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ON THE DETERMINANTS OF INDIVIDUAL RESILIENCE: RESULTS FROM PANEL AND CROSS-SECTIONAL DATA

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General Introduction

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With respect to the social sciences, resilience is described as either "*an ability to recover from or adjust easily to misfortune or change*" (Merriam-Webster Dictionary) or "*the ability to withstand or recover quickly from difficulties*" (Oxford Languages). Researchers, policy-makers and practitioners have increasingly been paying special attention to the topic due to its plausible repercussion on the overall well-being, behaviour and productivity of individuals. Resilience has been associated with numerous benefits (Burns and Anstey, 2010; Matuska 2014; Hodder *et al*., 2017) including better physical and mental health (Connor and Davidson, 2003; Davydov, *et al*., 2010; Goldstein *et al*., 2013; King *et al*., 1998; Maddi and Khoshaba, 1994; Tugade, *et al*., 2004), fewer physical symptoms (Armata and Baldwin, 2008), quality of sleep (Li *et al*., 2019), less burnout and absenteeism (Kotzé and Lamb, 2012), and less adolescent substance use (Fergus and Zimmermann, 2005).

Resilience is the focus of studies by many institutions, including the European Comission (see https://joint-research-centre.ec.europa.eu/scientific-activities-z/resilience_en) and the OECD (see https://www.oecd.org/naec/projects/resilience/). Several ongoing policy programmes envision to enhance resilience. *NextGenerationEU* is the European Union (EU)'s 800 billion plan launched in 2021 by the European Commission following the Covid-19 pandemic to "*emerge stronger and more resilient from the current crisis*".[1] One of this plan's objective is to create a more resilient society. The *Regional Refugee and Resilience Plan* (3RP)[2] was implemented by UNHCR, the UN Refugee Agency and the UNDP. It started as a response after the refugee crisis in Syria initiated in 2015 to protect, help and increase the socio-economic well-being of refugees coming to a new host country. Similarly, in the United States, the *President's Emergency Plan for Adaptation and Resilience* (PREPARES)[3] co-led by the U.S. Agency for International Development (USAID) and the State Department was announced in 2021. This plan's main goal is to mitigate the impact of climate change in developing countries and build resilience to improve their capacity to adapt.

[1] https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en
[2] https://www.3rpsyriacrisis.org/
[3] https://www.usaid.gov/news-information/press-releases/sep-15-2022-action-plan-released-presidents-emergency-plan-adaptation

Given the relevance of resilience in today's economy and overall society, it is of crucial importance to understand what determines resilience. This thesis attempts to address how our societies, and some of its most challenging problems, shape individual resilience.

Chapter 1, *Is Resilience Inherited?* looks at the role of culture and institutions in determining resilience. In specific, it looks at the role of the country of birth (culture that you 'inherit') and the country of residence (institutions and culture embedded in the context of daily life). This chapters builds on both the Culture Economics and the 'Epidemiological Approach' literature. For the purpose of the analysis, we use a sample of immigrants from the European Social Survey (ESS).[4] We measure resilience with the question "*When things go wrong in my life it takes a long time to get back to normal*". The first part of the analysis compares the country of residence and the country of birth fixed effects, and the second part draws from Alesina and Giuliano (2010) and Luttmer and Singhal (2011) to look at the influence of the average resilience in the country of birth and the country of residence.

Across all different specifications, the results show that both the country of birth and country of residence matter to determine individual resilience. Nonetheless, the 'contextual' component (the country of residence) is more important. The last specification reveals that its impact is twice as large as the country of birth. This suggests that resilience is partly culturally inherited by mostly defined by the context of daily life. Additional analyses suggest that while the culturally inherited component is remarkably strong for men and for those with no citizenship, the contextual component is stronger for those who have lived in the residence country the longest. We also look at the inter-generational transmission of the culturally inherited component and find that it is transmitted to the second generation, although its relevance decreases over generations. Moreover, we provide evidence of a gendered transmission of resilience. It seems to be transmitted from fathers to sons.

After finishing this chapter on the broad role of culture and institutions, I wanted to focus on a more specific component of society that was linked to institutions and that was perceived as a traumatic shock. As a result, I decided to explore the impact of war conflict, since it is a recurrent problem that has affected countless people worldwide. In 2022, the UN stated that there was approximately one fourth of humanity living in areas affected by conflict.[5] Moreover,

[4] The Norwegian Social Science Data Services (NSD) is the data archive and distributor of the ESS data.
[5] https://press.un.org/en/2023/sc15184.doc.htm

the recent large scalation of the Russo-Ukrainian War in February 2022 was a reminder to Europe of the continued risk of conflict in the continent.

Chapter 2, *War destruction and Resilience in the Long-Term* examines the consequences of experiencing warfare at birth, childhood or young adulthood on individual resilience in late adulthood. In order to shed light on the research question, I look at a very precise moment in time: World War II (WWII) in West German cities. I draw from Akbulut-Yuksel (2017) and I apply a difference-in-differences approach using variation in destruction at the end of the war and variation in exposure to the war. It is thus an investigation of the intensity of the traumatic shock that is warfare in the very long-run. To perform this analysis, I compute resilience using the novel index by Asheim *et al.* (2020) which captures the ability of individuals to recover from adversity using panel data. The data I use is a combination of the German Socio-Economic Panel (SOEP) at the individual level with the German Municipality Statistical Yearbooks of 1939 and 1949.

The main result obtained reveals that war intensity increases, on average, the resilience of those who experienced the war in the long-term. This result suggests that individuals learned from the shock. A cohort analysis suggests that those who were older at the time of the war were more sensitive to the shock and a heterogeneity analysis shows that the effect is stronger in urban areas. Lastly, I test different objective mechanisms which turn out not to be significant. I conclude that this result might suggest that psychological mechanisms such as coping resources might be mediating the effect.

Although Chapter 2 analyses the impact of the intensity of a shock, it does so in the very long run. In this context, the Covid-19 pandemic provided me with a juncture to study the impact of a number of shocks in a shorter period of time. The outbreak of Covid-19 was declared a pandemic on 11 March 2020. The subsequent lockdowns that took place changed daily life of individuals worldwide and led to a reported decrease in mental health[6]. The health crisis eventually had an impact on the economy as well, increasing unemployment and producing income losses.[7]

Chapter 3, *Has Covid Made Us Less Resilient?* investigates the impact of economic and health shocks happening during Covid-19 on individual resilience. We use the novel COME-

[6] https://www.oecd.org/coronavirus/en/themes/global-economy
[7] https://ec.europa.eu/eurostat/web/products-eurostat-news/-/ddn-20201210-2

HERE[8] survey which is a panel dataset collected at the University of Luxembourg. We look at two economic shocks, job loss and a major cut in household income, and at two health shocks, diagnosis of a mental disorder and isolation due to Covid-19. We examine both the incidence and the intensity of these shocks. Resilience in this dataset is measured using the Connor Davidson Scale 10 (CD-RISC 10), which is a psychological scale with ten different items such as "I am able to adapt to change" and "I tend to bounce back after illness or hardship" evaluated from 0 "not true at all" to 4 "true nearly all of the time". We then apply a pooled OLS, a value-added model and an OLS with individual fixed effects to examine the consequences of the four shocks.

The results display a negative impact of ever experiencing a job loss, a major cut in household income and a diagnosis of a mental disorder on individual resilience in the context of the Covid-19 pandemic. These findings support the Graham and Oswald (2010) model, expecting resilience, the ability to deal with shocks, to decrease after adversity. We find little evidence on the impact of the intensity of shocks, only the intensity of isolation experiences reduces resilience. Since we find that the incidence of different shocks reduces resilience, we also test for heterogeneity in our results. The hypothesis is that those with less initial resources to deal with adversity will be more negatively affected by unfortunate events. The empirical test of this hypothesis reveals very little heterogeneity in the results. This suggests that the there is no initial level of resilience above which the impact of shocks will be lower.

The analysis of the three chapters evidences a lack of harmonization in resilience measures using secondary datasets. Although the study of resilience is growing, I consider it is important to collect more data on different measures of resilience, especially in panel surveys. The findings from the first chapter confirm that resilience is mostly contextual and it can be modelled during the lifespan. It also provides evidence of the culturally inherited component of resilience. The findings carry important policy implications, suggesting that government action (the daily context that affects an individual) can have the ability to increase individual resilience. The second chapter of this thesis reveals that war intensity can increase resilience of individuals in the very long term. This result suggests that individuals can, on average, learn from adversity and how adverse events can be an opportunity for growth. The last chapter contributes to the literature on the impact of adversity on resilience by focusing on different economic and health shocks happening during the Covid-19 pandemic. The findings show that

[8] https://wwwen.uni.lu/research/fhse/dbcs/pandemic/

in the shorter-term negative shocks decrease resilience. This finding suggests that in future pandemics and crises, measures to mitigate shocks should be adopted when possible and psychological guidance should be provided to individuals facing these shocks. The three chapters look at how different components of societies and shocks that take place within these societies shape individual resilience.

For a better understanding and contextualization of the three chapters, I will next provide an introduction on the concept of resilience across and within disciplines, the conceptualization of adversity and the different existing measures of resilience.

The concept of resilience

Resilience has been the core focus of several disciplines over the last five decades. Scholars from material sciences and engineering, ecology, psychology and recently economics have worked on this matter. The existing literature is very broad. The definitions and concepts of resilience can vary within and across the aforementioned disciplines. Consequently, their measurement approaches will differ too.

The origin of the word comes from the Latin *resiliens* that means 'to jump back' or 'to recoil'. In engineering it is used to refer to a property of a material or structure. In Campbell (2008, p.206) it is described as "*the ability of a metal to absorb energy when elastically deformed and then to return it when it is unloaded*". This seems to be one of the few disciplines with a clear consensus on the definition of the term.

Concerning ecology, on the other hand, there exist two main concepts of resilience. Holling (1973) describes resilience as the ability of a system to persist, even if it needs to adopt changes or is out of an equilibrium state to do so. In his proposal, it is possible for a system to be resilient and unstable at the same time, since stability is described as "*the ability of a system to return to an equilibrium state after a temporary disturbance*" (Holling, 1973, p.17). His work represented a shift on the direction of resilience research in ecological systems since it had previously focused on equilibrium centered views. According to Standish *et al*. (2014), Holling (1973) is among the most highly cited papers in ecological resilience, together with Pimm (1984). Nonetheless, their definitions of resilience are clearly different. Pimm defines it as the time that a variable needs to return to its original form, or equilibrium, after a perturbation. The

author also made a clear distinction with respect to stability. In this case, it is treated as a binary property which will only be reached if all variables of a system return to the initial equilibrium. Hence, opposite to Holling, resilience will only exist if the system is stable.

Holling's rationale approaches that of resistance, seen as an ability to not disappear or become extinct, when facing disturbances; while Pimm's one approaches that of recovery, seen as a process following disturbance. As stated in Holling (1996), Standish *et al*. (2014) and Yeung and Richardson (2016), these two forms of resilience were traditionally called ecological and engineering resilience, respectively. In turn, some authors adopted Holling's concept as resilience and Pimm's as recovery. Others, such as Grimm and Wissel (1997), considered both as stability properties and took Pimm's definition for resilience. Nevertheless, there exist empirical studies suggesting that both definitions are regularly used. Along these lines, Hodgson *et al*. (2015, p.503) recommend to assume the broadest definition of the term and "*the simultaneous consideration of 'resistance' and 'recovery' as measurable components that together represent resilience*".

Similarly to ecology, psychology presents a resembling dichotomy. In this field, resilience has been regarded both as a process or as a fixed characteristic of an individual. Ayed *et al.* (2018) investigated the different conceptualizations of resilience within the area of adult mental health and concluded that they could be grouped in the two broad groups mentioned above. Resilience as a characteristic or a trait is characterised by having personal inherited resources or social resources. Personal resources are "*traits, talents, skills or interests that may protect them*" (Nicholson, 2014, as cited in Ayed et al., 2018, p.332). Examples of it are motivation, self-esteem, hope, humor and self-determination. Social resources, on the other hand, are everything an individual can rely on in her daily life (Meyer and Mueser, 2011). An example of it are meaningful relationships, as these make individuals feel "*a sense of belonging, cared for, and care for others*" (Edward et al., 2009, as cited in Ayed et al., 2018, p. 332). When conceptualising resilience as a process, the authors classify them in three types: 'immunity', where the individual is aware of the adversity, yet remains undisturbed and unaffected; 'bouncing back', where the individual's mental stability is disturbed following the adversity but then returns to the formal stability; and 'growth', where resilience contributes to a personal growth after adversity.

Although increasing interest and contributions have enriched and developed the resilience arena in psychology in a short period of time, confusion on its definition, concepts, attributes,

predictors and outcomes has also arisen. On an attempt to highlight and bring clarity to this problem, Ayed *et al*. (2018), Bonanno *et al*. (2015), Bonanno (2012), Fletcher and Sarkar (2013), Luthar *et al*. (2000) and Windle (2011) have developed reviews on psychological resilience reporting the evolution of the research field. I strongly recommend visiting their work for a better understanding.

The concept within psychology first appeared in the 1970s. As reported by Garcia-Dia *et al*. (2013) and Masten *et al*. (2003), Garmezy (1973) was the pioneer. His contribution on adaption and competences in schizophrenia and psychopathology of children in stressful conditions paved the way for future research on resilience. He observed that all people with a diagnosis experienced stress. Nonetheless, one group showed a positive behavioural adaptation while others did not. Hence, his research was focusing on the characteristics of individuals. Garmezy and Rodnick (1959), suggested that having psychological and social resources might help a person when dealing with adversity and encourage adaptation. Thus, they emphasised both the internal and external factors influencing resilience. It was in this environment that Normand Garmezy started a research program called Project Competence that aimed at discovering, through longitudinal studies, more details about how some children in adverse situations overcame difficulties (Garcia-Dia, *et al*., 2013).

Accompanying the new direction of resilience research, from characteristics of the individual to protective factors, Luthar (1999) and Rutter (1987), also emphasised on the psychological processes underling the effects of the socio-economic environmental and protective mechanisms that can be developed by individuals.

Researchers continued delving into long-term resilience of children who lived in chronic adversity such as poverty, prolonged civil wars or prolonged physical or sexual abuse and, nonetheless, turned out to achieve as good as others in adult life (DiRago and Vaillant, 2007; Gralinski-Bakker *et al*., 2004; Sampson and Laub, 1992; Vaillant and Davis, 2000). Qualities that seem to make an individual more resilient were "*easy temperament, good self-steem, planning skills, and a supportive environment inside and outside the family*" (Fletcher and Sarkar, 2013, p. 12). Revolutionary research was conducted by Werner and Smith (1992) who followed children through adulthood to find that even if many faced serious problems as adolescents, most of them ended up growing into healthy functional adults. They found that some protective factors, such as having a close bond with a family member from an early start, could outweigh the negative effect of risk factors. This contradicted another pioneer work in

resilience, Anthony (1974), who suggested that disorders begin in infancy and have a snowballing effect through adult life. Masten *et al*. (1999) followed the evolution of children over ten years and concluded that their intellect and a good relationship with the parents had a positive impact on their academic and social outcomes despite facing hardship.

In the 1980s, the Post Traumatic Stress Disorder (PTSD) was declared a clinical diagnosis. This step contributed to shifting the research interest and putting the focus on problems and characteristics of people who were not in chronically stressed environments, but who were exposed to shorter adverse events (Garcia-Dia *et al*., 2013). Another argument in favor of exploring this type of adversity is that most people are likely to experience a potentially traumatic event (PTE) at some point (Bonanno and Mancini, 2008).

One of the first researchers who deviated the concern towards more punctual stressful and common events in life was Bonanno (2004). The author presented a challenge to researchers as he reviewed evidence on how resilience is a different process from that of recovery. Moreover, and similarly to Masten *et al*. (1999), he suggested that "*resilience is more common than often believed, and there are multiple and sometimes unexpected pathways to resilience*" (Bonanno, 2004, p.20). The literature has since been more involved in exploring short-term resilience of adults when facing an acute adversity such as an accident, a terrorist attack or an explosion (Bonanno *et al*., 1995, 2001, 2002; Ryff and Singer, 2002).

Bonanno (2012) remarks that resilience is not a personality trait. More specifically, the author explains that the personal traits can only explain a very small proportion of the overall resilience outcome. His work criticizes the resilience scales such as the Connor-Davidson (CD-RISC) that observe changes in personal traits. This critique is intensified in the case where the resilience scale is used in the absence of a stressor. Similarly, Luthar *et al*. (2000) conceptualise resilience as a dynamic process in the context of significant adversity. Carver (1998), proposed four possible outcome processes as the result of changes in the level of functioning after an adverse event takes place. These possible processes were 'thriving', 'resilience' (recovery), 'survival with impairment' and 'succumbing'.

Some authors agree in accepting both concepts, resilience as a characteristic and resilience as a process, as correct. The most commonly cited theory in the literature, Richardson (2002), proposes a model in which an individual who has suffered a stressor, adversity or life event will go through a disruption of his or her 'homeostatic state' and later adjust and begin the

'reintegration process'. Nevertheless, the disruption will only happen in the case of insufficient protective factors. Hence, both characteristics and processes are taken into account in the approach. Similar to Carver (1998), the aforementioned 'reintegration process' can lead to four different outcomes: attaining more protective factors and a higher level of well-being, remaining at the same initial level, losing protective factors and ending in a lower level of well-being or ending up adopting destructive behaviours. Fletcher and Sarkar (2013, p.16) propose an integrated concept of resilience combining psychological characteristics and processes related to stressors. The authors define resilience as "*the role of mental processes and behavior in promoting personal assets and protecting an individual from the potential negative effect of stressors*". Along these lines, they acknowledge that the majority of theories accept that at least part of resilience is a dynamic process, although several factors will contribute to that process.

The conceptualization of adversity

Most researchers agree on the fact that resilience and adversity go hand in hand. There is no resilience if there is no adversity (Luthar *et al*. 2000; Fletcher and Sarkar, 2013; Ayed *et al*., 2018; Bonanno *et al*., 2015; Masten *et al*., 1999). Thus, there must be agreement on how adversity is conceptualised and quantified.

Bonanno et al. (2015) makes a distinction between different types of adverse events: 'acute' or 'chronic'; and between different types of exposure: 'proximal' or 'distal'. Events can affect individuals differently because of their variety in duration or intensity. The author states that acute adversities are usually no longer than one month (*e.g.* a car accident, a physical assault or an explosion) while chronic adversities persists for many months or even longer (*e.g.* poverty, prolonged civil war or political violence). Relevant for the consequences of adversity, the same event can produce different types of adverse circumstances conditional on the level of exposure or the perception of the individual (Bonanno et al., 2010).

Ayed et al. (2018) emphasise how adversity and risk factors differ. The former entails that it will have a negative repercussion on a person, while the latter could potentially affect her in a negative way but there is no certainty that it will eventually happen. Examples of risk factors are "*poverty, parental mental illness, and catastrophic life events*" (Luthar et al., 2000; Tusaie and Dyer, 2004; Yip, 2012, as cited in Ayed et al., 2018, p. 335). The authors came to this

conclusion after identifying resilience as immunity, for which the concept of risk factor would be more appropriate to be adopted. They admit that as the event or situation does not negatively impact the individual it might be reconsidered whether to take it as adverse. They address it by proposing a conceptualisation of adversity that involves probability. Given any risk factor, it will be considered adversity if it is probable or well-known that it will have a negative effect on individuals.

Carver (1998) also became aware of the limitations of defining adversity in the case of the thriving processes, acknowledging that this type of processes can only happen when circumstances allow some sort of improvement. In other words, only those adversities which can be also understood as challenges and are experienced as such, will allow the process of thriving. From a very different perspective, Fletcher and Sarkar (2013, p.14) also remark that adversity is generally associated with negative circumstances involving negative consequences "*which focus on established, statistically significant predictors of maladjustment*". Given this reality, they suggest to explore resilience given broader life events. For instance, life events generally known as positive can also be relevant in defining resilience. Such life events would be a job promotion, graduation or a new marriage.

Measuring resilience

Early work focused on measuring resilience as the absence psychopathology (*e.g*. PTSD, Complicated Grief (CG)). Bonanno (2012) criticizes the use of such measures as resilient outcomes. Adopting such binary variables, the resilience outcome is assigned to all those who do not get a diagnosis, thus any possible gradient among those individuals is hidden. Another disadvantage is that the observed sample is reduced because pathological responses can only occur to individuals exposed to PTE. There are many other pathways to resilience. For instance, although some individuals experience some Post Traumatic Stress Symptoms, they might not have the minimum number of symptoms for a PTSD diagnosis and will thus be disregarded. Others might be diagnosed with PTSD right after the stressor, but recover later (Bonanno, 2004). The author also criticizes employing measures of general health such as averaged scores. In this case, the researcher would misleadingly take a predictor of resilience as a resilience factor. Additional inaccuracy happen in the cases where individuals are only observed after the PTE has occurred (Bonanno, 2004).

Fletcher and Sarkar (2013), on the other hand, state that the different levels of resilience should also be determined by the characteristics of the adversity (*e.g.* nature, intensity). To illustrate, they give an example where a group of people with no psychiatric diagnosis after a direct exposure to a terrorist attack should be defined as resilient, instead of 'excellent functioning'.

What seems to be more generally accepted in the literature is "*resilience as a stable trajectory of healthy functioning*" (Bonanno, 2012, p.755). There is a growing literature showing that the resilience trajectory is a very commonly experienced outcome after suffering a PTE such as a traumatic injury, bereavement, violence, spinal cord lesion, combat deployment, and after life-threatening illnesses (Bonanno et al., 2015; Masten et al., 1999).

Indices, scales and dynamic models have also tried to articulate the reality and complexity of resilience. As mentioned in the introduction, the fact that there exist different concepts of it, also influences the amount of different measurement approaches in the existing literature.

Psychological scales

Measurement scales have been broadly used in the psychological resilience arena. Although facing criticism for only reporting characteristics of the individual (Bonanno, 2012), these self-reported measures represent an important and relevant approach to quantify resilience, allowing researchers to validate them, compare outcomes and apply them to longitudinal studies. As such scales started to accumulate, several reviews emerged in an effort to evaluate their validity. This evaluations are based on several parameters of psychometric properties. An extensive analysis by Windle *et al*. (2011, p. 3-4) takes into account the following properties: "*content validity, internal consistency, criterion validity, construct validity, reproducibility, responsiveness, floor and ceiling effects and interpretability*".

According to Windle *et al*. (2011), the scales that turn out to be more used and validated among the literature are the Brief Resilience Scale (BRS), the Connor-Davidson Resilience Scale (CD-RISC) and the Resilience Scale for Adults (RSA). In another thorough review, Salisu and Hashim (2017) conclude that the CD-RISC and CD-RISC 10 displayed the best psychometrics.

Thus, among the scales cited above, the greater consensus is on the Connor-Davidson Resilience Scale (CD-RISC) developed by Connor and Davidson (2003). The aim of this scale

was to fix challenges of other existing measures which did not get wider acceptability and applicability, in the general population but also in specific groups. The scale measures "*the ability to cope with events*" (Connor and Davidson, 2003, p.76). The twenty-five items of the scale were taken from different sources. Starting from Kobasa (1979) on hardiness and sense of control, followed by Rutter (1985) regarding coping strategies like having goals, humor, confidence, stable affectionate bonds or previous success and achievements, and Lyons (1991) concerning patience and the ability to bear with difficulties such as stress or pain. The authors also add new items regarding faith, belief or good luck based on the expedition that Edward Shackleton did in the Antarctic in 1912 (Alexander, 1998). This index contains twenty-five questions each self-rated on a 5-point scale (0-4). The responses range from "not true at all" (0) to "true nearly all of the time" (4). Thus, the total score ranged from 0, minimum resilience, to 100, maximum resilience. The initial factor analysis resulted in five factors which were interpreted in the following way: "*personal competence, high standards, and tenacity (8 items); trust in one's instinct, tolerance of negative effects, and strengthening effects of stress (7 items); positive acceptance of change and secure relationships (5 items); control (3 items); and spiritual influences (2 items)*" (Salisu and Hashim, 2017, p. 28).

Many researchers found that, when applied on other samples, the five factors could be composed of other items, or that items could be aggregated in four, three, two or one factor (Windle *et al*., 2011). Due to this factor instability in the original CD-RISC, Campbell-Sills and Stein (2007) developed and validated the CD-RISC 10 scale. Their new construct, on the other hand lead to a unidimensional 10-item scale measure, which is a selection of the original twenty-five items.

