in adulthood. We, therefore, propose our fourth hypothesis as follows:

Hypothesis 4: The likelihood that bombing intensity experienced during early-life exposure to the Vietnam War, increases the likelihood that they will become entrepreneurs will be mediated by the extent to which the War increased their social capital.

5. Data and variables

To examine the impact of childhood adversity on entrepreneurship in Vietnam, we use data from multiple sources. Measures of entrepreneurship are from the 1997/1998 VLSS. Given that the childhood shock we consider is the Vietnam War, we restrict our sample to those born between 1955 and 1975. The cut-off of 1955 for the lower bound is important to isolate the effect of the Vietnam War given that the first Indochina war ended in 1954. The upper bound cut-off of 1975 is chosen because the Vietnam War ended in 1975, and, thus, individuals born after this point would not have lived through the war and experienced it as a potential shock. In sensitivity check on our main results we further restrict the sample to those respondents who were aged five or below during the war, i.e. those born during 1960–1975.

It is important to control for migration as this allows us to isolate the true effect of the shock (i.e., bombing intensity in the Vietnam War). The level of exposure to shocks could vary significantly depending on the location of individuals when the bombings occurred. If individuals relocated to new locations after the war, our results will be biased if bombing intensity in their current location is used to access the effects of

adversity. Primarily, given that our study focuses on the impact of childhood adversity, it is important that respondents are matched to the intensity of bombing that they actually experienced growing up. Thus, migration would potentially bias the estimates if, for example, they lived in one district during the war and a different district at the time of the survey. Compared to later household surveys in Vietnam, the 1997/1998 VLSS has the significant advantage that it provides information on respondent's place of birth. To avoid bias related to migration, we use the information on place of birth and restrict our sample to those have not moved from their district of birth.¹

To measure entrepreneurship, we use information on respondents' main economic activity in alternatively the last seven days and 12 months, prior to the date at which they were interviewed for the survey. Our measure of entrepreneurship is a binary variable equal to one if the respondent reports that he or she is self-employed. We also separately consider whether the respondent is self-employed in farm work or in a non-farm business enterprise.

To measure the effect of the childhood adversity as proxied by bombing during the Vietnam War, we use bombing intensity at the district level, measured by the total quantity of bombs, missiles and rockets dropped by the United States military per square kilometre in Vietnam between 1965 and 1975. This variable is taken from Miguel and Roland (2011).

We control for a set of covariates that are likely to influence decisions to become an entrepreneur, consistent with the existing literature (see, e.g., Hammarstedt, 2001; Leoni & Falk, 2010; Taniguchi, 2002; Woronkiewicz & Noonan, 2017). Our control variables include ethnicity, gender, demographic, socioeconomic and geographic characteristics.

We consider economic growth, education, health, infrastructure, availability of wage-earning jobs and social capital as potential mechanisms through which bombing intensity could influence entrepreneurship. Given that we do not have data on per capita GDP at the district level, we follow the approach used in studies that have used night time light as a measure of economic activity (see, e.g., Doll et al., 2006; Henderson et al., 2012; Sutton & Costanza, 2002) and measure economic growth using district level night data from Hodler and Raschky (2014).

To measure health, we employ a binary variable equal to one if the respondent has been ill in the last 14 days. To measure education, we employ the respondent's highest level of education attained. To measure the availability of wage-earning jobs, we use a binary variable equal to one if the commune within which the respondent lives has at least one factory or manufacturing business, given that manufacturing businesses are a proxy for the availability of wage labour (Ahlin et al., 2011). To measure infrastructure, we use a binary variable equal to one if the commune has at least one of the following: roads suitable for cars, waterways or public transport, which are standard indicators of infrastructure (Farhadi, 2015).

The 1997/1998 VLSS community and household surveys contains information on the indicators of health, education, wage-earning jobs and infrastructure described above, but do not have a measure of social capital. Hence, to test the role of social capital as a mediator, we also use five waves of data for 2008 to 2016 from VARHS, which is a representative survey covering 12 provinces that is administered biennially. Based on the data in VARHS, we measure social capital using a dummy variable equal to one if the respondent belongs to any social group.² This measure of social capital captures social networks and group involvement, and is a commonly used proxy for social networks in the existing literature (see, e.g., Awaworyi Churchill & Mishra, 2017; Putnam,

¹ Our restriction focuses on district of birth, given that bombing data is at the district level.

² In VARHS, social groups are defined as political groups, youth unions, women's associations, farmer groups, veteran associations and 'other social groups'.

