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**ONCE BITTEN, TWICE SHY: THE ROLE
OF INERTIA AND PERSONAL
EXPERIENCES IN RISK TAKING**

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FINANCIAL ECONOMICS



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Abstract

We study how inertia and personal experiences affect individual risk taking. Our research design relies on active portfolio decisions relating to inheritances to separate the effect of personal experiences from inertia, which otherwise would be observationally equivalent. Experience derives from investments in banks that defaulted following the financial crisis. We classify experiences into first-hand experiences, resulting from personal losses; second-hand experiences, from the losses of close family members; and third-hand experiences, from living in municipalities where banks defaulted. Our results demonstrate that experiences gained personally, aside from inertia or common shocks, explain substantial heterogeneity in individuals' risk taking.

JEL Classification: D03, D14, G11

Keywords: Experiences, Inertia, Risk Taking, financial crisis, household finance

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Once Bitten, Twice Shy: The Role of Inertia and Personal Experiences in Risk Taking*

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1. Introduction

In the aftermath of the financial crisis, it seems appropriate to ask whether negative personal experiences during the crisis will result in lower future risk taking, as is evidenced for the generation of Depression babies (Malmendier and Nagel, 2011). We ask more generally whether exposure to first-hand experiences has a differential effect on risk taking relative to economy-wide experiences. Do individuals have to feel the pain themselves, or are common shocks enough to change individual risk taking?

Heterogeneity in revealed risk taking between individuals has been attributed to past experiences of macroeconomic shocks (Malmendier and Nagel, 2011; Guiso, Sapienza, and Zingales, 2013; Knüpfers, Rantapuska, and Sarvimäki, 2016), incidents of corporate fraud (Giannetti and Wang, 2016), and personal experiences in the stock market (Kaustia and Knüpfers, 2008, 2012; Choi et al., 2009; Chiang et al., 2011; Bucher-Koenen and Ziegelmeyer, 2014; and Hoffmann and Post, 2016). Collectively, these studies suggest that personal experiences explain substantial variation in individual risk taking.

An important concern with pre-existing studies on the effect of personal experiences on risk taking is the potential bias resulting from inertia and inattention, which has been shown to be endemic in household finance. If individuals are inert or inattentive, and hence slow to change their initial allocations, it is difficult to establish whether changes in risk taking are caused by personal experiences or whether the change in risk taking is due to inertia and movements in market prices. The problem arises because the effect of inertia is observationally equivalent to the hypothesized effect of personal experiences.

In this study, we separate the effect of personal experiences from the confounding effect of inertia. 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. If lower risk taking is caused by personal experiences, rather than inertia, we expect individuals to shy away from risk taking even when they receive large inheritances. Inertia, on the other hand, predicts that beneficiaries hold on to the inherited portfolio and, therefore, works in the opposite direction of the hypothesized effect of personal experiences. Thus, lower risk taking in this setting is not caused by inertia or inattention.

To understand the effect of personal experiences on the intensive margin of risk taking, we analyze both the indirect effect on individual risk taking from personal experiences of close

family members and individuals living in the same local environment, as well as the direct effect of experiences made by the individual him- or herself. This approach allows us to generate variation in the degree of personal experiences, and examine whether reinforcement learning as documented 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 future risk-taking than events affecting peers and relatives. We provide additional evidence on how individuals learn from personal experiences by examining the effect on portfolio allocations. Reinforcement learning in our setting unfortunately does not cause individuals to change their investment decisions toward a more diversified portfolio allocation. Rather, we find that they shy away from risk taking (and hold cash), as suggested by our title.

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 the banks at which they are customers—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 their banks as a profitable investment. In 2006, 746,465 out of 1,207,278 individuals holding stocks (62%) had invested in the banks at which they are customers. In fact, individuals participating in the stock market on average had allocated 43.1% of their portfolios to the stocks of their banks, and incredibly, 34.5% of all stock market participants held *only* the stock of their retail bank.

The 2007–9 financial crisis had a significant impact on financial institutions in Denmark. Excessive exposure to real estate developers and farm land led to severe write-offs and liquidity needs in many banks. As a consequence of write-offs on non-performing loans, eight publicly traded banks defaulted between 2008 and 2012, resulting in significant losses for 105,016 shareholders, equivalent to 8.7% of all Danes holding stocks in 2006.² On average, shareholders lost 36,270 DKK (4,800 EUR), or approximately 15% of their portfolios. Astonishingly, 79,896 of the 105,016 (76%) shareholders were also customers; the defaulted bank acted as their primary

¹ Kaustia and Knüpfer (2008) show that individuals who subscribe to IPOs and experience high returns are more likely to subscribe to future IPOs than are individuals who experienced low returns. They interpret this result as suggesting that investors overweigh personal experiences, as opposed to observing these high or low returns from afar by just participating in the market, relative to Bayes' rule.

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 8 defaulted banks held assets worth 141 billion DKK (18.9 billion EUR). See Appendix A for details.

bank. 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 first-hand experiences will be more reluctant to take risk in subsequent periods.³ Moreover, due to the institutional setting, changes in risk taking cannot be attributed to lost deposits, because temporary provisions by the Danish Financial Supervisory Authority fully insured the vast majority of depositors against defaults.⁴ To ensure financial stability, the activities of the defaulting bank were immediately taken over by a government-owned bank holding company, which continues the operations. The institutional setting is also helpful in ruling out the possibility that tax laws are driving lower risk taking. Estates are subject to a 15% estate tax for immediate relatives, which is levied on the estate's total net wealth above a threshold, irrespective of the underlying assets or potential unrealized capital gains. The threshold is 242,400 DKK (32,500 EUR) in 2006 and inflated by a price index in subsequent years. Due to the relatively low estate tax and substantial cash holdings, 74% of the estates (or their beneficiaries) hold sufficient cash to settle the estate tax without selling assets. 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; and finally, 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 in the close family reduce their allocation to risky assets by around 1 percentage point, whereas those with first-hand experiences reduce the fraction of liquid wealth allocated to stocks by 6 percentage points. These effects are economically significant given a baseline allocation of liquid wealth to stocks of around 30% for beneficiaries who inherit.

³ Interestingly, we find a smaller effect on risk taking of negative experiences deriving from non-bank defaults. The difference suggests that (mis-)trust might play a role in explaining the strongly negative effect of bank defaults on risk taking. Unfortunately, non-bank defaults only affect 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 EUR). From October 5, 2008 to September 30, 2010, the Danish government decided to provide unlimited guarantees to depositors. As a result, few customers lost their deposits due to defaults. In Table 9, we exclude individuals who potentially lost deposits, with little effect on our results.

We then decompose the change in risk taking into passive and active components, and find that the lower risk taking is driven by an active choice to sell risky assets. In so doing, we contrast the evidence from the contemporaneous relationship between personal experiences and changes in risk taking, where the effect on risk taking is driven by the passive channel, rather than active changes. This difference highlights the challenge posed by inertia, and confirms the contribution of our identification strategy based on changes in risk taking around inheritances to overcome the confounding effect of inertia or inattention.

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 risk when they inherit. To address this issue we test whether the 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, while 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 the 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 increase their risk taking by 0.8 percentage points. Individuals who inherit after they have experienced a default actively reduce the fraction of liquid wealth allocated to stocks by 6.0 percentage points. The difference equals 6.8 percentage points and is both economically and statistically significant given a baseline allocation of liquid wealth to stocks of around 30% for beneficiaries who inherit.

Investors who trusted their banks by investing in the stock of their retail bank, 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. However, 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 the macroeconomic conditions.

Our paper contributes to the existing literature analyzing limited stock market participation, by focusing and measuring the effect of personal experiences over and above the common experiences of market participants. Stock market participation varies greatly across countries and has increased recently (Guiso, Haliassos, and Jappelli, 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, Donaldson, and Mehra, 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, Sapienza, and Zingales, 2008).⁵

Our study is similar in spirit to Malmendier and Nagel (2011), Brunnermeier and Nagel (2008), and Andersen and Nielsen (2011). First, 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 rather than cohort effects based on individuals' ages and the development of the S&P 500 index during their lifetimes. Second, it 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. Our study differs from Brunnermeier and Nagel (2008) and Andersen and Nielsen (2011) in that we focus on disentangling the effect of personal experiences from the effect of inertia on 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.

Finally, our study is related to Choi et al. (2009), Kaustia and Knüpfer (2012), Chiang et al. (2011), Guiso, Sapienza, and Zingales (2013), Bucher-Koenen and Ziegelmeier (2014), Giannetti and Wang (2016), Hoffmann and Post (2016), and Knüpfer, Rantapuska, and Sarvimäki (2016), who show that personally experienced outcomes in stock markets and 401(k) plans are an important influence in investment decisions. Our study differs from these prior findings by using an identification strategy that disentangles the effect of personal experiences on investment decisions from inertia.

⁵ Our research also contributes to an existing literature focusing on peer and social-effects. Dufló 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, compared to a control sample. In the finance literature, entry decisions in the stock market seem to be influenced by family members (Li, 2014; Hellström, Zetterdahl, and Hanes, 2013), as well as by neighborhood and community participation rates (Kaustia and Knüpfer, 2012; Ivkovic and Weisbenner, 2007), language and cultural similarity (Grinblatt and Keloharju, 2001), and sociability and neighborhood interactions (Hong, Kubic, and Stein, 2004). Further, specific asset investments are affected by coworkers (Hvide and Östberg, 2014), and from an institutional perspective, industry peers in the same city (Hong, Kubic, and Stein, 2005).

Our results raise the question of how and what individuals learn from their past investment experiences. An appropriate response to the personal experiences documented in this study is to diversify the portfolio. Instead, individuals shy away from risk taking as our title suggests: once bitten, twice shy. 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 financial institutions. 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. In contrast, we find small effects on risk taking for depositors in default banks, who did not invest in the bank, as well as smaller effects of non-bank default on risk taking. One interpretation of this difference is that bank default might cause individuals, who took advice from financial advisors and invested in the default bank, to lower their trust in financial markets. This interpretation also resonates with survey evidence documenting an unprecedented drop in 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 documented in Guiso, Sapienza, and Zingales (2008).

Our study proceeds as follows: we first illustrate the challenge posed by inertia when measuring changes in risk taking in Section 2. Section 3 describes in detail the construction and sources of our dataset. In Section 4, we discuss the institutional setting in Denmark and the deceptive statistics of the individual investors in our sample. We then consider the effect of personal experiences on stock market participation in Section 5. Section 6 examines how the portfolio allocation is affected by personal experiences, while Section 7 examines three counterfactual experiences with defaults. We discuss the interpretation of our findings in relation to the existing literature and provide robustness checks in Section 8; we then conclude.

2. The challenge of inertia when measuring changes in risk taking

To illustrate the challenge posed by inertia when measuring changes in risk taking, consider the following estimating equation, which relates observed changes in risk taking, $\Delta\alpha$, to household characteristics, X , and contemporaneous personal experiences, E :

$$\Delta\alpha_{t,k} = \beta X_{t-k} + \gamma E_{t-k} \quad (1)$$

Where $\Delta\alpha_{t,k}$ is the observed change in risk taking from period $t-k$ to period t ; $\Delta\alpha_{t,k} = \alpha_t - \alpha_{t-k}$, α_t is the value of risky assets over liquid wealth in period t , X_{t-k} is a vector of (constant or

time-variant) household characteristics that determine the desired changes in the level of risk taking, while E_{t-k} , denotes personal experiences between time $t-k$ and t . In keeping with the literature, personal experiences derive from gains or losses in the stock market.

Now consider the additional effect of inertia, $Inert_{t-k}$, defined as the (counterfactual) change in the risky asset shares that the household would have experienced between $t-k$ and t due to movements in market prices, rather than through active changes to the allocation of risky assets. If individuals are slow, to a degree φ , at changing their asset allocation, this condition will induce a positive contemporaneous relationship between changes in market prices and risky asset shares, hence $\varphi \geq 0$:

$$\Delta a_{t,k} = \beta X_{t-k} + \gamma E_{t-k} + \varphi Inert_{t-k} \quad (2)$$

If individuals exhibit perfect inertia, ignoring characteristics and experiences, then $\varphi=1$ and the actual change $\Delta a_{t,k}$ equals $Inert_{t-k}$. If households exhibit no inertia at all, and hence rebalance their portfolios immediately following capital gains, then $\varphi=0$.

