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Family changes and the willingness to take risks

Mark J. Browne[1] | **Verena Jäger**[2] | **Andreas Richter**[2] | **Petra Steinorth**[3]

[1]Maurice R. Greenberg School of Risk Management, Insurance and Actuarial Science, The Peter J. Tobin College of Business, St. John's University, New York, New York, USA

[2]Munich Risk and Insurance Center, Munich School of Management, Ludwig-Maximilians-Universität Munich, Munich, Germany

[3]Institute for Risk Management and Insurance, Hamburg Business School, University of Hamburg, Hamburg, Germany

Correspondence
Petra Steinorth, Institute for Risk Management and Insurance, Hamburg Business School, Universität Hamburg, Moorweidenstr. 18, 20148 Hamburg, Germany.
Email: petra.steinorth@uni-hamburg.de

Abstract

Economic decisions frequently entail choices in the presence of risk. Decisions to purchase insurance, to save, to invest, and to pursue an education are all choices that may involve some degree of risk, just to name a few. We analyze the impact of changes in family structure on individuals' willingness to take risk (WTR). We find evidence that separating from a partner is associated with an increase in the WTR; while the birth of a first child is associated with a decrease in the WTR. Interestingly, these changes are temporary and the WTR returns to the level observed before the family event within 1–2 years following the event. Married individuals are more risk averse and this does not change with the passage of time of the actual wedding. Providing long term care is also associated with a higher WTR.

KEYWORDS

family structure, marital status transitions, marriage, variable risk attitudes, willingness to take risks

JEL CLASSIFICATION

D14, D81, G11, J12, J13

1 | MOTIVATION

Economic decisions frequently entail choices in the presence of risk. Decisions to purchase insurance, to save, to invest, and to consume are all choices that involve some degree of risk. Decision theory, which offers a framework to analyze normative and descriptive decision-making in the presence of risk, postulates that individuals' willingness to take risk (WTR) influences their choices. The current paper considers the association between changes in family structure and individuals' WTR. Utilizing a multiyear representative panel, the German Socio Economic Panel (SOEP), we observe whether individuals significantly adjust their WTR when they experience dramatic changes in their family composition. In a second step, we use regression adjusted matching aiming at establishing causality, that is, that the family events actually imply changes in the WTR.

We disentangle transitions into family states from the actual state and find that for the events birth of first child and separation from a partner/spouse the WTR changes during the transition. Interestingly, these changes are temporary and the WTR returns to the level observed before the family event within 1–2 years following the event. Providing long term care (LTC) is also associated with a higher WTR, but we are not able to disentangle whether the state or the transition cause the change. Marriage is different. We observe a lasting pattern that married individuals are more risk averse than singles. We do not find any evidence that individuals in their first year(s) of marriage are different in WTR than other married individuals, nor do we find a difference in the years before marriage. Our findings contribute to the growing bodies of literature on both the stability of preferences and family financial decision making in the presence of risk.

In their influential paper on the demographics of risk aversion, Halek and Eisenhauer (2001) show that family status and family composition are significantly related to individuals' attitudes towards risk. Yet, relatively little is known about causality and the long term impact of these associations as little of the relevant prior literature employs time series data. We extend their work by analyzing the impact of changes in family status and composition on risk aversion. While it has been repeatedly shown that married individuals are more risk averse (see, for instance, Cohn et al., 1975; Lin, 2009; Riley & Chow, 1992), it remains unclear whether individuals who marry become more risk averse or whether risk averse individuals are more likely to marry. Our data, a panel of the German population over several years, includes extensive information on family transitions. The data allow us to observe individuals before marriage, in the year of marriage, and in the years following marriage. Similarly, we are able to observe individuals' self-reported WTR in the years before, during and after other family structure events, such as the birth of a child and a separation from a partner.

