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RISK PREFERENCE DYNAMICS AROUND LIFE EVENTS

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Risk preference dynamics around life events*

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Abstract

Using a panel of Australians I estimate the dynamic relationship between common life events and risk preferences. Changes in financial circumstances, parenthood and family loss predict changes in risk preferences. Importantly the effects are largest closer to the event date and disappear over time. This supports a model of preference formation where risk preferences are (trend) stable but fluctuations are at least partly deterministic. The linkages between life events and risk preferences are explored. There is little evidence that changes in consumption, state dependence, or changes in mental health and mood explain the results. However, emotional stability is an influential moderator suggesting that emotions play an important role.

Keywords: risk preferences, life events, dynamics, fixed effects ordered logit

JEL: D01; D81; D91

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1 Introduction

Risk preferences are a key determinant of economic behavior. Traditionally, economists have treated these preferences as stable across time and state-space (Stigler & Becker, 1977). However, there is considerable controversy around this assumption. Studies suggest that the genetic component in risk preferences is relatively low – between 15-35% (Cesarini et al., 2009; Le et al., 2010; Benjamin et al., 2012). Considerable within-variation in risk preferences is frequently found in datasets that track individuals across time (Chuang & Schechter, 2015; Mata et al., 2018). Some researchers have suggested that underlying preferences are relatively stable and that variation over the life course is largely noise (e.g. Sahm, 2012; Salamanca, 2016). On the other hand, evidence of a deterministic component comes from research that links shifts in risk preferences to significant natural events such as hurricanes, floods, earthquakes and tsunamis (Eckel et al., 2009; Page et al., 2014; Cameron & Shah, 2015; Said et al., 2015; Cassar et al., 2017; Hanaoka et al., 2018) as well as more frequent life experiences such as health shocks (Decker & Schmidt, 2016), exposure to violent crime and conflict (Voors et al., 2012; Brown et al., 2017), parenthood (Görlitz & Tamm, 2015; Browne et al., 2016) and changes in financial circumstances (Anderson et al., 2008). People also appear to become more risk averse as they get older (e.g. Schurer, 2015; Mata et al., 2016; Dohmen et al., 2017).

In addition to understanding whether risk preferences change over time, it is also important to understand *why* they change. In the expected utility paradigm, changes in risk preferences over time can be explained by fluctuations in consumption if the curvature of the utility function depends on consumption. On the other hand, risk preferences might change due to state-dependence if the parameters of the utility function themselves depend on current circumstances (Anderson et al., 2008). It is also possible that variation in risk preferences is explained by human traits not easily incorporated in expected utility theory, such as mental health and emotions. These explanations, which are not mutually exclusive, imply fundamentally different things about the nature of the decision function.

The goal of this paper is to explore the role of common personal life events in explaining short-run dynamics in risk preferences and to explore mechanisms behind any changes in preferences. Specifically, I focus on changes in financial circumstances, injury or illness, parenthood, family loss and crime victimisation. These events are particularly important since most people will experience one or more throughout their lifetime.

There are two main contributions of this research. The first is to focus on dynamics in risk preferences around life events and study both anticipation and adaptation effects.¹ If the mechanisms that link life events to risk preferences, for example consumption shocks or emotional states, are only temporarily affected, then we should expect the same pattern in risk preferences. This would be consistent with risk preferences being a stationary time series process in which individuals have a (trend) stable underlying preference that is quickly mean reverting (e.g. Schildberg-Hörisch, 2018). Failure to account for this structure could hide important relationships between life events and preferences. Understanding these relationships can inform more sophisticated models of choice under risk, such as portfolio and insurance decisions, which take into account fluctuations in preferences that can be predicted from common life-cycle experiences. It also matters for modelling macroeconomic trends. For example, economic recovery from financial shocks will depend on risk preferences and the speed of recovery is likely to depend on whether, and how quickly, preference adapt to adverse shocks. This research also matters for quantifying second order effects from policies or demographic changes that affect the frequencies of life events. If preferences respond to parenthood for example, declining fertility rates could change the average level of risk tolerance in the wider economy.

The second major contribution is to test for mechanisms linking life events to changes in risk preferences. There is little understanding about the channels between life events and risk preferences, yet this information is critical if we are to predict when life events will matter,

¹Decker and Schmidt (2016) do not test for anticipation effects but do estimate the effect of health shocks on risk preferences up to four years after the event. Görlitz and Tamm (2015) test for anticipation and adaptation effects but only consider parenthood.

who are most vulnerable and whether and how the effect of life events can be managed. I test for changes in consumption, changes in the marginal utility of consumption and changes in emotions as potential channels.

I also make other important advances. By utilizing several years of panel data, I am able to control for unobserved time invariant heterogeneity. Most of the literature on risk preferences and life events to date has used cross sectional data or has not exploited within temporal variation. I am also able to estimate the effect of multiple life events in a single econometric model. This is important since certain shocks, such as adverse health shocks and changes in finances, are likely to be correlated. It is also valuable to derive estimates within a unified dataset – to date results on different types of life events typically relate to different samples, contexts and methodologies, making them difficult to compare.

The existing empirical literature on the stability of risk preferences around life events is characterized by considerable heterogeneity in terms of preference measures, definitions of life events, study populations and statistical methodologies. Unsurprisingly, there is also heterogeneity in the findings from these studies. In Table A1 I summarize studies in which some measure of risk preferences is the outcome variable and one or more of the life events considered in this paper is a control. One important finding from this review is that very few studies deal with either the endogeneity of life events or the dynamic relationship between life events and risk preferences; both are addressed in this paper.

With few exceptions (Anderson et al., 2008; Paravisini et al., 2018), studies have used either stated preferences or responses to hypothetical scenarios. This is unsurprising since there is generally no or limited time series data for laboratory or field experiment samples and these samples are typically constrained by limited observations. Importantly, Dohmen et al. (2011) have undertaken an extensive validation of stated preference measures against behavioral benchmarks. I follow the existing literature in using stated risk preferences. My main instrument is a question about willingness to take financial risks. I test its validity by demonstrating i) that it correlates with personal characteristics in expected ways and ii) it

strongly predicts actual risk-taking behaviors.

To estimate the effect of life events on risk preferences I use data from a large Australian household panel survey. These data are particularly advantageous as I can estimate effects in quarters since the event, allowing me to explore the possibility of very short-run adaptation. After sample restrictions I am able to track the life events of almost 5,000 individuals between 2004–2016. I find that risk preferences do respond to certain life events. Improvements in finances are found to increase risk willingness while worsening finances, parenthood and the death of a spouse or child are associated with increased risk aversion. On the other hand, health shocks and property crime do not affect preferences. Importantly, the impact of any life event tends to be more pronounced closer to the event date and disappears over time. This is consistent with a model of preference formation in which preferences are mean reverting but fluctuations over time are at least partly deterministic. The results have important implications for understanding how preferences evolve over the life course, when preferences are likely to change, the malleability of preferences in adulthood and the external validity of preferences elicited in different contexts.

In exploring the pathways between life events and risk preferences, I find only weak evidence that changes in consumption (i.e. a direct relationship between consumption and risk preferences, such as with decreasing absolute risk aversion (DARA) utility) explains the results. There is also little evidence that state-dependence – as reflected by changes in the marginal utility of consumption – or changes in mental health or mood are important. Instead, the influence of life events on risk preferences is found to be moderated by emotional stability, implying a key role for emotional regulation.

The paper is organized as follows. In Section 2 I discuss the theoretical linkages between life events and risk preferences. In Section 3 I review the related empirical literature. In Section 4 I discuss the data. In Section 5 I discuss the estimation strategy. In Section 6 I present the main results. Section 7 concludes.

2 Conceptual framework

To begin I present a simple conceptual framework for thinking about the relationship between life events and risk preferences. In order to embed common utility functions, such as constant absolute risk aversion (CARA) and DARA, I consider an agent with a more general hyperbolic absolute risk aversion (HARA) utility function. Using the notation of Merton (1971), the agent derives utility U from consumption C according to

$$U(C) = \frac{1-\gamma}{\gamma} \left(\frac{\beta C}{1-\gamma} + \eta \right)^\gamma \quad (1)$$

subject to the restrictions that $\gamma \neq 1$, $\beta > 0$, $\frac{\beta C}{1-\gamma} + \eta > 0$ and $\eta = 1$ if $\gamma = -\infty$. The coefficient of absolute risk aversion $A(C) = -U''(C)/U'(C)$ is a function of consumption and the parameters of the HARA utility function γ , β and η .

$$A(C) = \frac{1}{\frac{C}{1-\gamma} + \frac{\eta}{\beta}} \quad (2)$$

It is straightforward to show that $A(C)$ is decreasing for the range $-\infty < \gamma < 1$ (DARA utility function) and approaches a constant as γ approaches $+\infty$ (CARA utility function). The case of increasing absolute risk aversion is also possible if $1 < \gamma < +\infty$; however this is an uncommon specification in practice.

In equation (1) the parameters of the utility function, other than C , are treated as exogenous and stable across time and context. As an extension to the basic specification, consider the case where γ depends on the current state of the world $\theta \in \Theta$ so that $\gamma = \gamma(\theta)$. Different states of the world could include for example a good health state, a poor health state, a state in which the person is stressed, sad or fearful and so on. Importantly, states may be temporary and the relationship between θ and γ may be time dependent. This gives rise to the possibility that risk preferences depend not only on experiencing various states of the world, but are also a function of how long ago this occurred.

Applying this framework to the current project, it is clear that life events can influence

risk preferences through two broad channels. First, life events may affect risk preferences through their effect on consumption. Most of the life events considered in this study could reasonably be expected to decrease consumption, which may increase risk aversion if people have DARA preferences ($A'(C) < 0$) or leave risk aversion unaffected if they have CARA preferences ($A'(C) = 0$). It is also worth noting that according to prospect theory (Kahneman & Tversky, 1979) people are more willing to take risks after a loss, giving rise to the possibility that risk aversion decreases after an adverse wealth shock. Over time they may habituate the loss, resetting their reference point and returning to their initial level risk-taking behavior.

The second channel is state dependence in which the parameters of the utility function (e.g. γ) depend on the current state of the world θ . One possibility is that certain events lower the experienced utility of consumption (i.e. increase γ). For example, Finkelstein et al. (2013) provide evidence that marginal utility of consumption decreases in worse health states. Life events might also place individuals in different emotional states. Worsening finances, worsening health and being the victim of property crime, are likely to elevate fear, which has been shown to increase risk aversion (Lerner & Keltner, 2001; Cohn et al., 2015; Guiso et al., 2017). Stress is also likely to be elevated by negative life events and has been linked to changes in risk preferences, although the evidence is mixed, with some studies finding that stress increases risk aversion (Porcelli & Delgado, 2009; Kandasamy et al., 2014; Cahlíková & Cingl, 2017), while others find it increases risk willingness (Starcke et al., 2008; Putman et al., 2010; Pabst, Brand, & Wolf, 2013; Pabst, Schoofs, et al., 2013) or has no significant effect (Delany et al., 2014; Sokol-Hessner et al., 2016). Sadness has also been linked to both increased risk aversion (Campos-Vasquez & Cuijly, 2014) as well as increased risk willingness (Raghunathan & Pham, 1999). Raghunathan and Pham (1999) suggest that sadness may increase risk taking as people seek reward replacement. Mental health may also be affected by life events and adverse states have been associated with more conservative investment behavior (Bogan & Fertig, 2013; Lindeboom & Melnychuk, 2015). A different line of argument comes from evolutionary adaptation. For example, from an evolutionary

perspective there is cause for new parents to become more risk averse, since actions risking survival are more costly when death leaves children vulnerable (Wang et al., 2009).

While the theoretical framework motivates studying the relationship between risk preferences and life events, it is unable to provide strong predictions for the direction of such relationships. Nevertheless, it does provide important modelling insights. To the extent that life events constitute only temporary deviations in the state of the world or consumption, this may in turn give rise to only temporary fluctuations in risk preferences. In some cases life events may only exert a short-term influence, such as monetary windfall gains and losses or transient health shocks. Even for events that are long-lasting or permanent, such as parenthood, the effect on risk preferences may be more pronounced closer to the event date if the underlying mechanisms, for example changes in mood, mental health or biological triggers, are themselves only temporarily affected. It may also be important to allow for anticipation effects, particularly for events that are largely foreseeable like parenthood and bereavement, since emotional and biological reactions may occur before the event date. This suggests modelling dynamics around life events.

3 Previous empirical literature

Studies tend to find that changes in wealth and income are either uncorrelated with risk preferences (e.g. Sahm, 2012; Dohmen et al., 2016) or that favorable financial shocks increase willingness to take risks (Anderson et al., 2008; Paravisini et al., 2018). Indicators of financial circumstances vary considerably across this literature with studies focusing on general income and wealth (Sahm, 2012; Dohmen et al., 2016), housing wealth shocks (Paravisini et al., 2018) and self-assessed circumstances (Anderson et al., 2008). In contrast to most studies looking at other life events, those looking at finances have typically used panel data to at least partially control for innate preferences, although only one study (Paravisini et al., 2018) explicitly controls for individual fixed effects . There has also been a wide range of

preference measures including stated preferences (Dohmen et al., 2016), behaviorally elicited preferences (Anderson et al., 2008), preferences from revealed choice (Paravisini et al., 2018) and preferences from hypothetical choices (Sahm, 2012).

Although several studies estimate the effect of various health shocks on risk preferences (Sahm, 2012; Chuang & Schechter, 2015; Gloede et al., 2015; Decker & Schmidt, 2016; Dohmen et al., 2016), only Decker and Schmidt (2016) find a consistent statistically significant relationship between health shocks and risk preferences, with deteriorating grip strength associated with increased risk aversion. Although all these studies use panel data, none explicitly control for individual fixed effects. Only a few studies have looked at parenthood; however, the evidence there is more consistent. Wang et al. (2009), Görlitz and Tamm (2015) and Browne et al. (2016) all find a positive association between parenthood and risk aversion. Görlitz and Tamm (2015) is closest to the current study, since they explore dynamics around the birth, finding that the impact of parenthood fades over time. The measure of crime used in this paper is being the victim of property crime. The focus on property crime is important since this form of crime is relatively frequent, and while less severe than other forms of crime, could potentially influence the risk preferences of a large proportion of the population. I am not aware of any study in a developed country context that focuses on a similar measure of crime.² There is also little evidence around bereavement. Two studies find no statistically significant relationship for the death of a spouse (Browne et al., 2016; Salamanca, 2016) although neither allows for the possibility of dynamics in the response function.

²Chuang and Schechter (2015) regress risk aversion on the change in the value of items stolen for a sample of rural Paraguayans and find a positive correlation between theft and risk willingness in one period but no statistically significant effect in a subsequent period.

4 Data

4.1 Overview

The data for this study are from the Household Income and Labour Dynamics in Australia (HILDA) Survey, a large panel dataset that commenced in 2001 with a random population sample of 7,682 households (13,969 individuals aged 15 years and older completed the survey in wave 1). Participants have been tracked every year since. At the time of writing there are 16 waves (2001-2016) of data available.

The main risk preference question used in this study was asked in 2006, 2008 and then every year from 2010.³ To avoid measurement error in the entire vector of life event-year combinations, it is helpful to restrict the sample to a balanced panel of individuals. The sample used to construct covariates comprises a balanced panel of individuals responding in every year between 2004-2016⁴. The sample is also restricted to those 18 years or older in 2004.

The resulting estimation sample consists of 4,810 individuals and $T = 8$ years in which risk preferences are observed (2006, 2008 and 2010-2015). Note that 2016 is not included in the estimation sample so that anticipation effects can be estimated for up to one year. To better understand the population under study, descriptive statistics for 2006 and 2014 are presented for key demographic variables in Table 1 (information on wealth is available in these years). In 2006, the mean age is 47.5 years and real household disposable income is AU\$80,856 per year (2011 dollars). 46% of the sample are male. The sample means for most time varying variables are relatively stable between 2006 and 2014. The main changes are in income and employment, with mean income increasing by just over AU\$9,000 on average,

³The question was asked in some earlier waves but has only partial coverage because people could opt-out of answering if they indicated they did not have discretionary income for investing.

⁴Note that this means that in year 1 of the estimation (2006) I can control for if a life event occurred 2-3 years ago but do not control for life events that occurred earlier than this. Since the results generally indicate substantial adaptation to life events by this point, this is a reasonable trade-off point between comprehensively controlling for the life event history and reducing the sample size by moving the base period further back. To the extent that life events that occurred prior to this window resulted in a permanent shift in risk preferences, this will be captured by individual fixed effects.

employment decreasing from 69% to 61% and retirement increasing from 19% to 31%. There is considerable representation of different groups in terms of education level, migrant status, employment, geographic location and couple status.

Table 1: Descriptive statistics

Variable	Description	Mean	
		2006	2014
Age	Age in years	47.50 (14.08)	55.50 (14.08)
Male	=1 if male	0.459	0.459
Disposable income	Household disposable income (AU\$ 2011)	\$80,856 (56,893)	\$89,899 (69,330)
Overseas	=1 if born overseas	0.216	0.216
University	=1 if highest academic achievement degree	0.269	0.290
Diploma	=1 if highest academic achievement diploma	0.110	0.119
Mother secondary	=1 if mother completed secondary education	0.295	0.295
Father secondary	=1 if father completed secondary education	0.496	0.496
Student	=1 if currently full-time student	0.024	0.008
Rec. dividends	=1 if receives income from dividends	0.327	0.289
Total assets	Total value of household assets (AU\$ 2011)	\$1,055,036 (1,533,988)	\$1,181,185 (1,400,369)
Home owner	=1 if home owner	0.778	0.817
Own property	=1 if own property in addition to home	0.219	0.236
Equity ratio	Ratio of equities to total assets	0.045	0.033
Self-employed	=1 if self-employed	0.078	0.066
Region	=1 if lives outside major city	0.124	0.124
Employed	=1 if employed	0.689	0.606
Unemployed	=1 if unemployed	0.018	0.014
Retired	=1 if retired	0.193	0.312
Couple	=1 if coupled (married or defacto)	0.747	0.746

Note: There are 4,810 individuals in each year. Values for household income and assets include imputed values for missing information, which are supplied with the HILDA survey data. Household disposable income is a derived variable based on gross income net of the expected tax liability, which takes into account personal and family circumstances. Further details are in the HILDA User Manual (Summerfield et al., 2017). Standard deviations for continuous variables are in parentheses.

4.2 Outcome variables

The main outcome variable in this paper is a measure of self-assessed risk preferences in the financial domain. This question is based on a regular survey item contained in the U.S.

Survey of Consumer Finance and has been used in previous studies to estimate the effect of the Great Depression and the Global Financial Crisis on investor risk preferences (Malmédier & Nagel, 2011; Guiso et al., 2017). Participants are asked the following question.

Which of the following statements comes closest to describing the amount of financial risk that you are willing to take with your spare cash? That is, cash used for savings or investment.

Participants can choose from the following responses (emphasis not added).

1. I take substantial financial risks expecting to earn substantial returns
2. I take above-average financial risks expecting to earn above-average returns
3. I take average financial risks expecting to earn average returns
4. I am not willing to take any financial risks
5. I never have any spare cash

In the waves used in this study, people who choose option 5 are given the following follow-up question.

Assume you had some spare cash that could be used for savings or investment. Which of the following statements comes closest to describing the amount of financial risk that you would be willing to take with this money?