Another self-reported scale used and validated is the Resilience Scale for Adults, developed by Friborg *et al*. (2003). At the time it was constructed, there existed two main scales: the Resilient Scale by Wagnild and Young (1993) and the scale by Jew *et al*. (1999), which the authors claim none of them included measurement of social factors. To address that, they proposed a scale that would cover personal, family and external support attributes. The measure showed good internal consistency for five factors. Although the preliminary scale contained forty-five items (Hjemdal *et al*., 2001) further progress on the factor solution and factor loadings ended up with an index that consisted of thirty-seven items comprised in the same five dimensions as the first one.

Smith *et al*. (2008, p. 194) developed and validated the Brief Resilience Scale (BRS). This is also a self-reported measure which quantifies the most original and core concept of resilience which according to the authors is "*the ability to bounce back or recover from stress*". The authors also claim that the novelty, compared to other measures of resilience, was that this measure does not assess resources that may promote resilience, but resilience itself. It consists of a unidimensional index with six items rating on a 5-point ranging scale from 1 "strongly disagree" to 5 "strongly agree".

Longitudinal studies

According to Kimhi and Eshel (2015), there exist three major approaches to measure resilience which are different from psychological self-reported indicators. The first and more reliable is longitudinal designs. This type of analysis focuses on individuals who have faced some type of adversity at one or more points in life, and follow them through time. This method, highly recommended by Bonanno *et al*. (2015) and employed in Bonanno (2004), is qualified by the author as essential for the study of resilience, comparing pre-adversity functioning to post-adversity outcomes.

Bonanno *et al*. (2015) mention an approach that allows for non-linearity of outcomes. This approach is latent growth modeling using Latent Class Growth Analysis (LCGA), which is a semi-parametric technique employed to analyse longitudinal data (Andruff *et al*., 2009). The authors suggest that it would be appropriate to use them for the analysis of acute adversity. Employing this method, the heterogeneity of outcomes will be taken into account instead of treating it as an error, and it will be more likely to fit more individuals as it identifies homogeneous trends of groups of individuals within the larger heterogeneity of trends of the whole sample. This method is used in Galtzer-Levy and Bonanno (2013). The authors followed college students during the four years of their studies. They identified general patterns of stress by semester and year, to then account for these patterns in the final model of individual adjustment. Feldman *et al*. (2009) perform a complete comparison of other generalized linear growth models that could be applied in longitudinal data as well.

Etilé *et al*. (2017) construct an empirical approach which consists of a dynamic finite mixture model applied to a panel dataset. This allows the authors to model different trajectories of psychological health to ten major life events.

The above mentioned psychological resilience scales also have been applied in the context of longitudinal analysis. Such is the case of Perna *et al*. (2012), which use a short version of the Resilience Scale (RS) by Wagnild and Young (1993). Although this is a validated measure, it only accounts for one of the protective factors of resilience: personality.

Randomized Control Trials (RCT) have also been used in an attempt to disentangle the effect of an intervention aiming at increasing the resilience of an individual. This approach could potentially randomly impose which individuals are more resilient. Dray *et al*. (2017) review different articles that have applied RCTs to study the impact of different interventions aimed at increasing resilience on child and adolescent mental health.

Indices

A more novel method of measurement are indices. Zahran *et al*. (2011) proposes to measure mental health resilience to disaster events such as hurricanes. As a measure of mental health the authors takes the number of poor mental health days over the last thirty days. Their measure takes into account how far the individual deviated from a "normal state" and the recovery time to return to it. A more recent index that also captures resilience as the ability to recover from adversity is proposed by Asheim *et al*. (2020). Their index is based on the evolution of a variable over time. The authors suggest that every drop of the variable can be interpreted as a result of an adversity. Based on their index, resilience increases with the severity of the adversity and decreases with the time and badness (the area) of recovery.

Other measures

The other two approaches mentioned by Kimhi and Eshel (2015) are post-traumatic individual differences and post-traumatic group differences. These designs are more limited because they use data after the adverse event happened and cannot be as robust because they are missing the pre-adversity data. Thus, a before and after comparison is not plausible.

Another method suggested in Bonanno *et al*. (2015) are network approaches which aim at fixing the problems of binary variable approaches to mental disorders. PTSD and CG have been examined in this context (McNally *et al*., 2015; Robinaugh *et al*., 2014a, b). This technique constructs a multidimensional variable allowing for different clusters of symptoms to determine the person's mental disorder. The motivation behind it is that the variety of

symptoms are the mental disorder itself. An example of an application is McNally *et al*. (2015), who uses the R package *qgraph* (Epskamp *et al*., 2012).

Another class of models used are hierarchical approaches (Bonanno *et al*., 2015). These types of models would be desirable to adopt in cases where we have information beyond the individual unit. For example, at the family, neighbourhood or regional level. This path could potentially highlight predictors and tendencies of the resilience outcome not only at the individual level but also at other nested levels such as neighbourhoods (Kim and Kawachi, 2006; Bernburg *et al*., 2009).

A major problem in economics is to take only changes in health as health resilience. Such is the case, for instance, of the papers considered in the review by Glonti *et al*. (2015) about resilience to economic crises. They take resilience as a change in different health outcomes or health behaviours. Examples of such outcomes are mental health, cardiovascular and respiratory illnesses, happiness, stress, self-perceived health, coronary heart disease, mortality, suicides, sleep disturbances, dysthymia, alcohol use, smoking and healthy eating. In a similar way, when analysing the impact of economic shocks on health resilience using a panel data from Russia, Grodeev *et al*., (2016) use a resilience outcome variable based on the difference between self-assessed health in the current period and the previous period.

Deriving from ecological and social-ecological system resilience, economists have developed models based on regime shifts. In this area of research, the resilience of a system consists in being able to adapt to change rather than resist it. The three classes of models, from deterministic to probabilistic, are presented in the review by Li *et al*. (2018).

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Chapter

1 Is Resilience Inherited?

Is Resilience Inherited?[9]

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1.1 Introduction

Many societies have exhibited resilience in the face of major upheavals such as war, famine, natural disasters, pandemics, and economic crises. This ability to either withstand a shock or recover fairly quickly from it is a valuable resource in attenuating the cumulative effect of hard times. As such, it is of great interest to understand what lies behind the resilience of the individuals who make up different societies.

The existing literature has underlined the correlation between a number of demographic variables and individual resilience: gender and age (Bonanno *et al*., 2007), education (Bonanno *et al*., 2006; Mancini *et al*., 2011), income (Bonanno *et al*., 2006; Bonanno *et al*., 2007) and health (Burton *et al*., 2015). Additional work has underlined the role of individual, social and psychological variables: some examples are social support (Bonanno *et al*. 2008; Kaniasty and Norris, 2009), the level of perceived stress (Bonanno *et al*. 2007), the personality traits of optimism, extraversion, openness, consciousness, control coping and neuroticism (Riolli *et al*., 2002), self-enhancement (Bonanno *et al*., 2005), and self-efficacy (Bonanno *et al*., 2011; DeRoon-Cassini *et al*., 2010). A thorough review of the research on psychological resilience is provided in Bonanno *et al*. (2015).

Despite this wealth of work on the individual correlates of resilience, rather less is known about the role played by societal culture and institutions. Societies are defined in Merriam Webster as a "*nation, or broad grouping of people having common traditions, institutions, and collective activities and interest*". It is these common traditions, collective activities and institutions that we wish to analyse here, with respect to their relationship to individual resilience in the face of adversity. We here understand traditions and collective activities as a society's culture, as in Guiso *et al*. (2006, p.23): "*Those customary beliefs and values that*

[9] The Norwegian Social Science Data Services (NSD) is the data archive and distributor of the ESS data. We thank Anthony Lepinteur, Philippe Van Kerm, Claus Vögele, Conchita D'Ambrosio, Núria Rodríguez-Planas and participants at the 2022 PhD Jamboree at the University of Luxembourg for helpful comments. Andrew Clark is grateful for support from EUR grant ANR-17-EURE-0001.

ethnic, religious and social groups transmit fairly unchanged from generation to generation" (see also Fernández, 2011). These cultural traits have been shown to persist over time (Voigtländer and Voth, 2012). Institutions, on the other hand, are defined as "*commonly known rules used to structure recurrent interaction situations that are endowed with a sanctioning mechanism*" (Voigt, 2018, p.2). Our aim here is to distinguish between the roles of inherited beliefs and values, on the one hand, and the contextual beliefs, values and institutions on the other in determining how resilient individuals are to shocks. While culture is only slow to change, institutions can be reformed relatively quickly: the scope for policy to affect resilience outside of the long run will then depend on their relative importance.

The existing evidence on the relationship between culture and resilience in the psychology literature has focused on cultural traits and practices. Research on indigenous communities has highlighted the role of rituals of reconciliation and forgiveness (Kirmayer *et al*., 2011) and "*spirituality, traditional activities, traditional languages, and traditional healing*" (Fleming and Ledogar, 2008, p.3). In Theron *et al*. (2013), young resilient individuals from the Basotho community in South Africa showed flexibility, determination, connection to community support and respect towards cultural values. In a variety of communities, general cultural practices such as religion have been proposed as key determinants of resilience (Ungar, 2011). In Afghani culture, values such as "*faith, family unity, service, effort, morals, and honour*" provide hope and meaning to life that in turn feed resilience (Eggerman and Panter-Brick, 2010, p.71). Other sources of resilience for those facing racial or ethnic discrimination include pride in their heritage and training to deal with discrimination (Evans *et al*., 2012, Hughes *et al*., 2006, and Serafica and Vargas, 2006, as cited in Masten, 2014, p.12). Personality traits and behaviours that may be culturally embedded have also been linked to resilience. For example, Schurer (2017) compares the resilience to a health shock of those with high and low levels of locus of control.

Although research in economics has not specifically related culture to resilience, culture has been explored in a number of other contexts and this research will help us to understand how culture can be measured. The most commonly-used strategy, which we will also apply, is the "epidemiological approach" (Fernández, 2008). In a sample of individuals with different countries-of-ancestry, this separates the effect of culture from other contextual variables such as institutions. In-depth reviews can be found in Fernández (2011) and Fernández (2008).

Fernández and Fogli (2006) apply this approach to establish the separate roles of culture and personal experience on fertility, with the total fertility rate (TFR) in the country of ancestry being a proxy for culture: both are found to be relevant. Similarly, Fernández and Fogli (2009) analyse the effect of culture on the work and fertility decisions of a sample of second-generation women in the US, proxying culture by female labour-force participation and TFR in the country of ancestry. Culture is found to be significant for both variables. Hajdu and Hajdu (2016), Helliwell *et al*. (2020) and Voicu and Vasil (2014) all find some role for the birth country when considering the subjective well-being of immigrants.

Guiso *et al*. (2006) consider the role of culture (religion and ethnic background) in determining trust, which they then relate to entrepreneurship and preferences for redistribution. This analysis of trust requires information on individuals who live in the same country (and are thus exposed to the same institutions) but have different ethnic backgrounds/religions (so that culture and institutions are not multi-collinear). At the aggregate level, the diversity of ethnic backgrounds in a country is measured by the percentage of its residents whose ancestors came from different countries. In this spirit, Guiso *et al*. (2009) consider the degree of commonality in religion and ethnic origins between two countries (the country of origin and the country of residence) as an indicator of bilateral trust, and then show that greater trust increases trade between two countries.

At the country level, Luttmer and Singhal (2011) take the average preference for redistribution in the country of birth as a measure of culture, and show that this birth-country average affects immigrants' preferences for redistribution in the residence country. We will discuss later how we apply these strategies in our analysis of resilience.

A similar approach can be taken at a regional level. Guiso *et al*. (2004) analyse the effect of social capital on the financial development of Italian regions, with the former being measured by electoral turnout and blood donations. They distinguish between the 'inherited' and 'environmental' components of social capital via electoral turnout in the provinces of birth and residence respectively. Their results indicate that environmental social capital is usually more important for financial development.

Last, Licht *et al*. (2007) apply a language-based measure of culture based on the use of pronouns in a country's language. Languages that involve the explicit use of the terms 'I' or

'You' in phrases[10] are argued to be more self-centred, as the individual is highlighted. On the contrary, those that do not require the explicit use of pronouns contextualise the individual, so that the country's culture will be more embedded.

The evidence of a link between institutions and resilience is scarcer, and comes from research on social support and social capital (Kaniasty and Norris, 2009; Bernier and Meinzen-Dick, 2014). Institutions can be the means via which emotional, informational and tangible support are provided to individuals to help them face adversity. Examples are income support, unemployment benefits, and health and social services. But not all social support is provided by institutions, and some types may reflect both institutions and culture (kin relations, such as family or marriage), while others are purely cultural (non-kin informal networks, such as friends and neighbours, and people to whom you can talk about your worries).

Some measures of institutions have included information on trust, social capital, bilateral cooperation or the provision of public goods (see Voigt, 2018, for a review of the measurement of informal institutions). Formal institutions are captured by societal variables such as civil liberties, democracy, government regimes, property rights and Law enforcement (Alesina and Perotti, 1994; Aron, 2000; Dell *et al*., 2018; Persson and Tabellini, 2021). Alesina and Giuliano (2015) provide an extended review of the measurement of institutions and culture, and the relationship between them.

We here explore the determinants of individual resilience as measured by the answers to a question in the European Social Survey (ESS): "*When things go wrong in my life it takes a long time to get back to normal*". We follow the epidemiological approach in the existing literature, and distinguish between the 'inherited' and 'contextual'[11] components of resilience, where the former depends on the culture in the country of birth and the latter on the country of residence (via both its institutions and the acculturation process). For natives, these two countries of course coincide; for immigrants, they are separate. The cultures of natives and immigrants in a given country are then argued to be different, and the culture of two immigrants in a given country will differ according to the countries in which they were born (Luttmer and Singhal, 2011). As such, the analysis of immigrants allows us to separately identify the roles of the birth

[10] These can be dropped, for example, in spoken Spanish or Italian, but not in spoken French or English.
[11] We call these the 'inherited' and 'contextual' components partly following Guiso *et al*. (2004), who call them 'inherited' and 'environmental'.

country (what you inherit) and the residence country (the context that you are affected by daily) in the determination of resilience.

We find that both the culturally inherited component from the birth country and the contextual component from the residence-country are important in determining individual resilience. The contextual contribution is larger: resilience is in part culturally inherited but mostly determined by the context of daily life.

The remainder of the paper is organised as follows. Section 1.2 proposes an overview of the data that we analyse and presents some descriptive statistics. Section 1.3 then sets out the empirical specification to disentangle the effect of culture and institutions in the birth and residence countries and lists the results. Last, Section 1.4 concludes.

1.2 Data

Our data comes from the European Social Survey (ESS: available for free at http://www.europeansocialsurvey.org). This is a biennial cross-national survey that includes information from 38 different countries over the various waves from Round 1 in 2002 to Round 10 in 2020. Our analysis covers data from Rounds 3 (2006) and 6 (2012), as these are the only waves with information on resilience.[12] There are 32 countries in these two waves.

Our main research question is whether resilience is culturally inherited (from where an individual was born) or contextual (from where they live). For individuals who live in the country in which they were born, inheritance and context are indistinguishable, and we thus require information on individuals for whom the two differ: those who were born in one country but now live in another. We consider that the culture of these migrants will partly reflect their country of birth, while their institutions and acculturation will reflect the country in which they currently live.

Table 1.1 lists the 32 countries in our analysis sample over ESS Waves 3 and 6, showing the number of observations and the percentage of respondents who were born both outside of the country where they now live and in one of the ESS countries that appear in Table 1.1. We

[12] ESS Round 6: European Social Survey Round 6 Data (2012). Data file edition 2.4. NSD - Norwegian Centre for Research Data, Norway – Data Archive and distributor of ESS data for ESS ERIC. doi:10.21338/NSD-ESS6-2012. ESS Round 3: European Social Survey Round 3 Data (2006). Data file edition 3.7. NSD - Norwegian Centre for Research Data, Norway – Data Archive and distributor of ESS data for ESS ERIC. doi:10.21338/NSD-ESS3-2006.

impose this latter condition as we will require information on resilience in both the birth and residence countries: this will allow us to see how an immigrant's own resilience score is correlated with both of these two country-level measures.[13]

Appendix Table A1.1 provides two figures for a number of countries: the percentage of those interviewed in that country who were also born there, and then the percentage who were born in that country in our sample and who still live there (in the sense that they were not interviewed in another ESS country). In the first row, for example, 1,062 individuals were interviewed in Albania in ESS Waves 3 and 6, all of whom were born there (so that no immigrants were interviewed in Albania). This percentage of first-generation immigrants is substantial in other countries, with figures of over 10% in Switzerland, Estonia, Ireland and Israel.

Columns 3 and 4 of Table A1.1 provide complementary information on the 69,342 individuals in our sample. Column 3 shows the number of interviews with individuals who were born in a given country, and column 4 the percentage who still live in that country. In the first row, for example, almost all ESS respondents who were born in Albania still live there: only 11 of the 1,073 Albanian-born respondents (1%) were interviewed in another ESS country. On the contrary, more than 10% of ESS respondents who were born in Italy, Russia and Ukraine were interviewed in a different ESS country.

Our final sample of immigrants covers the 2,966 individuals who were born in countries that were surveyed in the 2006 or 2012 ESS waves but now reside in another one of these ESS respondent countries. The country-of-birth restriction allows us to match the average resilience of natives in the respondent's birth country to the individual's own resilience when living in the residence country. The other 66,376 individuals are natives (those born in the country in which they currently live).

[13] The ESS birth countries here refer to those that appear in either wave, so that our analysis will cover, for example, Albanian immigrants in Austria, even though the two countries do not appear in the same ESS waves.

Table 1.1: Summary Statistics. Sample Sizes and Percentage Born in a Different ESS Country.

	Wave 3: 2006		Wave 6: 2012	
	Total	**% Born in a Different ESS Country**	**Total**	**% Born in a Different ESS Country**
Albania	-	-	1,062	0.0
Austria	1,349	3.6	-	-
Belgium	1,448	4.3	1,494	6.5
Bulgaria	1,016	0.7	1,870	0.4
Switzerland	1,290	13.2	1,106	15.4
Cyprus	724	1.5	797	5.8
Czech Republic	-	-	1,228	2.4
Germany	2,026	4.8	2,336	5.1
Denmark	1,245	2.4	1,104	2.5
Estonia	-	-	1,811	14.6
Spain	1,051	3.0	1,357	3.8
Finland	1,665	1.9	1,984	3.1
France	1,565	3.1	1,578	4.0
Great Britain	1,682	2.3	1,547	3.8
Hungary	-	-	1,326	1.1
Ireland	1,121	10.4	1,792	11.7
Israel	-	-	1,213	16.2
Iceland	-	-	582	3.6
Italy	-	-	492	3.3
Lithuania	-	-	1,651	2.1
Latvia	1,271	9.6	-	-
Netherlands	1,480	2.2	1,412	2.3
Norway	1,579	3.6	1,402	4.4
Poland	1,320	0.7	1,416	1.0
Portugal	1,045	1.2	929	1.4
Romania	1,682	0.1	-	-
Russia	1,809	2.4	1,783	2..0
Sweden	1,621	5.7	1,502	5.7
Slovenia	1,001	0.9	811	1.1
Slovakia	935	2.7	1,173	1.8
Ukraine	-	-	1,593	6.7
Kosovo	-	-	1,066	0.9
Total	29,925	3.7	39,417	4.8

Note: Data from ESS Waves 3 and 6.

We wish to model individual resilience. In the ESS this is measured by answering the question "*When things go wrong in my life it takes a long time to get back to normal*", with responses a one to five response scale: 1 "Agree strongly", 2 "Agree", 3 "Neither agree or disagree", 4 "Disagree" and 5 "Disagree strongly". Higher numbers thus correspond to greater resilience. This question was proposed among a battery of questions in the rotating module "Personal and Social Well-being"[14] in ESS waves 3 and 6. Although resilience is often measured using psychological scales (for example, the CD-RISC), a number of contributions in this area have relied on the single-item measure that appears in the ESS (Alaminos and Pervova, 2015; Becchetti and Conzo, 2021; Bibi and Karim, 2017).

The distribution of resilience in the 32 ESS countries in 2006 and 2012 is depicted in Table 1.2. Columns (1) and (3) refer to natives, and columns (2) and (4) to immigrants. This distribution is somewhat left-skewed. In Table 1.2, around half of both natives and immigrants "Disagree" or "Disagree strongly" that "when things go wrong in their life it takes a long time to get back to normal". The non-resilient (those who reply "Agree strongly" (1) or "Agree" (2)) account for around one quarter of the sample. The remaining quarter provide the neutral response of "Neither agree nor disagree". On this account, therefore, there are twice as many resilient as non-resilient Europeans.

The comparison of the left- and right-hand panels of Table 1.2 reveals a small rise in resilience from 2006 to 2012, with a two percentage point increase in those replying 'Disagree' or 'Disagree strongly'. Of course, the 2006 and 2012 figures are not directly comparable as the two waves did not cover exactly the same group of countries (see Table 1.1). The regression analysis below will include country dummies that will allow us to better identify the way in which resilience has changed over time: this will continue to indicate growing resilience between 2006 and 2012. The χ^2 test-statistic at the foot of Table 1.2 indicates that the distributions of native and immigrant resilience are not significantly different from each other in either year.

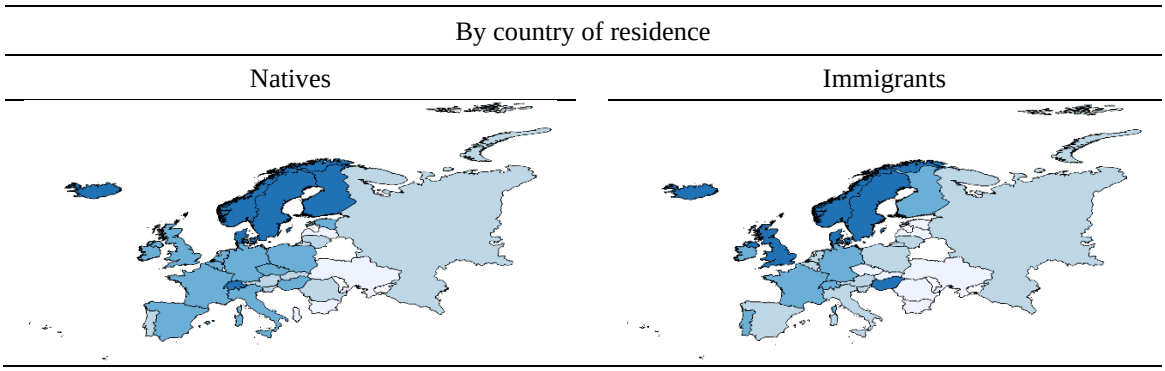
[14] More information about the proposals, abstracts and team compositions of the rotating modules can be found here: https://www.europeansocialsurvey.org/methodology/ess_methodology/source_questionnaire/.

Table 1.2: "When things go wrong in my life it takes a long time to get back to norma".

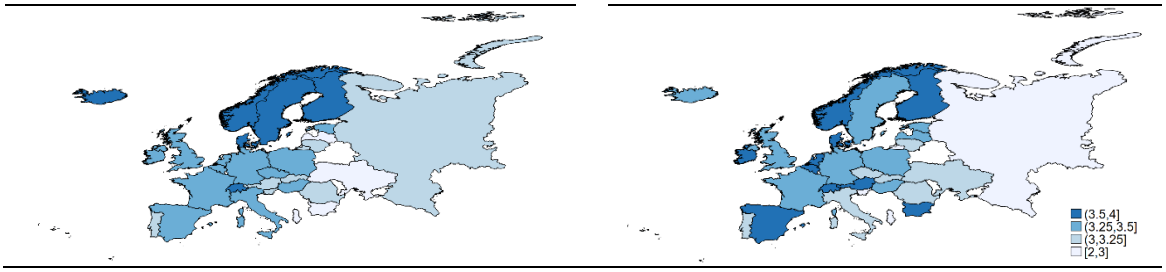
		2006		2012	
		Natives (%)	Immigrants (%)	Natives (%)	Immigrants (%)
1	Agree strongly	4.7	5.3	4.9	4.7
2	Agree	21.4	22.7	21.1	21.6
3	Neither agree or disagree	24.4	22.5	22.2	22.5
4	Disagree	41.7	41.5	41.6	40.6
5	Disagree strongly	7.8	8.0	10.2	10.6
	No. of Observations	28,831	1,094	37,545	1,872
		Pearson $\chi^2(4) = 3.5$ Pr=0.5		Pearson $\chi^2(4) = 1.1$ Pr=0.9	

Figure 1.1 presents maps of resilience in Europe by country of residence and country of birth for first natives (on the left-hand side) and then immigrants. The two maps of course coincide for natives. Resilience is highest in Scandinavia, Iceland and Switzerland, and then Western and Southern Europe, followed by Eastern Europe. For the immigrant sample on the right-hand side, resilience is first plotted for immigrants according to the country in which they now live, and then (for the same individuals) according to the country in which they were born. It can be seen that the distributions by immigrants' country of residence and country of birth are remarkably different. We aim to measure the extent of this resilience gap for immigrants, and ask whether it is correlated with natives' resilience in both the residence country and the birth country. We will find below that the resilience of natives and immigrants is more similar by country of residence, underscoring the importance of context.

