# Formative Experiences and Portfolio Choice: Evidence from the Finnish Great Depression

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### ABSTRACT

We trace the impact of formative experiences on portfolio choice. Plausibly exogenous variation in workers' exposure to a depression allows us to identify the effects and a new estimation approach makes addressing wealth and income effects possible. We find that adversely affected workers are less likely to invest in risky assets. This result is robust to a number of control variables and it holds for individuals whose income, employment, and wealth were unaffected. The effects travel through social networks: individuals whose neighbors and family members experienced adverse circumstances also avoid risky investments.

THE LARGE DEGREE OF HETEROGENEITY in how individuals construct financial portfolios poses a challenge for theory and empirical work. Studies of twins deepen the puzzle by showing that genetically inherited traits and family background cannot account for the variation in portfolio choice. Likewise, observable characteristics over and above genetic makeup and family environment do

little to explain portfolio heterogeneity.[1] These patterns suggest the answers to the heterogeneity puzzle may lie in the events and circumstances individuals experience during their lifetimes.

Experiences may influence portfolio choice through the formation of beliefs and preferences. Although psychologists and sociologists have long acknowledged that experiences can have a long-lasting impact on people (see Elder (1998) for a review), economists have only recently started investigating the impact of such formative experiences on financial decision making (Malmendier and Nagel (2011, 2016)). In this paper, we extend this line of research by investigating how formative experiences contribute to the large degree of heterogeneity in household portfolios.

The Finnish Great Depression of the early 1990s, combined with rich register-based data, allows us to solve three challenges that plague attempts to identify the impact of formative experiences on portfolio choice. First, the events and circumstances people experience should relate to the formation of beliefs and preferences. We analyze how experiences of labor market distress influence long-run portfolio choice. Experiencing a job loss, facing difficulties in job search, and seeing other workers laid off can lead individuals to hold more pessimistic beliefs, reduce their appetite for risk, and shatter their trust in financial markets.[2]

Second, individuals may experience different events and circumstances because they are different in ways that are unobservable to the econometrician.[3] Variation across local labor markets solves this identification problem. The depth of the Finnish Great Depression and its root causes—the collapse of the Soviet Union in 1991 and a twin currency-banking crisis[4]—meant many local labor markets experienced unexpected and severe disruptions. We show that the exposure to adverse labor market conditions is plausibly exogenous to worker characteristics and hence allows us to identify the impact of labor market experiences on portfolio choice.

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[1] Bertaut and Starr-McCluer (2002), Calvet, Campbell, and Sodini (2007), Curcuru et al. (2010), Guiso and Sodini (2013), Haliassos and Bertaut (1995), and Heaton and Lucas (2000) document portfolio heterogeneity. Barnea, Cronqvist, and Siegel (2010), Cesarini et al. (2010), and Calvet and Sodini (2013) use register-based twin data to analyze the determinants of portfolio choice.

[2] During the 2007 to 2009 Great Recession, approximately one in six workers in the U.S. labor force experienced a job loss (Farber (2011)). Labor market distress was not solely confined to job losers: more than one-third of workers expressed anxiety about layoffs, wage cuts, shorter hours, and difficulties in finding a good job (Davis and von Wachter (2011)).

[3] For example, more risk-averse individuals may experience fewer adverse events because they choose a safer environment, but at the same time their risk aversion makes them less likely to invest in risky assets. This behavior would generate a spurious positive correlation between adverse experiences and risky investment.

[4] From 1991 to 1993, Finland's real Gross Domestic Product (GDP) fell by 10% and its unemployment rate rose quickly from 3% to 16%. The collapse of the Soviet Union in 1991 induced large output contraction in industries involved in barter trade between Finland and the USSR (Gorodnichenko, Mendoza, and Tesar (2012)). The export shock was amplified by a twin currency-banking crisis that is typically attributed to financial deregulation and credit expansion in the 1980s and to attempts to defend the currency peg (Honkapohja et al. (2009), Jonung, Kiander, and Vartia (2009), Gulan, Haavio, and Kilponen (2014)).

Third, experiences may not only influence portfolio choice through their effects on preferences and beliefs, but also affect other determinants of financial decisions, such as income and wealth.[5] Controlling for contemporaneous income and wealth does not necessarily solve this challenge because income and wealth are potential outcomes of labor market conditions (Angrist and Pischke (2009)). We develop an alternative approach that leverages the great amount of detail in the data to isolate experiences that likely do not correlate with wealth, income, or other determinants of portfolio choice. These settings analyze the influence of secondhand experiences gained through the network of an individual's neighbors and family members.

Our measure of local labor market conditions stratifies the data according to each worker's region and occupation, and calculates how the rate of unemployment in each region-occupation cell changed compared to years prior to the depression. We then relate labor market conditions to investment in risky assets measured more than a decade after the depression. Importantly, the employment histories that feed into the calculation of labor market conditions and the asset holdings that determine our measure of investment in risky assets do not suffer from measurement error caused by recall biases in surveyed employment histories or by imprecise reporting of asset holdings.[6]

Our way of measuring labor market experiences captures local labor market conditions that are unrelated to worker characteristics. Conditional on fixed effects for regions and occupations, a number of observable worker characteristics measured prior to the depression do not correlate with labor market experiences during the depression. Most importantly, labor market conditions during the depression do not relate to investment in risky assets prior to the depression. This falsification exercise suggests omitted variables are unlikely to explain our results.

We find that experiences of adverse labor market conditions are associated with less long-term investment in risky assets. The estimates suggest the stock market participation rate, more than a decade after the depression, was 2.8 to 3.6 percentage points lower for workers who experienced a one-standard-deviation deterioration in labor market conditions. The $t$-values, clustered at the level of local labor markets, range from –5.9 to –6.0. This effect is large given that the unconditional stock market participation rate in our sample is 22%. The reductions in risky investment also extend to other asset classes. Adverse labor market conditions are associated with less investment in fixed income

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[5] These factors play a key role in determining risky investment in theories of household portfolio choice (see Campbell (2006) and Guiso and Sodini (2013) for reviews).

[6] The main survey used to assess job losses in the United States, the Displaced Workers Survey (DWS), suffers from recall bias due to its long recall period (five years in the early years of the survey, three in the later years). For example, the number of displaced workers in 1987 is dramatically different when estimated based on answers to the January 1988 wave (2.3 million) and the January 1992 wave (1.3 million). See Appendix A in Congressional Budget Office (1993) and Evans and Leighton (1995).

funds, balanced funds, and derivatives. These effects suggest labor market disruptions affect the extensive margin of having any risky investments.[7]

Is the reduction in risky investment driven solely by changes in income, employment, and wealth accumulation? We examine this question by investigating the experiences of an individual's neighbors and family members. Because these secondhand experiences do not predict the individual's labor income, employment, or wealth accumulation in the data, other factors must be driving the effects on risky investment.

The analyses of secondhand experiences suggest a reduction of 0.4 to 0.6 percentage points in risky investment for a one-standard-deviation worsening in the neighbors', siblings', and parents' labor market conditions. Comparing these estimates to the magnitudes we obtain for firsthand experiences suggests at least 11% of the effect of labor market experiences on risky investment cannot be attributed to the wealth, income, and employment channels. We interpret this number as a lower bound because secondhand experiences likely exert less influence than personal firsthand experiences. Consistent with this conjecture, we find a reduction of 1.2 percentage points in regressions of firsthand experiences that explicitly control for postdepression labor market outcomes and wealth accumulation.

Taken together, our findings lead us to conclude that labor market experiences, which are just one dimension of the many different events and circumstances individuals may experience, generate portfolio heterogeneity that individual-specific characteristics observable in a typical data set do not fully explain. More broadly, our results suggest that experiences can have a long-term impact on the formation of beliefs and preferences. Our paper relates to four strands of research. First, we contribute to the literature that studies how personal experiences influence investment decisions. Chiang et al. (2011), Choi et al. (2009), Kaustia and Knüpfer (2008), and Odean, Strahilevitz, and Barber (2011) analyze the role prior investment experiences play in determining Initial public offering (IPO) subscriptions, retirement savings decisions, and stock purchases. These papers focus on relatively short-term experiences and do not address portfolio heterogeneity. In their analysis of cohort-specific macroeconomic experiences, Malmendier and Nagel (2011, 2016) find that the history of experienced stock returns and inflation is associated with investment decisions and beliefs. Our focus is different because we study the permanent mark labor market experiences leave on households' financial portfolios. These experiences are measured from the cross-section of labor market conditions and thus vary within cohorts. This within-cohort variation can contribute to portfolio heterogeneity over and above any macroeconomic experiences captured by cohort effects. Nevertheless, when many workers share the same experiences, they can sideline large groups of individuals from participating in risky asset markets and generate systematic patterns in aggregate demand for risky assets.

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[7] We do not find an effect on the intensive margin: portfolio volatility, beta, and idiosyncratic risk are not reliably related to labor market experiences. The impact of labor market conditions on the extensive margin might mask the true effect on the intensive margin.

