The long-term effects of experienced macroeconomic shocks on wealth

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Abstract

This paper examines the long-term effects of experienced macro-economic shocks – defined as multi-year peak-to-trough GDP declines of at least 10 percent – on the wealth distribution, portfolio allocation, and risk attitudes of older individuals in Europe. We show that individuals who have experienced more economic depression episodes have lower wealth in absolute terms, a lower probability to invest in risky assets, and display higher risk aversion. When analysing early investment decisions, we find that individuals hit by a depression are less likely to make risky investments and more likely to invest in housing, and that these early choices shape wealth in the long-term.

Keywords: wealth distribution, economic depressions, risk aversion, early investments

JEL Classification: D31, E21, G51

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1 Introduction

Population ageing implies that an increasing number of households will rely on their wealth holdings to support consumption during retirement, especially in a context in which pension reforms are shifting more responsibility to the individual. As current wealth is the result of accumulation during the entire life of individuals, we investigate empirically how negative macroeconomic shocks experienced during the lifetime affect the level and composition of wealth of older Europeans, as well as their attitudes towards risky investments.

We draw on very rich data from the Survey of Health, Ageing and Retirement in Europe (SHARE) on the current financial position and life-histories of a representative sample of the 50+ population in twelve countries. Following the definition of economic depressions given by Barro and Ursúa (2008), we measure macroeconomic shocks as multi-year peak-to-trough GDP declines of at least 10 percent. To understand the effect of economic depressions on the entire distribution of wealth, we use a set of unconditional quantile regressions and we look at both the level and composition of wealth. We also study which periods of life are more sensitive to these shocks, which is particularly important in light of the recent financial crisis and current pandemic. Importantly, the data include information on the timing of the first investment in stocks and of the first house purchase, which we exploit to better understand the channels through which macroeconomic shocks shape long-term wealth. Finally, we also study the long-term effects of experienced economic depressions on risk attitudes, measured using both a survey measure of risk aversion and households' stock ownership.

In unconditional median regressions, we find that individuals who experienced more depression episodes during their life have lower total wealth, lower real wealth and lower financial wealth in absolute terms. They also display a lower probability to invest in risky assets, and higher risk aversion, measured as respondents' willingness to take financial risk. Interestingly, when separately looking at macroeconomic shocks experienced at different ages, we find a statistically significant positive effect of economic depression experienced when younger than 25 on real wealth. When analysing early investment decisions, we find that young individuals hit by a depression invest more in housing and less in stocks. These results point to the fact that young individuals hit by a

depression are less likely to make risky investments and more likely to invest in housing. Second, we find evidence that experiences at early ages shape decisions in the long-term, through a certain stickiness of financial choices.

We contribute to the literature in mainly three ways. First, to the best of our knowledge we are the first to study the long-term effects of macroeconomic shocks experienced at different stages of life on wealth and risk attitudes. Many studies document how labour market conditions at the time a worker is hired or idiosyncratic luck at the time of hiring affect their entire career trajectory and income (Von Wachter and Bender, 2006; Kahn, 2010; Schmieder and Von Wachter, 2010; Schwandt and Von Wachter, 2019). However, wealth is a broader concept than income and can be thought of as a long-run indicator of well-being, fundamental to provide income security at older ages and better suited to measure inequality.

Second, we study the effect of experienced macroeconomic shocks on financial decisions by looking not only at the level but also at the composition of wealth. Malmendier and Nagel (2011) show that US individuals who have experienced low stock market returns throughout their lives are more pessimistic about future stock returns and, therefore, are less likely to participate in the stock market, and invest a lower fraction of their liquid assets in stocks if they participate. In Europe, only relatively few people invest in the stock market. Therefore, we study the effect of macroeconomic shocks rather than stock market returns. Unemployment experiences are arguably a much more salient event for most individuals, both when they are personally affected and when people in their family or network are.[1] It is worth noting that macroeconomic shocks and stock market crashes are correlated. Barro and Ursúa (2017) show that while stock-market crashes go along with minor depressions 31 percent of the time and major depressions 10 percent of the time, minor depressions feature stock-market crashes 71 percent of the time, and major depressions feature these crashes 92 percent of the time. Therefore, by looking at macroeconomic shocks, we are also implicitly accounting for contemporaneous stock market crashes.

Third, we look at both risk aversion and the timing of the first financial investment as potential

[1] Some studies have found negative spillover effects of an individual's unemployment, for example on the mental health of the spouse (Marcus, 2013), and on children's school performance (Rege et al., 2011).

mechanisms. We are able to show that experienced macroeconomic shocks do not only influence risk aversion in the long run, but they also affect early decisions to invest in risky assets.

The paper proceeds as follows. Section 2 provides the theoretical background and lays out the main hypotheses on the long-term relationship between macroeconomic shocks, wealth and financial risk attitudes. Section 3 describes the micro- and macro-economic data we use, and Section 4 describes our measure of experienced macroeconomic shocks. Section 5 discusses the empirical model. Section 6 reports the main results of the paper, and section 7 reports results on early saving decisions. Section 8 concludes.

2 Background

There are several channels through which experienced economic depressions might influence accumulated wealth, risk aversion, and portfolio choices. The first channel is through an effect on lifetime earning capacity. Starting from the seminal work of Jacobson et al. (1993), several other studies have found that displacement due to business closure during depressions determines sizable earnings losses, which may also persist several years after reemployment. Among others, Von Wachter and Bender (2006) find evidence of long-term costs of job displacements during the 1982 depression in the US, with large immediate losses in annual earnings of 30% and 20% losses after 15 to 20 years. Negative effects on earnings seem particularly strong for individuals entering the labour market for the first time during a recession, as shown by Schwandt and Von Wachter (2019). Oreopoulos et al. (2012) find that the cost of recessions for new graduates is substantial and unequal, such that unlucky graduates suffer persistent earnings declines lasting ten years.

Potential consequences of this are not only reduced savings, and therefore lower accumulated wealth at older ages, but also changes in the composition of wealth due to changes in risk attitudes. Indeed, if absolute risk aversion is decreasing, the reduction in wealth following a macroeconomic shock will lead to higher risk aversion and lower investments in risky assets.

Moreover, individuals hit by macroeconomic shocks might be subject to binding liquidity con-

straints in the future, making them unable to diversify their portfolio risk, and thus leading to a higher degree of aversion towards portfolio risk (Gollier (2000)). Another factor that is often ignored is the presence of background risk. Indeed, most risks borne by households are uninsurable risks affecting their human capital (Gollier (2000)). Households that are subject to larger uncertainty about their future labour incomes should present reduced demand for stocks and should rebalance their portfolio towards risk-free assets. As a consequence, individuals facing high exogenous labour income risk - which is normally uninsurable - will be more risk averse and will thus avoid exposure to portfolio risk by holding less or no risky assets (Guiso and Paiella (2008)). If this is the case, one should be able to observe an effect of macroeconomic shocks on the timing of first financial investments, as individuals facing liquidity constraints and higher income uncertainty might choose to postpone risky investments.

Finally, evidence has been found of a fear-induced effect of negative macroeconomic shocks. Historical data clearly show that the drop in stock return during financial crises is only temporary. Rational investors know that volatility is only short-term and, therefore, they should not change their investment strategies during a depression. Under the assumption that risk aversion and perceived risk do not change with the crises, investors might actually wish to rebalance their portfolios, by buying stocks when prices are low.

However, Guiso et al. (2018) find that, following the 2008 financial crisis, Italian investors' risk aversion increased and they divested more stock, but they did not find strong evidence of any of the usual potential mechanisms that could explain this..[2] Instead, they provide some evidence of yet another mechanism, that is emotion-based changes of the utility function driven by fear. This might explain also why even people who did not lose any money in the financial crisis became more risk averse. The authors cannot answer the question of how persistent fear-induced changes in risk aversion are. To the extent that the fear-induced effect on risk-aversion found by Guiso et al. (2018) is driven by the salience of the event, even irrespective of whether the individual was directly affected, economic depressions could likely induce more fear than financial crises.

