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Once bitten, twice shy: The power of personal experiences in risk taking☆

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ABSTRACT

We study whether personal experiences are so powerful that they make individuals actively shy away from risk. Our research design relies on portfolio decisions relating to inheritances, which alter the active decision from one of choosing to take risk to one of choosing to reduce risk. Experience derives from investments in banks that defaulted following the 2007–2009 financial crisis. We classify experiences into first-hand experiences, resulting from personal losses; second-hand experiences, from losses of family members; and third-hand experiences, from locations where banks defaulted. Our results demonstrate that experiences gained personally, not common shocks, make individuals shy away from risk.

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1. Introduction

In the aftermath of the 2007–2009 financial crisis, an appropriate question to ask is whether negative personal experiences during the crisis would result in lower future risk taking, as is evidenced for the generation of Great Depression babies (Malmendier and Nagel, 2011). We ask more generally whether personal experiences are so powerful that they make individuals actively shy away from risk, by studying whether exposure to first-hand experiences has a differential effect on active risk taking relative to economy-wide experiences. Do individuals have to feel the pain themselves, or are common shocks enough to make individuals actively reduce their exposure to risky assets?

Heterogeneity in revealed risk taking between individuals has been attributed to past experiences of macroeconomic shocks (Malmendier and Nagel, 2011; Knüpfer et al., 2017; Guiso et al., 2018), incidents of corporate fraud (Giannetti and Wang, 2016), and personal experiences in the stock market (Kaustia and Knüpfer, 2008, 2012; Choi et al., 2009; Chiang et al., 2011; Bucher-Koenen and Ziegelmeyer, 2014; Hoffmann and Post, 2017).

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Collectively, these studies suggest that personal experiences make individuals refrain from opportunities to take risk.

In this study, we analyze whether personal experiences are so powerful that they make individuals not only refrain from opportunities to take risk, but also actively change their attitudes toward risky assets. We use an identification strategy that relies on a sample of individuals who inherit a portfolio of risky assets as a result of the death of their parents. The main advantage of our identification strategy is that inheritances from estates that hold risky assets alter the active decision from one of choosing to take risk to one of choosing not to take risk. By analyzing active changes in risk taking in this setting, we show that personal experiences are so powerful that they make individuals shy away from risk by selling inherited assets, even when they receive large windfalls.

To understand the effect of personal experiences on the intensive margin of risk taking, we analyze both the indirect effect on individual risk taking of the personal experiences of close family members and individuals living in the same local environment and the direct effect of experiences made by the individual himself. This approach allows us to generate variation in the degree of personal experiences and examine whether reinforcement learning as shown in Kaustia and Knüpfer (2008) also occurs when experiences are further removed from the individual.[1] We show that events experienced personally have much stronger effects on active risk taking than do events affecting peers and relatives.

We use high-quality administrative register data from Denmark to classify individuals' personal experiences and observe their allocation of liquid wealth into risky assets around inheritances. As a plausible source of negative experiences, we identify individuals who invested in bank stocks (a common phenomenon in Denmark prior to the financial crisis), some of which defaulted in the aftermath of the crisis.

The portfolio compositions of the Danish population prior to the crisis illustrate the apparent trust individuals placed in banks when allocating their investments. In 2006, 817,547 of 1,207,278 individuals holding stocks (67.7%) had invested in a bank. Individuals participating in the stock market on average had allocated 47.8% of their portfolios to bank stocks, and 40.1% of all stock market participants held only bank stocks.

The 2007–2009 financial crisis had a significant impact on financial institutions in Denmark. Excessive exposure to real estate developers and farmland led to severe write-offs and liquidity needs in many banks. As a consequence of write-offs on nonperforming loans, eight publicly traded banks defaulted between 2008 and 2012, resulting in significant losses for 108,744 shareholders, equivalent to 9.1% of all Danes holding stocks in 2006.[2] On average, shareholders lost 36,023 Danish kroner (DKK), equivalent to 4,800 euros or approximately 17.9% of their portfolios. Most of the shareholders were also customers. The defaulted bank acted as the primary bank for 85,911 of the 108,744 shareholders (79%).

If negative experiences affect individuals' future outlook on investments in risky assets or individuals' prior about the trustworthiness of financial institutions, we hypothesize that individuals with personal experiences will be more reluctant to take risk in subsequent periods.[3]

In addition to providing administrative register data of high quality, the institutional setting is helpful in ruling out alternative explanations for lower risk taking by individuals with personal experiences around inheritances. Temporary provisions by the Danish Financial Supervisory Authority fully insured the vast majority of depositors against defaults.[4] Relatively low estate tax and substantial cash holdings further ensures that 85% of the estates (or their beneficiaries) hold sufficient cash to settle the estate tax without selling assets.[5] Our results are qualitatively unaffected if we exclude estates that cannot settle the estate tax without selling assets.

To examine the effect by the degree of personal experience, we investigate whether beneficiaries with first-, second-, and third-hand experiences behave differently than do beneficiaries with common experiences when allocating inherited wealth. We define first-hand experiences as the direct effect of losing one's investment in a bank as a result of its default. We define second-hand experiences as the peer effect of having a close relative who is exposed to a first-hand experience. We define third-hand experiences as the effect of living in the municipality of a defaulted bank. We find that third-hand experiences, without the incidence of a first- or second-hand experience, have a negligible effect on the level of risk taking. Investors with a second-hand experience resulting from losses within the close family reduce their allocation to risky assets by around 1 percentage point, and those with first-hand experiences actively reduce the fraction of liquid wealth allocated to stocks by 9 percentage points. These effects are economically significant given a baseline

[1] Kaustia and Knüpfer (2008) show that individuals who subscribe to initial public offerings (IPO) and experience high returns are more likely to subscribe to future IPOs than are individuals who experienced low returns. This is consistent with reinforcement learning, in which personally experienced outcomes are overweighted compared with rational Bayesian learning.

[2] More banks have defaulted in the aftermath of the financial crisis, but, due to data availability, our focus is on publicly listed banks. Collectively, the eight defaulted banks held assets worth 141 billion Danish kroner (18.9 billion euros). See Online Appendix Table OA1 for details.

[3] We find a smaller effect on risk taking of negative experiences deriving from nonbank defaults. The difference suggests that (mis-)trust could play a role in explaining the strongly negative effect of bank defaults on risk taking. Unfortunately, nonbank defaults affect only a small number of shareholders, making it difficult to assess the generality of this result.

[4] Depositor insurance in Denmark provided by the Guarantee Fund for Depositors and Investors guarantees 100% of deposits up to 750,000 DKK (100,000 euros). From October 5, 2008 to September 30, 2010, the Danish government decided to provide unlimited guarantees to depositors. As a result, few customers lost any deposits due to defaults.

[5] Estates are subject to a 15% estate tax for immediate relatives, which is levied on the total net wealth of the estate above a threshold, irrespective of the underlying assets or potential unrealized capital gains. The threshold is 242,400 DKK (32,500 euros) in 2006 and inflated by a price index in subsequent years.

allocation of liquid wealth to stocks of around 30% for beneficiaries who inherit.

A plausible alternative interpretation of our results is that investors with first-hand experiences somehow have a different investment style and are, therefore, less likely to take risks when they inherit. To address this issue, we test whether active changes in risk taking around inheritances depend on whether the inheritance was received before or after the bank default. The strength of this strategy is that the timing of the death (and, hence, the inheritance case) is unrelated to the timing of the bank default. The within-subject differences effectively eliminate the possibility that our results are driven by partial anticipation of inheritances, and the between-subject differences effectively control for the overall effect of the financial crisis on risk taking. Thus, the causal effect of first-hand experiences can be estimated by comparing active changes in risk taking around inheritances, depending on the timing of the inheritance case relative to defaults. Individuals who inherit before they experience a default, on average, actively increase their risk taking by 3.1 percentage points, and individuals who inherit after they have experienced a default actively reduce the fraction of liquid wealth allocated to stocks by 9.2 percentage points. The difference equals 12.3 percentage points and is both economically and statistically significant.

Investors who invested in bank stocks and subsequently lost a significant fraction of their wealth are less willing to hold risky assets, even when they receive a significant positive windfall that more than offsets their losses. The investment behaviors of their local peers, who witness a deteriorating macroeconomic climate, remain relatively unaffected by these experiences. Our results show that changes in an individual's risk taking are largely shaped by events experienced personally and to a lesser extent by experiences of close relatives or macroeconomic conditions.

Our paper contributes to the existing literature analyzing limited stock market participation, by focusing on and measuring the power of personal experiences on active decisions to take risk. Stock market participation varies across countries and has increased recently (Guiso et al., 2003; Giannetti and Koskinen, 2010), but the overall impression is that participation is still low (Campbell, 2006). Alternative explanations for limited stock market participation are low awareness of the equities market (Guiso and Jappelli, 2005), limited financial literacy (van Rooij Lusardi, and Alessie, 2011), the presence of one-time or ongoing fixed participation costs (Vissing-Jørgensen, 2002; Andersen and Nielsen, 2011), limited wealth of younger individuals (Constantinides et al., 2002), presence of income and background risk (Heaton and Lucas, 2000; Gollier, 2001; Guiso and Paiella, 2008), and individuals' lack of trust in other people and financial institutions (Guiso et al., 2008).[6]

Our study is similar in spirit to Malmendier and Nagel (2011); Brunnermeier and Nagel (2008), and Andersen and Nielsen (2011). It shares with Malmendier and Nagel (2011) a focus on the effect of personal experiences on individual risk taking. In contrast to Malmendier and Nagel (2011), we measure the degree of personal experience at the individual level instead of cohort effects based on individuals' ages and the development of the Standard & Poor's (S&P) 500 index during their lifetimes. Our study largely shares an identification strategy with Brunnermeier and Nagel (2008) and Andersen and Nielsen (2011), who examine the effect of inheritance receipts to identify the effect of windfall wealth on an individual's asset allocation. It differs from Brunnermeier and Nagel (2008) and Andersen and Nielsen (2011) in that we focus on identifying the power of personal experiences on active changes in individual risk taking. We show that individuals with negative first-hand experiences actively reduce their allocation of liquid wealth to risky assets when their wealth increases.

Our study is also related to Choi et al. (2009), Kaustia and Knüpfer (2008, 2012), Chiang et al. (2011), Guiso et al. (2018), Bucher-Koenen and Ziegelmeyer (2014), Giannetti and Wang (2016), Hoffmann and Post (2017), and Knüpfer et al. (2017), who show that personally experienced outcomes in stock markets and 401(k) plans play an important role in influencing investment decisions. Our study differs from these prior findings by using an identification strategy in which individuals actively shy away from, rather than refrain from, opportunities to take risk.

Our results raise the question of how and what individuals learn from their past investment experiences. An appropriate response to the personal experiences shown in this study would be to diversify the portfolio. Instead, individuals shy away from risk taking by selling risky assets, as our title suggests: once bitten, twice shy. While the decision to sell inherited assets is the strongest for directly held stocks, it remains economically significant for mutual funds. One plausible interpretation of the profound effect of first-hand experiences on future risk taking is that individuals subsequently have revised their priors about the trustworthiness of banks. Consistent with this channel, we find that individuals with personal experiences, among directly held stocks, are more likely to sell inherited bank stocks than nonbank stock. Among mutual funds, they are more likely to sell bank managed funds than independently managed funds. These results suggest that mistrust toward banks could be one of the channels driving the lower risk taking. The source of mistrust arising from first-hand experiences in our setting is likely to be particularly severe, because many individuals were advised to invest by their financial advisors, who in many cases, according to the Danish Financial Supervisory Authority (2009), violated their fiduciary duty. This interpretation also resonates with survey evidence finding an unprecedented drop in

[6] Our research also contributes to an existing literature focusing on peer and social effects. Duflo and Saez (2003) find strong positive externalities in tax deferred account retirement plan participation rates of the untreated individuals who work in the same department as treated individuals. Entry decisions in the stock market seem to be influenced by family members (Li, 2014; Hellström et al., 2013), as well as by neighborhood and community participation rates (Kaustia and Knüpfer, 2012; Ivković and Weisbenner, 2007), language and cultural similarity (Grinblatt and Keloharju, 2001), and sociability and neighborhood interactions (Hong et al., 2004). Furthermore, investments are influenced by coworkers (Hvide and Östberg, 2015) and, from an institutional perspective, industry peers in the same city (Hong et al., 2005).

individuals' trust in financial markets and financial intermediaries that has taken place since the emergence of the crisis (Guiso, 2010) and the positive correlation between trust and individual risk taking shown in Guiso et al. (2008).