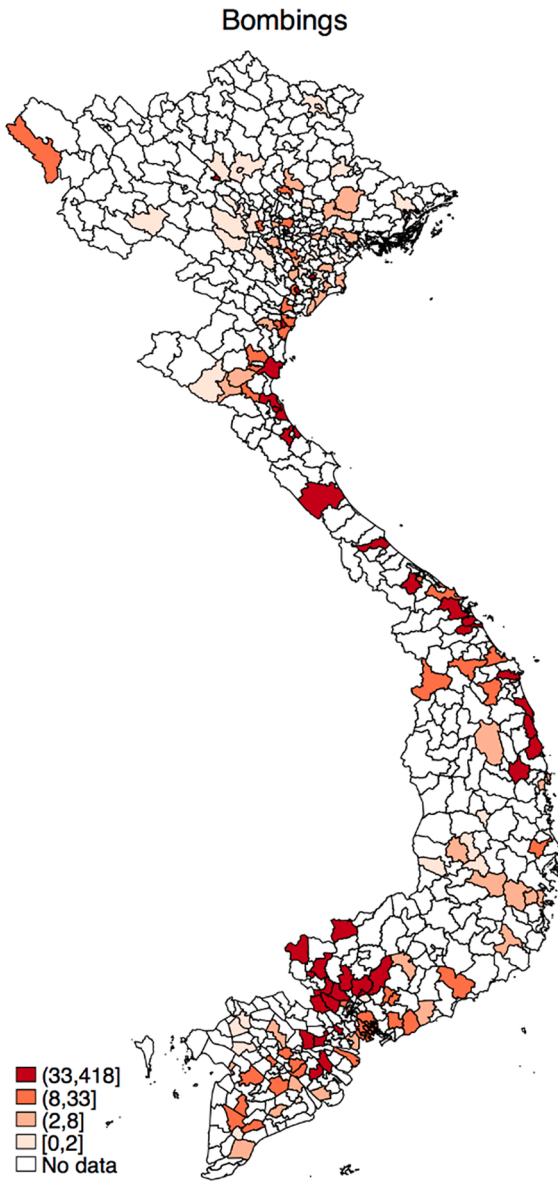


Fig. 1. Intensity of Bombings across districts.

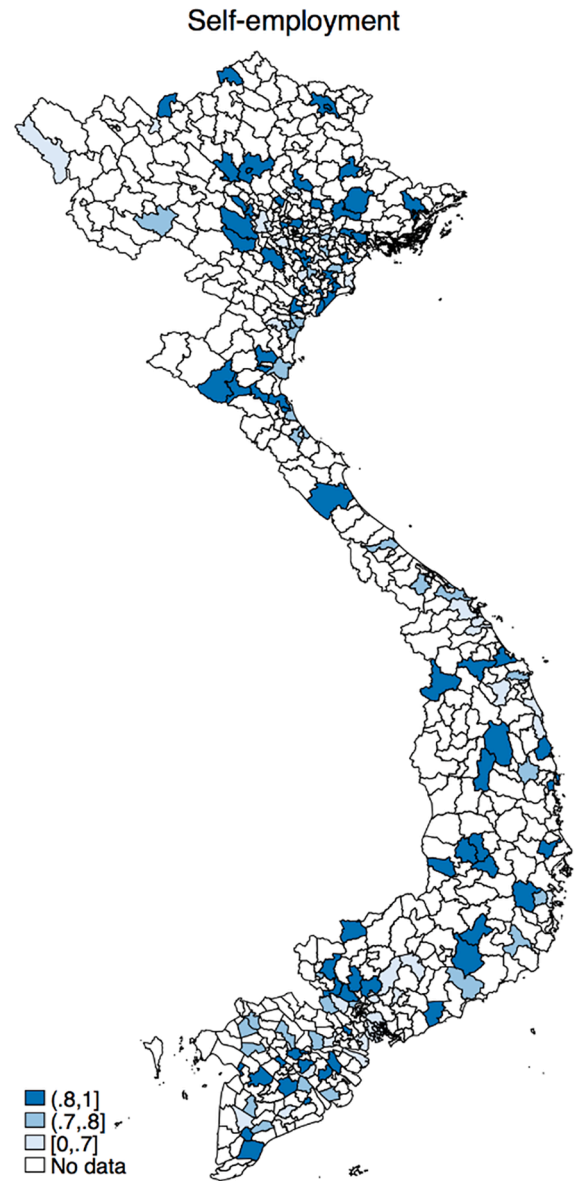


Fig. 2. Self-employment across districts.