[2]Reduction in wealth, changes in expected future income, or changes in the expected distribution of future investments (expected return or volatility)

Many mechanisms affecting risk aversion during macroeconomic depressions might be relevant also during financial crises. Indeed, even though depressions and stock market crashes represent two distinct events, they are correlated.[3] Malmendier and Nagel (2011) find that, in the US, individuals' level of risk taking in financial markets at a point in time is related to the returns they have experienced during their lifetime. Households with higher experienced stock market returns subsequently invest more of their liquid assets in stocks. The authors find evidence that experienced returns affect beliefs about future asset returns, even though they cannot rule out that return experiences affect risk preferences as well. Although these results refer to the US, Ampudia and Ehrmann (2017) have found similar evidence for Europe.

It should be stressed, however, that only relatively few individuals ever invest in the stock market, which makes it likely that past stock market returns are not salient (and thus not really "experienced") for most individuals. In fact, most of the observed volatility of households' earnings comes from variations in labour income (Gollier (2000)).

Overall, all the above-mentioned mechanisms might be in place when someone is hit by an economic depression, but the empirical evidence on the long-term effects of such event on wealth is scarce, while it is richer when it comes to other outcomes.[4] Moreover, the relationship between unemployment and risk preferences might go both ways, but surprisingly the literature until now has concentrated only on the effect of risk-aversion on unemployment (see for instance Feinberg (1977)). One exception is Guiso and Paiella (2008), who use GDP growth at the provincial level to construct a measure of the variability of GDP by province.[5] Like our measure of macroeconomic shocks, such a measure of background risk has the advantage that it is likely to be truly exogenous to individuals' risk attitude, differently from subjective measures of future income uncertainty. By also using proxies of borrowing constraints, they find that individuals who are more likely to face income

[3] Barro and Ursúa (2017) found, in a panel of 30 countries and starting at the beginning of the XX century, 71 stock-market crashes and depressions with at least some overlap, and 29 cases of depressions without stock market crashes, during which stock returns were mostly positive on average. On the contrary, the vast majority of stock market crashes is not accompanied by any depression.

[4] For instance, the literature has shown that individuals who experienced a depression when young believe that success in life depends more on luck than effort, support more government redistribution, and tend to vote for left-wing parties, and that the effect is long-lasting (Giuliano and Spilimbergo (2014)). Also, individual's well-being of both employed and unemployed individuals has been shown to be affected by the unemployment of others (Clark et al. (2010)).

[5] The variability of GDP is calculated as the variance of the residuals in a regression of log-GDP on a time trend.

uncertainty or to become liquidity constrained exhibit a higher degree of absolute risk aversion. Hetschko and Preuss (2020) find causal evidence of increased risk aversion upon involuntary job loss in a panel of German workers, and present some evidence that the effect is due to lower future income expectations and more uncertainty about future incomes. Overall, these results are consistent with the theories stating that the presence of uninsurable risks affects attitudes towards risk.

3 Data

3.1 Microeconomic data

Data on wealth and other individual characteristics come from the Survey of Health, Ageing and Retirement in Europe (SHARE). SHARE is a longitudinal, cross-national European survey. It includes micro data on health, socioeconomic status, and social and family networks of a representative sample of individuals (and spouses) aged 50 and above. Interviews are conducted approximately every two years. Questions are asked in the native language and follow a generic questionnaire such that they are comparable across countries. Data collection began in 2004 with 12 countries included in the first wave, and by the seventh wave of 2017 all European Union countries, plus Switzerland and Israel, were included in the sample. The third and seventh waves of SHARE, also known as SHARELIFE, are different from the regular panel waves as they focus on retrospective questions about the respondents' childhood and their employment, fertility, marital and health histories.

Our analysis of current wealth will be based on five regular waves of SHARE, broadly covering the years from 2004 to 2015. Our analysis of early investments instead will be based on SHARELIFE data, spanning all years from the birth of each respondent until the interview year.[6] We include twelve countries in the analysis, the selection of which is solely based on the availability of GDP data going back to the earliest birth year of the respondents in each country.[7]

SHARE contains information on a number of wealth items at the household level, the sum of

[6] SHARELIFE interviews in wave three of SHARE were conducted in years 2008 and 2009, while SHARELIFE interviews in wave seven were conducted in 2017.

[7] The included countries are Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Sweden and Switzerland.

which amounts to the overall (net) real and financial wealth of households. Specifically, households' real assets are given by the sum of the value of the main residence net of the mortgage on the main residence, the value of the real estate, the value of own businesses and the value of cars. Households' financial assets are given by the sum of the value of bank accounts, bonds, stocks and mutual funds, plus savings for long term investments and net of financial liabilities. In turn, savings for long term investments are given by the amounts in individual retirement accounts, the value of contractual savings for housing and the face value of whole life policies. We use imputed wealth data to address the fact that the missingness pattern of monetary values is most likely non-random, which means that estimates obtained using only complete observations would produce biased results (Little and Rubin (2014)).

The data allow directly measuring financial risk attitudes. Indeed, SHARE elicits individuals' willingness to take financial risks on a scale from 1 to 4, where 1 indicates a willingness to "take substantial financial risk expecting to earn substantial returns" and 4 indicates "Not willing to take any financial risks".[8] This question has been asked starting from wave 4, and only at the first interview of each individual. For this reason, the sample size will be lower when analyzing risk attitudes.

As wealth variables are defined at the household level, our sample consists of the heads of the households who were born in the country of interview and are aged between 50 and 90. We exclude from the sample households whose head or head's spouse migrated and who have therefore experienced different macroeconomic conditions. The head of the household is defined as the household's financial respondent.

A significant advantage for our analysis is that SHARELIFE, the retrospective questionnaire of SHARE, includes questions about a number of investments that respondents may have made during their life, namely: stocks or shares, mutual funds or managed investment accounts, individual

[8]The question reads: "When people invest their savings they can choose between assets that give low return with little risk to lose money, for instance a bank account or a safe bond, or assets with a high return but also a higher risk of losing, for instance stocks and shares. Which of the statements on the card comes closest to the amount of financial risk that you are willing to take when you save or make investments? 1. Take substantial financial risks expecting to earn substantial returns 2. Take above average financial risks expecting to earn above average returns 3. Take average financial risks expecting to earn average returns 4. Not willing to take any financial risks"

retirement account and life insurance policy. If respondents ever invested in any of these products, they are further asked the year they invested for the first time. Moreover, the accommodation section of SHARELIFE includes questions about the different places respondents have lived in during their life, and whether they, or their parents, were the owner of the residence. We complement this with information on the year in which respondents started to live on their own or established their own household to infer the age when they first acquired their own home.

Financial and accommodation questions in SHARELIFE are asked at the individual level to both household members. Therefore, when we analyze early saving decisions, our sample will consist of individuals (as opposed to households) who are born in the country of interview and are between 50 and 90 years old.

In the analysis we will include controls for households and individual characteristics, namely gender, education, employment status, total household income, marital status, number of children. In the robustness checks, we will also include a set of control variables as proxies of early childhood conditions. These come from both the regular waves and SHARELIFE interviews.[9]

In Table 1 we show descriptive statistics of the main control variables we use in the analysis. We also show the percentage of individuals owning any stock, which is on average 10%, and the percentage owning a house, on average 73%. Financial risk attitudes, measured on a scale from 1 to 4 as described above, are skewed towards the highest risk aversion level. In Table 2 we show the mean and the 25th, 50th and 75th percentiles of the main wealth outcome variables. All monetary values are expressed in German 2015 Euro.

3.2 Macroeconomic data

Historical data on GDP come from the Maddison database on Historical Statistics of the World Economy, which provides the widest coverage of data on GDP per capita across countries and over

[9]The early childhood condition variables include the number of rooms in the house where respondent was living at age 10 divided by the number of people living in the house, the number of books present in the house at 10, school performance at ten compared to the other children in the class, in mathematics and language respectively, and health at ten. School performance at ten is ranked from 1 ("much better") to 5 ("much worse").

time currently available (Bolt and van Zanden (2020)). As such, it is the best source of data for our analysis. The Maddison project aims at standardising historical national accounts to provide data on long term economic growth comparable across countries. Figure A.1 shows the evolution of per-capita GDP (in logarithm), by country, since 1900. The GDP series is expressed in 2011 US dollars.