Figure 1.1: Resilience in Europe, by country of birth and country of residence.



By country of birth	
Natives	Immigrants



Notes. Resilience comes from the question "When things go wrong in my life it takes a long time to get back to normal", with responses from 1(Agree strongly) to 5 (Disagree strongly). The map shows the combined average 2006 and 2012 country scores. Darker shades correspond to higher resilience. The four coloured categories correspond to values of [2,3], (3,3.25], (3.25,3.5] and (3.5,4]. Cyprus, Israel and Kosovo are not depicted in the map. *Source*: ESS and http://tapiquen-sig.jimdofree.com.

1.3 The Empirical Analysis of Inherited and Contextual Resilience

In order to establish the separate roles of the birth and residence countries[15] in individual resilience, we estimate the following regression on our sample of 2,966 immigrants who are interviewed in one ESS country but were born in another ESS country:

$$Resilience_{ibrt} = \beta_0 + \beta_1 X_{ibrt} + \beta_2 M_{ibrt} + \delta_b + \delta_r + \gamma_t + \epsilon_{ibrt} \quad (1.1)$$

Here $\text{Resilience}_{\text{ibrt}}$ is the one-to-five resilience score described above for individual i from country of birth b interviewed at time t in country of residence r, and X_{ibrt} a vector of the exogenous individual characteristics of gender, age and belonging to a minority ethnicity. Our first regressions will include only these exogenous characteristics, to avoid potential mediating effects of institutions via the more-endogenous variables that appear in the M_{ibrt} vector (income, labour-force status, education, and marital status); these M_{ibrt} variables will appear in the second set of regressions. The descriptive statistics of the control variables appear in Appendix Table A1.2.[16]

Our dependent variable is ordinal, so that ordered probit (OP) estimation is in theory more suitable. In our case, the OP and OLS results are very similar (as is often the case: see Ferrer-i-Carbonell and Frijters, 2004). For simplicity (as the marginal effects are the estimated

[15] We here follow Guiso *et al*. (2006), who capture the role of culture via country of ancestry fixed effects.
[16] Household total net income in ESS Wave 3 is reported in bands, and in Wave 6 as deciles of the household-income distribution in the residence country. We harmonise the two by converting the Wave-3 information to income deciles, imputing income in Euros via uniform random values between the upper and lower cut-offs of band and assigning this figure to an income decile.

coefficients), we mainly show OLS estimates and present the results from OP and a linear probability model (LPM: with Resilience as a dummy outcome variable) as robustness checks in Appendix Table A1.3.

Table 1.3 shows the results from the OLS estimation of Equation (1.1). Column 1 contains only the exogenous X_{ibrt} variables and column 2 adds the potentially-endogenous M_{ibrt} variables. Both columns include country of residence and country of birth dummies. The estimated coefficients from this ESS analysis are similar to those highlighted in the existing literature: men, the richer and those with higher education report greater resilience (Bonanno *et al*., 2006; Bonanno *et al*., 2007; Mancini *et al*., 2011). Belonging to a minority ethnic group is associated with lower resilience, in line with findings on the determinants of Post-Traumatic Stress Disorder (PTSD) onset (Brewin *et al*., 2000). While Bonanno *et al*. (2007) find that ethnicity is no longer related to resilience when controlling for socioeconomic status, this is not the case in our ESS regression results. The subjective well-being literature has concluded that the negative effects of unemployment persist over time (Clark *et al*., 2008; Fritjers *et al*., 2011). Along these lines, we find greater resilience for the employed. The existing evidence on marital status is mixed, with resilience being higher either for the widowed and divorced, or for the married (Ang *et al*., 2018). We here find evidence for the latter. Overall, the socio-economic variables reflect that resilience is associated with the resources that the individual can use to face adversity. We find no significant relationship with age, whereas the literature often concludes as to a positive correlation.

Perhaps surprisingly, resilience is higher in 2012, after the Great Recession, than in 2006. Although, many factors may have changed between these two dates (only some of which we can control for), this is consistent with thriving after facing adversity (Carver, 1998; Richardson, 2002).

Table 1.3: The determinants of resilience

	(1)	(2)
Male	0.16***	0.09**
	(0.04)	(0.04)
Age/100	0.75	-0.44
	(0.68)	(0.81)
Age^2/100	-0.01	0.01
	(0.01)	(0.01)
Minority ethnic group	-0.11**	-0.11**
	(0.05)	(0.05)
Year (ref: 2006)		
2012	0.11**	0.12**

	(0.05)	(0.05)
Marital Status (ref: Married)		
Separated		-0.10*
		(0.06)
Widowed		-0.15**
		(0.08)
Never married		0.02
		(0.06)
Education (ref: Primary)		
Secondary and post-secondary		0.16**
		(0.08)
Tertiary		0.33***
		(0.08)
Labour-force status (ref: Employed)		
Unemployed		-0.24***
		(0.08)
Inactive		-0.21***
		(0.06)
Retired		-0.15**
		(0.07)
Income (ref: 1st decile)		
Income: 2nd decile		0.02
		(0.08)
Income: 3rd decile		0.05
		(0.08)
Income: 4th decile		0.10
		(0.08)
Income: 5th decile		0.19**
		(0.09)
Income: 6th decile		0.13
		(0.09)
Income: 7th decile		0.15*
		(0.09)
Income: 8th decile		0.20**
		(0.09)
Income: 9th decile		0.30***
		(0.10)
Income: 10th decile		0.26***
		(0.10)
Number of people in the household		0.01
		(0.02)
Children in the household		-0.08
		(0.06)
Observations	2966	2966
Adjusted R^2	0.094	0.121
Country of residence dummies	Yes	Yes
Country of birth dummies	Yes	Yes

Notes. These are estimated coefficients from OLS regressions. The dependent variable comes from the question "When things go wrong in my life it takes a long time to get back to normal", with responses from 1(Agree strongly) to 5 (Disagree strongly), so that higher scores reflect greater resilience. Standard errors appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Appendix Table A1.4 shows the estimated coefficients on the X_{ibrt} and M_{ibrt} variables in the natives' sample for comparison purposes, including only country-of-residence dummies (as these are the same as country-of-birth dummies for natives). The correlations between resilience and right-hand side variables are broadly similar for natives and immigrants. We

again do not find a positive relationship with age: this is negative in column (1), and becomes U-shaped (with a minimum at age 52) in column (2). This change from negative to U-shaped reflects labour-force status, as the probability of being employed falls with age and employment is positively correlated with resilience.

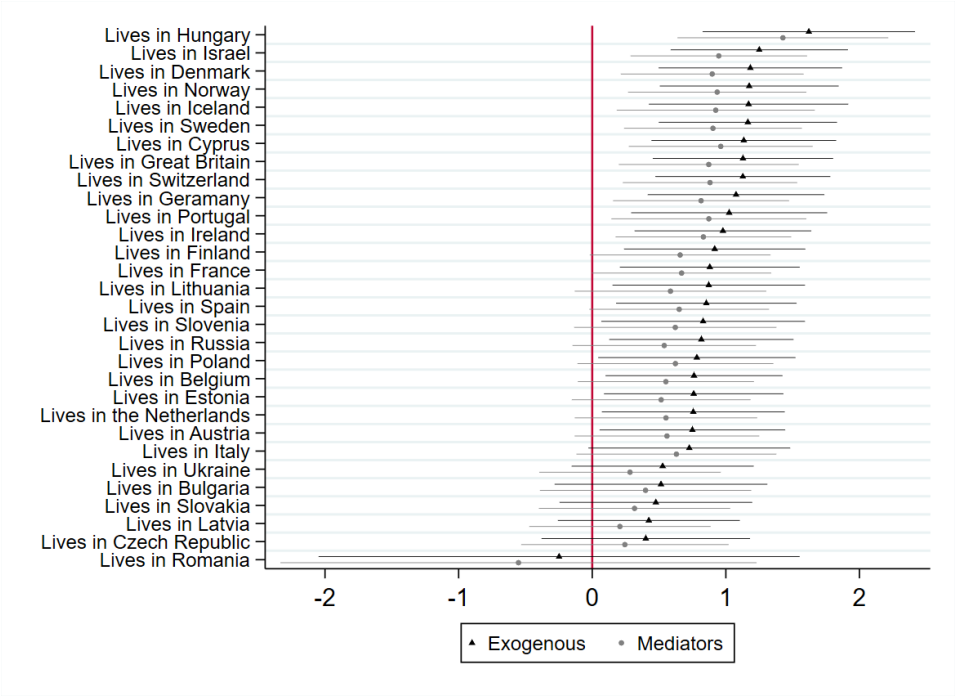
The key coefficients in Table 1.3 with respect to our research question are those on the birth- and residence-country dummies: these are depicted in Figure 1.2. The top panel refers to the residence country and the bottom panel to the country of birth; these two panels allow us to compare culture (where you were born) to acculturation and institutions (where you now live). We plot the estimated country coefficients from both columns 1 and 2 of Table 1.3 (where the latter includes the potential mediators).

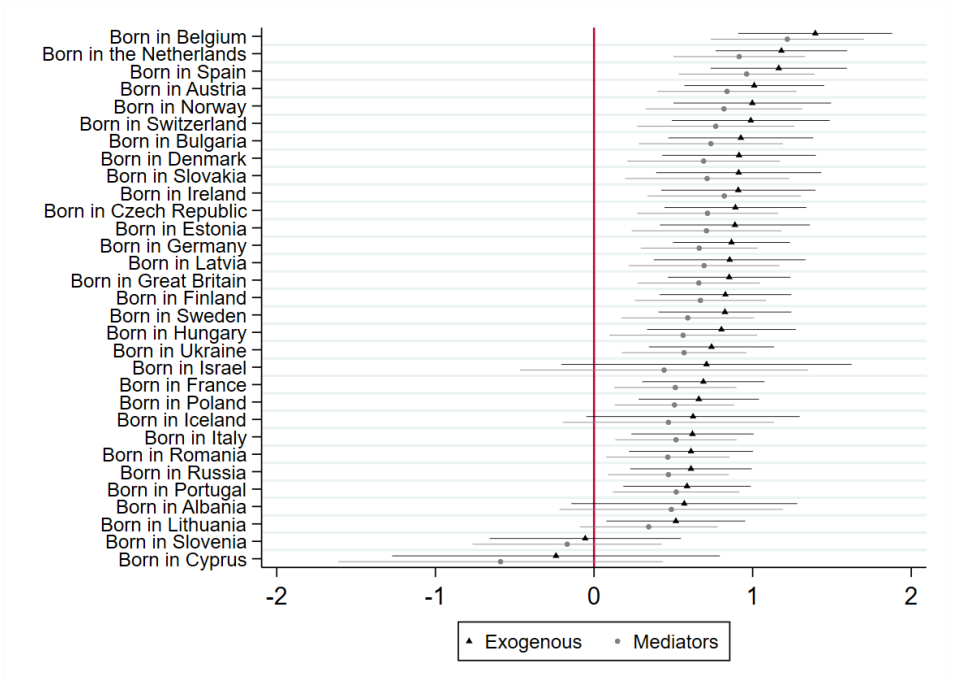
The coefficients in Figure 1.2 can be compared to the distribution in the raw data in Figure 1.1. In general, the patterns for country of birth (residence) in Figure 1.2 match those in the raw data in the bottom-right (top-right) panel of Figure 1.1: the country distribution of resilience does not then seem to be overly-affected by composition effects. Equally, controlling for mediators does not much change the pattern of the estimated country dummies in Figure 1.2.

The F-tests for the exclusion of all of the δ_b and all of the δ_r dummies separately produce respective figures of 2.66 and 3.98 respectively. Both country of birth and country of residence are thus significantly correlated with resilience, with the effect of country of residence being larger.

There are a large number of estimated coefficients in Figure 1.2, and we would like to understand their distribution. Our first classification attempt is via country GDP. The regression results in Table 1.3 suggested that, within a country, richer individuals were more resilient: we therefore ask whether, at the aggregate level, richer countries are more resilient too. The analysis here will refer to the (unmediated) country coefficients from column (1) of Table 1.2.

Figure 1.2: Country of residence and country of birth fixed effects (relative to Kosovo)





Notes. These estimated coefficients are from the OLS regressions in Table 1.3. The dependent variable comes from the question "When things go wrong in my life it takes a long time to get back to normal", with responses from 1 ("Agree strongly") to 5 ("Disagree strongly"), so that higher scores reflect greater resilience. The exogenous characteristics are gender, age and belonging to a minority ethnic group; the mediators are marital status, education, labour-force status, income, number of people in the household and children in the household. Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

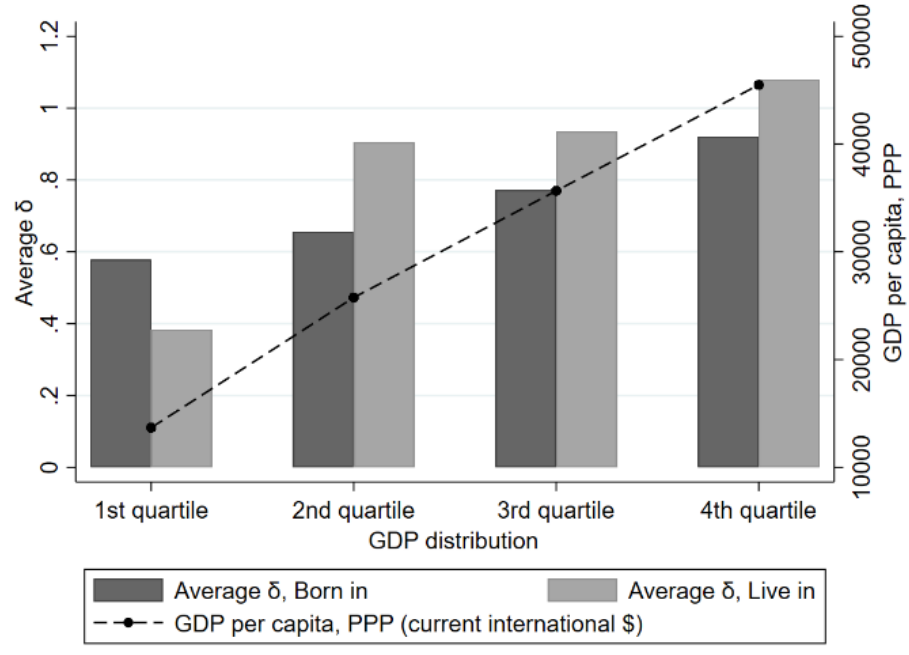
Table 1.4 lists the 32 countries of birth and/or residence in our estimation sample by quartile of the GDP distribution. Figure 1.3 then plots resilience, given by the estimated birth- and residence-country coefficients from column 1 of Table 1.3 (*i.e.* without the potential mediators) against GDP. There is a clear positive relationship: immigrants born in richer countries are more resilient, and immigrants who move to richer countries are also more resilient.[17] These country differences are larger when calculated using the GDP quartile of the residence country.

Table 1.4: Country GDP Quartiles

1st quartile	2nd quartile	3rd quartile	4th quartile
Kosovo	Lithuania	Cyprus	Iceland
Albania	Hungary	Spain	Denmark
Ukraine	Estonia	Italy	Sweden
Bulgaria	Slovakia	France	Austria
Romania	Portugal	United Kingdom	Netherlands
Latvia	Czech Republic	Finland	Ireland
Poland	Slovenia	Germany	Switzerland
Russia	Israel	Belgium	Norway

Notes: These GDP quartiles are calculated only over the countries in our estimation sample. *Source:* ESS and the World Bank.

Figure 1.3: Resilience by GDP Quartile



[17] Appendix Figure A1, which uses information from both natives and immigrants, also reveals a positive correlation between resilience and residence-country GDP.

In addition to GDP, we also ask whether resilience differs systematically by cultural group. Table 1.5 lists our countries by cultural area using the Inglehart-Welzel World Cultural Map, and Figure 1.4 maps resilience by cultural group. We retain four broad culture groups: Orthodox, Catholic, Protestant, and English-speaking (this leads to the omission of four countries: see the notes to Table 1.5).

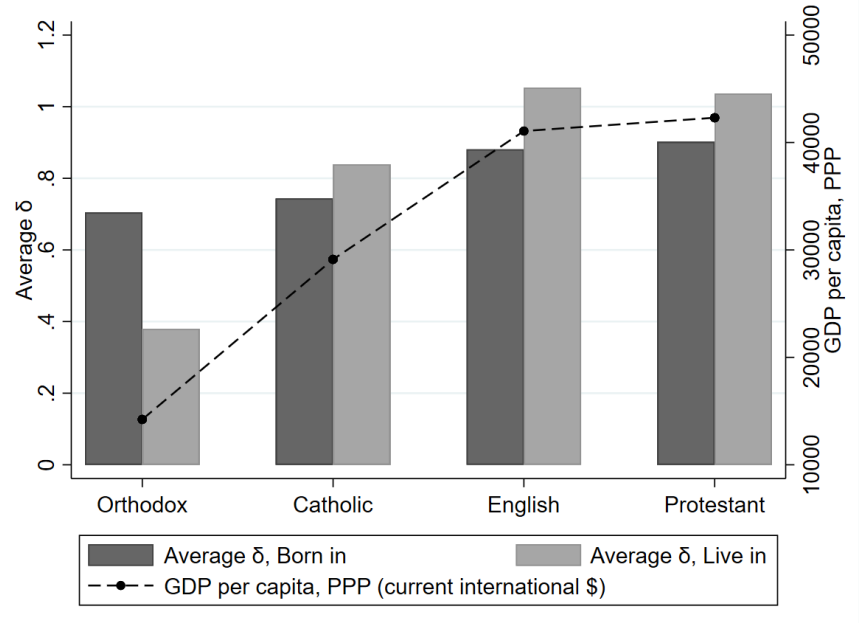
Figure 1.4 shows that Orthodox countries have the lowest resilience, in terms of both birth and residence country, with a higher figure in Catholic countries, and the greatest resilience in English and Protestant countries. These differences among culture groups, as was the case for GDP quartiles, are larger for the culture of the residence country than for that of the birth country. Last, the GDP per capita figure plotted by the dashed line in the figure reveals that cultural groups and GDP per capita in our sample are not independent of each other.

Table 1.5: Country classification by culture

Orthodox	Catholic	Protestant	English
Russia	Belgium	Switzerland	United Kingdom
Ukraine	Spain	Germany	Ireland
Bulgaria	France	Denmark	
Romania	Hungary	Finland	
Latvia	Poland	Netherlands	
	Portugal	Norway	
	Slovenia	Sweden	
	Slovakia	Estonia	
	Italy	Iceland	
	Austria		
	Czech Republic		
	Lithuania		

Source: The Inglehart-Welzel World Cultural Map. https://www.worldvaluessurvey.org/. Cyprus is omitted, as it is not clear if the waves we use were also asked in occupied areas where Muslims are predominant. We also do not show Albania and Kosovo, where the predominant religion is Muslim, and Israel where the predominant religion is Jewish.

Figure 1.4: Resilience and Cultural Groups



To tease out the separate relationships with GDP and culture, we turn to regression analysis. Table 1.6 shows the results from regressions of first the birth- and then the residence-country estimated coefficients in Figure 1.2 on both culture and GDP-quartile dummies at the same time. As we dropped four countries from the culture groups in Table 1.5, there are only 28 observations. None of the estimated coefficients in these regressions are significant. This may reflect multi-collinearity. When the regressions are run separately first with GDP quartiles[18] and then with culture groups, significant estimates were only found for the former with respect to the residence country. As such, resilience first seems to be more determined by the residence than by the birth country, and it is the economic characteristics of the residence country that matter more than its cultural group.

Table 1.6: Country-level Resilience Regressions.

	Birth country coefficients (1)	Residence country coefficients (2)
GDP (ref: 1st quartile)		
2nd Quartile	-0.01	0.05
	(0.28)	(0.32)
3rd Quartile	0.26	0.05
	(0.29)	(0.33)
4th quartile	0.28	0.11
	(0.30)	(0.35)
Culture (ref: Orthodox)		
Catholic	-0.09	0.38
	(0.29)	(0.33)

[18] We find similar results when applying the same specification and substituting the logarithm of GDP per capita for the GDP quartile groups.

English	-0.14	0.57
	(0.36)	(0.41)
Protestant	-0.09	0.54
	(0.32)	(0.37)
Observations	28	28
Adjusted R^2	0.008	0.262

Notes. These are the estimated coefficients from OLS regressions. The dependent variables are the estimated residence and birth-country dummies in Equation (1.1).

Our research question was whether an individual's resilience partly comes from the country in which she was born. The results above show that this is indeed the case, but also suggest that the residence-country plays a larger role. Nonetheless, the country fixed effects could be capturing aspects other than cultural and institutional resilience (Luttmer and Singhal, 2011). One obvious empirical exercise is then to consider the correlation between immigrants' resilience scores and those found for natives in both the immigrants' birth and residence countries. As in the epidemiological approach, we regress individual resilience on the average resilience scores in the birth country ($\overline{Resilience_b}$) and the residence country ($\overline{Resilience_r}$), both calculated from within the ESS data we use. These two scores replace δ_b and δ_r in Equation (1.1). The aim of this regression is to understand the patterns in Figure 1.2.

In column 1 of Table 1.7, both the average resilience of natives in the birth country and natives in the residence country attract significant estimated coefficients.[19] Continuing the theme of our results that the residence country is more important in determining resilience than the birth country, the estimated coefficient for the former is twice that of the latter. A one-point rise in average birth-country resilience (on the 1 to 5 scale) is associated with a 0.38 higher resilience score for immigrants who come from that country. Adding birth- and residence-country GDP per capita[20] in column 2 of Table 1.7 tests whether this country resilience reflects only the country's economic development. The similarity of the estimated resilience coefficients in columns 1 and 2 suggests that this is not the case. We do not control for both

[19] Appendix Table A1.5 presents the LPM and OP versions of Table 1.7, in which the results are very similar. In addition, even if a migrant was born in a certain country their parents might have been born elsewhere, so that the individual's birth country does not entirely reflect their culture when growing up. In Appendix Table A1.6 we restrict the sample to migrants whose father, or mother, or both parents were born in the same country as the individual. This has no material effect on the results.

[20] Appendix Table A1.7 instead includes birth-country GDP from 5 and 10 years in the past, which likely more-accurately reflects birth-country development at the time that the migrant left. The coefficients for birth-country resilience are smaller in this analysis, consistent with part of birth-country resilience reflecting the level of economic development, but are not significantly different from those in Table 1.7.

GDP and culture groups at the same time, as the two are very strongly correlated (see Figure 1.4).

Table 1.7: The role of birth- and residence-country resilience

	(1)	(2)
Birth-country resilience	0.38***	0.37*
	(0.14)	(0.21)
Residence-country resilience	0.89***	0.72***
	(0.14)	(0.21)
Birth-country GDP per capita		-0.01
		(0.10)
Residence-country GDP per capita		0.11
		(0.09)
Observations	2966	2966
Adjusted R^2	0.071	0.071
Time dummies	Yes	Yes
Exogenous Controls	Yes	Yes

Notes. These are estimated coefficients from OLS regressions. The dependent variable comes from the question "When things go wrong in my life it takes a long time to get back to normal", with responses from 1 ("Agree strongly") to 5 ("Disagree strongly"), so that higher scores reflect greater resilience. Controls included in the regression but omitted in the table are gender, age and belonging to a minority ethnic group. Birth-country GDP per capita is the log of mean GDP per capita in PPP in current US$ in the waves available and per country of birth. Residence-country GDP per capita is the analogous figure per country of residence. None of the columns includes residence- or birth-country dummies. Standard errors in parentheses are clustered at the country of residence *x* country of birth level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Our results are overall consistent with resilience being more contextual (from current institutions and acculturation) than inherited from birth-country culture, with the former effect being twice that of the latter. These effects of resilience in the birth and residence countries do not reflect their level of economic development. The coefficients are large in size: the effect of a point of birth-country resilience is 15% larger than that of tertiary (relative to primary) education, and one quarter larger than being in the 9th rather than the 1st decile of the income distribution.