2000). We use the VAHRS dataset for the mediation analysis focused on social capital, given that intuitively, measures of social capital from 2006 cannot explain outcomes in 1997.³

Table A1 presents a description and summary statistics for all variables used in our main analysis. Overall, in regressions with the highest number of observations, analysis with VLSS includes 1602 observations while analysis with the VARHS includes 5382 observations. In our sample, 82.5% are self-employed. Self-employment in agriculture is more common, compared to self-employment in non-farm related businesses. Figs. 1 and 2 map the intensity of bombing and prevalence of self-employment across districts using the VLSS 1997/1998 data. As a first look at the relationship, we calculated the simple correlation between the intensity of bombing and the prevalence of self-employment in VLSS. The correlation is positive, which is suggestive evidence in support of our first hypothesis. Specifically, a 10% increase in the intensity of bombings is associated with a 0.17 percentage point increase

in the probability of being self-employed in the last seven days, and a 0.1 percentage point increase in the probability of being self-employed in the last 12 months. We find that these preliminary correlations remain robust when we control for the relevant covariates and endogeneity below, although the magnitude of the coefficients on intensity of bombings increases.

6. Empirical strategy

To examine the effect of bombing intensity on entrepreneurship we use the following equation:

$$E_{i,j,t} = \alpha + \gamma B_j + \rho IC_{i,j,t} + \varphi Z_j + \pi_C + \nu_{i,j,t} \quad (1)$$

where i is an index of the individual, t the birth cohort and j the district. $E_{i,j,t}$ defines our entrepreneurial outcome (i.e. either self-employed or in wage employment). B_j represents bombing intensity; $IC_{i,j,t}$ represents a set of individual characteristics that are likely to influence the probability of being self-employed including ethnicity, gender, health status and educational attainment, among others. Z_j is a vector of district-level factors including pre-war population density, average precipitation and

³ In robustness checks, not reported here, we find that our results are generally robust to the use of the VARHS dataset as well.

Table 1
Bombings and self-employment.

Self-employment	Linear Probability Model		2SLS	
	Last 7 days (1)	Last 12 months (2)	Last 7 days (3)	Last 12 months (4)
Log total bombing per km ²	−0.004 (0.010)	0.003 (0.008)	0.479*** (0.168)	0.229** (0.114)
Other controls	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Cohorts FE	Yes	Yes	Yes	Yes
First stage of 2SLS Latitude-17N			−0.431*** (0.107)	−0.431*** (0.107)
Kleibergen-Paap test			73.47	73.47
Observations	1602	1602	1602	1602

Notes: Robust standard errors in parentheses; standard errors are clustered at the district level; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Full results are reported in Table A2.

temperature during the Vietnam War, latitude and the share of land at different latitudes. π_c is a cohort fixed effects term that controls for the year of birth of each individual. ν_{ijt} is a random error term that allows for correlation at the district level. In our main results, standard errors are clustered at the district level, although in robustness checks we check the sensitivity of doing this to other ways of clustering.

γ is the estimate of interest and reflects the effect of bombing intensity on entrepreneurship. Given that bombing was not random, γ is likely to be biased. To address endogeneity, we use distance from the centroid of each district to the 17th parallel north latitude, D_j , as the instrument. This instrument was originally proposed by Miguel and Roland (2011) and was more recently used by Palmer et al. (2019), Singhal (2019) and Awaworyi Churchill et al. (2020). Distance to the 17th parallel north latitude is correlated with bombing intensity because bombing was heaviest close to the former North and South Vietnamese border. The border was established as a result of negotiations between the United States and the Soviet Union as part of the 1954 Geneva Accords. Importantly, the border was decided without consultation with the Vietnamese and without regard to the prevailing socioeconomic conditions. As Miguel and Roland (2011) put it, proximity to the Vietnamese South–North border can be viewed as a natural experiment in estimating the causal effect of bombing intensity on long-term outcomes.

Using this instrument, we estimate the following first stage equation:

$$B_j = \alpha + \theta D_j + \varphi Z_j + \varepsilon_j \quad (2)$$

Given that our instrument, D_j , is measured as the absolute value of the distance between the centroid of district j to the 17th parallel, the sign on θ is expected to be negative.

7. Results

7.1. Main estimates

We present linear probability model (LPM) and 2SLS estimates of the relationship between bombing intensity and entrepreneurship in Table 1. Columns 1 and 2 present LPM estimates for the relationship between bombing intensity and self-employment in the last seven days and 12 months, respectively. The coefficients on bombing intensity in both columns are statistically insignificant, suggesting that endogeneity is associated with a downward bias.

In Columns 3 and 4, we present 2SLS estimates for the effect of

Table 2
Bombings and self-employment – Different types of self-employment.

Self-employment	Farming (1)	Non-farming (2)
Panel A: Activities in the last 7 days		
Log total bombing per km ²	0.116 (0.221)	0.559** (0.240)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1602	1602
Panel B: Activities in the last 12 months		
Log total bombing per km ²	0.152 (0.192)	0.722*** (0.243)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1602	1602

Notes: Robust standard errors in parentheses; 2SLS regressions with standard errors clustered at the district level; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; first stage results pass the relevant tests; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

bombing intensity on self-employment in the last seven days and 12 months, respectively. The Kleibergen-Paap test results from both columns show that our instrument is not weakly correlated with self-employment (Stock & Yogo, 2005). From the first-stage estimates, the negative coefficient on our instrument is consistent with expectations and findings in the existing literature (Miguel & Roland, 2011; Singhal, 2019; Awaworyi Churchill et al., 2020).