4 Measures of experienced macroeconomic shocks

Our measure of macroeconomic shocks is based on Barro and Ursúa (2008), who define depressions as multi-year peak-to-trough GDP declines of at least 10 percent. Following this definition, we define our main measure of experienced depressions as a count variable of the depression years between a peak and a trough encompassing a GDP decline of at least 10%.

Local minima and maxima, or in other words potential trough and peaks, are identified over a two-period window. This means that log-GDP in each year is compared to that in the two preceding and consecutive years. Then, in order to be defined as peak or trough, candidate points have to satisfy a minimum phase length of 2 years and a minimum cycle length of 4 years, where phases are expansions and contractions and cycles are the periods between two peaks or two troughs. The values assigned to windows, phases and cycles are arbitrary. We run robustness checks to examine the sensitivity of our results to these assumptions.[10]

Figure 1 shows, for each country, the number of experienced macro shocks - calculated using the definition above - by cohort of birth. Of course, the decreasing number of shocks across cohorts can be in part explained by the fact that younger cohorts are observed only until a younger age. Nevertheless, substantial variation can be observed across the same birth cohorts in different countries and across different birth cohorts. Overall, this measure leads to a number of experienced depression years ranging from 0 to 21.[11]

In addition, based on the same definition of depressions, we construct a count variable of de-

[10] Barro and Ursúa (2008) do not explicitly make any assumption regarding minimum duration of phases and cycles and regarding the search window for peaks and troughs.

[11] Notice that the reason why Greece shows an increase in experienced depression years by cohort is that we are pooling over years 2005-2015, a time span that includes the Great Recession.

pression episodes, as opposed to depression years. Figure 2 shows that the number of experienced depression episodes ranges from 0 to 3.

Finally, we are interested in determining whether experiencing depressions in different periods of an individual's life-cycle holds a different weight in wealth accumulation. For this purpose, we construct three separate count variables of depression years experienced in the age categories 0-24, 25-49, and 50 or older, which broadly correspond to the standard definition of young, prime age and older individuals.[12] Depression years by age are displayed in Figure 3.

As first descriptive evidence, we plot in Figure 4 the cumulative sum of experienced depression years against net total wealth held in old-age, for five-year birth cohort bins. Each dot in the figure represents a specific country and birth cohort bin. Overall, we observe a negative relationship between depressions and wealth. This, however, might be also due to an age effect, if older individuals decumulate their wealth by dissaving.

The picture provides contrasting evidence when we look at different cohorts: while we observe a negative correlation between experienced depression years and net total wealth for younger cohorts, the opposite can be observed for the oldest cohorts in the sample. This might be due to survival bias: due to the socioeconomic gradient in health, individuals who have experienced more depression years, and that are more likely to be poor, are probably underrepresented in the oldest cohorts. Overall, this unconditional evidence does not easily allow separating the effect of interest from country, age and cohort effects.

5 Empirical strategy

Our basic empirical specification is the following:

$$Y_{itbc} = \alpha + \beta M_{tbc} + \theta X_{itbc} + \delta_c + \gamma_b + \mu_t + \epsilon_{itbc} \tag{1}$$

where Y_{itbc} is the outcome variable at time t for household i living in country c, whose head was

[12] Typically, the three age categories would be 0-24, 25-54, and 55 or older. However, because we select in our sample individuals who are 50 or older, the count variable for the third age category would be missing for individuals of age 50-54.

born in year b. We study several outcomes, including total net wealth, real wealth and financial wealth. Since the distribution of wealth is skewed, we use Recentered Influence Function (RIF) unconditional quantile regressions (Firpo et al., 2009) to recover treatment effects on the median and other quantiles of the wealth distribution. The advantage of unconditional quantile regression is that it marginalizes the effect over the distributions of other covariates in the model, thus providing more interpretable results than with conditional quantile regression (Borah and Basu, 2013). Furthermore, we will analyse stock ownership and risk aversion, using logit models as they are coded as binary variables.

M_{tbc} is the variable of interest, which measures experienced macroeconomic shocks of cohort b, interviewed in year t and resident in country c. M_{tbc} will be a count variable of experienced depression years or a count variable of experienced depression episodes, depending on the measure used.

In order to identify the effect of experienced macroeconomic shocks on wealth at older ages, we add fixed effects to control for potentially confounding unobservables. First, δ_c is a vector of country fixed effects that controls for unobserved shocks related to living in a particular country as well as fixed country-level characteristics. Second, γ_b is a vector of birth year fixed effects that remove any aggregate cohort effects. Third, μ_t is a vector of survey year fixed effects that control for national macroeconomic conditions in the year the outcome is measured. Because we can include as many country, age, cohort and time dummies as possible until the point they are not perfectly collinear,[13] we also run robustness analyses including ρ_a, a vector of age fixed effects that control for variations in wealth holdings related to the life cycle. As our results are virtually unaffected by the inclusion of age fixed effects, we prefer the more parsimonious specification. Finally, X_{itbc} is a vector of individual and household characteristics, including education, retirement status, total household income, marital status, number of children.

In order to analyse what periods of life are more sensitive to economic shocks, we run a second model that separately accounts for shocks experienced at different stages of one's life:

[13] See for instance Malmendier and Nagel (2011).

$$Y_{itbc} = \alpha + \beta_1 M^y_{tbc} + \beta_2 M^m_{tbc} + \beta_3 M^o_{tbc} + \theta X_{itbc} + \delta_c + \gamma_b + \mu_t + \epsilon_{itbc} \quad (2)$$

where M^y_{tbc},M^m_{tbc} and M^o_{tbc} are count variables of the depression years experienced at ages 0-24, 25-49 and 50 or older, respectively. In all models, we use clustered standard errors by country and year of birth, corresponding to the level of variation of macroeconomic shocks.

6 Results

6.1 The effect of macroeconomic shocks on wealth

Results based on equations (1) and (2) are shown in Tables 3 to 5, where the outcome variables are total net wealth and its real and financial components. In each table, column (1) shows the effect of having experienced one more depression year on wealth, while column (2) shows the effect of having experienced one more depression episode.

In table 3, we can observe a negative effect of depression years and depression episodes on total net wealth, even though only the effect of depression episodes is sizable and statistically significant. The interpretation of the coefficient of interest in Column (2) is that experiencing one additional depression episode reduces total median wealth by almost 11,000 €. This effect corresponds to 6% of median total wealth.

Furthermore, results in Column (3) tell us that depression years experienced by prime age and older individuals are the most detrimental to wealth accumulation. Each unit increase in depression years experienced at these ages reduces total median wealth by around 5%. Depressions experienced when young, on the contrary, seem to have a positive impact on median wealth, even though much smaller in size.

Next, we separately analyze the real and financial components of total wealth. Table 4 shows the effect of macroeconomic shocks on real wealth. We find that each depression episode decreases real median wealth by 6%. The effect of depression years is negative although not significant in Column

(1). When we analyse depression years experienced at different ages, though, we find a negative and significant effect of depressions experienced after the age of 25.

Finally, Table 5 shows the effect of macroeconomic shocks on financial wealth, which is substantial. Each depression episode reduces median financial wealth by 36%. As for real wealth, the effect is driven by depression years experienced after the age of 25.

To investigate the heterogeneous effects of experienced depressions across the wealth distribution, we report in Table 6 and 7 the estimates of unconditional quantile treatment effects obtained by RIF regressions (Firpo et al., 2009) for different quantiles of wealth. Table 6 reports the unconditional quantile treatment effects of experienced depression years on total, real and financial wealth. We observe a negative and significant effect on net total wealth at the 10th percentile, and a negative and significant effect on real wealth at the 10th percentile. The strongest effects are observed for net financial wealth. Interestingly, the effect of depression years on financial wealth is negative until the median, and turns positive as we move towards the 75th percentile. Table 7 reports the unconditional quantile treatment effects of experienced depression episodes. As expected, results are bigger in size. Moreover, we observe negative larger effects as we move up the distribution of total and real wealth. As regards financial wealth, we observe a U-shaped effect, even though the positive effect at the highest percentiles is not significant anymore.