Second, we share a theme with the few papers that use data on twins to shed light on portfolio heterogeneity. Barnea, Cronqvist, and Siegel (2010) and Cesarini et al. (2010) show that genetic factors and family environments explain only a small share of the variation in household portfolios. These papers point to experiences as a catch-all explanation for the remaining variation, whereas our paper measures specific experiences and investigates their impact on portfolio choice. The focus on labor market conditions and their long-term impact also sets our paper apart from Calvet and Sodini (2013), who use a twin design to estimate the relation between wealth and risky investment.

Third, we add to the literature that studies intergenerational transmission of beliefs and attitudes toward risk. Charles and Hurst (2003) document positive parent-child correlations in wealth accumulation and stock market participation and Dohmen et al. (2012) report similar correlations in survey-based measures of risk attitudes and trust. Our results suggest that personal formative experiences whose consequences carry over to future generations may contribute to intergenerational correlations. In addition, our analyses of family members and neighbors suggest that the consequences of formative experiences may spread in the population through interpersonal information-sharing or observational learning.

Finally, we contribute to the literature that studies the impact of labor market conditions on long-run earnings and unemployment (e.g., Jacobson, LaLonde, and Sullivan (1993), Oyer (2008), von Wachter, Song, and Manchester (2009), Couch and Placzek (2010), Kahn (2010), Davis and von Wachter (2011), Oreopoulos, von Wachter, and Heisz (2012)). Our paper adds a new dimension to the effects associated with living through adverse labor market conditions. The intergenerational results also relate to papers that study the impact of parents' job losses on children's long-term outcomes (Bratberg, Nilsen, and Vaage (2008), Oreopoulos, Page, and Stevens (2008), Rege, Telle, and Votruba (2011)).

The remainder of this paper is organized as follows. Section I introduces the timeline of the events, the data sources, and the empirical strategy. Section II presents results on the impact of firsthand labor market experiences on risky investment. Section III analyzes the impact of secondhand labor market experiences. Section IV concludes.

## I. Timeline, Data, and Empirical Strategy

### A. Timeline

This section details the timing of events and describes the measurement of the predepression control variables, labor market conditions, and postdepression outcomes. What were the main features of the Finnish Great Depression? Its scale was unusual: no other Organisation for Economic Co-operation and Development (OECD) country had experienced such a severe economic contraction since the 1930s. Figure 1 plots the real Gross Domestic Product (GDP) and unemployment rate from 1980 to 2005. Real GDP fell by 10%, and the unemployment rate increased from 3% to 16% between 1990 and 1993. Although
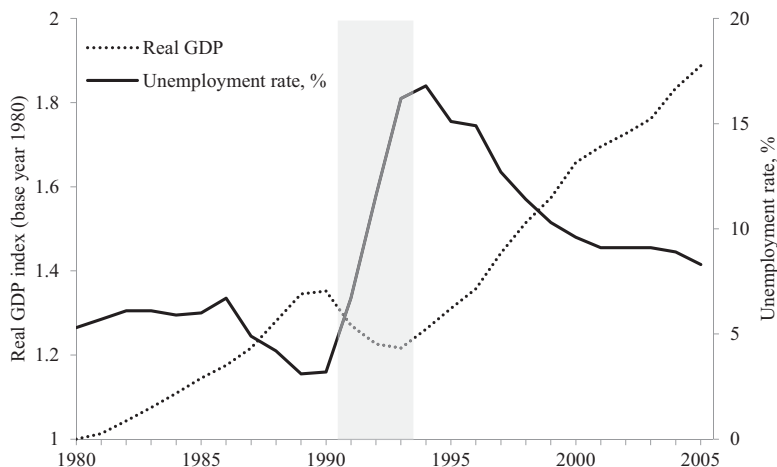
**Figure 1.  Unemployment rate and real Gross Domestic Product (GDP) growth around the Finnish Great Depression.** The graph depicts the annual rate of unemployment and annual real GDP in Finland from 1980 to 2005. The shaded area highlights the Finnish Great Depression from 1991 to 1993.

GDP started to recover at the end of 1993, it reached its 1990 level only in 1996. The unemployment rate remained above 10% until 1999.

The causes of the depression were twofold. First, the collapse of the Soviet Union in 1991 generated large output contraction. Gorodnichenko, Mendoza, and Tesar (2012) discuss why the collapse was so detrimental for Finland. Soviet trade accounted for about 20% of Finnish exports during the 1980s, with some industries, such as shipbuilding and railroad equipment manufacturing, exporting more than 80% of their goods to the USSR. The products exported to the USSR were often specialized and could not be sold easily to other countries (e.g., railroad equipment manufacturing using Russian track gauge). The overvalued terms of trade in the barter arrangements that exchanged the exported goods for oil and gas meant that the effective price of Soviet imports was significantly lower than their market price, resulting in an up-hike in energy prices when the Soviet Union collapsed. The trade shock was also largely unexpected. The Soviet Union cancelled the trade arrangements on December 6, 1990 without a transitional period and the Finnish firms did not seem to anticipate the shock.

The second factor contributing to the depression was a twin currency-banking crisis (Honkapohja et al. (2009), Jonung, Kiander, and Vartia (2009)). A few years prior to the depression, regulation concerning domestic bank-lending rates was abolished, and foreign private borrowing was allowed. Finland's currency remained pegged, and foreign loans, which had significantly lower nominal interest rates, appeared attractive: 25% of new borrowing was in foreign currency. These policies led to a significant increase in capital inflows and bank lending, and while the economy was booming in the late 1980s, the financial sector became fragile.
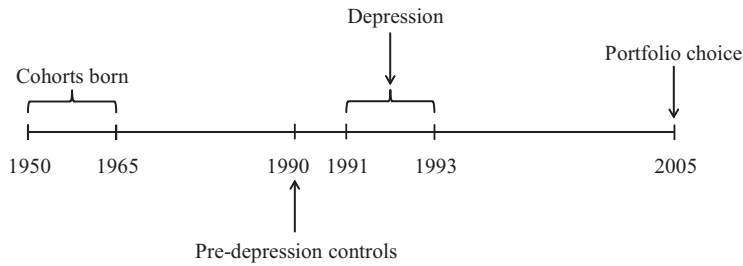
**Figure 2. Timeline of events and measurement.** The sample consists of subjects born between 1950 and 1965 who are employed at the end of 1990 when the predepression controls are measured. Labor market conditions are measured during the 1991 to 1993 depression, and the portfolio choice variable comes from 2005.

Attempts to moderate the boom and defend the currency peg against speculative attacks led to a sharp increase in real interest rates. The defense ultimately failed, with the currency devalued and floated in November 1991 and September 1992, respectively. Increases in debt burdens denominated in foreign currency trumped benefits to exporting firms. Declines in asset prices and increases in credit losses contributed to a banking crisis, which likely further affected consumption and investment through the classic credit channel (Bernanke (1983)).

Figure 2 summarizes the timeline of events and the time at which we measure the key variables. Our primary sample includes individuals born between 1950 and 1965. We measure predepression control variables at the end of 1990, the year prior to the beginning of the depression.[8] We measure labor market conditions over 1991 to 1993 and investigate their impact on portfolio choice we observe, based on asset holdings, in 2005. We also use data on labor income, unemployment incidence, and wealth accumulation in the 12-year postdepression period ranging from 1994 to 2005.

## B. Data

The data originate from two official primary sources that include a personal identification number used to merge the data.

### B.1. Statistics Finland (SF)

The first source provides us with the population of individuals. For our main analyses, we use individuals born between January 1, 1950 and December 31, 1965. This restriction ensures that the individuals are both still in the labor

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[8] We have experimented with assigning the local labor market and the control variables based on 1987 or 1989. The results, reported in Table IA.I of the Internet Appendix, show that the effects inversely relate to the length of the period from measurement to the onset of the depression. The Internet Appendix is available in the online version of this article on the *Journal of Finance* website.

force in 2005 when we measure their portfolio choice and not too young in 1990 when we measure predepression characteristics.[9] To be included in the final sample, we further require that the subjects are in labor force and that we have full information on their employer at the end of 1990. This restriction leaves us with 838,881 individuals of the total 1,250,362 individuals in the cohorts we use in our sample.[10]

The data from SF pool together information from a number of administrative registers held by different authorities. The unemployment data record the number of months a subject was unemployed in a given year. The Ministry of Labor collects these data from the Regional Employment Offices that register unemployed workers. The incentives to register as an unemployed worker are strong because registration is a requisite for claiming unemployment benefits. Other information from SF includes field and level of education, sector and region of the subject's employer, occupation (326 professions aggregated into 71 occupations), year of birth, gender, marital status, and native language (Finland has two official languages, Finnish and Swedish). These data are drawn from the records at the Finnish Tax Administration (FTA), the Ministry of Education, and the Population Register Center. The latter data source also gives us the family relationships that make linking each individual to their parents possible. It further includes the individual's place of residence, at the level of 3,096 zip codes and 12 regions. The regions correspond to the largest cities supplemented with their neighboring municipalities.