Our study proceeds as follows. Section 2 describes in detail the construction and sources of our data. In Section 3, we discuss the institutional setting in Denmark and individuals' exposure to bank stocks. We then examine how risk taking around inheritances is affected by personal experiences (Section 4) and the effect of personal experiences on portfolio allocation and portfolio diversification around inheritances (Section 5). Section 6 addresses the effect of measurement error due to annual holdings of risky assets. We discuss the interpretation of our findings in relation to the existing literature and provide robustness checks in Section 7. We then conclude.

2. Data

We assemble a data set from the universe of the Danish population that focuses on adults aged 20 or above in 2006. Our data set contains economic, financial, and personal information about individuals, as well as their deceased parents.[7] The data set is constructed based on several different administrative registers made available from Statistics Denmark, as explained below.

Individual and family data originate from the official Danish Civil Registration System. These records include the personal identification number (*CPR*), gender, date of birth, *CPR* numbers of family members (parents, children, and siblings), and their marital histories (number of marriages and divorces). In addition to providing individual characteristics, such as age, gender, and marital status, these data enable us to identify all individuals' legal parents. The data set provides unique identification across individuals, households, generations, and time.

Income, wealth, and portfolio holdings are from the official records at the Danish Tax and Customs Administration (*SKAT*). This data set contains personal income and wealth information by *CPR* number on the Danish population. *SKAT* receives this information directly from the relevant sources. Financial institutions supply information to *SKAT* on their customers' deposits and holdings of security investments. Employers similarly supply statements of wages paid to their employees. Through Statistics Denmark, we obtain access to personal income and wealth data from 1990 to 2012. From 2006 to 2012, we have information on individuals' stock and mutual fund holdings by International Securities Identification Number (ISIN) at the end of the year. For simplicity, we refer to the joint holdings of stocks and mutual funds as stocks (or risky assets). We obtain the bank registration number of each individual's primary bank account. This bank registration number comes directly from tax authorities, as it is the bank account associated with the third-party reporting by financial institutions. Thus, we are able to match an individual's bank with her portfolio investments. We refer to such overlaps between bank accounts and investments in the same bank as individuals with investments in their own banks.[8]

Causes of deaths are from the Danish Cause-of-Death Register at the Danish National Board of Health (*Sundhedsstyrelsen*). In this data set, the cause of death is classified according to international guidelines specified by the World Health Organization (WHO) International Classification of Diseases (ICD-10) system.[9] The sources of these data are the official death certificates issued by a doctor immediately after the death of every deceased Danish citizen. *Sundhedsstyrelsen* compiles these data for statistical purposes and makes them available for medical and social science research through Statistics Denmark. We obtain the cause of death from all Danish citizens who passed away between 2005 and 2011. We use this data set to identify inheritance cases and classify a subsample of individuals who died suddenly and unexpectedly.

Educational records are from the Danish Ministry of Education. All completed (formal and informal) education levels are registered on a yearly basis and made available through Statistics Denmark. We use these data to measure an individual's level of education.

In addition to the administrative register data, we obtain monthly stock prices from Datastream and the Copenhagen Stock Exchange. We use these data to assess portfolio diversification at the individual level.

3. Individual exposure to bank stocks

As the starting point of our analysis, we identify individuals in our sample with investments in banks prior to the global financial crisis. A report on the sales of bank stocks to depositors from the Danish Financial Supervisory Authority (2009) describes the institutional nature of banks as having a tradition of local presence, in which local customers support their local banks, even taking part in the annual general meeting. Over time, many of these customers built a considerable level of trust in local banking institutions and their advice, and they maintained portfolios that contained significant stock holdings in banks.

In the run-up to the financial crisis, many local banks in Denmark followed an aggressive growth strategy financed by equity issues to customers. In its report, the Danish Financial Supervisory Authority (2009) concludes that investments in bank stocks were often encouraged by direct marketing campaigns with a one-sided focus on

[7] Demographic, income, and wealth data are comparable to the data from other Nordic countries [Finland: Grinblatt and Keloharju (2001), Kaustia and Knüpfer (2012), and Knüpfer et al. (2017); Norway: Hvide and Östberg (2015); and Sweden: Calvet et al. (2007, 2009)]. The information on inheritances and the official medical causes of death in our data, however, provide a novel source for identifying windfalls.

[8] Individuals who invest in a mutual fund managed by their brokerage bank are not classified as individuals with investment in their banks unless they also hold the stock of the same bank in their portfolios.

[9] WHO's International Classification of Diseases, ICD-10, is the latest in a series that has its origin in the 1850 s. The first edition, known as the International List of Causes of Death, was adopted by the International Statistics Institute in 1893. WHO took over the responsibility of ICD at its creation in 1948, and the system is currently used for mortality and morbidity statistics by all member states. The current ICD-10 standard came into use by member states in 1994.

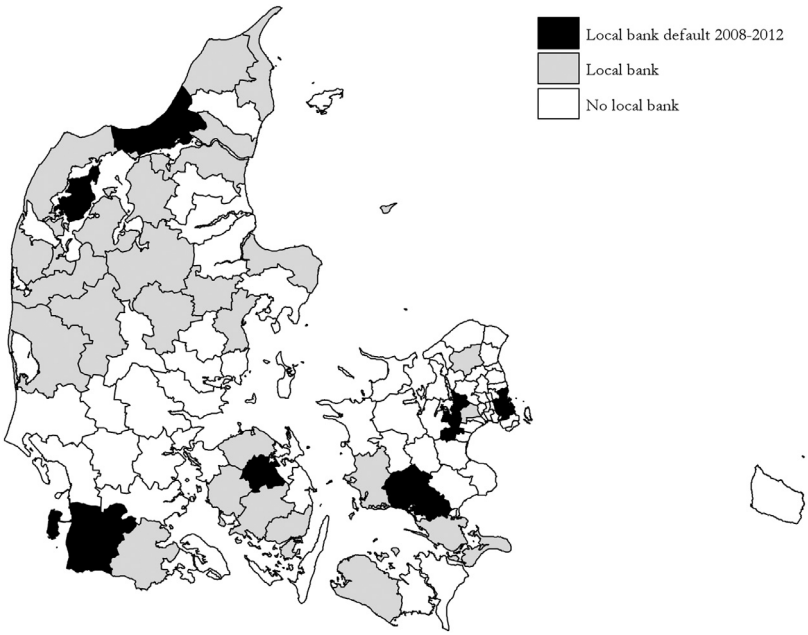

Fig. 1. Location of local banks and incidences of bank defaults in Denmark.
This map shows the location of publicly listed banks and incidences of bank defaults across municipalities in Denmark from 2006 to 2012 based on bank headquarters. Municipalities in which a publicly listed bank defaulted between 2008 and 2012 are displayed in black. Municipalities with a surviving publicly listed bank are displayed in gray. Municipalities without a publicly listed bank are shown in white.

benefits such as capital gains, dividends, and banking privileges, with little attention to the inherent risks. Bankers contacted customers directly, offering opportunities to participate in equity issues and, in many cases, loans to finance the purchase. Many customers, appearing to place trust in this investment advice, purchased stock in their banks without adequately considering the potential risks or their portfolios' lack of diversification (Danish Financial Supervisory Authority, 2009). The tendency for individuals to invest in companies they frequent has been shown in prior literature (Keloharju et al., 2012) and is consistent with the view that such investors regard stocks as consumption goods, not just as investments.

As a result of these institutional features, the average stock market participant held bank stocks in 2006 (see Online Appendix Tables OA2 and OA3). In 2006, on average, 29.7% of the Danish population participated in the stock market by holding either stocks or mutual funds.[10] The market value of the portfolio of average participants is 328,000 DKK (44,025 euros), equivalent to 41.1% of their liquid wealth. The average portfolio consists of 2.6 stocks, of which bank stocks account for 0.8.[11] More than half of all stock market participants hold bank stocks (67.7%), and 40.0% of all participants only hold bank stocks in their portfolio. As a result, the average portfolio weight allocated to bank stocks in general is 47.8%, with the majority of the exposure (42.9% out of 47.8%) tilted toward an individual's own bank.

A total of eight publicly traded banks defaulted between 2008 and 2012 (see list in Online Appendix Table OA1). Fig. 1 provides a mapping of headquarters of publicly listed banks and bank defaults across the 98 municipalities in Denmark. Municipalities with a publicly listed local bank between 2006 and 2012 are displayed in grey, and municipalities with a bank default in the aftermath of the financial crisis are shown in black. Fig. 1 shows that the presence of a publicly listed bank and bank defaults are relatively geographically dispersed. Online Appendix Table OA3 shows that investors in default banks have similar individual and portfolio characteristics to investors in banks that did not default.

4. Personal experiences and risk taking around inheritances

To identify the power of personal experiences, we examine the change in risk taking when individuals inherit a portfolio of risky assets.[12] The main advantage of this approach is that it allows us to observe active changes to risk taking, and it reduces the potential bias resulting from

[10] Consistent with prior literature, Online Appendix Table OA2 shows that, in the cross section, stock market participants have significantly higher income and wealth, are more likely to be male, and are older, better educated, and more often married than nonparticipants.

[11] In terms of individual and portfolio characteristics, our sample looks similar to other studies of individual investor behavior in the United States and other Nordic countries (Barber and Odean 2000, 2002; Grinblatt and Keloharju, 2001; Calvet et al., 2007, 2009; Hvide and Östberg, 2015).

[12] We do not analyze risk taking around inheritances for estates that do not hold risky assets. We are motivated to exclude these estates primarily because the active decision for this subsample is choosing to take risk, rather than choosing not to take risk.

Table 1
Inheritance characteristics.
This table reports descriptive statistics for inheritance cases from 2007 to 2011, and personal experiences of beneficiaries associated with these estates. Panel A reports the total number of estates and beneficiaries for all deaths and sudden deaths. Sudden deaths are defined as household terminations wherein the cause of death is sudden and unanticipated. Panel B reports portfolio characteristics of estates, with stocks and beneficiaries associated with these estates. We observe the year-end market value of shareholdings and risky asset share (market value of stocks and mutual funds relative to liquid wealth). Panel C reports the inheritance characteristics of the beneficiaries who inherit stocks subject to their personal experiences. *First-hand experience* occurs due to the loss of investments in a defaulted bank. *Second-hand experience* derives from first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* identifies individuals who are living in a municipality with a bank default. All amounts are in thousands of year 2010 Danish kroner (DKK). One euro is equal to 7.45 DKK. Standard deviations are in parentheses.