In the second stage the coefficients on bombing intensity in Columns 3 and 4 are positive and significant at the 1% and 5% significance levels, respectively. Specifically, a 10% increase in bombing intensity generates a 4.8 percentage point increase in the probability that a respondent was self-employed in the last seven days, and 2.3 percentage point increase in the probability that they were self-employed in the last 12 months. These results are consistent with our first hypothesis and with the finding in Cheng et al. (2021) that childhood adversity increases the likelihood of becoming an entrepreneur in adulthood.

The results in Table 1 do not differentiate between self-employment in agriculture and non-farm businesses. In Table 2, we examine heterogeneity across the different types of self-employment or economic activities in which entrepreneurs can engage. Panel A reports results for self-employment in the last seven days, while Panel B reports results for self-employment in the last 12 months. The impact of bombing intensity on self-employment is only significant for non-farm businesses, suggesting that self-employment in this category is driving the results.

Specifically, we find that the coefficient on bombing intensity in column (1) is significant at the 5% significance level, while the coefficient in Column (2) is significant at the 1% significance level. The magnitudes of the coefficients show that a 10% increase in bombing intensity generates a 5.6 percentage point increase in the probability that a respondent was self-employed in a non-farm business in the last seven days and 7.2 percentage point increase in the probability that they were self-employed in a non-farm business in the last 12 months. That the coefficients on bombing intensity is statistically insignificant in regressions examining self-employment in farm businesses is an indication that the overall effect of bombing intensity on self-employment observed in Table 1 is driven by the effect on self-employment in the non-farm business category.

7.2. Mechanisms

Section 2 discussed the role of economic growth, health, education, availability of wage-employment, infrastructure and social capital as

Table 3
SEM results – VLSS data.

	Self-employment last 7 days	Self-employment last 12 months
<i>Panel A: Effects of bombing intensity on mediators</i>		
Education	−0.625 (0.394)	−0.625 (0.394)
Illness	0.295 (0.212)	0.295 (0.212)
Factories	−0.157 (0.146)	−0.157 (0.146)
Infrastructure	−0.226*** (0.086)	−0.226*** (0.086)
Night-time light	4.402 (2.965)	4.402 (2.965)
<i>Panel B: Effects of significant mediator (infrastructure) on self-employment</i>		
Self-employment	0.048 (0.060)	0.027 (0.041)
<i>Panel C: Effects of bombing intensity on self-employment</i>		
Total indirect effect	−0.017 (0.016)	−0.027 (0.019)
Direct effect	0.479*** (0.168)	0.029* (0.121)
Combined effect (total indirect effect + direct effect)	0.461*** (0.167)	0.202* (0.122)
Observations	1,602	1,602

Notes: In Panels A and B, the variables noted in Column 1 are outcome variables, and the coefficients represent the effects of variable described in the panel sub-heading; Results from IV Structural Equation Modelling; we use the *sem* command in STATA and apply the predicted values of bombing intensity; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4
SEM results – VARHS data.

	Effects of log total bombing per km ²
<i>Panel A: Effect of bombing intensity on social networks</i>	
Social networks	0.039*** (0.014)
<i>Panel B: Effect of social network on self-employment</i>	
Self-employment	0.063*** (0.011)
<i>Panel C: Effects of bombing intensity on self-employment</i>	
Total indirect effect	0.002** (0.001)
Direct effect	0.032*** (0.010)
Combined effect (total indirect effect + direct effect)	0.035*** (0.010)
Observations	5382

Notes: In Panels A and B, the variables noted in Column 1 are outcome variables, and the coefficients represent the effects of variable described in the panel sub-heading; Results from IV Structural Equation Modelling; we use the *sem* command in STATA and apply the predicted values of bombing intensity; individual controls include social networks, gender, age, education, illness, household areas; district controls include pre-war population density, average rainfall and temperatures during the war, latitude, north; *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

potential mechanisms through which childhood adversity might influence entrepreneurship. In this section, we examine empirically whether these factors mediate the relationship between bombing intensity and self-employment; hence, testing hypotheses 2–4. In order to estimate how much of the indirect relationship between bombing intensity and self-employment is channelled through economic growth, education, health, availability of wage-employment and infrastructure, we employ

an IV structural equation model (SEM). The SEM results are reported in Table 3.