The SOEP data set is a representative panel of private households in Germany. It tracks changes in family composition and marital status over time. Importantly for our study, the SOEP records individuals' self-reported risk attitude, which has been shown to be a reliable measure of an individual's risk attitude.[1] Even though a very simple and straight forward way to elicit risk attitudes, self-reported risk preferences, such as that in the SOEP, have been found in studies assessing their efficacy to perform quite well, particularly with respect to time

[1]Dohmen et al. (2011) validate the self-reported risk measure as a meaningful way to elicit risk preferences in big surveys. Lönnqvist et al. (2015) as well as Chuang and Schechter (2015) show that self-reported preferences have reliable test-retest stability and explain behavior in experiments reasonably. Mata et al. (2018) conduct a meta-study and show that self-reported measures outperform measure from incentivized experiments in terms of convergent and predictive validity as well as temporal stability.

stability, see for example, Lönnqvist et al. (2015) and Mata et al. (2018). Time stability is specifically relevant for our analyses as we observe individuals over several years.

After the introduction, the paper is structured as follows. Section 2 discusses related literature. Section 3 reports on our data set and methodology. We discuss our results in Section 4 and provide robustness checks in Section 5. We review our major findings and provide suggestions for future research in Section 6.

2 | FAMILY TRANSITIONS AND RISK ATTITUDES

2.1 | Desirable versus undesirable family transitions

We group family transitions into desirable and undesirable family events following the literature from psychology (see, for instance, Scully et al., 2000). Desirable family events include the formation of a domestic partnership (two partners living together without being married), marriage, the birth of a first child, and the birth of subsequent children. Undesirable family events include separation from a life partner/spouse, divorce, death of a life partner and the onset of providing informal long-term care. Desirable events are those associated with the growth of a family and undesirable ones with its decline. We acknowledge that an individual's perception of a family event, based on the person's unique circumstances, may be different than these generalized classifications. In addition, we control for whether children leave the household but are hesitant to label this as a desirable or undesirable life event. The life events that we consider all rank high on the social readjustment rating scale (SRRS), which was originally introduced by Holmes and Rahe (1967) and reevaluated by Scully et al. (2000). The SRRS measures stress associated with life events and relates them to each other. Using our available data, we are able to cover the top ten family events within the SRRS.

2.2 | Desirable family transitions

In this section, we discuss the impact of marriage and childbirth on the WTR. We consider these to be desirable family transitions, as previously discussed.

2.2.1 | Formation of a domestic partnership and marriage

As mentioned above, the formation of a household unit, either informally or by marriage, is commonly considered a desirable event in one's life. Financially, marriage may improve one's circumstances by providing economic advantages. Economic advantages arise from economies of scale in living expenses and tax benefits. Certainly, economies of scale achieved through marriage have significantly changed over time. Since most couples who married in our sample shared housing before their marriage, scale effects were typically achieved before marriage. Sizeable tax benefits accrue to married couples in Germany. In addition, marriage creates risk sharing opportunities through economic union, see Hanewald and Kluge (2014). Staying within classical economic theory, we could hypothesize that higher disposable income and better abilities to externalize negative consequences of risk would imply a higher WTR. In our data

analyses, we control for additional household income but do not have direct controls for the improved abilities to share risks.

At the same time, married individuals have been found to report greater levels of life satisfaction (see e.g., Myers & Diener, 1995). In the field of psychology, there is extensive research on the impact of mood on risk taking behavior. Isen et al. (1988) find that individuals that have been primed with a positive effect risk less in gambles even though they consider the odds more favorable. They formulate the Mood Maintenance Hypothesis which states that individuals refrain from risk taking in good moods to prevent negative outcomes that may worsen their mood and reduce their current state of happiness.[2] Entering into a marriage is typically a happy event in one's life; we therefore test if we can extend their hypothesis to show that marriage leads to a lower WTR.

Prior literature reports mixed evidence on whether marriage increases or decreases risk taking. Outreville (2014) provides an extensive review of the findings. Cohn et al. (1975), Riley and Chow (1992), Halek and Eisenhauer (2001), and Lin (2009) find that married individuals are more risk averse. Other studies find mixed evidence and point to the fact that gender and wealth differences also play an important role in this regard (see, for instance, Jianakoplos & Bernasek, 2006; Sundén & Surette, 1998). Also, results may differ in different domains of risk taking.