Panel A: Household terminations	All deaths	All deaths with stocks	Sudden deaths	Sudden deaths with stocks
Number of estates	80,052	27,670	14,508	5190
Number of beneficiaries	139,817	47,418	24,975	8853
Panel B: Portfolio characteristics	Estates with stocks		Beneficiaries who inherit stocks	
	All deaths	Sudden deaths	All deaths	Sudden deaths
Market value of stocks (thousands of DKK)	411.8	372.9	103.7	101.7
	(4255.7)	(1625.5)	(897.8)	(504.7)
Risky asset share (percent)	34.3	33.9	14.2	14.8
	(23.2)	(23.4)	(24.5)	(24.9)
N	27,670	5190	47,418	8853
Panel C: Inheritance characteristics	Personal experience			
	First-hand Experience	*Second-hand experience*	*Third-hand experience*	None
Deceased's Portfolio:				
Market value of stocks before inheritance (thousands of DKK)	206.0	95.7 (593.2)	179.2	101.6
	(568.2)		(2403.0)	(838.8)
Market value of inherited stocks (thousands of DKK)	212.3	181.5 (409.0)	493.0	223.7
	(508.1)		(6619.6)	(1758.5)
Lost investment from bank default (thousands of DKK)	60.9	–	–	–
	(143.0)			
N	245	1277	1065	44,831

inertia. Fully inert individuals passively merge the inherited portfolio into their pre-inheritance portfolio, and deviations from this counterfactual post-inheritance portfolio result from an active choice to buy or sell assets. If personal experiences affect risk taking negatively, we expect that those individuals are more likely to liquidate inherited portfolios and, hence, actively reduce their risk taking relative to individuals without personal experiences.

The starting point of our inheritance sample is documenting deaths that cause a household termination and, hence, an inheritance case. Household terminations occur whenever the last living member of the household dies or, in rare cases, when a couple dies in the same year. To simplify the analysis, we focus on deaths wherein the deceased have offspring, in which case the estate will, by default, be shared equally among the offspring. Estates in Denmark take an average of nine months to resolve, and the Danish Inheritance Act of 1964 requires estates to be resolved legally within 12 months following the death (Andersen and Nielsen, 2017). In addition, the net worth of the estate is subject to a 15% estate tax for immediate relatives if the estate's net wealth in 2006 exceeds 242,400 DKK (32,500 euros). This threshold is inflated by a price index in subsequent years. Furthermore, any unrealized capital gains incurred by the deceased from investments are not directly taxed. Thus beneficiaries have no tax incentives to either keep or liquidate the inherited assets. Because of the relatively low estate tax and substantial cash holdings, 85% of the estates (or their beneficiaries) hold sufficient cash to settle the estate tax without selling assets.

We use two samples of inheritance cases: a gross sample covering all deaths and, in a robustness check, a smaller subsample covering only sudden deaths. The main advantage of the latter is that windfalls are, to a large degree, unanticipated, and individuals ceteris paribus should be more willing to take risk when they obtain an unexpected windfall. The disadvantage of using sudden deaths is that we obtain a smaller sample, which makes estimating the effect of personal experiences on risk taking with precision more difficult. We present results using all deaths and have robustness results using sudden deaths in Online Appendix Table OA8.[13]

Panel A of Table 1 summarizes the number of deaths and sudden deaths for which the deceased held stocks. We focus on deaths in the period between 2007 and 2011

[13] To classify sudden deaths, Andersen and Nielsen (2011, 2012) combine relevant ICD-10 codes from related medical literature with a thorough inspection of WHO's detailed classification system. The medical literature defines sudden death as unexpected death that occurs instantaneously or within a few hours of an abrupt change in the previous clinical state. We use ICD-10 codes to identify causes of death that are truly sudden and unexpected by beneficiaries.

Table 2
Individual and portfolio characteristics of beneficiaries.
This table reports descriptive statistics (mean and standard deviation) for beneficiaries who hold and inherit stocks, and Online Appendix Table OA4 reports the same descriptive statistics for the whole sample of beneficiaries who inherit stocks. For each individual, we observe demographic characteristics in Panel A: *income after tax, net wealth, age, gender, education* (years of schooling), *married*, and whether there are *children in the household*; and portfolio characteristics in Panel B: *risky asset share* (market value of stocks and mutual funds relative to liquid wealth), *market value* of shareholdings, the composition of the portfolio including the *number of stocks and mutual funds*, and an indicator equal to one for individuals with *investment in mutual funds. First-hand experience* occurs due to the loss of investments in a defaulted bank. *Second-hand experience* derives from first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* identifies individuals who are living in a municipality with a bank default. All amounts are in thousands of year 2010 Danish kroner (DKK). One euro is equal to 7.45 DKK. Standard deviations are in parentheses.

	Personal experience			
	First-hand experience	Second-hand experience	Third-hand experience	None
Panel A: Demographic characteristics				
Income after tax (thousands of DKK)	416.0	389.8	487.6	417.8
	(363.0)	(247.5)	(872.7)	(367.0)
Net wealth (thousands of DKK)	1475.2	143.7	1673.3	1422.9
	(3383.7)	(12485.3)	(5769.4)	(3463.5)
Age (years)	50.6	49.4	50.6	49.1
	(17.3)	(17.4)	(16.5)	(17.4)
Gender (percent male)	57.5	50.5	50.7	49.1
	(49.5)	(50.1)	(50.0)	(49.7)
Education (years)	13.6	13.7	14.1	13.4
	(2.6)	(2.9)	(3.2)	(3.0)
Married (percent)	68.2	66.7	63.4	63.1
	(46.7)	(47.2)	(48.1)	(48.3)
Children in household (percent)	41.2	45.3	42.1	42.9
	(49.3)	(49.8)	(49.4)	(49.5)
Panel B. Portfolio characteristics				
Risky asset share (percent)	19.2	30.4	28.3	32.9
	(24.8)	(27.8)	(25.9)	(27.9)
Market value (thousands of DKK)	206.0	247.0	406.0	233.8
	(568.2)	(933.6)	(3606.6)	(1260.4)
Number of stocks and mutual funds	2.6	3.5	3.1	3.0
	(4.3)	(4.2)	(3.8)	(3.5)
Investment in mutual funds (percent)	30.2	45.1	40.6	42.0
	(46.0)	(49.8)	(49.2)	(49.4)
N	245	495	470	19,475

because we need to observe the decedents' stock holdings prior to their deaths and identify whether the beneficiaries keep these stocks after the estate is resolved. We observe portfolio holdings at the end of the year, from 2006 to 2012, which limits the time window during which we can track inherited stocks to between 2007 and 2011.

We have, in total, 80,052 household terminations between 2007 and 2011, of which 27,670 held stocks prior to their deaths. Each stock-holding estate has 1.71 beneficiaries on average, resulting in a sample of 47,418 beneficiaries who inherited stocks. Our subsample is significantly smaller, with 8,853 beneficiaries who inherited stocks due to a sudden death.

Panel B of Table 1 reports the portfolio characteristics of the deceased as well as of the beneficiaries. We report the portfolio characteristics of all deaths and sudden deaths conditional on holding stocks prior to the death. On average, deceased individuals held stocks worth 411,800 DKK (55,300 euros), equivalent to 34.3% of their liquid wealth. Panel B also reports the portfolio characteristics of all beneficiaries of inheritances resulting from all deaths and from sudden deaths, conditional on the deceased holding stocks. On average, beneficiaries hold stocks worth 103,700 DKK before they inherit.

In Panel C, we report inheritance characteristics for beneficiaries subject to their personal experiences. We consider personal experiences of different degrees: *First-hand experience* is an indicator taking the value one for individuals losing their investments in a bank as a result of the bank default. *Second-hand experience* is an indicator equal to one if an individual's family member, a parent, sibling, child, in-law, or spouse had a first-hand experience. *Third-hand experience* is an indicator for individuals living in a municipality with a defaulting bank. To avoid spurious correlation, we exclude individuals with personal experiences within the inheritance window and code only the highest degree of personal experience. Thus, if an individual has a first-hand experience, we set second-hand and third-hand experiences equal to zero.

For beneficiaries who experienced a bank default, the average loss is 60,900 DKK (8,200 euros), and the average inheritance of stocks is worth 212,300 DKK (28,500 euros). In addition, 93% of all beneficiaries who experienced a default lost significantly less than they received through the

Table 3
Personal experience effects on risk taking.
This table reports the effect of personal experiences on changes in risk taking around inheritances. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varphi\omega(\alpha^i_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t},$$

where the dependent variable $\Delta\alpha_{i,\,t,\,2k}$ is the active change in the risky asset share of individual i from year $t-k$ to $t+k$, year t is the year of inheritance, and $k=1$. The active change is the observed change in risky asset share less the counterfactual change due to the inheritance. $X_{i,\,t}$ is a vector of control variables, and $E_{i,\,b}$ is a vector of personal experiences gained before the start of the inheritance window, i.e., $b<t$-1. $\omega(\alpha^i_{t-k} - \alpha_{t-k})$ controls for inertia. Individuals with personal experiences within the inheritance window are excluded from the sample. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank. *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a defaulted bank. Control variables are *market value of inherited stocks, stock market participation, investment in mutual funds, investment in own bank*, log. *of income*, log. *of net wealth, age, gender, education, married*, and *children in household* (see Table 2 for further description). To control for inertia, we include the *pre-inheritance risky asset share* and the *counterfactual change* in the risky asset share due to inheritance (see Eq. (1)). Standard errors are in parentheses. ***, **, and * indicate coefficients that are significant at the 1%, 5%, and 10% level, respectively, using standard errors clustered at the level of municipality-year.

	Dependent variable: active change in risky asset share			
	(1)	(2)	(3)	(4)
First-hand experience	−0.093***	−0.092***		−0.093***
	(0.012)	(0.012)		(0.012)
First-hand investor and customer experience			−0.095***	
			(0.013)	
First-hand investor and noncustomer experience			−0.084***	
			(0.029)	
First-hand customer experience			0.019	
			(0.025)	
First-hand experience in nonbank stocks				0.046
				(0.038)
Second-hand experience	−0.001	−0.002	−0.002	−0.002
	(0.005)	(0.005)	(0.005)	(0.005)
Third-hand experience	0.001	0.000	0.000	0.000
	(0.005)	(0.004)	(0.004)	(0.004)
Control variables	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.462	0.463	0.463	0.463
N	47,418	47,418	47,418	47,418

inheritance of wealth. Thus, the average beneficiary in our sample would passively take more risk after inheriting if they are fully inert.

Table 2 compares individual and portfolio characteristics of beneficiaries subject to their personal experiences. To facilitate a comparison with beneficiaries with first-hand experiences, we report the descriptive statistics for beneficiaries who hold stocks.[14] From Panel A, the demographic characteristics of individuals with and without personal experiences are fairly comparable, the main exceptions being gender and marital status among individuals with first-hand experiences. Panel B shows that individuals with personal experiences that result from the loss of their investments in a defaulted bank have a lower risky asset share, lower market value of risky assets, and fewer risky assets.

Table 3 examines the effect of personal experiences on changes in risk taking around inheritances. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varphi\omega(\alpha^i_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t}, \tag{1}$$

where the dependent variable $\Delta\alpha_{i,\,t,\,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, year t is the year of inheritance, and $k=1$. $X_{i,\,t}$ is a vector of control variables, $E_{i,\,b}$ is a vector of personal experiences gained before inheriting (i.e., $b<t$-k), and $\omega(\alpha^i_{t-k} - \alpha_{t-k})$ controls for inertia. If beneficiaries are inert, inertia dictates that the change in risk taking is a weighted average of the risk taking before receiving the inheritance, α_{t-k}, and the risk taking in the inherited wealth, α^i_{t-k}:

$$Inert_t = (1-\omega)\alpha_{t-k} + \omega\alpha^i_{t-k} - \alpha_{t-k} = \omega(\alpha^i_{t-k} - \alpha_{t-k}), \tag{2}$$

where the parameter, ω, denotes the fraction of inherited wealth relative to liquid wealth after inheriting.