Heterogeneity

We have above considered resilience for the whole immigrant sample; we now ask whether the results differ across groups. The specification here is that in column 1 of Table 1.7, without controlling for GDP in either the birth or residence country. We consider heterogeneity by gender, age, belonging to a minority ethnic group, how long the individual has lived in the country, citizenship in the residence country, having a parent from the residence country,

distance to the birth country, having an EU birth country, and age at the time of migration. The results appear in Appendix Tables A1.8 through A1.10.

Overall, there is strikingly little evidence of heterogeneity in the transmission of resilience from the birth country. Two results that do stand out are a far-larger effect of birth-country resilience for men than women, and a far-smaller effect of the same for those with citizenship in the residence country. Citizenship in the context of immigration within the European Union is often a choice,[21] and it may well be that those who have better acclimatised to the residence country will be more likely to try to acquire it.

We also find a larger effect of residence-country resilience for those who have lived in the country for more than twenty years. Living for a longer period of time in the residence country can result in a better adaptation and easier access to institutions. Although the results reported in Table A1.10 for country of birth and age at time of migration are not significant, they become so when controlling for GDP in the birth and residence countries: they are far larger for residence-country resilience for those born in the EU and those who migrated during adulthood. Most immigrants (67.4% of the sample) live in an EU member state, and being born in another EU country could imply easier access to residence-country institutions or that these latter are similar to those in the birth country (*e.g.* the health system). Arriving to the new country during adulthood intensifies the impact of culture and institutions in the residence country on resilience. Individuals who migrate as adults benefit to a greater extent from the institutions of the new country at the time of migration which ultimately results in a far-larger effect of these in terms of resilience. This result also suggests that the residence-country captures institutions more than culture. Those who migrated during childhood are arguably better acclimatised to the new culture, while migration at adulthood means less cultural acclimatation but more influence of institutions at the time of migration. Moreover, migration during adulthood is intrinsically motivated by the individual, while migration during childhood is most likely motivated by the parents.

Second-generation immigrants

Considering the transmission of traits, and inspired by Luttmer and Singhal (2011), we also look at second-generation immigrants: those who were born in the residence country but whose

[21] 72% of those without citizenship came from EU member states and 28% from non-EU countries. For those with citizenship in the residence country, the analogous figures are 67% and 33%.

father and/or mother were born in another country. We identify 3,283 individuals who have at least one parent born in another ESS country: 1,993 native respondents with mothers who were born in another ESS country, 2,063 with fathers born in another ESS country, and 773 with both. The results in Table 1.8 reveal the intergenerational transmission of resilience. The effect of the father's birth country resilience is larger in size than that of the mothers', although we cannot reject the hypothesis that they are statistically equal. To further explore gender heterogeneity in the transmission of resilience, we compare the effect of the inherited cultural resilience of mothers and fathers separately for sons and daughters. Table 1.9 suggests that this transmission of resilience is particularly present between fathers and sons.

Table 1.8: Second-generation resilience: Birth-country resilience of parents

	All	Both parents from abroad	Both parents from same country abroad	Mothers	Fathers
	(1)	(2)	(3)	(4)	(5)
Parents' birth-country resilience	0.26**	0.17	0.12		
	(0.12)	(0.28)	(0.30)		
Residence-country resilience	0.83***	1.51***	1.67***	0.97***	0.91***
	(0.16)	(0.36)	(0.40)	(0.21)	(0.19)
Mothers' birth-country resilience				0.15	
				(0.15)	
Fathers' birth-country resilience					0.35**
					(0.16)
Observations	3283	773	659	1993	2063
Adjusted R^2	0.058	0.036	0.040	0.048	0.059
Country of birth dummies	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes
Exogenous controls	Yes	Yes	Yes	Yes	Yes

Notes. See the notes in Table 1.7. In columns 1 and 2, we calculate average birth-country resilience when the parents come from different countries. Residence-country log GDP per capita in PPP in current US$ in the waves available is controlled for but not shown in the table. Standard errors in parentheses are clustered at the parents' country of birth *x* individual country of residence level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 1.9: Second-generation resilience: Gender heterogeneity

	Daughters		Sons	
	Mother	Father	Mother	Father
	(1)	(2)	(3)	(4)
Residence-country resilience	0.81**	0.96***	1.12***	0.79***
	(0.32)	(0.29)	(0.27)	(0.27)
Mothers' birth-country resilience	0.20		0.12	
	(0.22)		(0.21)	
Fathers' birth-country resilience		0.10		0.64***
		(0.20)		(0.22)
Observations	1032	1094	961	969
Adjusted R^2	0.046	0.074	0.034	0.033
Country of birth dummies	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes
Exogenous controls	Yes	Yes	Yes	Yes

Notes. See the notes in Table 1.8. Standard errors in parentheses are clustered at the parents' country of birth *x* individual country of residence level. * p < 0.1, ** p < 0.05, *** p < 0.01.

1.4 Conclusion

This paper has used European data on immigrants to explore the role of the 'inherited' (culture in the birth country) and 'contextual' (institutions and culture in the residence country) components of individual resilience. We find that both matter, but that the contextual component is twice the size of the inherited component. Inherited resilience plays a greater role for men and those with no citizenship, while contextual resilience matters more for those who have lived in the country for more than twenty years. Resilience rises with income, both across and within countries. We also provide evidence for the intergenerational transmission of parents' birth-country resilience for second-generation immigrants, and in particular from fathers to sons.

The results presented in this paper have a number of policy implications. Most generally, they first show that resilience is not a fixed trait, as it depends significantly on the country of residence for immigrants (although we have not identified the exact country characteristics that lie behind this correlation). Second, resilience remains inherited to a large part for those without citizenship. If there is on average lower resilience in the birth countries than in residence countries, then the ease of access to citizenship may be one way to increase immigrant resilience. Third, residence-country resilience may on average matter less for immigrants from non-EU countries, and specific programmes to encourage resilience may be important for this group.

Our main results show a large effect of both country of residence and birth. It would be of interest to understand exactly what these reflect. Future research could usefully attempt to disentangle the components that may lie behind our main findings, such as the role of legal concepts (*e.g.* laws regarding social protection), social norms, market institutions, resources, language style, religion and social behaviours.

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Appendix

Figure A1.1: Average resilience of the full sample by residence-country per year and GDP per capita. Source: ESS and World Bank.

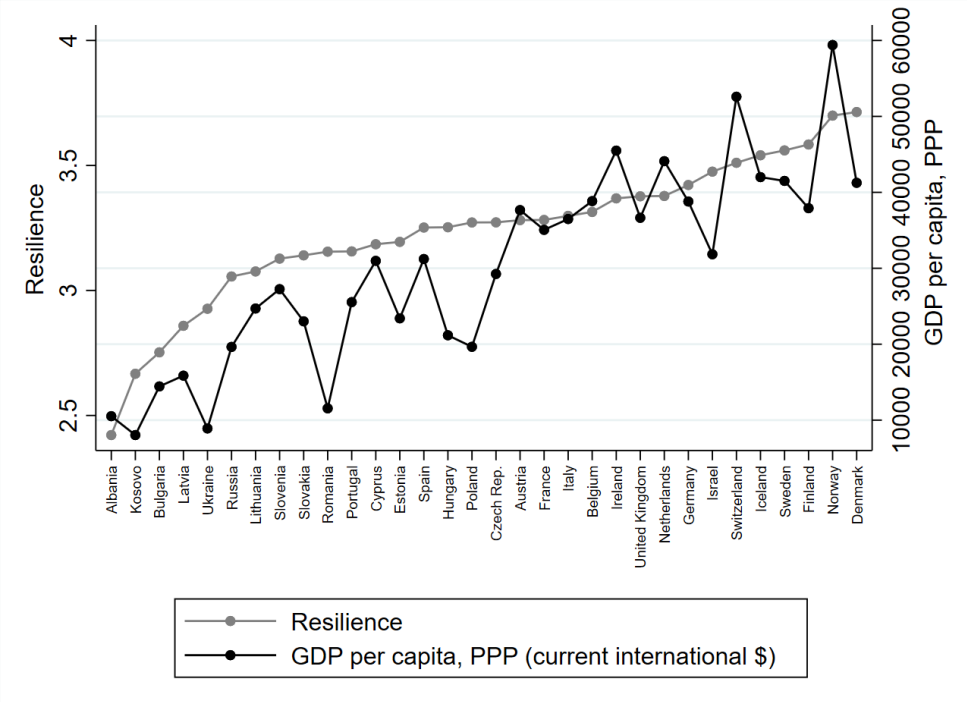

Table A1.1: Number of observations by country of residence and country of birth.

	Country of residence		Country of birth	
	No. Interviewed in country	**% born in the country**	**No. Born in country**	**% still living in the country of birth**
Albania	1,062	100.0	1,073	99.0
Austria	1,349	96.4	1,342	96.9
Belgium	2,942	94.6	2,812	99.0
Bulgaria	2,886	99.5	2,911	98.7
Switzerland	2,396	85.8	2,080	98.9
Cyprus	1,521	96.3	1,467	99.8
Czech Republic	1,228	97.6	1,264	94.8
Germany	4,362	95.1	4,451	93.2
Denmark	2,349	97.5	2,320	98.8
Estonia	1,811	85.4	1,579	98.0
Spain	2,408	96.6	2,376	97.9
Finland	3,649	97.5	3,644	97.6
France	3,143	96.5	3,177	95.4
Great Britain	3,229	97.0	3,407	92.0
Hungary	1,326	98.9	1,344	97.6
Ireland	2,913	88.8	2,619	98.7
Israel	1,213	83.8	1,021	99.6

Iceland	582	96.4	570	98.4
Italy	492	96.8	609	78.2
Lithuania	1,651	97.9	1,667	97.0
Latvia	1,271	90.4	1,179	97.5
Netherlands	2,892	97.8	2,897	97.6
Norway	2,981	96.0	2,888	99.1
Poland	2,736	99.2	2,945	92.1
Portugal	1,974	98.7	2,039	95.6
Romania	1,682	99.9	1,833	91.7
Russia	3,592	97.8	4,125	85.2
Sweden	3,123	94.3	3,024	97.4
Slovenia	1,812	99.0	1,806	99.3
Slovakia	2,108	97.8	2,101	98.1
Ukraine	1,593	93.4	1,693	87.8
Kosovo	1,066	99.1	1,079	97.9
Total	69,342	95.7	69,342	95.7

Table A1.2: Descriptive statistics of the ESS immigrant sample.

	Mean	**SD**	**Min**	**Max**
Age	49.92	17.02	15.0	85.0
Male[d]	0.43			
Primary education[d]	0.07			
Secondary education[d]	0.53			
Tertiary education[d]	0.40			
2006[d]	0.37			
2012[d]	0.63			
Minority ethnicity[d]	0.19			
Married[d]	0.57			
Separated[d]	0.13			
Widowed[d]	0.10			
Never married[d]	0.21			
Employed[d]	0.52			
Unemployed[d]	0.06			
Inactive[d]	0.15			
Retired[d]	0.27			
Income: 1st decile[d]	0.10			
Income: 2nd decile[d]	0.13			
Income: 3rd decile[d]	0.12			
Income: 4th decile[d]	0.11			
Income: 5th decile[d]	0.11			
Income: 6th decile[d]	0.10			
Income: 7th decile[d]	0.10			
Income: 8th decile[d]	0.08			

Income: 9th decile[d]	0.07			
Income: 10th decile[d]	0.08			
People in the household	2.56	1.35	1.0	12.0
Children in the household	0.39[d]			
Resilience	3.28	1.06	1.0	5.0
Observations	2,966			

1.

Table A1.3: Determinants of resilience.

	LPM		Ordered Probit	
	(1)	(2)	(3)	(4)
Male	0.07***	0.04**	0.16***	0.09**
	(0.02)	(0.02)	(0.04)	(0.04)
Age/100	0.70**	0.39	0.83	-0.39
	(0.32)	(0.39)	(0.71)	(0.86)
$Age^2/100$	-0.01**	-0.00	-0.01	0.01
	(0.00)	(0.00)	(0.01)	(0.01)
Minority ethnic group	-0.03	-0.04	-0.12**	-0.13**
	(0.03)	(0.03)	(0.06)	(0.06)
Year (ref: 2006)				
2012	0.04*	0.04*	0.12**	0.13***
	(0.02)	(0.02)	(0.05)	(0.05)
Marital status (ref: married)				
Separated		-0.04		-0.11*
		(0.03)		(0.06)
Widowed		-0.05		-0.15*
		(0.04)		(0.08)
Never married		0.01		0.02
		(0.03)		(0.07)
Education (ref: Primary)				
Secondary and post-secondary		0.05		0.17**
		(0.04)		(0.08)
Tertiary		0.11***		0.35***
		(0.04)		(0.09)
Labour-force status (ref: Employed)				
Unemployed		-0.08**		-0.26***
		(0.04)		(0.09)
Inactive		-0.09***		-0.22***
		(0.03)		(0.06)
Retired		-0.06		-0.16**
		(0.04)		(0.08)
Income (ref: 1st decile)				
2nd decile		0.01		0.02
		(0.04)		(0.08)
3rd decile		0.00		0.08
		(0.04)		(0.09)
4th decile		0.01		0.11
		(0.04)		(0.09)
5th decile		0.05		0.21**
		(0.04)		(0.09)
6th decile		0.05		0.14
		(0.04)		(0.09)
7th decile		0.04		0.16*
		(0.04)		(0.09)
8th decile		0.05		0.22**
		(0.04)		(0.10)
9th decile		0.08		0.34***

		(0.05)		(0.11)
10th decile		0.09**		0.28***
		(0.05)		(0.10)
Number of people in the household		0.00		0.00
		(0.01)		(0.02)
Children in the household		-0.04		-0.09
		(0.03)		(0.06)
Observations	2966	2966	2966	2966
Adjusted R^2	0.072	0.090		
Country of residence dummies	Yes	Yes	Yes	Yes
Country of birth dummies	Yes	Yes	Yes	Yes

Notes. These are estimated coefficients from Linear Probability Model (columns 1, 2, 3, 4) and Ordered Probit (columns 5, 6, 7, 8) regressions. The dependent variable is the question "When things go wrong in my life it takes a long time to get back to normal". Responses range from 1 ("Agree strongly") to 5 ("Disagree strongly"), so that higher scores reflect greater resilience. For the LPM we converted the dependent variable to a dummy for the responses Disagree (4) and Disagree strongly (5) to this question. Standard errors appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A1.4: Determinants of resilience. Natives sample.

	(1)	(2)
Male	0.16***	0.13***
	(0.01)	(0.01)
Age/100	-0.09	-2.07***
	(0.12)	(0.16)
Age^2/100	-0.01***	0.02***
	(0.00)	(0.00)
Minority ethnic group	-0.12***	-0.06***
	(0.02)	(0.02)
Year (ref: 2006)		
2012	0.14***	0.14***
	(0.01)	(0.01)
Marital Status (ref: Married)		
Separated		-0.06***
		(0.01)
Widowed		-0.10***
		(0.02)
Never married		-0.05***
		(0.01)
Education (ref: Primary)		
Secondary and post-secondary		0.11***
		(0.01)
Tertiary		0.23***
		(0.02)
Labour-force status (ref: Employed)		
Unemployed		-0.18***
		(0.02)
Inactive		-0.13***
		(0.01)
Retired		-0.10***
		(0.02)
Income (ref: 1st decile)		
Income: 2nd decile		0.05***
		(0.02)
Income: 3rd decile		0.14***
		(0.02)
Income: 4th decile		0.16***

		(0.02)
Income: 5th decile		0.20***
		(0.02)
Income: 6th decile		0.23***
		(0.02)
Income: 7th decile		0.24***
		(0.02)
Income: 8th decile		0.28***
		(0.02)
Income: 9th decile		0.32***
		(0.02)
Income: 10th decile		0.39***
		(0.02)
Number of people in the household		-0.00
		(0.00)
Children in the household		0.03**
		(0.01)
Observations	66376	66376
Adjusted R^2	0.086	0.112
Country of residence dummies	Yes	Yes

Notes. These are estimated coefficients from OLS regressions. The dependent variable is the question "When things go wrong in my life it takes a long time to get back to normal". Responses range from 1 ("Agree strongly") to 5 ("Disagree strongly"), so that higher scores reflect greater resilience. Standard errors appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A1.5: Birth- and residence-country joint effects on resilience

	LPM		Ordered Probit	
	(1)	(2)	(4)	(5)
Birth-country resilience	0.25***	0.19**	0.35**	0.34
	(0.06)	(0.09)	(0.15)	(0.22)
Residence-country resilience	0.38***	0.28***	0.91***	0.74***
	(0.06)	(0.09)	(0.15)	(0.22)
Birth-country GDP per capita		0.02		-0.01
		(0.04)		(0.10)
Residence-country GDP per capita		0.07*		0.11
		(0.04)		(0.10)
Observations	2966	2966	2966	2966
Adjusted R^2	0.068	0.069		
Time dummies	Yes	Yes	Yes	Yes
Exogenous controls	Yes	Yes	Yes	Yes

Notes. These are estimated coefficients from Linear Probability Model (columns 1 and 2) and Ordered Probit (columns 3 and 4) regressions. The dependent variable is the question "When things go wrong in my life it takes a long time to get back to normal". Responses range from 1 ("Agree strongly") to 5 ("Disagree strongly"), so that higher scores reflect greater resilience. For the LPM we converted the dependent variable to a dummy for the responses "Disagree" (4) and "Disagree strongly" (5) to this question. The controls included in the regression but omitted in the table are gender, age and belonging to a minority ethnic group, marital status, education, labour-force status, income, number of people in the household and children in the household. Birth-country GDP per capita is the log of mean GDP per capita in PPP in current US$ in the waves available and per country of birth. Residence-country GDP per capita is the log of mean GDP per capita in PPP in current US$ in the waves available and per country of residence. None of the columns includes residence- or birth-country dummies. Standard errors in parentheses are clustered at the country of residence *x* country of birth level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A1.6: Birth- and residence-country effects on resilience. Restricted sample to parents with same country of birth as child.

	Father or Mother born in the same country as individual		Both born in the same country as individual	
	(1)	(2)	(3)	(4)
Birth-country resilience	0.46***	0.34	0.43***	0.40*
	(0.15)	(0.23)	(0.16)	(0.23)
Residence-country resilience	0.89***	0.64***	0.91***	0.63**
	(0.15)	(0.23)	(0.18)	(0.27)
Birth-country GDP per capita		0.04		-0.01
		(0.10)		(0.11)
Residence-country GDP per capita		0.16*		0.19*
		(0.09)		(0.11)
Observations	2449	2449	1988	1988
Adjusted R^2	0.078	0.079	0.075	0.075
Time dummies	Yes	Yes	Yes	Yes
Exogenous Controls	Yes	Yes	Yes	Yes

Notes. See the notes to Table 7. Standard errors in parentheses are clustered at the country of residence *x* country of birth level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A1.7: Birth- and residence-country joint effects on resilience, controlling for past GDP in birth-country and distance between birth- and residence-country.

	(1)	(2)
Birth-country resilience	0.20	0.12
	(0.20)	(0.21)
Residence-country resilience	0.74***	0.77***
	(0.21)	(0.20)
Birth-country GDP per capita 5 years ago	0.03	
	(0.08)	
Birth-country GDP per capita 10 years ago		0.06
		(0.07)
Residence-country GDP per capita	0.12	0.10
	(0.09)	(0.09)
Observations	2943	2943
Adjusted R^2	0.104	0.104
Time dummies	Yes	Yes
Controls	Yes	Yes

Notes. See the notes to Table 7. Distance is the logarithm of the distance between the most populated cities in the birth and residence countries. The number of observations in column 1 and 2 is 23 lower compared to Table 7 because these are the individuals born in Kosovo, where there is no information on GDP per capita before 2008. In column 3 we lose additional observations because Kosovo is not in the distance dataset from CEPII (http://.cepii.fr). 23 immigrants born in Kosovo and 10 immigrants living in Kosovo are lost. Standard errors in parentheses are clustered at the country of residence *x* country of birth level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A1.8: Birth- and residence-country joint effects on resilience. Heterogeneity by demographic characteristics

	(1) Female	(2) Male	(3) Young	(4) Old	(5) Minority ethnicity	(6) No minority
Birth-country resilience	0.17	0.65***	0.21	0.49***	0.35	0.39***
	(0.18)	(0.14)	(0.18)	(0.17)	(0.27)	(0.15)
p-value on test of equal coefficients		*0.008*		*0.167*		*0.890*
Residence-country resilience	0.98***	0.76***	0.62***	0.97***	0.69**	0.92***
	(0.16)	(0.16)	(0.20)	(0.15)	(0.28)	(0.15)
p-value on test of equal coefficients		*0.199*		*0.112*		*0.429*
Observations	1689	1277	1016	1950	549	2417
Adjusted R^2	0.069	0.055	0.026	0.093	0.062	0.063
Exogenous controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes. See the notes to Table 7. The Young are aged 40 or less. Standard errors in parentheses are clustered at the country of residence *x* country of birth level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A1.9: Birth- and residence-country joint effects on resilience. Heterogeneity by immigration characteristics.

	(1) Lived in the country for less than 20 years	(2) Lived in the country for more than 20 years	(3) Citizenship in residence country	(4) No citizenship in residence country	(5) None of the parents is from residence country	(6) At least one parent is from residence country	(7) Close residence and birth countries	(8) Distant residence and birth countries
Birth-country resilience	0.45***	0.33*	0.23	0.61***	0.44***	0.24	0.47**	0.38**
	(0.16)	(0.18)	(0.17)	(0.16)	(0.16)	(0.25)	(0.23)	(0.19)
p-value on test of equal coefficients		*0.560*		*0.062*		*0.062*		*0.763*
Residence-country resilience	0.58***	0.97***	0.24	0.54*	0.96***	0.64**	0.86***	0.72***
	(0.20)	(0.15)	(0.22)	(0.31)	(0.15)	(0.26)	(0.18)	(0.22)
p-value on test of equal coefficients		*0.068*		*0.689*		*0.689*		*0.616*
Observations	1256	1710	1663	1301	2312	637	1834	1132
Adjusted R^2	0.071	0.116	0.079	0.140	0.082	0.033	0.096	0.023
Exogenous controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes. See the notes to Table 7. All columns include birth- and residence-country average log GDP per in PPP in current US$ in the waves available. Close birth and residence countries are those with the most-populated cities under 1,000 km apart. Standard errors in parentheses are clustered at the country of residence *x* country of birth level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A1.10: Birth- and residence-country joint effects on resilience. Heterogeneity by immigration characteristics. Continued.

	(1) Country of birth in EU		(2) Country of birth non-EU	(3) Migration at age 0-5		(4) Migration at age 6-10
Birth-country resilience	0.21		0.56***	0.40*		0.48**
	(0.18)		(0.20)	(0.21)		(0.20)
p-value on test of equal coefficients		*0.183*			*0.722*	
Residence-country resilience	0.98***		0.85***	0.58**		0.98***
	(0.86)		(0.23)	(0.23)		(0.21)
p-value on test of equal coefficients		*0.949*			*0.164*	
Observations	1778		1188	706		1123
Adjusted R^2	0.034		0.098	0.052		0.073
Exogenous controls	Yes		Yes	Yes		Yes

Notes. See the notes to Table 7. All columns include birth- and residence-country average log GDP per capita in PPP in current US$ in the waves available. We also checked for heterogeneity between residents in EU and non-EU countries, which produced no significant differences. The exact age at migration is only available in ESS round 3. The residence-country resilience coefficients in columns (4) and (6) are significantly higher than those in columns (3) and (5). Standard errors in parentheses are clustered at the country of residence *x* country of birth level. * p < 0.1, ** p < 0.05, *** p < 0.01.

Chapter

2 War destruction and resilience in the long-term

War destruction and resilience in the long-term[22]

2.1 Introduction

The term 'resilience' has been increasingly used worldwide over the last decades. We often hear political leaders and policy makers talk about it and launch plans using this term. It has been specially stressed in the last few years with the Covid-19 pandemic, the conflict in Ukraine and the increasing threats of climate change. I quote below some examples of speeches and interviews that make references to it:

> *"Resilience is a quality shared by people and economies; it is the ability to adapt to unexpected circumstances, quickly recover from adverse shocks and bounce back into shape.* […] *The ECB creates a more resilient world through its contribution to a strong European economy and financial system for the good of Europeans and their trading partners."* - Christine Lagarde, Leaders Magazine, Volume 43, Number 4, 2020.

> *"With NextGenerationEU, we are transforming our continent for the decades ahead. We are digitalising our economies. We are making the European Green Deal a reality. And we are making our societies stronger and more resilient.*" – Ursula Von der Leyen, Strasbourg, 8 June 2021.