Inertia poses a challenge to the empirical design, because it is observationally equivalent to personal experiences if investors are passive, hence $Inert_{t-k} = E_{t-k}$ and one would estimate:

$$\Delta a_{t,k} = \beta X_{t-k} + (\gamma + \varphi) E_{t-k} \quad (3)$$

It follows that the estimated effect of experiences on changes in observed risk taking in Equation (1), $\hat{\gamma}$, is biased by the level of inertia, φ . Only in the special case where individuals are fully attentive, $\varphi=0$, will $\hat{\gamma} = \gamma$ be an unbiased estimate of the effect of personal experiences on the desired level of risk taking. In the case where investors do not actively react to personal experiences, $\gamma=0$, the estimated effect of experiences on changes in observed risk taking given by the coefficient estimated in a regression such as equation (1) would be misleading. It would be entirely driven by the investor's level of inertia: $\hat{\gamma} = \varphi$.

The above example illustrates two challenges with identifying the effect of personal experiences on changes in observed risk taking. First, part of the relationship is mechanical because negative experiences (from market movements) affect risk taking through the passive price channel. Second, inertia reduces the incidence of active decisions, which makes observing changes in desired risk taking difficult. In other words, inertia exacerbates the mechanical relationship between personal experiences and observed risk taking: if individuals are slow to adjust quantities of risky assets because they are inert, then price changes will dominate the inference on risk taking. To overcome these challenges, we use a natural experiment by which

individuals receive a windfall of risky assets due to inheritances. As we outline below, windfalls change quantities and reverse the bias from inertia, as passive individuals would tend to move toward their parents portfolio allocation.

To convincingly show that past personal experiences, rather than confounding inertia or inattention, lead to lower risk taking, we look at the decision to keep inherited stocks. In this setting, an inert individual would passively merge the inherited portfolio with his existing portfolio. Thus, inertia dictates that the change in risk taking is a weighted average of the risk taking before receiving the inheritance, α_k , and the risk taking in the inherited wealth, α_t^i :

$$Inert_{t-k} = (1-\omega)\alpha_k + \omega\alpha_t^i - \alpha_k = \omega(\alpha_t^i - \alpha_k) \quad (4)$$

where the parameter, ω , denotes the fraction of inherited wealth relative to total liquid wealth after inheriting. Rewriting Equation (2) to incorporate the effect of past experiences, E_p , and inertia, $Inert_{t-k}$, from Equation (4) around inheritances received between period $t-k$ and t yields:

$$\Delta\alpha_{t,k} = \beta X_{t-k} + \gamma E_p + \varphi\omega(\alpha_t^i - \alpha_k) \quad (5)$$

Note that any contemporaneous effect of personal experiences on risk taking is already differenced out because the personal experience, E_p , occurs before period $t-k$ (i.e., $p < t-k$). Equation (5) therefore tests whether past personal experiences affect the desired level of risk taking when individuals receive a windfall of risky assets. As a result, Equation (5) allows us to obtain an unbiased estimate of the effect of personal experiences on risk taking, $\hat{\gamma} = \gamma$.

The main advantage of analyzing changes in risk taking around inheritances is that the experience effect is independent of the inertia effect. One might argue that one could obtain the same degree of independence between personal experiences and risk taking by lagging personal experiences in Equation (2). The main problem with this approach is that inertia will still bias the results, because inertia delays active risk taking. In other words, inertia also poses a challenge when estimating the effect of personal experiences on risk taking in future periods, because the effect of inertia is observationally equivalent to the hypothesized effect of personal experiences. To this end, our research design based on inheritances overcomes this challenge.

3. Data

We assemble a dataset from the universe of the Danish population that focuses on adults aged 20 or above in 2006. Our dataset contains economic, financial, and personal information

about the individuals, as well as their deceased parents.⁶ The dataset 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 thus siblings), and their marital histories (number of marriages, divorces, and widowhoods). In addition to providing individual characteristics, such as age, gender, and marital status, these data enable us to identify all individuals' legal parents. The dataset 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 dataset contains personal income and wealth information by *CPR* numbers 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 additionally have information on individuals' stock and mutual fund holdings by ISIN number at the end of the year. For simplicity, we refer to the joint holdings of stocks and mutual funds as stocks (or risky assets). In addition, 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 his or 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.⁷

Causes of deaths are from The Danish Cause-of-Death Register at the Danish National Board of Health (*Sundhedsstyrelsen*). In this dataset, the cause of death is classified according to international guidelines specified by the World Health Organization's (WHO) International

⁶ Demographic, income, and wealth data are comparable to the data from other Nordic countries (Finland: Grinblatt and Kaloharju, 2001, Kaustia and Knüpfer, 2012, and Knüpfer, Rantapuska, and Sarvimäki, 2013; Norway: Hvide and Östberg, 2014; and Sweden: Calvet, Campbell, and Sodini, 2007, 2009). The information on inheritances and the official medical causes of death in our data, however, provides a novel source for indentifying windfalls.

⁷ 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.

Classification of Diseases (ICD-10) system.⁸ 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 it 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 dataset 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 education level.

4. Investment decisions and personal experiences

As the starting point of our analysis, we characterize individuals in our sample toward experiences with investments in their own banks. 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, where local customers support their local banks, even taking part in the annual general meeting. Many of these customers over time built a considerable level of trust in local banking institutions and their advice, and maintained portfolios that contained significant stock holdings in their banks.

In the run-up to the financial crisis, many local banks in Denmark followed an aggressive growth strategy financed by equity issues to depositors. In its report, the Danish Financial Supervisory Authority (2009) concludes that investments in the bank's stocks were often encouraged by direct marketing campaigns with a one-sided focus on benefits such as capital gains, dividends, and banking privileges, with little attention to the inherent risks. Depositors were contacted directly by their bankers and offered to participate in equity issues, and in many cases, offered a loan to finance the purchase. Many depositors seemed to have placed a great deal of trust in this investment advice and 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 documented in prior literature (Keloharju, Knüpfer, and Linnainmaa, 2012), and is

⁸ WHO's International Classification of Diseases, ICD-10, is the latest in a series that has its origin in the 1850s. 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.

consistent with the view that such investors regard stocks as consumption goods, not just as investments.

According to the Danish Financial Supervisory Authority (2009), the decision to purchase stocks in a bank was driven primarily by the bank’s own advice, and customers trusted into this advice, and allocated their entire portfolios to the stocks of their own bank. Tables 1 and 2 provide descriptive overviews of stock market participation and portfolio composition for Danes aged 20 or above in 2006. In 2006, on average, 29.7% of the population participated in the stock market by holding either stocks or mutual funds. As is consistent with prior literature, Table 1 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 non-participants.

Table 2 shows the portfolio characteristics in 2006 for all stock market participants, participants who invested in their own banks, and participants who experience a default in the subsequent financial crisis. The market value of the portfolio of the average participant is 328,000 DKK (44,025 EUR), equivalent to 41.1% of their liquid wealth. The average portfolio consists of 2.6 stocks, of which bank stocks account for 0.8. 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, Campbell, and Sodini 2007, 2009; Hvide and Östberg, 2014).

Interestingly, more than half of all stock market participants hold stocks in their banks (61.8%), and 34.5% of all participants *only* hold stocks in their banks. As a result, the average portfolio weight allocated to bank stocks in general is 47.8%, with the majority of the exposure (43.1% out of 47.8%) tilted toward an individual’s own bank.

Figure 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 light grey, whereas municipalities with a bank default in the aftermath of the financial crisis are shown in black. Figure 1 shows that the presence of a publicly listed local bank and local bank defaults are relatively geographically dispersed.

Table 3 relates the degree of personal experiences to changes in risk taking. The following equation is estimated:

$$\Delta\alpha_{i,t,k} = \beta X_{i,t} + \gamma E_{i,t,k} + \varepsilon_{i,t} \quad (6)$$

where the dependent variable $\Delta\alpha_{i,t,k}$ is the change in risk taking of individual i from year $t-k$ to t , measured as yearly changes, $k=1$. $X_{i,t}$ is a vector of control variables, and $E_{i,t,k}$ is a vector of personal experiences gained between year $t-k$ and t .

We consider contemporaneous personal experiences of different degrees: *First-hand experience* is an indicator taking the value one for individuals losing their investments in their own banks as a result of the banks' default.⁹ *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 arising from overlap in portfolio composition of close family members, we only code 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.¹⁰ The number of first-hand experiences in each year equals the number of shareholders of the banks that defaulted in that year, whereas the number of second- and third-hand experiences depends on the number of family members who are holding stocks, and the number of individuals holding stocks in the municipality of the defaulting banks, respectively.

Results in Column 1 of Table 3 suggest that personal experiences are driving the reduction in risk taking. Individuals with a first-hand experience significantly reduce their individual risk taking, whereas experiences seem to taper as they become further removed from the individual. First-hand experiences reduce the fraction of liquid wealth allocated to stocks by 8.4 percentage points on average. Second-hand experiences reduce the fraction of liquid wealth allocated to stocks by 0.6 percentage points, while the effect of third-hand experiences is both economically and statistically insignificant.

Although these results suggest that future risk taking will be lower as a result of personal experiences, the effect might, as discussed in Section 2, be confounded by inertia. In Column 2, we therefore use the passive change defined as the counterfactual change in risk taking resulting from price movements as our dependent variable. The passive change is calculated by keeping the portfolio allocation at the beginning of the year constant, and calculating the counterfactual

⁹ We focus on individuals losing their investments in their own banks, because direct marketing campaigns on bank deposition with a one-sided focus on benefits encouraged this type of investment. As a result, around 80,000 out of 105,000 (76%) investors who invested in a default bank were also customers in the bank.

¹⁰ We note in the data that parents and children relatively commonly invest in the same stock. If children invest in their retail banks, around 15% of their parents have also invested in the same bank, while the unconditional probability is 8%. However, we also note that geography plays a large role in determining portfolio allocations. The conditional probability of investing in the same bank is 22% for individuals living in the same municipality. We address concerns about whether our results are driven by intergenerational overlaps in portfolio allocations in Section 5.

change in risk taking resulting from market movements at the end of the year. Column 2 in Table 3 reports that personal experiences are highly correlated with passive changes in risk taking. This finding is not surprising, as the variation in both variables results from changes in stock prices while holding the initial portfolio constant. Perhaps more interesting, the dependent variable in Column 3 is the active change in risk taking measured by the difference between the observed change in risk taking and the passive change. We refer to this change as the active change, which reflects that the variation derives from changes in allocations (quantities), rather than market prices. Column 3 finds no contemporaneous correlation between personal experiences and active changes in risk taking.

Finally, Figure 2 summarizes the decomposition of the observed change in risk taking into the passive and active component conditional on the level of personal experiences. Figure 2 highlights the concern that the contemporaneous relationship between personal experiences and risk taking is entirely driven by market prices through the passive channel, while the active change is economically insignificant. The lack of contemporaneous relationship between personal experiences and risk taking could motivate one to investigate the effect of personal experiences on changes in active risk taking in later periods. The main problem with this approach is that inertia will still bias the results. Inertia delays active risk taking, and the effect of inertia is therefore observationally equivalent to the hypothesized effect of personal experiences. Overall, these concerns highlight the need for an identification strategy wherein inertia cannot confound the inference between personal experiences and risk taking.

5. Personal experiences and risk taking around inheritances

To separate the effect of personal experiences from the effect of inertia, we examine the change in risk taking when individuals inherit a portfolio of risky assets.¹¹ The main advantage of this approach is that it alters the potential bias resulting from inertia. Fully inert individuals will passively merge the inherited portfolio into their pre-inheritance portfolio, and any deviation from this counterfactual post-inheritance portfolio results 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.

¹¹ 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 effect of personal experiences and inertia are observationally equivalent, as risk taking requires an active decision which will bias results toward zero.

We use two samples of inheritance cases: a gross sample including all deaths, and in a robustness check, a smaller subsample including only sudden deaths. The main advantage of the latter is that windfalls are to a large degree unanticipated, and individuals *ceteris paribus* should be 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 show results using all deaths, and have robustness results using sudden deaths in the internet Appendix F.¹²

Panel A in Table 4 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 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.

The starting point of our inheritance sample is 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 that estates must legally be resolved within 12 months following the death (Andersen and Nielsen, 2016). Additionally, the net worth of the estate is subject to a 15% estate tax for immediate relatives if the estate's net wealth exceeds 242,400 DKK (32,500 EUR) in 2006. 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, and 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, 74% of the estates (or their beneficiaries) hold sufficient cash to settle the estate tax without selling assets.

In total, we have 80,939 household terminations between 2007 and 2011, of which 28,040 held stocks prior to their deaths. Each stock-holding estate has 1.72 beneficiaries on average,

¹² 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 person's previous clinical state. We use ICD-10 codes to identify causes of death that are truly sudden and unexpected by beneficiaries.

resulting in a sample of 48,104 beneficiaries who inherited stocks. Our subsample is significantly smaller and contains 8,968 beneficiaries who inherited stocks due to a sudden death.

Panel B of Table 4 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 412,500 DKK (55,400 EUR), equivalent to 34.3 percent of their liquid wealth. In the right side of Panel B, we report 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 104,300 DKK before they inherit.