We measure the active change in the risky asset share, calculated by the market value of stocks and mutual funds

[14] For completeness, Online Appendix Table OA4 reports individual and portfolio characteristics for all beneficiaries. Beneficiaries with first-hand experiences by construction held stocks, which explains why they have a higher risky asset share, greater market value of stocks, and larger number of stocks and investment in mutual funds than individuals with second- or third-hand experiences. Thus, to facilitate a meaningful comparison of individual characteristics, Table 2 conditions on holding stocks.

relative to liquid wealth, in a two-year period around the year in which a parent dies to ensure that the estate is settled and, hence, that inherited wealth is transferred to the beneficiary. The active change is the observed change in risky asset share less the counterfactual change due to the inheritance. The counterfactual change in the risky asset share is calculated by merging the inherited portfolio with the beneficiaries' pre-inheritance portfolio and updating market prices to year $t+1$. The active change therefore captures changes in the allocation of risky assets by the beneficiary, instead of passive changes caused by inertia. As we infer the inheritance from annual holdings of the deceased and their beneficiaries, we address concerns about whether measurement bias is an issue in Section 6.

We use a linear regression model and control for income, net wealth, age, gender, education, indicators for being married and having children in the household, and year fixed effects. Standard errors are clustered at the municipality-year level to alleviate the concern that defaults disproportionally affect specific geographic locations. To consider the role of different personal experiences on changes in risk taking, we include the three experience indicators. To avoid spurious correlation between personal experiences and changes in risk taking, we exclude individuals who inherit in the time period in which they have their first-, second-, or third-hand experience. That is, individuals in our analysis either have their first-hand experience before year $t-1$ or after year $t+1$, but never between year t-1 and $t+1$, which is the period over which we measure the change in risk taking around inheritances.[15]

Column 1 in Table 3 shows that first-hand experiences reduce risk taking. Individuals who experienced a default before inheriting reduce their risk taking by 9.3 percentage points. This effect is economically and statistically significant. Beneficiaries with second- and third-hand experiences do not actively decrease their allocation to risky assets.[16] In Column 2, we introduce control variables and find that beneficiaries with first-hand experiences actively reduce their allocation to risky assets by 9.2 percentage points.

One important question is whether financial losses generate the effect of personal experiences or whether common losses due to bank defaults are particularly discouraging for future risk taking, perhaps because individuals lose trust in the financial system. In Column 3 of Table 3, we therefore consider different types of first-hand experiences: investor and customer experience, investor and noncustomer experience, (non-investor) customer experience, and non-investor and noncustomer experience, which is the reference group. This decomposition is helpful for understanding the channels at play. For instance, following defaults, individuals with first-hand experiences could reduce risk taking if the default causes them to become liquidity constrained. Alternatively, individuals with first-hand investor and customer experiences could reduce risk taking because they trusted the advice of their banks and invested in bank stock.

Individuals with first-hand experiences reduce risk taking more if they were also customers at their banks. First-hand experiences reduce risk taking by 9.5 percentage points for individuals who were also customers, and individuals who were not customers reduce their risk taking by 8.4 percentage points. One plausible interpretation of the difference of 1.1 percentage points is that individuals who were also customers could have trusted the advice of their banks and invested in bank stock. Column 3 of Table 3 also shows that the effect of personal experiences on risk taking is not caused by liquidity constraints due to deposits being frozen. Individuals who were customers but not investors in a defaulted bank are not actively changing their allocation to risky assets around inheritances.

The final personal experience we consider is default of nonbank stocks. We identify six nonbank defaults between 2007 and 2011. The six nonbank defaults have approximately five thousand individual investors, of which 53 receive an inheritance after the default experience. Column 4 of Table 3 compares the effect of personal experiences with bank and nonbank defaults on individual risk taking. Investors in defaulted nonbank stocks increase their risky share allocation around inheritances, but the effect is statistically insignificant. Although we find results suggesting that bank defaults have a significantly stronger negative effect on risk taking, the main caveat is the limited number of observations for nonbank defaults, making it difficult to estimate standard errors with precision.

The underlying changes in risk taking around inheritances subject to an individual's level of experience are displayed in Fig. 2. The figure reports the pre-inheritance level of liquid assets allocated to stocks at year $t-1$ and the counterfactual post-inheritance level of risk taking if individuals passively merge their inherited portfolios into their existing portfolios. The counterfactual post-inheritance level of risk taking is calculated by merging the portfolios at year $t-1$ and updating market prices to year $t+1$. The difference between the pre-inheritance and counterfactual post-inheritance bars reveals that average beneficiaries, irrespective of personal experiences, would increase their allocation to risky assets if they were passively accepting the inheritance. For individuals without a personal experience, the counterfactual passive effect would increase their allocation to stocks from 29.2 to 32.6 percentage points. This increase is a natural result of the fact that their parents, on average, allocated a higher fraction of their liquid wealth to risky assets. Thus, if individuals passively accept inheritances, they take more risk after inheriting. In contrast, Fig. 2 shows that individuals tend to make active portfolio decisions around inheritances. The observed post-inheritance risk taking deviates significantly from the counterfactual post-inheritance level. On average, individuals without a personal experience actively reduce

[15] Our results are stronger if we alternatively include individuals who inherit in the same period in which they have their personal experiences.

[16] In Online Appendix Fig. OA1, we report the source and incidence of second-hand experiences. Table OA5 shows that that all second-hand experiences do not affect risk taking, irrespective of their source or frequency. In Table OA6, we include interaction terms between personal experiences and the market value of inherited stocks. Consistent with a negative effect of personal experiences on risk taking, interaction terms are negative and statistically significant. While the propensity to keep inherited stocks is increasing with the market value of inherited stocks for beneficiaries in general, this outcome does not hold for beneficiaries with first-hand experiences.

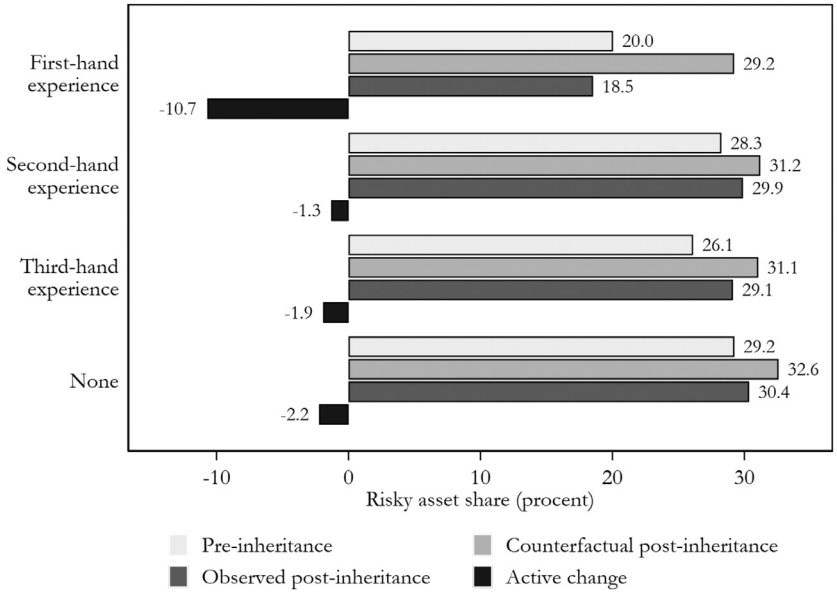

Fig. 2. Degree of experience and portfolio rebalancing around inheritances.
This graph decomposes the change in risky asset share, measured by the fraction of liquid assets allocated to stocks and mutual funds around inheritances, into the counterfactual passive and active changes. We report the pre-inheritance risky asset share, the counterfactual post-inheritance risky asset share, the observed post-inheritance risky asset share, and the active change in the risky asset share. The counterfactual post-inheritance risky asset share is calculated by merging the beneficiaries' portfolios with the inherited portfolio in year $t-1$ and updating it with market prices in year $t+1$. The active change is calculated as the difference between the observed post-inheritance risky asset share and the counterfactual post-inheritance risky asset share. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank. *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a defaulted bank.

their allocation to risky assets by 2.2 percentage points to 30.4% of their liquid wealth. Although individuals on average undo two-thirds of the passive change (a 2.2 percentage point active change relative to a 3.4 percentage point passive change), inheritance still results in an increased allocation to risky assets by 1.2 percentage points relative to the pre-inheritance level. Thus, our findings support previous evidence of relative risk aversion being either constant or slightly decreasing (see Calvet et al., 2007; Brunnermeier and Nagel, 2008; Chiaporri and Paiella, 2011; and Calvet and Sodini, 2014). In general, individuals seem to follow a simple rule of thumb and keep their risky asset share constant.

Now contrast the change in risk taking for individuals without personal experiences to those with them. Individuals with a first-hand experience before they inherit (i.e., before year $t-1$) would passively increase the allocation to risky assets from the pre-inheritance level of 20.0% to 29.2%.[17] Instead, they actively reduce their allocation to risky assets by selling stocks. The observed post-inheritance allocation to risky assets is reduced to 18.5%, which is lower than their pre-inheritance level of 20.0%. The active change equals a reduction in risk taking by 10.7 percentage points. It follows that the effect of personal experiences on risk taking around inheritance results from an active choice to reduce risk. In contrast to individuals without a personal experience, these individuals do not seem to follow the same rule of thumb. Instead of holding their risky asset share constant, individuals with first-hand experiences seem to exhibit increasing relative risk aversion.

Fig. 2 also reports the decomposition of changes for individuals with second- and third-hand experiences. The lower levels of risk taking result from active choices, although the reduction in risk taking is lower than for individuals without personal experiences.

One concern with our focus on estimating the effect of personal experiences around inheritance is whether inheritances received by beneficiaries with personal experiences are somehow different from those received by beneficiaries without personal experiences. For instance, if intergenerational overlaps exist in portfolios, inheritances are more likely to include bank stocks if the beneficiaries hold bank stocks. Thus, the lower risk taking by individuals with personal experiences could be driven by differences in inheritance composition, not by changes in attitudes toward risk.

To alleviate this concern, we estimate the effect of personal experiences using a placebo test in which we look at the difference in risk taking depending on the timing of the first-hand experience relative to the inheritance. The strength of the placebo test is twofold. First, the timing of the death, and hence the inheritance case, is unrelated to the timing of the bank default. Second, the difference in risk taking between individuals who inherit before their

[17] Individuals with first-hand experiences, as suggested by Table 3, have lower allocation to stocks pre-inheritance as a result of the negative shock. Despite this finding, the counterfactual post-inheritance level of risk taking of 29.2% is close to the 32.6% for individuals without personal experiences, because the inherited wealth is significantly larger than the beneficiaries' pre-inheritance wealth.