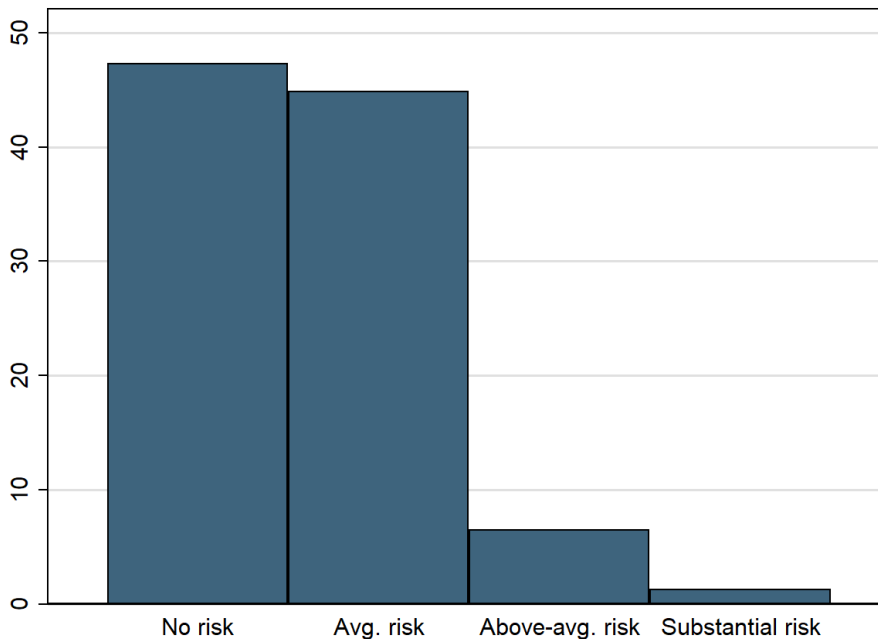
They are then asked to choose from 1-4 above.

I pool responses from people who answer in respect of hypothetical money (i.e. those choosing option 5 above) and those who answer in respect of real money. 12.5% of the risk preference values in my data are elicited with respect to hypothetical money.⁵

⁵In Appendix D (Table D1) I present the main results with observations relating to hypothetical responses dropped from the estimation sample and in Table D2 with a dummy controlling for if the response is hypothetical. The results are not sensitive to these modelling choices. The distribution of the risk preference variable by whether they answered hypothetically is shown in Figure D1.

The distribution of pooled responses to the risk elicitation question are presented in Figure 1.⁶ Most people seem to be risk averse in the sense that they are either not willing to take any financial risks or are only willing to take average risks. Around 8% of people are willing to take above-average or substantial risks. Note that throughout the paper I reverse the risk preference scale so that it increasing in willingness to take risks.

Figure 1: Distribution of risk preferences in financial domain



Note: Results are for the pooled sample of 4,810 individuals across eight years 2006, 2008 and 2010-2015 (38,480 observations).

The key question is whether the HILDA instrument is a valid measure of risk preferences. Dohmen et al. (2011) find that stated risk attitudes are highly correlated with incentivized monetary tasks typically used in experimental work, while Frey et al. (2017) find that they outperform behavioral measures in test-retest analysis and in capturing an underlying common factor across alternative measures. One attractive feature of the question in this study is that it speaks directly to risk taking behaviors. To more formally test the validity of the

⁶To assess the representativeness of risk preferences in the estimation sample to the general population, I compared the distribution in Figure 1 to the distribution after adjusting with population weights provided with the HILDA survey. The frequencies are very similar (47.3%, 44.8%, 6.5% and 1.3% unadjusted; 48.3%, 43.6%, 6.7% and 1.5% adjusted).

instrument, in Appendix B I estimate its correlation with known correlates of risk preferences and test whether it predicts risk taking behaviors (i.e. owning dividends, equity share of wealth, investment property, self-employment). In all cases, the evidence supports the instrument.

It is worth highlighting that the risk preference question is strongly framed in the financial domain. In other studies using attitudinal proxies for risk preferences, the elicitation question is often asked in the general domain e.g. how willing are you to take risks in general? Questions framed in specific domains have been shown to better predict behavior relevant to that domain (Weber et al., 2002; Dohmen et al., 2011). In the present context, this means that the risk preference question is likely to better predict financial risk taking than a more general instrument. Since financial decision making is pivotal to economic outcomes, this is a particularly interesting domain to focus on. Further, the instrument is easier to interpret than a more general question because it is clearer what type of risk taking behavior the respondent has in mind when answering the question.

Nevertheless, in order to align the outcome measure with other studies and assess the sensitivity of results to the domain, it would be interesting to compare results with a general measure of risk attitudes. In the HILDA survey, general preferences for risk were elicited in a single wave (2014) using a similar question to the German Socio-Economic Panel (SOEP). Participants were asked “Are you generally a person who is willing to take risks or are you unwilling to take risks?” and answered on a risk-willingness scale of 0-10. The distribution for this question is reported in Appendix B, along with results on its validity. Its polychoric correlation with the main risk preference instrument is 0.51 This measure is used in sensitivity analysis presented later.

4.3 Life event variables

The life event data in the HILDA survey is obtained through a regular question asking whether event l has occurred in the previous 12 months. An affirmative response therefore

indicates that the event occurred up to one year ago. A follow-up question asks whether the event occurred 0-3, 3-6, 6-9 or 9-12 months ago.⁷ This is helpful since it allows us to account for the possibility there are significant effects very close to the event date followed by rapid adaptation. Such effects may be missed if the time since the event is aggregated to a longer duration (e.g. one year). The trade-off is that aggregating may increase precision and is less prone to recall issues.

Using the data from 2004-2016, I construct indicators for whether an event will occur in the next twelve months, occurred 0-3, 3-6, 6-9 or 9-12 months ago, 1-2 years ago or 2-3+ years ago.⁸ The base group are those who have not experienced the life event and will not experience it within the next 12 months. Note that it is possible for the same individual to experience the same life event more than once over the data period. I do not restrict these experiences and effectively assume that individuals can be simultaneously affected by life events that occurred different lengths of time ago.⁹

Although the HILDA survey collects information on an extensive range of life events, for feasibility reasons I restrict attention to a subset of events that cover a range of interesting domains (i.e. finances, health, family dynamics and crime) and are likely to be experienced by most people during their lifetime. The frequencies for these life events are presented in Table 2. The most common life event is serious personal injury or illness (3,389 occurrences)

⁷In 4-19% of cases (depending on the life event), this follow-up question is not answered. Rather than dropping these respondents, I assume the event occurred 3-6 months ago when this is missing, since this means that misclassification will generally only be in the order of one quarter. Further, if life events exert a stronger influence closer to the event date, this will tend to bias estimates towards zero if misclassification is such that more of the missing values come from events that occurred 6-12 months ago, which is plausible given recall issues. In Appendix C (Table D3) I repeat the main estimation with people with missing life event quarters dropped; the results are consistent with the main results. I also present results controlling for 0-1 year since the event (rather than in quarters), which are less influenced by assumptions around the event date (Table D4).

⁸For each life event, I determine how long it has been since the event at each wave as precisely as possible by using the survey completion dates. In most cases, surveys are completed approximately one year after the previous survey (median 362 days; mean 361 days; s.d. 30 days).

⁹An alternative approach, that has the disadvantage of using less of the data, would be to assume that when a new event occurs there is immediate adaptation from the previous event by only including dummy variables relating to the most recent event (e.g. Frijters et al. (2011) in the context of life events and subjective wellbeing). I repeat the main estimation under this assumption and report the results in Appendix E (Table D5); the results are consistent with the main results.

while the least common event is death of a spouse or child (291 occurrences). While I include the death of a child in this indicator, there are only 26 such deaths for the sample between 2004-2016, so this life event predominately reflects the loss of a spouse.

Table 2: Frequencies for life events

Life event	When event occurred			
	-(0-1) year	0-1 year	1-2 years	2-3+ years
Major improvement finances	1289	1284	1191	6020
Major worsening finances	960	989	945	4384
Serious personal injury or illness	3501	3389	3016	11132
Birth first child	280	317	312	2841
Victim property crime	1074	1178	1095	6647
Death of spouse or child	311	291	245	1302

Note: Pooled sample size is 38,480 (4,810 individuals). Data are from the years 2006, 2008 and 2010-2015. The questions on life events are part of the self-completion questionnaire in the HILDA survey. Respondents are asked “Did any of these happen to you in the past 12 months”.

It is important to note that the indicators for changes in financial circumstances are subjective. There are several advantages to using subjective indicators. First, they are more likely to capture how people feel about their change in circumstances than objective measures, such as changes in income or wealth fluctuations. This is likely to be particularly important if the way people feel about their new circumstance determines whether it influences their risk preferences. Second, subjective assessments avoid the need to make arbitrary judgements about the definition of a life event. For example, how large does an income shock need to be to constitute a life event? Finally, subjective indicators can more holistically capture changes in circumstances. For example, measuring improvements/worsening finances with income data ignores the fact that financial circumstances could change through changes to cost of living, periodic or one-off expenses and so on.

One disadvantage of using subjective indicators is that it is not necessarily clear what the underlying driver is of the life event. Changes in self-assessed financial circumstances could be driven by changes in income, debt, expenses or the economic outlook. The improvement in finances variable has previously been analysed in Au and Johnston (2015), who argue

that it can be thought of as an exogenous increase in income of approximately AU\$50,000. This comes from the fact that bequests and lump sum transfers are highly correlated with this life event, which seems to be partly driven by the way the answer is prompted. In the HILDA questionnaire, participants answer whether they experienced a “major improvement in financial situation (e.g., won lottery, received an inheritance)”. There is also prompting in the case of worsening finances; participants answer whether they experienced a “major worsening in financial situation (e.g., went bankrupt)”.

To better understand these indicators for the current sample, I regress various controls for wealth shocks (e.g. income fluctuations, lump-sum transfers, housing wealth fluctuations, employment) and expense shocks (e.g. sickness/injury, crime, parenthood, bill stress) on the financial improvement/worsening life event indicators. For brevity, these results are presented and discussed in greater detail in Appendix C. The main findings are that: i) improvements in finances is largely predicted by transfers; and ii) worsening finances is strongly predicted by expense shocks. Consequently, these indicators should not be thought of as strictly reciprocal events. In Appendix C I also present results where the life event indicators for financial circumstances are replaced with indicators for whether household income improved/worsened by 30%, 50% or 70% on the previous year (Table C3). These results are consistent with the main results, although somewhat weaker for favorable financial shocks.

5 Empirical model

The basic estimation equation is given by equation (3). Risk preferences are represented by a linear index function for individual i in period t , with $\gamma_{it}^{\rho l}$ indicating that life event $l \in L$ occurred ρ years ago (negative values indicating that event l will occur in the future). x_{it} is a vector of time-varying covariates, α_i is an unobserved individual fixed effect, which is likely to be correlated with ε_{it} , a random error term discussed below.

$$y_{it}^* = \sum_l \sum_{\rho=-(1-0)}^{2-3+} \beta^{\rho l} \gamma_{it}^{\rho l} + x_{it}' \delta + \alpha_i + \epsilon_{it} \quad i = 1, \dots, N; t = 1, \dots, T \quad (3)$$

Because risk preferences are only measured on a discrete ordinal scale, I do not observe y_{it}^* but only y_{it} . For the main risk preference measure, y_{it} takes on four values with $y_{it} = 1$ corresponding to being unwilling to take any financial risks and $y_{it} = 4$ indicating the individual takes substantial risks. Formally

$$y_{it} = k \text{ if } \tau_{ik} < y_{it}^* \leq \tau_{ik+1} \quad k = 1, 2, 3, 4$$

where τ_{ik} are individual specific thresholds and k are the possible values of y_{it} . There are $K - 1 = 3$ kink points (thresholds above which y_{it} changes value).

Estimation of equation (3) will deliver consistent estimates of the dynamic impact of life events on risk preferences ($\beta^{\rho l}$) provided that the standard conditional expectation assumption holds. That is, conditional on time varying controls (x_{it}) and unobserved time invariant heterogeneity (α_i), the occurrence of life events is uncorrelated with unobserved time varying determinants of risk preferences in ϵ_{it} . Controlling for α_i is important since innate preferences are likely to influence the occurrence of various life events. It can also pick up individual differences in the way people interpret the risk preference scale, which could be influenced by heterogeneous beliefs about financial risks. Any age-trend or macroeconomic sentiment is captured by year dummies included in x_{it} .¹⁰

Given the discrete, ordinal nature of the dependent variable it is natural to consider models such as ordered logit and probit. However, dealing with individual fixed effects is problematic in these models due to the incidental parameters problem – maximum likelihood estimation of α_i is inconsistent when T is fixed since even as N goes to infinity, each α_i is identified by only T observations and is subject to small sample bias. Solutions available for

¹⁰ x_{it} also includes controls for the following: age²; education (separate indicators for if highest qualification is a university degree or a diploma); indicator for being a full-time student; indicator for living in a rural area; indicators for whether employed, unemployed or retired; and a couple (married or defacto) indicator.

the linear regression case generally do not result in consistent estimates of the parameters of interest. One alternative is to estimate models with random effects; however, this involves invoking strong additional distributional assumptions. Rather than invoking such assumptions I use the ‘blow up and cluster’ (BUC) fixed effects ordered logistic regression model discussed in Mukherjee et al. (2008) and Baetschmann et al. (2015).

The BUC estimator is based on the well known conditional maximum likelihood (CML) fixed effects logit model of Chamberlain (1980). Both models assume that ϵ_{it} are independent and identically distributed according to a logistic cumulative distribution function. The CML model dichotomizes the ordered outcome variable and estimates the probabilities for the given sequence of choices over T for each individual conditional on the sum of all choices, which is a sufficient statistic for α_i . Importantly, the conditional probabilities do not depend on α_i . Whereas the standard CML estimator only dichotomizes the ordered outcome variable once, the BUC estimator involves all possible dichotomizations and proceeds on the basis that the estimated parameter values are constant across all thresholds k of y_{it} . Like CML, BUC is consistent but is more efficient since it makes greater use of the available data. The BUC estimator is computationally straightforward, with similar efficiency compared to other consistent fixed effects ordered logit models, and has been found to be more robust than more complicated estimators in finite samples (Baetschmann et al., 2015).

An alternative to BUC is to treat the risk preference value as a continuous variable and estimate a standard linear fixed effects model. This has the advantage of not restricting the distribution of the error term but ignores the fact that y_{it} is discrete and is censored left and right. With only four categories, the bias from estimating a linear fixed effects model may be large and as such the BUC estimator is the preferred specification. In practice, results using linear fixed effects are qualitatively similar to BUC and marginal effects from this model are presented for comparison.

6 Results

6.1 Main regression

Odds ratios (ORs) from BUC estimates for equation (3) are reported in Table 3. The results correspond to a single estimated model controlling for all life events interacted with when they occurred.

Table 3: BUC estimation results

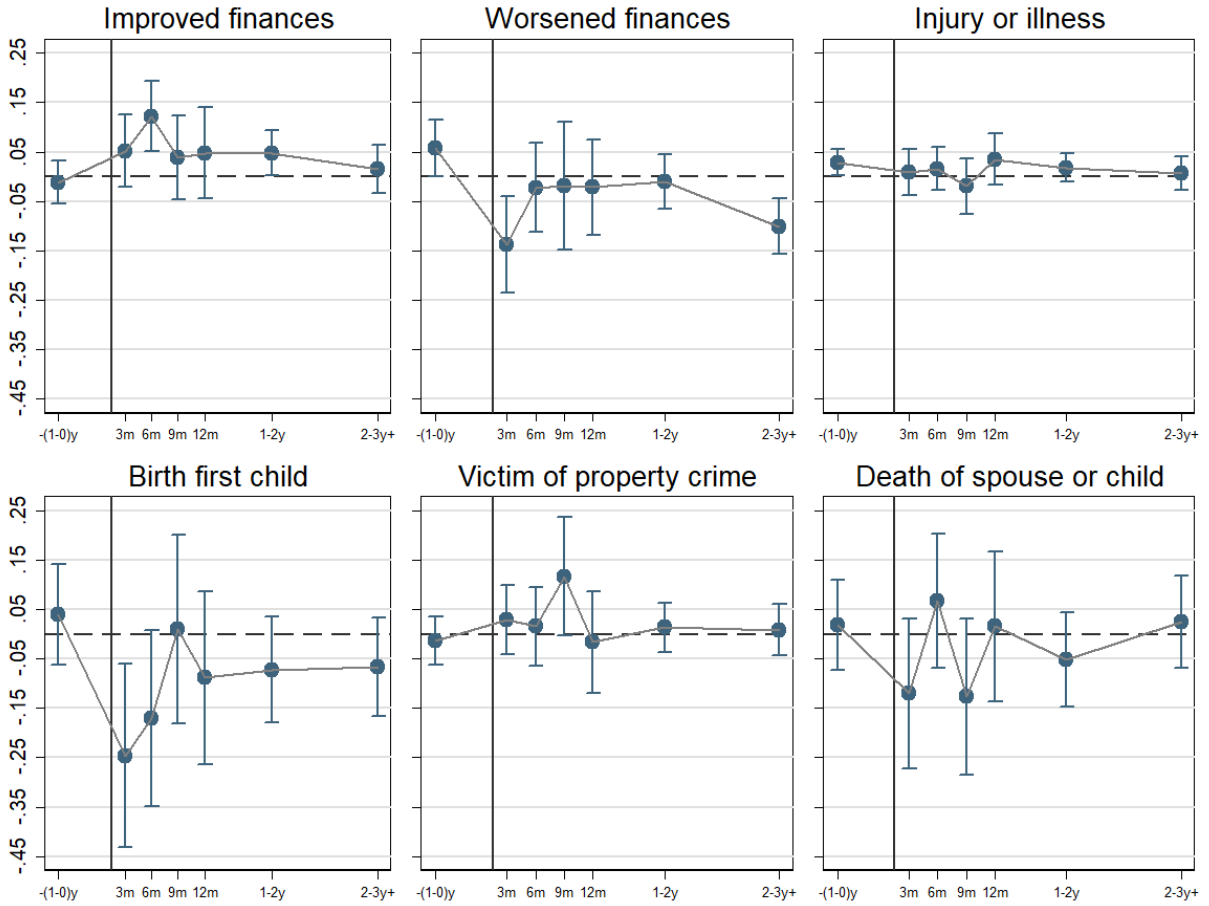
	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
0-1 year before	0.969 (0.084)	1.242** (0.127)	1.135** (0.066)	1.133 (0.206)	0.952 (0.091)	1.110 (0.230)
0-3 months after	1.238 (0.172)	0.594*** (0.118)	1.034 (0.107)	0.388** (0.146)	1.113 (0.149)	0.578 (0.217)
3-6 months after	1.563*** (0.204)	0.902 (0.148)	1.083 (0.106)	0.535* (0.183)	1.044 (0.158)	1.320 (0.456)
6-9 months after	1.221 (0.222)	0.926 (0.239)	0.926 (0.121)	1.008 (0.362)	1.501* (0.312)	0.501 (0.222)
9-12 months after	1.254 (0.251)	0.909 (0.164)	1.159 (0.129)	0.695 (0.241)	0.929 (0.196)	0.938 (0.365)
1-2 years after	1.234** (0.116)	0.969 (0.098)	1.096 (0.069)	0.755 (0.155)	1.047 (0.101)	0.777 (0.178)
2-3+ years after	1.098 (0.110)	0.703*** (0.075)	1.032 (0.077)	0.759 (0.142)	1.033 (0.106)	1.059 (0.226)

Note: N= 31,736. T= 2006, 2008, 2010-2015. The estimation sample size is less than $N(4,180) \times T(8) \times K(3)$ because observations where outcomes do not vary over the period drop out of the likelihood function. Exponentiated coefficients (odds ratios) from a single estimation of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. The estimation controls for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple as well as a full set of year dummies. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

To better convey the dynamics in risk preferences, marginal effects from a linear fixed effects regression are presented as a series of two-way graphics in Figure 2, with the horizontal axis representing time until/since the event and the vertical axis representing the marginal

effect on the risk preference value.¹¹

Figure 2: Marginal effects: OLS fixed effects regression



Note: N= 38,480 (4,810 individuals). T=2006, 2008, 2010-2015. The estimates are marginal effects (with 95% confidence intervals) from an OLS fixed effects regression on risk preferences (standardized) in the financial domain [1-4 scale].