The effect of depression years on wealth, especially when experienced at younger ages, might be mediated by childhood conditions. Therefore, in Table A.1 we run a robustness analysis where we include a set of variables accounting for individuals' childhood conditions. We find that they all have a significant effect on wealth later in life in the expected direction. Health and performance in mathematics and language at age ten have an inverse scale (the higher the value, the lower health or performance), therefore as expected we see that health and performance in mathematics at ten are positively correlated with wealth later in life. Results are less clear for language performance at ten, which seems negatively correlated to real wealth and stock ownership in the long-term, even though the effect is much smaller than that of performance in mathematics. The size of the house at age ten (conditional on the number of people living in the house) and the number of books available

in the accommodation at age ten are positively related to wealth in the long term. The coefficients of depression episodes, however, are only marginally affected by the introduction of early childhood conditions: conditional on given childhood conditions, experienced depression episodes have an independent effect on wealth later in life.

Finally, in Table A.2 we report results when excluding total household income, which could be endogenous in our model. All specifications appear robust to the exclusion of income.

6.2 The effect of macroeconomic shocks on risk taking

In this section, we study the ownership of stocks in order to gain some insights into the consequences of experienced macroeconomic shocks on the willingness to take financial risks. For this purpose, we create an indicator variable that takes value one if the household holds any stocks, and zero otherwise. In this model, we also control for liquid assets, given that stock market participation is increasing in liquid assets (Malmendier and Nagel, 2011).[14]

Average marginal effects from logit regressions are shown in Table 8. Each depression year is associated with a 0.3 percentage points lower probability to hold any stock, and individuals who experienced one more depression episode display almost 1 percentage points lower probability to hold any stock.[15] This corresponds to a 2% and 7% effect, respectively.[16] Interestingly, this effect seems to be driven by shocks experienced in the 0-24 age range. To ease the interpretation of these effects, we display in Figure **??** the predicted probability of stock ownership for individuals who experienced zero, five or ten years of depressions. Moving from zero to ten experienced depression years reduces the probability of stock ownership from more than 15% to around 12%.

We now turn to a direct measure of risk attitudes, using the SHARE question that elicits individuals' willingness to take financial risks on a scale from 1 to 4, where 1 indicates a willingness to "take substantial financial risk expecting to earn substantial returns" and 4 indicates "Not willing to

[14] Liquid assets are defined as stock holdings, plus bonds, mutual funds and bank accounts holdings.

[15] Stock ownership is a dummy equal to one if an individual holds a strictly positive amount in stocks, and equal to zero otherwise. Because SHARE provides an imputed variable of the amount held in bonds, stocks and mutual funds together, but not in stocks alone, we cannot define stock ownership using an imputed value. This explains the lower sample size in Table 8.

[16] Less than 15% of households in the sample own any stock.

take any financial risks". We model the cumulative probability of the four ordinal outcomes with an ordered probit model.

Results are shown in Table 9. The effect of experienced depression years and of experienced depression episodes is not significant. When exploring the age pattern of experienced depression years, we find that depression years experienced at earlier ages do not significantly affect risk aversion later in life. On the contrary, we find a positive and significant effect of depression years on risk aversion for shocks experienced after the age of 24.

Because the estimated coefficients of ordered probit models are not easy to interpret, we calculate the predicted probability of the fourth outcome (highest risk aversion) at zero, five and ten experienced depression years. We report predicted probability for this outcome because most individuals (almost 75% of the sample) report not being willing to take any financial risk. Results are shown in Figure 6. We observe that moving from zero to ten experienced depression years in middle-age increases the probability of reporting no willingness to take any financial risk from 75% to around 87%. The effect is somewhat smaller for depression years experienced when older: in this case, the probability increases from 75% to around 82%. The effect of depression years experienced when younger is negative but not statistically significant.

7 Macroeconomic shocks and early savings decisions

In our previous analyses, we have studied how experienced macroeconomic shocks can explain savings in the long run, when individuals are older than 50. We now ask whether experienced macroeconomic shocks affect initial investment and home-ownership decisions. Indeed, these choices might be sticky, so that earlier experiences might affect wealth and its composition later in life through the initial investment decision. This would imply that macroeconomic shocks do not only directly affect the size of wealth through, for instance, lower returns, but also through saving behaviour. Therefore, we now zoom into the timing of first investment decisions to provide evidence on whether experienced macroeconomic shocks explain the hazard of these decisions.

This is possible because SHARE data includes a retrospective survey, collected in wave 3 and wave 7, called SHARELIFE that focuses on respondents' life histories. SHARELIFE is unique in that it gathers detailed information about what happened in important areas of respondents' lives from their birth until the date of the interview. This includes information about partners and children, housing history, employment history and health. Importantly, it collects information on savings decisions made by individuals.

More specifically, all respondents are asked about a number of investments they may have made during their life, including stocks. If they have made any such investment, they are further asked in what year they invested for the first time in that specific investment type. Moreover, individuals are asked about their whole housing history. For each accommodation where they have lived for more than six months, they are further asked whether they lived there as an owner, a member of a cooperative, a tenant, or rent free. We complement this information with information on when individuals started to live on their own or established their own household to infer if and when they first became home owners.

The information contained in SHARELIFE allows us to construct a retrospective panel with yearly information on individuals' employment status, marital status, number of children, as well as time constant characteristics such as childhood conditions. We merge to this dataset an indicator of experienced macroeconomic shocks, which varies by year and country, and we create a cumulative measure of the total number of depression years experienced by each individual at each point in their lifetime.

In Table 10 we show the effect of experienced depression years on the hazard of home and stock ownership. In all models, we control for household and individual characteristics, as well as for early childhood conditions. Standard errors are clustered at the household level. We also include year of birth dummies, to control for any aggregate cohort effect.

Interestingly, we find a positive and significant effect of experienced depression years on the hazard of house ownership (Column 1). This means that each experienced depression year increases the probability of becoming home-owner by almost 3%. In terms of stock ownership, we find in

Column 2 that experienced depression years reduce the hazard of stock ownership by 2%.

These results highlight two important facts. First, macroeconomic experiences affect early savings decisions, which in turn can impact the trajectory of lifetime investments, ultimately leading to significantly different saving decisions in the long-run. This might be especially true for the investment in a house, which is likely to be more sticky than other types of investment. Second, living through an economic depression induces a shift in portfolio choices away from risky investments.