With respect to financial risk taking, there are many studies showing that married investors hold riskier assets than single investors (see, e.g., Bertocchi et al., 2011; Christiansen et al., 2015; Love, 2010; Schooley & Worden, 1996).

In regard to health behavior and safety risks, marriage and having children have been linked to lower risk taking (Arnett, 1998). Further, there are well-documented associations between being married and lower mortality and between having children and lower mortality (see, for instance, Umberson, 1987).

Causality of the association between marriage and risk aversion is not clear. Halek and Eisenhauer (2001) question whether being married leads one to being more risk averse or whether being risk averse makes one more likely to marry. Dohmen et al. (2011) also discuss causality. Light and Ahn (2010) provide evidence that less risk averse individuals tend to marry later. Our data set enables us to consider transitions into a marital state, as opposed to simply being married or not. The data set provides individuals' self-reported WTR before marriage, in the year of marriage, and in the years following marriage. This provides us with the opportunity to observe change while controlling for inherent risk attitudes. This can address part of the causality problem, that is, we can observe whether individuals change their WTR when they get married.[3] In addition, we utilize regression-adjusted matching to test for causality, which confirms the results of our panel estimation.

2.2.2 | Childbirth

Childbirth is generally considered a desirable family event despite potentially significant income effects. The birth of a child reduces a family's per capita disposable income and may

[2]Relating this to and assuming that monetary gains make individuals happier, one could argue that Kahneman and Tversky's Prospect Theory is in line with the mood maintenance hypothesis.

[3]Van de Venter et al. (2012) investigate the effect of changes in family structure on risk attitude. They use the FINCA metric of *SMART Investor* magazine as their measure of risk attitude. While they find no statistically significant impact of marrying or divorcing on their risk measure, their data set is relatively small. With our data set, we can observe whether an individual married within the previous observation year and how this interacts with his or her risk attitude, his or her subsequent changes in risk attitude, and the likelihood of the individual's risk attitude changing.

result in a family breadwinner reducing his or her labor income. Since standard theory often assumes decreasing absolute risk aversion in wealth, we control for income per capita in our analyses. We are unaware of prior research that has assessed how marginal utility changes after the birth of a child. Consequently, we are not able to make a prediction on the relationship between the addition of a child to a family and the WTR based on the concept of correlation aversion/love.[4] Having a child may add an altruistic argument to one's utility function and it may reduce the ability of individuals to bear the extremely negative outcomes of risky activities, which is hypothesized to reduce risk taking. This suggests a negative relationship between childbirth and WTR.

Several studies have found that the addition of children to a family is associated with changes in risk taking. Chaulk et al. (2003) find that the presence of a child reduces individuals' willingness to take investment risks and observe that this is more pronounced for males than for females. Overall, the negative correlation between children and investment risk taking could be moderated by income, indicating that investment risk tolerance of more affluent segments of the society may comparatively be less contingent on having children. Görlitz and Tamm (2015) find that becoming a parent is associated with becoming more risk averse regardless of the parent's gender. Bellante and Green (2004) find no significant impact of having children on relative risk aversion, yet their data set focuses on the elderly for whom it is less likely that children are financially dependent. Cohn et al. (1975), Siegel and Hoban (1991), Hersch (1996), and Lin (2009) find that risk aversion decreases in family size.

We consider whether the addition of a child to a family is associated with changes in WTR. We distinguish between the first and subsequent children in our analysis. We also investigate whether there is a greater change in WTR for a household head than for one who is not a household head.

2.3 | Undesirable family transitions

In this section, we investigate the association between undesirable family events and the WTR. The events we consider are separation from a life partner, death of a life partner and the onset of the need to provide LTC to a loved one.

2.3.1 | Separation from a life partner/spouse and divorce

Separation from a life partner/spouse and divorce ends the economic union of two individuals. Note that German divorce rules requires a very stringent timetable to get a divorce: the spouses need to separate and live in separate household for a whole year to be granted a divorce unless in some hardship cases such as domestic violence. Luckily, our data set allows us to track when married couples separate and subsequently get a divorce in the following year or later. Divorce can lead to a significant reduction in income for a dependent spouse, who is often a female (see e.g., Gadalla, 2008). In addition, the end of an economic union can lead to fewer abilities to externalize negative outcomes of risky activities.