The results indicate that common life events are related to changes in risk preferences. Those who experience a major improvement in finances in the previous 3-6 months are 1.6 times more likely to be in a higher risk preference category. This effect diminishes over time – after 1-2 years the OR is 1.2 and by 2-3+ years it is 1.1 and no longer statistically significant. This is consistent with the model of adaptation discussed in Section 2. Surprisingly, a major

¹¹Note that marginal effects for the BUC estimator depend on α_i , which is cancelled out in the conditional probabilities. These can therefore only be obtained by arbitrarily setting α_i . Linear regression results are qualitatively similar to BUC with quantitatively similar ratios between coefficient estimates. Consequently, this is the preferred estimator for obtaining marginal effects.

worsening in finances is associated with greater willingness to take risk in the year preceding the event. One possible explanation is that people who experience a worsening in finances include those who in $t = -1$ become more risk loving and then in $t = 0$ experience a significant loss from this behavior. This loss is associated with an increase in risk aversion – the OR decreases from 1.2 to 0.6 0-3 months after the event. As with favorable financial shocks, risk preferences quickly rebound. However, there is also evidence of a persistent negative effect when looking at the estimate for 2-3+ years. Overall, adverse financial shocks are associated with lower willingness to take risks, implying symmetry in the effects between favorable and unfavorable changes in finances. The more volatile dynamics for worsening finances could indicate that those who experience financial losses are inherently less stable in their preferences.

There is little evidence that an adverse health shock affects risk preferences. Interestingly, risk willingness is statistically significantly higher in the year before the health shock, although the effect is economically modest (OR=1.1). In Appendix D I consider alternative definitions of health shocks and find no evidence they shift risk preferences.¹² Being the victim of property crime also does not appear to influence preferences, with only the estimate for 6-9 months marginally significant. Death of a child or spouse is associated with a large increase in risk aversion immediately after the event (OR = 0.6) as well as after 6-9 months (OR=0.5) but neither estimate is statistically significant. Surprisingly, there is a temporary recovery 3-6 months after the event, which may just reflect noise in the data (noting that these are low frequency events). In Appendix D (Table D7) I present results with gender interactions. Overall, there is little evidence of gender differences; however, there is evidence

¹²The first alternative I consider is whether the person reports difficulty gripping things in the current year but did not report any difficulty in the previous year. This is based on Decker and Schmitz (2016), who use large changes in measured grip strength as a proxy for health shocks, arguing that grip strength is a strong indicator of overall health. Next I use self-assessed perceptions of own health today compared to one year ago. I treat the response ‘much worse now than one year ago’ as an adverse health shock and ‘much better now than one year ago’ as a favorable shock. Considering both favorable and unfavorable health shocks is unusual in this literature so is interesting in and of itself. None of the estimated coefficients are economically large or statistically significant (see Table D6).

that men become more risk averse in anticipation of a death and in the year after the death.¹³

New parents are 0.4 times as likely to be in a higher risk category immediately after the birth. As with other events, there is evidence of an adaptation effect. People become less risk averse the less recently the birth occurred – following the point estimates, the OR generally becomes closer to one as time since the birth increases.

Instead of focusing on individual events, it is worthwhile testing jointly whether the average effect sizes across all events are larger closer to the event date. This can help to overcome limited temporal variation in some life events and provide a more general test of the adaptation hypothesis. Indeed, the average absolute effect size from the BUC estimates across the six life events 0-3 months after the event date is statistically significantly larger than the estimates for 2-3+ years ($p=0.025$). This is also true when comparing 0-6 months to 2-3+ years ($p=0.020$) and the difference is marginally significant when comparing 0-12 months to 2-3+ years ($p=0.086$).

An important question is whether the effect sizes in Table 3 and Figure 2 are economically meaningful. This is difficult to gauge from the ORs and marginal effects alone. If life events only affect risk taking behavior through risk preferences, it would in principle be possible to use these events as instrumental variables. However, it is possible that life events also influence risk taking independently of risk preferences. The results in Table B2 – looking at the correlation between risk preferences and certain risk taking behaviors conditional on various personal characteristics – provide some suggestive evidence about the magnitude of the estimates. For example, based on Tobit regression on the share of equities to total assets, being in a higher risk taking class increases the probability of owning some equities by 13.3 percentage points (28.7%) and the proportion of equities held conditional on having some equities by 1.9 percentage points (23.3%).¹⁴ While this implies potentially large effects for

¹³Interacting by gender substantially reduces cell sizes, which may partially explain the lack of significant effects. The fact that death of a spouse or child is an exception may be related to the fact that older women are more likely to experience bereavement and this group tends to be risk averse; in the year before losing a spouse 65% of women are already in the lowest risk preference category compared to 48% for men.

¹⁴These results are based on unreported Tobit regressions on the raw risk preference value, rather than the standardized value as reported in Table B2.

some individuals, the aggregate effect sizes are likely to be relatively modest. For example, based on results in Figure 2, 3-6 months after an improvement in finances risk willingness is estimated to be 0.12 standard deviations higher. This implies an increase in the probability of owning equities of 1.1 percentage points (2.3%) and on the proportion of equities held conditional on having some equities of 0.15 percentage points (1.9%).

One final statistic worth discussing is the amount of variance in risk preferences explained by individual fixed effects. In the linear fixed effects regression, this estimate is 58.5%. While the coefficients on life events imply an important role for these experiences, there is clearly also a strong stable component to risk preferences in adulthood.

6.2 Mechanisms

The conceptual framework in Section 2 sets out two broad channels through which life events can influence risk preferences – consumption and changes in the current state of the world that affect the parameters of the utility function, potentially through channels such as emotions, mood, mental health, biological responses and so on. Such state dependence can be thought of equivocally as changes in the marginal utility of consumption under a single parameter utility function. In this Section I test whether changes in wealth, the marginal utility of consumption or mood and mental health are likely channels for the estimated relationships between life events and risk preferences.

Consumption. To test the effect of consumption I use a basic mediation approach in which controls for consumption are added to the baseline regression model and changes to the estimates of interest are analyzed. Note that the baseline model already controls for self-assessed changes in finances through the life event variables. However, this may not fully capture deviations in the consumption possibilities of individuals. The main control for consumption is total self-reported expenditure on goods and services.¹⁵ Since the con-

¹⁵Respondents are asked to recall their spending on a broad range of household goods and services over the past month, which are extrapolated to an annual figure. The expenditure categories are not exhaustive, for example there is limited time series information on luxury goods or one-off items like motor vehicles.

sumption data are non-exhaustive, I also use controls for household disposable income and indicators for self-assessed material wellbeing, which include the ability to raise a moderate sum of money and prosperity relative to personal circumstances.¹⁶ The resulting estimates are plotted in Figure 3.¹⁷

While household income is a significant predictor of risk preferences (see Table E1), it has almost no influence on the magnitude of the marginal effects. Only when controls for self-assessed material wellbeing are included is there a small attenuation in some of the estimates, which is mainly seen in the coefficients for improvements/worsening in finances. For example, the marginal effect for 3-6 months after an improvement in finances decreases by 16.3%; for 0-3 months after a worsening in finances the estimate increases by 15.6%. There are similar degrees of attenuation for other estimates. However, in all cases the significance of the marginal effects remains unchanged and confidence intervals include the baseline estimates. The fact that even conditional on consumption and financial wellbeing the estimates for improvements/worsening in finances remain significant suggest that these results are not simply driven by the direct relationship between C and risk preferences in equation (2).

Marginal utility of consumption. Next I turn to state dependence and more specifically changes in the marginal utility of consumption. People should be more (less) willing to take risks when their marginal utility of consumption is high (low).¹⁸ If this explains the

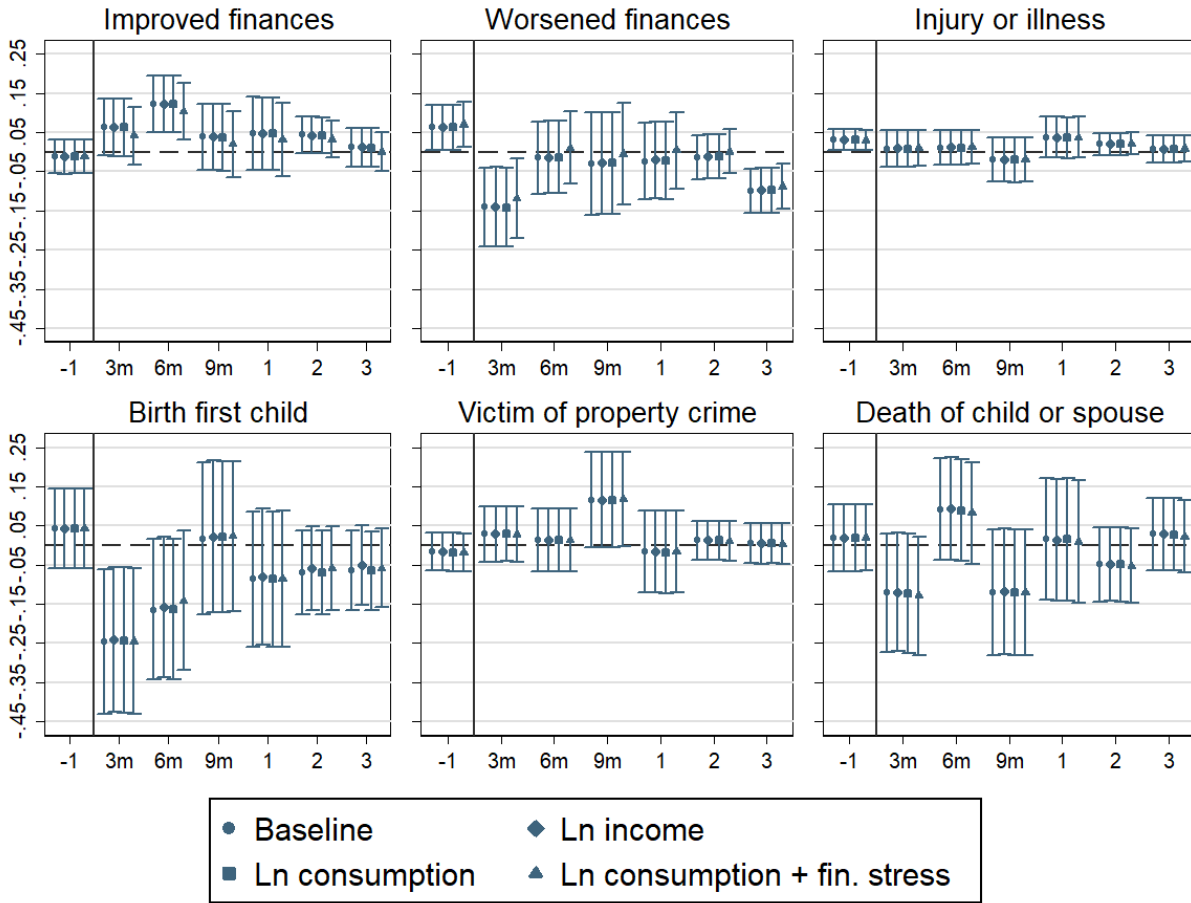
However, they do cover a broad range of regular discretionary items, specifically alcohol, cigarettes, tobacco, clothing and footwear for children and adults, childcare fees, education fees, groceries, fees paid to health practitioners, home repairs and maintenance, meals eaten out, motor vehicle fuel, motor vehicle repairs, insurance fees, public transport and taxis, medicines, prescriptions and pharmaceuticals, telephone and internet fees, household utilities and rent. To calculate imputed rent for home-owners, I use the self-reported house value and assume a rent-to-price ratio of 1500:1 (i.e. imputed annual rent = 52*house value/1500), which is in line with the median observed ratio for Australia during the sample period (ABS, 2015). As for income, expenditure details are occasionally missing in the HILDA data and rather than dropping these observations I use the supplied imputed values. Just under 9% of household value observations are imputed; for the other expenditure items, imputation rates vary but are never above 4.4%.

¹⁶Further details are in Figure 3.

¹⁷For consistency with other figures in the paper, marginal effects from linear fixed effects regression are reported. Results from the BUC estimator are qualitatively similar.

¹⁸Note that for a concave utility function, if $U'(C)$ is larger in value in the new state of the world then it must be true that the new utility curve is always steeper than the old curve. This implies that marginal utility is decreasing more slowly in the new state of the world (i.e. $|U''(C)|$ is smaller). It follows from

Figure 3: Marginal effects: Mediation effect of material wellbeing variables



Note: $N = 38,101$ (4,810 individuals). $T = 2006, 2008, 2010-2015$. The estimates are marginal effects (with 95% confidence intervals) from an OLS fixed effects regression on risk preferences (standardized) in the financial domain [1-4 scale]. The sample size is slightly smaller than for the main regression results because observations are dropped if household income is negative or if the financial means variables are missing. The ‘Ln income’ model includes a control for current (log) household disposable income. The ‘Ln consumption’ model includes a control for current (log) equivalized household consumption. The ‘Ln consumption + financial stress’ model controls for equivalized household consumption as well as a full factorial for the following i) difficulty in raising \$2000 (\$3000 in wave 9+) and ii) self-assessed prosperity given current needs and financial responsibilities. There are four possible responses to (i): “Could easily raise emergency funds”; “Could raise emergency funds, but it would involve some sacrifice”; “Would have to do something drastic to raise emergency funds”; and “Couldn’t raise emergency funds”. There are six possible responses to (ii): “Prosperous”; “Very comfortable”; “Reasonably comfortable”; “Just getting along”; “Poor”; and “Very poor”. The full regression results are in Table E1.

results, we would therefore expect that favorable changes in finances increase the marginal utility of consumption, while adverse financial circumstances, parenthood and the death of

equation (2) that higher (lower) marginal utility of consumption would decrease (increase) risk aversion.

a spouse or child lower the marginal utility of consumption, at least in the short run. Intuitively, this pattern of results seems plausible. The link between stressful life events and depressive symptoms is well established (Kessler, 1997; Tennant, 2002). Life events have also been linked to changes in measured affect, such as self-reported happiness and well-being (Luhmann et al., 2012), and sustained negative affect (depression) is associated with decreased sensitivity to rewards (see Hasler et al., 2004). In the case of parenthood, children may create new rivalry in consumption.

To test whether life events change the marginal utility of consumption I follow Finkelstein et al. (2013) by treating subjective wellbeing (SWB) as a proxy for experienced utility and interacting life event variables with household consumption. The intuition for this is that – assuming low/high consumption people share a common utility function – events that change the curvature of the utility function (i.e. the marginal utility of consumption) will be identified by disproportionate utility responses for low/high consumption people. If responses are not disproportionate, then a positive (negative) life event may result in a parallel shift up (down) of the utility curve, but this would not affect the curvature.¹⁹ I estimate the following function:

$$SWB_{it} = \sum_l \sum_{\rho=-(1-0)}^{2-3+} \beta_1^{\rho l} \gamma_{it}^{\rho l} + \sum_l \sum_{\rho=-(1-0)}^{2-3+} \beta_2^{\rho l} \gamma_{it}^{\rho l} C_i + \beta_3 C_i + x'_{it} \delta + \alpha_i + \epsilon_{it} \quad i = 1, \dots, N; t = 1, \dots, T \quad (4)$$

The dependent variable is a continuous measure of SWB – “All things considered, how satisfied are you with your life?” – which ranges from 0 (extremely dissatisfied) to 10 (extremely satisfied). C_i is log household consumption (equivalized) and β_3 reflects the

¹⁹Finkelstein et al. (2013) control for permanent household income rather than consumption. This makes more sense for their sample, since they study people who are retirement age and are likely to be relatively stable in their consumption patterns and family composition. Household consumption is conceptually stronger but is likely to be more prone to measurement error than income. A significant advantage of controlling directly for consumption, rather than permanent income (which is constant across time), is that I do not need to assume that life events have no direct or indirect effect on consumption. Any effect from consumption shifts on risk preferences is controlled for by C_{it} in equation (4).

marginal utility of consumption.²⁰ α_i is an individual fixed effect.

The main interest is on the vector of coefficients $\beta_2^{\rho l}$, which reflect the additional utility of consumption conditional on having experienced the relevant life event ρ periods ago. Positive (negative) values on these interactions indicate higher (lower) marginal utility of consumption in the given state of the world. Since higher marginal utility of consumption should lead to greater willingness to take risks, the coefficients in $\beta_2^{\rho l}$ should closely follow the marginal effects presented in Figure 2 if changes in the marginal utility of consumption are a mechanism. I estimate equation (4) using linear fixed effects regression.

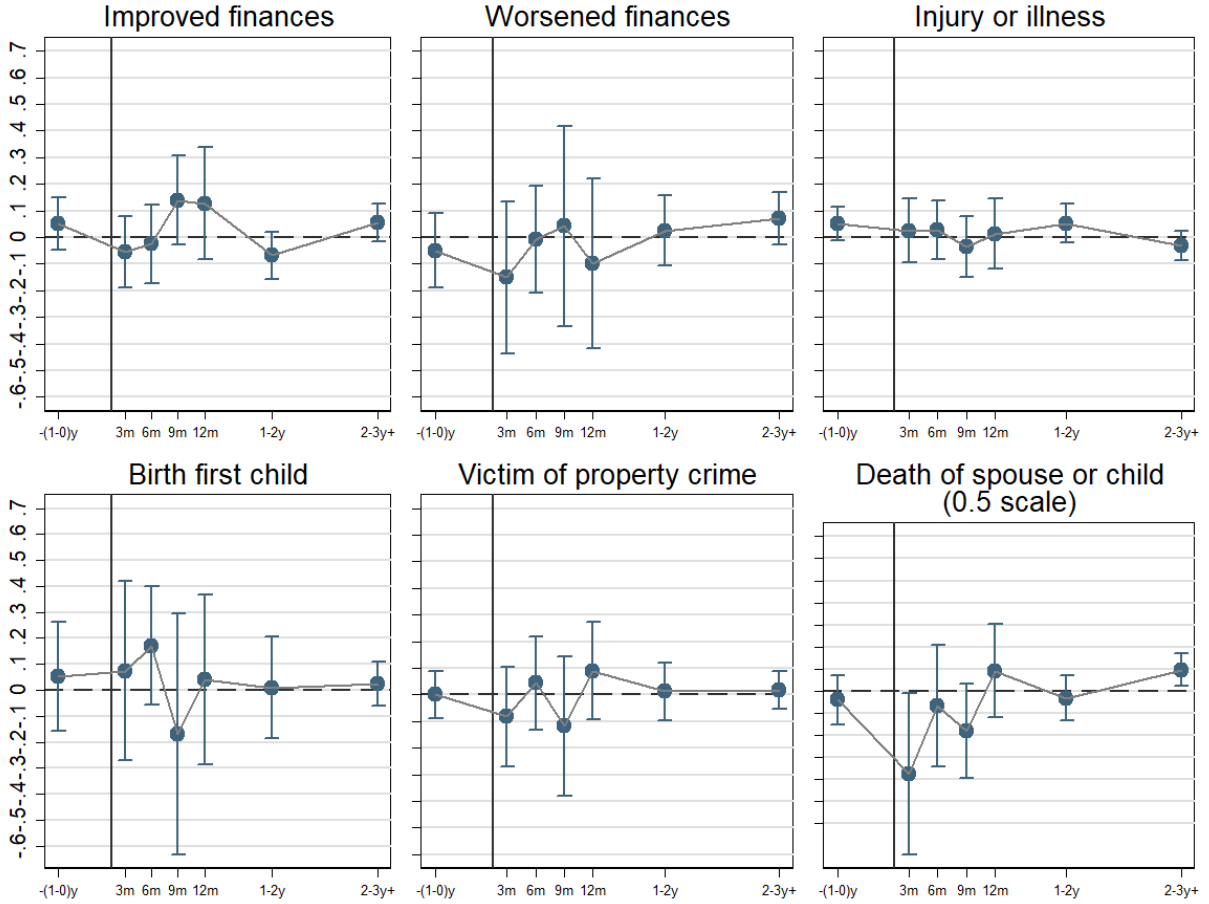
Before discussing the results, two caveats are worth highlighting. First, while the inclusion of individual fixed effects addresses unobserved time invariant heterogeneity, time variant heterogeneity correlated with the life events, as well as measurement error for consumption, may bias the estimates. Second, the model assumes that self-reported experiences are the same for different consumption types. This is reasonable for events like parenthood and death of a spouse or child but is potentially problematic for subjective life events such as changes in financial circumstances, the magnitude of which may differ between high and low consumption types.