Table 4
Timing of personal experience effects on risk taking.
This table reports the effect of the timing of personal experiences on changes in risk taking around inheritances. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma_b E_{i,b} + \gamma_a E_{i,a} + \phi\omega(\alpha^i_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t},$$

where the dependent variable $\Delta\alpha_{i,\,t,\,2k}$ is the active change in the risky asset share of individual i from year t-k to $t+k$, year t is the year of inheritance, and $k=1$.$X_{i,\,t}$ is a vector of control variables, $E_{i,\,b}$ is a vector of personal experiences gained before the start of the inheritance window, i.e., $b<t$-1, and $E_{i,\,a}$ is a vector of personal experiences gained after the end of the inheritance window, i.e., $a>t+1$. $\omega(\alpha^i_{t-k} - \alpha_{t-k})$ controls for inertia. Individuals with personal experiences within the inheritance window are excluded from the sample. The active change is the observed change in risky asset share less the counterfactual change due to the inheritance. *First-hand experience* occurs due to the loss of investments in a defaulted bank. *First-hand experience before inheritance* is an indicator for individuals with first-hand experiences before they inherited. *First-hand experience after inheritance* is an indicator for individuals with first-hand experiences after they inherited. *Second-hand experience before inheritance* is an indicator for first-hand experiences in the immediate family before they inherited. *Second-hand experience after inheritance* is an indicator for first-hand experiences in the immediate family after they inherited. *Third-hand experience before inheritance* is an indicator for individuals who are living in a municipality with a defaulted bank before inheritance. *Third-hand experience after inheritance* is an indicator for individuals who are living in a municipality with a defaulted bank after inheritance. Control variables are *market value of inherited stocks, stock market participation, investment in mutual funds, investment in own bank*, log. *of income*, log. *of net wealth, age, gender, education, married*, and *children in the household* (see Table 2 for further description). To control for inertia, we include the *pre-inheritance risky asset share* and the *counterfactual change* in the level of risk taking due to inheritance (see Eq. 1). Standard errors are in parentheses. ***, **, and * indicate coefficients that are significant at the 1%, 5%, and 10% level, respectively, using standard errors clustered at the level of municipality-year.

	Dependent variable: active change in risky asset share			
	(1)	(2)	(3)	(4)
First-hand experience before inheritance	−0.092***			−0.092***
	(0.012)			(0.012)
First-hand experience after inheritance	0.031***			0.030***
	(0.011)			(0.011)
Second-hand experience before inheritance		−0.001		−0.002
		(0.005)		(0.005)
Second-hand experience after inheritance		0.015***		0.003
		(0.006)		(0.006)
Third-hand experience before inheritance			0.001	−0.001
			(0.004)	(0.004)
Third-hand experience after inheritance			−0.005*	−0.007**
			(0.003)	(0.003)
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.463	0.462	0.462	0.463
N	47,418	47,418	47,418	47,418

first-hand experience and individuals who inherit after their first-hand experience effectively eliminates the possibility that our results are driven by differences in inheritance composition or investment style. Thus, the placebo test is helpful in controlling for differences attributable to inheritance compositions and investment style. To address these concerns, we estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma_b E_{i,b} + \gamma_a E_{i,a} + \varphi\omega(\alpha^i_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t}, \tag{3}$$

where the dependent variable $\Delta\alpha_{i,\,t,\,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, year t is the year of inheritance, and $k=1$. $X_{i,\,t}$ is a vector of control variables, $E_{i,\,b}$ is a vector of personal experiences gained before the start of the inheritance window (i.e., $b<t-k$), $E_{i,\,a}$ is a vector of personal experiences gained after the end of the inheritance window (i.e., $a>t+$k); and $\omega(\alpha^i_{t-k} - \alpha_{t-k})$ controls for inertia. The difference between γ_a and $\gamma_b$allows us to ascertain that our results are not driven by differences in inheritance compositions and investment style.

Column 1 of Table 4 shows a large difference in the change in risk taking depending on the timing of the inheritance relative to the experience. Individuals who inherit after a first-hand experience reduce their allocation of liquid assets to stocks by 9.2 percentage points, and individuals who will experience a first-hand experience in the future increase their exposure to stocks by 3.1%. The latter result also serves as a natural placebo test because the timing of the deaths is unanticipated relative to the inheritance. The placebo test suggests that lower risk taking is not an artifact of the investment style or the inherited portfolio, as individuals with investments in banks increase their exposure to stock when the bank has not yet defaulted.

Columns 2 and 3 of Table 4 show results for second- and third-hand experiences. Although smaller in

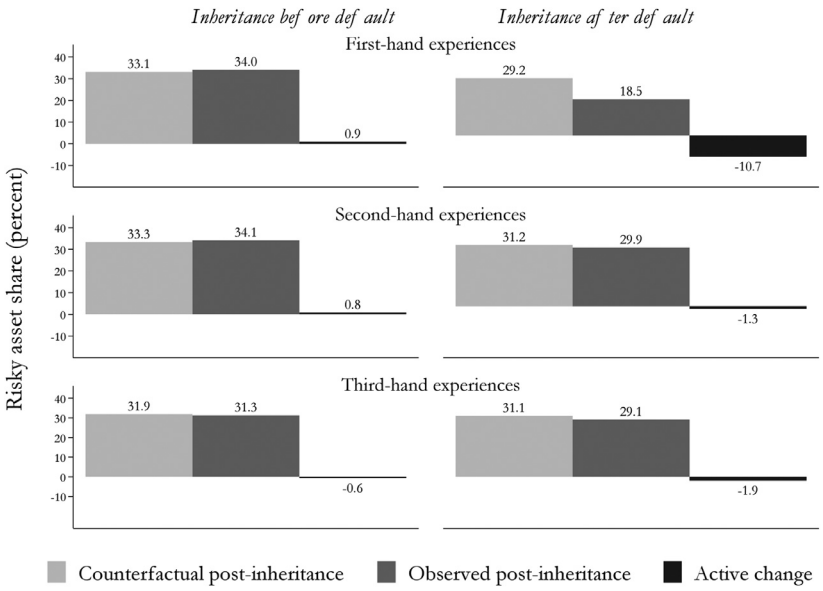

Fig. 3. Timing of inheritance relative to personal experience.
This figure shows the effect of personal experiences on risk taking conditional on the timing of the inheritance relative to the personal experiences. *Inheritance before default* is a placebo-test, and *inheritance after default* is the treatment effect. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank. *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a defaulted bank. We report counterfactual post-inheritance risky asset share, the observed post-inheritance risky asset share, and the active change in risky asset share. Risky asset share is measured by the ratio of liquid asset allocated to stocks and mutual funds. The counterfactual post-inheritance risky asset share is calculated by merging the beneficiaries' portfolios with the inherited portfolio in year $t-1$, and updating it with market prices in year $t+1$. The active change is calculated as the difference between the observed post-inheritance risky asset share and the counterfactual post-inheritance risky asset share.

magnitude, the effects are economically and statistically insignificant. Finally, Column 4 confirms the results when we include all personal experiences in the same specification.

To illustrate the power of the results in Table 4, Fig. 3 shows the changes in the allocation of liquid wealth to stocks for individuals with first-hand experiences conditional on the timing of the experience relative to the inheritance. Individuals with a personal experience after inheritance (i.e., after year $t+1$) tend to make small active changes to their risk taking, while individuals with personal experiences before inheritance (i.e., before year $t-1$) tend to make large active changes by reducing the allocation to risky assets.

A natural extension of the placebo test in Table 4 is to look at whether the effect of personal experiences decays as risk taking decisions get further removed from the personal experience. Unfortunately, based on the data available, personal experiences in our sample occur either two, three, or four years before individuals inherit. Thus, we do not have statistical power to ascertain whether the effect of personal experiences decays over time.

In Table 5, we consider the effect of first-hand experiences using a matched sample to effectively rule out the possibility that lower risk taking is driven by local macroeconomic shocks or lower pre- or post-inheritance wealth. We compare the change in the allocation of liquid wealth to stocks using Eq. (1) for individuals with first-hand experiences relative to five control groups: (1) beneficiaries who hold stocks, (2) beneficiaries with the same counterfactual risky asset share, (3) beneficiaries holding stocks who have invested in bank stocks and live in the default municipality but did not experience a default, (4) beneficiaries holding stocks matched to the same level of pre-inheritance wealth and value of inherited stocks, and (5) beneficiaries holding stocks matched to the same post-inherence levels of wealth and value of inherited stocks. In all matched samples, we select the five nearest neighbors based on the matching criteria, although the number of observations is significantly lower in the third matched sample because we restrict the sample to municipalities with more than two publicly listed banks of which one did and one did not default. Thus, the first control group is formed by selecting the five nearest neighbors among stock market participants based on value of inherited stocks, and the second control group is formed by selecting the five nearest neighbors based on the counterfactual risky asset share. The third control group matches on investment in a bank with headquarters in the same municipality as the default bank and selects the five nearest neighbors based on value of inherited stocks. The fourth (fifth) control group is formed by employing exact matching on the vigintile of pre-inheritance (post-inheritance) wealth distribution and, then, selecting the five nearest neighbors based on the value of inherited stocks.

Across all five matched samples, Table 5 shows results that are consistent with the prior analysis. Individuals with first-hand experiences actively reduce risk taking when they inherit. Collectively, the matched sample approach addresses concerns about the strength of the local macroeco-

Table 5
Matched sample estimate of the effect of personal experiences on risk taking.
This table reports matched sample estimates of the effect of personal experiences on changes in risk taking around inheritances. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varphi\omega(\alpha^{i}_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t},$$

where the dependent variable $\Delta\alpha_{i,\,t,\,2k}$ is the active change in the risky asset share of individual i from year $t-k$ to $t+k$, year t is the year of inheritance, and $k=1$. The active change is the observed change in risky asset share less the counterfactual change due to the inheritance.$X_{i,\,t}$ is a vector of control variables, and $E_{i,\,b}$ is a vector of personal experiences gained before the start of the inheritance window, i.e., b < t-1. $\omega(\alpha^{i}_{t-k} - \alpha_{t-k})$ controls for inertia. Individuals with personal experiences within the inheritance window are excluded from the sample. The treatment group consists of investors with first-hand experiences before the start of the inheritance window, and the control group is a matched sample of beneficiaries without first- or second-hand experiences. The matched control group in Column 1 consists of stock market participants, and the control group in Column 2 is matched on the counterfactual change to the risky asset share due to inheritance (see Eq. 1). In Column 3, we use investors holding bank stocks with third-hand experiences (individuals who are living in a municipality with a bank default) as the control group. The control group in Column 4 consists of individuals who hold stocks and are from the same vigintile of the pre-inheritance wealth distribution. The control group in Column 5 consists of individuals who hold stocks and are from the same vigintile of the post-inheritance wealth distribution. Among the matches in Columns 1, 3, 4, and 5, we use the five closest neighbors based on the value of inherited stocks. In Column 2, we use the five closest neighbors based on the counterfactual risky asset share. *First-hand experience* is an indicator for individuals who experienced the default of their own banks before inheritance. Control variables are *market value of inherited stocks, stock market participation, investment in mutual funds, investment in own bank*, log. *of income*, log. *of net wealth, age, gender, education, married*, and *children in the household* (see Table 2 for further description). To control for inertia, we include the *pre-inheritance risky asset share* and the *counterfactual change* in the level of risk taking due to inheritance (see Eq. (1)). Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: active change in risky asset share				
	(1)	(2)	(3)	(4)	(5)
First-hand experience	−0.082***	−0.125***	−0.100***	−0.087***	−0.086***
	(0.014)	(0.016)	(0.017)	(0.014)	(0.016)
Control group	Stock market participants	Counterfactual risky asset share	Invested in own bank & third-hand experience	Pre-inheritance wealth & inherited wealth	Post-inheritance wealth
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.208	0.060	0.207	0.215	0.176
N	1,470	1,406	585	1,470	1,470

nomic shock as well as about potential differences in pre- and post-inheritance wealth. Online Appendix Table OA8 shows results of similar magnitude for the subsample of sudden deaths. Sudden deaths are a close-to-random draw of individuals and effectively rule out concerns about the timing of the inheritance relative to the bank defaults.