In Panel C, we summarize the average beneficiary's allocation to risky assets, which corresponds to 14.3 percent of their liquid wealth. For beneficiaries who experienced a bank default, the average loss is 56,300 DKK (7,600 EUR), whereas the average inheritance of stocks is worth 250,300 DKK (33,600 EUR). Additionally, 93% of all beneficiaries who experienced a default lost significantly less than they received through the inheritance of wealth. Thus, the average beneficiary in our sample would passively take *more* risk after inheriting if they are fully inert.

Table 5 examines the effect of personal experiences on changes in risk taking around inheritances. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t} \quad (7)$$

where the dependent variable $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and 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 inheriting (i.e., $b < t-k$).

We measure the change in risk taking 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. 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, as well as year fixed-effects. Standard errors are clustered at the municipality-year level to alleviate the concern that defaults disproportionately affect specific geographic locations. Column 1 of Table 5 reports the results.

To consider the role of different personal experiences on changes in risk taking, we include the three experience indicators. To avoid spurious correlation due to inertia 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.¹³

Column 1 in Table 5 shows that first-hand experiences reduce risk taking. Individuals who experienced a default before inheriting reduce their risk taking by 6.1 percentage points. This effect is economically and statistically significant. Second-hand experiences decrease their allocation to risky assets by 1.5 percentage points.¹⁴ This effect is economically significant given that individuals with second-hand experiences did not lose wealth, but it is also smaller than the effect of first-hand experiences. Individuals living in a municipality with a local bank default take marginally less risk, but the effect is not statistically significant.¹⁵ We also find effects of similar magnitude if we restrict the sample to beneficiaries who hold at least two stocks or mutual funds (see Appendix E).

In columns 2 and 3, we further examine whether the effect of personal experiences is driven by passive or active changes. The passive change is calculated as the counterfactual change in the level of risk taking if the beneficiary passively merges the inherited portfolio into his pre-inheritance portfolio and holds it until year $t+1$. The active change is calculated as the difference between the observed change in risk taking and the passive change. The active change therefore captures changes in the allocation of risky assets by the beneficiary. If our idea of using inheritances to overcome the potential bias of inertia is valid, we expect the effect of the personal experience on observed changes in risk taking to be driven by the active change, rather than the passive change. Columns 2 and 3 in Table 5 report the results.

Consistent with our conjecture we find no association between first-hand experiences and passive risk taking in Column 2 of Table 5. If anything, individuals with first-hand experiences would tend to passively take more risk if they were fully inert. Column 3 of Table 3, on the other hand, shows a strong and negative effect of first-hand experiences on active changes in risk

¹³ Our results are stronger if we alternatively include individuals who inherit in the same period in which they have their personal experiences. In Appendix B, we report results of similar magnitude when we allow individuals to have second- or third-hand experiences before the end of our inheritance window (i.e., $b < t+1$). As explained in Section 2, we do not consider the contemporaneous effect of first-hand experiences on risk taking due to the confounding effect of inertia.

¹⁴ In appendices C and D, we report the source and incidence of second-hand experiences. We find large effects of second-hand experiences deriving from spouse, and siblings, whereas the effects of second-hand experiences of parents, children, and in-laws are modest. Finally, the number of second-hand experiences leads to lower propensity to keep inherited stocks.

¹⁵ In Appendix E, 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, we find that 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, it does not hold for beneficiaries with first-hand experiences.

taking. Individuals with first-hand experiences actively reduce risk taking by selling inherited stocks. Thus, the change in the observed risk taking in Column 1 is driven by an active choice to take less risk, rather than a passive choice confounded by inertia. Having established that observed changes in risk taking in our setting arise from active decisions, we will for brevity report results using the observed change in risk taking as the dependent variable for the remainder of the analysis.

The underlying changes in risk taking around inheritances subject to an individual's level of experience are displayed in Figure 3. Figure 3 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 the average beneficiary, irrespective of personal experiences, would increase their allocation to risky assets if they are fully inert. For individuals without a personal experience, the counterfactual passive effect would increase their allocation to stocks from 29.3 to 32.6 percentage points. This consequence 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 are fully inert, they would passively take more risk after inheriting. On the contrary, Figure 3 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 under perfect inertia. On average, individuals without a personal experience actively reduce their allocation to risky assets by 2.2 percentage points to 30.4 percent of their liquid wealth. Although individuals on average undo two-thirds of the passive change (2.2 percentage points active change relative to a 3.3 percentage point passive change), inheritance still results in an increased allocation to risky assets by 1.3 percentage point relative to the pre-inheritance level.

Now contrast the change in risk taking for individuals without personal experiences to those with. 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 18.5 percent to 28.5 percent if they are fully inert.¹⁶ Instead, they actively reduce their allocation to risky assets by selling stocks. The observed post-inheritance allocation to risky assets is reduced

¹⁶ Note that 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 29.5 percent is close to the 32.6 percent for individuals without personal experiences, because the inherited wealth is significantly larger than the beneficiaries' pre-inheritance wealth.

to 17.6 percent, which is lower than their pre-inheritance level of 18.5 percent. The active change equals a reduction in risk taking by 10.9 percentage points, which is equivalent to 109 percent of the passive change. It follows that the effect of personal experiences on risk taking around inheritance results from an active choice that cannot be attributed to inertia. Finally, Figure 3 also reports the decomposition of changes for individuals with second- and third-hand experiences. Here we also note that the lower levels of risk taking result from active choices rather than inertia.

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, intergenerational overlaps in portfolio allocation might depend on the investment style of parents and their children. 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 threefold. First, the timing of the death, and hence the inheritance case, is unrelated to the timing of the default. Second, the within-subject difference effectively eliminates the possibility that our results are driven by partial anticipation of inheritances or investment style, while the between-subject difference effectively controls for the overall effect of the financial crisis on risk taking. Third, the placebo test approach is helpful in controlling for differences attributable to investment style and potential intergeneration overlap in portfolio allocation. For instance, individuals who invest in their banks and experience a default might be different from individuals who invest in their banks and do not experience a default. To address these concerns, we estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma_b E_{i,b} + \gamma_a E_{i,a} + \varepsilon_{i,t} \quad (8)$$

where the dependent variable $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and 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., $b < t-k$), and $E_{i,a}$ is a vector of personal experiences gained after the end of the inheritance window (i.e., $a > t+k$). The difference between γ_a and γ_b allows us to ascertain that our results are not driven by differences in investment style or differences in the inherited portfolio due to intergenerational overlaps in portfolio allocation of children and parents.

Column 1 in Table 6 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 6.0 percentage points, whereas individuals who will experience a first-hand experience in the future increase their exposure to stocks by 0.8 percent. 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 their banks increase their exposure to stock when the bank has not yet defaulted.

Column 2 of Table 6 shows similar results, although of smaller magnitude, for individuals with second-hand experiences, whereas the effects for third-hand experiences 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 6, Figure 4 shows the changes in the allocation of liquid wealth to stocks for individuals with first-hand experiences conditional on the timing of the first-hand experience relative to the bank default. 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 6 is to look into 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 2, 3, or 4 years before individuals inherit. Thus, we do not have statistical power to ascertain whether the effect of personal experiences decays over time.

In Table 7, we consider the effect of first-hand experiences using a matched sample to effectively rule out that the 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 Equation (7) for individuals with first-hand experiences relative to four control groups: (a) beneficiaries who hold stocks; (b) beneficiaries holding stocks who have invested in their banks and live in the default municipality but did not experience a default; (c) beneficiaries holding stocks matched to the same level of pre-inheritance wealth and value of inherited stocks; and, finally, (d) beneficiaries holding stocks matched to the same *post*-inheritance levels of wealth and value of inherited stocks. The second control group is made possible by the fact that several of the municipalities with defaults also have other publicly listed local banks. The third (fourth) 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. We note that we obtain results that are consistent with the prior analysis once we address concerns about the strength of the local macroeconomic shock as well as potential differences in pre- and post-inheritance wealth. Appendix F 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 Figure 5 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 is done in Column 3 of Table 7. In the second bar of Figure 5, 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. We note that the effect of first-hand experiences remains remarkably stable as we change the ratio. Even when individuals with first-hand experiences inherit stock worth 5 times as much as that of the control group, they are still allocating 4 percentage points less of their liquid wealth to stocks. Panel B repeats the analysis in Panel A, where we alternatively match on post-inheritance wealth and inherited stocks as in Column 4 of Table 7. We note that the results are similar to those in Panel A. Taken as a whole, Figure 5 indicates that the effect of first-hand experiences far dominates the confounding wealth effect.

Finally, we consider the effect of first-hand experiences depending on the fraction of the portfolio lost as a result of the default in Figure 6. We report 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 as are those in Figure 5. We split into subsets individuals with first-hand experiences depending on the fraction of their portfolios lost due to default: a) less than 25%, b) 25% to 50%, c) 50% to 75%, and d) more than 75%. We note that 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 5.8 percentage points relative to their liquid wealth, whereas individuals who lost more than 75% reduce their allocation to risky assets by 13.3 percentage points.

6. Personal experiences and portfolio allocation around inheritances

In this section, we shed light on how individuals with personal experience alter their portfolio allocation across assets. 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 two later assets address whether individuals reduce risk taking by increasing their allocation to bond, cash, or both. Table 8 reports the results.

Table 8 shows that individuals with first-hand experiences both reduce their direct stock holding 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. Rather than responding appropriately to their personal experience by diversifying their portfolios, individuals shy away from risk taking as our title suggests: once bitten, twice shy. In Column 3, we note that close to two thirds 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, we note that the reduced risk taking is thus not entirely concentrated among bank stocks, as we find an effect for mutual funds as well. 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), while the effect for bonds is negative and statistically insignificant. Overall, Table 8 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, Figure 7 shows the change in the fraction of liquid wealth in cash around inheritances. We note that, consistent with the results in tables 5 and 8, as well as in Figure 3, individuals with first-hand experiences actively increase their allocation of liquid wealth to cash. While this figure shows the allocation relative to liquid wealth, it should be noted that the level of cash holding is also increasing.

7. Alternative experiences with banks and defaults

One important question that arises from our analysis is whether the effect of personal experiences is driven by financial losses, or whether the losses due to bank defaults are particularly discouraging for future risk taking—perhaps because individuals lose trust in the

financial system. In this section we attempt to address this issue by considering three alternative counterfactuals.

The first alternative counterfactual we consider is whether the effect of personal experiences is driven by liquidity constraints. Following the default of their retail banks, individuals with first-hand experiences might reduce risk taking if the default causes them to become liquidity constrained. To address this concern, we identify individuals who are depositors in, but have not invested in, a bank that defaults. We refer to these individuals as having a *first-hand depositor experience*. Column 1 of Table 9 reports the results when we jointly assess the effect of first-hand experiences and first-hand depositor experiences on risk-taking. We note that individuals who were depositors in a default bank, but who had not invested in the default bank, reduce their allocation of liquid wealth to risky assets by 0.1 percentage points. The difference in the change in risk taking between individuals with first-hand experiences and individuals with first-hand depositor experiences is significant at the one-percent level. We conclude that the effect of personal experiences on risk taking is not caused by liquidity constraints.

The second counterfactual experience we consider is whether individuals shy away from risk-taking when they inherit from an estate with bank stocks as opposed to from an estate without bank stocks. Column 2 of Table 9 shows that in both cases individuals reduce their risk taking. Although individuals reduce their risk taking more when they inherit from an estate with bank stocks (6.9 percentage points lower risky asset share), we still find economically significant effects for individuals who inherit from an estate that did not hold stocks. Individuals with first-hand experiences who inherit from an estate without stocks still reduce their allocation of liquid wealth to risky assets by 4.3 percentage points relative to a baseline allocation of liquid wealth to risky assets of around 30 percent.

The third and final counterfactual experience we consider is default of non-bank stocks. In total we have identified 6 non-bank defaults between 2007 and 2011. The 6 non-bank defaults have around 5,000 individual investors, of which 55 receive an inheritance after the default experience. Column 3 in Table 9 compares the effect of personal experiences with bank and non-bank defaults on individual risk taking. The individuals with a first-hand experience with a non-bank default reduce their allocations to risky assets by 2 percentage points, which is significantly lower than the 6.1 percentage point reduction we observe for individuals with first-hand experiences with bank defaults. The difference of 4.1 percentage points is economically as well as statistically significant. Although we find results that suggest that bank defaults have a stronger

negative effect on risk taking, the main caveat is the limited number of observations for non-bank defaults, making it difficult to estimate standard errors with precision.

8. Alternative specifications

One may be concerned that under-diversified investors or investors who are financially or liquidity constrained may drive the effect of personal experiences on risk taking. We pursue a series of alternative specifications of personal experiences and control variables in Equation 7 to address these concerns and present the results in Table 10. For brevity, we display the marginal effects and standard errors of our three variables of interest, *first-hand*, *second-hand*, and *third-hand experience*, while controlling for (unreported) demographic characteristics and time effects. In Panel A, the dependent variable is the observed change in risk taking, whereas the dependent variables in Panel B and Panel C are the passive and active change, respectively.