The full set of estimates from equation (4) are in Appendix E (Table E3). The primary interest is in the estimates $\hat{\beta}_2^{\rho l}$, which are reported in Figure 4.

For changes in financial circumstances and parenthood, the dynamics in marginal utility do not match those for risk preferences and none of the estimates are statistically significant at the 5% level. The large decrease in the marginal utility of consumption immediately after the death of a spouse or child coincides with increased risk aversion in Figure 2, although that estimate is not statistically significant. The marginally significant increase in risk aversion after 6-9 months also shadows the change in risk preferences. However, the increase in marginal utility after 2-3 years does not. Altogether, there is limited evidence to support the marginal utility of consumption channel.

²⁰The first adult household member receives an equivalence value of one, additional household members aged 15 years and over receive 0.5 and children aged 0-14 years receive 0.3.

Figure 4: Marginal effects: Marginal utility of income and life events



Note: N= 38,468 (4,810 individuals). T= 2006, 2008, 2010-2015. The estimates are marginal effects (with 95% confidence intervals) from an OLS fixed effects regression on the standardized value of life satisfaction [0-10 scale]. The marginal effects correspond to interaction terms between the relevant life event and (log) equivalized household consumption (inclusive imputed values). The sample size is slightly smaller than for the main regression results because observations are dropped if SWB is missing. The full regression results are in Table E3.

Mood and mental health. The failure to find a strong role for the mechanisms identified in Section 2 suggests that something outside the traditional framework of expected utility theory might be driving the results. In Section 2, emotions, mood and mental health were discussed as possible underlying factors for state dependence. However, these factors may exert independent effects on risk attitudes. Loewenstein et al. (2001) emphasize the importance of emotions as key determinants of risky decision making that operate outside the realm of a well-behaved utility function. Adverse life events have been linked to increased

risk of depression (Kendler et al., 1999). At the same time, depressive symptoms are associated with cognitive deficiencies, impairments in memory, fixation on negative outcomes and reduced reward sensitivity (see Hasler et al., 2004; Hammar & Årdal, 2009; Gotlib & Joorman, 2010; Chen et al., 2015, for reviews); each may affect proclivity towards risky financial choices. Haushofer and Fehr (2014) argue that negative life shocks may lead to adverse mental health, stress and negative affect, which in turn can lead to greater risk aversion and failure to act on risky opportunities.

While there is limited time series information on fear and stress in the HILDA data, the survey does collect detailed information on mental health and mood each year through the SF-36 health questionnaire.²¹ To test the mediating effect of mental health and mood I add controls to the main regression model for the mental health subcomponent of the SF-36, responses to questions about positive/negative affect and SWB (see Appendix E Table E2). Despite a strong conceptual basis for considering mental health and mood as mediators, all measures of mental health, mood and SWB are statistically insignificant predictors of risk preferences. Including them in the regressions has virtually no impact on the point estimates for the life events variables.

Emotions. Although the results imply no mediating effect for mental health or mood, it is still possible that emotions and psychological factors outside the standard expected utility model are important. First, it is possible that other emotions and feelings, such as stress and fear, are mechanisms but these are not captured by the SF-36 questionnaire. Second, it is possible that the causal chain of events assumed by the regression model does not reflect the true process. For example, life events may only temporarily heighten emotions but have longer lasting effects on risk preferences due to path dependent behavior. Alternatively, in the framework of a dual-systems model for decision making under uncertainty (Loewenstein et al., 2001), experience with life events may increase the probability that risky decisions are

²¹The SF-36 is a widely used, comprehensive health questionnaire that includes a subset of questions on mental health. These responses are used to create a mental health index score ranging between 0-100, with higher values corresponding to better mental health (see Ware et al., 2000). For the current sample, the mean of this index is 76.3 (s.d. 16.3).

driven by the affective system. Without a strong intuition for the causal chain, and with only annual observations, it is difficult to explore these possibilities directly. A different approach is to consider whether those who are more (less) emotionally stable are less (more) likely to be affected by life events. The response to aversive stimuli of people with lower emotional stability (neuroticism) is more likely to be dictated by their emotions (e.g. Vogeltanz & Hecker, 1999; Norris et al., 2007; Reynaud et al., 2012). Indeed, several studies demonstrate experimentally the causal effect of emotional regulation on choices in risky decision tasks (Leith & Baumeister, 1996; Heilman et al., 2010; Martin & Delgado, 2011). Consequently, emotional stability may be a moderator and differences in risk preference responses across the emotional stability continuum could indicate a mechanistic role for emotions.

Information on emotional stability is available in the 2005, 2009 and 2013 waves of HILDA. Respondents completed a version of the Big-Five personality questionnaire; I take the median of the within-individual mean across these years to classify people as high or low emotional stability and estimate equation (3) with the life event indicators interacted with being low/high emotional stability.²² The marginal effects from linear OLS regression are reported in Figure 5.

There is consistent evidence that emotional stability has a moderating effect. The increase in risk willingness following an improvement in finances after 3-6 months is around twice as large for the low stability group and is not significantly different from zero for the high stability group. Similarly, the increase in risk aversion 0-3 months after a worsening in finances is only apparent for the low stability group. The increase in risk aversion 0-3 months after the death of a spouse or child is also only present for the low stability group. This is consistent with emotional regulation playing a moderating role in whether risk preferences

²²The Big Five questionnaire used in HILDA is based on Saucier (1994). For emotional stability, a 7-point scale is created by taking the mean value for the following items (reversed scale): envious; moody; touchy; jealous; temperamental; and fretful (see Summerfield et al., 2017, for further details). One concern is that emotional stability may change over time and this might be related to the experience of different life events. However, Cobb-Clark and Schurer (2012) explore the stability of personality variables using the HILDA data and find that changes in emotional stability over time are economically small and largely unrelated to life events (see also Lucas & Donnellan, 2011).

change after these events. Interestingly, changes in risk preferences are more pronounced for the high stability group in the case of parenthood. In particular, this group is more risk willing leading up to the birth and experience a much larger decrease immediately after the birth. This again suggests that emotional stability is an important moderator but that the interaction between stability and life events may depend on the nature of the event.

Figure 5: Marginal effects: Main results by emotional stability



Note: N= 38,480 (4,810 individuals). T= 2006, 2008, 2010-2015. The estimates are marginal effects (with 95% confidence intervals) from an OLS fixed effects regression on risk preferences (standardized) in the financial domain [1-4 scale]. The marginal effects correspond to interaction terms between the relevant life event and low (below median) or high (above or equal median) emotional stability. Emotional stability is determined according to the within-person mean from the emotional stability (neuroticism) component of the Big Five questionnaire contained in the HILDA survey in the years 2005, 2009 and 2013 (in the case of missing values, available years are used).

Summary. The analysis offers little support for the idea that life events shift risk

preferences through changes in consumption levels, the marginal utility of consumption, mental health or mood. However, people who are more prone to having their behavior dictated by their emotions (i.e. those with low emotional stability) do in many cases have a stronger response to life events. This indicates that the feelings associated with life events may determine whether those events shift risk preferences. It would be helpful in future work to explore which emotions are influential and investigate the underlying psychological process in greater detail.

6.3 General domain

As a final exercise I estimate the effect of life events on an alternative measure of risk preferences, namely the general risk attitude question asked in 2014 and discussed in Section 4. This recognizes some limitations with the Survey of Consumer Finance (SCF) measure used as the primary instrument in this paper. First, the SCF measure is elicited in respect of financial decisions rather than general willingness to take risks. It may therefore not adequately capture risk taking behavior outside this domain. Second, the SCF instrument has only four risk preference categories and a more granular measure may be better able to pick up variation in preferences across individuals. Third, the SCF instrument asks directly about actual financial behavior (except for the subset of hypothetical responses) rather than abstractly about attitudes towards taking risks. While actual financial behavior should be strongly influenced by risk preferences, there may also be other determinants. While these criticisms do not imply that the SCF instrument is inferior to the general risk attitude measure, they do motivate sensitivity analysis with this alternative.

The fact that the general risk attitude question is only asked in a single year is a significant constraint to utilizing this variable. This means that I can no longer ‘transform out’ the unobserved individual specific heterogeneity. One approach would be to assume that, conditional on covariates, unobserved heterogeneity is unrelated to life events. However, this is a strong assumption; it is likely that unobserved characteristics influence an individual’s

propensity to experience various life events. Instead, I propose a novel solution to controlling for unobserved heterogeneity based on the idea that risk preferences in different domains exert a common fixed effect (up to scale). More formally, assume that risk preferences in the general domain are given by

$$\tilde{y}_{it}^* = \sum_l \sum_{\rho=(1-0)}^{2-3+} \tilde{\beta}^{\rho l} \tilde{\gamma}_{it}^{\rho l} + x'_{it} \tilde{\delta} + \sigma \alpha_i + \tilde{\epsilon}_{it} \quad i = 1, \dots, N; t = 1, \dots, T \quad (5)$$

The individual fixed effect α_i is common to both equations (3) and (5), which assumes that any differences in risk preferences across domains are driven by the unequal effect of time varying covariates (x_{it}), life events (l) or idiosyncratic error on domain specific risk preferences. The parameter σ is a scale term. If y_{it} and \tilde{y}_{it} are measured on the same scale and α_i exerts the same influence in both equations then $\sigma = 1$. In my estimation, y_{it} and \tilde{y}_{it} are standardized values so this implies that a marginal change in α_i has an identical impact on the risk preference value in both domains in terms of standard deviation units.

While the assumption of a common fixed effect in equation (5) may seem strong, it is supported by recent experimental work that finds a common underlying preference across a myriad of elicitation tasks in different domains (Frey et al., 2017). It is also consistent with the way that economists typically treat risk preferences in applied and theoretical work, namely that risk preferences elicited in one context can be used to predict behavior in a different context. To demonstrate the critical assumption, imagine that individual i faces two gambles, one in the financial domain and one in the health domain. The gambles have equivalent risks and pay-offs when converted to a common monetary unit. Equation (5) assumes that if the agent behaves differently in the two gambles, this must be due to domain specific effects in the relationship between covariates and risk preferences (i.e. $\tilde{\beta}^{\rho l} \neq \beta^{\rho l}$ or $\tilde{\delta} \neq \delta$) or random error, not the agent's innate preference for risk.

I estimate equation (5) using a two-stage procedure where α_i is estimated in the first stage and then included as a regressor in the second stage. Estimating α_i is not straightforward. The approach I use is to estimate equation (3) by linear fixed effects regression and then back

out the individual specific fixed effects. It is necessary to use a linear specification in the first stage since $\hat{\alpha}_i$ cannot be recovered from the BUC estimator. If we estimate $\hat{\sigma}$ freely in the second stage we will get a biased estimate due to the incidental parameters problem – each $\hat{\alpha}_i$ is obtained from only a small number of observations and $\hat{\sigma}$ only approaches its true value as $T \rightarrow \infty$. To address this I assume that equations (3) and (5) are directly proportional so that $\sigma = 1$. In this case we can estimate $\tilde{\beta}^{\rho^l}$ by estimating a constrained regression in the second stage. Given the assumptions involved in this procedure, the estimates should be treated with some caution and perhaps best interpreted as bias reducing compared to a regression that relies solely on the selection on observables assumption.

Before turning to the estimation results, it is informative to look at the frequencies for the life event variables for the 2014 sample (Table 4). The frequencies are much smaller than for the full sample and while the improved granularity of the general risk preference instrument may improve precision, the small frequencies for the life event variables works against this. Given these smaller frequencies, it is no longer feasible to estimate the first year effects by quarters since the event. Instead these are amalgamated into a single identifier for 0-1 year.

Table 4: Frequencies for life events: 2014 sample

Life event	When event occurred			
	-(0-1) year	0-1 year	1-2 years	2-3+ years
Major improvement finances	161	170	150	1042
Major worsening finances	101	103	106	754
Serious personal injury or illness	487	470	408	1895
Birth first child	19	24	24	477
Victim property crime	116	124	131	1083
Death of spouse or child	43	37	27	247

Note: 4,794 individuals. Data are from the year 2014. The questions on life events are part of the self-completion questionnaire in the HILDA survey. Respondents are asked “Did any of these happen to you in the past 12 months”.

Results from the two-stage estimator are presented in Table 5. For comparison, results from standard OLS and from the two-stage estimator without constraining $\hat{\sigma}$ are presented in Appendix E in Table E4. Standard errors for the constrained model are calculated using

clustered non-parametric bootstrap.

Although there is some evidence that individuals become more willing to take risk in the first year after an improvement in finances from the basic OLS and unconstrained two-stage models, this effect is not significant in the two-stage constrained regression. As in the financial domain, there is evidence that people are more willing to take risk in the year before a worsening in finances and after this event the coefficients are all negative although insignificant. The strongest result is for parenthood. The birth of a first child is associated with an increase in risk aversion that is particularly strong 1-2 years after the event (-0.5 standard deviation units). There is also some evidence of an anticipation effect when looking at the basic OLS and unconstrained two-stage estimation results. As with the financial domain, there is evidence of adaptation over time – the marginal effect is closest to zero and no longer significant 2-3+ years after the event. Death of a spouse or child and property crime are unrelated to risk preferences; the former result should be interpreted with caution since there are few observations to identify its effect (see Table 4).

Overall, the results using the general risk preference instrument are weaker than the main results (with the exception of parenthood). One reason for this is that the estimates are identified by less observations (since only one year of data are used). It is also likely that there is more noise in the general risk question due to respondents framing their responses based on different risk taking behaviors. A third possibility is that there are domain specific responses to risk attitudes, which is an interesting question for future work.

7 Conclusion

This paper provides evidence that risk preferences are not independent of common life events. The events I study are particularly interesting because they are widely experienced – most people will experience one or more over their lifetime. Favorable changes in finances are associated with greater willingness to take risk; unfavorable changes in finances, parenthood

Table 5: Regression results: General domain

	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
0-1 year before	0.031 (0.079)	0.228** (0.101)	0.022 (0.048)	-0.369 (0.242)	-0.114 (0.093)	0.056 (0.153)
0-1 year after	0.093 (0.074)	-0.034 (0.112)	0.010 (0.048)	-0.333 (0.209)	0.043 (0.086)	0.008 (0.136)
1-2 years after	0.058 (0.067)	-0.081 (0.097)	0.079 (0.052)	-0.538*** (0.171)	0.062 (0.083)	-0.026 (0.142)
2-3+ years after	-0.043 (0.038)	-0.042 (0.048)	0.052 (0.032)	-0.093 (0.067)	0.055 (0.039)	0.008 (0.067)

Note: N= 4,794. T= 2006, 2008, 2010-2015. Coefficients from a two-step constrained OLS regression are reported. The dependent variable in the second stage is risk preferences in the general domain (standardized), measured on a 0-10 scale and elicited in wave 14 only. In the first stage, a linear fixed effects regression is estimated on risk preferences in the financial domain (standardized) measured on a 1-4 scale with the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple, a full set of year dummies and indicators for if a life event occurred -(0-1) year ago, 0-3 months ago, 3-6 months ago, 6-9 months ago, 9-12 months ago, 1-2 years ago or 2-3+ years ago for all of the life events in Table 2. In the second stage, the estimated vector of individual fixed effects ($\hat{\alpha}_i$) is included as an additional covariate along with age, age², overseas, university, diploma, student, region, employed, unemployed, retired, couple, male, mother secondary, father secondary and height. Clustered non-parametric bootstrap standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

and bereavement are associated with greater risk aversion. While the effect for bereavement is not statistically significant in the main sample, it is significant for those with low emotional security and males. On the other hand, there is little evidence that health shocks or property crime affect risk preferences, even in the short-run.

A key finding is that people seem to be adaptive to life events in the sense that life events tend to exert the strongest influence close to the event date and the effects generally disappear over time. One hopeful property of this is that it may guard against reinforcing behavior, for example individuals experiencing a financial loss, becoming more risk averse, and failing to take advantage of profitable opportunities in the future. From a modelling perspective, the results do support a type of preference stability – one in which deviations in risk preferences over time are at least partly deterministic but preferences are tending towards an underlying mean (noting also that almost 60% of the variation in risk preferences

is explained by individual fixed effects). They also suggest a more nuanced approach to controlling for life events in applied work. Failure to control for dynamics in the response function could help to explain mixed results in the literature.

In addition to focusing on dynamics, an important contribution of this paper is to explore mechanisms between life events and risk preferences. I find limited evidence that changes in consumption, the marginal utility of consumption, or mental health and mood explain the results. Instead, emotional stability is found to be an important moderator implying that emotions related to the experience of life events are influential.

The findings in this paper have wide-ranging implications for areas where risk preferences are a key input into decision making. For instance, the results on how risk preferences vary around financial shocks can improve our understanding of portfolio management over the life-course – there are key periods where investors are likely to be more or less risk averse. At the macroeconomic level, the fact that preferences seem to be adaptive over time can be used to predict recovery from recession, or the limits to economic booms. The fact that those with low emotional stability are more prone to instability in their preferences means that policies that affect this aspect of personality, for example through educational practices or behavioral therapies, may have the unintended (although not necessarily adverse) effect of improving resistance to preference shifting events.