We find that an increase in the intensity of bombing is associated with poorer infrastructure. Specifically, bombing intensity is associated with a lower probability of having access to roads and public transportation. However, the effects of bombing intensity on education, health, prevalence of wage-earning jobs and economic growth are statistically insignificant. Further, the effect of infrastructure and the total indirect effect of bombing intensity on self-employment is statistically insignificant, suggesting that the combined effect of bombing intensity on self-employment is mostly driven by bombing intensity's direct effect. However, the findings are quite different when we focus on social capital using the VARHS data. In Table 4, SEM results show that bombing intensity has a positive effect on social capital. Thus, an increase in bombing intensity is associated with a higher probability of being involved in a social group. Specifically, at the 1% significance level, a 10% increase in bombing intensity is associated with a 0.39% increase in the probability that a respondent will belong to a social group. This finding is consistent with studies, such as Blattman (2009), Carmil and Breznitz (1991) and Shewfelt (2009) suggesting that victims of war tend to build resilience together by participation in social groups. The results also show that social capital is associated with a higher probability of being self-employed. Further, the total indirect effect of bombing on self-employment is statistically significant with an effect size that constitutes about 5.7 per cent of the total effect of bombing on self-employment. These results suggest that social capital is a mechanism through which war influences self-employment. Thus, we find support for hypothesis 4, but not hypotheses 2 and 3.

7.3. Robustness checks

In this section, we subject our main 2SLS estimates, reported in Table 1, to several robustness checks. Our main results are based on regressions with standard errors clustered at the district level. In Table A3, we examine the sensitivity of our results to clustering at different levels. In Panel A and B of Table A3, we cluster the standard errors at the province level and cohort levels, respectively. In Panel C of Table A3, we report results using Conley (1999) standard errors. Our results, in all cases, are robust to the level at which standard errors are clustered.

In Table A4, we examine the robustness of our results to differential time trends. As Singhal (2019) argues, one might be concerned that differences in post-war policies and location-specific resources could be driving our results. To check if this is the case, we include a variable that interacts province dummies with linear year of birth time trends. The results reported in Panel A of Table A4 show that our results are not driven by different time trends. In Panel B of Table A4, we account for interview fixed effects by controlling for the time of interviews. We find that our results are not sensitive to the control of interview fixed effects.

To isolate the effect of childhood shocks associated with bombings experienced in the district in which respondents were born and grew up, our main results are based on a restricted sample consisting of only those who have not migrated since birth. The downside of this approach, though, is that we lose about 29 per cent of our sample who lived in a different district at the time of the survey to that in which they were born. Previous studies on the long-term effects of the Vietnam War that have employed surveys that did not have information on place of birth spend considerable time showing that their results are not sensitive to migration (Palmer et al., 2019; Singhal, 2019).

In our main results, the self-employment variable is defined relative to wage-employment. Our binary variable is equal to 1 if respondents are self-employed and zero if engaged in wage-employment, excluding those that are unemployed. In Table A5, we examine the robustness of our results to including those that are unemployed in the sample. Hence, in Table A5, our measure of entrepreneurship is defined as a binary variable equals one if the respondent is self-employed and zero if either

unemployed or in wage-employment. The results remain robust.

One might be worried that our results are being driven by one or two outliers that were most heavily bombed during the Vietnam War, in which the long-term effects on reduced opportunities to gain wage employment are most persistent. The obvious outlier candidate is Quang Tri province which was the most heavily bombed during the Vietnam War. 'Of 3000 villages that existed in Quang Tri province before the war, by 1975 just 11 villages had a single building left standing' (Church, 2018). In Table A6, we re-estimate our results excluding Quang Tri. The results are robust and, thus, our results are not driven by this province.

Our main analysis is based on a sample restricted to respondents born between 1955 and 1975. As a robustness check on these results, we further restrict the sample to those respondents who were aged five or below during the war, i.e. those born during 1960–1975. The results of this exercise, which are reported in Table A7, suggest our main results are robust.

In a further check, we adopt an alternative cohort approach in which we interact a dummy variable capturing those born between 1960 and 1975 with our bombing intensity variable. Results reported in Table A8 show that the impact of bombings on entrepreneurship is stronger for the younger cohort born between 1960 and 1975.

For ease of interpretation, our main results are based on LPMs. Given that our outcome variables are binary variables, we examine the sensitivity of our results to using the probit model. In Columns 1 and 2 of Table A9, we report IV-probit results. Columns 1 and 2 report results for self-employment in the last seven days and 12 months, respectively.

The summary statistics show that in our sample, 82.5% of respondents are self-employed. Given that our outcome variable is skewed, as a final sensitivity check, we re-estimate our main results using rare events logit (RELogit), which does not assume that the outcome variable is normally distributed (King & Zeng, 2001). In Columns 3 and 4, we report the IV-RELogit regression results for self-employment in the last seven days and 12 months, respectively. The results for both IV-probit and IV-RELogit are consistent with our main results in Table 1.