### B.2. Finnish Tax Administration

The second data source records information on income, assets, and liabilities of our sample subjects. The FTA collects these data to calculate the taxes levied on income and wealth. We use the FTA's data on labor income and the taxable values of assets and outstanding liabilities. Euroclear Finland delivers stock ownership data to the FTA, and the data contain the year-end number and value of shares held by an individual in each stock listed on the Helsinki Stock Exchange. We link the stock ownership data with monthly stock returns from the Helsinki Stock Exchange in our calculation of portfolio characteristics. Mutual fund companies directly deliver mutual fund ownership data to the FTA. These records indicate the mutual funds in which an individual has invested and the year-end market value of each holding. We supplement these data with information from the Mutual Fund Report (a monthly publication

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[9] The individuals in our sample are old enough to have completed their studies by the age of 25 in 1990 and are also below the mandatory retirement age of 65 in 2005. During our sample period, the early-retirement schemes the Finnish government provides apply only to individuals born before 1950.

[10] An individual can only leave the sample due to death. Regressions of mortality on labor market conditions, reported in Panel A of Table IA.II of the Internet Appendix, show that labor market conditions are associated with mortality (in line with Sullivan and von Wachter (2009)). However, in Panel B of Table IA.II of the Internet Appendix, we find that assuming all the deceased workers had not participated in the stock market changes the estimates little.

detailing fund characteristics) on the asset class in which a fund invests and monthly returns on each mutual fund. Grinblatt et al. (2016) provide additional details on the mutual fund data. The stock and mutual fund holdings are available for 2005. We also obtain a proxy for stock market participation from the FTA based on an individual reporting realized capital gains in any of the years between 1987 and 1990.

## C. Identification

Our definition of labor market conditions takes advantage of the data that record the region and occupation of all workers prior to the depression. We define local labor markets using 12 regions and 71 occupations. For each of the 817 region-occupation cells (35 region-occupation cells have no workers), we calculate the share of months workers in these cells were unemployed during the 1987 to 1990 predepression period and the 1991 to 1993 depression period. Because we are interested in labor market shocks, we use the difference in the 1991 to 1993 and 1987 to 1990 unemployment shares as our main variable of interest. Intuitively, this variable captures the change in labor market conditions in the region-occupation cell caused by the depression.

With this definition of labor market conditions at hand, the baseline specification for estimating the effect of labor market experiences on risky investment in 2005 is

$$y_i = \alpha + \beta C_i + X_i \gamma + \mu_r + \mu_o + \varepsilon_i, \tag{1}$$

where $i$ indexes individuals, the dependent variable $y_i$ is an indicator variable for whether a worker invests in risky assets (stocks in the baseline specification, bonds, and other risky investments in robustness checks),[11] $C_i$ captures the change in labor market conditions during the depression, and $X_i$ is a vector of control variables that contains observables measured prior to the depression. These control variables include indicators for the level and field of education,[12] native language, gender, marital status, and stock market participation, all measured prior to the depression in 1990. Cohort dummies further control for birth cohort and age effects, although they are not separately identifiable (Mankiw and Zeldes (1991)). Values of income, assets, and liabilities enter as a piecewise linear function that breaks down the continuous variable into decile dummies and then interacts the decile dummies with the continuous variable. This linear spline accounts for any within-decile variation. The two sets of fixed effects $\mu_r$ and $\mu_o$ are for the worker's region and occupation. Our estimation strategy thus identifies the effect solely from variation between

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[11] To facilitate interpretation, we estimate all the regressions using linear probability models. Table IA.III of the Internet Appendix shows that logit models produce estimates that are similar to the Ordinary Least Squares (OLS) approach.

[12] The nine fields are agriculture and forestry, business and economics, educational science, health and welfare, humanities and arts, natural sciences, services, social sciences, and technology and engineering.

region-occupation cells while controlling for unobserved characteristics of workers in each region and each occupation.

The parameter $\beta$ measures the impact of labor market conditions on investment in risky assets if, conditional on control variables and fixed effects, selection into experiencing different labor market conditions is as good as randomly assigned. This conditional independence assumption (e.g., Angrist and Pischke (2009), Imbens and Wooldridge (2009)) means that we assume that individuals identical along observable dimensions face the same propensity to experience adverse labor market conditions.

### D. Assessing the Conditional Independence Assumption

The main advantage of using the depression of the early 1990s is that it likely brings about variation in labor market conditions that is unrelated to unobserved worker characteristics. We evaluate this conjecture using correlations of observable worker characteristics with labor market conditions.

Table I reports sample descriptive statistics and presents evidence that suggests that our way of measuring labor market conditions captures variation that is unrelated to unobserved determinants of risky investment. The four leftmost columns calculate the mean and standard deviation of each characteristic in 1990 and 2005. The remaining columns report statistics that evaluate the correlation of labor market conditions with observable worker characteristics. We first calculate the average of each characteristic separately for local labor markets whose conditions are worse ("bad") or better ("good") than the median, and find meaningful differences in many characteristics. However, the differences become much smaller when we condition on fixed effects for regions and occupations in the three rightmost columns in Table I. This estimation regresses each characteristic in 1990 on our measure of labor market conditions during the 1991 to 1993 depression and the fixed effects for the two dimensions of local labor markets. We evaluate the marginal effects at a one-standard-deviation deterioration in labor market conditions.

The regressions suggest that workers who experienced a one-standard-deviation worsening of labor market conditions during the depression had 66 euros less labor income, spent 0.05 months more in unemployment, and had accumulated 352 euros less wealth in 1990. These differences are small in magnitude and statistically insignificant (*t*-values –0.2, –1.2, and –1.7). Marital status, gender, and age also show insignificant correlations with labor market conditions during the depression. However, we find small but statistically significant differences for education. For example, the estimates suggest that the share of workers with a graduate degree is 2.0 percentage points lower in the group of individuals who experienced adverse labor market conditions.

The most important analysis in Table I comes from regressing stock market participation prior to the depression on labor market conditions during the depression. If unobserved characteristics lead certain workers to shy away from risky assets and to simultaneously sort into adversely affected labor

**Table I**

**Falsification Exercise and Descriptive Statistics**

This table reports descriptive statistics for the individuals in the sample. Income and wealth variables are inflation adjusted using the Consumer Price Index from Statistics Finland using 2005 as the base year. Months unemployed calculates the annual number of months a worker spent in unemployment. Taxable net worth is the difference between total taxable assets and total liabilities. Predepression stock market participation takes the value of one if an individual reports any capital gains in 1987 to 1990, and zero otherwise. The four leftmost columns show the mean and *SD* of each characteristic over 1990 to 2005. The remaining columns stratify the sample according to labor market conditions, which are measured as the mean share of months spent in unemployment in a region-occupation cell. Unconditional means report the average values of the characteristics in local labor markets where the labor market conditions were worse and better than the median. The conditional means are based on regressing each characteristic in 1990 on labor market conditions during the 1991 to 1993 depression and on fixed effects for regions and occupations. The *t*-values are based on clustering at the region-occupation level. The marginal effect is the coefficient multiplied by the standard deviation of labor market conditions.

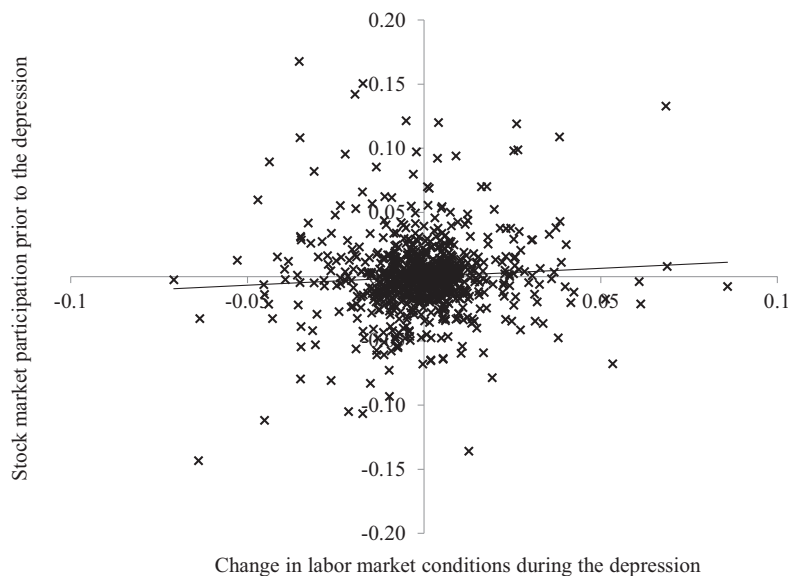| | Full Sample | | | | Stratified by Labor Market Conditions | | | | |
| | 1990 | | 2005 | | Unconditional Means in 1990 | | Regression-Based Conditional Differences in 1990 | | |
| | Mean | SD | Mean | SD | Bad Conditions | Good Conditions | Marginal Effect | Coefficient | t-value |
|---|---|---|---|---|---|---|---|---|---|
| **Income and wealth** | | | | | | | | | |
| Labor income (euros) | 20,921 | 9,836 | 30,640 | 24,502 | 20,872 | 20,970 | −66 | −1,598 | (−0.16) |
| Months unemployed | 0.25 | 0.85 | 0.77 | 2.45 | 0.29 | 0.21 | −0.05 | −1.15 | (−1.18) |
| Net worth (euros) | 6,344 | 70,513 | 21,286 | 230,681 | 5,968 | 6,715 | −352 | −8,549 | (−1.70) |
| Stock market participation (%) | 7.0 | 25.4 | 22.0 | 41.4 | 6.7 | 7.2 | −0.5 | −12.9 | (−1.69) |
| **Education (%)** | | | | | | | | | |
| Basic or vocational | 79.9 | 40.1 | 79.1 | 40.7 | 87.7 | 72.2 | 3.1 | 76.2 | (2.92) |
| High school | 6.0 | 23.8 | 3.6 | 18.6 | 4.9 | 7.2 | −1.3 | −31.5 | (−2.33) |
| Bachelor | 6.2 | 24.2 | 7.2 | 25.9 | 4.6 | 7.9 | 0.1 | 2.8 | (0.24) |
| Graduate | 7.8 | 26.9 | 10.1 | 30.2 | 2.8 | 12.8 | −2.0 | −47.5 | (−2.83) |
| **Other characteristics** | | | | | | | | | |
| Married (%) | 57.4 | 49.4 | 59.7 | 49.0 | 53.9 | 61.0 | 0.5 | 12.9 | (0.73) |
| Cohabits (%) | 17.1 | 37.6 | 13.7 | 34.4 | 19.1 | 15.0 | 0.3 | 8.3 | (1.37) |
| Female (%) | 49.3 | 50.0 | | | 31.2 | 67.2 | 0.7 | 16.0 | (0.52) |
| Swedish speaking (%) | 4.8 | 21.4 | | | 4.0 | 5.7 | −0.8 | −18.9 | (−2.68) |
| Birth year | 1957 | 4.6 | | | 1957 | 1957 | 0.0 | −1.0 | (−1.02) |
| Number of individuals = 838,881 | | | | | | | | | |