References

- ABS. (2015). *Feature article: The Australian residential property market*. Australian Bureau of Statistics Cat. No. 6416.0. Retrieved from www.abs.gov.au/ausstats/abs@.nsf/Lookup/6416.0Feature+Article1Sep%202015 (Viewed 13 May 2018)
- Anderson, S., Harrison, G. W., Lau, M. I., & Rutström, E. E. (2008). Lost in state space: Are preferences stable? *International Economic Review*, *49*, 1091–1112.
- Au, N., & Johnston, D. W. (2015). Too much of a good thing? Exploring the impact of wealth on weight. *Health Economics*, *24*, 1403–1421.
- Baetschmann, G., Staub, K. E., & Winkelmann, R. (2015). Consistent estimation of the fixed effects ordered logit model. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, *178*, 685–703.
- Benjamin, D. J., Cesarini, D., van der Loos, M. J. H. M., Dawes, C. T., Koellinger, P. D., Magnusson, P. K. E., . . . Visscher, P. M. (2012). The genetic architecture of economic and political preferences. *Proceedings of the National Academy of Sciences*, *109*, 8026–8031.
- Bogan, V. L., & Fertig, A. R. (2013). Portfolio choice and mental health. *Review of Finance*, *17*, 955–992.
- Brown, R., Montalva, V., Thomas, D., & Velásquez, A. (2017). *Impact of violent crime on risk aversion: Evidence from the Mexican Drug War*. NBER Working Paper No. 23181.
- Browne, M. J., Jaeger, V., Richter, A., & Steinorth, P. (2016). *Family transitions and risk attitude*. MRIC Working Paper No. 32.
- Cahlíková, J., & Cingl, L. (2017). Risk preferences under acute stress. *Experimental Economics*, *20*, 209–236.
- Callen, M., Isaqzadeh, M., Long, J. D., & Sprenger, C. (2014). Violence and risk preference: Experimental evidence from Afghanistan. *American Economic Review*, *104*, 123–148.
- Cameron, L., & Shah, M. (2015). Risk-taking behavior in the wake of natural disasters. *Journal of Human Resources*, *50*, 484–515.
- Campos-Vasquez, & Cuijty, E. (2014). The role of emotions on risk aversion: A prospect theory experiment. *Journal of Behavioral and Experimental Economics*, *50*, 1–9.
- Cassar, A., Healy, A., & Von Kessler, C. (2017). Trust, risk, and time preferences after a natural disaster: Experimental evidence from Thailand. *World Development*, *94*, 90–105.
- Cesarini, D., Dawes, C. T., Johannesson, M., Lichtenstein, P., & Wallace, B. (2009). Genetic variation in preferences for giving and risk taking. *Quarterly Journal of Economics*, *124*, 809–842.
- Chamberlain, G. (1980). Analysis of covariance with qualitative data. *The Review of Economic Studies*, *47*, 225–238.
- Chen, C., Takahashi, T., Inoue, T., & Kusumi, I. (2015). Reinforcement learning in depression: A review of computational research. *Neuroscience and Biobehavioral Reviews*, *55*, 247–267.
- Chuang, Y., & Schechter, L. (2015). Stability of experimental and survey measures of risk, time, and social preferences: A review and some new results. *Journal of Development*

- Economics*, 117, 151–170.
- Cobb-Clark, D. A., & Schurer, S. (2012). The stability of big-five personality traits. *Economics Letters*, 115, 11–15.
- Cohn, A., Engelmann, J., Fehr, E., & Maréchal, M. A. (2015). Evidence for countercyclical risk aversion: An experiment with financial professionals. *American Economic Review*, 105, 860–885.
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47, 1–27.
- Decker, S., & Schmidt, H. (2016). Health shocks and risk aversion. *Journal of Health Economics*, 50, 156–170.
- Delany, L., Fink, G., & Harmon, C. (2014). *Effects of stress on economic decision-making: Evidence from laboratory experiments*. SIRE Discussion Paper No. 2014-006.
- Dohmen, T., Falk, A., Golsteyn, B., Huffman, D., & Sunde, U. (2017). Risk attitudes across the life course. *Economic Journal*, *Forthcoming*.
- Dohmen, T., Falk, A., Huffman, D., Sunde, U., Schupp, J., & Wagner, G. G. (2011). Individual risk attitudes: Measurement, determinants, and behavioral consequences. *Journal of the European Economic Association*, 9, 522–550.
- Dohmen, T., Lehmann, H., & Pignatti, N. (2015). *Time-varying individual risk attitudes over the Great Recession: A comparison of Germany and Ukraine*. IZA Discussion Paper No. 9333.
- Dohmen, T., Lehmann, H., & Pignatti, N. (2016). Time-varying individual risk attitudes over the Great Recession: A comparison of Germany and Ukraine. *Journal of Comparative Economics*, 44, 182–200.
- Eckel, C. C., El-Gamal, M. A., & Wilson, R. K. (2009). Risk loving after the storm: A Bayesian-Network study of Hurricane Katrina evacuees. *Journal of Economic Behavior and Organization*, 69, 110–124.
- Finkelstein, A., Luttmer, E. F. P., & Notowidigdo, M. J. (2013). What good is wealth without health? The effect of health on the marginal utility of consumption. *Journal of the European Economic Association*, 11, 221–258.
- Frey, R., Pedroni, A., Mata, R., Rieskamp, J., & Hertwig, R. (2017). Risk preference shares the psychometric structure of major psychological traits. *Science Advances*, 3.
- Frijters, P., Johnston, D. W., & Shields, M. (2011). Life satisfaction dynamics with quarterly life event data. *Scandinavian Journal of Economics*, 113, 190–211.
- Gloede, O., Menkoff, L., & Waibel, H. (2015). Shocks, individual risk attitude, and vulnerability to poverty among rural households in Thailand and Vietnam. *World Development*, 71, 54–78.
- Görlitz, K., & Tamm, M. (2015). *Parenthood and risk preferences*. IZA Discussion Paper No. 8947.
- Gotlib, I. H., & Joorman, J. (2010). Cognition and depression: Current status and future directions. *Annual Review of Clinical Psychology*, 6, 285–312.
- Guiso, L., Sapienza, P., & Zingales, L. (2017). Time varying risk aversion. *Journal of Financial Economics*, *Forthcoming*.
- Hammar, r., & Årdal, G. (2009). Cognitive functioning in major depression – a summary. *Frontiers in Human Neuroscience*, 3, 1–7.

- Hanaoka, C., Shigeoka, H., & Watanabe, Y. (2018). Do risk preferences change? Evidence from the Great East Japan Earthquake. *American Economic Journal: Applied Economics*, *10*, 298–330.
- Hasler, G., Drevets, W. C., Manji, H. K., & Charney, D. S. (2004). Discovering endophenotypes for major depression. *Neuropsychopharmacology*, *29*, 1765–1781.
- Haushofer, J., & Fehr, E. (2014). On the psychology of poverty. *Science*, *6186*, 862–867.
- Heilman, R. M., Crişan, L. G., Houser, D., Miclea, M., & Miu, A. C. (2010). Emotion regulation and decision making under risk and uncertainty. *Emotion*, *10*, 257–265.
- Holt, C. A., & Laury, S. K. (2002). Risk Aversion and Incentive Effects. *American Economic Review*, *92*, 1644–1655.
- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An Analysis of Decision Under Risk. *Econometrica*, *47*, 263–291.
- Kandasamy, N., Hardy, B., Page, L., Schaffner, M., Graggaber, J., Powelson, A. S., . . . Coates, J. (2014). Cortisol shifts financial risk preferences. *Proceedings of the National Academy of Sciences of the United States of America*, *111*, 3608–3613.
- Kendler, K. S., Karkowski, L. M., & Prescott, C. A. (1999). Causal relationship between stressful life events and the onset of major depression. *The American Journal of Psychiatry*, *156*, 837–841.
- Kessler, R. (1997). The effects of stressful life events on depression. *Annual Review of Psychology*, *48*, 191–214.
- Le, A. T., Miller, P. W., Slutske, W. S., & Martin, N. G. (2010). Are attitudes towards economic risk heritable? Analyses using the Australian Twin Study of Gambling. *Twin Research and Human Genetics*, *13*, 330–339.
- Lee, G. R., DeMaris, A., Bavin, S., & Sullivan, R. (2001). Gender differences in the depressive effect of widowhood in later life. *The Journals of Gerontology: Series B*, *56*, S56-S-61.
- Leith, K. P., & Baumeister, R. F. (1996). Why do bad moods increase self-defeating behavior? Emotion, risk taking, and self-regulation. *Journal of Personality and Social Psychology*, *71*, 1250–1267.
- Lerner, J. S., & Keltner, D. (2001). Fear, anger and risk. *Journal of Personality and Social Psychology*, *81*, 146–159.
- Lindeboom, M., & Melnychuk, M. (2015). Mental health and asset choices. *Annals of Economics and Statistics*, *119/120*, 65–94.
- Loewenstein, G. F., Weber, E. U., Hsee, C. K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin*, *127*, 267–286.
- Lucas, R. E., & Donnellan, M. B. (2011). Personality development across the life span: Longitudinal analyses with a national sample from Germany. *Journal of Personality and Social Psychology*, *101*, 847–861.
- Luhmann, M., Hofmann, W., Eid, M., & Lucas, R. E. (2012). Subjective well-being and adaptation to life events: A meta-analysis. *Journal of Personality and Social Psychology*, *102*, 592–615.
- Malmedier, U., & Nagel, S. (2011). Depression babies: Do macroeconomic experiences affect risk taking? *Quarterly Journal of Economics*, *126*, 373–416.
- Martin, L. N., & Delgado, M. R. (2011). The influence of emotion regulation on decision-making under risk. *Journal of Cognitive Neuroscience*, *23*, 2569–2581.

- Mata, R., Frey, R., Richter, D., Schupp, J., & Hertwig, R. (2018). Risk preference: A view from psychology. *Journal of Economic Perspectives*, *32*, 155–172.
- Mata, R., Josef, A. K., & Hertwig, R. (2016). Propensity for risk taking across the life span and around the globe. *Psychological Science*, *27*, 231–243.
- Merton, R. C. (1971). Optimum consumption and portfolio rules in a continuous-time model. *Journal of Economic Theory*, *3*, 373–413.
- Mukherjee, B., Ahn, J., Liu, I., Rathouz, P. J., & Sánchez, B. N. (2008). Fitting stratified proportional odds models by amalgamating conditional likelihoods. *Statistics in Medicine*, *27*, 4950–4971.
- Norris, C. J., Larsen, J. T., & Cacioppo, J. T. (2007). Neuroticism is associated with larger and more prolonged electrodermal responses to emotionally evocative pictures. *Psychophysiology*, *44*, 823–826.
- Pabst, S., Brand, M., & Wolf, O. T. (2013). Stress and decision making: A few minutes make all the difference. *Behavioural Brain Research*, *250*, 39–45.
- Pabst, S., Schoofs, D., Pawlikowski, M., Brand, M., & Wolf, O. T. (2013). Paradoxical effects of stress and an executive task on decisions under risk. *Behavioral Neuroscience*, *127*, 369–379.
- Page, L., Savage, D. A., & Torgler, B. (2014). Variation in risk seeking behaviour following large losses: A natural experiment. *European Economic Review*, *71*, 121–131.
- Paravisini, D., Rappoport, V., & Ravina, E. (2018). Risk aversion and wealth: Evidence from person-to-person lending portfolios. *Marketing Science*, *Forthcoming*.
- Porcelli, A. J., & Delgado, M. R. (2009). Acute stress modulates risk taking in financial decision making. *Psychological Science*, *20*, 278–283.
- Putman, P., Antypa, N., Cyrsovergi, P., & van der Does, W. A. J. (2010). Exogenous cortisol acutely influences motivated decision making in healthy young men. *Psychopharmacology*, *208*, 257–263.
- Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational influences of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes*, *79*, 56–77.
- Reynaud, E., Khoury-Malhame, M. E., Rossier, J., Blin, O., & Khalifa, S. (2012). Neuroticism modifies psychophysiological responses to fearful films. *PLoS ONE*, *7*, e32413.
- Sahm, C. R. (2012). How much does risk tolerance change? *Quarterly Journal of Finance*, *2*.
- Said, F., Afzal, U., & Turner, G. (2015). Risk taking and risk learning after a rare event: Evidence from a field experiment in Pakistan. *Journal of Economic Behavior and Organization*, *118*, 167–183.
- Salamanca, N. (2016). *The dynamic properties of economic preferences*. Mimeo.
- Saucier, G. (1994). Mini-markers: A brief version of Goldberg’s unipolar big-five markers. *Journal of Personality Assessment*, *63*, 506–516.
- Schildberg-Hörisch, H. (2018). Are risk preferences stable? *Journal of Economic Perspectives*, *32*, 135–154.
- Schurer, S. (2015). Lifecycle patterns in the socioeconomic gradient of risk preferences. *Journal of Economic Behavior and Organization*, *119*, 482–495.
- Sokol-Hessner, P., Raio, C., Gottesman, S. P., Lackovic, S. F., & Phelps, E. A. (2016). Acute stress does not affect risky monetary decision-making. *Neurobiology of Stress*,

- 5, 19–25.
- Starcke, K., Wolf, O. T., Markowitsch, H. J., & Brand, M. (2008). Anticipatory stress influences decision making under explicit risk conditions. *Behavioral Neuroscience*, *122*, 1352–1360.
- Stigler, G. J., & Becker, G. S. (1977). De gustibus non est disputandum. *American Economic Review*, *67*, 76–90.
- Summerfield, M., Bevitt, A., Freidin, S., Hahn, M., La, N., Macalalad, N., . . . Wooden, M. (2017). *HILDA User Manual – Release 16*. Melbourne Institute of Applied Economic and Social Research, University of Melbourne.
- Tennant, C. (2002). Life events, stress and depression: a review of recent findings. *Australian and New Zealand Journal of Psychiatry*, *36*, 173–182.
- van Grootheest, D. S., Beekman, A. T. F., van Groenou, M. I. B., & Deeg, D. J. H. (1999). Sex differences in depression after widowhood. Do men suffer more? *Social Psychiatry and Psychiatric Epidemiology*, *34*, 391–398.
- Vogeltanz, N. D., & Hecker, J. E. (1999). The roles of neuroticism and controllability/predictability in physiological response to aversive stimuli. *Personality and Individual Differences*, *27*, 599–612.
- Voors, M. J., Nillesen, E. E. M., Verwimp, P., Bulte, E. H., Lensink, R., & Van Soest, D. P. (2012). Violent conflict and behavior: A field experiment in Burundi. *American Economic Review*, *102*, 941–964.
- Wang, X. T., Kruger, D. J., & Wilke, A. (2009). Life history variables and risk-taking propensity. *Evolution and Human Behavior*, *30*, 77–84.
- Ware, J. E., Kosinski, M., Dewey, J. E., & Gandek, B. (2000). *SF-36 Health Survey : Manual and Interpretation Guide*. Lincoln, RI : Quality Metric.
- Weber, E. U., Blais, A., & Betz, N. E. (2002). A domain-specific risk-attitude scale: measuring risk perceptions and risk behaviors. *Journal of Behavioral Decision Making*, *15*, 263–290.

A Literature review

Table A1: Summaries of empirical studies of life events on risk preferences

Study	How risk preferences are measured	Sample	Estimation approach	Findings
<i>Changes in finances</i>				
Anderson et al. (2008)	Holt and Laury (2002) multiple price list (MPL) (incentivized).	Representative sample of Danish population 2003-2004. Follow up after 17 months. N=287.	Linear regression on the change in risk preferences.	People who became more risk willing more likely to self-report that finances improved.
Dohmen et al. (2016)	Risk willingness scale [0-10] framed in general domain. ^a	Representative samples from the German SOEP (2004-2011) and Ukrainian Longitudinal Monitoring Survey (2007 and 2012) aged 17-72. N=10,022 for Germany 2004-2009, N=7,809 for Germany 2006-2011 and N=3,456 for Ukraine 2007-2012.	Interval regression on the change in risk preferences.	Changes in household income not statistically significant. Improvements in household wealth relative to changes in financial position are associated with greater risk willingness in Ukraine but not Germany.
Guiso et al. (2017)	1. Risk willingness scale [1-4] framed in financial domain. 2. Variant of MPL (hypothetical).	Survey of Italian bank clients with at least 10,000 Euro in wealth in 2007. Follow up in 2009. N=666 (participants both waves).	Mean change in risk preferences.	After the Global Financial Crises, clients are more risk averse even if they experienced no loss.
Malmendier and Nagel (2011)	Risk willingness scale [1-4] framed in financial domain. Also uses actual financial behavior as outcome variables.	Repeated cross-sections from the U.S. Survey of Consumer Finance 1960-2007 (risk preference question only from 1983). N=28,571 (asked risk preference question).	Ordered probit regression (for risk preferences).	Individuals exposed to poor stock market performance throughout their lives are more risk averse, invest more conservatively and exhibit greater pessimism regarding future returns.
Paravisini et al. (2018)	Derived based on financial decisions in a person-to-person lending platform.	Investors in a U.S. person-to-person lending platform October 2007-April 2008. N=2,168.	Linear fixed effects regression.	Adverse housing wealth shocks are associated with greater risk aversion.

Sahm (2012)	Hypothetical gambles on lifetime income.	U.S. Health and Retirement Survey (HRS) 1992-2002 (age range 45-70). N=12,003.	Correlated random effects regression.	Income and wealth fluctuations not statistically significant.
<i>Health</i>				
Chuang Schechter (2015)	1. Hypothetical gamble questions (number of risky choices). 2. Incentivized gambling task (2002 only).	Field study in Paraguay. In 2002 participants completed an incentivized gambling task. In 2007 and 2009 they completed a hypothetical task. N=140 for 2007, N=49 for 2009.	Linear regression conditional on previous wave risk preference.	For 2007, number of days sick predicts greater risk aversion (marginally significant). For 2009, number of days sick predicts lower risk aversion.
Decker and Schmidt (2016)	Risk willingness scale [0-10] framed in general domain.	Representative sub-sample from the German SOEP 2006-2014. N=6642.	Regression-adjusted matching estimation.	Large changes in grip strength associated with increased risk aversion that persists up to four years.
Dohmen et al. (2016)	Risk willingness scale [0-10] framed in general domain. ^a	Representative samples from the German SOEP (2004-2011) and Ukrainian Longitudinal Monitoring Survey (2007 and 2012) aged 17-72. N=10,022 for Germany 2004-2009, N=7,809 for Germany 2006-2011 and N=3,456 for Ukraine 2007-2012.	Interval regression on the change in risk preferences.	Self-assessed improvement in health associated with increased risk willingness in Germany for period 2004-2009 (insignificant for 2006-2011). Worsening health associated with increased risk aversion in Ukraine. Changes in disability status not statistically significant.
Gloede et al. (2015)	Risk willingness scale [0-10] framed in general domain.	Samples from three provinces in Northeast Thailand and three provinces in Vietnam in 2010. N=2,068 in Thailand, N=2048 in Vietnam.	Interval regression.	An indicator for illness or injury to a household member is associated with higher risk aversion in Vietnam but not Thailand.
Sahm (2012)	Hypothetical gambles on lifetime income.	U.S. HRS 1992-2002. N=12,003.	Correlated random effects regression.	Adverse health conditions (heart disease, stroke, cancer or lung disease) not statistically significant.
<i>Parenthood</i>				
Browne et al. (2016)	Risk willingness scale [0-10] framed in general domain.	Representative sample from the German SOEP (2004-2012) aged 18+. N=7,339.	Linear fixed effects regression.	Birth of a first child (if household head) associated with increased risk aversion. Insignificant for non-heads of household.

Görlitz and Tamm (2015)	Risk willingness scale [0-10] framed in general domain.	Representative sample from the German SOEP (2004-2012) aged 17-64. N=28,000.	Linear fixed effects regression.	Birth of a first child associated with increased risk aversion up to two years before the event and persisting for several years after the event for both men and women. Effect strongest closer to the birth.
Wang et al. (2009)	Questionnaire based on propensity to engage in risky behaviors across five separate domains: within-group competition; between-group competition; environmental challenge; mating; reproduction.	Student sample (University of South Dakota). N=448. Note: only 31 parents among student sample.	Correlation (conditional on age).	Parenthood associated with increased risk aversion in within-group competition and between-group competition domains.