We begin with our baseline results from Column 1 of Table 5 in Specification (1). In Specification (2), we control for the amount 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 for *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 EUR) in bank deposits available for immediate consumption.

Specification (5) addresses concerns about the confounding effect of limited depositor insurance. We drop any beneficiaries if they held bank deposits over the amount of the government guarantee and subsequently lost deposits due to the default. For most of the defaults, the government guaranteed all deposits, whereas in a few cases the binding level was 750,000 DKK (around 100,000 EUR). As a result, only 8 beneficiaries in our inheritance sample eventually lost part of their bank deposits due to the default. We note that limited depositor insurance does not affect our results.

We control for unemployment spells in Specification (6) 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.

In Specification (7), we redefine the *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. In Specification (8), we redefine the *third-hand experience* to

include neighboring municipalities to the municipality where the default bank is headquartered. Regardless of the alternative specifications, first-hand experiences affect future risk taking significantly, consistent with our previous findings.

Finally, we have in unreported regressions assessed whether lower risk taking is driven by estate taxes. While the vast majority of estates can settle the estate tax without selling assets, it still remains a possibility that beneficiaries with first-hand experiences due to their wealth loss have to sell assets to incur the estate tax. If we restrict the sample to inheritance cases where either the estate or the beneficiaries hold sufficient cash to settle the estate tax without selling assets, we find results of comparable magnitude.

9. Conclusion

In this study we examine the effect of personal experiences on risk taking in the aftermath of the financial crisis. As a plausible negative personal experience, we identify individuals who followed the advice of their banks and suffered significant investment losses when the bank subsequently defaulted. We show that individuals with negative personal experiences in the stock market take significantly lower risk in the future. We do this using an identification strategy that allows us to separate the effect of individual experiences from the confounding effect of inertia. Our findings provide evidence that first-hand experiences have a causal and sizeable effect on future risk taking, while the magnitude of second- and third-hand effects are substantially smaller. We show that the degree of personal experiences can explain substantial heterogeneity in individuals' investment decisions.

Our results also document the challenge posed by inertia when estimating the effect of personal experiences on risk taking. In particular, we highlight the concern that the contemporaneous relationship between personal experiences and risk taking is biased by inertia. Because inertia is observationally equivalent to the hypothesized effect of personal experiences, it is problematic to interpret correlations between personal experiences deriving from movement in market prices and risk taking as causal evidence. To overcome this challenge, we rely on changes in risk taking around inheritances, where inertia is no longer observationally equivalent to the hypothesized effect of inertia. Our results show a causal effect of personal experience by oneself on active risk taking of sizeable magnitude.

Our study documents that the financial crisis resulted in lower future risk taking, as is evidenced by the generation of 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, rather than 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 documented in this study is to diversify the portfolio. Rather, individuals seem to shy away from risk taking and react as suggested by our title: once bitten, twice shy.

References:

- Andersen, S., and K.M. Nielsen. 2011. Participation constraints in the stock market: Evidence from unexpected inheritance due to sudden death. *Review of Financial Studies* 24 (5), 1667–1697.
- Andersen, S., and K.M. Nielsen. 2012. Ability or finances as constraints to entrepreneurship: Evidence from survival rates in natural experiments. *Review of Financial Studies* 25 (12), 3684–3710.
- Andersen, S., and K.M. Nielsen. 2016. Fire sales and house prices: Evidence from estate sales due to sudden death. Forthcoming in *Management Science*.
- Barber, B.M., and T. Odean. 2000. Trading is hazardous to your wealth: The common stock investment performance of individual investors. *Journal of Finance* 55(2), 773–806.
- Barber, B.M., and T. Odean. 2002. Online investors: Do the slow die first? *Review of Financial Studies* 15(2), 455–487.
- Brunnermeier, M.K., and S. Nagel. 2008. Do wealth fluctuations generate time-varying risk aversion? Micro-evidence on individuals' asset allocation. *American Economic Review* 98 (3), 713–736.
- Bucher-Koenen, T., and M. Ziegelmeyer. 2014. Once burned, twice shy? Financial literacy and wealth losses during the financial crisis. Forthcoming in *Review of Finance*.
- Callen, M., M. Isaqzadeh, J.D. Long, and C. Sprenger. 2014. Violence and risk preference: Experimental evidence from Afghanistan. *American Economic Review* 104 (1), 123–148.
- Calvet, L.E., and P. Sodini. 2014. Twin picks: Disentangling the determinants of risk-taking in household portfolios. *Journal of Finance* 119 (2), 867–906.
- Calvet, L.E., J.Y. Campbell, and P. Sodini. 2007. Down or out: Assessing the welfare costs of household investment mistakes. *Journal of Political Economy* 115, 707–747.
- Calvet, L.E., J.Y. Campbell, and P. Sodini. 2009. Fight or flight? Portfolio rebalancing by individual investors. *Quarterly Journal of Economics* 124, 301–348.
- Campbell, J.Y. 2006. Household finance. *Journal of Finance* 61, 1553–1604.
- Chiang, Y.M., D. Hirshleifer, Y. Qian, and A.E. Sherman. 2011. Do investors learn from experience? Evidence from frequent IPO investors. *Review of Financial Studies* 24 (5), 1560–1589.
- Choi, J., D. Laibson, B.C. Madrian, and A. Metrick. 2009. Reinforcement learning and savings behavior. *Journal of Finance* 64 (6), 2515–2534.
- Cocco, J.F., F.J. Gomes, and P.J. Maenhout. 2005. Consumption and portfolio choice over the life cycle. *Review of Financial Studies* 18, 491–533.
- Constantinides, G.M., J.B. Donaldson, and R. Mehra. 2002. Junior can't borrow: A new perspective on the equity premium puzzle. *Quarterly Journal of Economics* 118, 269–296.
- Danish Financial Supervisory Authority. 2009. Rapport om salg af egne aktier, Report, Copenhagen Denmark.
- Duflo, E., and E. Saez. 2003. The role of information and social interactions in retirement plan decisions: Evidence from a randomized experiment. *Quarterly Journal of Economics* 118 (3), 815–842.
- Giannetti, M., and Y. Koskinen. 2010. Investor protection and demand for equity. *Journal of Financial and Quantitative Analysis* 45 (1), 135–168.

- Giannetti, M., and T. Y. Wang. 2016. Corporate scandals and household stock market participation. Forthcoming in *Journal of Finance*.
- Giuliano, P., and A. Spilimbergo. 2014. Growing up in a recession. *Review of Economic Studies* 81 (2), 787–817.
- Gollier, C. 2001. *The Economics of Risk and Time*. Cambridge, MA: MIT, 2001.
- Grinblatt, M., and M. Keloharju. 2001. How distance, language, and culture influence stockholdings and trades. *Journal of Finance* 56, 1053–1073.
- Guiso, L. 2010. A trust-driven financial crisis: Implications for the future of financial markets. Working paper.
- Guiso, L. 2012. Trust and risk aversion in the aftermath of the great recession. *European Business Organization Law Review* 13, 195–209.
- Guiso, L., M. Haliassos, and T. Japelli. 2003. Household stockholding in Europe: Where do we stand and where do we go? *Economic Policy* 18, 123–170.
- Guiso, L., and T. Jappelli. 2005. Awareness and stock market participation. *Review of Finance* 9, 537–567.
- Guiso, L., and M. Paiella. 2008. Risk aversion, wealth, and background risk. *Journal of the European Economic Association* 6 (6), 1109–1150.
- Guiso, L., P. Sapienza, and L. Zingales, 2008. Trusting the stock market. *Journal of Finance* 58, 2557–2600.
- Guiso, L., P. Sapienza, and L. Zingales. 2013. Time varying risk aversion. NBER Working paper, 2013.
- Heaton, J., and D. Lucas. 2000. Portfolio choice and asset prices: The importance of entrepreneurial risk. *Journal of Finance* 55 (3), 1163–1198.
- Hellström, J., E. Zetterdahl, and N. Hanes. 2013. Loved ones matter: Family effects and stock market participation. Working paper.
- Hoffmann, A., and T. Post. 2016. How return and risk experiences shape investor beliefs and preferences. Forthcoming in *Accounting and Finance*.
- Hong, H., J.D. Kubik, and J.C. Stein. 2004. Social interaction and stock-market participation. *Journal of Finance* 59 (1), 137–163.
- Hong, H., J.D. Kubik, and J.C. Stein. 2005. Thy neighbor's portfolio: Word-of-mouth effects in the holdings and trades of money managers. *Journal of Finance* 60 (6), 2801–2824.
- Hvide, H., and P. Östberg. 2014. Social interaction at work: Co-worker influence on stock investments. Forthcoming in *Journal of Financial Economics*.
- Ivkovic, Z., and S. Weisbenner. 2007. Information diffusion effects in individual investors' common stock purchases: Covet thy neighbors' investment choices. *Review of Financial Studies* 20 (4), 1327–1357.
- Kaustia, M., and S. Knüpfer. 2008. Do investors overweight personal experience? Evidence from IPO subscriptions. *Journal of Finance* 63(6), 2679–2702.
- Kaustia, M., and S. Knüpfer. 2012. Peer performance and stock market entry. *Journal of Financial Economics* 104 (2), 321–338.
- Keloharju, M., S. Knüpfer, and J. Linnainmaa. 2012. Do investors buy what they know? Product market choices and investment decisions. *Review of Financial Studies* 25(10), 2921–2958.
- Knüpfer, S., E.H. Rantapuska, and M. Sarvimäki. 2016. Formative experiences and portfolio choice: Evidence from the Finnish Great Depression. Forthcoming in *Journal of Finance*.

- Li, G. 2014. Information sharing and stock market participation: Evidence from extended families. *Review of Economics and Statistics* 96 (1), 151–160.
- Malmendier, U., and S. Nagel. 2011. Depression babies: Do macroeconomic experiences affect risk taking? *Quarterly Journal of Economics* 126, 373–416.
- Mankiw, N.G., and S.P. Zeldes. 1991. The consumption of stockholders and nonstockholders. *Journal of Financial Economics* 29, 97–112.
- van Rooij, M., A. Lusardi, and R. Alessie. 2011. Financial literacy and stock market participation. *Journal of Financial Economics* 101, 449–472.
- Vissing-Jørgensen, A. 2002. Towards an explanation of household portfolio choice heterogeneity: Nonfinancial income and participation cost structures, NBER, Working paper.
- Voors, M.J., E.E. Nillesen, P. Verwimp, E.H. Bulte, R. Lensink, and D.P. Van Soest. 2012. Violent conflict and behavior: A field experiment in Burundi. *American Economic Review* 102 (2), 941–964.

Table 1: Individual characteristics

We report descriptive statistics: mean and standard deviation for all individuals in our sample for 2006. For each individual, we observe *risky asset share* (i.e., fraction of liquid assets allocated to stocks and mutual funds), *income after tax*, *net wealth*, *age*, *gender*, *education* (years of schooling), *marital status*, and whether there are *children in the household*. We compare the mean characteristics of stock market participants and non-participants and test whether these differences are significantly different from zero. Corresponding *t*-statistics are reported in square brackets. All amounts are in thousands year-2010 DKK. One EUR is equal to 7.45 DKK. Standard deviations are in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels by standard *t*-tests, respectively.

	All	Stock market participation		Difference (1)-(2)
		Yes (1)	No (2)	
Stock market participation (%)	29.7 (45.7)	100.0 -	0.0 -	- -
Risky asset share (%)	12.2 (24.1)	41.1 (27.8)	0.0 -	- -
Income after tax (1,000 DKK)	290.4 (535.0)	328.4 (583.5)	274.4 (512.2)	54.0*** [93.1]
Net wealth (1,000 DKK)	573.6 (5710.7)	1236.2 (10211.3)	293.2 (1423.8)	943.0*** [152.5]
Age (years)	49.1 (17.4)	54.3 (17.3)	46.9 (17.0)	7.4*** [400.1]
Gender (% male)	48.9 (50.0)	51.4 (50.0)	47.8 (50.0)	3.5*** [65.1]
Education (years)	11.4 (4.0)	11.8 (4.0)	11.3 (3.8)	0.5*** [127.0]
Married (%)	52.8 (49.9)	57.4 (49.5)	50.9 (50.0)	6.4*** [118.9]
Children in household (%)	31.3 (46.4)	24.3 (42.9)	34.2 (47.4)	-9.9*** [-197.1]
N	4,060,510	1,207,278	2,853,232	

Table 2: Portfolio characteristics

We report descriptive statistics of individuals' portfolio characteristics: mean and standard deviation for all individuals who hold stocks in 2006. We report *risky asset share*, *market value* of shareholdings, and the composition of the portfolio including the *number of stocks* and *number of bank stocks*; and whether or not the individual *invested in own banks stock*, an indicator equal to one for individuals who *only invested in own bank stock*, the *fraction in bank stocks* relative to all shareholdings, and an indicator equal to one for individuals who *invested in mutual funds*. We compare the mean characteristics of individuals who invest in their own banks, depending on whether or not the bank defaults between 2008 and 2012, and test whether these differences are significantly different from zero. Corresponding *t*-statistics are reported in square brackets. All amounts are in thousands year-2010 DKK. Standard deviations are in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels by standard *t*-tests, respectively.