**Figure 3. Stock market participation prior to the depression as a function of labor market conditions during the depression.** For each local labor market, the graph plots stock market participation in 1990 against the change in labor market conditions in 1991 to 1993 and 1987 to 1990. Predepression stock market participation is the average of an indicator that takes the value of one if an individual reports any capital gains in 1987 to 1990, and zero otherwise. Labor market conditions are the mean share of months that workers spent in unemployment in each local labor market. The variables are demeaned by taking the residuals from a regression of labor market conditions on the region and occupation fixed effects. The line plots the fitted values from a regression of the demeaned stock market participation against the demeaned change in labor market conditions. The slope coefficient equals 0.117 (*t*-value 1.07), and the $R^2$ of the regression is 0.0003.

markets, we should see a negative correlation between predepression stock market participation and labor market conditions during the depression.

Because stock and mutual fund holdings are observed only in 2005, the predepression stock market participation proxy is based on tax reporting of capital gains. The proxy takes the value of one if a worker files a tax return containing realized capital gains in the 1987 to 1990 period, and zero otherwise.[13] The average participation rate using this variable equals 7.6% in 1990, which is in line with the 9.3% stock market participation rate in 1996 (Ilmanen and Keloharju (1999)).

The analysis shows labor market conditions during the depression do not significantly relate to predepression stock market participation. As a further illustration of this pattern, Figure 3 plots average predepression stock market participation against labor market conditions in each of the region-occupation

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[13] Sales of stocks and mutual funds likely constitute the bulk of these gains because sales of owner-occupied housing are exempt from capital gains taxation.

cells.[14] Because each cell receives equal weight, the coefficients are not directly comparable to the estimates in Table I. Nevertheless, the figure confirms that stock market participation prior to the depression does not correlate with labor market conditions during the depression. This falsification exercise supports the conjecture that the way we measure labor market conditions does not capture differences in omitted variables that make workers invest in risky assets.

Taken together, the results in this section show that the depression generated a large degree of variation in labor market conditions, and this variation is likely not associated with unobserved worker characteristics that correlate with risky investment.

## II. Labor Market Experiences and Investment in Risky Assets

This section evaluates how long-term investment in risky assets relates to labor market experiences. We estimate regressions that correlate postdepression risky investment with labor market conditions during the depression, and supplement them with a battery of robustness checks that add control variables and vary the definition of local labor markets. We also investigate alternative dependent variables and employ alternative estimation approaches.

The main independent variable in all of the regressions measures the labor market conditions the individual experienced during the 1991 to 1993 depression. The predepression controls come from 1990, one year prior to the beginning of the depression. These variables include the fixed effects we use to control for differences in unobserved characteristics that make workers sort into regions and occupations, and the observable worker characteristics detailed in Section I.C.

Because labor market conditions can influence wealth accumulation, labor income, and employment, which in turn may affect investment in risky assets,[15] we also estimate regressions that add controls for these variables observed in the 1994 to 2005 period. These regressions do not have a straightforward causal interpretation because they condition on factors that may be direct outcomes of labor market conditions (see Angrist and Pischke (2009)). Nevertheless, they serve as a useful comparison for our analyses later in the paper that use settings in which labor market conditions are unlikely to operate through wealth accumulation and labor market outcomes. They also help in comparing our alternative estimation approaches to previous studies.[16]

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[14] Figure IA.1 of the Internet Appendix further shows the shocks to local labor markets do not relate to labor market conditions prior to the depression.

[15] Lower levels of wealth accumulation can curb risky investment if participation in the stock market incurs fixed costs (Vissing-Jorgensen (2003), Gomes and Michaelides (2005)), and leverage—often originating from having taken out a mortgage—can crowd out investment in risky assets (Cocco (2005), Yao and Zhang (2005), Chetty and Szeidl (2016)). Lower levels of permanent income and background risks also predict less risky investment (Merton (1971), Bodie, Merton, and Samuelson (1992), Heaton and Lucas (1997), Viceira (2001), Cocco, Gomes, and Maenhout (2005)).

[16] Studies that run regressions in which the main independent variable of interest is historically determined and the controls are measured at the same time as the dependent variable include

We base statistical inference on test statistics that assume two types of clustering in the data. In parentheses, we report *t*-statistics that assume clustering at the level of the region-occupation cell we use to compute labor market conditions. The *t*-statistics in brackets report a more conservative approach that is robust to clustering at the level of occupations.

## A.  Baseline Regressions

The baseline regressions estimate the impact of labor market conditions on stock market participation in 2005. The dependent variable takes the value of one if an individual owns equities either directly or through mutual funds, and zero otherwise. We calculate this variable from the comprehensive asset holdings reported by the FTA (below we also investigate other variables related to risky investment).

The regressions in Table II show that experiences of labor market disruptions are negatively associated with long-run stock market participation. In column (3), which includes the most exhaustive set of predepression controls, the coefficient on labor market conditions takes the value of –0.676 and has a *t*-value of –6.0. The coefficient translates into a decrease of $0.676 \times 0.041 = 2.8$ percentage points in stock market participation for a one-standard-deviation worsening of labor market conditions during the depression. This effect is economically significant because the average stock market participation in our sample is 22.0%.

An alternative way to gain perspective on the magnitude of the effect is to consider a specification that decomposes labor market conditions into quintiles, and indicates each quintile with a dummy variable (bottom quintile omitted). The estimates from this approach, reported in Table IA.IV of the Internet Appendix, show that the difference in stock market participation rates between the bottom and top quintiles of labor market conditions equals –0.036 (*t*-value –3.7). The coefficients on the other quintile dummies show that the fourth and fifth quintiles are the primary drivers of the participation effect.[17]

The –0.870 and –0.696 estimates in the first two columns of Table II imply marginal effects of –3.6 and –2.9 percentage points. In Section I in the Internet Appendix, we compare these estimates to assess how much omitted variables could potentially bias the results using the approaches of Altonji, Elder, and Taber (2005) and Oster (2016). The results indicate that, to qualitatively alter our conclusions, selection on omitted variables would have to be more than 6.9 times larger than selection on the set of controls included in Table II.

The regressions in the three rightmost columns of Table II add controls for characteristics measured in the 1994 to 2005 postdepression period.

Cronqvist et al. (2016), Grinblatt, Keloharju, and Linnainmaa (2011), and Malmendier and Nagel (2011).

[17] This observation, combined with evidence suggesting nonlinearities in the impact of labor market conditions on labor market outcomes and wealth accumulation in Table IA.V of the Internet Appendix, motivates our piecewise-linear specification for wealth, income, and employment.