> "[…] *these words capture well the story of Cyprus in modern times. It is a story full of adventure, with many obstacles along the way. And yet, your people have overcome them all, gaining in knowledge, and emerging stronger and more resilient each time.*" - Christine Lagarde, Nicosia, 30 March 2022.

Besides its use in politics, in the news and in daily life, there has also been an increased presence in research. Bonanno *et al.* (2015) report that the use of the words "resilience", "resilient" or "resiliency" in social sciences journal titles increased from two hundred in the 2000s to eight hundred in the 2010s. In Google Scholar, there is a jump from 4,710 entries of review articles when searching for the word "resilience" in 2012, to 25,800 entries in 2022.

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Resilience, in reference to the social aspect, is "*an ability to recover from or adjust easily to misfortune or change*" (Merriam-Webster Dictionary) or "*the ability to withstand or recover quickly from difficulties*" (Oxford Languages). It can be applied to an individual, a community, a region, a country; But also, the economy, the health system and the social system, just to mention some examples. The benefits of individual resilience include better physical and mental health (Connor and Davidson, 2003; King et al., 1998; Maddi and Khoshaba, 1994; Sanders et al., 2008; Armata and Baldwin, 2008; Goldstein *et al*., 2013), less burnout and absenteeism (Kotzé and Lamb, 2012), quality of sleep (Li *et al*., 2019) and longevity (Law *et al*., 2014). More information on the implications of resilience can be found in Scales *et al*. (2006), Hodder *et al*. (2011), Fergus and Zimmermann (2005) and Gatta *et al*. (2021).

Given the relevance of resilience in our society, it becomes crucial to understand its determinants and underlying mechanisms. More specifically, some of the above referenced speeches, imply that resilience increases after facing adversity. Nonetheless, there is no clear conclusion in the literature on what happens to resilience after experiencing a shock. There are different models trying to explain the reaction to traumatic events. They can be synthetised in two big groups: models on post-traumatic growth (Carver, 1998; Tedeschi and Calhoun 2004) and a model expecting decreased resilience after a shock (Graham and Oswald, 2010). It is important to note that the post-traumatic growth models have nuances and mention, for instance, that the predicted outcome in their model will not be experienced by every individual.

It is in this context that I am interested in warfare, to analyse it as a traumatic shock that has affected millions of people around the world. The previously mentioned and ongoing war in Ukraine has been a reminder to Europe of the risks of conflict that still exist in the continent. Furthermore, many other parts of the world are still under armed conflicts (*e.g.* Myanmar, Afghanistan, Mexico, Ethiopia, Colombia, Somalia, D.R.Congo, Uganda or Nigeria).

In the present paper, I am interested in finding the causal effect of warfare on resilience to satisfaction with health, on average, in the general population. To do so, I use municipality level destruction in rubble per capita in m^3 at the end of World War II (WWII) from Käestner (1949), as used in Akbulut-Yuksel (2014), Akbulut-Yuksel (2017) and Akbulut-Yuksel & Yuksel (2017), and combine it with SOEP data at the individual level, which contains information on the municipality of birth. These datasets allow me to have a quasi-experiment setting, where I exploit the WWII destruction variation after the Allied Air Forces (AAF) bombardments and the variation in being alive during the war or not. The difference-in-

differences estimation then finds the causal relationship between warfare and resilience in the long-term. Moreover, I perform different robustness checks to further proof this causal effect, including a falsification test to check the parallel trends assumption.

I find that war destruction increases resilience in the long-term. Older generations and those from urban areas were especially sensitive to the shock. An analysis of different instrumental mechanisms reveals that none of them is mediating the effect of war destruction on resilience. Consequently, this suggests that psychological mechanisms might explain the increase in resilience. Based on models of Post-Traumatic Growht and Thriving, the traumatic shock of the war could provide new tools to face adversity in the future, and that would explain the relative increased resilience we observe (Aldwin, 1994; Aldwin *et al.* 1996). Along these lines, another explanation of post-traumatic growth is that the individual becomes 'desensitised' against future shocks (Carver, 1998) or, in other words, that she 'relativizes' every future shock to the experience of the war.

This is how the remaining of the paper will unfold: Section 2.2 presents the literature review; Section 2.3 sets the historical framework of the intense bombing on German cities in WWII; in Section 2.4 I describe the data I will use; Section 2.5 sets the empirical strategy; the results are contained in Section 2.6; Section 2.7 contains a series of robustness checks and Section 2.8 concludes.

2.2 Literature Review

Resilience in the context of warfare has been studied in the past. Great part of the existing evidence is based on samples of veterans. While there are studies on the psychological long-term detrimental effects of conflict, manly focusing on Post-Traumatic Stress Disorder (PTSD) (Vogt and Tanner, 2007; Withworth and Ciccolo, 2016), others observe post-traumatic growth after experiencing the war (Tsai *et al*., 2015). Mark *et al*. (2018) propose a systematic review on post-traumatic growth in samples of veterans mostly deployed in Iraq and Afghanistan and find that the factors most frequently associated with the phenomenon were belonging to a minority ethnic group, time since the shock happened, social support, spirituality and rumination. Vogt and Tanner (2007) look at the potential drivers of developing post-traumatic stress symptoms, they analyse pre-war experience, war-intensity, and post-war social support and stressors. They find that war-exposure during conflict was the most important factor.

There is a similar duality in the evidence on resilience of children that experienced war. On the one hand, the psychological literature finds "*elevated PTSD symptoms, depression, anxiety, somatic complaints, sleep problems and behavioural problems*" in children exposed to war (American Psychological Association, 2010, p. 26), although the prevalence of mental disorders in war-affected children can vary greatly among different samples. On the other hand, different studies suggest that many children affected by war display high resilience (Bonanno and Mancini, 2008; Garmezy, 1988; Klingman, 2002). An in-depth review of the topic can be found in Masten and Narayan (2012).

Other papers have studied the consequences of warfare on different outcomes. In particular, I will use the same dataset and similar strategies (difference-in-differences, although taking different treatment and control groups) to the following three papers: Akbulut-Yuksel (2014) finds that the level of WWII destruction during school-age years negatively affected future educational attainment, health and employment. Akbulut-Yuksel (2017) and Akbulut-Yuksel and Yuksel (2017) look at the consequences of experiencing the war during childhood or while being in the womb on different components of health. The former investigates the effects on BMI, obesity and the probability to have a chronic health condition. The latter provides evidence on the consequences on height. In both papers they find detrimental effects of the war on health.

2.3 Historical context and the bombing of German cities during WWII

One of the main principles of war is civilian immunity. This was already a practice in the Middle Ages and a followed rule by armies in most European countries by the 18th century (Primoratz, 2010). It later became formally included in the Hague treaties of 1899 and 1907. Nonetheless, this principle was violated during World War I and WWII.

Before the outbreak of WWII in September 1939 and in the first months of the war, British Prime Minister Chamberlain stated that no civilians would be killed[23]. This was also reiterated by US President Roosevelt before joining the war on December 1941. There was a change in strategy, however, after Winston Churchill became the new British Prime Minister in May 1940. Under his rule, he allowed the bombing of targets on a region of Germany. Until 1942, the British Royal Air Forces (RAF) officially performed precise bombing targeting only the

[23] Sir John Slessor, *The Central Blue* (London: Cassell & Co., 1956), 214 and Great Britain, 5 *Parliamentary Debates* (Commons), vol. 351 (September 14, 1939): 750 as cited in Primoratz (2010)

military and different industries *(e.g.* oil, aluminium, communications, aircraft plans, roads). This strategy was reported to create no real damage on the German economy (Brakman *et al*., 2004). The transition to an unprecise bombing is considered to start in 1940 already (Primoratz, 2010). First, due to the weather conditions that did not allow precision on targets and later, due to revenge after Germany bombarded British cities.

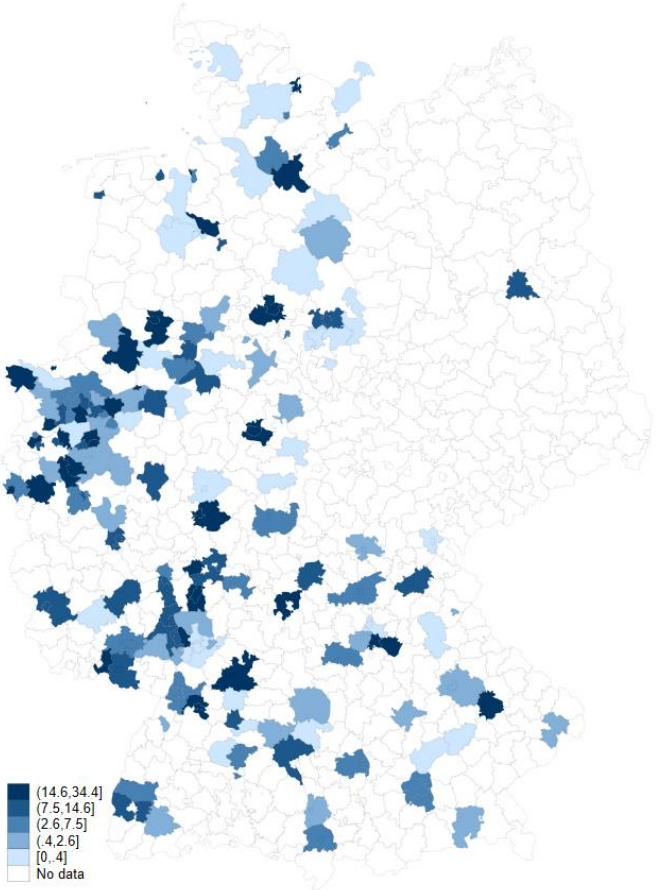
This so called 'area bombing' became official with a policy adopted on February of 1942. They aimed at the centre of cities and took place during the night. The objective of such strategy was to create a fire in the centre of the city that would then expand to the rest of the city, and to destroy German population's morale and willingness to fight (USSBS 1945).

On its part, The United States Army Air Forces (USAAF) focused on daylight precision bombing. Historians have highlighted that they performed a 'morally' accepted war practice, although there is evidence that they also harshly bombed cities such as Dresden and Berlin (Primoratz, 2010).

During the war, around 1.5 million of tons fell over Germany. More than 14 million people lost their home and "*approximately 3.5 million civilians and 3.3 million soldiers were killed*" (Meiners, 2011; Heineman, 1996, as cited in Akbulut-Yuksel, 2017, p. 18). Around 40% of German housing was destroyed to a great extent (Diefendorf, 1993). The majority of demolished buildings were homes. Nonetheless, roads and public buildings such as hospitals and schools were also shattered.

Although their level of destruction differed, almost all German cities were bombarded (Akbulut-Yuksel, 2014; Diefendorf, 1993). Figure 2.1, which plots the data that I will be using, shows how the intensity varies considerably across cities in West Germany. Different reasons contributed to the different levels of destruction across municipalities. Greater destruction was, in part, due to the characteristics of the city, such as the dimension and population, the distance to England, where the base for the RAF was, or having visible landmarks from the air such as cathedrals (Knopp, 2001; Friederich, 2002). However, part of the destruction was random. For instance, weather conditions or technological development would determine the precision and the extent to which the objectives were met (Akbulut-Yuksel, 2014).

Figure 2.1: War destruction at the end of WWII by rural district in Germany



Notes. War destruction data in blue is rubble per capita in m^3. Darker shades correspond to more destruction. Each region in the map corresponds to a *Kreis* (rural district) in Germany. Each municipality in Kaestner (1949) corresponds to one *Kreis.* In this map, we extrapolate the municipality data to the *Kreis. Source*: data from Kaestner (1949) and map MPIDR (Max Planck Institute for Demographic Research) & CGG (Chair for Geodesy and Geoinformatics, University of Rostock) (2011).

2.4 Data

For the purpose of this analysis, I employ individual data of the German Socio-Economic Panel (SOEP) and I match it to information on WWII destruction of West German cities collected in Käestner (1949), which can be found in the German Municipality Statistical Yearbook of 1949. SOEP is an ongoing representative longitudinal survey conducted every year in Germany from 1984 until the current latest wave in 2020. The survey consists of a sample of around 50,000 individuals in the latest years. There are around 1,000,000 observations in total over the years. At the individual level, it contains a variety of socio-economic variables such as gender, age, labour force status, education or income. Information about childhood, parents, partner, and children is also available. It also includes a battery of questions on health, immigration history, wealth, or opinions.

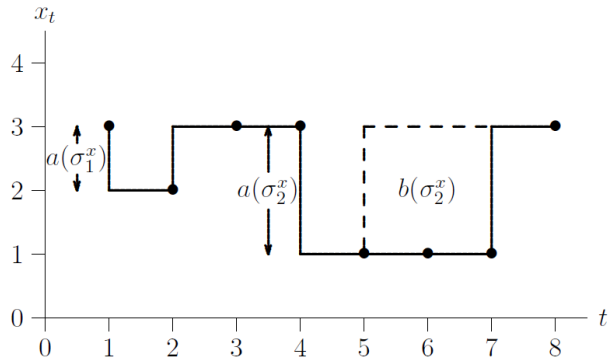
I gathered information at the municipality level from the German Municipality Statistical Yearbooks from 1939 and 1949. The Yearbooks do not provide information about all municipalities in Germany. Nonetheless, for some variables, they provide information for all cities above 20,000 inhabitants. That is how I obtained the pre-war characteristics of the municipality, such as the population density and the property tax revenue. Käestner (1949) collects information on the rubble per capita in m^3 at the end of WWII for 199 municipalities in West Germany. The SOEP questionnaire includes information on the city of birth of the respondents. This allows to match the city level destruction after the war with the individual data.

The Resilience Index

To compute resilience, I use the resilience index proposed by Asheim *et al*. (2020). This index captures resilience as the ability to recover from adversity. It follows the evolution of a variable (*e.g.* health) for each unit available (*e.g.* individuals). For simplicity, relevance for this paper and following Asheim *et al*. (2020), I will refer to the evolution of a health variable over time as a 'health stream'.

Figure 2.2 provides an example of a health stream. Additional examples of health streams and their resilience calculation are provided in Figure A2.1 of the Appendix.

Figure 2.2: Health stream example



Health stream x = (3,2,3,3,1,1,1,3)

Notes: Figure extracted from Asheim *et al*. (2020).

In Figure 2.2, the health stream displays two down spells, σ_1^x and σ_2^x. $a(\sigma_1^x)$ represents the magnitude of the initial drop from the highest value observed $x_1 = 3$ to the lowest $x_2 = 2$, which is interpreted as the reaction to a shock or an adverse event. There is an immediate

recovery back to $x_3 = 3$. At time t=5 there is a new drop from $x_4 = 3$ to $x_5 = 1$. $b(\sigma_2^x)$ is the area of the down spell following the new drop until full recovery or until the last period observed. This is interpreted as the negative consequences of the initial adverse event and the ability to recover from it. $b(\sigma_2^x) = 4$ and $b(\sigma_1^x) = 0$ since there is immediate recovery in the first down spell.

The resilience index for an individual with health stream x is then computed as follows:

$$Resilience(x) = \frac{\sum_{i=1}^{m^x} a(\sigma_i^x)}{\sum_{i=1}^{m^x} a(\sigma_i^x) + \sum_{i=1}^{m^x} b(\sigma_i^x)}$$

$\sum_{i=1}^{m^x} a(\sigma_i^x)$ here is the sum of the magnitudes of the initial drops for $i = 1,2, \dots, m^x$. Where m^x is the total number of down spells in one health stream and i stands for the ith down spell σ_i^x. On its part, $\sum_{i=1}^{m^x} b(\sigma_i^x)$ is the sum of the areas for each down spell for $i = 1,2, \dots, m^x$.

The resilience index ranges from greater than zero to one. Higher scores mean higher resilience. Resilience increases with the magnitude of the initial drop and decreases with the area during recovery. The greater the magnitude of the initial drop, the more severe the adverse event is. Therefore, recovering from a more severe shock makes someone more resilient compared to a less severe one. A faster (partial) recovery also makes an individual more resilient. In addition, less drops during the recovery phase, which can also occur, result in a smaller area of the down spell and, consequently, in higher resilience. A value of resilience equal to one means immediate recovery after a drop.

Using the health stream example of Figure 2.2, the corresponding resilience calculation is as follows:

$$Resilience(x) = \frac{1+2}{1+2+0+4} = \frac{3}{7} = 0.43$$

In the present paper I compute the resilience index based on satisfaction with health. This variable is one of the core questions asked every year in the German Socio-Economic Panel (SOEP), as it is part of the essential areas of interest of the survey. Moreover, satisfaction with health has been positively associated with general self-reported health and overall quality of life (Michalos and Zumbo, 2002) and it has been used as a proxy for health status in the past (Ronellenfitsch and Razum, 2004). I restrict the sample to individuals reporting their health

satisfaction each year consecutively for a minimum of 6 periods and I drop those who have a break in reporting the variable at any time.

Figure A2.2 of the Appendix shows the distribution of our resilience variable, which is right-skewed.

2.5 Empirical Strategy

To capture the causal relationship between war destruction and resilience, I apply the following difference-in-differences specification based on Akbulut-Yuksel (2017):

$$War_i = \begin{cases} 1 \; if \; born \; between \; 1922 \; and \; 1945 \\ 0 \; if \; born \; between \; 1946 \; and \; 1969 \end{cases}$$

$$Resilience_{imtb} = \beta_0 + \beta_1 War_i * Destruction_m + \alpha X_{imtb} + \delta_m + \gamma_t + \rho_b + \sigma_s * War_i + pop\_den_m * \rho_b + \epsilon_{imtb} \quad (2.1)$$

The key variable is $War_i * Destruction_m$, an interaction term between experiencing WWII and the municipality's level of destruction due to the war. The average treatment effect of war destruction on those who experienced the war is then estimated by the coefficient β_1.

The outcome variable, $Resilience_{imtb}$, is the standardised value of the resilience for individual i in year t born in municipality m and year b. War_i is a dummy variable indicating if the individual experienced the war (treated group) or not (control group). The variable will take value one if the individual was born between 1922 and 1945, and value zero if she was born after the war, between 1946 and 1969. $Destruction_m$, the treatment, is the standardised m^3 of rubble per capita at the end of the war in municipality m. X_{imtb} is a vector that contains individual characteristics. It consists of gender, education, growing up in a rural or urban area, and characteristics of the parents including their education, parental occupation and age of the mother at birth of individual i. δ_m, γ_t and ρ_b are the municipality, time and year of birth fixed effects, respectively. The interaction $\sigma_s * War_i$ are the linear state times treated trends. And $pop\_den_m * \rho_b$ is an interaction between population density before the war in 1939 in municipality m and year of birth. Lastly, ϵ_{imtb} is a random, idiosyncratic error term clustered at the municipality level. I do not include War_i and $Destruction_m$ individually because these are captured in the municipality and year of birth fixed effects. Nonetheless, I will provide the results including all the variables as well.

This model will be estimated using a sample of 2,537 individuals for which the municipality of birth, and data on war destruction was available, and which had non-missing values for resilience and demographic and parental characteristics. In the final dataset, each individual is represented in only one observation. Table 2.1 presents the descriptive statistics separately for the treated, those who experienced the war, and for the control group, those born after the war. This table shows that the two groups have some similar characteristics, but it also displays important differences. The average resilience measure is around 0.26. Those born after the war have a value of resilience that is 0.03 higher. This difference is significant at the 10% level. Something very relevant for our analysis is the average level of destruction in 1945 for the two groups. The data shows very close numbers for both groups, around twelve m^3 of rubble per capita and 38% of destroyed dwelling. Both measures of destruction are lower for those born after the war. Nonetheless, the differences are not statistically significant. Population density is also very similar for both groups with 3,563.67 for those who experienced the war and 3,278.71 for those who did not. The ratio of men and women in the sample is approximately 50% for both groups and about 20% grew up in rural areas. Age at the end of the spell of course differs considerably, with an average difference of about twenty years for the two groups. Years of education is approximately thirteen, although those born after the war have half of a year more of education. This represents a significant difference. End of spell year and spell length, two variables related to the resilience measure are very close for the two groups as well, with higher numbers for the younger cohort.

While there are no significant differences for spell length, end of spell year is 0.35 higher for the control group at the 10% level. Health satisfaction at the end of the spell is almost one point higher for the younger cohort, with a value greater than six. There is a significant difference at the 1% level of 0.63 between the two groups. In both groups, there is around 17% of fathers and around 7% of mothers with secondary education completed or more. The proportion for the younger cohort is slightly higher, but not significantly different. There are some statistical differences in father's occupation between the two groups. The highest proportion of fathers performed a blue collar job with 33% and 37% of the sample for the treated and control groups, respectively. It is followed by white collar, representing 24% and 32%, respectively. Both these differences are statistically significant. Self-employed and civil servant fathers display non-significant differences. Their proportion is lower, with around 14% and 13% of the sample, respectively. There is an important and statistically significant jump from 15% of fathers who died or are unemployed for the treated group, to 6% for the control

group. Similarly, the proportion of father and mothers who died during WWII decreased significantly to zero percent for those born after the war. Evidently, these differences are due to the age difference among the control and treated groups. Average mother's age at birth is almost one year higher for the older cohort with about twenty-eight years old. This increase is statistically significant.

Table 2.1: Descriptive statistics by exposure to the war

	Experienced the war				Born after the war				
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.	Diff.
Resilience	0.27	0.24	0.01	1.00	0.29	0.25	0.01	1.00	0.03*
Rubble per capita in m^3	12.32	8.28	0	34.40	11.77	8.77	0	34.40	-0.73
Destroyed dwelling (%)	38.92	19.35	0.00	99.20	37.56	21.89	0	99.2	-2.07
Population density	3563.67	3025.56	281.49	25181.19	3278.71	3577.63	281.49	25181.19	-272.2
Male	0.51		0	1	0.48		0	1	-0.03
Rural	0.18		0	1	0.18		0	1	-0.03
Age	80.09	5.13	68	95	59.82	7.26	43	74	-12.06***
Years of education	12.65	3.00	7	18	13.26	2.90	7	18	0.49**
End of spell year	2017.59	2.84	2008	2020	2018.22	2.67	2002	2020	0.35*
Spell length	18.64	9.03	6	37	19.43	9.26	6	37	0.97
Health satisfaction	5.47	2.47	0	10	6.30	2.20	0	10	0.63***
Father education	0.17		0	1	0.18		0	1	-0.02
Mother education	0.07		0	1	0.08		0	1	0.01
Father self-employed	0.15		0	1	0.13		0	1	-0.02
Father blue collar	0.33		0	1	0.37		0	1	0.07**
Father white collar	0.24		0	1	0.32		0	1	0.05*
Father civil servant	0.13		0	1	0.12		0	1	0.01
Father not emp./died	0.15		0	1	0.06		0	1	-0.11***
Father died WWII	0.14		0	1	0.00		0	0	-0.15***
Mother died WWII	0.01		0	1	0.00		0	0	-0.01*
Mother's age at birth	28.70	5.42	12	47	27.51	5.64	14	48	-0.77*
N	762				1,775				

Notes. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A2.1 reports the difference between those above and below mean level of destruction. Relevant for this paper, the table shows that areas with lower levels of destruction had less rubble per capita at the end of the war, less percentage of destroyed dwelling, less population density and less tax revenues and tax revenues per capita. This could represent a threat to the analysis since this could reflect the resources that affect individual resilience in adulthood. To address this issue, I control for municipality fixed effects and, following Akbulut-Yuksel (2017), I perform a falsification test and I control for pre-war and post-war characteristics of the municipality per cohort.

2.6 Results

Table 2.2 displays the main results, obtained after estimating Equation (2.1). Column (1) considers the difference-in-differences estimation including only place of birth and year of birth dummies[24]. I then add different controls, including those variables that were statistically different between the treated and control groups in Table 2.1. Column (2) adds years of education. Column (3) introduces year at the end of the spell fixed effects and individual characteristics such as gender, age and rural dummies. It also controls for the spell length of the health satisfaction variable and the value of health satisfaction at the end of the spell. The fourth column additionally controls for parents' characteristics.

Column (1) shows a difference-in-differences estimate of 0.10. This result suggests that one standard deviation in war destruction increases resilience by 10% of a standard deviation. This outcome therefore indicates that experiencing the war more intensively (*i.e.* in more destroyed cities) in early-adulthood, childhood or birth increases resilience in the long-term. Column (2) adds years of schooling, and the coefficient remains the same. The estimate in columns (3) is also unchanged, after controlling for gender, spell length, health satisfaction at the end of the spell, and years of education. The last column introduces variables on parental characteristics, to capture the resources of the individual. It also adds linear state-war cohort dummies to control for policy differences put in place after the war between states, which might affect resilience outcomes in the long-term. In addition, I control for potential pre-war differences between cities and cohorts with an interaction of pre-war municipality population density and year of birth. None of these control variables changes the magnitude or significance of our difference-in-differences estimate, which continues to be 0.10. The magnitude of the coefficient of interest is the same as the one for satisfaction with health at the end of the spell and it also represents one sixth of the effect associated to a mother passing away during the war.