Victim of property crime

Chuang and Schechter (2015)	1. Hypothetical gamble questions (number of risky choices). 2. Incentivized gambling task (2002 only).	Field study in rural Paraguay. In 2002 participants completed an incentivized gambling task. In 2007 and 2009 they completed a hypothetical task. N=140 for 2007, N=49 for 2009.	Linear regression conditional on previous wave risk preference.	For 2007, changes in the amount of experienced theft in the last year (2007-2002) predicts greater risk willingness. For 2009, changes in the amount of experienced theft in the last year (2009-2007) is not statistically significant.
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Death of a spouse or child

Browne et al. (2016)	Risk willingness scale [0-10] framed in general domain.	Representative sample from the German SOEP (2004-2012) aged 18+. N=7,339.	Linear fixed effects regression.	Death of a spouse is not statistically significant.
Salamanca (2016)	Index based on six items related to financial risk taking.	Dutch National Bank Household Survey (1996-2015). N=2,894.	Dynamic GMM linear regression.	Being widowed is not statistically significant.

^a The working paper version (Dohmen et al., 2015) includes some results for other domains (e.g. career, driving, finance, health, sport).

B Validity of risk preference instrument

If the HILDA question is a valid measure of risk preferences, then we should be able to predict its correlation with known correlates of risk preferences from previous research. It should also be able to predict risky investment behavior, such as owning shares. To test this, I first follow Dohmen et al. (2011) and examine the correlation between the survey measure and four plausibly exogenous variables that have been found to correlate with risk willingness in previous studies: age (-); being male (+); height (+); and parental education (+). The results from a linear OLS regression are reported in column 2 of Table B1 (results from ordered logit regression are similar). Note that the risk preference levels have been rescaled so that 1 corresponds to not being willing to take any risks and 4 corresponds to being willing to take substantial risks (and then standardized). All variables show the expected correlations and are individually and jointly highly significant. Next I include two additional variables that frequently predict a higher propensity to take risks but are unlikely to be exogenous, namely (log) household income and an indicator for having obtained a university degree. Again, the correlations are in the expected direction and, apart from age, remain statistically significant.

In column 3 of Table B1, the general domain risk willingness variable is regressed against the covariates mentioned above. All correlations are in the expected direction although the coefficients for height and father's education are not significant when income and own education are controlled for. The distribution of this variable is presented in Figure B1. The modal choice is 5 and the distribution is left skewed, as in the financial domain. Note there is a strong positive correlation in risk preferences across domains. The polychoric correlation between the two measures is 0.51.

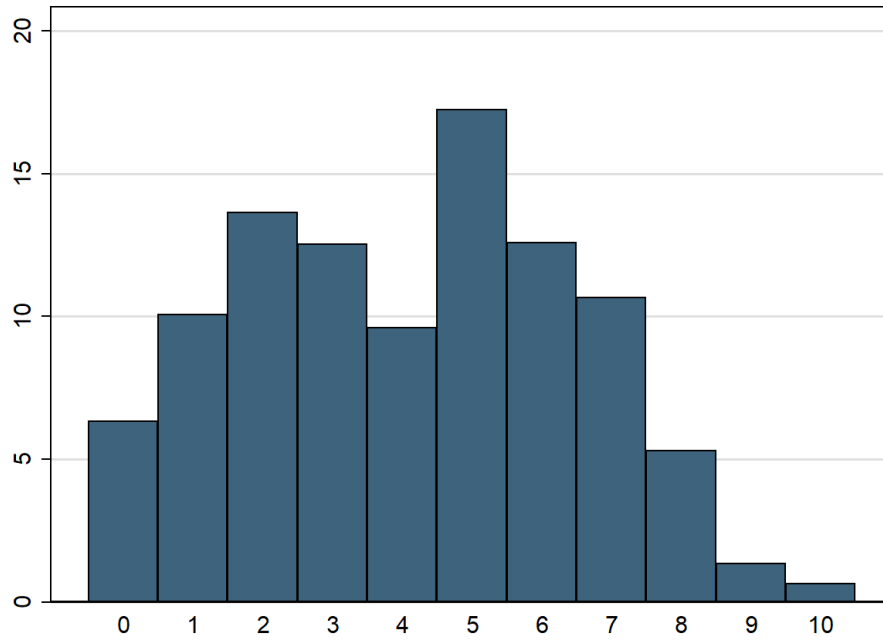
As a further check on the validity of the risk preference instruments, I turn to their predictive power. In Table B2 I regress these instruments (standardized values) on important indicators of risk taking behavior: receiving income from dividends; owning a second property; the share of equities as a proportion of household assets; and an indicator for self-employment. All regressions control for the covariates in Table B1. For the main instrument, all correlations are in the expected direction and highly significant. The effect sizes are also economically meaningful. For example, a one standard deviation increase in the risk score is associated with an increased probability of receiving income from dividends by 7.7 percentage points, owning a second property by 5.1 percentage points, increases the probability of owning equities by 8.9 percentage points, the proportion of equities to total assets (conditional on owning equities) by 1.2 percentage points and the probability of self-employment by 1.9 percentage points. For the general risk measure, these correlations are all positive as well, although the correlation for receiving income from dividends is statistically insignificant. Further, the correlations are smaller in economic magnitude, except for self-employment.

Table B1: Correlation risk preferences with key demographics

	Financial domain		General domain	
Age	-0.006*** (0.001)	-0.001 (0.001)	-0.014*** (0.001)	-0.011*** (0.001)
Male	0.253*** (0.030)	0.265*** (0.028)	0.352*** (0.040)	0.361*** (0.040)
Height	0.011*** (0.002)	0.008*** (0.001)	0.005** (0.002)	0.004 (0.002)
Mother secondary	0.173*** (0.026)	0.092*** (0.025)	0.128*** (0.032)	0.078** (0.032)
Father secondary	0.087*** (0.023)	0.039* (0.021)	0.057** (0.029)	0.027 (0.029)
Ln(Dis. income)		0.255*** (0.014)		0.103*** (0.021)
University		0.336*** (0.025)		0.217*** (0.032)
Constant	-1.466*** (0.230)	-4.124*** (0.259)	-0.193 (0.339)	-1.293*** (0.412)
Observations	38480	38380	4794	4784
R^2	0.066	0.128	0.094	0.111

Note: Risk preferences in the financial domain are measured on a 1-4 scale and are elicited in the years 2006, 2008 and 2010-2015. Risk preferences in the general domain are measured on a 0-10 scale and are elicited in 2014 only. For both measures, higher values correspond to greater willingness to take risks. The coefficients are obtained by linear OLS regression on the standardized values of the different risk preference instruments. The sample size slightly decreases in models that control for household income because those with negative values are dropped from the sample. Cluster robust standard errors are in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure B1: Distribution of risk preferences in general domain



Note: Results are for the sample of 4,794 individuals in the year 2014. 0 corresponds to extreme unwillingness to take risks in general; 10 corresponds to extreme willingness to take risk in general.

Table B2: Predictive power of risk preference variables

	<i>Financial domain</i>			
	Rec. div.	Own. prop.	Eq. share	Self emp.
	0.077*** (0.004)	0.051*** (0.004)	0.040*** (0.004)	0.019*** (0.003)
Observations	38380	14393	14393	24744
Pseudo R^2	0.095	0.071	0.473	0.071
	<i>General domain</i>			
	Rec. div.	Own. prop.	Eq. share	Self emp.
	0.004 (0.007)	0.028*** (0.006)	0.008*** (0.003)	0.030*** (0.006)
Observations	4784	4784	4874	2,908
Pseudo R^2	0.075	0.061	0.389	0.067

Note: Risk preferences in the financial domain are measured on a 1-4 scale and are elicited in the years 2006, 2008 and 2010-2015. Risk preferences in the financial domain are measured on a 0-10 scale and are elicited in 2014 only. For both measures, higher values correspond to greater willingness to take risks. The predictions for Receives dividends, Own property and Self employed are based on binary logit regressions and are the average marginal effect for a one unit increase in the normalized value of the risk preference variable across the estimation sample. The coefficients on Equity share are obtained via Tobit regressions and the estimate reported is the marginal effect on the Tobit index function. Information on property ownership and equities are only available for 2006, 2010 and 2014. Only those employed are included in the regressions on self-employment. All models control for the following: age, gender, height, mother's education, father's education, ln household income and university degree. Those with negative household income are dropped from the sample and imputed values are used for missing income. Robust and cluster robust standard errors are in parentheses. Standard errors for average marginal effects are obtained via the delta method. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C Replacing self-assessed financial shocks with income shocks

C.1 Drivers of changes in financial circumstances

In this Appendix I explore the drivers of changes in financial circumstances before turning to more objective measures, namely changes in real household disposable income.

To explore the underlying drivers for each of these life events I regress (using a binary logit model) the contemporaneous experience of an improvement/worsening in finances on a variety of covariates that capture i) changes in wealth and ii) changes in household expenses. I hypothesize that improvements in finances are more strongly correlated with wealth while worsening finances are more likely to capture changes in expenses. The marginal effects from these regressions are presented in Table C1. For each type of change in finances, the first column includes all people in the sample, the second column includes singles only and the third column is restricted to the 2006 and 2010 samples only. This restriction is so that I can include an indicator for those whose current household bills exceed 1% of current household income. This is likely to be a good indicator of financial stress and information on household bills was only collected in these waves.²³

Consistent with Au and Johnston (2015), I find that transfers are an important determinant of favorable changes in finances. The marginal effect for the full sample is 35.1 percentage points. For singles, this is the only significant covariate. For the full sample, there is a modest correlation with income, receiving dividends, changes in household value and health shocks. Overall, shocks more likely to result in permanent changes in wealth seem to play a relatively small role.

For unfavorable changes in finances, shocks on the expenses side seem to play an important role. Experiencing a health shock and being the victim of property crime increase the risk of worsening finances. Being a home owner reduces risk, perhaps indicating greater financial security for these people. Having a high bill to income ratio is associated with a large (6.3 percentage points) increase in the risk of worsening finances. Fluctuations in wealth also matter. Adverse income shocks, unemployment and receiving dividends all increase the risk of worsening finances.

This analysis reveals that the life event measures of improvements and worsening in finances are not reciprocal events. Improvements in finances are largely driven by transfers while worsening finances are strongly influenced by expenses. One advantage of these measures of financial shocks is that they capture this diversity in experiences. Moreover, the mere fact that people self-identify as having experienced these events indicates that the experience was meaningful. Nevertheless, it is useful to also examine more objective measures of changes in finances in order to better compare with the existing literature and to remove ambiguity about the underlying drivers. I turn to this now.

²³2.7% of individuals are in households that exceed this ratio.

Table C1: Drivers of changes in financial circumstances

	Finances improved			Finances worsened		
	All	Singles	2006, 2010	All	Singles	2006, 2010
Inc. imp.	0.007*	0.009	0.007	0.002	0.007	-0.003
	(0.004)	(0.007)	(0.006)	(0.003)	(0.008)	(0.005)
Inc. wor.	0.002	0.009	0.004	0.028***	0.038***	0.036***
	(0.005)	(0.007)	(0.007)	(0.006)	(0.011)	(0.010)
Rec. div.	0.004**	0.002	0.007**	-0.009***	-0.006	-0.009***
	(0.002)	(0.005)	(0.003)	(0.002)	(0.006)	(0.003)
Employed	0.001	0.003	0.000	-0.008***	-0.010*	-0.009***
	(0.002)	(0.004)	(0.003)	(0.002)	(0.005)	(0.003)
Rec. transfer	0.351***	0.385***	0.297***	0.013**	0.024	0.014
	(0.015)	(0.032)	(0.022)	(0.006)	(0.015)	(0.009)
Home val. imp.	0.011***	0.015	0.009*	-0.001	-0.003	-0.000
	(0.004)	(0.009)	(0.005)	(0.003)	(0.010)	(0.005)
Home val. wor.	0.016**	0.006	0.031**	0.010	0.018	0.010
	(0.008)	(0.015)	(0.015)	(0.007)	(0.019)	(0.013)
Sick/injury	0.007**	0.010	0.009	0.040***	0.054***	0.036***
	(0.003)	(0.007)	(0.006)	(0.005)	(0.011)	(0.006)
Prop. Crime	0.003	0.000	0.001	0.027***	0.036**	0.026***
	(0.005)	(0.009)	(0.008)	(0.007)	(0.016)	(0.010)
Home owner	-0.000	-0.002	-0.000	-0.019***	-0.020***	-0.014***
	(0.003)	(0.004)	(0.004)	(0.003)	(0.006)	(0.004)
Birth	0.001	0.033	0.014	0.005	-0.022	0.008
	(0.006)	(0.052)	(0.011)	(0.006)	(0.020)	(0.009)
HH bill high			0.000			0.079***
			(0.011)			(0.017)
Observations	38480	9607	14430	38480	9607	14430
Pseudo R^2	0.159	0.173	0.128	0.048	0.040	0.064

Note: In columns 2-4 (5-7) the dependent variable is an indicator for whether the individual reported that finances improved (worsened) in the last 12 months. Results are based on binary logit regressions and average marginal effects are reported. Inc. imp. (Inc. wor.) is an indicator for if real household disposable income increased (decreased) by at least 50% on the previous year. Rec. transfer is an indicator for if the individual received a lump sum transfer (e.g. bequest, redundancy). Home val. imp. (Home val. wor.) is an indicator for if the value of the own home increased (decreased) by at least 25% on the previous year. This indicator is set to zero when home value is missing in the previous year (< 2% of cases). Home owner is an indicator for being a home owner. Birth is an indicator for the birth or adoption of a child in the previous 12 months. HH bill high is an indicator for if the real value of current household bills exceeds 1% of current real household disposable income. Other variables are described in Tables 1 and B2. Cluster robust standard errors calculated using the delta method in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

C.2 Alternative measures of financial shocks

A more objective measure of financial shocks is large changes in real household disposable income. In this section I replace the self-assessed indicators for changes in financial circumstances with indicators for large fluctuations in real household disposable income. I treat an income shock of $\pm 50\%$ of last year's income as a baseline and consider the sensitivity of this by also estimating the model with a smaller (30%) and larger (70%) shock for comparison. In cases where household income is missing in the previous year (18% of observations) I act as if there was no financial shock.²⁴ Note as well that since I only observe current annual income, I have less information on the timing of the financial shock than with the life event variables. I therefore only have indicators for if the shock occurred 0-1 year ago, 1-2 years ago or 2-3+ years ago (noting that surveys are completed at intervals of approximately one-year on average). The frequencies for these income shock variables are in Table C2 and the regression results are reported in Table B3.

Table C2: Frequencies for income shocks

Life event	When event occurred			
	-(0-1) year	0-1 year	1-2 years	2-3+ years
30% income improvement	3912	4395	4626	15053
50% income improvement	2312	2636	2768	9380
70% income improvement	1575	1850	1888	6577
30% income drop	3104	3499	3482	14482
50% income drop	1244	1377	1430	8495
70% income drop	508	525	543	5573

Note: Pooled sample size is 38,481 (4,810 individuals). Data are from the years 2006, 2008 and 2010-2015.

The results for positive financial shocks are weaker when using income shocks compared to the life event variable. The only statistically significant effect (at 5%) is after 1-2 years in the case of a 30% income shock. This effect is positive, consistent with the main results (Table 3), and short-lived. The results for negative income shocks are more in-line with the life event variable. While not all effects are precisely estimated, looking across the rows of Table B2 there is evidence that negative income shocks are associated with greater risk willingness in the year before the event and greater risk aversion after the event and this is largely robust to different shock sizes. In contrast to the earlier results, there is a stronger indication of adaptation, in particular when restricting income shocks to be 70% of income in the previous 12 months.

These results may imply that the nature of the change in financial circumstances is important. Since the life event variable is strongly influenced by unanticipated exogenous increases in wealth, the evidence suggests that these shocks might matter more for preference formation than other income shocks, which are more likely to be anticipated or expected. When it comes to adverse financial shocks, income shocks seem to be more important. This

²⁴This is a conservative approach since it biases the results towards zero.

Table C3: BUC estimation results around real income shocks

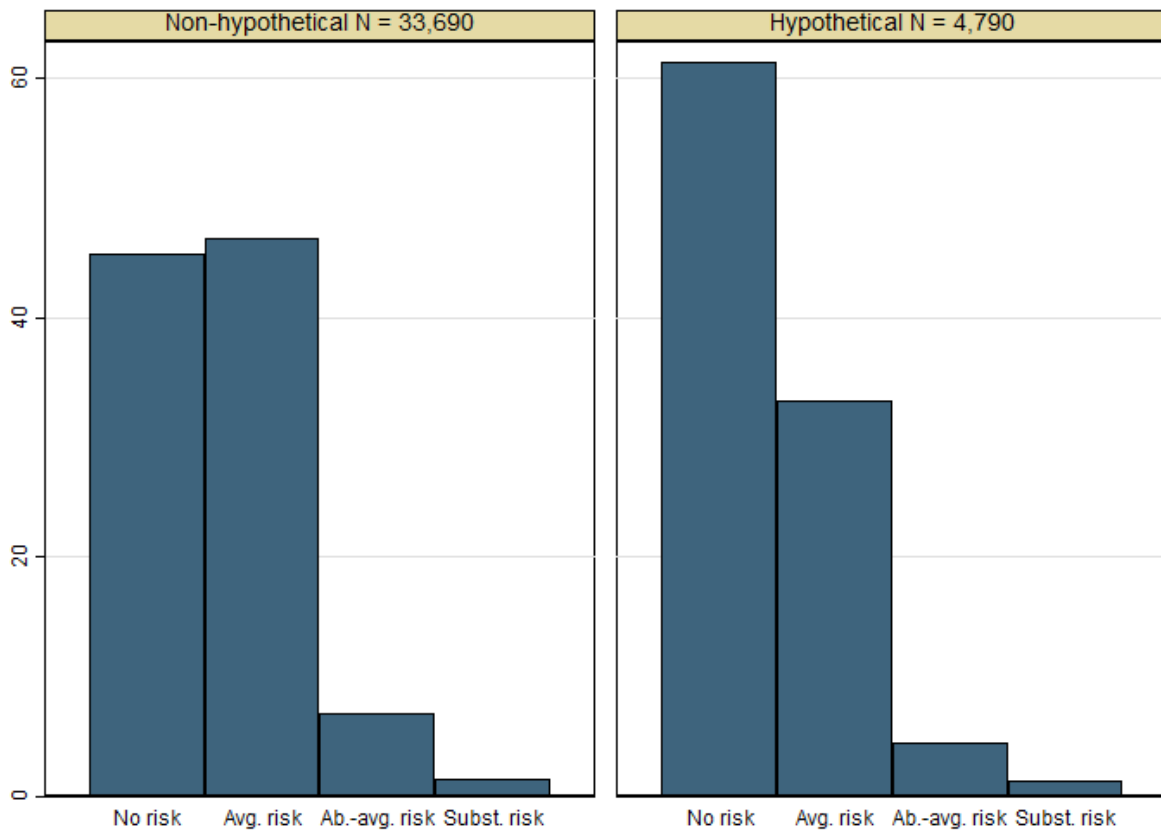
	Δ 50%		Δ 30%		Δ 70%	
	Inc. imp.	Inc. wor.	Inc. imp.	Inc. wor.	Inc. imp.	Inc. wor.
0-1 year before	0.967 (0.070)	1.079 (0.092)	0.982 (0.054)	1.074 (0.064)	0.976 (0.080)	1.077 (0.136)
0-1 year after	0.951 (0.066)	0.958 (0.088)	1.038 (0.056)	0.962 (0.057)	0.912 (0.075)	0.758* (0.108)
1-2 years after	1.100 (0.070)	0.882 (0.081)	1.108** (0.057)	0.869** (0.052)	1.025 (0.076)	0.825 (0.120)
2-3+ years after	1.003 (0.050)	0.919 (0.052)	1.062 (0.046)	0.895** (0.041)	0.952 (0.055)	0.929 (0.068)

Note: N= 31,736. T= 2006, 2008, 2010-2015. The estimation sample size is less than $N(4,968) \times T(8) \times K(3)$ because observations where outcomes do not vary over the period drop out of the likelihood function. Exponentiated coefficients (odds ratios) from three separate estimations of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. The main independent variables are changes in real household disposable income on the previous year. The estimations control for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple as well as a full set of year dummies. It also includes a full set of controls for other life events with indicators for if the event occurred -(0-1) year ago, 0-3 months ago, 3-6 months ago, 6-9 months ago, 9-12 months ago, 1-2 years ago or 2-3+ years ago. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

implies a degree of asymmetry in the way people respond to income shocks in terms of their risk preferences.