In a final check, we examine the robustness of our results to Bayesian modelling. The Bayesian method is more universal compared to traditional frequentist approaches. It relies on the entire posterior distribution of model parameters and, thus, inferences from Bayesian models are more flexible and comprehensive (Thompson, 2014). Despite the benefits of the Bayesian model, its application remains controversial, given the presumed subjectivity in specifying prior distribution and information (Berger & Wolpert, 1988; Bernardo & Smith, 2009; Thompson, 2014). However, the use of the Bayesian approach can serve as a useful robustness check. We use the predicted values of bombing intensity from the first stage to run regressions based on the Bayesian approach. The results reported in Table A10 show that the magnitude of the coefficient on the bombing intensity variable is identical to those reported from the frequentist 2SLS regression in Table 1. Specifically, the coefficient of bombing intensity in column 1 is 0.480 (versus 0.479 with 2SLS) and in column 2 it is 0.225 (versus 0.229 in 2SLS). The statistical significance of the coefficients is supported by the 95% credible interval.

8. Discussion and conclusion

Experiencing adversity early in life can have significant implications in adulthood. Adverse childhood shocks including abuse, extreme weather conditions and conflict, among others, can have major implications for labour market outcomes including decisions on what labour market activities in which to engage. According to Miller and Le Breton-Miller (2017), adverse shocks, which may be sociocultural, economical, physical, emotional, or cognitive, create experiences and situations that mould and promote a set of crucial entrepreneurial skills and attributes within an individual. We find that early life exposure to the Vietnam War, proxied by bombing intensity, increases the likelihood of becoming an entrepreneur in adulthood.

We hypothesised several potential channels consistent with the underdog entrepreneurship framework through which childhood exposure to war could increase the likelihood of becoming an entrepreneur. We find that most of these potential channels do not mediate the relationship between exposure to the Vietnam War in early life and propensity to become an entrepreneur; however, we find social capital to be an important channel.

Our findings add to the literature in three important ways. First, our study adds to the literature on the determinants of entrepreneurship and demonstrate that, in addition to contemporaneous factors, previous shocks can influence the propensity to be entrepreneurial. Second, by showing that childhood adversity can foster entrepreneurship, we extend the theoretical basis of the underdog framework of entrepreneurship. Miller and Le Breton-Miller (2017) posit that challenging backgrounds lead to conditions and experiences that increase propensity for entrepreneurship, but they assume these challenging backgrounds exist, rather than explain their origins. We show that challenging backgrounds can have their origins in early life adversity. Very few studies have provided evidence on how adversity growing up can foster entrepreneurship in adulthood. The two studies in this line of enquiry focus on famine, and by examining the Vietnam War, we provide a new context that adds to the literature. Third, by exploring the mechanisms through which early life adversity can influence entrepreneurship, we add to the literature by enhancing knowledge on how previous events or shocks can influence contemporaneous outcomes. Specifically, our results provide a foundation for policymakers in their efforts to help victims build resilience and foster entrepreneurship.

Much of the previous literature on the effects of early-life adversity on outcomes in adulthood has emphasised the negative effects, for example, for income. These studies have recommended early-life intervention in education to address these deficits. Yet, by linking early-life adversity to positive outcomes in adulthood in the form of propensity for entrepreneurship, our study puts a different policy spin on the effects of early-life adversity. If children who face adversity are particularly likely to become entrepreneurs, they may benefit from training that more closely educates them about the merits and demands of self-employment. Such awareness and training could be instrumental in developing countries with more limited opportunities for formal employment (Cheng et al., 2021).

Our findings suggest that those who are more exposed to bombing intensity during the Vietnam War tend to engage more in social activities and participate in collective action. Consistent with the underdog entrepreneurship framework, previous literature suggests that this could be associated with approaches that victims of war take to cope with the trauma of war. Thus, in an effort to build resilience, victims of war tend to build social capital, and when confronted by limited labour market opportunities for various reasons including low levels of human capital, they are compelled to take advantage of their networks to become entrepreneurs. These findings lend support to policies that promote the development of social capital as part of post-war reconstruction efforts. Importantly, policies and initiatives aimed at helping victims of war build resilience can promote entrepreneurial talent; thus, significantly strengthening the private sector. In many developing countries, in which conflict and other disasters have reduced the likelihood of formal employment, investing in training that helps build resilience and reinforce the benefits of self-employment can foster entrepreneurial talent.

One limitation of our study is that we are not able to disentangle all the mechanisms through which bombing intensity could influence entrepreneurship. Several other factors could potentially mediate the relationship between bombing intensity and entrepreneurship, including availability of arable land, which could explain the transition from farm-related self-employment to non-farm business. We are not able to explore all of these mechanisms, and this provides an avenue for future research. Additionally, because of data availability issues, we are unable to explore the detailed effect of bombing intensity on a breakdown of non-farm businesses. As demonstrated in the case of farm-

related self-employment versus non-farm business, it is likely that the various categories of ventures or business within the non-farm business category can offer some useful insight. However, we are unable to explore this. Our data also does not allow us to explore the length of time for which participants in our samples are entrepreneurs. An avenue for future research would be to adopt hazard models to explore the length of time from childhood adversity to becoming an entrepreneur, and also the probability of remaining as an entrepreneur. This can offer very useful policy insights.