[24] The variables War and Destruction alone are not included in the regression because they are already captured by year of birth and municipality fixed effects. Nonetheless, Appendix Table A2.2 displays the results including the two variables separately. The coefficient of interest, β_1, remains the same across all specifications.

Table 2.2: Consequences of the war on resilience in adulthood

	(1)	(2)	(3)	(4)
War × Destruction	0.10**	0.10**	0.08**	0.10***
	(0.04)	(0.04)	(0.03)	(0.04)
Years of education		0.01	-0.01	-0.01
		(0.01)	(0.01)	(0.01)
Male			0.03	0.03
			(0.04)	(0.04)
Spell length			-0.05***	-0.05***
			(0.002)	(0.002)
Health satisfaction			0.10***	0.10***
			(0.01)	(0.01)
Father's occupation (ref: Self-employed)				
Blue collar				0.04
				(0.06)
White collar				0.02
				(0.07)
Civil servant				0.11
				(0.08)
Not employed/has died				0.13
				(0.10)
Father secondary education or more				0.03
				(0.06)
Mother secondary education or more				-0.07
				(0.09)
Mother's age at birth				-0.01**
				(0.00)
Father died WWII				-0.02
				(0.10)
Mother died WWII				0.60**
				(0.30)
Observations	2,537	2,537	2,537	2,537
Adjusted R^2	0.015	0.016	0.258	0.257
State × Experienced war	No	No	No	Yes
Population density 39 × Year of birth	No	No	No	Yes

Notes. Columns 1-4 include municipality fixed effects and year of birth dummies. Columns 2-4 include rural dummies and last spell year fixed effects. Spell length is the number of consecutive periods where satisfaction with health is reported. Health satisfaction is the level of the variable at the end of the spell. Years of education is the level of the variable at the end of the spell. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Cohort Analysis

The estimation from Eq.(2.1) included individuals born between 1922 and 1969. The treated and control groups were formed by individuals born with a maximum difference of twenty-four years. In the treated group, there were individuals that were twenty-three by the end for the war and others that were born in that year. This is a large difference in age. To better understand if there are generational differences in the average effect, I perform similar cohort analysis to Akbulut-Yuksel (2014) and Duflo (2001). I keep as the control group the same as in the main specification.

The results for this analysis appear in Table 2.3. They suggest that older cohorts, those who were between the age of seventeen and twelve at the start of the war, were especially sensitive to the shock. This cohort was more likely to be involved and exposed to the war. They were also more conscious of what happened, which would potentially allow them to remember the experience in the long term. It also provides evidence that the results in Table 2.2 were not driven by pre-war and post-war specific region-cohort trends, because some of the cohorts born before and during the war are not statistically different from the control group, those born in 1946-1969.

Table 2.3: Consequences of the war on resilience in adulthood. Cohort analysis.

	(1)	(2)	(3)	(4)
Ref: Born 1946-1969 × Destruction				
Born 1940-1945 × Destruction	0.12*	0.11*	0.08	0.09
	(0.07)	(0.07)	(0.05)	(0.06)
Born 1934-1939× Destruction	0.11	0.11	0.10	0.11
	(0.08)	(0.07)	(0.06)	(0.08)
Born 1928-1933× Destruction	-0.03	-0.04	0.02	0.07
	(0.08)	(0.09)	(0.09)	(0.09)
Born 1922-1927× Destruction	0.40	0.43*	0.20	0.55***
	(0.26)	(0.25)	(0.23)	(0.19)
Observations	2,537	2,537	2,537	2,537
Adjusted R^2	0.015	0.016	0.257	0.257
State × Cohort	No	No	No	Yes
Population density 39 × Year of birth	No	No	No	Yes

Notes. Columns 1-4 include municipality fixed effects and year of birth dummies. Columns 2-4 include rural dummies and last spell year fixed effects. Spell length is the number of consecutive periods where satisfaction with health is reported. Health satisfaction is the level of the variable at the end of the spell. Years of education is the level of the variable at the end of the spell. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Heterogeneity

The results in Table 2.2 include the complete sample. Nevertheless, there are remarkable demographic differences within the sample that could contribute to different results. It is in this spirit that I perform heterogeneity analysis by gender and type of municipality of birth. The differences between men and women could be especially important in our analysis given that mostly men went to war, while the vast majority of women remained part of the civil population. I am also interested in exploring potential differences between rural and urban areas. Rural areas have less dwelling that could potentially be destroyed, and Table A2.1 of the Appendix showed that there is a higher percentage of rural areas in municipalities below mean level of destruction.

The results in the first three columns of Table 2.4 show that there are no significant differences between men and women. Consequently, this also suggests that the impact of war destruction on resilience does not differ between the civil population and those who went to war. On its part, the three last columns show that there are significant difference between types of municipalities. The increase of resilience as a result of destruction is significantly smaller and not significant for those born in rural areas. This may be caused by a reduced impact of the war, as the average destruction of rural areas is lower compared to that in urban areas.

Table 2.4: Consequences of the war on resilience in adulthood. Heterogeneity analysis.

	All	Male	Female	All	Rural	Urban
War × Destruction × Male	-0.09					
	(0.073)					
War × Destruction × Rural				-0.34***		
				(0.075)		
War × Destruction	0.15***	0.06	0.21***	0.18***	-0.09	0.17***
	(0.05)	(0.06)	(0.07)	(0.04)	(0.12)	(0.04)
N	2537	1237	1300	2537	465	2072
adj. R-sq	0.258	0.306	0.217	0.260	0.342	0.255

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, father's occupation, father's level of education, mother's level of education and mother's age at birth. Restricting the sample to only non-movers, the result is the same. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Mediation Analysis

The coefficient of interest in Table 2.2, captures the total average treatment effect of destruction on resilience. Nonetheless, mechanisms through which this may happen remain unexplored. I propose two types of mechanisms that could be operating behind the main effect,

instrumental (*e.g.* income, education) and psychological (*e.g.* coping resources). Instrumental mechanisms can be easily tested performing mediation analysis. Conversely, psychological mechanisms become impossible to test, as these types of variables involve a threat to exogeneity.

Tables 2.5, 2.6 and 2.7 display the result of the mediation analysis, which tests the different instrumental mechanisms I propose. I test for income, years of education and employment history. The value for each of these variables is taken for the same year in which resilience is calculated. In the first column of each table, I test if there is any effect of the variable of interest on the mediator. The second column tests the correlation between the mediator and resilience. The last two columns analyse the potential mediation. The results show that none of the instrumental mechanisms proposed is significant. I therefore conclude that psychological mechanisms might be behind the increased resilience observed.

Table 2.5: Instrumental mechanisms: Income.

	Log income	Resilience	Resilience	Resilience
War × Destruction	0.012		0.142***	0.142***
	(0.025)		(0.039)	(0.039)
Log income		0.048		0.0282
		(0.036)		(0.043)
N	2537	2537	2537	2537
adj. R-sq	0.185	0.000	0.012	0.012

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, father's occupation, father's level of education, mother's level of education and mother's age at birth. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 2.6: Instrumental mechanisms: Education.

	Years of education	Resilience	Resilience	Resilience
War × Destruction	0.120		0.142***	0.142***
	(0.115)		(0.039)	(0.040)
Years of education		0.014**		0.004
		(0.007)		(0.009)
N	2537	2537	2537	2537
adj. R-sq	0.266	0.001	0.012	0.012

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, father's occupation, father's level of education, mother's level of education and mother's age at birth. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table 2.7: Instrumental mechanisms: Employment.

	Ever employed	Resilience	Resilience	Resilience
War × Destruction	0.0101		0.142***	0.145***
	(0.021)		(0.039)	(0.040)
Ever employed		-0.163***		-0.305***
		(0.051)		(0.065)
N	2537	2537	2537	2537
adj. R-sq	0.391	0.004	0.012	0.020

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, father's occupation, father's level of education, mother's level of education and mother's age at birth. Standard errors clustered at the municipality level appear in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Models about Post-Traumatic Growth and Thriving could explain how these types of mechanisms operate. Aldwin (1994) and Aldwin *et al.* (1996) explain that a traumatic shock could provide the individual with new tools to face adversity in the future, and that would explain the increased resilience observed. Another explanation of post-traumatic growth is that the individual becomes 'desensitised' against future shocks (Carver, 1998), relativising every future shock to the experience of the war.

2.7 Robustness checks

The extent of the validity of the estimation analysis obtained in Table 2.2 will be discussed in this section. I will first check if they are sensitive to sample selection and to different calculations of the resilience measure. I will also perform a donut difference-in-differences to address the potential role of destroyed institutions on the control group. I will then provide evidence on the parallel trend assumption that needs to hold in order to validate the findings. Lastly, I will investigate if the results are robust to different confounding factors such as selection into fertility, adult mortality rates or internal migration.

Sample selection

Table 2.8 shows the results for Eq.(2.1) restricting the sample to different maximum and minimum birth years. In all cases the difference-in-differences estimator remains positive, statistically significant and close to the main coefficient in Table 2.2.

Table 2.8: Consequences of the war on resilience in adulthood. Different samples selected

	Born 1933-1958	Born 1914-1977
War × Destruction	0.13**	0.10***
	(0.05)	(0.04)
Observations	1,401	2,828
Adjusted R^2	0.266	0.262
State × Experienced war	Yes	Yes
Population density 39 × Year of birth	Yes	Yes

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, father's occupation, father's level of education, mother's level of education and mother's age at birth. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Resilience fixed at 2002

A concern that arises from the analysis is related to the resilience measure. First, in our main analysis, we allow resilience to be computed in different years for different individuals. Second, the resilience of some individuals is computed very far away from the war years. Fixing the calculation of the resilience measure to 2002, addresses these concerns. The difference-in-differences estimator obtained in Table 2.9 is still positive and significant in column (1) and remains statistically unchanged in column (2). The significance is notably lower, which could be due to the loss in predictive power.

Table 2.9: Consequences of the war on resilience in adulthood. Resilience fixed at 2002

	(1)	(2)
War × Destruction	0.17*	0.12
	(0.10)	(0.13)
Observations	679	679
Adjusted R^2	0.123	0.121
State × Experienced war	Yes	Yes
Population density 39 × Year of birth	Yes	Yes

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth fixed effects, spell length, health satisfaction in 2002, average health over the spell. Only column 2 includes years of education in 2002, father's occupation, father's level of education, mother's level of education and mother's age at birth. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Excluding the reconstruction period

This analysis could be challenged by arguing that the treated and control groups are different, in the sense that war destruction affected them differently. This could be due to the age at the time they were exposed to destroyed institutions (*e.g.* hospitals, schools). In fact, my

concern is that the main coefficient in Table 2.2 is positive because destruction decreases resilience for the control group. This could potentially be the case for individuals that were born or were in school age years when institutions were still destroyed. The reconstruction period ended in 1960[25]. By that time, most buildings had already been reconstructed (Diefendorf, 1993).

The coefficient of the sample closer to the threshold in Table 2.8, those born between 1933 and 1958, already hints at no differences in that regard given that the generations are similar in age. Nonetheless, to further address this issue, I propose to exclude those individuals in the control group who were in school age years during the reconstruction period (born 1946-1954) as in Akbulut-Yuksel (2014). In addition, I will also regress the specification excluding those born during the reconstruction period (born 1946-1959). Table 2.10 displays the coefficients obtained for each of the two samples. The coefficient including those of the control group who were not affected by destroyed schools is exactly the same as in Table 2.2. Although the estimate obtained excluding all those who were born during the reconstruction is not significant, it is not significantly different from the previous column, or that of Table 2.2.

Table 2.10: Consequences of the war on resilience in adulthood. Excluding reconstruction

	Control group: Born 1955-1969	Control group: Born 1960-1969
War × Destruction	0.10**	0.08
	(0.04)	(0.05)
Observations	2,003	1,588
Adjusted R^2	0.249	0.243
State × Experienced war	Yes	Yes
Population density 39 × Year of birth	Yes	Yes

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, father's occupation, father's level of education, mother's level of education and mother's age at birth. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Falsification tests

A condition that must hold for the difference-in-differences estimator to be valid is the parallel trends assumption that had the war not happened, the treated (experienced the war) and control

[25] Akbulut-Yuksel (2014) provides evidence on the evolution of schools and teachers over the period 1939-1960 and shows that in 1960 pre-war levels were reached.

(born after the war) group's long-term resilience would be affected the same way by different levels of destruction.

To provide evidence of that in our data, I perform a falsification test similar to Akbulut-Yuksel (2017). This test will perform a difference-in-differences estimation, but, in this case, I will take a younger and an older cohort, both born after the war, as a 'placebo' treated and control groups, respectively. The results in Table 2.11 show what would be the outcome had no one experienced the war. The results will reveal if our main finding was simply reflecting differences between younger and older cohorts, or if, instead, the differences were due to the war. In columns (1) to (4) the difference-in-differences coefficient is not significant and with opposite sign compared to that of the estimator of interest in Table 2.2. This provides evidence that our main result is valid as it satisfies the parallel trends assumption: if no one would have experienced the war, there would have been no effect of war destruction on resilience.

Table 2.11: Consequences of the war on resilience in adulthood. Sample born 1946-1969

	(1)	(2)	(3)	(4)
Born 1946-1958 × Destruction	-0.06	-0.0	-0.06	-0.07
	(0.06)	(0.07)	(0.06)	(0.07)
Years of education		0.01	-0.01	-0.00
		(0.01)	(0.01)	(0.01)
Male			0.04	0.03
			(0.05)	(0.05)
Spell length			-0.05***	-0.05***
			(0.00)	(0.00)
Health satisfaction			0.10***	0.10***
			(0.012)	(0.01)
Father's occupation (ref: Self-employed)				
Blue collar				0.11
				(0.07)
White collar				0.10
				(0.07)
Civil servant				0.05
				(0.09)
Not employed/has died				0.20*
				(0.12)
Father secondary education or more				0.04
				(0.08)
Mother secondary education or more				-0.07
				(0.11)
Mother's age at birth				-0.01
				(0.00)

Observations	1,775	1,775	1,775	1,775
Adjusted R^2	0.013	0.014	0.269	0.269
State × Experienced war	No	No	No	Yes
Population density 39 × Year of birth	No	No	No	Yes

Notes. Columns 1-4 include municipality and year of birth fixed effects. Columns 3-4 include rural dummies, and last spell year fixed effects. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01. No father or mother died during WWII in the sample used for the falsification test.

Validity checks

I will now focus on the potential composition bias that could exist in our sample. There are several issues that could be confounding the relationship between the interaction term of experiencing the war and the level of WWII destruction and adulthood resilience.

As Akbulut-Yuksel (2017) note, families from higher socio-economic backgrounds might have delayed fertility due to the war. Column (1) to (6) of Table 2.12 show that there is no association between the level of destruction and any of the variables related to socio-economic statuses. Moreover, this provides evidence of the randomness assignment to the treated and control groups, and to the level of treatment (destruction) in our sample.

Table 2.12: Validity checks: Randomness.

	Mother age at birth (1)	Parents education (2)	Father blue collar (3)	Father white collar (4)	Mother died WWII (5)	Father died WWII (6)
War × Destruction	-0.01	0.00	0.00	0.00	0.00	0.00
	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Male	0.11	0.01	-0.02*	0.00	0.00	-0.01
	(0.17)	(0.01)	(0.01)	(0.01)	(0.00)	(0.005)
Years of education	0.21***	0.02***	-0.05***	0.02***	-0.00	0.00
	(0.03)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Rural dummy	0.10	-0.03***	0.04**	-0.06***	0.00	0.00
	(0.21)	(0.01)	(0.02)	(0.02)	(0.00)	(0.00)
Observations	5268	4965	5099	5099	5465	5422
Adjusted R^2	0.033	0.055	0.146	0.047	0.016	0.134
State × Experienced war	Yes	Yes	Yes	Yes	Yes	Yes
Population density 39 × Year of birth	Yes	Yes	Yes	Yes	Yes	Yes

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, average health over the spell, years of education and age at the end of the spell and father's occupation. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Experiencing different intensities of war destruction could affect mortality in adulthood. If that was the case, our results, for example, could be due to only the resilient individuals arriving

to later adulthood alive. We test this in column (1) of Table 2.13 as in Akbulut-Yuksel (2017). The outcome variable in this analysis is binary, taking value one if the individual had died between 1985 and 2020 and value zero if she is still alive. The difference-in-differences coefficient obtained is not significant. This is further proof that our main results are not a consequence of selection bias due to mortality.

Another important point that needs to be addressed is migration due to war destruction. I do so in column (2) following Akbulut-Yuksel (2017). The outcome variable here is the probability to move. This is coded as one if the individual reports moving from her childhood town, and zero otherwise. Again, the difference-in-differences result is not statistically significant. Suggesting that there was no internal migration due to the war destruction.

Table 2.13: Validity checks: Influence of the war.

	Probability of death (1)	Probability to move (2)
War × Destruction	-0.00	0.00
	(0.00)	(0.00)
Male	-0.03***	0.03**
	(0.01)	(0.012)
Years of education	-0.00***	0.03***
	(0.00)	(0.00)
Rural dummy	-0.01	0.04
	(0.01)	(0.03)
Observations	5512	5090
Adjusted R^2	0.109	0.049
State × Experienced war	Yes	Yes
Population density 39 × Year of birth	Yes	Yes

Notes. All columns include municipality fixed effects, rural and gender dummies, year of birth and end of spell year fixed effects, spell length, health satisfaction at the end of the spell, average health over the spell, years of education and age at the end of the spell and father's occupation. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

2.8 Conclusion

Resilience in the context of warfare has been typically studied among veterans and focusing on development of PTSD symptoms. Other research using samples of the general population have looked at PTSD, other mental disorders and health outcomes. This paper fills a gap in the existing literature and provides evidence on the causal effect of warfare on resilience in satisfaction with health in the long-term and in the broad society, both civilians and army.

The findings indicate that exposure to WWII destruction during the war years made individuals more resilient in late adulthood. Therefore, this suggests that war intensity increases individual resilience in the long-term.

The cohort analysis reveals that older generations were especially sensitive to the shock, while the heterogeneity analysis shows that those from urban areas, compared to rural, were too.

I propose different instrumental and psychological mechanisms as potential explanations for increased resilience due to war destruction. I test for several instrumental mechanisms as possible mediators that turned out not to be significant. Based on that, I put forward psychological mechanisms that might explain the increase in resilience. These would be aligned with models of Post-Traumatic Growth and Thriving. They suggest that the shock of the war could provide new tools to face adversity in the future, which will in turn increase resilience (Aldwin, 1994; Aldwin *et al.* 1996). It could also be the case the individual becomes 'desensitised' against future shocks (Carver, 1998).

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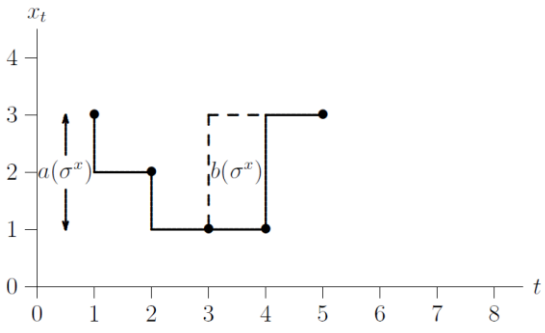
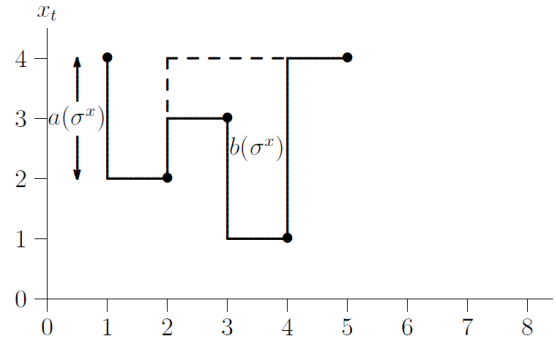
Appendix

Figure A2.1: Additional health streams examples and resilience calculations



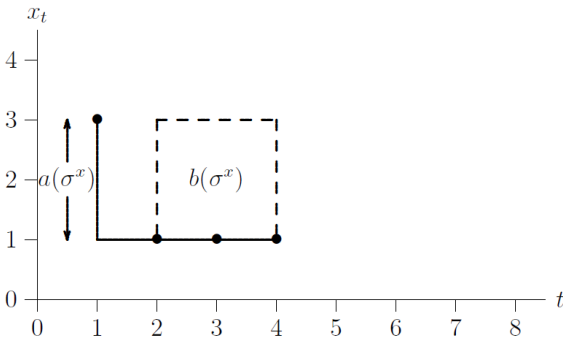
Health stream x = (3,2,1,1,3)

$$Resilience(x) = \frac{2}{2+2} = 0.5$$



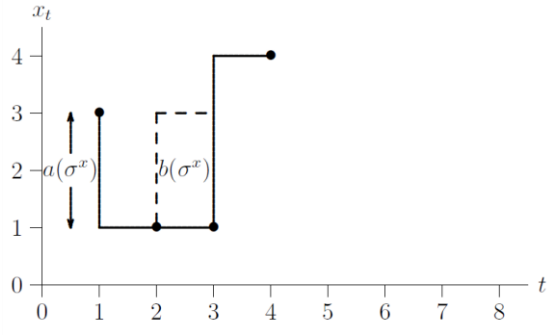
Health stream x = (4,2,3,1,4)

$$Resilience(x) = \frac{2}{2+4} = 0.33$$



Health stream x = (3,1,1,1)

$$Resilience(x) = \frac{2}{2+4} = \frac{1}{3} = 0.33$$



Health stream x = (3,1,1,4)

$$Resilience(x) = \frac{2}{2+2} = 0.5$$

Notes: Figures extracted from Asheim et al. (2020).