To gauge the magnitude of the confounding wealth change in relation to first-hand experiences, we form alternative counterfactuals in Fig. 4 by varying the ratio of inherited stocks between the control and treatment groups. In Panel A, we show the effect of first-hand experiences on risk taking when we match on pre-inheritance wealth and the value of inherited stocks, as represented in Column 4 of Table 5. In the second bar of Fig. 4, we change the ratio of inherited stocks to 1:2, implying that individuals with first-hand experiences by construction are matched to a counterfactual control group that inherited half the value of stocks. In the following columns, we change the ratio to 1:3 and 1:5. The effect of first-hand experiences remains stable as we change the ratio. Even when individuals with first-hand experiences inherit stock worth five times as much as that of the control group, they are still allocating at least 8 percentage points less of their liquid wealth to stocks. Panel B repeats the analysis in Panel A, alternatively matching on post-inheritance wealth and inherited stocks as in Column 5 of Table 5. The results are similar to those in Panel A. Taken as a whole, Fig. 4 indicates that the effect of first-hand experiences dominates the confounding wealth effect.

Finally in Fig. 5, we consider the effect of first-hand experiences depending on the fraction of the portfolio lost as a result of the default. We report the counterfactual post-inheritance ratio of liquid assets allocated to stocks, the observed post-inheritance ratio, and the active change in the ratio of liquid assets allocated to stocks. All of these ratios are calculated in similar fashion to those in Fig. 2. We split into subsets individuals with first-hand experiences depending on the fraction of their portfolios lost due to default: less than 25%, 25% to 50%, 50% to 75%, and more than 75%. Individuals with larger losses tend to reduce risk taking more than individuals with small losses. Individuals who lost less than 25% of their portfolios of risky assets actively reduce risk taking by 8.0 percentage points relative to their liquid wealth, and individuals who lost more than 75% reduce their allocation to risky assets by 12.9 percentage points.

5. Personal experiences and portfolio allocation around inheritances

In this section, we shed light on how individuals with personal experience actively alter their portfolio allocation. We do this in three steps. First we consider the allocation of liquid wealth to subcategories of asset classes to analyze how individuals with personal experiences reduce their risk taking. Second, we analyze the decision to keep inherited assets and pre-inheritance assets to ensure that the reduction in risk taking is driven by the decision to sell assets, rather than to increase precautionary savings. Third, we examine changes in the level of portfolio diversification to rule out the prospect that beneficiaries end up holding better diversified portfolios.

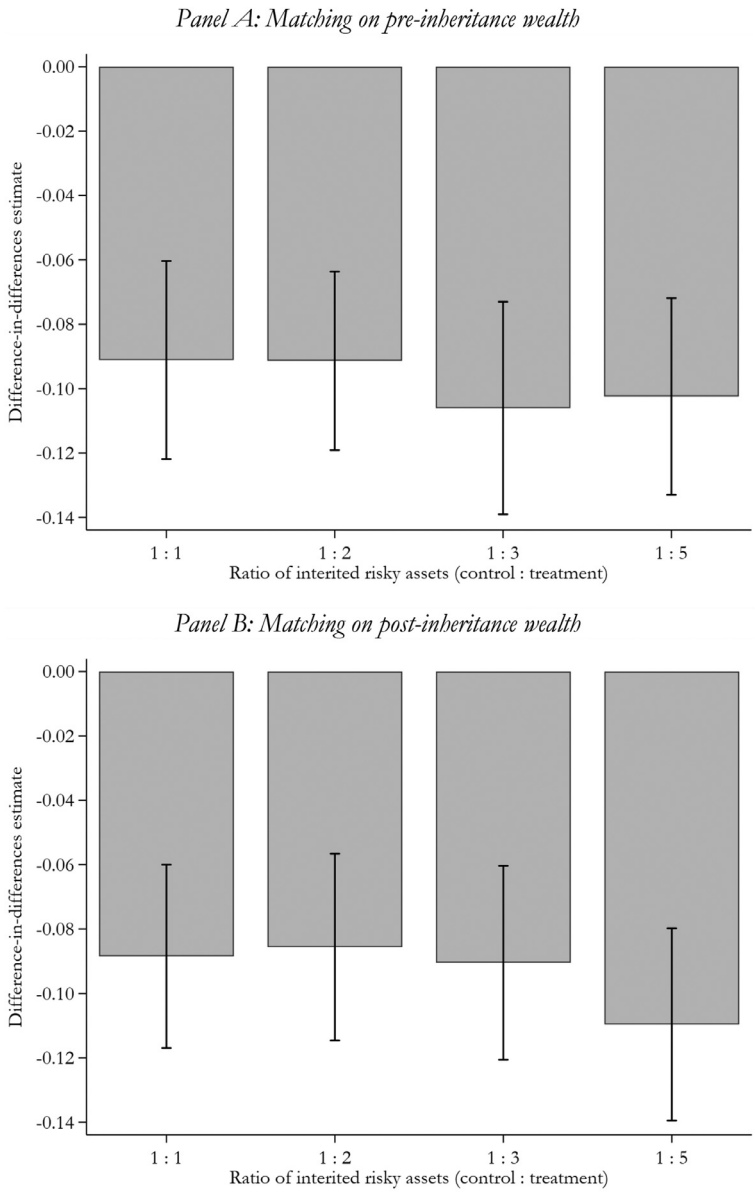

Fig. 4. Estimates matching on inherited wealth.
These graphs show the active change in risky asset share for a beneficiary with first-hand experiences from personal losses (i.e., individuals who lost their investments due to the default of a bank) compared with individuals who did not have a first-hand experience, matched in Panel A (Panel B) to the same pre-inheritance (post-inheritance) wealth. In addition, we vary the ratio of inherited stocks and mutual funds between control and treatment. In the first bar (1:1), the treatment and control group inherit the same value of stocks and mutual funds. In the second bar (1:2), we change the ratio of inherited stocks so that individuals with first-hand experiences by construction are matched to a counterfactual control group that inherited half the value of stocks. In the following bars, we change the ratio to 1:3 and 1:5 in similar fashion.

To further establish the power of personal experiences, we consider the effect of personal experiences on five subcategories of asset classes: directly held stocks, mutual funds, bank stocks, bonds, and cash. The first three assets address whether individuals diversify their portfolios by reducing (increasing) the portfolio allocation to directly held stocks (mutual funds) or whether they shun bank stocks. The last two assets address whether individuals reduce risk taking by increasing their allocation to bond or cash, or both. Table 6 reports the results.

Table 6 shows that individuals with first-hand experiences reduce both their direct stock holdings and their holdings of mutual funds. Lower risk taking is, thus, not caused by a desire to diversify the portfolio by increasing the allocation to mutual funds. In Column 3, around half of the reduction in the portfolio allocation to directly held stocks is caused by a reduction of the allocation to bank stocks. Although individuals shun bank stocks, the reduced risk taking is not entirely concentrated among bank stocks, as we find an effect for mutual funds as well.

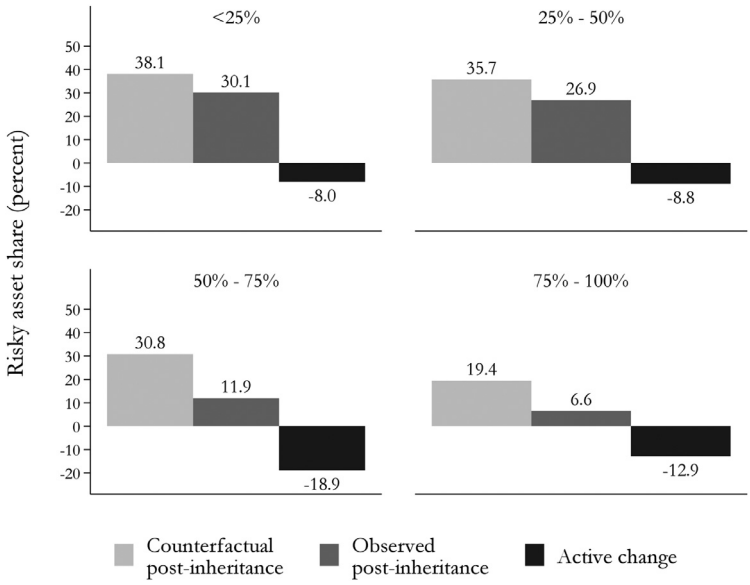

Fig. 5. First-hand experience and fraction of portfolio lost.
This figure shows the effect of first-hand experiences on risk taking depending on the fraction of portfolio lost. We report counterfactual post-inheritance risky asset share, the observed post-inheritance risky asset share, and the active change in risky asset share. Risky asset share is measured by the ratio of liquid asset allocated to stocks and mutual funds. The counterfactual post-inheritance level of risky asset share is calculated by merging the beneficiaries' portfolio with the inherited portfolio in year $t-1$, and updating it with market prices in year $t+1$. The active change is calculated as the difference between the observed post-inheritance risky asset share and the counterfactual post-inheritance risky asset share. We report these ratios for individuals with first-hand experiences who, due to the bank default, lost less than 25%, 25% to 50%, 50% to 75%, and more than 75% of their portfolios of risky assets.

Table 6
Effect of personal experiences on portfolio allocation.
This table reports the effect of personal experiences on the portfolio allocation of different asset classes. We estimate the following equation:

$$\Delta\alpha^{c}_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varphi\omega(\alpha^{i}_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t},$$

where the dependent variable $\Delta\alpha^{c}_{i,t,2k}$ is the active change in the fraction of liquid assets allocated to asset class subcategory c of individual i from year t-k to $t+k$, year t is the year of inheritance, and $k=1$. $X_{i,\,t}$ is a vector of control variables, and $E_{i,\,b}$ is a vector of personal experiences gained before the start of the inheritance window, i.e., $b<t$-1. $\omega(\alpha^{i}_{t-k} - \alpha_{t-k})$ controls for inertia. Individuals with personal experiences within the inheritance window are excluded from the sample. We consider the following subcategories of asset classes in Columns 1 through 5: directly held stocks, mutual funds, bank stocks, bonds, and cash. Asset class subcategory allocations are all measured relative to liquid assets. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank. *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a defaulted bank. Control variables are *market value of inherited stocks, stock market participation, investment in mutual funds, investment in own bank*, log. *of income*, log. *of net wealth, age, gender, education, married*, and *children in the household* (see Table 2 for further description). To control for inertia, we include the *pre-inheritance fraction of liquid assets* and the *counterfactual change* to the fraction of liquid assets allocated to each asset class subcategory (see Eq. (1)). Standard errors are in parentheses. ***, **, and * indicate coefficients that are significant at the 1%, 5%, and 10% level, respectively, using standard errors clustered at the level of municipality-year.