Appendix A

See Tables A1–A10.

Table A1
Summary statistics.

Variables	Description	Mean	St. Dev.
Employment in the last seven days			
Self-employment	Work for yourself or your household	0.825	0.380
Self-employment farming	Work in farming belonging to yourself or your household	0.655	0.476
Self-employment non-farming	Work in business enterprises managed by yourself or your household	0.306	0.461
Employment in the last twelve months			
Self-employment	Work for yourself or your household	0.915	0.279
Self-employment farming	Work in farming belonging to yourself or your household	0.789	0.408
Self-employment non-farming	Work in business enterprises managed by yourself or your household	0.372	0.484
Individual characteristics			
Male	Gender (Male = 1)	0.160	0.366
Non-Kinh	Ethnicity (Non-Kinh = 1)	0.182	0.386
Age	Age (in years)	35.217	4.843
Education	Highest level of education (years)	2.972	1.032
Illness	Ill-health in the past two weeks	0.399	0.490
Household size	Number of household members	4.883	1.519
Urban	Living in urban areas	0.184	0.388
Marital status	Married = 1	0.928	0.258
Household areas	Living areas per person (km ²)	13.880	8.823
Commune-level variables			
Factories	Enterprises/factories (including traditional occupation) within commune	0.278	0.411
Infrastructure	Access to car road, public transport and other transportations.	0.405	0.486
District-level variables			
Total U.S. bombs, missiles, rockets per km ²	Number of bombs, missiles, rockets per km ² during the war	41.826	78.407
Night-time light	Night-time light in 1997	8.669	16.651
Population density, 1960–1961	Log of population density (thousand people per km ²)	5.135	1.245
Average precipitation (cm)	Mean precipitation (cm) during the war	153.617	28.486
Average temperature (Celsius)	Mean temperature (Celsius) during the war	24.772	1.728
Latitude	Latitude of district centre	17.294	5.189
North	North Vietnam		

Table A2
Bombings and Self-employment – Full results.

	Linear Probability Model		2SLS	
Self-employment	Last 7 days	Last 12 months	Last 7 days	Last 12 months
	(1)	(2)	(3)	(4)
Log total bombing per km ²	−0.004 (0.010)	0.003 (0.008)	0.479*** (0.168)	0.229** (0.114)
Female	0.150*** (0.027)	0.060** (0.023)	0.152*** (0.026)	0.061** (0.023)
Non-Kinh	−0.048 (0.035)	−0.025 (0.023)	−0.030 (0.032)	−0.018 (0.022)
Age	−0.008 (0.021)	−0.007 (0.015)	−0.004 (0.020)	−0.005 (0.015)
Education	−0.010 (0.013)	−0.007 (0.010)	−0.009 (0.013)	−0.007 (0.010)
Illness	−0.001 (0.020)	−0.026* (0.015)	−0.002 (0.020)	−0.027* (0.015)
Household size	0.008 (0.008)	0.005 (0.005)	0.008 (0.008)	0.005 (0.005)
Urban	−0.201*** (0.072)	−0.162*** (0.041)	−0.201*** (0.071)	−0.161*** (0.040)
Married	0.128** (0.053)	0.102** (0.043)	0.126** (0.053)	0.101** (0.043)
Household areas	0.006*** (0.001)	0.004*** (0.001)	0.006*** (0.001)	0.004*** (0.001)
Factories	0.006 (0.037)	−0.012 (0.023)	0.005 (0.036)	−0.012 (0.022)
Infrastructure	0.080 (0.068)	0.024 (0.043)	0.086 (0.067)	0.027 (0.043)
Night-time light	−0.001 (0.003)	−0.004*** (0.001)	−0.000 (0.002)	−0.004*** (0.001)
Population density, 1960–1961	−0.065 (0.055)	0.006 (0.026)	0.054 (0.058)	0.061* (0.032)
Average precipitation	−0.001 (0.002)	0.001 (0.001)	−0.002 (0.002)	0.001 (0.001)
Average temperature	0.005 (0.081)	0.052 (0.065)	−0.521** (0.206)	−0.199 (0.156)
Latitude	−0.056 (0.081)	−0.054 (0.047)	−0.180* (0.096)	−0.112* (0.061)
North	0.781 (1.061)	0.950 (0.629)	0.582 (0.986)	0.828 (0.653)
Province FE	Yes	Yes	Yes	Yes
Cohorts FE	Yes	Yes	Yes	Yes
First stage of 2SLS				
Latitude-17N			−0.431*** (0.107)	−0.431*** (0.107)
Kleibergen-Paap test			73.47	73.47
Observations	1,602	1,602	1,602	1,602

Notes: Robust standard errors in parentheses; standard errors are clustered at the district level; *** p < 0.01, ** p < 0.05, * p < 0.1

Table A3
Bombings and self-employment – Different clustering.