Figure A2.2: Resilience distribution in our estimaion sample

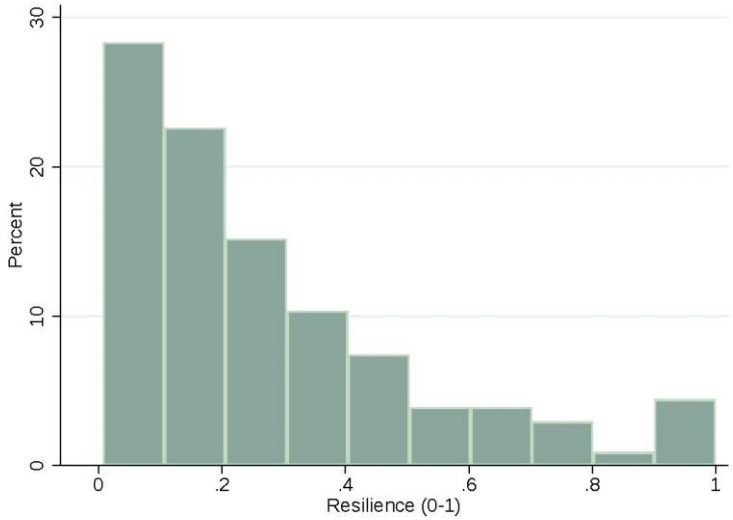


Table A2.1: Descriptive statistics by war destruction

	Above mean destruction				Below mean destruction				
	Mean	SD	Min.	Max.	Mean	SD	Min.	Max.	Diff.
Male	0.48		0	1	0.51		0	1	0.03
Resilience	0.29	0.25	0.01	1	0.28	0.25	0.01	1	-0.01
Rubble per capita in m^3	16.57	6.59	7.30	34.40	2.54	2.38	0.00	7.20	-14.03***
Destroyed dwelling (%)	48.68	14.76	15.90	99.20	16.22	14.45	0.00	75.70	-32.46***
Population density	4143.39	3875.63	390.37	25181.19	1787.55	1150.58	281.49	8013.81	-2355.8***
Rural	0.16	0.37	0	1	0.23		0	1	0.08***
Age	66.18	11.67	43.00	95.00	65.36	11.00	43.00	95.00	-0.83
Years of education	13.15	2.95	7.00	18.00	12.92	2.92	7.00	18.00	-0.23
End of spell year	2018.02	2.73	2002.00	2020.00	2018.05	2.76	2007.00	2020.00	0.03
Spell length	19.09	9.01	6.00	37.00	19.44	9.56	6.00	37.00	0.35
Health satisfaction	5.99	2.32	0.00	10.00	6.16	2.31	0.00	10.00	0.17
Father education	0.13		0	1	0.14		0	1	0.01
Mother education	0.34		0	1	0.40		0	1	0.05**
Father self-employed	0.32		0	1	0.25		0	1	-0.07***
Father blue collar	0.12		0	1	0.13		0	1	0.01
Father white collar	0.09		0	1	0.09		0	1	0.00
Father civil servant	0.19		0	1	0.15		0	1	-0.04*
Father not emp./died	0.09		0	1	0.06		0	1	-0.03*
Father died WWII	0.05	0.21	0	1	0.03	0.18	0	1	-0.01
Mother died WWII	0.00	0.05	0	1	0.00	0.05	0	1	0.00
Mother's age at birth	27.89	5.69	12	47	27.83	5.43	15	48	-0.06
N	1668				839				

Notes. The differences in average total tax revenues and average tax revenues per capita for the two groups were -38979.1*** and -0.01***, respectively. These results are for a reduced sample of 1622 and 800 observations for the above and below destruction, respectively. These differences indicate lower economic resources in areas with lower destruction, as it was also reported in Akbulut-Yuksel (2017) using income per capita. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A2.2: Consequences of the war on resilience in adulthood. Different specifications.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Experienced war	-0.07	-0.06	-0.03	-0.20	-0.07	-0.43	-0.40	-0.16
	(0.05)	(0.05)	(0.04)	(0.15)	(0.05)	(0.44)	(0.39)	(0.50)
Rubble per capita (m^3)	-0.02	-0.02	-0.01	-0.02	-0.54***	-0.54***	-0.12*	-0.48***
	(0.03)	(0.03)	(0.02)	(0.02)	(0.02)	(0.07)	(0.07)	(0.18)
Experienced war × Rubble per capita (m^3)	0.09**	0.09**	0.06**	0.07**	0.10**	0.10**	0.08**	0.10***
	(0.04)	(0.04)	(0.03)	(0.03)	(0.04)	(0.04)	(0.03)	(0.04)
Years of education		0.01*	-0.01	-0.01			-0.01	-0.01
		(0.01)	(0.01)	(0.01)			(0.01)	(0.01)
Male			0.01	0.02			0.03	0.03
			(0.04)	(0.04)			(0.04)	(0.04)
Spell length			-0.05***	-0.05***			-0.05***	-0.05***
			(0.00)	(0.00)			(0.00)	(0.00)
Health satisfaction			0.09***	0.09***			0.10***	0.10***
			(0.01)	(0.01)			(0.01)	(0.01)
Father's occupation (ref: Self-employed)								
Blue collar				0.06				0.04
				(0.06)				(0.06)
White collar				0.02				0.02
				(0.06)				(0.07)
Civil servant				0.13*				0.11
				(0.07)				(0.08)
Not employed/has died				0.18**				0.13
				(0.09)				(0.10)
Father secondary education or more				0.04				0.03
				(0.05)				(0.06)
Mother secondary education or more				-0.08				-0.07
				(0.08)				(0.09)
Mother's age at birth				-0.01**				-0.01**
				(0.0)				(0.00)
Father died WWII				-0.04				-0.02
				(0.10)				(0.10)
Mother died WWII				0.47*				0.60**
				(0.25)				(0.30)
Observations	2537	2537	2537	2537	2537	2537	2537	2537
Adjusted R2	0.001	0.003	0.248	0.248	0.015	0.015	0.258	0.257
Municipality FE	No	No	No	No	Yes	Yes	Yes	Yes
Year of birth FE	No	No	No	No	Yes	Yes	Yes	Yes
State × Experienced war	No	No	No	Yes	No	No	No	Yes
Population density 39 × Year of birth	No	No	No	Yes	No	No	No	Yes

Notes. Columns 3, 4, 7 and 8 include rural dummies and last spell year fixed effects. * p < 0.1, ** p < 0.05, *** p < 0.01.

Table A2.3: Consequences of the war on resilience in adulthood. Non-movers only.

	(1)	(2)	(3)	(4)
Experienced war × Rubble per capita in m^3 (std)	0.18***	0.18***	0.12**	0.15**
	(0.06)	(0.06)	(0.05)	(0.07)
Years of education		-0.01	-0.02	-0.02
		(0.01)	(0.01)	(0.01)
Male			-0.00	0.00
			(0.05)	(0.05)
Spell length			-0.05***	-0.05***
			(0.00)	(0.00)
Health satisfaction			0.09***	0.10***
			(0.01)	(0.01)
Father's occupation (ref: Self-employed)				
Blue collar				0.10
				(0.09)
White collar				0.05
				(0.11)
Civil servant				0.12
				(0.13)
Not employed/has died				0.17
				(0.13)
Father secondary education or more				0.11
				(0.09)
Mother secondary education or more				-0.20
				(0.15)
Mother's age at birth				-0.00
				(0.00)
Father died WWII				-0.03
				(0.14)
Mother died WWII				0.85***
				(0.29)
Observations	1424	1424	1424	1424
Adjusted R^2	0.018	0.017	0.255	0.254
State × Experienced war	No	No	No	Yes
Population density 39 × Year of birth	No	No	No	Yes

Notes. Columns 1-4 include municipality fixed effects and year of birth dummies. Columns 2-4 include rural dummies and last spell year fixed effects. Standard errors clustered at the municipality level appear in parentheses. * p < 0.1, ** p < 0.05, *** p < 0.01.

Chapter

3 Has Covid made us less resilient?

Has Covid made us less resilient?[26]

With

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3.1 Introduction

The COVID-19 pandemic has had drastic effects on individual lives, and exposed many to an unprecedented variety of negative shocks. Hundreds of millions of people were affected, quarantined or hospitalised due to the virus, and excess mortality in 2020 and 2021 is estimated to have been around 15 million.[27] Beyond the direct health impacts of COVID-19, a large literature has documented the massive associated job and income losses (among many others, see Clark *et al.*, 2021 and 2022, who use data from the same survey as we do here). According to the ILO (2021, p.5), "In 2020, 8.8% of global working hours were lost relative to the fourth quarter of 2019, which is equivalent to 255 million full-time jobs". Whether as a direct consequence of COVID-19 or the events that the pandemic triggered, empirical evidence has underlined a significant deterioration in individual well-being and mental health (among others, Aknin, 2021, Sibley *et al.*, 2020, Brodeur *et al.*, 2021, Clark and Lepinteur, 2022, Fancourt *et al*., 2021, and Schmidtke *et al.*, 2021).

We here ask whether the economic and health shocks engendered by the COVID-19 pandemic may also have produced substantial longer-run effects by affecting individuals' ability to recover from shocks (*i.e.* their resilience). If the pandemic has indeed reduced psychological resilience, then greater difficulty in coping with adversity and longer recovery periods from any future shocks will have profound implications for population well-being in the long-run. We focus here on the economic shocks of income and job losses, and the health-related shocks of isolation and being diagnosed with a mental disorder. We consider both the

[26] Financial support from the French Agence Nationale de la Recherche (ANR-21-CO16-0002), André Losch Fondation, Art2Cure, Cargolux, CINVEN Fondation and COVID-19 Foundation, under the aegis of the Fondation de Luxembourg, and the Fonds National de la Recherche Luxembourg (Grant 14840950 – COME-HERE) is gratefully acknowledged. Andrew Clark acknowledges financial support from the EUR grant ANR-17-EURE-0001.

[27] https://www.who.int/data/stories/global-excess-deaths-associated-with-covid-19-january-2020-december-2021.

incidence (having experienced the shock) and intensity (how many times experienced) of these shocks.

We analyse seven waves of panel data from five European countries covering the period from the start of the pandemic in April 2020 up to the beginning of 2022, and show that these shocks are, on average, associated with lower resilience, so that the effects of the pandemic will persist even while its health and economic consequences start to dissipate during the recovery period. Psychological resilience is a key protective factor that helps individuals to overcome difficult circumstances. It has acknowledged benefits in terms of better physical and mental health (Connor and Davidson, 2003, and Maddi and Khoshaba, 1994), lower levels of substance use in adolescents (Fergus and Zimmermann, 2005), better physical health and lower depression in victims of sexual abuse (Sanders *et al.*, 2008, Armata and Baldwin, 2008, and Goldstein *et al.*, 2013, as cited in Matuska, 2014, p.2), as well as reduced onset of Post-Traumatic Stress Disorder (King *et al.*, 1998). The consequences of resilience have also been found to go beyond the individual's well-being. For example, in Gatta *et al.* (2021) perceived resilience to job loss is positively correlated with fertility intentions.

We contribute to the literature in a number of ways. We first analyse data that was collected during the pandemic period to show that the sociodemographic characteristics that were shown to be associated with resilience before COVID-19 (age, gender, education and income) continued to be so during the pandemic. The COVID-19 pandemic has therefore not changed the sociodemographic profile of resilience. Second, we underline the role of economic and health shocks, evidence on which is only scarce: we consider shocks that are arguably more specific to the COVID-19 pandemic, such as isolation due to lockdown or illness, as well as those that became more widespread, such as job loss or an income loss. Third, we examine both the incidence and the intensity of these shocks.

The remainder of the paper is organised as follows. Section 3.2 discusses the existing literature on negative shocks and resilience prior to COVID-19. Section 3.3 then presents the data and the empirical specification, and Section 3.4 discusses the empirical results. Last, some conclusions are drawn in Section 3.5.

3.2 How do negative shocks affect resilience?

Graham and Oswald (2010) propose a theoretical framework of resilience to explain the behaviour of an individual who suffers from a negative shock. They consider that each

individual starts with a given amount of 'hedonic capital': the psychological resources that the individual can use in case they are faced with a shock. They note that "While this 'hedonic capital' has a social aspect (network or friends), some components come from the individual itself (self-esteem, religious faith, wealth or health)" (Graham and Oswald, 2010, p. 375). Each negative shock will deplete part of the individual's initial hedonic capital. Individuals can, however, invest in this capital to replenish it in between shocks via activities such as spending time with friends, receiving therapy or working. The level of 'hedonic capital' at any given point in time determines how well the individual can deal with adversity.

In contrast, other models of thriving and post-traumatic growth, such as Carver (1998) and Tedeschi and Calhoun (2004), suggest that certain difficulties in life circumstances provide opportunities for individual growth. Even though post-traumatic growth will not occur in every case, these models predict that individuals will on average become more resilient after adversity. There are a variety of explanations of the processes underlying this growth. In Aldwin (1994) and Aldwin *et al.* (1996), adversity can be an opportunity to increase personal competences, including coping skills. Carver (1998, pp. 245) suggests that this growth may come about through "decreased reactivity to subsequent stressors, faster recovery from subsequent stressors, or a consistently higher level of functioning". Tedeschi and Calhoun (2004) describe traumatic events as 'seismic challenges', and consider that successful coping will result in better functioning and less emotional distress. The Organismic Valuing model of growth (Joseph and Linley, 2005) suggests that individuals are intrinsically motivated towards growth. Nonetheless, the growth process depends on there being a supportive social environment (*i.e.* being surrounded by individuals who are able to deal with the adversity experienced). Joseph and Linley (2006) provide an extensive review of this literature on growth following adversity. The neuroscience approach in Tabibnia (2020) lists three pathways that lie behind greater resilience: "down-regulating the negative, up-regulating the positive and transcending the self" (Tabibnia, 2020, p. 324). Last, Buzzanell (2010, p.3) discusses different communication processes that build resilience: "the maintenance of normalcy, identity anchors, communication networks, alternative logics and negative feelings and productive action".

The existing evidence on the effect of negative events on resilience is only scarce. We are not aware of work that looks at the effect of job loss on subsequent resilience. Regarding income changes, the effect appears to be symmetric: falls in income reduce resilience (Bonanno *et al.*, 2007), while income rises might help the individual in coping (Hobfoll, 1989). Our

second group of major shocks relates to health. Healthier individuals have been shown to be more resilient. In a sample of older U.S Veterans, Pietrzak Cook (2013) finds that the psychologically resilient had better physical health and fewer mental-health problems. These findings are, however, based on cross-sectional comparisons between individuals, rather than within-variations that come from following the same individuals over time.

We here provide an empirical contribution to this literature by using panel data to establish how an individual's resilience is affected by the negative economic and health events that she experienced during a period of great turbulence, when these events were arguably more likely to be exogenous to the individual. A negative correlation is consistent with the model proposed by Graham and Oswald (2010), whereas a positive estimated coefficient is more in line with the post-traumatic growth models.

We consider both economic and health shocks. Infurna (2020) notes that job loss can be a result of other types of adversities (disability or caregiving duties), and that it is the sum of all these adversities that prevents the individual from adjusting. Along these lines, we shall consider four types of economic and health shocks at the same time in order to address this potential constellation of negative events.

3.3 Data and empirical specification

3.3.1 Data

We analyse data from the COME-HERE (COVID-19, MEntal HEalth, REsilience and Self-regulation) panel survey collected by the University of Luxembourg. The survey was conducted by Qualtrics in France, Germany, Italy, Spain and Sweden. Respondents complete an on-line questionnaire that takes approximately 20 minutes. Ethics approval for our study was granted by the Ethics Review Panel of the University of Luxembourg (ERP 20-026-C COME-HERE). Eight waves of data are currently available, collected around May 1st, June 9th, September 5th and November 20th 2020, March 1st, June 1st and October 1st 2021, and February 9th 2022. Qualtrics uses stratified sampling, and the Wave 1 COME-HERE samples are nationally-representative in terms of age, gender and region of residence. The survey includes information on a variety of demographic and socioeconomic individual characteristics including age, gender, relationship status, education, labour-force status, income, number of

children, number of rooms per person, and country of residence.[28] There is in addition a battery of questionnaires covering mental and physical health, health behaviours, loneliness and stress.

We focus on the shocks that individuals experienced during the pandemic. At each wave, COME-HERE respondents were asked to report the different events that they had experienced since the last survey wave (*e.g.*, a major drop in household income, job loss, eviction, having had COVID-19, and being hospitalised). The economic-shock measures we analyse are a major fall in household income and job loss, and the health shocks are the diagnosis of a mental disorder and the experience of isolation (either simply staying at home, or the isolation resulting from having COVID-19, having symptoms, or having had close contact with a confirmed case). We first consider these as binary variables changing over time per individual, taking on the value of zero if the individual has never experienced the shock at the time of the interview and one if they had experienced it in the current wave or one of the previous waves. As such, someone who experiences a shock for the first time at wave *t* will have a value of zero for this extensive-margin shock variable for all of the waves up to *t* and a value of one for the current wave and all subsequent waves. We also calculate the intensive margin of the experience of shocks at each wave as the number of experiences of the shock up to wave *t* divided by the number of waves up to *t* in which the individual appears. This variable, which we will standardise in the empirical analysis, can then both rise and fall over time.

Our dependent variable is resilience. In COME-HERE this is reported by all respondents using the Connor-Davidson Resilience Scale 10 (CD-RISC 10), which was included in seven out of eight waves (the exception is Wave 3). In the original Connor-Davidson Resilience Scale (CD-RISC: Connor and Davidson, 2003), respondents report the extent to which, in the last two weeks, 25 statements such as "I am able to adapt to change" and "I tend to bounce back after illness or hardship" are "Not true at all" (0), "Rarely true" (1), "Sometimes true" (2), "Often true" (3), and "True nearly all of the time" (4). The sum of these 25 responses produces the CD-RISC, with higher scores reflecting greater resilience. Campbell-Sills and Stein (2007) developed a shorter version of this scale for use in surveys with many questions. This CD-RISC 10 resilience measure is now widely-used in the literature (Salisu and Hashim, 2017). As the name implies, this measure includes only 10 of the 25 statements from the original scale, with the summary scores ranging from 0 to 40. The validity, reliability and factor structure of

[28] The gender, education, relationship status, number of children, number of rooms and country of residence questions were only asked in Wave 1: we assume in our analyses that these variables do not change over the (21-month) observation period.

the CD-RISC 10 have been demonstrated in numerous contributions (Burns and Anstey, 2010; Campbell-Sills and Stein, 2007; Cheng *et al*., 2020; Coates *et al*., 2013; Dolores *et al*., 2012; Goins *et al*., 2012; Gonzalez *et al*., 2016; Gucciardi *et al*., 2011; Notario-Pacheco *et al*., 2011; Ye *et al*., 2017). This resilience measure is positively associated with physical and mental health (Velickovic *et al*., 2020; Cheng *et al*., 2020). The correlation with emotional, psychological and social well-being is positive, and that with depression, anxiety and stress is negative (Kavčič *et al*., 2023). The CD-RISC 10 score is also lower for those with neuroticism (Cheng *et al*., 2020) and mood disturbances, persistent fatigue, sleep changes and self-reported cognitive complaints (Dini *et al*., 2021). The ten statements that make up the CD-RISC 10 are listed in Campbell-Sills and Stein (2007).

3.3.2 Empirical approach

We wish to understand the relationship between individual economic and health shocks and the individual resilience that an individual reports. We use panel data covering the first two years of the COVID-19 pandemic, and first estimate the following pooled OLS regression:

$$Resilience_{ict} = \beta_0 + \beta_1 Econ_{Shocks_{ic\Delta t}} + \beta_2 Health_{Shocks_{ic\Delta t}} + \beta_3 X_{ict} + \gamma_t + \delta_c + \epsilon_{ict} \quad (3.1)$$

Here $Resilience_{ict}$ is the standardised CD-RISC 10 score of individual i in country c at time (wave) t.[29] $Econ\_Shocks_{ic\Delta t}$ is a vector containing the economic shocks that occurred between waves 1 and t: a major cut in household income and job loss. $Health\_Shocks_{ic\Delta t}$ is the analogous measure for the recent health-related shocks of being isolated and being diagnosed with a mental disorder. These shocks will arguably often be directly or indirectly linked to the COVID-19 pandemic.

The sign of the estimated coefficients on the negative-shock variables, following the discussion in Section 2, is *a priori* ambiguous. In Graham and Oswald (2010), these shocks

[29] Resilience, in the empirical literature, is sometimes measured as the time taken to recover after a negative shock, also referred as adaptation, where the most-resilient recover more quickly. For example, it has been shown that the negative effects of unemployment on well-being do not entirely fade away over time (Clark *et al*., 2008; Frijters *et al*., 2011; Lucas *et al*., 2004). Equally, there is partial adaptation to changes in the financial situation (Frijters *et al*., 2011; Di Tella *et al*., 2010) and disability (Oswald and Powdthavee, 2008), but little adaptation to poverty (Clark *et al*., 2016): see also Etilé *et al*. (2021), Infurna and Luthar (2016) and Mancini *et al*. (2011). In the same spirit, Asheim *et al*. (2020) propose a resilience index based on the profile of health (or some other resource) in the time periods following a drop in the variable in question (which is considered a reaction to a negative event). This literature establishes which individuals are more or less resilient when faced with a certain shock: as such, the analysis only covers the 'treated': those who have experienced the shock in question. Our goal here is different. As indicated in Equation (3.1), we estimate whether a negative shock reduces an individual's subsequent resilience, and compares (in the pooled analysis) the resilience of those who were treated to those who were not treated.

should reduce individual psychological resources and resilience; conversely, resilience can rise after adversity in the models of thriving and post-traumatic growth. The signs of the estimated β_1 and β_2 coefficients will reveal which of these two best fits the average[30] observed changes in individual resilience during the pandemic. To tackle omitted-variable bias in β_1 and β_2, we include a vector X_{ict} containing gender, age, education, having a partner, parenthood and the logarithm of equivalised monthly household income (with the square root of the number of household members as the equivalence scale). Last, γ_t and δ_c are the wave and country fixed effects.[31]

We also make use of the panel dimension of the dataset and add individual fixed effects to Equation (3.1):

$$Resilience_{ict} = \beta_0 + \beta_1 Econ_{Shocks_{ic\Delta t}} + \beta_2 Health_{Shocks_{ic\Delta t}} + \beta_3 X_{ict} + \gamma_t + \delta_c + \alpha_i + \epsilon_{ict} \quad (3.2)$$

These fixed effects will pick up the influence of any time-invariant individual heterogeneity (for example, from genetic make-up or response style). In Equation (3.2), X_{ict} only includes equivalised monthly household income. We will below also estimate a value-added version of Equation (3.1) without the individual fixed effects[32] but including the individual's resilience in the first survey wave.

The estimation sample covers individuals with non-missing CD-RISC 10 and independent-variable information. In addition, we drop individuals who used the same response for all the CD-RISC 10 statements (who may not therefore have been careful in their answers). Our results are not affected by this trimming. The final sample includes 27,290 observations on 5,838 individuals. The distribution of resilience appears in Figure 3.1: this is somewhat left-skewed, as is common for resilience measures (Scali *et al.*, 2012; Velickovic *et al.*, 2020). This skewness is also found for other self-reported measures, such as psychological health (Etilé *et al.*, 2021) and life satisfaction (Frijters *et al.*, 2011). The average resilience in our estimation sample remains relatively stable over time.

[30] This is an average statement, and does not account for the fact that one model of the reaction to negative shocks may apply to some people but not to others.
[31] We have also run regressions with interacted wave and country fixed effects, so that we estimate the effect of negative shocks on resilience within country-wave: the results are similar.
[32] We do not estimate value-added models with individual fixed effects given that these are subject to the Nickell bias (Nickell, 1981), as we only have a maximum of seven observations per individual. The Nickell bias creates a correlation of order 1/T between the explanatory variables and the error term.

Appendix Table A3.1 lists the descriptive statistics for all of the observations in our estimation sample. Job loss and a major drop in household income had occurred at least once up to the interview date for 8% and 11% of the observations respectively. As these dummies reflect the occurrence of the events in all of the waves up to the current interview, they change within individual (being zero up to the first occurrence of the event in question and one thereafter). The average number of job losses per period to date at each observation is 0.03, with an analogous figure for major income drops of 0.05. Regarding health shocks, in almost all periods individuals had experienced an isolation experience at least once (86%), and in 26% of the periods they reported to have been diagnosed with a mental disorder at least once. At the individual level, Table A3.2 of the Appendix shows that 14% of COME-HERE respondents experienced a major cut in household income over the sample period, and 9% lost their jobs. The figures for the health shocks are 88% and 32% for isolation being diagnosed with a mental disorder. These percentages at the individual level represent the probability that an individual experience this shocks.

3.4 Results

Our main results for resilience and having experienced a shock during the pandemic appear in Table 3.1. Columns (1) and (2) refer respectively to the separate economic and health shocks. Column (3) then introduces both at the same time, and column (4) adds the control variables. These are all pooled analyses. The value-added model, which controls for Wave-1 resilience, appears in column (5). Last, we estimate panel resilience regressions in column (6).

The estimated coefficients in Table 3.1[33] provide empirical support for the model proposed in Graham and Oswald (2010): negative shocks are associated with less resilience. All of the estimated coefficients on the shock variables in columns (1) and (2) are negative and significant. The economic and health shocks are correlated (see the correlations in Table A3.3), and when these are introduced together in column (3) the estimated economic-shock coefficients become much smaller in size and insignificant, while those on the health shocks are only very little affected. As such, the negative estimated effect of the economic shocks on resilience in column (1) is largely explained by these shocks increasing the probability of

[33] The pattern of the estimated coefficients in Table 3.1 is unchanged if we restrict our analysis to the balanced sample or weight the observations to account for selective attrition.

isolation or the diagnosis of a mental disorder. Column (4) introduces the control variables, which make no substantial difference to the estimated shock coefficients.

The estimated coefficients on these control variables appear in Appendix Table A3.4. We confirm most of the standard findings in the literature: resilience rises with age (Bonanno *et al.*, 2007; Bonanno *et al.*, 2006; Mancini *et al.*, 2011; Diehl and Hay, 2010), income (Bonanno *et al.*, 2006; Bonanno *et al.*, 2007) and education (Bonanno *et al.*, 2006; Mancini *et al.*, 2011; Frankenberg *et al.*, 2013). The finding for age is usually thought to reflect that the elderly are exposed to fewer daily stressors (Stawski *et al.*, 2008) and have lower physiological reactivity (Levenson, 2000). Nonetheless, these analyses are cross-sectional and the age coefficient may in fact reflect cohort effects. Education and income are resources that help to deal with adversity. Frankenberg *et al.* (2013) conclude that the better educated have better skills and financial and social resources to face new challenges. The estimated coefficient on the female dummy is only small, but is negative, which is line with the existing literature that commonly finds women to be less resilient (Bonanno *et al.*, 2007; Hirani *et al.*, 2016; Bonanno *et al.*, 2006; Spahni *et al.* 2016).