8 Conclusions

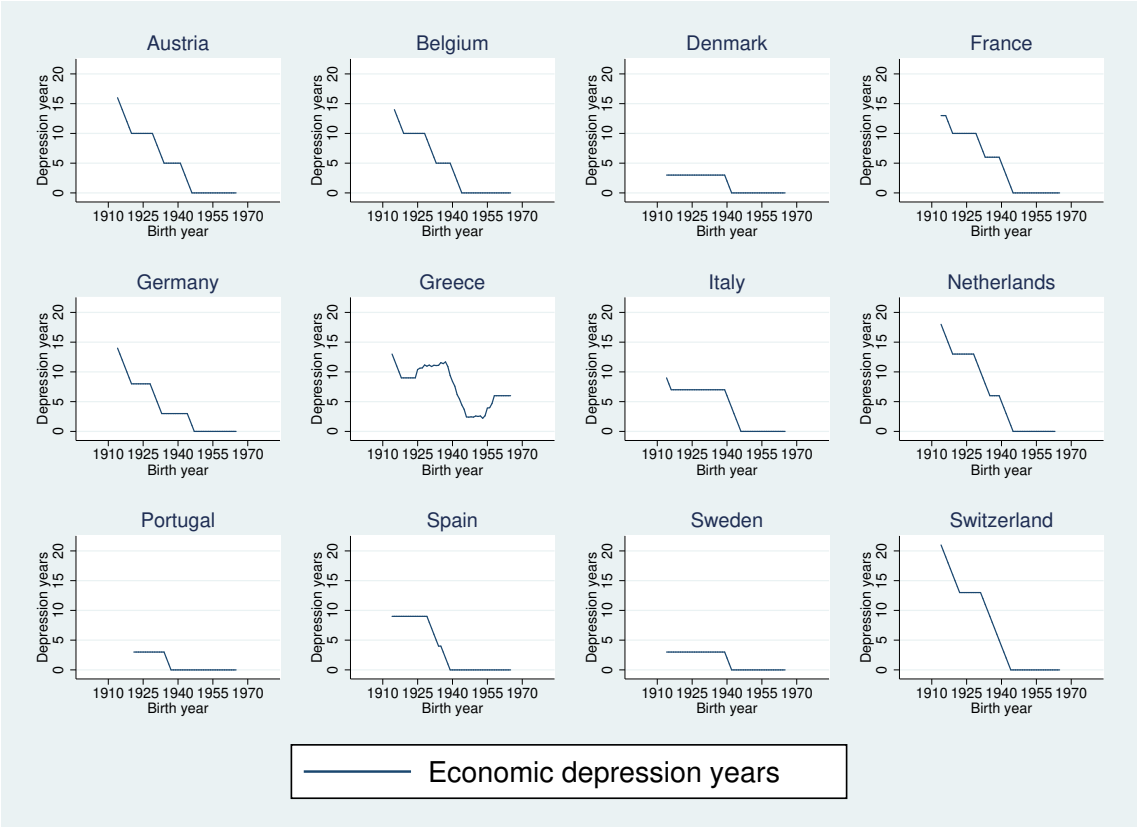
In this paper, we have studied what the long-term effects of experienced macroeconomic shocks are on wealth, portfolio choices and risk aversion of older individuals. Following Barro and Ursúa (2008), we have defined macroeconomic shocks as multi-year peak-to-trough GDP declines of at least 10 percent. We have drawn on very rich data on the current financial position and life-histories of a representative sample of the 50+ population in twelve countries. To understand the effect of depressions on the entire distribution of wealth, we have used a set of unconditional quantile regressions. Furthermore, to better understand the channels through which macroeconomic shocks shape long-term wealth, we have looked at risk aversion and the timing of the first investment decisions.

Our findings show that individuals who experienced more economic depression episodes have lower total wealth, lower real wealth and lower financial wealth in absolute terms. They also display a lower probability to invest in risky assets and higher risk aversion.

When analysing early investment decisions, we find that experienced depression years positively predict the hazard of an individual's first home-ownership, and negatively predict the hazard of first investment in stocks, pointing to a shift in portfolio choices away from risky investments. These early choices appear to be sticky and to shape wealth in the long-term, as we find a statistically significant positive effect of economic depression experienced when younger than 25 on real wealth when old, and a negative effect of economic depressions experienced when younger than 25 on stock ownership when old.

Our results may help shed some light on the different wealth and portfolio composition of different generations of Europeans. Moreover, studying the effect of negative macroeconomic shocks experienced at different stages of life on wealth accumulation is particularly important in light of the recent financial crisis and current pandemic.

Figure 1: Experienced depression years



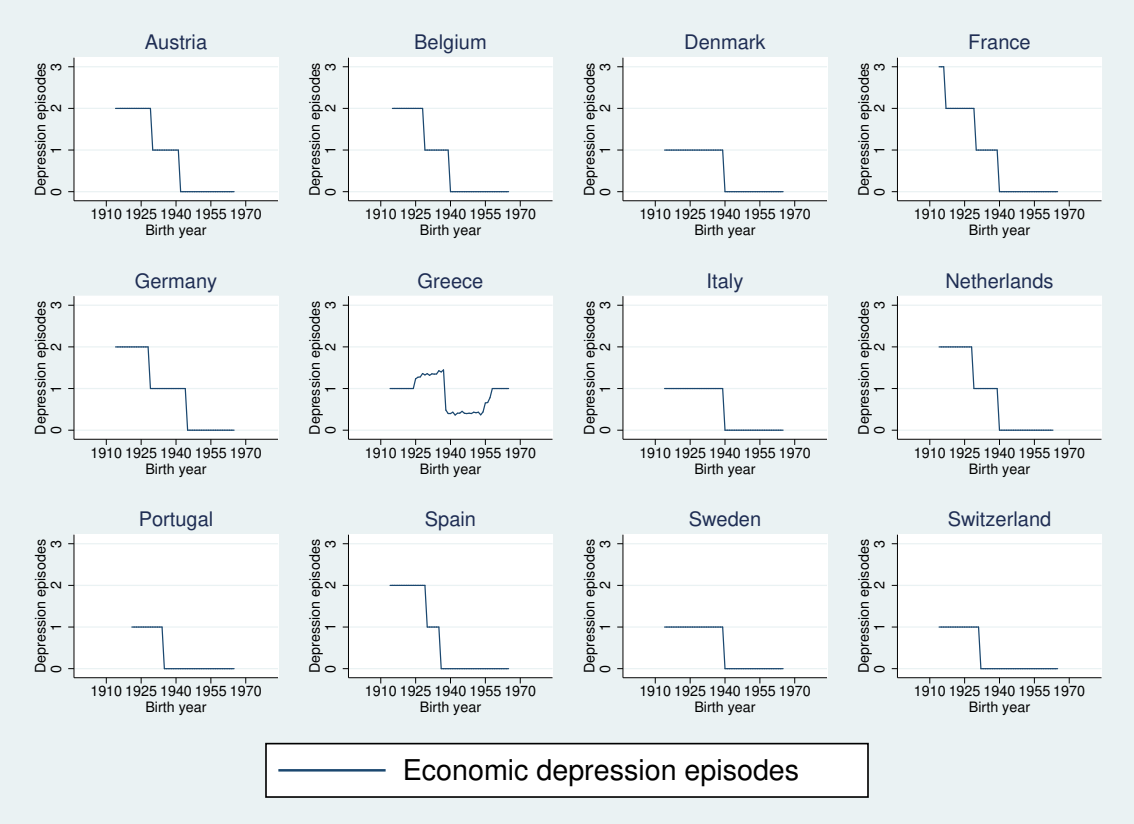
Notes: this graph displays the average number of experienced depression years of households in the sample, by country of interview.

Table 1: Descriptive statistics

VARIABLES	Mean	St. Dev.	Min	Max	N
Male financial respondent	0.43	0.50	0	1	100,048
Age	67.01	10.74	50	90	100,048
Year of birth	1,943	11.34	1,914	1,965	100,048
Married	0.59	0.49	0	1	100,048
Number of children	2.03	1.44	0	19	100,048
Years of education	10.16	4.64	0	25	100,048
Retired	0.52	0.50	0	1	100,048
Stock ownership	0.1	0.30	0	1	97,292
Home ownership	0.73	0.44	0	1	100,048
Risk attitudes	3.72	0.56	1	4	37,416

Notes: This table shows the mean, standard deviation, maximum and minimum values, and number of observations for a selection of variables, computed on a sample that includes twelve European countries (Austria, Belgium, Denmark, France, Germany, Greece, Italy, the Netherlands, Portugal, Spain, Sweden and Switzerland), over the period 2004-2015.