**Table II**

**Effect of Labor Market Experiences on Stock Market Participation**

This table reports coefficient estimates and their associated *t*-values from regressions that explain an individual's stock market participation decision. The dependent variable takes the value of one if an individual holds stocks directly or through mutual funds in 2005, and zero otherwise. In columns (1) to (3), the predepression controls are measured in 1990, one year prior to the onset of the 1991 to 1993 depression. Specification (1) controls for 12 region dummies and 71 occupation dummies. Specification (2) adds decile dummies for labor income (using average income from 1987 to 1989), for wealth (no wealth is the omitted category), and for liabilities (no liabilities omitted), and further includes dummies for four levels of education and nine fields of education. Specification (3) adds an indicator for predepression stock market participation, 16 cohort dummies, and dummies for females, native language, and marital status. Columns (4) to (6) add controls measured over the 1994 to 2005 postdepression period. Specification (4) includes values of assets and liabilities from 2005, as well as four asset-type variables for the values of real estate, forest land, foreign assets (excluding equity), and private equity (typically a business). Specification (5) adds the mean and standard deviation of income, and average income growth, calculated from annual observations over 1994 to 2005. Specification (6) includes the share of months spent in unemployment, measured over 1994 to 2005. Each continuous postdepression control variable is broken down into decile dummies that are interacted with the continuous variable to account for nonlinearities within deciles. The *t*-values reported are robust to clustering at the level of local labor markets (in parentheses) or at the level of occupations (in brackets). The marginal effect is the coefficient multiplied by the standard deviation of the labor market conditions variable.

| Dependent Variable: | Stock Market Participation | | | | | |
|---|---|---|---|---|---|---|
| Controls: | Predepression Controls | | | Postdepression Controls | | |
| Specification #: | (1) | (2) | (3) | (4) | (5) | (6) |
| Labor market conditions | −0.870 | −0.696 | −0.676 | −0.292 | −0.290 | −0.294 |
| | (−6.04) | (−5.93) | (−5.97) | (−4.29) | (−4.25) | (−4.32) |
| | [−4.34] | [−5.02] | [−5.02] | [−3.79] | [−3.78] | [−3.84] |
| Predepression controls | | | | | | |
|   Region, occupation | Yes | Yes | Yes | Yes | Yes | Yes |
|   Assets, liabilities, income | No | Yes | Yes | Yes | Yes | Yes |
|   Level and field of education | No | Yes | Yes | Yes | Yes | Yes |
|   Demographics | No | No | Yes | Yes | Yes | Yes |
|   Stock market participation | No | No | Yes | Yes | Yes | Yes |
| Postdepression controls | | | | | | |
|   Assets, liabilities | No | No | No | Yes | Yes | Yes |
|   Income | No | No | No | No | Yes | Yes |
|   Months unemployed | No | No | No | No | No | Yes |
| *SD* of labor market conditions | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 |
| Mean participation rate | 0.220 | 0.220 | 0.220 | 0.220 | 0.220 | 0.220 |
| Marginal effect | −0.036 | −0.029 | −0.028 | −0.012 | −0.012 | −0.012 |
| Adjusted $R^2$ | 0.075 | 0.129 | 0.133 | 0.287 | 0.287 | 0.287 |

Number of labor market cells = 817
Number of individuals = 838,881

Column (4) includes decile dummies for different dimensions of wealth accumulation. For 2005, we measure the values of total assets and total liabilities, as well as of holdings in real estate, forest land, foreign assets (excluding equity), and private equity (usually a business). These asset-type variables separate the effect of asset composition from wealth accumulation (as in Grinblatt, Keloharju, and Linnainmaa (2011)), and address the possibility that labor market experiences not only affect the level of wealth, but also background risks associated with holding different types of assets.

Column (5) adds the average, standard deviation, and growth rate of labor income, whereas column (6) includes the share of months spent in unemployment. We measure these variables over the 1994 to 2005 postdepression period.

In column (4), where we control for postdepression wealth accumulation, the coefficient estimate equals –0.292 (*t*-value –4.3). The marginal effect for a one-standard-deviation deterioration in labor market conditions is 1.2 percentage points.[18] Similar results are obtained in the two remaining columns that add various dimensions of postdepression labor income and employment to the regression.

The above results show that controlling for wealth accumulation and the path of labor market outcomes following the depression does not fully eliminate the association between labor market experiences and portfolio choice. However, these estimates should be interpreted with caution because wealth accumulation and labor market outcomes are potential outcomes of labor market conditions. To illustrate this point, Table III regresses labor income, employment, and wealth accumulation following the depression on labor market conditions during the depression. Labor income is the average labor income, and months unemployed refers to the total number of months spent in unemployment, both measured over the 1994 to 2005 period, whereas net worth is the total value of assets less liabilities in 2005. Because these variables are not normally distributed, and they include a nontrivial number of zeros, we estimate the regressions with Generalized linear model (GLM) using a logarithmic link function (see Nichols (2010)).

Table III shows that labor market conditions during the depression are statistically significantly associated with postdepression labor market outcomes and wealth accumulation. Labor income and net worth were 6.7% and 9.0% lower and unemployment was 13.5% higher per one-standard-deviation worsening of labor market conditions. In Section IV, we return to settings that are likely immune to the wealth, employment, and income effects.

### B. Robustness Checks

This section presents robustness checks that evaluate the extent to which the estimates change when we control for variables that could introduce bias in the baseline specifications. Parameter stability across these alternative

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[18] Table IA.VI of the Internet Appendix reports an alternative specification that aggregates the postdepression variables at the level of local labor markets.

**Table III**
**Effect of Labor Market Conditions on Labor Market Outcomes and Wealth Accumulation**

This table reports coefficients and their associated $t$-values from regressions that explain labor income and months spent in unemployment over the 1994 to 2005 period and net worth in 2005. The set of predepression controls for each dependent variable corresponds to columns (1) to (3) in Table II. The models are estimated using Generalized Linear Model (GLM) with a logarithmic link function to account for both the nonnormal distributions of and the zeros in the dependent variables (see Nichols (2010)). The bootstrapped $t$-values reported in parentheses are robust to clustering at the level of local labor markets. The marginal effect is the coefficient multiplied by the standard deviation of the labor market conditions variable, and it returns the log change in the dependent variable per a one-standard-deviation change in the independent variable.

| Regression: | | | | GLM with a Logarithmic Link Function | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Dependent Variable: | Labor Income | | | Months Unemployed | | | Net Worth | | |
| Specification #: | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) |
| Labor market conditions | −2.086 | −1.589 | −1.632 | 3.686 | 3.253 | 3.269 | −3.610 | −2.241 | −2.191 |
| | (−4.77) | (−6.78) | (−7.04) | (6.20) | (6.72) | (6.69) | (−4.82) | (−5.69) | (−5.60) |
| Predepression controls | | | | | | | | | |
|   Region, occupation | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
|   Assets, liabilities, income | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes |
|   Level and field of education | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes |
|   Demographics | No | Yes | Yes | No | Yes | Yes | No | Yes | Yes |
|   Stock market participation | No | No | Yes | No | No | Yes | No | No | Yes |
| *SD* of labor market conditions | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 |
| Marginal effect | −0.086 | −0.065 | −0.067 | 0.152 | 0.134 | 0.135 | −0.149 | −0.092 | −0.090 |
| Pseudo $R^2$ | 0.254 | 0.509 | 0.525 | 0.097 | 0.193 | 0.215 | 0.044 | 0.246 | 0.248 |

Number of labor market cells = 817
Number of individuals = 838,881

specifications would further alleviate concerns about having omitted a relevant control variable. We also discuss results from regressions that use alternative approaches to measuring local labor market conditions and estimates from region-by-region regressions that address the assignment of occupations into regions.

### B.1. Controlling for Additional Variables

Columns (1) and (3) in Table IV report results from regressions that control for family fixed effects. This analysis identifies the effect of labor market experiences solely from variation within offspring of the same parents, while controlling for work ethics, prudence, employment opportunities, and other latent traits to the extent that they are shared by members of the same family. The exclusion of individuals who are the only child born to a mother decreases the sample size to 756,119 individuals.

Columns (2) and (4) in Table IV use observable characteristics of the worker's parents in lieu of family fixed effects. In this specification, we have a sample size of 153,665 workers because the parental variables are not available for individuals whose parents are deceased or have retired from the labor force by 2005.

The results of these regressions show that omitted variable bias is unlikely to drive our baseline estimates. The regressions that control for predepression variables yield marginal effects of –0.022 to –0.024 (*t*-values –5.7 and –5.1), whereas the inclusion of postdepression controls returns marginal effects of –0.009 and –0.011 (*t*-values –3.6 and –2.7). The stability of these estimates, compared to Table II, reinforces the conclusion that our approach successfully identifies the effect of labor market experiences on portfolio choice.

### B.2. Alternative Labor Market Definitions

Although our definition of labor market conditions naturally relates to the nature of frictions that prevent mobility across local labor markets, we also study other definitions that vary the dimensions according to which we stratify the labor market. Columns (5) to (8) in Table IV present results for groupings that use information on the worker's sector, type of occupation, and educational background as the source of labor market segmentation. The coefficients using the alternative labor market definitions are statistically significant and indicate that the results are robust to alternative ways of defining the local labor markets.