Self-employment	Last 7 days (1)	Last 12 months (2)
Panel A: Cluster at province level		
Log total bombing per km ²	0.479*** (0.169)	0.229** (0.115)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1602	1602
Panel B: Cluster at cohort level		
Log total bombing per km ²	0.479*** (0.178)	0.229* (0.134)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1602	1602
Panel C: Conley regression		
Log total bombing per km ²	0.479*** (0.163)	0.229** (0.110)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1602	1602

Notes: Robust standard errors in parentheses; 2SLS regressions; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; first stage results pass the relevant tests; *** p < 0.01, ** p < 0.05, * p < 0.1

Table A4
Bombings and self-employment – Time trends and fixed effects.

Self-employment	Last 7 days (1)	Last 12 months (2)
Panel A: Province-cohort linear time trend		
Log total bombing per km ²	0.500*** (0.172)	0.236* (0.121)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Province*cohort FE	Yes	Yes
Observations	1602	1602
Panel B: Interview time fixed-effects		
Log total bombing per km ²	0.557*** (0.172)	0.298*** (0.105)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Interview time FE	Yes	Yes
Observations	1602	1602

Notes: Robust standard errors in parentheses; 2SLS regressions; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; first stage results pass the relevant tests; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A5
Bombings and self-employment (including unemployed).

Self-employment	Last 7 days (1)	Last 12 months (2)
Log total bombing per km ²	0.515*** (0.173)	0.218** (0.107)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1692	1692

Notes: Robust standard errors in parentheses; 2SLS regressions with standard errors clustered at the district level; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; first stage results pass the relevant tests; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A6
Bombings and self-employment: Excluding Quang Tri.

Self-employment	Last 7 days (1)	Last 12 months (2)
Panel A: Second stage		
Log total bombing per km ²	0.495*** (0.173)	0.237** (0.117)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Panel B: First stage (dependent variable is log total bombing per km²)		
Latitude-17N	-0.419*** (0.107)	-0.419*** (0.107)
Observations	1596	1596

Notes: Robust standard errors in parentheses; standard errors are clustered at the commune level; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A7
Bombings and self-employment (1960 – 1975 cohort).

Self-employment	Last 7 days (1)	Last 12 months (2)
Log total bombing per km ²	0.701*** (0.197)	0.291** (0.131)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1079	1079

Notes: Robust standard errors in parentheses; 2SLS regressions with standard errors clustered at the district level; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; first stage results pass the relevant tests; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A8

Bombings and self-employment – Interaction with cohort.

Self-employment	Last 7 days (1)	Last 12 months (2)
Log total bombing per km ² * Cohort (1960–1975)	0.491*** (0.167)	0.232** (0.114)
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1602	1602

Notes: Robust standard errors in parentheses; 2SLS regressions with standard errors clustered at the district level; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; first stage results pass the relevant tests; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A9

IV probit and RELogit estimates of bombing intensity and self-employment.

Self-employment	IV-Probit		IV-RELogit	
	Last 7 days (1)	Last 12 months (2)	Last 7 days (3)	Last 12 months (4)
Log total bombing per km ²	2.391*** (0.709)	3.591*** (0.936)	4.321*** (1.235)	6.812*** (1.891)
Other controls	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Cohorts FE	Yes	Yes	Yes	Yes
Observations	1414	1092	1414	1092
First stage of 2SLS				
Latitude-17N	-0.431*** (0.107)	-0.431*** (0.107)	-0.431*** (0.107)	-0.431*** (0.107)

Notes: Robust standard errors in parentheses; standard errors are clustered at the district level; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north; predicted values applied in the second stage to standard probit and RELogit regressions; *** p < 0.01, ** p < 0.05, * p < 0.1.

Table A10

Bombings and self-employment – Bayesian linear regression.

Self-employment	Bayesian linear regression	
	Last 7 days (1)	Last 12 months (2)
Log total bombing per km ²	0.480 (0.001) [0.478–0.481]	0.225 (0.003) [0.221–0.231]
Other controls	Yes	Yes
Province FE	Yes	Yes
Cohorts FE	Yes	Yes
Observations	1602	1602

Notes: Standard errors in parentheses; 95% credible interval is presented in square brackets; controls include gender, ethnicity, age, education, illness, household size, urban, marital status, household areas, factories, infrastructure, district level night-time light, pre-war population density, average rainfall and temperatures during the war, latitude, north.

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