Figure 2: Experienced depression episodes



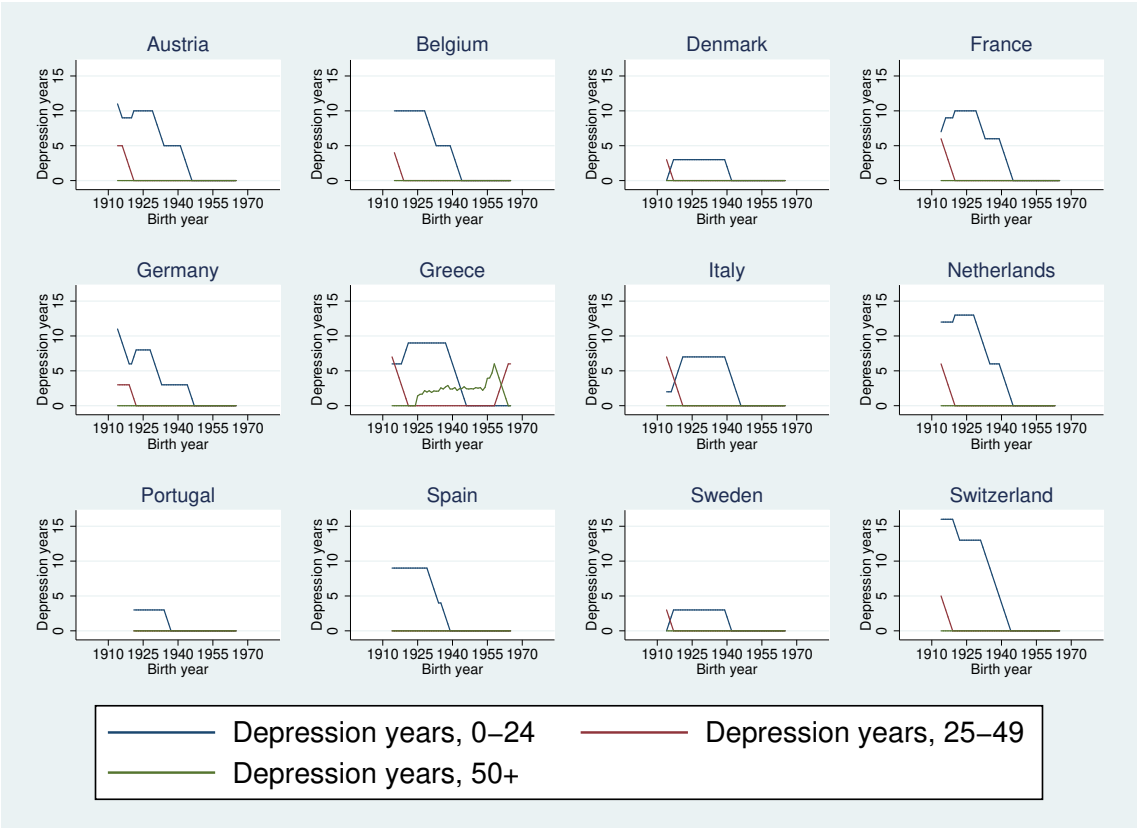
Notes: this graph displays the average number of experienced depression episodes of households in the sample, by country of interview.

Table 2: Descriptive statistics of monetary values

VARIABLES	Mean	p25	p50	p75	N
Total household income	32,336.22	12,842.79	22,112.53	38,412.40	100,048
Total net wealth	268,343.52	54,790.15	179,750.15	339,019.36	100,048
Total real wealth	229,867.70	19,793.48	157,135.88	293,116.83	100,048
Total financial wealth	38,475.81	219.70	7,658.15	37,949.03	100,048

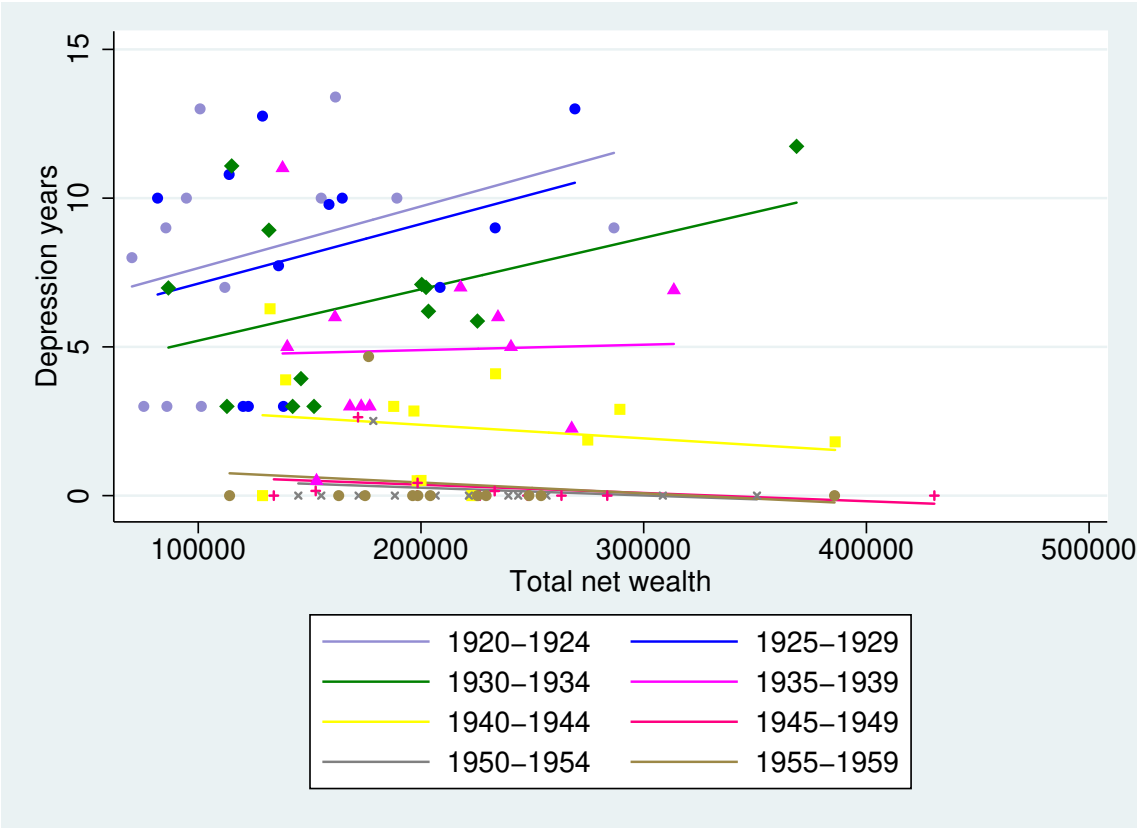
Notes: Monetary values are expressed in German 2015 Euro.

Figure 3: Experienced depression years, by age



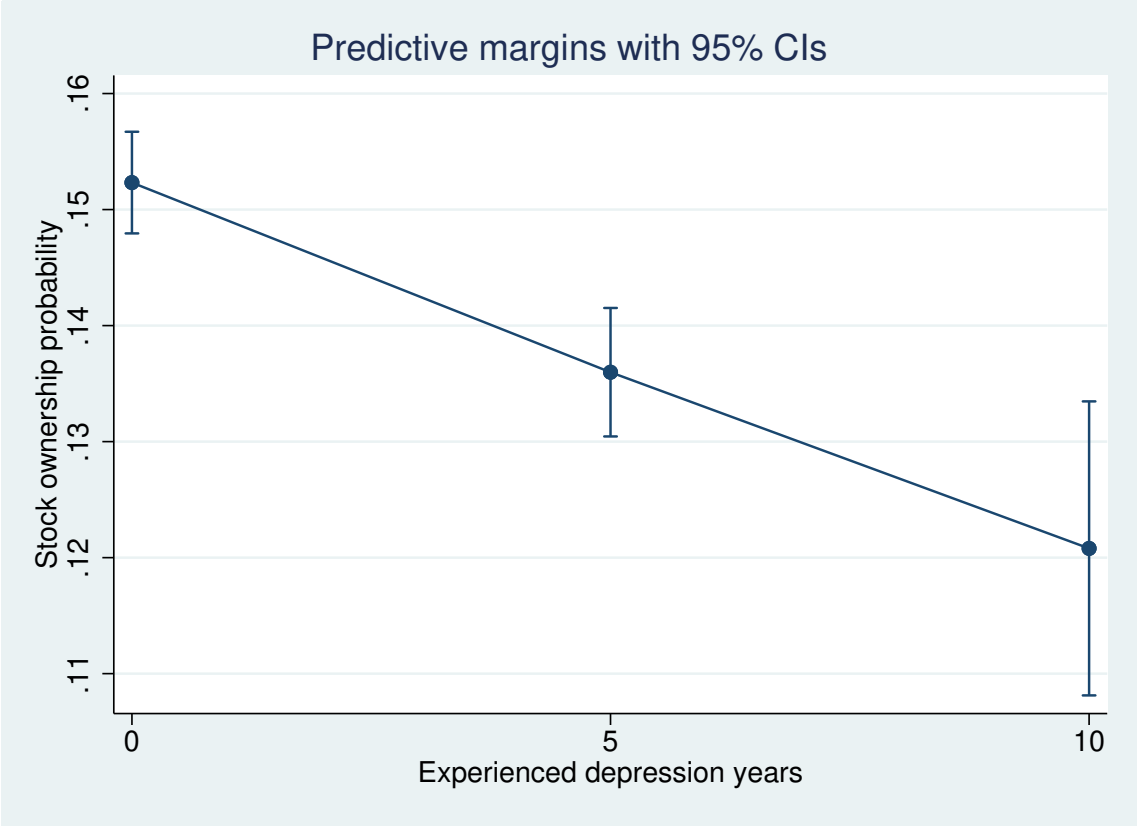
Notes: this graph displays the average number of experienced depression years of households in the sample, by country of interview and age at the event.