	All	Invested in own bank	Future default bank experience		Diff. (1)-(2)
			Yes (1)	No (2)	
Risky asset share (%)	41.1 (27.8)	40.0 (28.4)	42.7 (28.9)	39.7 (28.3)	3.0*** [27.4]
Market value (1,000 DKK)	327.7 (9495.2)	345.6 (11873.7)	368.2 (3942.1)	343.1 (12428.6)	25.1 [0.5]
Number of stocks	2.6 (3.1)	2.6 (3.3)	2.8 (4.3)	2.6 (3.1)	0.2*** [19.3]
Number of bank stocks	0.8 (0.7)	1.2 (0.5)	1.4 (0.9)	1.1 (0.4)	0.2*** [114.5]
Invested in own bank stock (%)	61.8 (48.6)	100.0 -	100.0 -	100.0 -	- -
Only invested in own bank stock (%)	34.5 (47.5)	58.8 (49.7)	53.4 (49.9)	56.0 (49.6)	-2.6*** [-13.4]
Fraction in bank stocks (%)	47.8 (46.1)	71.4 (38.9)	76.4 (35.5)	70.8 (39.2)	5.5*** [36.4]
Fraction in own bank stock (%)	43.1 (46.0)	69.6 (39.7)	73.4 (37.3)	69.2 (39.9)	4.2*** [26.9]
Invested in mutual funds (%)	44.4 (49.7)	32.6 (46.9)	27.7 (44.8)	33.1 (47.1)	-5.4*** [-29.5]
N	1,207,278	746,465	72,463	674,002	

Table 3: The effect of personal experiences on changes in risk taking

This table relates the degree of personal experiences to changes in risk taking. The following equation is estimated:

$$\Delta\alpha_{i,t,k} = \beta X_{i,t} + \gamma E_{i,t,k} + \varepsilon_{i,t}$$

where the dependent variable $\Delta\alpha_{i,t,k}$ is the change in risk taking of individual i from year $t-k$ to t , measured as yearly changes, $k=1$. In Column 1 the dependent variable is the *observed change* in the fraction of liquid assets allocated to stocks and mutual funds from year $t-1$ to year t . In columns 2 and 3, the dependent variable is the change in the *passive* and the *active* component of the observed change in the risky asset share. The passive component of the observed change in risky asset share is the counterfactual change in risky asset share due to changes in stock prices from year $t-1$ to t , while keeping holdings constant at the year $t-1$ allocation. The active component is the observed change in risky asset share less the change due to the passive component. $X_{i,t}$ is a vector of control variables, and $E_{i,t,k}$ is a vector of personal experiences gained from year $t-1$ to t . We consider the following personal experiences: *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, or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a bank default. For each individual, we code the highest degree of personal experience and set lower degrees of personal experiences (if any) to zero. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). Standard errors are in parentheses. ***, **, * indicate coefficients that are significant at the 1%, 5%, and 10% levels, respectively, using standard errors clustered at the level of municipality-year.

Dependent variable	Observed change	Passive change	Active Change
	(1)	(2)	(3)
First-hand experience	-0.084*** (0.015)	-0.085*** (0.014)	0.001 (0.001)
Second-hand experience	-0.006*** (0.001)	-0.003** (0.001)	-0.004*** (0.001)
Third-hand experience	-0.002 (0.001)	0.001 (0.002)	-0.003*** (0.001)
Control variables	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes
Pseudo R ²	0.051	0.064	0.015
N	6,835,546	6,835,546	6,835,546

Table 4: Inheritance characteristics

This table reports descriptive statistics for inheritance cases from 2007 to 2011 subject to whether the estate holds stocks, and whether the estate's beneficiaries have first-hand experiences. Panel A reports the total number of estates and beneficiaries for all deaths and sudden deaths. Sudden deaths are defined as household terminations where 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. Panel C reports the inheritance characteristics of the beneficiaries who inherit stocks subject to their prior first-hand experiences *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, or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a bank default. *Inheritance offsets loss from default* is an indicator taking the value one when the value of inherited stocks exceeds the lost investment from default. All amounts are in thousands year-2010 DKK. One Euro is equal to 7.45 DKK.

A. Household terminations	All deaths	All deaths with stocks	Sudden deaths	Sudden deaths with stocks
	Number of estates	80,939	28,040	14,683
Number of beneficiaries	141,469	48,104	25,261	8,968

B. Portfolio characteristics	Estates with stocks		Beneficiaries who inherit stocks	
	All deaths	Sudden deaths	All	Sudden deaths
Market value of stocks (1,000 DKK)	412.5 (4238.0)	375.3 (1588.2)	104.3 (894.2)	101.7 (502.4)
Risky asset share (%)	34.3 (23.2)	33.9 (23.5)	14.3 (24.6)	14.9 (24.9)
N	28,040	5,262	48,104	8,968

C. Inheritance characteristics	Personal experience			
	First-hand	Second-hand	Third-hand	None
Market value of stocks before inheritance (1,000 DKK)	150.0 (426.8)	86.6 (372.8)	185.2 (2362.4)	102.4 (838.8)
Market value of inherited stocks (1,000 DKK)	250.3 (1358.8)	186.4 (437.7)	487.1 (6483.7)	222.9 (1745.4)
Lost investment from default (1,000 DKK)	56.3 (162.8)	-	-	-
Fraction of portfolio lost (%)	62.5 (40.7)	-	-	-
Inheritance offsets loss from default (%)	91.6 (630.2)	-	-	-
N	331	1,113	1,111	45,549

Table 5: 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:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t}$$

where the dependent variable $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and year t is the year of inheritance and $k=1$. In Column 1, the dependent variable is the *observed change* in the fraction of liquid assets allocated to stocks and mutual funds from year $t-1$ to year $t+1$. In columns 2 and 3, the dependent variable is the change in the *passive* and the *active* component of the observed change in the risky asset share. The passive component of the observed change in risky asset share is the counterfactual change in risky asset share due to changes in stock prices from year $t-1$ to t , while keeping holdings constant at the year $t-1$ allocation. The active component is the observed change in risky asset share less the change due to the passive component. $X_{i,t}$ 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., $b < t-1$. 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, or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a default bank. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, Column 1 also includes the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are in parentheses. ***, **, * indicate coefficients that are significant at the 1%, 5%, and 10% levels, respectively, using standard errors clustered at the level of municipality-year.

Dependent variable	Observed change	Passive change	Active change
	(1)	(2)	(3)
First-hand experience	-0.061*** (0.013)	0.038 (0.024)	-0.068*** (0.020)
Second-hand experience	-0.015*** (0.001)	-0.027*** (0.010)	0.007 (0.008)
Third-hand experience	-0.001 (0.005)	-0.002 (0.008)	0.006 (0.009)
Control variables	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes
Pseudo R ²	0.160	0.105	0.142
N	48,104	48,104	48,104

Table 6: Timing of 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:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma_b E_{i,b} + \gamma_a E_{i,a} + \varepsilon_{i,t}$$

where the dependent variable $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and 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., $a > t+1$. Individuals with personal experiences within the inheritance window are excluded from the sample. The dependent variable is the *observed change* in the fraction of liquid assets allocated to stocks and mutual funds from year $t-1$ to year $t+1$. *First-hand experience before inheritance* is an indicator for individuals who experienced the default of their own banks before they inherited. *First-hand experience after inheritance* is an indicator for individuals who experienced the default of their own bank after they inherited. *Second-hand experience before inheritance* is an indicator for first-hand experiences in the immediate family before they inherited (parent, sibling, child, or spouse). *Second-hand experience after inheritance* is an indicator for first-hand experiences in the immediate family after they inherited (parent, sibling, child, or spouse). *Third-hand experience before inheritance* is an indicator for individuals who are living in a municipality with a default bank before inheritance. *Third-hand experience after inheritance* is an indicator for individuals who are living in a municipality with a default bank after inheritance. Control variables include: *market value of inherited stocks, stock market participation, invested in mutual funds, invested in own bank, log. of income, age, gender, education, married, and children in household* (see Table 1 for further description). To control for inertia, Column 1 also includes the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are in parentheses. ***, **, * indicate coefficients that are significant at the 1%, 5%, and 10% levels, respectively, using standard errors clustered at the level of municipality-year.

Dependent variable	Observed change			
	(1)	(2)	(3)	(4)
First-hand experience before inheritance	-0.060*** (0.013)			-0.061*** (0.013)
First-hand experience after inheritance	0.008 (0.014)			0.001 (0.016)
Second-hand experience before inheritance		-0.015*** (0.007)		-0.015*** (0.007)
Second-hand experience after inheritance		0.010 (0.008)		0.011 (0.009)
Third-hand experience before inheritance			0.003 (0.005)	-0.001 (0.003)
Third-hand experience after inheritance			-0.006* (0.003)	-0.006* (0.003)
Control variables	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Pseudo R ²	0.160	0.160	0.160	0.161
N	48,104	48,104	48,104	48,104

Table 7: Matched sample estimate of the effect personal experiences on risk taking

This table reports the effect of personal experiences on risk taking using a matched sample approach. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t}$$

where the dependent variable $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and 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., $b < t-1$. Individuals with personal experiences within the inheritance window are excluded from the sample. The dependent variable is the *observed change* in the fraction of liquid assets allocated to stocks and mutual funds from year $t-1$ to year $t+1$. The treatment group consists of investors with first-hand experiences before the start of the inheritance window, while the control group is a matched sample of beneficiaries without first- or second-hand experiences. In Column 1 the matched control group consists of stock market participants, while the control group in Column 2 includes investors in banks with third-hand experiences (individuals who are living in a municipality with a bank default). In Column 3 the control groups consist of individuals who hold stocks and are from the same vigintile of the pre-inheritance wealth distribution. In Column 4, the control group consists of individuals who hold stocks and are from the same vigintile of the post-inheritance wealth distribution. Among the matches in columns 3 and 4, we use the five closest neighbors based on the value of inherited stocks. *First-hand experience* is an indicator for individuals who experienced the default of their own banks before inheritance. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, Column 1 also includes the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable Control group	Observed change			
	Stock market participants	Invested in own bank & third-hand experience	Pre-inheritance wealth & inherited wealth	Post-inheritance wealth
	(1)	(2)	(3)	(4)
First-hand experience	-0.065*** (0.016)	-0.092*** (0.013)	-0.070*** (0.016)	-0.067*** (0.018)
Control variables	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Pseudo R ²	0.252	0.330	0.260	0.285
N	1,272	517	1,272	1,272

Table 8: Effect of personal experiences on portfolio allocation

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

$$\Delta\alpha_{i,t,2k}^c = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t}$$

where the dependent variable $\Delta\alpha_{i,t,2k}^c$ is the change in the fraction of liquid wealth allocated to asset class subcategory c of individual i from year $t-k$ to $t+k$, and year t is the year of inheritance and $k=1$. We consider the following subcategories of asset classes in columns 1 through 5: *directly held stocks*, *mutual funds*, *bank stocks*, *bonds*, and *cash*. Allocations to subcategories of asset classes are all measured relative to liquid wealth. *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, or spouse). *Third-hand experience* is an indicator for individuals who are living in a municipality with a default bank. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, we include the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are in parentheses. ***, **, * indicate coefficients that are significant at the 1%, 5%, and 10% levels, respectively, using standard errors clustered at the level of municipality-year.