### B.3. Regional Analyses

In Table IA.VII of the Internet Appendix, we experiment with regressions run separately for each of the 12 regions. These analyses address the possibility that the assignment of occupations into particular regions renders the fixed effects ineffective in controlling for shared worker characteristics along the

**Table IV**

**Additional Controls and Alternative Labor Market Definitions**

This table reports regressions similar to Table II using additional control variables and alternative definitions of local labor markets. Family fixed effects in columns (1) and (3) indicate siblings (defined as individuals born to the same mother). Parental variables in columns (2) and (4) are predepression controls defined for an individual's mother and father. Columns (5) and (7) define the local labor market as a combination of 12 regions, 10 sectors, and four types of occupations (blue collar, pink collar, white collar, self-employed). Columns (6) and (8) report a combination of 12 regions, four levels of education, and nine fields of education. The $t$-values reported in parentheses are robust to clustering at the level of local labor markets. The marginal effect is the coefficient multiplied by the standard deviation of the labor market conditions variable.

| Dependent Variable: | | | Stock Market Participation | | | | | |
|---|---|---|---|---|---|---|---|---|
| Robustness Check: | | Additional Controls | | | | Alternative Labor Markets | | |
| Controls: | Predepression Controls | Additional Controls | Postdepression Controls | | Predepression Controls | | Postdepression Controls | |
| | Family Fixed Effects | Parental Variables | Family Fixed Effects | Parental Variables | Region-Sector-Occupation | Region-Field of Education-Level of Education | Region-Sector-Occupation | Region-Field of Education-Level of Education |
| Specification #: | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Labor market conditions | −0.538 | −0.606 | −0.228 | −0.273 | −0.585 | −1.486 | −0.205 | −0.722 |
| | (−5.66) | (−5.05) | (−3.57) | (−2.74) | (−5.17) | (−5.26) | (−2.96) | (−5.21) |
| Predepression controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Postdepression controls | No | No | Yes | Yes | No | No | Yes | Yes |
| SD of labor market conditions | 0.042 | 0.039 | 0.042 | 0.039 | 0.045 | 0.027 | 0.045 | 0.027 |
| Mean participation rate | 0.213 | 0.235 | 0.213 | 0.235 | 0.220 | 0.220 | 0.220 | 0.220 |
| Marginal effect | −0.022 | −0.024 | −0.009 | −0.011 | −0.026 | −0.041 | −0.009 | −0.020 |
| Adjusted $R^2$ | 0.240 | 0.128 | 0.358 | 0.268 | 0.134 | 0.133 | 0.287 | 0.287 |
| Number of labor market cells | 817 | 785 | 817 | 785 | 476 | 343 | 476 | 343 |
| Number of individuals | 756,119 | 153,665 | 756,119 | 153,665 | 838,881 | 838,881 | 838,881 | 838,881 |

<div style="text-align:center">

**Table V**

**Matching Adversely Affected Individuals to Less Affected Workers**

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This table matches the workers in the top half of adverse labor market conditions with workers in the bottom half. The full set of predepression controls defines the match in columns (1) and (3). Postdepression controls supplement the match in columns (2) and (4). Columns (3) and (4) further require an exact match on the region-occupation cell in 2005, identifying the effect from workers who moved from their 1990 local labor market. The table reports the treatment effect based on the propensity-score method. The test statistic for the matching estimates uses robust Abadie and Imbens (2006) standard errors.

| Outcome: | Stock Market Participation | | | |
|---|---|---|---|---|
| Treatment: | Labor Market Conditions Above Median | | | |
| Controls: | No Controls for Local Labor Market in 2005 | | Controls for Local Labor Market in 2005 | |
| Specification #: | (1) | (2) | (3) | (4) |
| Treatment effect | −0.042 | −0.028 | −0.006 | −0.003 |
| | (−34.61) | (−24.13) | (−4.26) | (−2.14) |
| Predepression controls | Yes | Yes | Yes | Yes |
| Postdepression controls | No | Yes | No | Yes |
| Number of individuals | 838,881 | 838,881 | 838,881 | 838,881 |

dimensions we use to stratify the labor markets. All coefficients from the region-by-region regressions are statistically significant and imply sizeable reductions in risky investment. These analyses indicate that occupational assignment patterns do not drive our results.

### B.4. Matching Methods

As an alternative to the regression-based approach, we also use propensity-score matching to study the impact of labor market experiences on risky investment. We divide the sample into workers for which labor market conditions were above or below the median. For a treated worker in the worst half of labor market conditions, we find a control worker in the best half who was similar along all observable characteristics.

The characteristics we consider include the now familiar predepression and postdepression controls. We also estimate the effects by finding the control individual for a treated worker within the local labor market in 2005. This approach compares individuals who are in the same local labor market currently, but whose labor market experiences differ because they moved from their local labor market in 1990.

Table V reports four matching estimates that vary the set of controls and the exact match by the current local labor market. Columns (1) and (2) report the treatment effect when matching on pre- or postdepression controls but not requiring an exact match on the current labor market. The estimates suggest workers in the bottom half of labor market conditions were 4.2 and

2.8 percentage points less likely to participate in the stock market. Requiring an exact match on current local labor market in columns (3) and (4) yields reductions of 0.6 and 0.3 percentage points (*t*-values –4.3 and –2.1).[19] That the effects survive when we identify the effect within the group of workers who have moved to a given local labor market suggests that the impact of experiences does not disappear even when workers face a new environment.

## *C. Other Measures of Risky Investment*

In this section, we use additional dependent variables to evaluate how the effects extend to other margins in the data. These analyses help us understand whether the patterns arise from factors specific to the stock market or reflect general changes in worker perceptions. Malmendier and Nagel (2011) show that individuals' participation decisions in a particular asset market relate to their return experiences in that market. Because labor market experiences do not naturally relate to any particular asset market, we expect to find effects that extend to different dimensions of risky investment.[20]

Table VI replaces the stock market participation indicator with dummies for investment in fixed income funds, balanced funds, or derivatives. The latter two refer to mutual funds that invest in fixed income and equity (the typical asset allocation is 60% in fixed income and 40% in equity), and to options and warrants written on publicly listed stocks. The three leftmost columns, which include the predepression controls, show that adverse labor market conditions reduce investment in all categories of risky assets. The marginal effects equal –0.3, –0.4, and –0.5 percentage points (*t*-values –3.1, –3.1, and –3.8). These estimates appear reasonably large given the unconditional investment rates of 6.4%, 8.5%, and 1.0%.

The three rightmost columns in Table VI add controls for wealth accumulation and labor market outcomes observed in the 1994 to 2005 period. These specifications return coefficient estimates that are statistically insignificant, with the exception of derivatives. This result may obtain because fixed income funds and balanced funds are less risky than the asset classes for which we find statistically significant effects (equities and equity-linked derivatives). However, we cannot give these results a straightforward causal interpretation because they come from regressions that include control variables measured in the postdepression period.

Do the adversely affected workers who nonetheless choose to participate in the stock market shy away from riskier securities? Table IA.VIII of the Internet Appendix investigates the impact of labor market experiences on the riskiness of financial portfolios held by stock market participants. We measure riskiness

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[19] The test statistics for the matching approach use the robust Abadie and Imbens (2006) standard errors.

[20] Barseghyan et al. (2013), Barsky et al. (1997), Cutler and Glaeser (2005), Dohmen et al. (2011), Einav et al. (2012), and Wolf and Pohlman (1983) investigate the consistency of decision-making across contexts.

**Table VI**
**Effect of Labor Market Experiences on Alternative Measures of Risky Investment**

This table explains alternative measures of risky investment with labor market conditions. The sets of predepression and postdepression controls employed correspond to columns (3) and (6) in Table II. The dependent variables indicate workers who hold fixed income mutual funds, balanced funds that combine fixed income with equity investments, or derivatives written on publicly listed stocks. The $t$-values reported in parentheses are robust to clustering at the level of local labor markets. The marginal effect is the coefficient multiplied by the standard deviation of the labor market conditions variable.

| Controls: | Predepression Controls | | | Postdepression Controls | | |
|---|---|---|---|---|---|---|
| Dependent Variable: | Fixed Income Funds | Balanced Funds | Derivatives | Fixed Income Funds | Balanced Funds | Derivatives |
| Specification #: | (1) | (2) | (3) | (4) | (5) | (6) |
| Labor market conditions | −0.084 | −0.092 | −0.131 | 0.033 | 0.048 | −0.064 |
| | (−3.12) | (−3.09) | (−3.81) | (1.41) | (1.79) | (−2.49) |
| Predepression controls | Yes | Yes | Yes | Yes | Yes | Yes |
| Postdepression controls | No | No | No | Yes | Yes | Yes |
| $SD$ of labor market conditions | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 |
| Mean dependent variable | 0.064 | 0.085 | 0.010 | 0.064 | 0.085 | 0.010 |
| Marginal effect | −0.003 | −0.004 | −0.005 | 0.001 | 0.002 | −0.003 |
| Adjusted $R^2$ | 0.018 | 0.018 | 0.041 | 0.121 | 0.088 | 0.092 |
| Number of labor market cells = 817 | | | | | | |
| Number of individuals = 838,881 | | | | | | |

by calculating return volatilities and other measures from the time series of portfolio returns to circumvent any challenges that arise from categorizing securities into the least and most risky categories.[21]

The regressions in Panel A of Table IA.VIII of the Internet Appendix show that, if anything, portfolio volatility and market beta are higher for stock market participants who experienced adverse labor market conditions. However, the association between labor market experiences and stock market participation might mask the true effect. For example, adversely affected workers who nevertheless participate in the stock market are likely more willing to take on risk than adversely affected workers who stay away from the stock market.

## III. Using Secondhand Experiences to Understand Channels

This section presents results from estimation approaches that are likely immune to the concern that the impact of labor market conditions on risky investment operates solely through wealth, income, and employment. The common theme in these analyses is the notion that individuals may be affected by experiences of others through their social networks. However, such secondhand experiences are unlikely to lead to changes in the individual's wealth accumulation and labor market outcomes.