	Dependent variable: active change in allocation to …				
	Directly held stocks	Mutual funds	Bank stocks	Bonds	Cash
	(1)	(2)	(3)	(4)	(5)
First-hand experience	−0.053***	−0.032***	−0.028***	−0.010	0.100***
	(0.008)	(0.009)	(0.004)	(0.013)	(0.020)
Second-hand experience	−0.002	−0.001	−0.003	0.004	−0.003
	(0.004)	(0.003)	(0.003)	(0.004)	(0.007)
Third-hand experience	0.001	−0.001	−0.002	−0.004	0.003
	(0.005)	(0.003)	(0.002)	(0.004)	(0.004)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.340	0.585	0.369	0.559	0.539
N	47,418	47,418	47,418	47,418	47,418

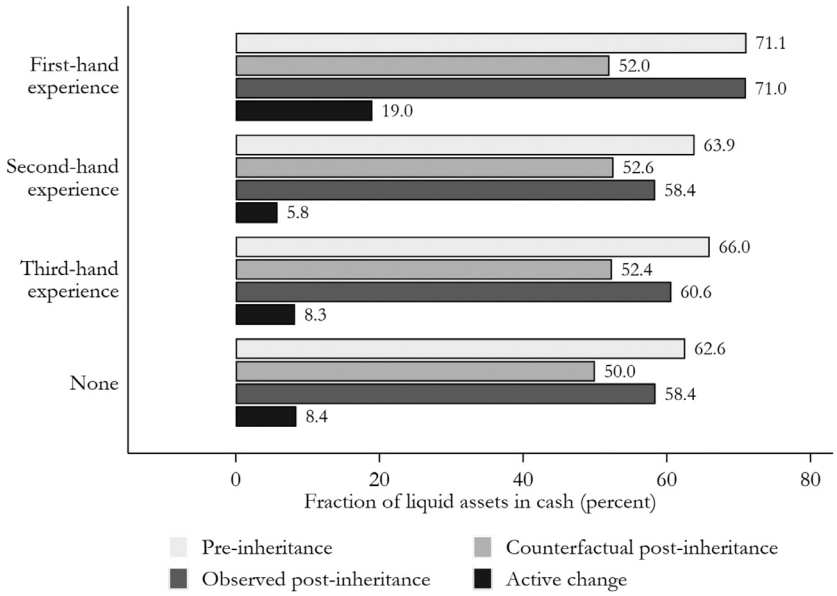

Fig. 6. Degree of experience and cash holdings (bank deposits) around inheritances.
This graph shows the change in the fraction of liquid assets allocated to cash (bank deposits) around inheritances subject to the individual's degree of experience. We report the pre-inheritance ratio of liquid assets allocated to cash, the counterfactual post-inheritance ratio of liquid assets allocated to cash, the observed post-inheritance ratio, and the active change in the ratio of liquid assets allocated to cash. The counterfactual post-inheritance level of cash is calculated by merging the beneficiaries' portfolios with the inherited portfolio in year t-1. The active change is calculated as the difference between the observed post-inheritance cash and the counterfactual post-inheritance level. *First-hand* experiences derive from personal losses, *second-hand* experiences derive from losses in the close family, and *third-hand* experiences derive from living in municipalities where banks defaulted.

Finally, Columns 4 and 5 show that individuals with first-hand experiences subsequently allocate a higher share of their portfolio to cash (i.e., bank deposits), and the effect for bonds is negative and statistically insignificant. Overall, Table 6 shows that individuals with personal experiences reduce risk taking by lowering their portfolio allocation to risky assets and increasing the portfolio allocation to safe assets.

To illustrate the change in the portfolio allocation toward safe assets, Fig. 6 shows the change in the fraction of liquid wealth in cash around inheritances. Consistent with the results in Tables 3 and 6, as well as in Fig. 2, individuals with first-hand experiences actively increase their allocation of liquid wealth to cash. While Fig. 6 shows the allocation relative to liquid wealth, the level of cash holding, notably, is also increasing due to a decision to sell inherited assets. In contrast, Online Appendix Table OA7 shows no effect of personal experiences on precautionary savings around inheritances, measured by the fraction of inherited wealth saved (i.e., change in wealth from year t-k to $t+k$ relative to inherited wealth).

While the shift toward safe assets is consistent with an active decision to reduce risk taking, we can go one step further by analyzing, for each subcategory of asset classes, the decision of beneficiaries to keep inherited assets and pre-inheritance assets. We estimate the effect of personal experiences on the decision to keep risky assets measured by the fraction of assets kept of a given subcategory. We focus on directly held stocks and mutual funds, as well as on subcategories of these asset classes. Table 7 presents the result. Panel A reports the effect of personal experiences on the fraction of inherited assets kept, and Panel B reports the effect of personal experiences on the fraction of pre-inheritance asset kept. To avoid spurious correlation, the samples condition on inheriting assets of the given subcategory in Panel A, and on holding assets of the given subcategory before the inheritance in Panel B. As the effects in Panel B are consistent with Panel A, but of smaller magnitude, we focus the discussion on Panel A.

Column 1 of Table 7 reports the effect of personal experiences on the fraction of inherited risky assets kept at year $t+1$. Individuals with first-hand experiences keep 17.3% less of their inherited risky assets, compared with 5.4% less and 0.8% more for individuals with second-hand experiences and third-hand experiences, respectively.[18] Columns 2 through 8 focus on decomposing this effect on subcategories of risky assets. Column 2 shows that the effects are dominated by directly held stocks as individuals with first-hand experiences are less likely to keep them, relative to mutual funds (Column 5). Among directly held stocks, a lower fraction of bank stocks are kept, although individuals with first-hand experiences also significantly reduce the fraction of nonbank stocks they keep. Among mutual funds, we also find interesting results. Based on the ownership of mutual fund families, we classify mutual funds into funds that are managed by banks (Column 6) and mutual funds that are independent (Column 7). We find that the effect of first-hand experiences on the fraction of

[18] The magnitude of the estimated effects of personal experiences is larger because the dependent variable is the fraction of inherited assets kept, varying from zero to one.

Table 7
Effect of personal experiences on the decision to keep risky assets.
his table reports the effect of personal experiences on the decision to keep risky assets. We estimate the following equation:

$$A^c_{i,t+k} = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t},$$

where the dependent variable $A^c_{i,t+k}$ is the fraction of risky asset subcategory c that individual i keeps at year $t+k$, where year t is the year of inheritance and $k=1$. In Column 1, we show results for all risky assets, and Columns 2 through 8 consider the following subcategories of risky assets: all directly held stocks (Column 2), bank stocks (Column 3), nonbank stocks (Column 4), all mutual funds (Column 5), bank-managed mutual funds (Column 6), independent mutual funds (Column 7), and short-term bond funds (Column 8). Bank-managed mutual funds are managed and distributed by banks, while independent mutual funds are neither managed nor distributed by banks. Short-term bond funds invest in bonds with maturities of less than 5 years. Panel A considers the fraction of each inherited asset that beneficiaries hold at year $t+k$, and Panel B focuses on the fraction of each pre-inheritance asset at year t-k that beneficiaries hold at year $t+k$. The sample in each column consists of investors conditional on inheritance of assets of the given subcategory in Panel A, and portfolio holdings of assets of the given subcategory before the inheritance in Panel B. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank. *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a default bank. Control variables are *market value of inherited stocks, stock market participation, invested in mutual funds, invested in own bank*, log. *of income*, log. *of net wealth, age, gender, education, married*, and *children in the household* (see Table 2 for further description). Standard errors are in parentheses. ***, **, and * indicate coefficients that are significant at the 1%, 5%, and 10% level, respectively, using standard errors clustered at the level of municipality-year.

Panel A		Dependent variable: fraction of inherited assets kept						
	Risky assets	Directly held stocks			Mutual funds			
		All	Bank stocks	Non-bank stocks	All	Bank-managed	Independent	Short-term bonds
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First-hand experience	−0.173***	−0.234***	−0.254***	−0.086***	−0.085***	−0.117***	−0.058	−0.116***
	(0.023)	(0.030)	(0.037)	(0.024)	(0.027)	(0.033)	(0.050)	(0.039)
Second-hand experience	−0.054***	−0.107***	−0.138***	−0.001	0.002	−0.004	0.023	0.020
	(0.010)	(0.013)	(0.014)	(0.012)	(0.013)	(0.015)	(0.022)	(0.018)
Third-hand experience	0.008	0.000	0.005	0.012	0.022	0.024	0.017	0.039**
	(0.011)	(0.014)	(0.016)	(0.013)	(0.013)	(0.015)	(0.030)	(0.017)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.214	0.266	0.280	0.129	0.111	0.109	0.108	0.102
N	47,418	35,440	27,606	33,239	27,714	21,078	6,184	16,490
Panel B		Dependent variable: fraction of pre-inheritance assets kept						
	Risky assets	Directly held stocks			Mutual funds			
		All	Bank stocks	Non-bank stocks	All	Bank-managed	Independent	Short-term bonds
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First-hand experience	−0.096***	−0.111***	−0.149***	−0.059**	−0.084*	−0.058	−0.127***	−0.189
	(0.024)	(0.025)	(0.032)	(0.030)	(0.045)	(0.064)	(0.064)	(0.119)
Second-hand experiences	−0.030**	−0.036***	−0.024	−0.031	−0.013	0.003	−0.059	−0.010
	(0.014)	(0.014)	(0.016)	(0.019)	(0.029)	(0.034)	(0.052)	(0.055)
Third-hand experiences	−0.006	−0.014	−0.008	0.006	−0.025	−0.020	−0.044	−0.009
	(0.014)	(0.014)	(0.016)	(0.020)	(0.030)	(0.034)	(0.059)	(0.058)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.239	0.236	0.235	0.196	0.142	0.142	0.098	0.115
N	17,622	14,840	10,199	11,560	6,714	5,122	1,941	2,525

mutual funds kept is primarily driven by bank-managed funds as opposed to independent funds. This result suggests that mistrust toward banks, not toward the financial sector as a whole, is driving the reduction in risk taking. Finally, we examine the effect of personal experiences on short-term bond funds to see whether beneficiaries also shy away from assets that are less risky.[19] We find that individuals with first-hand experiences keep a smaller fraction of short-term bond funds. This result could, at first glance, suggest that unwillingness to take risk, not mistrust, is driving our results. Unfortunately, all short-term bond funds in our sample are bank managed, making it difficult to disentangle the two effects.

Finally, we consider the effect of personal experiences on portfolio diversification around inheritances. Although the prior analysis shows that individuals with first-hand experiences shy away from risky assets by actively selling the risky assets they inherit, they could sell assets with high levels of idiosyncratic risk and end up holding better diversified portfolios. To address this issue, we follow Calvet et al. (2007) and calculate four measures of portfolio diversification: number of stocks in the portfolio, investment in mutual funds, idiosyncratic risk of the portfolio, and share of idiosyncratic risk in the portfolio. For each measure, we regress the active change on control variables

[19] Ideally, we would have liked to examine the effect on personal experiences of the decision to keep money market funds, but unfortunately most funds combine money market assets and short-term bonds issued by the government or mortgage banks.

Table 8
Portfolio diversification around inheritances.
This table reports the effect of personal experiences on portfolio diversification. We consider the following measures of portfolio diversification in Columns 1 through 4: the *number of risky assets in portfolio*, an indicator for whether the beneficiary has *investment in mutual funds,* the level of *idiosyncratic risk in the portfolio,* and the *share of idiosyncratic risk to total risk in the portfolio* (see Calvet et al., 2007). The sample in Columns 3 and 4 consists of investors holding stocks before receiving the inheritance. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank. *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a default bank. Control variables are *market value of inherited stocks, stock market participation, investment in mutual funds, investment in own bank*, log. *of income*, log. *of net wealth, age, gender, education, married*, and *children in the household* (see Table 2 for further description). All specifications control for the pre-inheritance level as well as the counterfactual change due to the inheritance. Standard errors are in parentheses. ***, **, and * indicate coefficients that are significant at the 1%, 5%, and 10% level, respectively, using standard errors clustered at the level of municipality-year.

	Dependent variable: active change to …			
	Number of risky assets in portfolio	Investment in mutual funds	Idiosyncratic risk in portfolio	Share of idiosyncratic risk to total risk in portfolio
	(1)	(2)	(3)	(4)
First-hand experience	−0.473***	−0.145***	0.001	0.016
	(0.195)	(0.025)	(0.004)	(0.010)
Second-hand experience	−0.026	0.005	0.003	−0.009
	(0.072)	(0.009)	(0.004)	(0.006)
Third-hand experience	−0.014	−0.005	−0.003	−0.017
	(0.082)	(0.010)	(0.003)	(0.011)
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
R^2	0.387	0.567	0.194	0.174
N	47,418	47,418	23,165	23,165

and the pre-inheritance level as well as on the counterfactual change. Table 8 presents the results.