[4]Isolating the effect from income changes are potentially very challenging in this set up.

When analyzing empirical evidence in the field of risk taking and separation and divorce, Love (2010) provides empirical insights into stock market participation with respect to divorce. He observes that divorce is associated with holding smaller shares of stocks in risky assets relative to married households. Christiansen et al. (2015) find that divorce has a gender specific impact on stock holdings. Women decrease their share in risky assets while men increase their holdings of risky shares.

Little is known about how separation from a life partner/spouse impacts risk attitude and preferences, as most surveys and experiments do not capture whether an individual is single because of a recent separation or has been single for a longer period of time. Kendler et al. (2010) classify the end of a relationship as one of life's most stressful events and finds a negative impact on mental health. Medical and psychological research has linked trauma and stressful life events to a higher propensity to take risks in the future.[5] Chiriboga and Cutler (1978) find high stress levels in individuals going through a divorce. The stress prevents approximately half of the observed individuals from functioning well. Both events, separation from a partner/spouse and divorce rank in the top three of the SSRS, see Scully (2000).

2.3.2 | Death of a life partner

While the premature death of a family member can severely affect a family's financial well-being; families can take precautionary steps, such as buying life insurance, to compensate for the potential loss of income. In Germany the social security system provides survivorship benefits for spouses and children. The death of a partner also affects mutual risk sharing and economies of scale available to a joint household, effects which may have an influence on the WTR of the surviving partner. There is, however, little evidence to date on how the death of a life partner affects the WTR of a surviving partner. Dohmen et al. (2011) is one exception. They observe that widows are less willing to take risks than single individuals.

2.3.3 | Providing long term care

Providing care to a loved one can be physically and financially draining. Further, it confronts one with one's own future frailty and mortality. Pinquart and Sörensen (2003) provide an extensive meta study of associated adverse mental and physical health consequences. Our data allows us to control for changes in income and health, enabling us to control for changes in the WTR through these two channels after starting to provide LTC. Yet, we find that the onset of caregiving relationship increases the WTR substantially.

2.4 | Permanent versus transient changes

Our data allow us to observe family events in addition to family states. We aim at disentangling whether transition into a family state has an effect on preferences apart from that of being in the state. In addition, we address in our study whether observed changes in risk taking after

[5]For example, Pat-Horenczyk et al. (2007) links exposure to terrorism to higher risk taking, Bornovalova et al. (2008) link childhood abuse to higher sexual risk-taking and Killgore et al. (2008) links combat experience to higher risktaking just to name a few studies.

major life events have a permanent impact on one's WTR or if changes are of a more limited duration. We hypothesize that changes in WTR revert with the passage of time when they are only associated with the family event but not the family state. We anticipate the reversion in WTR following the year of a life event as individuals adjust to their new life circumstances. This is consistent both with Kahneman and Tversky's (1979) Prospect Theory and habit formation utility as utilized by Abel (1990). Abel assumes that individuals react to changes in reference points or habit consumption but also adjust their reference point to new, persistent changes in wealth levels over time. These two theories are, however, based on monetary consumption and not nonmonetary utility. We test whether an adjustment to the reference point also holds for nonmonetary changes in utility resulting from desirable and undesirable events affecting family structure.

When the actual family state and not the family event transition is significant, we expect that the associated changes in the WTR are permanent in that sense that they last as long as the individual remains in this family state. In these cases, being in the actual family state is the driver for changes in the WTR.

In addition, we consider whether the family state and the family event are jointly associated with changes in WTR.

3 | DATA AND METHODOLOGY

We use the SOEP to test our hypotheses. The SOEP is a representative, longitudinal panel data set of the resident adult population in Germany. The survey has been conducted on an annual basis since 1984. There are approximately 20,000 individuals in the data set across 11,000 households. Each year between January and May, the SOEP surveys the head of each household in the sample, but also gives the survey to all other household members over the age of 18 (or turning 18 in the year when they are added to the survey sample). The SOEP asks individuals for a wide range of personal and household information. This includes financial data, including income, as well as lifestyle and health-related information. In addition, the survey contains a variety of socio-demographic indicators, such as gender, age, marital status, and information on education and occupation. Individuals are asked their attitudes on assorted topics, including political views, and about their satisfaction with professional and private life. Our data set is balanced and consists of 9293 individuals older than 18 years (or turning 18 in the year they were included to the data set). After dropping individuals with missing data, we are left with a balanced panel data set of 7167 individuals and 57,336 observations.