Dependent variable	Observed change in allocation to ...				
	Directly held stocks	Mutual funds	Bank stocks	Bonds	Cash
	(1)	(2)	(3)	(4)	(5)
First-hand experience	-0.038*** (0.011)	-0.023** (0.011)	-0.025*** (-0.009)	-0.017 (0.016)	0.078*** (0.024)
Second-hand experiences	-0.012** (0.006)	-0.003 (0.004)	-0.017*** (0.005)	-0.001 (0.004)	0.016* (0.009)
Third-hand experiences	0.001 (0.005)	0.001 (0.003)	-0.001 (0.006)	-0.006 (0.005)	0.005 (0.007)
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.107	0.056	0.082	0.012	0.120
N	48,104	48,104	48,104	48,104	48,104

Table 9: Alternative personal experiences deriving from banks and defaults

Each column of this table introduces alternative personal experiences deriving from banks and defaults. We estimate the following equation:

$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t}$$

where the dependent variable $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and year t is the year of inheritance and $k=1$. The dependent variable is the *observed change* in the fraction of liquid assets allocated to stocks and mutual funds from year $t-1$ to year $t+1$. $X_{i,t}$ 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., $b < t-1$. Individuals with personal experiences within the inheritance window are excluded from the sample. *First-hand experience* is an indicator for individuals who experienced the default of their own bank. *First-hand depositor experience* is an indicator for individuals who were depositors, but did not hold stocks, in a default bank. *First-hand experience & estate with bank stocks* is an indicator for individuals who experienced the default of their own banks and inherit from an estate that hold bank stocks. *First-hand experience & estate without bank stocks* is an indicator for individuals who experienced the default of their own banks and inherit from an estate that did not hold bank stocks. *Non-bank default experience* is an indicator for individuals who experienced the default of a non-bank. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, we include the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Dependent variable Specification	Observed change		
	Bank depositor	Bank vs. non- banks stocks	Non-bank defaults
	(1)	(2)	(3)
First-hand experience	-0.060*** (0.013)		-0.061*** (0.013)
First-hand depositor experience	-0.001 (0.011)		
First-hand experience & estate with bank stocks		-0.069*** (0.016)	
First-hand experience & estate without banks stocks		-0.043* (0.025)	
Non-bank default experiences			-0.020 (0.037)
Control variables	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Pseudo R ²	0.160	0.166	0.160
N	48,104	48,104	48,104

Table 10: Alternative specifications

Each column of this table represents an alternative specification of our main regressions (Table 5) by including new control variables or using alternative definitions of the variables of interest. We estimate the following equation: $\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t}$

where $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and year t is the year of inheritance and $k=1$. The dependent variable in Panel A is the change in risk taking measured by the observed change in the fraction of liquid assets allocated to stocks and mutual funds. The dependent variable in Panel B is the change in the passive component of the risky asset share, and in Panel C, the change in the active component of the risky asset share. $X_{i,t}$ 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., $b < t-1$. Individuals with personal experiences within the inheritance window are excluded from the sample. Specification (1) reports our baseline results from columns 1, 2, and 3 of Table 5 to facilitate a comparison to the results in columns 2 to 9 of panels A, B, and C, respectively. 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* with less than 5,000 DKK (670 EUR) in bank deposits, respectively. In Specification (5), we drop beneficiaries if their bank deposits exceeded the amount covered by the government depositor insurance system. In Specification (6), we control for unemployment spells by including an indicator for individuals who are unemployed during the year or the year before. In Specification (7), 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. Finally, in Specification (8) we redefine the *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% levels, respectively.

Specification	Baseline	Fraction of wealth lost	Financially constrained	Liquidity constrained	Depositors insurance	Unemployment spells	Household experience	Extended third-hand experience
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
A. Observed change								
First-hand experience	-0.061*** (0.013)	-0.053** (0.025)	-0.047*** (0.014)	-0.044*** (0.013)	-0.062*** (0.013)	-0.061*** (0.013)	-0.029** (0.012)	-0.063*** (0.013)
Second-hand experience	-0.015** (0.007)	-0.015** (0.007)	-0.015** (0.007)	-0.015** (0.007)	-0.015** (0.007)	-0.015** (0.007)	-0.012* (0.007)	-0.016** (0.007)
Third-hand experience	0.001 (0.005)	0.001 (0.005)	0.002 (0.005)	0.002 (0.005)	0.001 (0.005)	0.001 (0.005)	0.002 (0.005)	0.005 (0.005)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.160	0.160	0.160	0.161	0.160	0.160	0.160	0.161
N	48,104	48,104	48,104	48,104	48,096	48,104	48,104	48,104

B. Passive change								
First-hand experience	0.038 (0.024)	0.012 (0.038)	0.040 (0.024)	0.038** (0.019)	0.032 (0.024)	0.038 (0.024)	0.044** (0.018)	0.037 (0.024)
Second-hand experience	-0.027** (0.010)	-0.027** (0.010)	-0.027** (0.010)	-0.028*** (0.010)	-0.027** (0.010)	-0.027** (0.010)	-0.030*** (0.010)	-0.027** (0.011)
Third-hand experience	-0.002 (0.008)	-0.002 (0.008)	-0.002 (0.008)	-0.003 (0.008)	-0.002 (0.008)	-0.003 (0.008)	-0.002 (0.008)	0.004 (0.008)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.105	0.105	0.105	0.115	0.105	0.106	0.105	0.105
N	48,104	48,104	48,104	48,104	48,096	48,104	48,104	48,104
C. Active change								
First-hand experience	-0.068*** (0.020)	-0.068** (0.029)	-0.057*** (0.017)	-0.051*** (0.015)	-0.062*** (0.019)	-0.068*** (0.020)	-0.043*** (0.014)	-0.067*** (0.020)
Second-hand experience	0.007 (0.008)	0.007 (0.008)	0.007 (0.008)	0.008 (0.008)	0.007 (0.008)	0.007 (0.008)	0.011 (0.008)	0.007 (0.009)
Third-hand experience	0.006 (0.009)	0.006 (0.009)	0.006 (0.009)	0.007 (0.009)	0.006 (0.009)	0.007 (0.009)	0.008 (0.009)	-0.002 (0.004)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R ²	0.142	0.142	0.142	0.151	0.142	0.143	0.160	0.142
N	48,104	48,104	48,104	48,104	48,096	48,104	48,104	48,104

Figure 1: Location of local banks and incidences of bank defaults in Denmark

This map shows the location of publicly trading retail banks and incidences of bank defaults across municipalities in Denmark from 2006 to 2012 based on bank headquarters. Municipalities in which a retail bank defaulted between 2008 and 2012 are displayed in black. Municipalities with a surviving publicly listed bank are displayed in grey. Municipalities without a publicly listed retail bank are shown in the lightest grey.

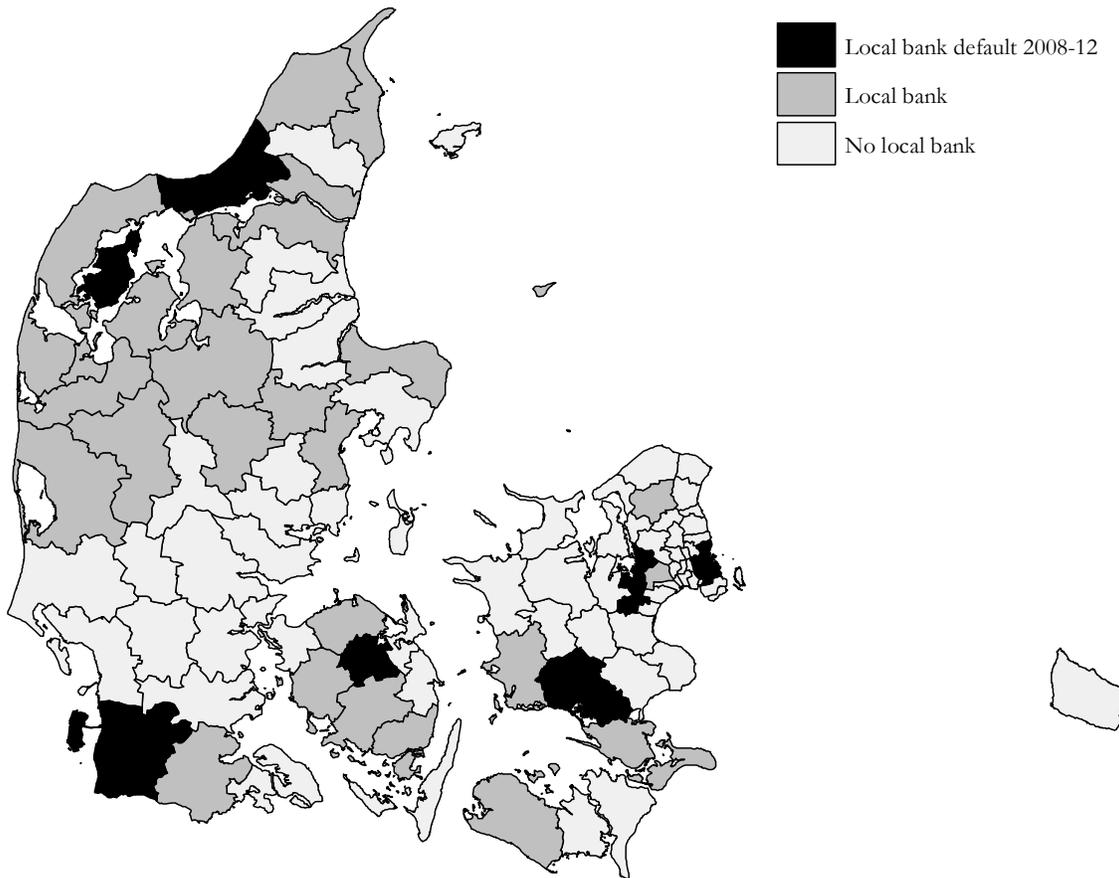


Figure 2: Degree of experience and portfolio rebalancing

This graph decomposes the year-to-year change in the fraction of liquid assets allocated to stocks and mutual funds into the active and passive change of the risky asset share. The passive component of the risky asset share is given by the changes in prices, holding constant the underlying assets, while the active component is the observed actual risky asset share less the passive component. The graph shows the average changes for all participants depending on their degree of personal experience. *First-hand* experiences derive from personal losses, *second-hand* experiences from losses in the close family, and *third-hand* experiences from living in municipalities where banks defaulted.

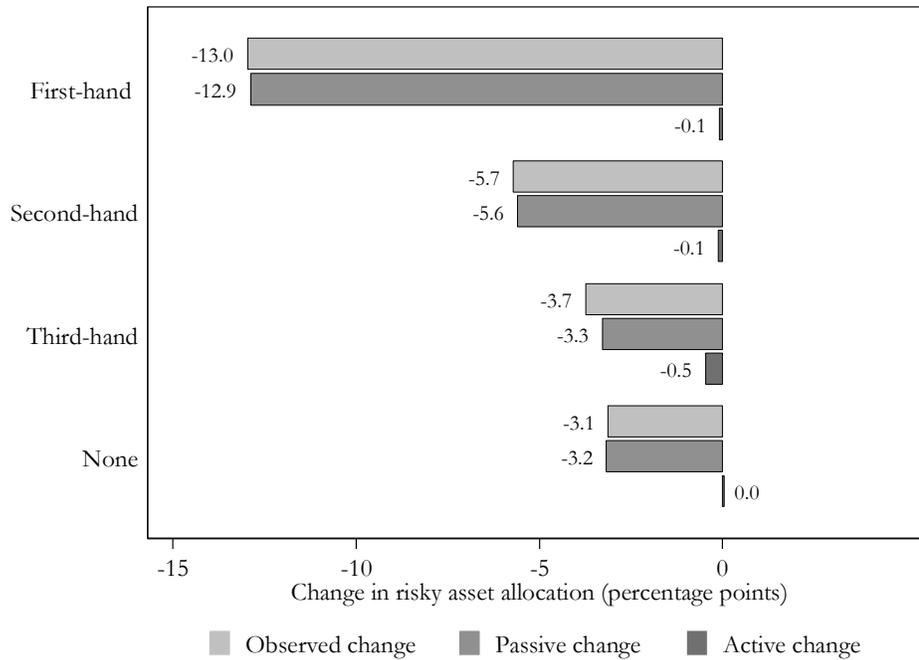


Figure 3: Degree of experience and portfolio rebalancing around inheritances

This graph decomposes the change in 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 ratio of liquid assets allocated to stocks and mutual funds, the counterfactual post-inheritance ratio of liquid assets allocated to stocks and mutual funds, the observed post-inheritance ratio, and the active change in the ratio of liquid assets allocated to stocks and mutual funds. The counterfactual post-inheritance level of risk taking 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 risk taking and the counterfactual post-inheritance level. *First-hand* experiences derive from personal losses, *second-hand* experiences from losses in the close family, and *third-hand* experiences from living in municipalities where banks defaulted.