D Sensitivity analysis

Figure D1: Distribution of risk preferences in financial domain by hypothetical



Note: Results are for the pooled sample of 4,810 individuals across eight years 2006, 2008 and 2010-2015 (38,480 observations). Hypothetical responses are when people respond that they do not have any spare cash on the risk preference question, in which case they are asked to answer assuming they did have spare cash available for saving and investment.

Table D1: Main BUC estimation results excluding hypothetical responses

	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
0-1 year before	0.980 (0.092)	1.335** (0.161)	1.158** (0.077)	0.934 (0.176)	0.940 (0.102)	1.049 (0.245)
0-3 months after	1.402** (0.206)	0.496*** (0.115)	1.055 (0.122)	0.352*** (0.137)	1.153 (0.175)	0.602 (0.235)
3-6 months after	1.778*** (0.251)	0.778 (0.148)	1.073 (0.119)	0.473** (0.174)	1.049 (0.184)	1.617 (0.662)
6-9 months after	1.382* (0.269)	1.139 (0.347)	1.011 (0.150)	1.237 (0.464)	1.541* (0.374)	0.378* (0.192)
9-12 months after	1.394 (0.304)	0.991 (0.224)	1.057 (0.131)	0.813 (0.291)	1.043 (0.235)	1.032 (0.432)
1-2 years after	1.343*** (0.136)	0.930 (0.117)	1.107 (0.080)	0.641** (0.144)	1.022 (0.110)	0.800 (0.206)
2-3+ years after	1.191 (0.128)	0.748** (0.092)	1.046 (0.086)	0.665** (0.133)	1.015 (0.116)	1.132 (0.279)

Note: N= 26,118. T= 2006, 2008, 2010-2015. Exponentiated coefficients (odds ratios) from a single estimation of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. Observations where respondents initially answered the risk preference question with “I never have any spare cash” have been dropped from the estimation. The estimation controls for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple as well as a full set of year dummies. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D2: Main BUC estimation results controlling for hypothetical responses

	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
0-1 year before	0.969 (0.085)	1.242** (0.129)	1.126** (0.066)	1.106 (0.198)	0.965 (0.096)	1.150 (0.241)
0-3 months after	1.314* (0.186)	0.553*** (0.113)	1.023 (0.107)	0.393** (0.148)	1.125 (0.153)	0.583 (0.223)
3-6 months after	1.659*** (0.224)	0.784 (0.131)	1.081 (0.106)	0.544* (0.186)	1.038 (0.160)	1.383 (0.474)
6-9 months after	1.312 (0.242)	0.861 (0.245)	0.946 (0.123)	0.982 (0.369)	1.468* (0.307)	0.484* (0.205)
9-12 months after	1.314 (0.264)	0.838 (0.151)	1.153 (0.128)	0.697 (0.250)	0.939 (0.204)	0.980 (0.387)
1-2 years after	1.261** (0.120)	0.938 (0.098)	1.095 (0.070)	0.746 (0.155)	1.068 (0.103)	0.757 (0.172)
2-3+ years after	1.124 (0.115)	0.688*** (0.076)	1.025 (0.078)	0.719* (0.135)	1.048 (0.109)	1.067 (0.235)

Note: N= 31,736. T= 2006, 2008, 2010-2015. Exponentiated coefficients (odds ratios) from a single estimation of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. Observations where respondents initially answered the risk preference question with “I never have any spare cash” have been dropped from the estimation. The estimation controls for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple, a full set of year dummies and a dummy for if the respondent indicated they do not have spare cash for investment so answered the risk preference question hypothetically. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D3: Main BUC estimation results excluding missing life event quarters

	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
0-1 year before	1.051 (0.107)	1.311** (0.165)	1.119* (0.074)	1.176 (0.237)	0.900 (0.100)	1.060 (0.266)
0-3 months after	1.280 (0.200)	0.529*** (0.121)	0.965 (0.115)	0.352*** (0.138)	1.140 (0.181)	0.673 (0.299)
3-6 months after	1.528** (0.263)	0.880 (0.216)	1.042 (0.128)	0.428** (0.163)	1.203 (0.230)	1.982* (0.822)
6-9 months after	1.205 (0.243)	0.979 (0.279)	0.944 (0.143)	0.920 (0.345)	1.513* (0.359)	0.518 (0.274)
9-12 months after	1.426 (0.309)	0.858 (0.205)	1.087 (0.139)	0.903 (0.305)	1.095 (0.253)	0.595 (0.224)
1-2 years after	1.273** (0.139)	1.026 (0.134)	1.093 (0.083)	0.680* (0.153)	1.002 (0.111)	0.911 (0.270)
2-3+ years after	1.219 (0.147)	0.801 (0.111)	1.008 (0.084)	0.680* (0.138)	1.082 (0.129)	0.932 (0.251)

Note: N= 26,056. T= 2006, 2008, 2010-2015. Exponentiated coefficients (odds ratios) from a single estimation of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. Respondents are excluded from the estimation sample if at any point during 2004-2015 they indicate experiencing a life event in the previous 12 months but do not indicate in which quarter (i.e. 0-3, 3-6, 6-9 or 9-12 months ago) this occurred. The estimation controls for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple as well as a full set of year dummies. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D4: Main BUC estimation results with aggregate first year effect

	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
0-1 year before	0.966 (0.084)	1.233** (0.126)	1.137** (0.066)	1.109 (0.198)	0.948 (0.090)	1.075 (0.218)
0-1 year after	1.352*** (0.113)	0.826* (0.088)	1.059 (0.065)	0.612** (0.123)	1.101 (0.099)	0.805 (0.170)
1-2 years after	1.223** (0.113)	0.984 (0.099)	1.112* (0.070)	0.774 (0.159)	1.043 (0.099)	0.789 (0.174)
2-3+ years after	1.096 (0.109)	0.707*** (0.075)	1.037 (0.078)	0.764 (0.143)	1.026 (0.105)	1.042 (0.220)

Note: N= 31,736. T= 2006, 2008, 2010-2015. Exponentiated coefficients (odds ratios) from a single estimation of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. The estimation controls for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple as well as a full set of year dummies. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D5: Main BUC estimation results with immediate adaptation to old events

	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
0-1 year before	0.961 (0.082)	1.244** (0.131)	1.130** (0.065)	1.146 (0.209)	0.937 (0.090)	1.145 (0.235)
0-3 months after	1.252 (0.182)	0.526*** (0.110)	1.054 (0.124)	0.391** (0.147)	1.103 (0.171)	0.610 (0.233)
3-6 months after	1.609*** (0.230)	0.794 (0.144)	1.101 (0.122)	0.534* (0.184)	1.029 (0.172)	1.417 (0.496)
6-9 months after	1.319 (0.252)	0.826 (0.225)	0.953 (0.134)	0.991 (0.359)	1.343 (0.300)	0.530 (0.236)
9-12 months after	1.341 (0.275)	0.786 (0.154)	1.207 (0.156)	0.653 (0.232)	0.851 (0.193)	0.922 (0.366)
1-2 years after	1.311** (0.154)	0.825 (0.116)	1.094 (0.100)	0.791 (0.173)	1.012 (0.133)	0.878 (0.220)
2-3+ years after	1.051 (0.115)	0.690*** (0.086)	1.021 (0.089)	0.754 (0.146)	0.982 (0.117)	1.201 (0.273)

Note: N= 31,736. T= 2006, 2008, 2010-2015. Exponentiated coefficients (odds ratios) from a single estimation of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. When a new life event occurs, respondents are assumed to immediately adapt to the previous event. For example, if in a given year a person experiences an improvement in finances and then the following year experiences a second improvement in finances, the indicators for the first event are set to zero, effectively assuming that people are only affected by the most recent event. The estimation controls for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple as well as a full set of year dummies. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D6: Main BUC estimation results with alternative definitions of health shocks

	Grip wor.	Health wor.	Health imp.
0-1 year before	1.097 (0.127)	1.248 (0.208)	1.034 (0.100)
0-1 year after	1.056 (0.145)	0.937 (0.148)	1.007 (0.092)
1-2 years after	0.927 (0.121)	1.076 (0.166)	0.979 (0.092)
2-3+ years after	0.952 (0.115)	0.943 (0.128)	0.945 (0.072)

Note: N= 31,736. T= 2006, 2008, 2010-2015. Exponentiated coefficients (odds ratios) from a two separate estimations of the BUC ordered fixed effects logit model are reported. The dependent variable is risk preferences in the financial domain, measured on a 1-4 scale. The first estimation (column 2) replaces the life event indicator for a health shock with an indicator for if the respondent reports experiencing difficulty gripping things in the current wave but did not report this in the previous wave. In the second estimation (columns 3-4) an adverse health shocks is where respondents report that their health is ‘much worse now than one year ago’. A favorable health shock is where they report their health is ‘much better now than one year ago’. Both estimation control for the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple as well as a full set of year dummies. It also includes a full set of controls for other life events with indicators for if the event occurred -(0-1) year ago, 0-3 months ago, 3-6 months ago, 6-9 months ago, 9-12 months ago, 1-2 years ago or 2-3+ years ago. Cluster robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table D7: Regression results: With gender interactions

	Fin. imp.	Fin. wor.	Sick	Fbirth	Crime	Death
<i>OR estimates for females (baseline group)</i>						
0-1 year before	0.952 (0.117)	1.118 (0.162)	1.063 (0.089)	1.058 (0.268)	1.087 (0.167)	1.541 (0.418)
0-3 months after	1.362 (0.275)	0.700 (0.229)	1.063 (0.153)	0.365* (0.223)	1.103 (0.227)	0.445* (0.219)
3-6 months after	1.528** (0.258)	1.029 (0.243)	1.120 (0.162)	0.837 (0.366)	1.220 (0.268)	2.004* (0.802)
6-9 months after	1.222 (0.282)	0.827 (0.301)	0.976 (0.188)	1.871 (1.138)	1.276 (0.437)	0.747 (0.372)
9-12 months after	1.382 (0.374)	0.742 (0.195)	1.035 (0.157)	0.490 (0.225)	1.031 (0.344)	1.755 (0.909)
1-2 years after	1.276* (0.164)	0.862 (0.126)	1.146 (0.102)	0.933 (0.242)	1.140 (0.153)	0.742 (0.230)
2-3+ years after	1.152 (0.157)	0.571*** (0.085)	1.048 (0.106)	0.997 (0.239)	0.937 (0.137)	1.086 (0.281)
<i>OR estimates interaction with male dummy</i>						
0-1 year before	1.037 (0.180)	1.184 (0.241)	1.148 (0.133)	1.148 (0.418)	0.792 (0.154)	0.426** (0.168)
0-3 months after	0.834 (0.231)	0.741 (0.302)	0.940 (0.194)	1.093 (0.837)	1.037 (0.282)	1.680 (1.249)
3-6 months after	1.040 (0.275)	0.789 (0.257)	0.937 (0.184)	0.345 (0.231)	0.730 (0.219)	0.373 (0.253)
6-9 months after	0.929 (0.344)	1.315 (0.673)	0.895 (0.236)	0.351 (0.260)	1.260 (0.546)	0.329 (0.313)
9-12 months after	0.833 (0.332)	1.431 (0.522)	1.258 (0.280)	2.360 (1.558)	0.834 (0.361)	0.195** (0.147)
1-2 years after	0.942 (0.178)	1.211 (0.242)	0.922 (0.116)	0.653 (0.259)	0.868 (0.165)	1.124 (0.502)
2-3+ years after	0.897 (0.173)	1.429* (0.296)	0.958 (0.132)	0.593 (0.201)	1.212 (0.240)	0.947 (0.421)

Note: N= 31,736. T= 2006, 2008, 2010-2015. Sample only includes males. Cluster robust standard errors in parenthesis. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. See Table 3 for additional details. Note the overall OR for males can be recovered by multiplying the interaction effects with the baseline effects. For example, the overall OR for a male who experienced a financial improvement 0-3 months ago is $1.362 \times 0.834 = 1.136$.

E Ancillary results

Table E1: Estimates from Figure 3: Wealth mediation

	(1) Baseline	(2) Ln income	(3) Ln consume	(4) Financial stress
<i>Improved finances</i>				
0-1 year before	-0.012 (0.022)	-0.013 (0.022)	-0.012 (0.022)	-0.011 (0.022)
0-3 months after	0.063* (0.037)	0.063* (0.037)	0.063* (0.037)	0.041 (0.038)
3-6 months after	0.123*** (0.037)	0.122*** (0.037)	0.122*** (0.037)	0.103*** (0.037)
6-9 months after	0.039 (0.043)	0.038 (0.043)	0.037 (0.043)	0.020 (0.043)
9-12 months after	0.047 (0.047)	0.046 (0.047)	0.047 (0.047)	0.031 (0.047)
1-2 years after	0.043* (0.024)	0.043* (0.024)	0.042* (0.024)	0.032 (0.024)
2-3+ years after	0.012 (0.025)	0.011 (0.025)	0.010 (0.025)	0.001 (0.025)
<i>Worsened finances</i>				
0-1 year before	0.062** (0.030)	0.062** (0.030)	0.063** (0.030)	0.070** (0.029)
0-3 months after	-0.141*** (0.051)	-0.140*** (0.051)	-0.141*** (0.051)	-0.119** (0.052)
3-6 months after	-0.016 (0.047)	-0.014 (0.047)	-0.014 (0.047)	0.010 (0.047)
6-9 months after	-0.030 (0.066)	-0.029 (0.066)	-0.029 (0.066)	-0.005 (0.067)
9-12 months after	-0.024 (0.050)	-0.020 (0.050)	-0.022 (0.050)	0.004 (0.050)
1-2 years after	-0.014 (0.028)	-0.011 (0.029)	-0.012 (0.029)	0.001 (0.029)
2-3+ years after	-0.100*** (0.029)	-0.098*** (0.029)	-0.097*** (0.029)	-0.088*** (0.029)
<i>Injury or illness</i>				
0-1 year before	0.031** (0.014)	0.031** (0.014)	0.031** (0.014)	0.030** (0.014)
0-3 months after	0.008 (0.024)	0.009 (0.024)	0.008 (0.024)	0.010 (0.024)
3-6 months after	0.011 (0.022)	0.011 (0.022)	0.011 (0.022)	0.013 (0.022)

6-9 months after	-0.020	-0.020	-0.021	-0.020
	(0.029)	(0.029)	(0.029)	(0.029)
9-12 months after	0.037	0.037	0.036	0.037
	(0.027)	(0.027)	(0.027)	(0.027)
1-2 years after	0.020	0.019	0.019	0.021
	(0.015)	(0.015)	(0.015)	(0.015)
2-3+ years after	0.007	0.007	0.007	0.009
	(0.018)	(0.018)	(0.018)	(0.018)
<i>Birth first child</i>				
0-1 year before	0.043	0.043	0.042	0.043
	(0.052)	(0.052)	(0.052)	(0.052)
0-3 months after	-0.245***	-0.240**	-0.242**	-0.245***
	(0.094)	(0.094)	(0.094)	(0.094)
3-6 months after	-0.165*	-0.158*	-0.163*	-0.141
	(0.091)	(0.091)	(0.091)	(0.091)
6-9 months after	0.017	0.023	0.020	0.023
	(0.099)	(0.099)	(0.098)	(0.098)
9-12 months after	-0.086	-0.081	-0.087	-0.086
	(0.088)	(0.088)	(0.088)	(0.088)
1-2 years after	-0.069	-0.059	-0.069	-0.059
	(0.055)	(0.055)	(0.055)	(0.054)
2-3+ years after	-0.064	-0.051	-0.065	-0.059
	(0.051)	(0.052)	(0.051)	(0.051)
<i>Victim of property crime</i>				
0-1 year before	-0.017	-0.017	-0.017	-0.019
	(0.025)	(0.025)	(0.025)	(0.025)
0-3 months after	0.028	0.028	0.029	0.028
	(0.036)	(0.036)	(0.036)	(0.036)
3-6 months after	0.014	0.014	0.014	0.014
	(0.041)	(0.041)	(0.041)	(0.041)
6-9 months after	0.116*	0.116*	0.116*	0.118*
	(0.062)	(0.062)	(0.062)	(0.062)
9-12 months after	-0.016	-0.017	-0.017	-0.016
	(0.053)	(0.053)	(0.053)	(0.053)
1-2 years after	0.013	0.012	0.013	0.010
	(0.026)	(0.025)	(0.026)	(0.026)
2-3+ years after	0.005	0.004	0.005	0.003
	(0.027)	(0.026)	(0.026)	(0.026)
<i>Death of child or spouse</i>				
0-1 year before	0.018	0.018	0.018	0.020
	(0.043)	(0.043)	(0.044)	(0.043)
0-3 months after	-0.121	-0.120	-0.123	-0.129*
	(0.077)	(0.077)	(0.077)	(0.077)

3-6 months after	0.091	0.094	0.089	0.082
	(0.066)	(0.066)	(0.066)	(0.066)
6-9 months after	-0.120	-0.117	-0.121	-0.120
	(0.082)	(0.081)	(0.082)	(0.082)
9-12 months after	0.016	0.014	0.015	0.009
	(0.079)	(0.079)	(0.079)	(0.080)
1-2 years after	-0.049	-0.048	-0.049	-0.053
	(0.048)	(0.048)	(0.048)	(0.048)
2-3+ years after	0.028	0.028	0.027	0.022
	(0.047)	(0.047)	(0.047)	(0.047)
Age sq	-0.000***	-0.000***	-0.000***	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
University	0.008	0.009	0.010	0.001
	(0.072)	(0.071)	(0.072)	(0.072)
Diploma	-0.004	-0.003	-0.002	-0.003
	(0.061)	(0.061)	(0.061)	(0.061)
Student	-0.066	-0.063	-0.065	-0.062
	(0.042)	(0.042)	(0.042)	(0.042)
Region	-0.022	-0.021	-0.020	-0.025
	(0.043)	(0.043)	(0.043)	(0.043)
Employed	0.012	0.006	0.011	0.004
	(0.017)	(0.017)	(0.017)	(0.017)
Unemployed	-0.010	-0.011	-0.009	-0.002
	(0.039)	(0.039)	(0.039)	(0.039)
Retired	-0.030*	-0.029*	-0.029*	-0.031*
	(0.016)	(0.016)	(0.016)	(0.016)
Couple	0.053**	0.051*	0.056**	0.043
	(0.026)	(0.026)	(0.027)	(0.027)
2008	0.030*	0.027	0.028	0.029
	(0.018)	(0.018)	(0.018)	(0.018)
2010	-0.007	-0.013	-0.011	-0.009
	(0.027)	(0.027)	(0.027)	(0.027)
2011	-0.002	-0.009	-0.005	-0.002
	(0.033)	(0.034)	(0.034)	(0.033)
2012	0.005	-0.004	0.001	0.003
	(0.039)	(0.039)	(0.039)	(0.038)
2013	0.069	0.059	0.065	0.066
	(0.044)	(0.044)	(0.044)	(0.044)
2014	0.074	0.063	0.069	0.070
	(0.050)	(0.050)	(0.050)	(0.050)
2015	0.044	0.033	0.039	0.040
	(0.056)	(0.056)	(0.056)	(0.056)
Ln dis. income		0.032***		