Columns 1 and 2 of Table 8 show that individuals with first-hand experiences end up holding 0.47 fewer risky assets and are 14.5% less likely to hold mutual funds. As mutual funds are obliged to provide investors with well-diversified portfolios subject to their investment mandate, the lower investment in mutual funds appears at odds with better portfolio diversification. This finding is confirmed in Column 3, which shows that the level of idiosyncratic risk in the portfolio is slightly increasing for individuals with first-hand experiences. Consistently, Column 4 shows that the fraction of idiosyncratic risk in the portfolio is also increasing for individuals with first-hand experiences. We therefore conclude that individuals with first-hand experiences reduce risk taking and that their resulting portfolio allocation does not make up for the return loss through better diversification.

6. Annual holdings and measurement error

The prior analysis infers inheritances from the deceased holdings prior to death and analyzes the effect of personal experiences on active changes in risk taking, measured by the difference between the counterfactual and observed post-inheritance holdings. This approach introduces measurement error for two reasons. First, parents could have changed their holdings between the beginning of the year and the time of death. Second, the estate could alter the portfolio between the time of death and the end of year when the beneficiaries' holdings are observed.

The identifying assumption in the prior analysis is that neither source of measurement error is biased toward individuals with personal experiences. While it seems reasonable to assume that the timing and the cause of deaths are unrelated to beneficiaries' personal experiences, the decision to let a lawyer or a relative administer the estate could be related to personal experiences and, hence, could introduce measurement error.

To address whether the first source of measurement error is biased toward individuals with personal experiences, we analyze the effect of personal experiences conditional on the timing of the death. It follows that the proposed measurement error should be less severe for deaths closer to the beginning of the year. In Table 9, we therefore interact indicators for the time of death with indicators for personal experiences.

To facilitate a comparison to the main results, Column 1 of Table 9 reports the baseline result from Column 2 of Table 3. In Column 2 of Table 9 the effect of first-hand experiences is of similar magnitude to the estimated effect in Column 1, and the interaction term between first-hand experiences and deaths in the second half of the year (July to December) is positive and insignificant. We find similar results in Column 3, when we interact indicators for quarter of death with first-hand experiences.

To address whether the second type of measurement error is biased toward individuals with personal experiences, we include estate fixed effects in Column 4 of Table 9. Estate fixed effects effectively absorb any changes to the portfolio made by the estate between the time of death and the end of year, when the beneficiaries' holdings are observed. This analysis ensures that we identify the effect of personal experiences within the estate (i.e., the effect of differences in personal experiences among siblings) on active changes in risk taking. Column 4 shows that individuals with first-hand experiences actively reduce their risk taking. The effect is of similar magnitude to the

Table 9
Annual holdings and measurement error.
This table examines whether measurement error caused by annual holdings affects the estimated effect of personal experiences on changes in risk taking around inheritances. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \phi\omega(\alpha^{i}_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t},$$

where the dependent variable $\Delta\alpha_{i,\,t,\,2k}$ is the active change in risky assets share of individual i from year t-k to $t+k$, year t is the year of inheritance, and $k=1$. The active change is the observed change in risky asset share less the counterfactual change due to the inheritance.$X_{i,\,t}$ is a vector of control variables, and $E_{i,\,b}$ is a vector of personal experiences gained before the start of the inheritance window, i.e., $b < t$-1. $\omega(\alpha^{i}_{t-k} - \alpha_{t-k})$ controls for inertia. Individuals with personal experiences within the inheritance window are excluded from the sample. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank. *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, in-law or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a default bank. Column 1 provides the baseline estimate from Column 2 of Table 3. In Column 2, we interact *first-hand experience* with an indicator for inheritance cases in which the death occurs between July and December. In Column 3, we interact *first-hand experience* with indicators for quarter of death. Column 4 includes estate fixed effects. Control variables are *market value of inherited stocks, stock market participation, investment in mutual funds, investment in own bank*, log. *of income*, log. *of net wealth, age, gender, education, married*, and *children in the household* (see Table 2 for further description). To control for inertia, we include the *pre-inheritance risky asset share* and the *counterfactual change* in the level of risk taking due to inheritance [see Eq. 1]. Standard errors are in parentheses. ***, **, and * indicate coefficients that are significant at the 1%, 5%, and 10% level, respectively, using standard errors clustered at the level of municipality-year.

	Dependent variable: active change in risky asset share			
	(1)	(2)	(3)	(4)
First-hand experience	−0.093***	−0.094***	−0.100***	
	(0.012)	(0.015)	(0.020)	−0.083*
				(0.042)
Second-hand experience	−0.001	−0.003	−0.002	−0.011
	(0.005)	(0.002)	(0.005)	(0.033)
Third-hand experience	0.001	−0.001	−0.001	−0.015*
	(0.005)	(0.004)	(0.004)	(0.009)
Death between July and December		−0.003*		
		(0.002)		
First-hand experience x Death between July and December		0.004		
		(0.023)		
Death in second quarter			−0.005**	
			(0.003)	
Death in third quarter			−0.005**	
			(0.003)	
Death in fourth quarter			−0.007***	
			(0.003)	
First-hand experience x Death in second quarter			0.013	
			(0.034)	
First-hand experience x Death in third quarter			0.013	
			(0.032)	
First-hand experience x Death in fourth quarter			0.006	
			(0.031)	
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Estate fixed effects	No	No	No	Yes
R^2	0.462	0.463	0.463	0.836
N	47,418	47,418	47,418	47,418

estimated effect in Column 1, as individuals with first-hand experiences reduce their risky asset share by 8.3 percentage points. We conclude that measurement error due to annual holdings is not biased toward investors with personal experiences.

7. Alternative specifications

One may be concerned that under-diversified investors or investors who are financially or liquidity constrained could drive the effect of personal experiences on risk taking. We pursue a series of alternative specifications of personal experiences and control variables in Eq. (1) to address these concerns and present the results in Table 10. We begin with our baseline results from Column 2 of Table 3 in Specification 1. In Specification 2, we control for the fraction of wealth lost for individuals with first-hand experiences. In Specification 3, we control for individuals who have negative or zero net wealth at the time of their inheritances by including an indicator variable (*financially constrained)* and its interaction term with *first-hand experience*. In Specification 4, we include a similar variable, *liquidity constrained,* and its interaction term with *first-hand experience*. The variable captures the effect of having less than 10,000 DKK (1,340 euros) in bank deposits available for immediate consumption.

Table 10
Alternative specifications.
Each column of this table represents an alternative specification of our main regression (Table 3), either by including new control variables or by using alternative definitions of the variables of interest. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \omega(\alpha^{i}_{t-k} - \alpha_{t-k}) + \varepsilon_{i,t},$$

where $\Delta\alpha_{i,\,t,\,2k}$ is the active change in the risky asset share of individual i from year t-k to $t+k$, year t is the year of inheritance, and $k=1$. The active change is the observed change in risky asset share less the counterfactual change due to the inheritance.$X_{i,\,t}$ is a vector of control variables, and $E_{i,\,b}$ is a vector of personal experiences gained before the start of the inheritance window, i.e., $b < t$-1. $\omega(\alpha^{i}_{t-k} - \alpha_{t-k})$ controls for inertia. Individuals with personal experiences within the inheritance window are excluded from the sample. Specification 1 reports our baseline results from Column 2 of Table 3 to facilitate a comparison to the results in Columns 2 to 8. In Specifications 2, 3, and 4, we add controls for *fraction of wealth lost*, an indicator for *financially constrained* individuals who have negative net wealth, and an indicator for *liquidity constrained* individuals with less than 5,000 Danish kroner (DKK) (670 euros) in bank deposits, respectively. In Specification 5, we control for unemployment spells by including an indicator for individuals who are unemployed during year t or year $t-$k. In Specification 6, we redefine the *first-hand experience* to the household level by including the experience of the spouse, and redefine *second-hand experience* to exclude the experiences of the spouse. Specification 7 considers an alternative measure of third-hand experiences by calculating the fraction of individuals with first-hand experiences in the parish of the beneficiary. Finally, in Specification 8 we redefine *third-hand experience* to include neighboring municipalities to the municipality where the default bank was headquartered. Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively, using standard errors clustered at the level of municipality-year.

	Specification							
	Baseline	Fraction of wealth lost	Financially constrained	Liquidity constrained	Unemployment spells	Household experience	Alternative measure of third-hand experience	Extended third-hand experience
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First-hand experience	−0.092***	−0.051***	−0.075***	−0.077***	−0.092***	−0.048***	−0.093***	−0.093***
	(0.012)	(0.016)	(0.014)	(0.012)	(0.012)	(0.011)	(0.012)	(0.012)
Second-hand experience	−0.001	−0.002	−0.002	−0.002	−0.002	−0.004	−0.002	−0.002
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
Third-hand experience	0.001	(0.001)	0.001	0.001	0.001	0.001	0.006	0.003
	(0.005)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.025)	(0.002)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.463	0.463	0.463	0.465	0.463	0.463	0.463	0.463
N	47,418	47,418	47,418	47,418	47,418	47,418	47,418	47,418

We control for unemployment spells in Specification 5 by including an indicator variable that takes the value one if an individual was unemployed at any point during the year of inheritance or the year before. These results are robust if we alternatively measure unemployment as the percentage of the year an individual is unemployed.

Specifications 6 to 8 focus on alternative definitions of personal experiences. In Specification 6, we redefine *first-hand experience* as an experience that either the beneficiary or his or her spouse had and redefine *second-hand experience* to exclude the experiences of the spouse in this estimation. Specification 7 investigates an alternative definition of third-hand experiences by calculating the fraction of individuals with first-hand experiences in the same parish. The main benefit of this measure is that it is not necessarily tied to the location of the defaulting bank. Instead, it exploits local heterogeneity in the exposure of neighbors to bank defaults. Consistent with the prior results, we find no effect of third-hand experiences on active changes in risk taking around inheritances. In Specification 8, we redefine *third-hand experience* to include neighboring municipalities to the municipality in which the defaulted bank is headquartered. Regardless of the alternative specifications, first-hand experiences affect future risk taking significantly, consistent with our previous findings.

Finally, we assess whether lower risk taking is driven by estate taxes in Online Appendix Table OA9. While the vast majority of estates can settle the estate tax without selling assets, the possibility remains that beneficiaries with first-hand experiences due to their wealth loss have to sell assets to incur the estate tax. Our results are qualitatively unaffected if we include (among the control variables) an indicator for individuals who have insufficient cash to settle estate taxes without selling assets or alternatively exclude these individuals from the sample.

8. Conclusion

In this study, we examine the effect of personal experiences on risk taking in the aftermath of the financial crisis. We identify, as a plausible negative personal experience, individuals who invested in bank stocks and suffered significant investment losses when the bank subsequently defaulted. We show that such personal experiences are so powerful that they make individuals shy away from risk, even when they receive windfall wealth. Our findings also provide evidence that first-hand experiences have a causal and sizable effect on future risk taking, and the magnitude of second- and third-hand effects are substantially smaller.

Our study shows that the financial crisis resulted in lower future risk taking, as is evidenced in the generation of Great Depression babies. Personal experiences in our study can be measured at the individual level, and our results suggest that cohort effects are driven primarily by first-hand experiences, not by common experiences. The welfare costs of the lower levels of risk taking are likely to be substantial and will lead to significantly lower lifetime consumption. The evidence also raises the question of how and what individuals learn from their past investment experiences. An appropriate response to the personal

experiences shown in this study is to diversify the portfolio. Instead, individuals seem to avoid risk by selling the risky asset they inherit and holding cash. In short, they react according to our study's title: "Once bitten, twice shy."

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