The SOEP asks individuals to self-assess their WTRs. People are asked to indicate on a scale from 0 to 10 how they see themselves in terms of their WTRs, with 0 representing no tolerance for risks and 10 representing the greatest willingness to be exposed to risk. This self-reported risk attitude question was included in the 2004 survey, was included again in the 2006 survey and has been included yearly since 2008. For our analysis, we use the 2004, 2006, and 2008–2013 waves of the SOEP.

Generally, there are several ways risk attitude can be elicited and reported in data sets.[6] Some studies use hypothetical choice questions (see, for instance, Donkers et al., 2001; Hartog et al., 2002) or real life choices such as portfolio choices (see, for instance, Hansen &

[6]See, for example, Charness et al. (2013), for a more detailed overview and discussion of elicitation and measurement methods of risk preferences in experiments.

Singleton, 1983; Jackwerth, 2000) or insurance purchasing decisions (see, for instance, Cohen & Einav, 2007; Sydnor, 2010). When utilizing hypothetical answers in surveys, potential hypothetical bias can be of concern; that is, the hypothetical answers could be systematically skewed in some way.[7]

As the SOEP relies on a self-reported measure on a Likert scale, we need to consider whether a hypothetical bias could affect the meaningfulness of our results. As we analyze changes over time in absolute levels a systematic bias would not create issue when it affects all observation periods. Given the longitudinal nature of our study and the fact that we control for individual specific biases, a systematic potential hypothetical bias would not impact our results if stable over time. Lönnqvist et al. (2015) find that the Likert scale we utilize in the SOEP outperforms the classical Holt and Laury (2002) approach in terms of retest stability, which further reduces our concerns with hypothetical bias. In terms of predictive power, self-assessed WTR has been proven to reliably predict risk taking behavior. Lönnqvist et al. (2015) find a stronger association with the BIG five personality traits and observed behavior in a trust game than the classical Holt and Laury (2002)-approach.[8] Dohmen et al. (2011) confirm the validity of the self-reported risk attitude measure in the SOEP with paid lottery choices.

In addition to risk attitudes, the SOEP includes rich information on family structure and household size. We use this information to investigate the association between changing family and household structures and individuals' risk attitudes. In contrast to many other studies, our panel data set allows us to analyze changes over time in the WTR. We are particularly interested in transitions in families over time, including the time before and after the events discussed above. The SOEP asks individuals if and how their family situation changed during the prior calendar year. For example, respondents are asked to indicate whether they married, whether they moved in with a partner, or whether they had a child during the last year. In addition, individuals are asked if they provide care to a disabled or elderly family member. To include this information, we create a dummy variable to capture if individuals become a care provider for family members in a particular year. We use the information on family structure and household size as independent variables in our analyses and test their relationship to risk attitudes. Table 1 reports all summary statistics. Note that the life events we consider are all relatively rare, as indicated by the low population means of these variables.

We include control variables for those factors that have been found to be associated with risk attitudes in previous studies. These include information on income and wealth, gender, age, education level attained, type of employment, federal state (Bundesland), home ownership, self-rated health, and macroeconomic conditions (See Barsky et al., 1997; Browne et al., 2019; Dohmen et al., 2011; Donkers et al., 2001; Hartog et al., 2002; Kimball et al., 2008; Outreville, 2014). We capture wealth by including monthly, real after tax income at the household level. In addition, we include income received as interest and dividend payments on an individual level.[9] To account for individual savings behavior, we include a dummy variable

[7] Hypothetical bias have been discussed repeatedly when comparing compensated lottery choices with hypothetical choices even though many studies find no evidence for differences on average risk aversion between compensated and hypothetical lotteries, see for example, Taylor (2013), Kühberger et al. (1999), and Camerer and Hogarth (1999) and Beattie and Loomes (1997) just to name a few. Battalio et al. (1990) and Holt and Laury (2002) find that individuals exhibit more risk taking in hypothetical choices and Holt and Laury (2002) find that the bias increase in stakes of the paid experiment. Taylor (2013) finds evidence that cognitive ability is related to lower risk aversion in the hypothetical setting but not for real choices. They offer the quest for the right answer in the hypothetical set-up as one possible explanation.