The value-added model appears in column (5) of Table 3.1. The introduction of lagged resilience attenuates the estimated coefficient on the health shocks by around one half, rendering the coefficient on isolation insignificant. Our preferred fixed-effects specification is in the last column of Table 3.1. Holding all individual time-invariant heterogeneity constant, a major cut in household income, a job loss and being diagnosed with a mental disorder during COVID-19 reduce resilience by 7%, 6% and 11% of a standard deviation, respectively. These are reasonably-sizeable effects, similar to the estimated equivalised household income coefficient in the value-added model, and around half of the estimated cross-section coefficients on equivalised household income and post-secondary education.

The intensities of the four shocks over the course of the survey appear in Table 3.2: this is measured as the standardised value of the number of shocks per type of shock in all of the periods up to the wave of the interview, divided by the number of individual interviews up to that date[34] (as opposed to the extensive-margin dummy for having experienced the shock in question in any of the waves to date in Table 3.1). To account for the mechanical correlation

[34] For example, consider an individual who is interviewed in each of the first four waves, and experienced an isolation episode in Waves 1 and 4. Her isolation intensity score would be 1 in Wave 1, then 1/2 and 1/3 in Waves 2 and 3, before rising to ½ again in Wave 4 (as she had at that time had two isolation experiences out of the four waves in which she was interviewed).

between the extensive and intensive margins, all specifications in Table 3.2 include the extensive margin dummies as a control: we thus estimate the impact of the intensity of the shocks given their incidence. Again, health shocks matter far more than do economic shocks (for which all estimated coefficients are insignificant). In our preferred panel analysis, a one standard-deviation rise in the number of isolation experiences per period reduces resilience by around 2% of a standard deviation.

We have so far estimated the average effect of economic and health shocks on resilience. However, the support we find for Graham and Oswald's model may not apply across the whole distribution of individual resources. We hypothesise that the resilience of those with fewer resources (less initial 'hedonic capital') will be more affected by negative shocks, as these resources may be insufficient to protect them against adversity. We hence relax the assumption that the determinants of resilience are the same for all respondents by estimating the panel regressions in column (6) of Tables 3.1 and 3.2 separately by sex, age, parenthood and income subgroups (the income level used to split the sample here is that reported by the respondent for the pre-pandemic period). According to the low hedonic-capital hypothesis, we expect the resilience of women, the young, those without children and those with a lower income to drop more following negative shocks.[35]

The results in Table 3.3 do not provide much support for this hypothesis, as there is only very little heterogeneity across the different groups in the effect of the incidence of shocks.[36] As such, negative shocks during the pandemic period reduced resilience for all those who suffered from them, with there being little evidence consistent with a key resource level above which resilience is unchanged. Even so, the economic and health shocks that appeared during the pandemic will have changed the distribution of resilience across the population, as these shocks themselves were not evenly distributed. Appendix Table A3.6 reveals that women, the young, the poorer and those with children experienced significantly more negative shocks. As these correspond broadly to the groups that were already less resilient (see the estimated regression coefficients in Table A4), the negative shocks experienced during COVID-19 not only reduced resilience in society but also increased the inequality of its distribution.

[35] We also considered interactions between the four shock variables and a number of psychological variables measured at Wave One. Almost none of these attracted significant estimated coefficients.
[36] We also tested differences in the effect of the intensity of shocks for these same groups (see Appendix Table A3.5) but again find little evidence of heterogeneity.

3.5 Conclusion

We have provided new results regarding resilience and negative shocks, in the context of the COVID-19 pandemic. Job losses, major cuts in household income and the diagnosis of a mental disorder during the pandemic are all associated with lower resilience. These results are found in pooled, value-added and panel regressions. This drop in resilience in the wake of negative events is consistent with the model of hedonic capital proposed in Graham and Oswald (2010). In addition to the experience of the shock, the intensity of health shocks is also correlated with resilience.

Our results have a number of implications. First, resilience is reduced by job loss, income drops and mental disorders. As such, policies that avoid these, and in particular in pandemic times, will be beneficial in the longer run. These include policies on the labour market (*e.g.* Furlough in the UK and ERTE in Spain applied during the pandemic) that reduce job losses, and fiscal policies (*e.g.* the CARES Act in the US and the two supplementary budgets in Japan) that helped avoid sharp falls in income (see Clark *et al*., 2022). Second, to the extent that there will always be some negative shocks, the provision of psychological resources would likely be of use not only to shore up well-being in the immediate aftermath of the event but also for the maintenance of resilience; policy here could also provide individuals with assets that substitute for those lost following the negative shock (*e.g.* social contact and unemployment benefits in the case of a job loss).

One limitation of our analysis is that while we have considered heterogeneity with respect to demographic variables (and actually find only little), we have not considered the role of psychological variables in this respect. The potentially different reactions to shocks by individuals with different psychological characteristics will help shed light on the implications of the latter for individual life trajectories.

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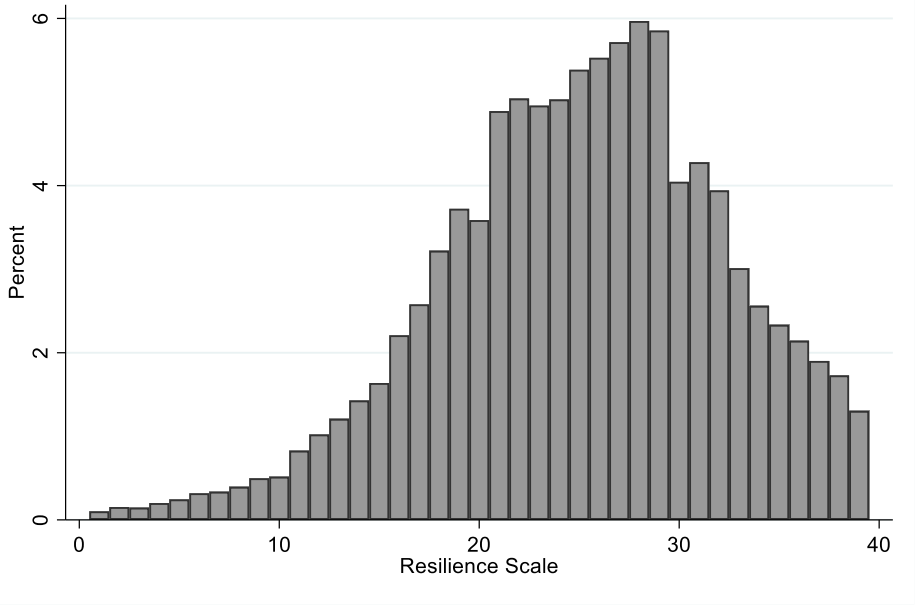
Tables and figures

Figure 3.1: Distribution of resilience in the estimation sample



Note: Resilience is calculated using the CD-RISC 10 scale.

Table 3.1: Resilience and the Incidence of Economic and Health Shocks during COVID-19 – Pooled and Panel Results

	CD-RISC 10 (std)					
	(1)	(2)	(3)	(4)	(5)	(6)
Major cut in HH income	-0.11***		-0.04	-0.00	0.00	-0.07**
	(0.04)		(0.04)	(0.04)	(0.03)	(0.03)
Job loss	-0.09**		-0.01	0.06	-0.02	-0.06*
	(0.04)		(0.04)	(0.04)	(0.03)	(0.04)
Isolation		-0.10***	-0.10***	-0.09***	-0.03	-0.04
		(0.03)	(0.03)	(0.03)	(0.02)	(0.03)
Diagnosis of a mental disorder		-0.40***	-0.39***	-0.31***	-0.18***	-0.11***
		(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
CD-RISC 10 (std) wave 1					0.09***	
					(0.00)	
Individual Controls	No	No	No	Yes	Yes	Yes
Individual Fixed-Effects	No	No	No	No	No	Yes

Notes: These are linear regressions. There are 27,290 observations on 5,838 individuals in each column. Standard errors in parentheses are clustered at the individual level. Resilience is the standardised value of the CD-RISC 10. All columns include wave and country fixed-effects. Individual controls for the pooled estimations in columns (1) to (5) are the logarithm of the equivalent monthly household income (in PPP), gender, age, partnership, parenthood and education dummies. Individual controls for the panel estimations in column (6) is equivalised household income. *p < 0.1, **p < 0.05, *** p < 0.01.

Table 3.2: Resilience and the Intensity of Economic and Health Shocks during COVID-19 – Pooled and Panel Results

	CD-RISC 10 (std)					
	(1)	(2)	(3)	(4)	(5)	(6)
Average number of major cuts in HH income (std)	-0.02		-0.01	-0.00	0.01	-0.01
	(0.01)		(0.01)	(0.01)	(0.01)	(0.01)
Average number of job losses (std)	-0.02		-0.00	0.01	-0.01	0.00
	(0.01)		(0.01)	(0.01)	(0.01)	(0.01)
Average number of isolation experiences (std)		-0.05***	-0.04***	-0.03***	-0.02**	-0.02**
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Average number of diagnoses of a mental disorder (std)		-0.15***	-0.15***	-0.12***	-0.08***	-0.01
		(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Individual Controls	No	No	No	Yes	Yes	Yes
Individual Fixed-Effects	No	No	No	No	No	Yes
Value added model	No	No	No	No	Yes	No

Notes: These are linear regressions. There are 27,290 observations on 5,838 individuals in each column. Standard errors in parentheses are clustered at the individual level. Resilience is the standardised value of the CD-RISC 10. All columns include wave and country fixed-effects, and dummy variables for the incidence of the four shocks (as in Table 3.1). The individual controls for the pooled estimations in columns (4) and (5) are the logarithm of the equivalent monthly household income (in PPP), gender, age, partnership, parenthood and education dummies. The individual control for the panel estimations in column (6) is the logarithm of the equivalent monthly household income. *p < 0.1, **p < 0.05, *** p < 0.01.

Table 3.3: Resilience and Economic and Health Shocks during COVID-19 –Panel Results. Heterogeneity.

	CD-RISC 10 (std)							
	Men	Women	Young	Old	No child in HH	Child in HH	Below median income	Above median income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Major cut in HH income	-0.07*	-0.07	-0.05	-0.06	-0.06	-0.09**	-0.05	-0.09**
	(0.04)	(0.05)	(0.04)	(0.05)	(0.04)	(0.04)	(0.04)	(0.04)
Job loss	-0.08*	-0.03	-0.04	-0.05	-0.12***	0.03	-0.06	-0.04
	(0.05)	(0.05)	(0.04)	(0.06)	(0.05)	(0.06)	(0.05)	(0.05)
Isolation	-0.06	-0.02	-0.02	-0.07	-0.03	-0.07	-0.08*	-0.01
	(0.04)	(0.04)	(0.05)	(0.04)	(0.04)	(0.06)	(0.05)	(0.04)
Diagnosis of a mental disorder	-0.09***	-0.11***	-0.10***	-0.10***	-0.11***	-0.09**	-0.11***	-0.10***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.04)	(0.03)	(0.03)
Observations	14,017	13,273	13,813	13,477	18,577	87,13	13,725	13,120
Individuals	2,961	2,877	3,091	2,747	3,969	1,869	2,990	2,715
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: These are linear regressions. The groups below and above median income are based on income in January 2020. Standard errors in parentheses are clustered at the individual level. Resilience is the standardised value of the CD-RISC 10. All columns include wave and country fixed-effects. Individual controls are the logarithm of the equivalent monthly household income (in PPP), gender, age, partnership, parenthood and education dummies. *p < 0.1, **p < 0.05, *** p < 0.01.

Appendix

Table A3.1: Summary statistics for observations in the estimation sample

	Mean	SD	Min	Max
CD-RISC 10	35.12	7.10	11	49
Major cut in HH income	0.11		0	1
Average number of major cuts in HH income	0.05		0	1
Job Loss	0.08		0	1
Average number of job losses	0.03		0	1
Isolation	0.86		0	1
Average number of isolation experiences	0.54		0	1
Diagnosis of a mental disorder	0.26		0	1
Average number of diagnoses of a mental disorder	0.13		0	1
Monthly HH Income in PPP (in logs)	7.26	0.66	4.9	9.4
Female	0.49		0	1
Age	50.59	15.85	18	93
Partnered	0.61		0	1
Parenthood	0.32		0	1
Wave 1	0.20		0	1
Wave 2	0.14		0	1
Wave 4	0.17		0	1
Wave 5	0.14		0	1
Wave 6	0.12		0	1
Wave 7	0.12		0	1
Wave 8	0.11		0	1
France	0.22		0	1
Germany	0.19		0	1
Italy	0.22		0	1
Spain	0.23		0	1
Sweden	0.13		0	1
Observations	27,290			

Table A3.2: Summary statistics for individuals in the estimation sample

	Mean	SD	Min	Max
CD-RISC 10	35.18	6.31	12	49
Major cut in HH income	0.14		0	1
Average number of major cuts in HH income	0.04		0	1
Job Loss	0.09		0	1
Average number of job losses	0.02		0	1
Isolation	0.88		0	1
Average number of isolation experiences	0.57		0	1
Diagnosis of a mental disorder	0.32		0	1
Average number of diagnoses of a mental disorder	0.13		0	1
Monthly HH Income in PPP (in logs)	7.24	0.61	5.4	9.3
Female	0.49		0	1
Age	49.59	16.21	18	93
Partnered	0.60		0	1
Parenthood	0.32		0	1
Wave 1	0.24		0	1

Wave 2	0.16	0	1
Wave 4	0.18	0	1
Wave 5	0.13	0	1
Wave 6	0.11	0	1
Wave 7	0.10	0	1
Wave 8	0.09	0	1
France	0.22	0	1
Germany	0.21	0	1
Italy	0.22	0	1
Spain	0.22	0	1
Sweden	0.13	0	1
Observations	5,838		

Table A3.3: Economic and health shocks correlation matrix - Incidence

	Major cut in HH income	Job Loss	Isolation	Diagnosis of a mental disorder
Major cut in HH income	1.000			
Job Loss	0.475	1.000		
Isolation	0.097	0.077	1.000	
Diagnosis of a mental disorder	0.199	0.200	0.088	1.000
Observations	27,290			

Table A3.4: Incidence of Economic and Health Shocks on Resilience in COVID-19 times – All Coefficients

	CD-RISC 10 (std)					
	(1)	(2)	(3)	(4)	(5)	(6)
Major cut in HH income	-0.11***		-0.04	-0.01	0.00	-0.07**
	(0.04)		(0.04)	(0.04)	(0.03)	(0.03)
Job loss	-0.09**		-0.01	0.07	-0.02	-0.06*
	(0.04)		(0.04)	(0.04)	(0.03)	(0.04)
Isolation		-0.10***	-0.10***	-0.09***	-0.03	-0.04
		(0.03)	(0.03)	(0.03)	(0.02)	(0.03)
Diagnosis of a mental disorder		-0.40***	-0.39***	-0.32***	-0.18***	-0.11***
		(0.03)	(0.03)	(0.03)	(0.02)	(0.02)
Age/100				0.90***	0.54***	
				(0.08)	(0.06)	
Female				-0.02	-0.03**	

					(0.02)	(0.02)	
Partnered					0.01	-0.00	
					(0.02)	(0.02)	
Parenthood					0.14***	0.07***	
					(0.03)	(0.02)	
Secondary education					0.05	0.02	
					(0.03)	(0.02)	
Post-secondary education					0.16***	0.06**	
					(0.03)	(0.02)	
Eq. HH Income (in PPP and log)					0.16***	0.07***	0.03*
					(0.02)	(0.01)	(0.01)
Individual Controls	No	No	No	Yes	Yes	Yes	
Individual Fixed-Effects	No	No	No	No	No	Yes	
Value added model	No	No	No	No	Yes	No	

Notes: These are linear regressions. There are 27,290 observations on 5,838 individuals in each column. Standard errors in parentheses are clustered at the individual level. Resilience is the standardised value of the CD-RISC 10. All columns include wave and country fixed-effects. *p < 0.1, **p < 0.05, *** p < 0.01.

Table A3.5: Intensity of Economic and Health Shocks on Resilience during COVID-19 – Panel Results. Heterogeneity.

	CD-RISC 10 (std)							
	Men	Women	Young	Old	No child in HH	Child in HH	Below median income	Above median income
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Average number of major cut in HH income (std)	0.03	-0.00	-0.00	0.03	0.02	0.00	0.02	0.00
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Average number of job losses (std)	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.01
	(0.02)	(0.01)	(0.01)	(0.02)	(0.02)	(0.02)	(0.01)	(0.02)
Average number of isolation experiences (std)	-0.01	-0.03*	-0.03**	-0.01	-0.01	-0.04**	-0.04***	0.01
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)
Average number of diagnoses of a mental disorder (std)	0.00	0.02	-0.01	0.03*	0.01	0.01	-0.00	0.03*
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	14,017	13,273	13,813	13,477	18,577	8,713	13,725	13,120
Individuals	2,961	2,877	3,091	2,747	3,969	1,869	2,990	2,715
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual Fixed-Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: These are linear regressions. The groups below and above median income are based on income in January 2020. Standard errors in parentheses are clustered at the individual level. Resilience is the standardised value of the CD-RISC 10. All columns include wave and country fixed-effects, and dummy variables for the incidence of the four shocks (as in Table 3.1). The individual controls for the pooled estimations in columns (4) and (5) are the logarithm of the equivalent monthly household income (in PPP), gender, age, partnership, parenthood and education dummies. The individual control for the panel estimations in column (6) is the logarithm of the equivalent monthly household income. *p < 0.1, **p < 0.05, *** p < 0.01.

Table A3.6: Heterogeneity in the average proportion of incidence and intensity of shocks per individual

	Major cut in HH income		Job loss		Isolation		Diagnosis of a mental disorder	
	Incidence	Intensity	Incidence	Intensity	Incidence	Intensity	Incidence	Intensity
Male	0.13	0.04	0.08	0.02	0.86	0.54	0.28	0.11
Female	0.15	0.05	0.11	0.03	0.90	0.59	0.36	0.16
Difference	*-0.02***	*-0.01***	*-0.03****	*-0.01****	*-0.04****	*-0.05****	*-0.08****	*-0.04****
Old	0.09	0.03	0.05	0.01	0.87	0.54	0.23	0.08
Young	0.18	0.06	0.13	0.03	0.89	0.59	0.40	0.18
Difference	*-0.09****	*-0.03****	*-0.08****	*-0.02****	*-0.02****	*-0.04****	*-0.17****	*-0.10****
Children	0.19	0.06	0.12	0.03	0.89	0.56	0.40	0.17
No children	0.11	0.04	0.08	0.02	0.88	0.57	0.28	0.12
Difference	*0.08****	*0.02****	*0.04****	*0.01****	*0.01*	*0.00*	*0.12****	*0.05***
Below median income	0.17	0.05	0.12	0.03	0.90	0.60	0.37	0.17
Above median income	0.11	0.04	0.07	0.02	0.86	0.53	0.27	0.10
Difference	*0.07****	*0.02****	*0.05****	*0.01****	*0.04****	*0.06****	*0.10****	*0.06****
Observations	5,838							

Notes: There are 5,838 observations in each column. The demographic groups are defined as in Table 3.3. *p < 0.1, **p < 0.05, *** p < 0.01.

Conclusions, Limitations and Future Research

Conclusions, Limitations and Future research

Given the relevance of individual resilience for human well-being and the economy, this thesis is a contribution to understand how societies shape resilience. It also contributes to the scarce literature on how recurring negative shocks impact resilience in the medium- and long-term.

This thesis makes use of different measures of resilience in the three chapters. This enriches the literature in a way, given that it is the first time that the index by Asheim *et al*. (2020) is implemented in an empirical analysis and the question in the ESS has been previously used only a few times. Nonetheless, it also supposes a limitation. The objective of the measures of the first and second chapters is to capture the ability of a person to recover from adversity, although they do so in very different ways. In contrast, the measure used in the third chapter, the CD-RISC 10, captures the ability to cope with adversity.

In the first chapter, we use the single statement "*When things go wrong in my life it takes a long time to get back to normal*", with responses 1 (Agree strongly), 2 (Agree), 3 (Neither agree or disagree), 4 (Disagree) and 5 (Disagree strongly). Thus, this is a single item on self-assessed resilience in terms of recovery time after adversity. This measure could carry a limitation if there was a difference between the true resilience of the individual and her self-assessed one. This is a measurement problem that exists in all self-assessed measures. Assuming that the error is random, this would imply that the results in this paper may suffer from attenuation bias. Second, there might be individual heterogeneity. However, since the interest of the analysis is the impact of a 'culturally inherited' component and the 'contextual' component, keeping constant the country of birth and residence first, and the average resilience in the country of birth and country of residence second, we should be capturing the source of heterogeneity linked to different cultures and institutions. Moreover, our specifications keep constant a number of exogenous characteristics such as gender, age and ethnic background.

In the second chapter, the resilience index by Asheim *et al*. (2020) is used. This index requires each individual to report a variable for at least three periods. To compute it, I use the variable satisfaction with health, which is asked in SOEP every year starting in 1984. The data and strategy that I take allows me to apply this index. The index assumes that every drop of the variable from the highest level is a reaction to a shock. Although we do not include any information on the shocks experienced by a person, this property allows us to measure resilience in detailed panel datasets such as the SOEP. In addition, the authors acknowledge the "dose of subjectiveness" in the index.

The third chapter uses the validated psychological scale CD-RISC 10 which asks ten self-assessed items such as "I am able to adapt to change" and "I tend to bounce back after illness or hardship" with responses from 0 "not true at all" to 4 "true nearly all of the time". This scale has the same limitation as other self-assessed questions. The problem emerging from the individual heterogeneity in the pooled OLS, nonetheless, is addressed to some extent when we adopt the value added model and the OLS with individual fixed effects.

The differences among the three measures used pose a question on whether the results found can be extrapolated. For this reason, I believe a next step is to perform analogous exercises with different measures of resilience. However, there are data limitations in that regard. The resilience measures I have used in each of the chapters was the only measure available in each of the datasets. With that in mind, I encourage future data collection on resilience, especially in panel datasets. This exercise would enable researchers to have information on resilience before and after a shock happened, or a reform was implemented. Regarding indexes such as the one proposed by Asheim *et al*. (2020) that require a lot of time periods of the same variable, I encourage and highlight the importance of collecting high frequency panel data.

Linked to this, I propose future research to investigate the harmonization of different measures of resilience. For instance, looking at how the different measures I used (and additional measures mentioned in the introduction) correlate with each other. Future developments in resilience should also work towards a measure of the ability to withstand a shock, rather than recover from it. I believe there is a great scope for novel analysis in that regard.

Chapter 2 finds a positive impact of war intensity on resilience in the very long term (between sixty-eight and ninety-five years after) and Chapter 3 shows a negative impact of economic and health shocks on resilience in the shorter-term (between three months and less than two years). First, since these results suggest that resilience decreases until a certain point in time and then increases, I encourage future research to empirically investigate a plausible U-shape of resilience over time after the occurrence of a shock. Second, for Chapter 2, we look at resilience of individuals later in life, but we do not have information on the individuals' resilience right after the shock happened. Future research should look at the impact of the war in the short term and follow individuals throughout the life span, to be able to better understand the evolution.

The analysis of the impact of warfare in Chapter 2 only considers the intensity of the shock. I am currently working on implementing a difference-in-differences comparing the

same cohorts for Australia, a country that was barely destroyed during WWII, and Germany. This analysis can potentially shed light on what was the incidence of the shock in the long-term.

Lastly, the impact of negative shocks explored in this thesis are on very specific points in time: the Covid-19 pandemic and WWII in West Germany. This has limitations in terms of extrapolation of results. Part of my research agenda includes looking at negative shocks in different settings. For instance, examining the impact of economic, health and social shocks in other countries outside of Europe as well as investigating ongoing war conflicts. I intend to do so by applying the resilience measures used in this thesis and applying other approaches mentioned in the introduction.

Co-author Statement

Chapter 1 – **Is resilience inherited?** – co-authored with Andrew E. Clark (Paris School of Economics – CNRS and University of Luxembourg). Andrew E. Clark is at the origin of the research question. I was in charge of the data analysis and production of tables and figures in the paper. Andrew supported me in the process. I worked on the first draft but we later wrote the current paper together.

Chapter 2 – **War destruction and resilience in the long-run** – this is a single author paper.

Chapter 3 – **Has covid made us less resilient?** – co-authored with Anthony Lepinteur (University of Luxembourg), Andrew E. Clark (Paris School of Economics – CNRS and University of Luxembourg), Claus Vögele (University of Luxembourg) and Conchita D'Ambrosio (University of Luxembourg). Conchita D'Ambrosio is at the origin of the research question. I was in charge of the data cleaning, data analysis and writing of the first draft. Anthony, Conchita, Claus and I are at the origin of the design of the empirical models adopted. All co-authors supported me in the revision and writing of the current paper.