Figure 4: Net total wealth, by cohort of birth



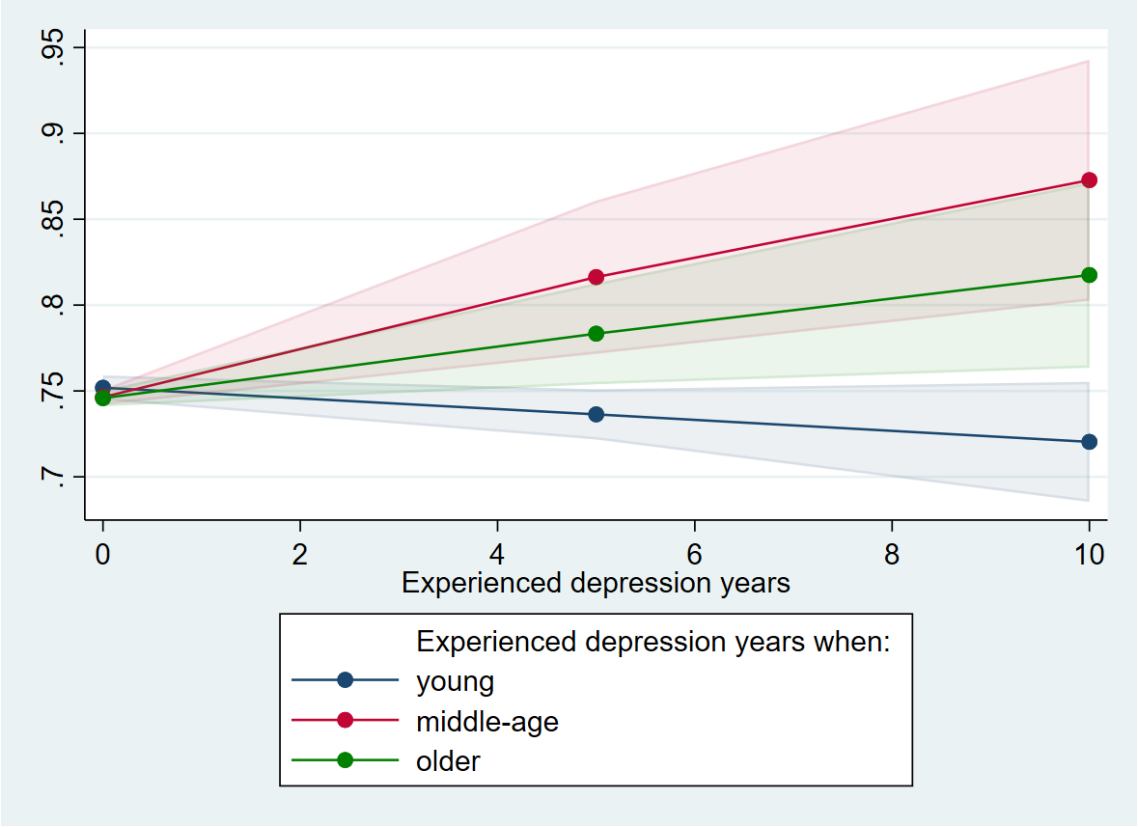
Notes: this graph plots the count of experienced depression years against net total wealth held in old-age against number of experienced depression years, by cohort of birth. Each dot in the figure represents a specific country and birth cohort bin.

Figure 5: Predicted probabilities of stock ownership



Notes: this figure displays predicted probabilities of stock ownership, using a logit model and specification (1).

Figure 6: Predicted probabilities of highest risk aversion



Notes: this figure displays predicted probabilities for outcome 4 ("Not willing to take any financial risk"), using an ordered probit model of the willingness to take financial risk and specification (2).

Figure 7: Failure curves

Notes: this figure displays failure curves of time to first house ownership and first stock ownership by country.

Table 3: Macroeconomic shocks and total net wealth. Median regressions.

VARIABLES	(1) Total Net Wealth	(2) Total Net Wealth	(3) Total Net Wealth
Depression years	-286.7		
	(745.6)		
Depression episodes		-10,918***	
		(4,143)	
Depression years, age 0-24			2,419***
			(750.7)
Depression years, age 25-49			-9,428***
			(2,299)
Depression years, age 50+			-9,943***
			(1,065)
Observations	100,103	100,103	100,103
R^2	0.171	0.172	0.172
Country FE	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports the effects experienced depression years or episodes on median wealth, estimated via Recentered Influence Function (RIF) unconditional quantile regressions. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

Table 4: Macroeconomic shocks and real wealth. Median regressions.

VARIABLES	(1) Real Wealth	(2) Real Wealth	(3) Real Wealth
Depression years	-868.8		
	(637.0)		
Depression episodes		-9,354***	
		(3,548)	
Depression years, age 0-24			1,204*
			(651.1)
Depression years, age 25-49			-6,797***
			(2,188)
Depression years, age 50+			-8,356***
			(992.4)
Observations	100,103	100,103	100,103
R^2	0.165	0.165	0.166
Country FE	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports the effects experienced depression years or episodes on median wealth, estimated via Recentered Influence Function (RIF) unconditional quantile regressions. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

Table 5: Macroeconomic shocks and financial wealth. Median regressions.

VARIABLES	(1) Financial Wealth	(2) Financial Wealth	(3) Financial Wealth
Depression years	-180.6		
	(113.6)		
Depression episodes		-2,726***	
		(634.7)	
Depression years, age 0-24			324.8***
			(112.4)
Depression years, age 25-49			-1,596***
			(446.6)
Depression years, age 50+			-2,009***
			(153.4)
Observations	100,103	100,103	100,103
R^2	0.212	0.212	0.213
Country FE	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports the effects experienced depression years or episodes on median wealth, estimated via Recentered Influence Function (RIF) unconditional quantile regressions. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

Table 6: Unconditional quantile treatment effect of depression years on wealth

VARIABLES	(1) q10	(2) q25	(3) q50	(4) q75	(5) q90
Total net wealth	-415.4*	-805.3	-286.7	641.6	905.5
	(227.9)	(766.6)	(745.6)	(1,230)	(2,419)
Real wealth	-41.81*	161.3	-868.8	-846.3	-1,656
	(22.66)	(515.5)	(637.0)	(942.7)	(2,002)
Financial wealth	-190.9***	-170.4***	-180.6	1,062***	2,766***
	(20.45)	(37.49)	(113.6)	(364.2)	(1,021)
Observations	100,103	100,103	100,103	100,103	100,103
Country FE	Yes	Yes	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the unconditional quantile treatment effects of experienced depression years on wealth. Unconditional quantile treatment effects are estimated via Recentered Influence Function (RIF) regressions. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

Table 7: Unconditional quantile treatment effect of depression episodes on wealth