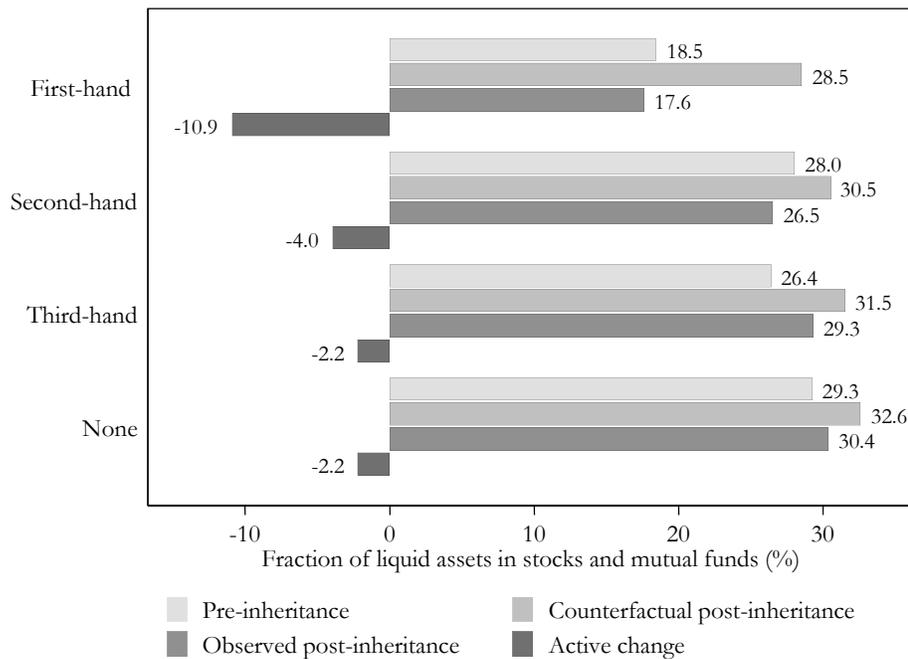


Figure 4: Timing of inheritance relative to personal experience

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, whereas *inheritance after default* is the treatment effect. *First-hand experiences* derive from personal losses, *second-hand experiences* from losses in the close family, and *third-hand experiences* from living in municipalities where banks defaulted. We report counterfactual post-inheritance ratio of liquid assets allocated to stocks and mutual funds, the observed post-inheritance ratio, and the active change in the ratio of liquid assets allocated to stocks and mutual funds. The counterfactual post-inheritance level of risk taking 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 risk taking and the counterfactual post-inheritance level.

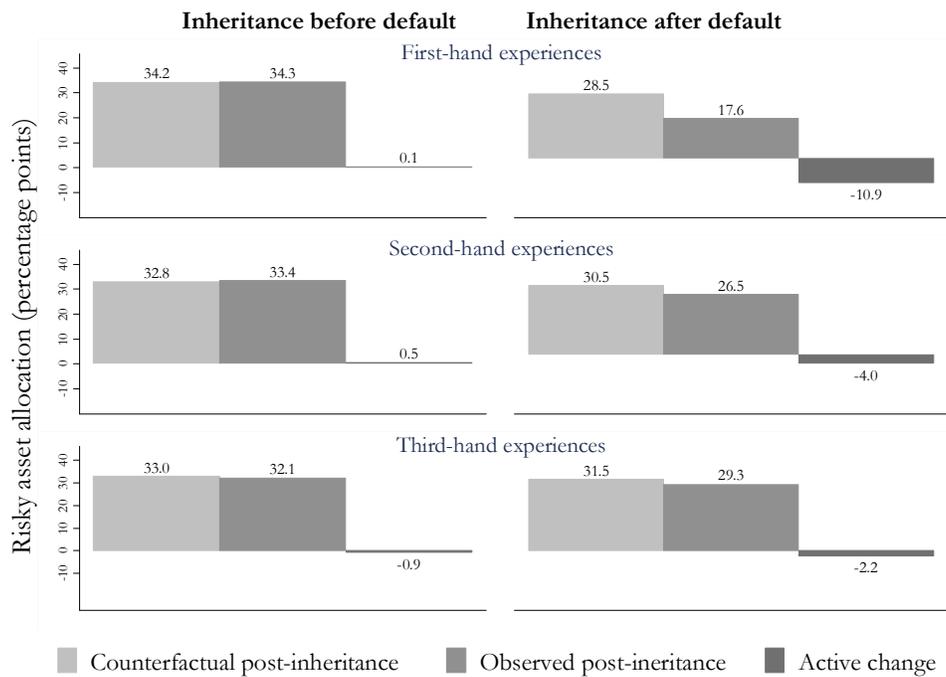
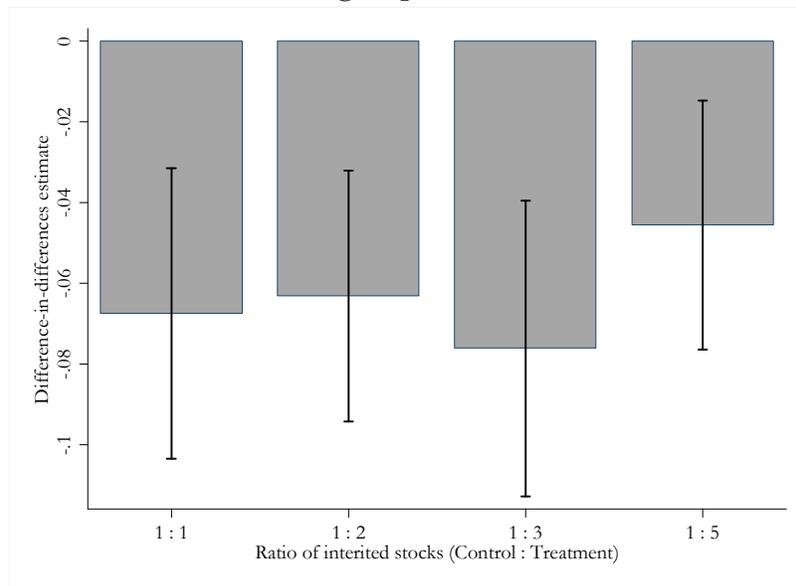


Figure 5: Estimates matching on inherited wealth

These graphs show the change in risky assets for a beneficiary with first-hand experiences from personal losses (i.e., individuals who lost their investments due to the default of their own banks) compared to individuals who did not have a first-hand experience, matched in Panel A (Panel B) to the same post-inheritance (pre-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, 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 in similar fashion.

Panel A: Matching on post-inheritance wealth



Panel B: Matching on pre-inheritance wealth

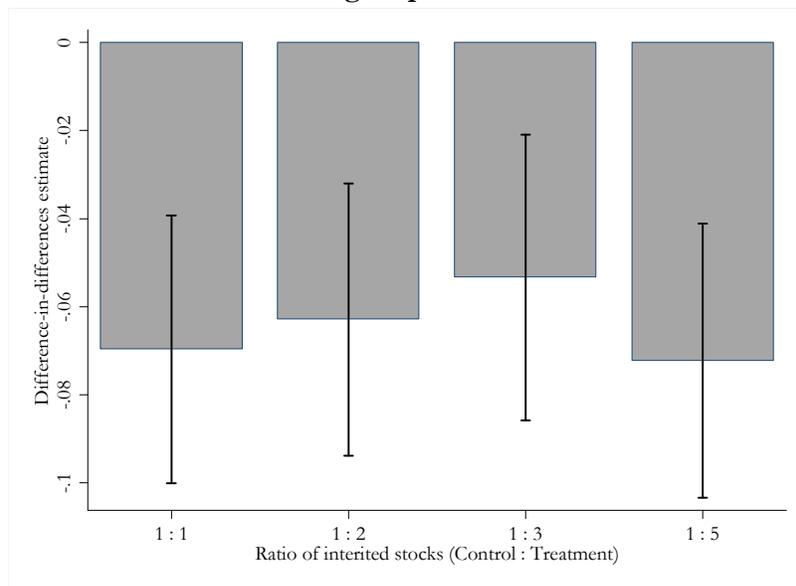


Figure 6: First-hand experience and fraction of portfolio lost

This figure shows the effect of first-hand experiences on risk taking depending on the fraction of portfolio lost. We report counterfactual post-inheritance ratio of liquid assets allocated to stocks and mutual funds, the observed post-inheritance ratio, and the active change in the ratio of liquid assets allocated to stocks. The counterfactual post-inheritance level of risk taking 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 risk taking and the counterfactual post-inheritance level. We report these ratios for individuals with first-hand experiences who due to the default lost a) less than 25%, b) 25% to 50%, c) 50% to 75%, and d) more than 75% of their portfolios of risky assets.

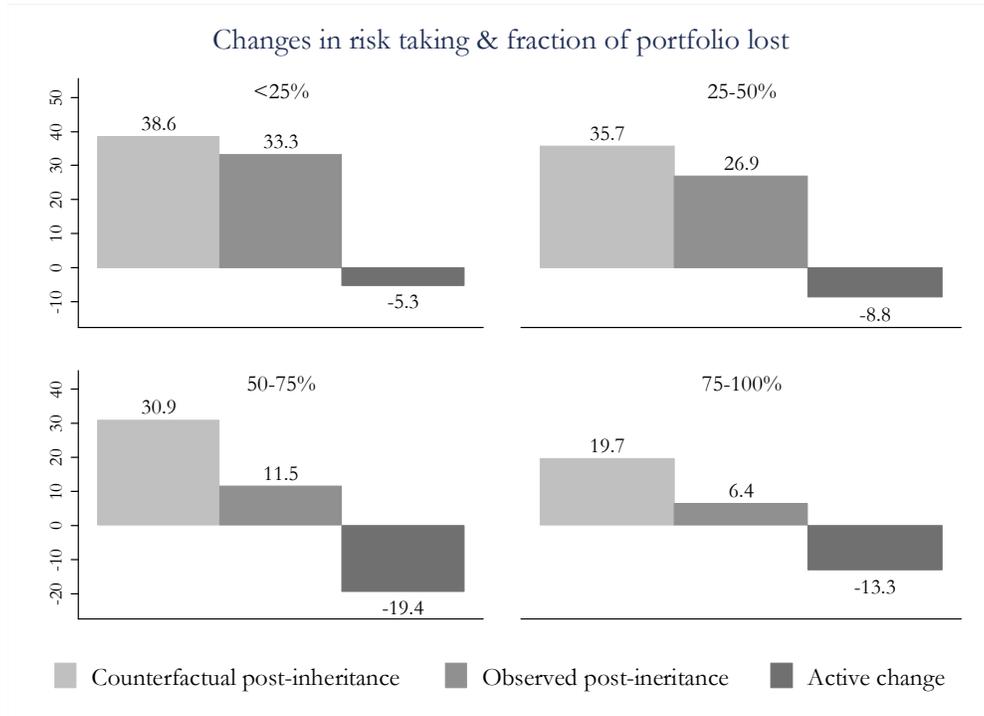
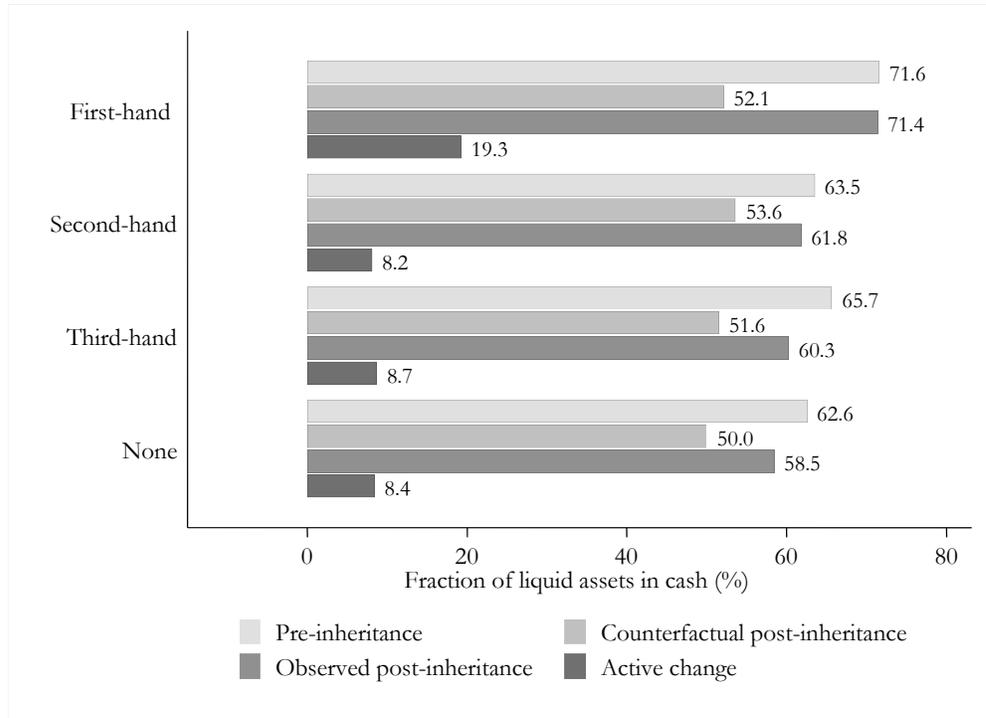


Figure 7: Degree of experience and cash holdings (bank deposits) around inheritances

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 from losses in the close family, and *third-hand* experiences from living in municipalities where banks defaulted.