[8] Andersson et al. (2016) argue that lower cognitive ability may lead to more random decision making in lab elicited risk preferences.

[9] We use 2012 numbers in our analysis and account for inflation by referring to http://de.inflation.eu/inflationsraten/hvpi-inflation.aspx.

TABLE 1 Reports summary statistics for all control variables used in our analyses

Variable	Definition	Mean	*SD*	Min	Max
Dependent variables					
WTR	Scale from 0 to 10 (0): no risk tolerance and (10): high willingness to take risks	4.35	2.25	0	10
Family states					
Domestic partnership[a]	(1) individual lives in domestic partnership	0.09	0.28	0	1
Married[a]	(1) individual is married	0.68	0.47	0	1
Child in household[a]	(1) child resides in household	0.35	0.48	0	1
Support person care[a]	(1) Individual provides long term care	0.06	0.24	0	1
Desirable family changes					
Marriage[a]	(1) individual got married	0.01	0.11	0	1
Domestic partnership[a]	(1) individual forms domestic partnership	0.01	0.11	0	1
Childbirth[a]	(1) individual became a parent	0.02	0.19	0	1
First child[a]	(1) individual became parent for the first time	0.01	0.09	0	1
Subsequent child[a]	(1) individual became parent for the (at least) second time	0.01	0.10	0	1
Undesirable family changes					
Separated partner/spouse[a]	(1) individual (got) separated from partner/spouse	0.02	0.12	0	1
Divorce[a]	(1) individual got a divorce	0.005	0.07	0	1
Death partner[a]	(1) partner of individual died	0.005	0.07	0	1
Start support person care[a]	(1) individual provides care for a family member	0.02	0.14	0	1
Other family events					
Child moves	(1) child leaves household	0.03	0.18	0	1
Control variables					
Ln_real_aftertaxincome	natural logarithm of individual's real monthly household after tax income	7.90	0.58	0	12.23
Job_loss[a]	(1) individual lost his or her job	0.08	0.27	0	1
Death_parent[a]	(1) individual's mother or father died	0.02	0.15	0	1
Ln_real_interestdividendincome	Income received income from interest and dividends	5.13	2.47	0	14.21
Propertyownership[a]	(1) individual owns house or flat	0.58	0.49	0	1
Savingsaccount[a]	(1) individual has a savings account	0.76	0.43	0	1
Civilservant[a]	(1) civil servant	0.05	0.22	0	1

(Continues)

TABLE 1 (Continued)

Variable	Definition	Mean	*SD*	Min	Max
Nojob[a]	(1) individual has no job	0.06	0.24	0	1
Trainee[a]	(1) individual is trainee	0.02	0.15	0	1
Whitecollar[a]	(1) an individual is white-collar worker	0.32	0.47	0	1
Bluecollar[a]	(1) individual is blue-collar worker	0.14	0.35	0	1
Unemployed[a]	(1) individual is registered as unemployed	0.05	0.21	0	1
Retired[a]	(1) individual is retired	0.29	0.46	0	1
Selfemployed[a]	(1) individual is self-employed	0.06	0.24	0	1
Age	age of individual	52.95	15.61	17	103
Male[a]	(1) individual is male	0.47	0.50	0	1
Height	body height in cm	171.16	9.37	80	207
Highlevelschool[a]	(1) individual has high level school leaving certificate	0.28	0.45	0	1
Health[a]	Scale from 1 to 5 with (1): very good health status and (5): poor health status	2.69	0.91	1	5

Note: Summary statistics for variables in our analyses during observation period 2004–2013.