### A. Secondhand Experiences in the Neighborhood

Our first analysis of secondhand experiences studies social networks based on geography. We link individuals to their immediate neighborhood and study how the experiences of neighbors affect risky investment. Because similar people tend to cluster in neighborhoods, the challenge is to find individuals who were not directly affected by the shocks their neighbors experienced.

We analyze a subsample of workers whose profession provided them with job security during the depression.[22] We consider workers in 326 professions provided by SF and rank the professions according to their average length of unemployment. The lowest decile of unemployment serves as the group of workers that the depression did not materially affect. These safe professions include physicians, pharmacists, nurses, teachers, priests, judges, prosecutors, auditors, claims adjusters, maritime pilots, air traffic controllers, railroad engineers, correctional officers, and customs officers. They had on average 0.6 months of unemployment, and only 8.4% of them experienced at least one month of unemployment during the 1991 to 1993 depression (the corresponding numbers for the full sample are 2.8 months and 25.7%, respectively). Although the depression had little direct effect on the safe professions, the shocks

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[21] Specifically, we use the euro-denominated MSCI Europe and MSCI World indices as the market portfolios and the 36 most recent monthly return observations in the estimation of portfolio risk measures.

[22] Previous studies show labor market distress affects different types of workers in different ways (Jacobson, LaLonde, and Sullivan (1993), von Wachter, Song, and Manchester (2009), Couch and Placzek (2010), Oreopoulos, von Wachter, and Heisz (2012)).

experienced in their immediate neighborhood might have made them less willing to take risk in financial markets.

Just like the baseline approach, the neighborhood approach should return an insignificant relation in the falsification exercise that regresses predepression stock market participation on labor market conditions during the depression. To isolate the effect that does not work through income, employment, and wealth, the approach should further show an insignificant correlation of these variables with labor market conditions. We report these regressions in Table VII, where the dependent variables are predepression stock market participation (as in Table I) and the income, employment, and wealth variables (as in Table III). The last column reports the effect of neighbors' labor market conditions on the main variable of interest, namely, postdepression stock market participation (as in Table II).

Columns (1) to (4) in Table VII show that the labor market conditions experienced in the individual's neighborhood do not relate to the individual's predepression stock market participation, labor market prospects, or wealth accumulation. The latter result casts doubt on wealth effects arising from the housing market. Areas whose residents suffer from poor economic conditions likely see the value of the housing stock decline and may accumulate less wealth over time. However, the long-term effects on the housing stock should show up in postdepression wealth accumulation that contains the value of housing held by an individual. Column (4) finds no evidence in favor of the housing channel, or any other wealth effects.

In contrast, column (5) in Table VII does show a statistically significant reduction in stock market participation following the depression. The coefficient implies a reduction of 0.6 percentage points in stock market participation for a one-standard-deviation worsening of labor market conditions in the neighborhood. This result suggests that the workers in professions shielded from the wealth, employment, and income effects of the depression reduced their risky investment in response to their neighbors' adverse experiences.

Table IA.IX of the Internet Appendix reports the neighborhood regressions in the full sample without imposing the restriction on safe professions. It also finds a reduction in risky investment, but unlike safe professions, labor market conditions now strongly associate with postdepression labor market outcomes and wealth accumulation. This analysis underscores the need to focus on safe professions whose labor market outcomes and wealth accumulation were not affected by adverse labor market conditions.

## B. Secondhand Experiences in the Family

Family networks provide another useful setting for understanding the channels through which labor market experiences influence risky investment. We first analyze how the adverse labor market conditions experienced by an individual's siblings influence her risky investment. Table VIII, Panel A reports results from regressions that mirror our baseline approach but add to the regression the labor market conditions a randomly chosen sibling experienced.

**Table VII**

**Labor Market Experiences in an Individual's Neighborhood**

This table explains an individual's stock market participation decision with the labor market experiences of her neighbors. The sample includes individuals who were in a safe profession in 1990. These professions are in the bottom decile of unemployment during the 1991 to 1993 depression. The dependent variable is the stock market participation indicator, and the independent variable measures the labor market conditions in the zip code in which a worker lives in 1990. Column (1) reports the falsification exercise from Table I, whereas columns (2) to (4) report the effects on labor market outcomes and wealth accumulation from Table IV. Column (5) reports the effect on stock market participation from Table II. All the specifications include the full set of predepression controls, defined for the individual and for the average worker in the zip code. Columns (1) and (5) are estimated using Ordinary Least Squares (OLS), whereas columns (2) to (4) are based on GLM with a logarithmic link function. The means of labor income and net worth are reported in thousand euros. The $t$-values reported in parentheses are robust to clustering at the level of neighborhoods. The marginal effect is the coefficient multiplied by the standard deviation of labor market conditions.

| Analysis: | Falsification Exercise | Postdepression Labor Market Outcomes and Wealth Accumulation | | | Risky Investment |
| --- | --- | --- | --- | --- | --- |
| Dependent Variable: | Stock Market Participation | Labor Income | Months Unemployed | Net Worth | Stock Market Participation |
| Specification #: | (1) | (2) | (3) | (4) | (5) |
| Neighbor's labor market conditions | −0.081 | 0.036 | 2.087 | 0.099 | −0.432 |
| | (−0.60) | (0.29) | (1.31) | (0.18) | (−2.18) |
| Mean dependent variable | 0.081 | 33.858 | 2.924 | 20.077 | 0.290 |
| *SD* of labor market conditions | 0.013 | 0.013 | 0.013 | 0.013 | 0.013 |
| Marginal effect | −0.001 | 0.0005 | 0.027 | 0.001 | −0.006 |
| Pseudo $R^2$/Adjusted $R^2$ | 0.042 | 0.594 | 0.166 | 0.212 | 0.099 |
| Number of neighborhoods = 3,095 | | | | | |
| Number of individuals = 84,409 | | | | | |

**Table VIII**

**Labor Market Experiences in an Individual's Family**

This table explains an individual's stock market participation decision with the labor market experiences of her siblings and father. The sample for siblings in Panel A includes individuals who have at least one sibling in the labor force in 1990. The sample for fathers in Panel B consists of individuals born in 1972 to 1982. The dependent variable is the stock market participation indicator, and the independent variable measures the labor market conditions the individual's siblings or father experienced during the depression. The sibling's labor market experience is calculated for a randomly drawn sibling to account for the confounding effects of family size. Column (1) reports the falsification exercise from Table I, whereas columns (2) to (4) report the effects on labor market outcomes and wealth accumulation from Table IV. Column (5) reports the effect on stock market participation from Table II. All the specifications include the full set of predepression controls. These controls are defined for the individual and the randomly chosen sibling in Panel A, whereas they are calculated for the father of the individual in Panel B. Stock market participation in column (1) in Panel B is the individual's father's predepression stock market participation. Columns (1) and (5) are estimated with ordinary least squares, whereas columns (2) to (4) are based on GLM with a logarithmic link function. The means of labor income and net worth are reported in thousand euros. The *t*-values reported in parentheses are robust to clustering at the level of local labor markets. The marginal effect is the coefficient multiplied by the standard deviation of labor market conditions.

| | Falsification Exercise | Panel A: Siblings' Labor Market Experiences | | | Risky Investment |
| | | Postdepression Labor Market Outcomes and Wealth Accumulation | | | |
| Analysis: | | | | | |
| Dependent Variable: | Stock Market Participation | Labor Income | Months Unemployed | Net Worth | Stock Market Participation |
| Specification #: | (1) | (2) | (3) | (4) | (5) |
| Personal labor market conditions | −0.022 | −1.570 | 3.348 | −2.004 | −0.682 |
| | (−0.45) | (−6.33) | (5.16) | (−5.16) | (−6.14) |
| Siblings' labor market conditions | 0.020 | −0.109 | −0.037 | −0.306 | −0.134 |
| | (0.61) | (−1.50) | (−0.14) | (−1.93) | (−2.53) |

*(Continued)*

**Table VIII—***Continued*

### Panel A: Siblings' Labor Market Experiences

| Analysis: | Falsification Exercise | Postdepression Labor Market Outcomes and Wealth Accumulation | | | Risky Investment |
|---|---|---|---|---|---|
| Dependent Variable: | Stock Market Participation | Labor Income | Months Unemployed | Net Worth | Stock Market Participation |
| Specification #: | (1) | (2) | (3) | (4) | (5) |
| Mean dependent variable | 0.069 | 27.209 | 10.623 | 15.693 | 0.219 |
| SD of personal labor market conditions | 0.041 | 0.041 | 0.041 | 0.041 | 0.041 |
| SD of siblings' labor market conditions | 0.042 | 0.042 | 0.042 | 0.042 | 0.042 |
| Marginal effect for personal conditions | −0.001 | −0.065 | 0.138 | −0.083 | −0.028 |
| Marginal effect for siblings' conditions | 0.001 | −0.005 | −0.002 | −0.013 | −0.006 |
| Pseudo $R^2$/Adjusted $R^2$ | 0.040 | 0.532 | 0.214 | 0.252 | 0.135 |
| Number of labor market cells = 811 | | | | | |
| Number of individuals = 469,491 | | | | | |