		(0.011)		
Ln consumption			0.031**	0.024*
			(0.014)	(0.014)
<i>Ability to raise \$2,000 (\$3,000 in wave 9+)</i>				
Some sacrifices				-0.042***
				(0.015)
Something drastic				-0.059**
				(0.025)
Couldn't raise				-0.094***
				(0.029)
<i>Prosperity</i>				
Very comfortable				-0.147***
				(0.045)
Reasonably comfortable				-0.197***
				(0.048)
Just getting along				-0.246***
				(0.050)
Poor				-0.238***
				(0.059)
Very poor				-0.307***
				(0.089)
Constant	0.412***	0.061	0.090	0.395*
	(0.142)	(0.182)	(0.209)	(0.217)
Observations	38101	38101	38101	38101

Note: T= 2006, 2008, 2010-2015. The estimates are from an OLS fixed effects regression on risk preferences (standardized) in the financial domain [1-4 scale]. The sample size is slightly smaller than for the main regression results because observations are dropped if household income is negative or if the financial means variables are missing. The base group for ability to raise \$2,000 (\$3,000 in wave 9+) is "Could easily raise emergency funds". The base group for Prosperity is "Prosperous". Cluster robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table E2: Estimates from mental health and mood mediation

	(1) Baseline	(2) M H score	(3) Pos/Neg Affect	(4) Life sat.
<i>Improved finances</i>				
0-1 year before	-0.007 (0.022)	-0.007 (0.022)	-0.007 (0.022)	-0.007 (0.022)
0-3 months after	0.049 (0.037)	0.049 (0.037)	0.049 (0.037)	0.049 (0.037)
3-6 months after	0.123*** (0.037)	0.123*** (0.037)	0.123*** (0.037)	0.123*** (0.037)
6-9 months after	0.043 (0.043)	0.043 (0.043)	0.043 (0.043)	0.043 (0.043)
9-12 months after	0.048 (0.047)	0.048 (0.047)	0.048 (0.047)	0.048 (0.047)
1-2 years after	0.047** (0.024)	0.047** (0.024)	0.047** (0.024)	0.047** (0.024)
2-3+ years after	0.017 (0.025)	0.017 (0.025)	0.017 (0.025)	0.017 (0.025)
<i>Worsened finances</i>				
0-1 year before	0.053* (0.029)	0.053* (0.029)	0.053* (0.029)	0.053* (0.029)
0-3 months after	-0.131*** (0.050)	-0.130*** (0.050)	-0.130*** (0.050)	-0.131*** (0.050)
3-6 months after	-0.026 (0.048)	-0.025 (0.048)	-0.026 (0.048)	-0.026 (0.048)
6-9 months after	-0.011 (0.066)	-0.010 (0.066)	-0.010 (0.066)	-0.011 (0.066)
9-12 months after	-0.017 (0.050)	-0.016 (0.050)	-0.016 (0.050)	-0.016 (0.050)
1-2 years after	-0.020 (0.028)	-0.020 (0.028)	-0.020 (0.028)	-0.020 (0.028)
2-3+ years after	-0.096*** (0.029)	-0.096*** (0.029)	-0.096*** (0.029)	-0.096*** (0.029)
<i>Injury or illness</i>				
0-1 year before	0.024* (0.013)	0.024* (0.013)	0.024* (0.013)	0.024* (0.013)
0-3 months after	0.015 (0.024)	0.016 (0.024)	0.016 (0.024)	0.015 (0.024)
3-6 months after	0.012 (0.022)	0.012 (0.023)	0.013 (0.023)	0.012 (0.022)
6-9 months after	-0.020 (0.029)	-0.019 (0.029)	-0.019 (0.029)	-0.020 (0.029)

9-12 months after	0.041 (0.027)	0.041 (0.027)	0.041 (0.027)	0.041 (0.027)
1-2 years after	0.017 (0.015)	0.017 (0.015)	0.017 (0.015)	0.017 (0.015)
2-3+ years after	0.004 (0.018)	0.004 (0.018)	0.004 (0.018)	0.004 (0.018)
<i>Birth first child</i>				
0-1 year before	0.036 (0.052)	0.036 (0.052)	0.036 (0.051)	0.036 (0.052)
0-3 months after	-0.235** (0.094)	-0.235** (0.094)	-0.235** (0.094)	-0.235** (0.094)
3-6 months after	-0.175* (0.092)	-0.175* (0.092)	-0.175* (0.092)	-0.175* (0.092)
6-9 months after	0.035 (0.095)	0.034 (0.095)	0.035 (0.095)	0.035 (0.095)
9-12 months after	-0.089 (0.089)	-0.089 (0.089)	-0.089 (0.089)	-0.089 (0.089)
1-2 years after	-0.078 (0.055)	-0.078 (0.055)	-0.077 (0.055)	-0.078 (0.055)
2-3+ years after	-0.066 (0.051)	-0.066 (0.051)	-0.066 (0.051)	-0.066 (0.051)
<i>Victim of property crime</i>				
0-1 year before	-0.013 (0.025)	-0.013 (0.025)	-0.013 (0.025)	-0.013 (0.025)
0-3 months after	0.031 (0.036)	0.031 (0.036)	0.031 (0.036)	0.031 (0.036)
3-6 months after	0.013 (0.041)	0.014 (0.041)	0.014 (0.041)	0.014 (0.041)
6-9 months after	0.118* (0.062)	0.118* (0.062)	0.118* (0.062)	0.118* (0.062)
9-12 months after	-0.020 (0.053)	-0.020 (0.053)	-0.020 (0.053)	-0.020 (0.053)
1-2 years after	0.017 (0.025)	0.017 (0.025)	0.017 (0.025)	0.017 (0.025)
2-3+ years after	0.008 (0.027)	0.008 (0.027)	0.008 (0.027)	0.008 (0.027)
<i>Death of child or spouse</i>				
0-1 year before	0.014 (0.048)	0.015 (0.048)	0.015 (0.048)	0.014 (0.048)
0-3 months after	-0.116 (0.079)	-0.114 (0.079)	-0.115 (0.079)	-0.116 (0.079)
3-6 months after	0.059 (0.070)	0.060 (0.070)	0.060 (0.070)	0.059 (0.070)

6-9 months after	-0.125 (0.082)	-0.124 (0.082)	-0.124 (0.082)	-0.124 (0.082)
9-12 months after	0.021 (0.078)	0.022 (0.078)	0.022 (0.078)	0.022 (0.078)
1-2 years after	-0.052 (0.049)	-0.052 (0.049)	-0.052 (0.049)	-0.052 (0.049)
2-3+ years after	0.023 (0.048)	0.023 (0.048)	0.023 (0.048)	0.023 (0.048)
Age sq	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
University	-0.006 (0.072)	-0.006 (0.072)	-0.006 (0.072)	-0.006 (0.072)
Diploma	-0.012 (0.061)	-0.012 (0.061)	-0.012 (0.061)	-0.012 (0.061)
Student	-0.072* (0.042)	-0.071* (0.042)	-0.071* (0.042)	-0.072* (0.042)
Region	-0.019 (0.043)	-0.019 (0.043)	-0.019 (0.043)	-0.019 (0.043)
Employed	0.016 (0.017)	0.016 (0.017)	0.017 (0.017)	0.016 (0.017)
Unemployed	-0.008 (0.039)	-0.008 (0.039)	-0.008 (0.039)	-0.008 (0.039)
Retired	-0.030* (0.016)	-0.030* (0.016)	-0.030* (0.016)	-0.030* (0.016)
Couple	0.063** (0.026)	0.063** (0.026)	0.063** (0.026)	0.063** (0.026)
2008	0.030 (0.018)	0.030 (0.018)	0.030 (0.018)	0.030 (0.018)
2010	-0.008 (0.027)	-0.008 (0.027)	-0.008 (0.027)	-0.008 (0.027)
2011	-0.000 (0.033)	-0.000 (0.033)	-0.000 (0.033)	-0.000 (0.033)
2012	0.003 (0.039)	0.003 (0.039)	0.003 (0.039)	0.003 (0.039)
2013	0.066 (0.044)	0.066 (0.044)	0.066 (0.044)	0.066 (0.044)
2014	0.069 (0.050)	0.069 (0.050)	0.069 (0.050)	0.069 (0.050)
2015	0.041 (0.056)	0.041 (0.056)	0.041 (0.056)	0.041 (0.056)
SF36 MH score		0.000 (0.000)		
Positive affect			-0.005	

			(0.007)	
Negative affect			-0.002	
			(0.009)	
Life satisfaction				0.001
				(0.006)
Constant	0.387***	0.374***	0.412***	0.388***
	(0.142)	(0.144)	(0.153)	(0.142)
<i>N</i>	38014	38014	38014	38014

Note: T= 2006, 2008, 2010-2015. The estimates are from an OLS fixed effects regression on risk preferences (standardized) in the financial domain [1-4 scale]. The sample size is slightly smaller than for the main regression results because observations are dropped if mental health, positive/negative affect or SWB are missing. Positive affect is the mean response to the following: “Felt calm and peaceful” and “Been a happy person”. Negative affect is the mean response to the following: “Been a nervous person”, “Felt so down in the dumps nothing could cheer you up” and “Felt down”. These are answered on a scale 1 (all of the time) to 6 (none of the time). Life satisfaction is standardized value of “All things considered, how satisfied are you with your life?” – which ranges from 0 (extremely dissatisfied) to 10 (extremely satisfied). Cluster robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table E3: Estimates from Figure 4: Regression on life satisfaction

<i>Improved finances</i>		
0-1 year before	-0.575	(0.522)
0-3 months after	0.666	(0.708)
3-6 months after	0.397	(0.794)
6-9 months after	-1.329	(0.882)
9-12 months after	-1.254	(1.110)
1-2 years after	0.739	(0.474)
2-3+ years after	-0.519	(0.375)
<i>Worsened finances</i>		
0-1 year before	0.360	(0.729)
0-3 months after	1.192	(1.490)
3-6 months after	-0.316	(1.040)
6-9 months after	-0.845	(1.954)
9-12 months after	0.442	(1.651)
1-2 years after	-0.343	(0.694)
2-3+ years after	-0.799	(0.514)
<i>Injury or illness</i>		
0-1 year before	-0.551*	(0.328)
0-3 months after	-0.387	(0.631)
3-6 months after	-0.462	(0.579)
6-9 months after	0.281	(0.597)
9-12 months after	-0.264	(0.691)
1-2 years after	-0.600	(0.392)
2-3+ years after	0.261	(0.296)
<i>Birth first child</i>		
0-1 year before	-0.414	(1.101)
0-3 months after	-0.549	(1.767)
3-6 months after	-1.587	(1.192)
6-9 months after	1.832	(2.425)
9-12 months after	-0.342	(1.715)
1-2 years after	-0.212	(1.033)
2-3+ years after	-0.352	(0.446)
<i>Victim of property crime</i>		
0-1 year before	-0.015	(0.466)
0-3 months after	0.809	(0.990)
3-6 months after	-0.518	(0.922)
6-9 months after	1.188	(1.387)
9-12 months after	-0.923	(0.960)
1-2 years after	-0.136	(0.568)
2-3+ years after	-0.230	(0.375)
<i>Death of child or spouse</i>		

0-1 year before	0.601	(1.147)
0-3 months after	7.399**	(3.717)
3-6 months after	1.075	(2.860)
6-9 months after	3.337	(2.147)
9-12 months after	-2.188	(2.230)
1-2 years after	0.593	(1.061)
2-3+ years after	-1.965**	(0.768)
<i>Improved finances</i> × <i>Ln equivalized household consumption</i>		
0-1 year before	0.053	(0.050)
0-3 months after	-0.054	(0.068)
3-6 months after	-0.025	(0.076)
6-9 months after	0.139	(0.086)
9-12 months after	0.128	(0.108)
1-2 years after	-0.068	(0.046)
2-3+ years after	0.054	(0.036)
<i>Worsened finances</i> × <i>Ln equivalized household consumption</i>		
0-1 year before	-0.050	(0.071)
0-3 months after	-0.151	(0.146)
3-6 months after	-0.008	(0.102)
6-9 months after	0.042	(0.192)
9-12 months after	-0.097	(0.163)
1-2 years after	0.025	(0.068)
2-3+ years after	0.071	(0.050)
<i>Injury or illness</i> × <i>Ln equivalized household consumption</i>		
0-1 year before	0.052	(0.032)
0-3 months after	0.024	(0.061)
3-6 months after	0.028	(0.056)
6-9 months after	-0.036	(0.058)
9-12 months after	0.013	(0.067)
1-2 years after	0.053	(0.038)
2-3+ years after	-0.031	(0.029)
<i>Birth first child</i> × <i>Ln equivalized household consumption</i>		
0-1 year before	0.052	(0.107)
0-3 months after	0.074	(0.176)
3-6 months after	0.171	(0.117)
6-9 months after	-0.169	(0.237)
9-12 months after	0.040	(0.167)
1-2 years after	0.010	(0.100)
2-3+ years after	0.023	(0.043)
<i>Victim of property crime</i> × <i>Ln equivalized household consumption</i>		
0-1 year before	0.000	(0.045)
0-3 months after	-0.083	(0.095)
3-6 months after	0.043	(0.090)

6-9 months after	-0.118	(0.133)
9-12 months after	0.089	(0.093)
1-2 years after	0.012	(0.055)
2-3+ years after	0.019	(0.036)
<i>Death of child or spouse × Ln equivalized household consumption</i>		
0-1 year before	-0.083	(0.112)
0-3 months after	-0.754**	(0.372)
3-6 months after	-0.136	(0.281)
6-9 months after	-0.365*	(0.218)
9-12 months after	0.181	(0.216)
1-2 years after	-0.068	(0.104)
2-3+ years after	0.190**	(0.075)
Age sq	-0.000	(0.000)
University	-0.039	(0.076)
Diploma	0.039	(0.065)
Student	-0.026	(0.045)
Region	-0.060	(0.051)
Employed	0.069***	(0.023)
Unemployed	-0.130***	(0.047)
Retired	0.086***	(0.020)
Couple	0.185***	(0.029)
2008	0.018	(0.018)
2010	0.016	(0.028)
2011	0.062*	(0.033)
2012	0.055	(0.039)
2013	0.064	(0.044)
2014	0.089*	(0.050)
2015	0.102*	(0.056)
Ln consumption	0.013	(0.020)
Constant	-0.237	(0.256)

Note: N= 38,468 (4,810 individuals). T= 2006, 2008, 2010-2015. The estimates are from an OLS fixed effects regression on the standardized value of life satisfaction [0-10 scale]. The sample size is slightly smaller than for the main regression results because observations are dropped if SWB is missing. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table E4: Regression results general risk preferences

	(1) OLS	(2) 2SU-OLS	(3) 2SC-OLS
<i>Improved finances</i>			
0-1 year before	0.111 (0.083)	0.068 (0.077)	0.031 (0.079)
0-1 year after	0.156** (0.075)	0.123* (0.068)	0.093 (0.074)
1-2 years after	0.002 (0.074)	0.032 (0.063)	0.058 (0.067)
2-3+ years after	0.037 (0.034)	-0.005 (0.032)	-0.043 (0.038)
<i>Worsened finances</i>			
0-1 year before	0.039 (0.106)	0.139 (0.097)	0.228** (0.101)
0-1 year after	0.018 (0.112)	-0.009 (0.105)	-0.034 (0.112)
1-2 years after	-0.077 (0.106)	-0.079 (0.093)	-0.081 (0.097)
2-3+ years after	0.060 (0.040)	0.006 (0.040)	-0.042 (0.048)
<i>Injury or illness</i>			
0-1 year before	-0.047 (0.048)	-0.011 (0.045)	0.022 (0.048)
0-1 year after	-0.029 (0.050)	-0.008 (0.045)	0.010 (0.048)
1-2 years after	0.050 (0.051)	0.066 (0.049)	0.079 (0.052)
2-3+ years after	-0.003 (0.029)	0.026 (0.028)	0.052 (0.032)
<i>Birth first child</i>			
0-1 year before	-0.440** (0.200)	-0.403* (0.213)	-0.369 (0.242)
0-1 year after	-0.205 (0.139)	-0.273 (0.169)	-0.333 (0.209)
1-2 years after	-0.452** (0.191)	-0.497*** (0.150)	-0.538*** (0.171)
2-3+ years after	0.016 (0.050)	-0.042 (0.051)	-0.093 (0.067)
<i>Victim of property crime</i>			
0-1 year before	-0.019 (0.097)	-0.069 (0.087)	-0.114 (0.093)

0-1 year after	0.021 (0.087)	0.033 (0.079)	0.043 (0.086)
1-2 years after	0.046 (0.078)	0.055 (0.073)	0.062 (0.083)
2-3+ years after	0.060* (0.033)	0.057* (0.033)	0.055 (0.039)
<i>Death of child or spouse</i>			
0-1 year before	-0.033 (0.151)	0.014 (0.142)	0.056 (0.153)
0-1 year after	0.095 (0.175)	0.049 (0.150)	0.008 (0.136)
1-2 years after	-0.163 (0.158)	-0.090 (0.148)	-0.026 (0.142)
2-3+ years after	-0.032 (0.068)	-0.011 (0.061)	0.008 (0.067)
Age	-0.007 (0.008)	-0.018** (0.007)	-0.028*** (0.008)
Age sq	-0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Overseas	0.066* (0.035)	0.097*** (0.032)	0.123*** (0.034)
University	0.275*** (0.033)	0.039 (0.047)	-0.171** (0.073)
Diploma	0.198*** (0.045)	0.068 (0.051)	-0.047 (0.071)
Student	0.078 (0.124)	0.088 (0.114)	0.097 (0.119)
Region	0.065 (0.044)	0.090** (0.046)	0.112** (0.057)
Employed	0.077 (0.057)	0.027 (0.053)	-0.018 (0.057)
Unemployed	0.212* (0.119)	0.165 (0.109)	0.124 (0.125)
Retired	-0.180*** (0.067)	-0.165*** (0.062)	-0.151** (0.066)
Couple	-0.002 (0.034)	-0.035 (0.034)	-0.063 (0.040)
Male	0.339*** (0.041)	0.204*** (0.037)	0.083** (0.038)
Mother secondary	0.068** (0.032)	0.016 (0.030)	-0.030 (0.033)
Father secondary	0.022 (0.029)	0.006 (0.026)	-0.009 (0.028)

Height	0.004 (0.002)	-0.000 (0.002)	-0.004* (0.002)
$\hat{\alpha}_i$		0.529*** (0.017)	1.000
Constant	-0.467 (0.401)	0.889** (0.371)	2.097*** (0.406)
Observations	4794	4794	4794

Note: The dependent variable is risk preferences in the general domain (standardized), measured on a 0-10 scale and elicited in 2014 only. Coefficients in column 2 are from a multivariate OLS regression. Coefficients in column 3 are from a two-stage unconstrained OLS regression. In the first stage, a linear fixed effects regression is estimated on risk preferences in the financial domain (standardized) measured on a 1-4 scale with the following time varying covariates: age², university, diploma, student, region, employed, unemployed, retired, couple, a full set of year dummies and indicators for if a life event occurred -(0-1) year ago, 0-3 months ago, 3-6 months ago, 6-9 months ago, 9-12 months ago, 1-2 years ago or 2-3+ years ago for all of the life events in Table 2. In column 4 a constrained two-stage model is estimated with the restriction ($\hat{\sigma} = 1$). Asymptotic robust standard errors (column 2) and clustered non-parametric bootstrap standard errors in parentheses (columns 3-4). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.