[a]Denotes dummy variables and summary statistics for Federal State variables are reported in the Supporting Information Appendix.

indicating whether individuals have a savings account. Lastly, we create a dummy variable indicating homeownership.

We also control for individuals' occupational status (see, e.g., Cohn et al., 1975; Halek & Eisenhauer, 2001; Siegel & Hoban, 1991). We differentiate between blue-collar employees, white-collar employees, civil servants, trainees, and self-employed individuals. In addition, we control for individuals that have no job either because they are currently seeking work or because they choose not to work in the wage economy.

Similar to risk attitude, health status is a self-reported variable. Self-rated health state is measured by an integer variable taking values between "1" (very good health status) and "5" (poor health status).

We create dummy variables for all 16 Federal States of Germany to control for possible regional variation in WTR.

We include individuals' marital status and the omitted category in our regressions is living in a household without a spouse or partner.[10] As mentioned before, a married couple needs to usually live through 1 year of separation before being granted a divorce. In the separation year, individuals are still in the state of being married but would report to go through a separation from a partner/spouse. We include the number of children for which the household receives child allowances.[11]

[10]Regardless of individuals were never married, are divorced or widowed.

[11]The German Government pays financial support, that is, child allowances, to a primary caregiver, who is financially responsible, for each child they are providing care for. Monthly allowances are currently 188 Euros for the first two children and up to 219 Euros for further children. We prefer using this measure over the actual number of children living in the household as it better reflects the financial responsibility for the children.

Table 2 reports information on household transitions in our sample. Rows report pretransition structure while column headings report posttransition household structure. For instance, of the 686 individuals in our sample who report entering a marriage in a survey year, 264 reported themselves as single in the year before marriage and 422 reported themselves in a domestic partnership in the prior year. Similarly, the table reports that of the 449 households reporting the birth of a first child in a survey year, 12 reported being single in the prior year, 133 reported being in a domestic partnership during the prior year, and 304 reported being married the year before. Of the 789 individuals reporting separating from a partner, 272 reported being in a single household the year prior. This reflects either a short domestic partnership or that those in the domestic partnership were living in separate households the year earlier.

We estimate several different statistical models to analyze the impact of changing family and household conditions on risk attitude. First, we run a year- and individual-fixed effects ordinary least square (OLS) model, which we refer to as Model 1. In this model, we include clustered standard errors on the individual level and regress the previously mentioned life changing events and control variables on risk attitude.[12] Our empirical model is supported by the Breusch-Pagan Lagrangean multiplier test that rejects the null hypothesis of no individual-specific and time-specific effects. In addition, the Hausman test supports the choice of a fixed-effects model. Model 1 is specified as follows:

$$\begin{aligned} riskattitude_{i,t} = {} & \beta_0 + \beta_1 LifeEvent1_{i,t} + ... + \beta_n LifeEventn_{i,t} + \beta_{n+1} FamilyState1_{i,t} + ... \\ & + \beta_{n+k} FamilyStatek_{i,t} + \gamma \bullet X_{controls_{i,t}} + \delta \bullet YearDummies + \alpha_i + \varepsilon_{i,t} \end{aligned} \quad (1)$$

with $i = 1, ..., N$ and $t = 1, ..., T$ where $N =$ number of individuals and $T =$ number of years. α_i denotes the individual specific fixed effect.

Our set of time-varying control variables is denoted by $X_{controls}$. Since we use a model with individual fixed effects, we do not include variables that do not change over time, such as gender and height. In addition to the first specification, we add variables for lagged events to determine whether observed changes are persistent or transient in Table 3. To account for potential nonlinearities on the Likert-scale, we also estimate an ordered probit model with individual fixed effects utilizing a blow up and cluster routine proposed by Baetschmann et al. (2015). Even though the risk preference question is only asked bi-annually during the years 2004–2008, the SOEP survey is still conducted every year during this period. The yearly data allow us to determine the specific year that family events occurred.[13] We do not expect that this may create some econometric issues.

4 | RESULTS

In this section, we report and discuss our empirical findings. As mentioned above, we are interested in investigating the association between risk attitudes, family states, and family events.