**Online Appendix for “Once Bitten, Twice Shy:
The Role of Inertia and Personal Experiences in Risk Taking
by
Steffen Andersen, Tobin Hanspal, and Kasper Meisner Nielsen**

The following tables and figures are included in this appendix:

- **Appendix A: List of default banks, 2008–2012**
This table shows the chronology of bank defaults in Denmark in the aftermath of the financial crisis.
- **Appendix B: The effect of personal experiences on risk taking**
This table presents results for the alternative specification where we allow second- and third-hand experiences to occur before the end of our inheritance window. As a result, the specifications are identical to the specifications in Table 5, but the number of observations increase from 48,104 to 52,331 when we include beneficiaries that gain a second- or third-hand experience during the inheritance window.
- **Appendix C: Source and incidence of second-hand experiences**
This figure plots the distribution of the sources of second-hand experiences and the number of incidences per individual.
- **Appendix D: Alternative second-hand experiences definitions**
This table reports estimates of the marginal effect on the propensity to keep inherited stocks by i) decomposing the effect of second-hand experiences into its source (parents, siblings, spouse, children, and parent in-laws), and ii) the propensity to keep inherited stocks as a function of the number of second-hand experiences per individual.
- **Appendix E: The effect of personal experiences and the value of inherited stocks**
This table presents results for the alternative specification where we include interactions between personal experiences and the market value of inherited stocks. Column 1 is identical to the baseline specification in Table 5, and Column 3 restricts the sample to individuals with at least two stocks in their portfolios when they inherit, whereas even numbered columns include the interaction term between personal experiences and the market value of inherited stocks, respectively.
- **Appendix F: Personal experience and risk taking using inheritance due to sudden deaths**
This table presents results for our matched sample using inheritances due to sudden deaths. The table is comparable to Table 7, which is based on all deaths.

Appendix A: List of default banks, 2008–2012

This table lists the chronological order of defaults of publicly listed banks from 2008 to 2012. *Location of headquarters* is the city of the bank's headquarters. *Assets* are in DKK billions at the end of the year in the year before the default. *Number of shareholders* is the number of individual shareholders in our data at the beginning of the year of default.

Bank	Location of headquarters	Date of default	Assets DKK bn.	Number of shareholders
Roskilde Bank	Roskilde	24-08-2008	42.0	18,550
EBH Bank	Fjerritslev	28-11-2008	10.4	6,315
Fionia Bank	Odense	23-02-2009	32.8	18,716
Capinordic Bank	Hellerup	11-02-2010	1.7	2,108
Amagerbanken	Copenhagen	06-02-2011	28.3	40,649
Fjordbank Mors	Nykøbing Mors	24-06-2011	13.2	8,540
Max Bank	Næstved	09-11-2011	9.8	13,047
Tønder Bank	Tønder	04-11-2012	2.8	3,650

Source: Danish Financial Supervisory Authority and authors' own calculations.

Appendix B: The effect of personal experience on risk taking

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

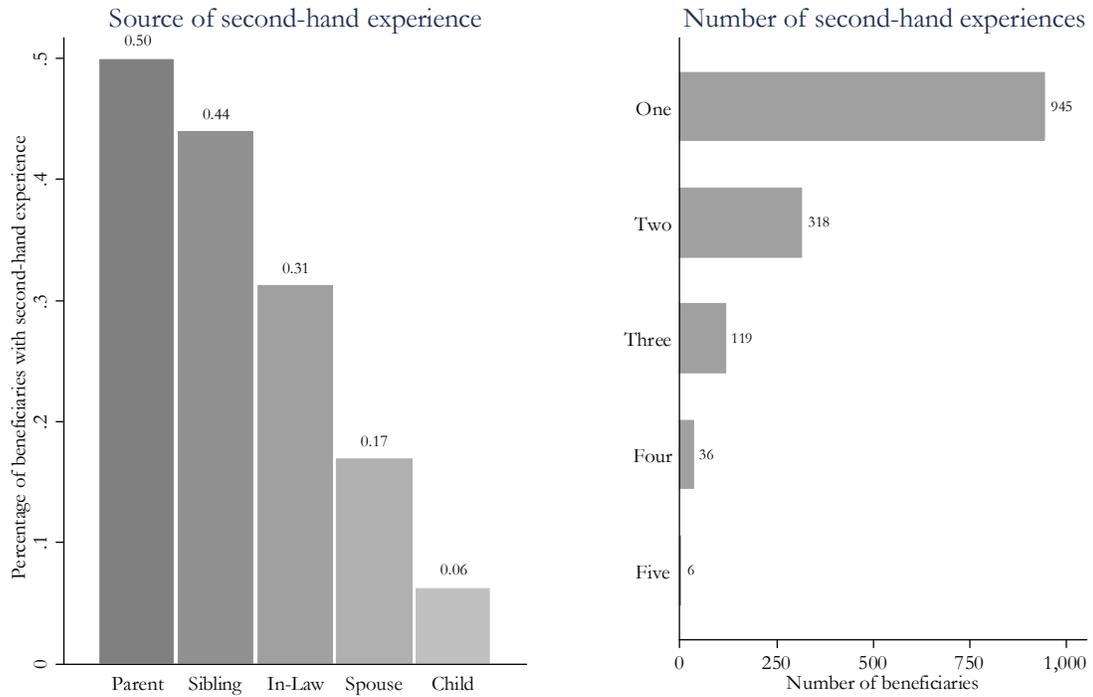
$$\Delta\alpha_{i,t,2k} = \beta X_{i,t} + \gamma E_{i,b} + \varepsilon_{i,t}$$

where the dependent variable $\Delta\alpha_{i,t,2k}$ is the change in risk taking of individual i from year $t-k$ to $t+k$, and year t is the year of inheritance and $k=1$. In Column 1, the dependent variable is the *observed change* in the fraction of liquid assets allocated to stocks from year $t-1$ to year $t+1$. In columns 2 and 3, the dependent variable is the change in the *passive* and the *active* component of the observed change in the risky asset share. The passive component of the observed change in risky asset share is the counterfactual change in risky asset share due to changes in stock prices from year $t-1$ to t , while keeping the stockholding constant at the year $t-1$ allocation. The active component is the observed change in risky asset share less the change due to the passive component. $X_{i,t}$ is a vector of control variables, and $E_{i,b}$ is a vector of personal experiences. *First-hand experience* is an indicator for personal experiences due to the loss of investments in a defaulted bank gained before the start of our inheritance window (i.e., $b < t-a$). *Second-hand experience* is an indicator for first-hand experiences in the immediate family (parent, sibling, child, or spouse) before end of our inheritance window ($b < t+1$). *Third-hand experience* is an indicator for individuals who are living in a municipality with a default bank before the end of our inheritance window ($b < t+1$). Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, Column 1 also includes the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are in parentheses. ***, **, * indicate coefficients that are significant at the 1%, 5%, and 10% levels, respectively, using standard errors clustered at the level of municipality-year.

Dependent variable	Observed change (1)	Passive change (2)	Active change (3)
First-hand experience	-0.060*** (0.013)	0.036 (0.023)	-0.066*** (0.019)
Second-hand experience	-0.014*** (0.001)	-0.031*** (0.008)	0.013*** (0.006)
Third-hand experience	-0.001 (0.001)	0.005 (0.006)	-0.001 (0.006)
Control variables	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes
Pseudo R ²	0.159	0.103	0.139
N	52,331	52,331	52,331

Appendix C: Source and incidence of second-hand experiences

This figure reports the source and incidence of second-hand experiences among all beneficiaries who inherit stocks. The left side of the top panel presents the distribution of second-hand experiences by source. The right side of the top panel shows the distribution of the number of second-hand experiences.



Appendix D: Alternative second-hand experiences definitions

The dependent variable is an indicator for whether the beneficiary keeps inherited stocks. In columns 1 and 3, we separate out the family relations that make up our definition of second-hand experiences. We include variables that indicate whether a *Spouse*, *Parent*, *Child*, *Sibling*, or *In-law* of the beneficiary had a first-hand experience with a defaulting bank. In columns 2 and 4, we consider the effect at the household level; we define *Household experience* as a first-hand experience had by either the beneficiary or his or her spouse. We therefore redefine *Second-hand experience* to exclude the experiences of the spouse in this estimation. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see tables 1 and 6 for further description). *Number of second-hand experiences* is a count of the number of second-hand experiences in the close family. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, Column 1 also include the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Specification	Source of second-hand experience	Number of second-hand experiences
	(1)	(2)
First-hand experience	-0.061*** (0.013)	-0.043*** (0.014)
Spouse experience	-0.017 (0.014)	
Parent experience	-0.001 (0.006)	
Child experience	-0.009 (0.017)	
Sibling experience	-0.052*** (0.014)	
In-law experience	0.028** (0.010)	
Third-hand experience	0.001 (0.005)	0.001 (0.003)
Number of second-hand experiences		-0.010*** (0.004)
Household experience		
Second-hand experience		
Control variables	Yes	Yes
Year effects	Yes	Yes
Pseudo R ²	0.161	0.160
N	48,104	48,104

Appendix E: The effect of personal experiences and the value of inherited stocks

This table presents results for the alternative specification where we include interactions between personal experiences and the market value of inherited stocks. In Column 1, we include the market value of inherited stocks (in million DKK), and column 2 includes interaction effects between personal experiences and the market value of inherited stocks. Columns 3 and 4 present results for the subsample of beneficiaries holding at least two stocks. *Market value of inherited stocks* is the market value of the inherited stocks in millions year-2010 DKK. *Stock market participant* is an indicator for beneficiaries who hold stocks. *Invested in own bank* is an indicator for beneficiaries who invested in their own bank. *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 (parents, siblings, children, or spouses). *Third-hand experience* is an indicator for beneficiaries who are living in a municipality with a bank default. *Future personal experience* is an indicator for beneficiaries who encounter a first-hand experience in a subsequent period. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, Column 1 also includes the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Sample	All		At least 2 stocks	
	(1)	(2)	(3)	(4)
First-hand experience	-0.061*** (0.013)	-0.069*** (0.015)	-0.098*** (0.032)	-0.131*** (0.037)
Second-hand experience	-0.015** (0.007)	-0.011 (0.007)	-0.017 (0.023)	0.009 (0.025)
Third-hand experience	0.002 (0.005)	0.001 (0.005)	-0.031** (0.013)	-0.030** (0.013)
First-hand experience*		0.043 (0.041)		0.115 (0.071)
Value of inherited stock				
Second-hand experience*		-0.020*** (0.007)		-0.078*** (0.029)
Value of inherited stock				
Third-hand experience*		0.000 (0.001)		-0.000 (0.000)
Value of inherited stock				
Control variables	Yes	Yes	Yes	Yes
Year effects	Yes	Yes	Yes	Yes
Pseudo R ²	0.161	0.161	0.295	0.296
N	48,104	48,104	5,666	5,666

Appendix F: Personal experience and risk taking using inheritance due to sudden deaths

This table reports a matched sample estimate test of the effect of personal experiences on risk taking. The dependent variable is the change in the fraction of liquid wealth allocated to stocks in a window from year -1 to +1 around the year of inheritance. The treatment group consists of investors with first-hand experiences or future first-hand experiences due to one of the three bank defaults in 2011, while the control group is a matched sample of beneficiaries without first- or second-hand experiences. In Column 1, the matched control group consists of stock market participants, while the control group in Column 2 includes investors in banks with third-hand experiences (individuals who are living in a municipality with a bank default). In Column 3, the control groups consist of individuals who hold stocks and are from the same vigintile of the pre-inheritance wealth distribution. In Column 4, the control group consists of individuals who hold stocks and are from the same vigintile of the post-inheritance wealth distribution. Among the matches in columns 3 and 4, we use the five closest neighbors based on the value of inherited stocks. *First-hand experience* is an indicator for individuals who experienced the default of their own banks before inheritance. Control variables include: *market value of inherited stocks*, *stock market participation*, *invested in mutual funds*, *invested in own bank*, *log. of income*, *age*, *gender*, *education*, *married*, and *children in household* (see Table 1 for further description). To control for inertia, Column 1 also includes the counterfactual change in the level of risk taking if individuals are fully inert (see Equation 4). Standard errors are in parentheses. ***, **, * indicate coefficients that are significant at the 1%, 5%, and 10% levels, respectively, using standard errors clustered at the level of municipality-year.

Dependent variable Control group	Observed change			
	Stock market participants	Invested in own bank & third-hand experience	Pre-inheritance wealth & inherited wealth	Post-inheritance wealth
	(1)	(2)	(3)	(4)
First-hand experience	-0.068*** (0.015)	-0.039* (0.022)	-0.068** (0.028)	-0.046* (0.027)
Control variables	Yes	Yes	Yes	Yes
Year fixed-effects	Yes	Yes	Yes	Yes
Pseudo R ²	0.238	0.363	0.344	0.352
N	1,344	279	384	384