### Panel B: Father's Labor Market Experiences

| Analysis: | Falsification Exercise | Postdepression Labor Market Outcomes and Wealth Accumulation | | | Risky Investment |
|---|---|---|---|---|---|
| Dependent Variable: | Father's Stock Market Participation | Labor Income | Months Unemployed | Net Worth | Stock Market Participation |
| Specification #: | (1) | (2) | (3) | (4) | (5) |
| Father's labor market conditions | 0.066 | 0.041 | 0.215 | −0.266 | −0.085 |
| | (0.81) | (0.45) | (0.86) | (−1.61) | (−2.17) |
| Mean dependent variable | 0.107 | 10.513 | 10.381 | 1.894 | 0.154 |
| SD of labor market conditions | 0.046 | 0.046 | 0.046 | 0.046 | 0.046 |
| Marginal effect | 0.003 | 0.002 | 0.010 | −0.012 | −0.004 |
| Pseudo $R^2$/Adjusted $R^2$ | 0.036 | 0.506 | 0.187 | 0.198 | 0.386 |
| Number of labor market cells = 801 | | | | | |
| Number of individuals = 405,532 | | | | | |

We randomize the choice of sibling to ensure that families of varying size do not confound the estimates (larger families are more likely to have at least one sibling with adverse labor market experiences). The regressions also include controls for the sibling's characteristics measured prior to the depression.

Table VIII, Panel A regresses a worker's labor market outcomes, wealth accumulation, and stock market participation on the labor market conditions of her randomly chosen sibling. The falsification exercise in column (1) shows that the sibling's labor market experiences do not correlate with the individual's predepression stock market participation. In columns (2) to (4), insignificant correlations are obtained for the individual's labor income and months unemployed, whereas the coefficient for wealth accumulation is significant only at the 10% level. These patterns suggest that a sibling's labor market conditions do not materially affect an individual's labor market outcomes and wealth accumulation. Hence, they are not in line with a story whereby a worker's occupational choice correlates with that of her sibling, and as a result generates a relation between the sibling's labor market outcomes and the individual's stock market participation.

The last column in Panel A of Table VIII documents that the sibling's experience of adverse labor market conditions is significantly related to the individual's risky investment. The coefficient of –0.134 (*t*-value –2.5) translates into a decrease of 0.6 percentage points in stock market participation per one-standard-deviation deterioration in the sibling's labor market conditions. A natural interpretation of these patterns is that word-of-mouth communication with or observational learning from siblings affects an individual's decision to invest in risky assets.

Panel B considers an intergenerational setting in which we ask how the labor market experiences of an individual's parents affect her investment decisions. Here, we examine a sample of individuals who were born between 1972 and 1982 and were thus 8 to 18 years old in 1990. Because of their young age, these individuals had little firsthand experience of labor markets during the depression. Given that these young individuals were not in the labor force in 1990, we now define the predepression control variables for the individual's parents.

Panel B of Table VIII reports the falsification exercise and the regressions of income, employment, and wealth in the intergenerational setting. Because the individuals in this sample are so young at the time of the depression and only a few of them hold stocks, column (1) performs the falsification exercise by regressing the father's stock market participation prior to the depression on his labor market conditions during the depression. This falsification exercise generates an insignificant relation. Columns (2) to (4) report that experiences of labor market distress by one's father do not significantly correlate with the individual's own labor income, months spent in unemployment, and wealth accumulation.[23]

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[23] Financial assistance from parents to children might generate a relation with wealth accumulation. Gifts and bequests of directly held stock, however, are an unlikely explanation. Euroclear

Column (5) in Panel B of Table VIII yields a statistically significant reduction in stock market participation for individuals whose fathers experienced adverse labor market conditions. The coefficient implies a marginal effect of 0.4 percentage points. This finding is consistent with parents passing on the effects of adverse labor market conditions to their offspring.

Tables IA.X and IA.XI of the Internet Appendix perform robustness checks on the family influences. Table IA.X of the Internet Appendix estimates the effect of a sibling's adverse labor market conditions by dividing the sample into siblings that are younger or older than the individual. Older siblings may be more likely to serve as role models, in which case their experiences may have a larger impact. However, the coefficients and marginal effects for younger and older siblings are comparable. Table IA.XI of the Internet Appendix separately estimates the impact of the father's labor market experiences on younger and older children to account for the possibility that children in different developmental stages are differentially susceptible to the influence of adverse labor market conditions. The regressions yield reductions in stock market participation of 1.3 and 0.7 percentage points for children who were 8 to 12 and 13 to 18 years old in 1990, respectively (*t*-values –4.6 and –2.3). This finding suggests that experiences of one's father affect younger children more than older ones. We also investigate the impact of the mother's labor market experiences and find an insignificant effect of –0.2 percentage points (*t*-value –0.8).

Taken together, these results are consistent with the hypothesis that people pass on the consequences of labor market experiences to their family members, most likely through observational learning or word-of-mouth communication.

## C. Comparing Secondhand Experiences to Firsthand Experiences

The analyses on siblings, parents, and neighbors indicate that experiencing labor market distress leads to a reduction in risky investment even in the absence of an impact of labor market conditions on income and wealth. The magnitudes of these effects are useful for understanding the extent to which wealth accumulation and labor market outcomes drive the effects in Table II.

The effect sizes, evaluated for a one-standard-deviation deterioration in labor market conditions, vary from –0.4 to –0.6 percentage points in the analyses of secondhand experiences in Tables VII and VIII. The corresponding magnitudes range between –2.8 and –3.6 percentage points in Table II, which investigates personal firsthand experiences. These numbers suggest that at least –0.4/–3.6 = 11.1% of the total personal effect cannot be attributed to the wealth, employment, and income channel.

This percentage is likely to be conservative, however, because learning from others introduces an additional layer of noise. Parents might conceal true

Finland's data on gifts and bequests suggest that 0.34% of the cohorts born in 1972 to 1982 became stock market participants through gifts and bequests from 1995 to 2005. Under the extreme assumption that all of these transfers came from parents who did not experience adverse labor market conditions, gifts and bequests would generate a 0.34 percentage point effect of parents' labor market experiences on their children's stock market participation.

experiences from their children in an attempt to safeguard them from adverse effects and reputational concerns might lead siblings and neighbors to refrain from disclosing their poor economic conditions. Personal firsthand experiences, by contrast, are impossible to ignore, and the affected individual will fully bear their impact. In line with this argument, Table II finds a larger reduction of 1.2 percentage points in stock market participation for the firsthand effect in regressions that control for the individual's postdepression wealth accumulation and labor market outcomes.

## IV. Conclusion

We show that labor market experiences have a long-lasting impact on investment in stocks and other risky assets. We establish this result by taking advantage of the Finnish Great Depression in the early 1990s and rich register-based data spanning almost two decades. The severity and suddenness of the depression make it a useful source of plausibly exogenous variation in local labor market conditions, which alleviates concerns about omitted correlates of both investment in risky assets and exposure to labor market disruptions. Furthermore, estimation approaches that take advantage of secondhand experiences enable us to examine effects of labor market experiences that do not operate through the impact of labor market distress on labor market outcomes and wealth accumulation.

We find an economically and statistically significant reduction in risky assets for the workers who were most adversely affected by the depression. The estimates are remarkably similar across specifications with different sets of control variables. Parameter stability is not surprising because a falsification exercise and other tests indicate that worker characteristics do not strongly correlate with our measure of that labor market conditions. Assessing omitted variable bias by the degree of selection on observable worker characteristics also supports the conclusion that any remaining omitted variable bias is an unlikely explanation for our results.

The explanatory power of labor market experiences does not come solely from their impact on wealth accumulation, income, and employment. Secondhand experiences gained through social networks affect neither wealth accumulation nor labor market outcomes, but they do influence investment in risky assets. Given that the behavioral changes we document are not confined to a particular risky asset class, the candidate explanations for these changes are permanent effects on risk preferences, beliefs, or trust in financial markets.

Our paper speaks to the importance of formative experiences in generating heterogeneity in household portfolios. We corroborate earlier findings on the role of personal experiences by showing that labor market experiences are an important determinant of portfolio choice. We also uncover an interpersonal channel through which the consequences of formative experiences travel in social networks. These effects have implications for understanding belief and preference formation. For example, the rate of learning from publicly available data may be slower in an economy in which personal experiences affect belief

formation. The interpersonal correlations further suggest that the heterogeneity caused by personal experiences can spread across the population through social networks and be persistent.

Formative experiences relating to other areas of life, such as health and family, can also influence how individuals construct their financial portfolios. Our results suggest that isolating the behavioral impact of these experiences from the effects working through wealth and income might be challenging. The same challenge applies to any studies that investigate the impact of historically determined variables on current financial decisions and, more broadly, to any studies that attempt to differentiate between alternative causal mechanisms. Our approach of using secondhand experiences to exclude some of the possible causal mechanisms provides an avenue for overcoming this challenge.

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## Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

**Appendix S1:** Internet Appendix.