VARIABLES	(1) q10	(2) q25	(3) q50	(4) q75	(5) q90
Total net wealth	-2,561*	-8,973**	-10,918***	-15,475**	-18,324
	(1,346)	(4,324)	(4,143)	(6,693)	(13,603)
Real wealth	-379.6***	-1,926	-9,354***	-13,828**	-14,230
	(116.1)	(2,878)	(3,548)	(5,399)	(11,326)
Financial wealth	-856.9***	-711.9***	-2,726***	-2,290	3,012
	(156.4)	(217.5)	(634.7)	(1,990)	(5,195)
Observations	100,103	100,103	100,103	100,103	100,103
Country FE	Yes	Yes	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes

Notes: The table reports the unconditional quantile treatment effects of experienced depression episodes on wealth. Unconditional quantile treatment effects are estimated via Recentered Influence Function (RIF) regressions. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Macroeconomic shocks and stock ownership

VARIABLES	(1) Stock ownership	(2) Stock ownership	(3) Stock ownership
Depression years	-0.00326***		
	(0.000884)		
Depression episodes		-0.00981*	
		(0.00561)	
Depression years, age 0-24			-0.00376***
			(0.000926)
Depression years, age 25-49			0.00307
			(0.00785)
Depression years, age 50+			0.00431
			(0.00300)
Observations	97,327	97,327	97,327
Country FE	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports average marginal effects. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income and liquid assets as control variables. *** p<0.01, ** p<0.05, * p<0.1

Table 9: Risk aversion, ordered probit

VARIABLES	(1) Risk aversion	(2) Risk aversion	(3) Risk aversion
Depression years	-0.0115		
	(0.00709)		
Depression episodes		0.00770	
		(0.0427)	
Depression years, age 0-24			-0.0110
			(0.00711)
Depression years, age 25-49			0.0541***
			(0.0196)
Depression years, age 50+			0.0278**
			(0.0120)
Observations	37,435	37,435	37,435
Country FE	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

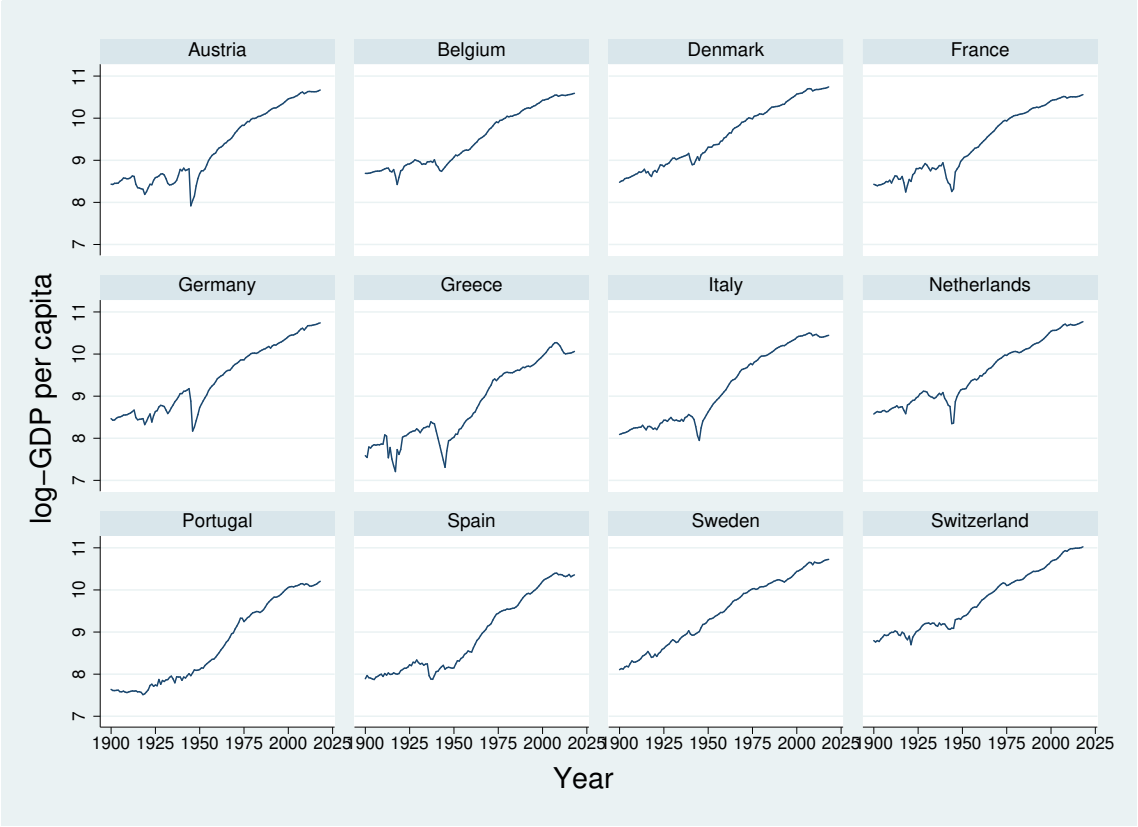
Table 10: Cox PH model

VARIABLES	(1) Home ownership	(2) Stock ownership
Depression years	1.028***	0.980**
	(0.00628)	(0.00914)
Married	2.379***	1.179***
	(0.0525)	(0.0338)
Number of children	0.998	0.938***
	(0.00761)	(0.00916)
Employee or self-employed	1.491***	1.756***
	(0.0274)	(0.0604)
Retirement spell	1.405***	1.600***
	(0.0649)	(0.0856)
house_size_ten	1.065***	1.167***
	(0.0174)	(0.0255)
books_ten	1.046***	1.155***
	(0.00670)	(0.0105)
perform_math_ten	0.940***	0.814***
	(0.00776)	(0.0102)
perform_lang_ten	0.991	0.959***
	(0.00855)	(0.0122)
health_ten	0.960***	0.972***
	(0.00677)	(0.0102)
Observations	700,164	1,831,357
Individuals	32,349	41,881
Country FE	Yes	Yes
Birth year FE	Yes	Yes

Notes: This table shows Cox Proportional Hazard models of time to first home ownership and first stock ownership. *** p<0.01, ** p<0.05, * p<0.1

A Appendix

Figure A.1: GDP per capita by country



Notes: this figure displays the evolution of log-GDP per capita in years 1900 to 2015, by country .

Table A.1: Childhood conditions controls. Median regressions.

VARIABLES	(1) Total Net Wealth	(2) Real Wealth	(3) Financial Wealth
Depression episodes	-11,696**	-10,555***	-2,972***
	(4,535)	(3,865)	(827.0)
house_size_ten	34,628***	28,309***	3,479***
	(3,097)	(2,774)	(490.5)
books_ten	9,784***	7,123***	1,243***
	(1,158)	(1,042)	(174.6)
perform_math_ten	-17,504***	-13,630***	-2,696***
	(1,489)	(1,308)	(238.7)
perform_lang_ten	3,717**	2,749**	233.7
	(1,568)	(1,326)	(247.8)
health_ten	-8,716***	-6,296***	-1,295***
	(1,029)	(910.0)	(180.4)
Observations	83,899	83,899	83,899
R^2	0.179	0.171	0.215
Country FE	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports the effects experienced depression years or episodes on median wealth, estimated via Recentered Influence Function (RIF) unconditional quantile regressions. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

Table A.2: Robustness to HH income exclusion. Median regressions.

VARIABLES	(1) Total Net Wealth	(2) Real Wealth	(3) Financial Wealth
Depression episodes	-13,929***	-11,596***	-3,314***
	(4,280)	(3,612)	(674.6)
Observations	100,103	100,103	100,103
R^2	0.163	0.159	0.198
Country FE	Yes	Yes	Yes
Birth year FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: The table reports the effects experienced depression years or episodes on median wealth, estimated via Recentered Influence Function (RIF) unconditional quantile regressions. Standard errors clustered by country and year of birth in parentheses. The regression includes marital status, number of children, education level, retirement status and total household income as control variables. *** p<0.01, ** p<0.05, * p<0.1

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