[12] Clustered standard errors account for possible correlations within a cluster and asymptotically equal unclustered standard errors. Since we cannot rule out that clustered standard errors are necessary, we include them to err on the side of caution.

[13] Assume, as an example, that an individual has a first child in 2006. The 2005 wave of the SOEP would report the individual had no children in 2005 and the 2006 SOEP would report a child. While the 2005 SOEP does not report a WTR value for the individual, it does allow us to determine there has been an addition to the family.

TABLE 2 State-transition matrix 2004–2013

	Getting married (686)	First child (449)	Subsequent child (581)	Separation partner/spouse (789)
Single household	264	12	14	272
Domestic partnership	422	133	94	191
Married living together	0	304	473	326
Child in household	380	0	581	285

Note: States denote family states in the period before the transition.

Table 2 reports regression results without lagged family events. The dependent variable in Model 1 and Model 2 (ordered logit) is WTR as reported yearly by each individual in the SOEP data. In addition to family events, we control for family states. These include whether the individuals are married; whether there are existing children in the household; whether the individual lives in a domestic partnership; and, whether the individual has been providing long-term care for more than a year. Note that we define the family controls such that we distinguish between states and controls. For instance, the variable "Married" indicates if an individual is married, regardless of when the individual entered a marriage. In contrast, the variable "Marriage" takes the value 1 the year an individual enters a marriage and otherwise takes the value 0.

The individual of reference in our models is not married, does not live in a domestic partnership, has no children in his or her household, and did not provide LTC before the current year.

The models include individual and year fixed effects as well as additional controls.

All models regress on the absolute levels of the reported WTR. As discussed above, we run the regression using an ordered logit routine in addition to OLS. This addresses concerns that OLS may produce biased estimates as the dependent variable is on an 11 item Likert scale. Table 2 shows that coefficient estimates across models are generally very similar in size and statistical significance. In the discussion that follows, we focus on the coefficient estimates in the OLS model (Model 1). We report the coefficient estimates for the ordered logit models in brackets (Model 2).

We first consider the desirable family changes: marriage, the birth of a first child, and the birth of subsequent children. We find that the state of being married is associated with a reduction in WTR by 0.1552 (0.2086). The effect is significant at the 5% level. The event of getting married, however, is not statistically significant. Being married is associated with a decrease in WTR but we do not detect any significant change related to the transition itself. The family event of getting married and the state of being married are, however, jointly significant at the 5% level.

With respect to the birth of children, we find a substantial difference between the birth of a first child and that of subsequent children. In Model 1 (Model 2), our coefficient estimate for the birth of the first child is −0.20 (−0.25), which is significant at the 5% level. This is consistent with, among others, Chaulk et al. (2003), who find that having children reduces individuals' willingness to take financial risks. The coefficient estimate for the birth of subsequent children is much smaller and statistically insignificant. The family state control for having a child living

TABLE 3 Regression results

	(1) OLS dependent variable: WTR	(2) Ordered logit dependent variable: WTR
Family states		
Domestic partnership	−0.0639	−0.0919
	[0.0505]	[0.0661]
Married	−0.1552*	−0.2086*
	[0.0494]	[0.0660]
Child	−0.0104	−0.0144
	[0.0304]	[0.0406]
Support person care	0.0529	0.0631
	[0.0447]	[0.0564]
Desireable transitions		
Marriage	−0.0666	−0.0751
	[0.0652]	[0.0839]
First child	−0.2041**	−0.2505**
	[0.0870]	[0.1108]
Subsequent child	−0.0529	−0.0674
	[0.0733]	[0.0854]
Moved together	0.1131	0.1333
	[0.0708]	[0.0918]
Undesireable transitions		
Separated partner/spouse	0.2118*	0.2683*
	[0.0631]	[0.0814]
Divorce	0.0227	0.0068
	[0.1058]	[0.1398]
Death partner	−0.1071	−0.1728
	[0.1088]	[0.1344]
Start support person care	0.0951	0.1126
	[0.0652]	[0.0828]
Other family changes		
Child moves	−0.0042	−0.0088
	[0.0403]	[0.0529]

(Continues)

TABLE 3 (Continued)

	(1) OLS dependent variable: WTR	(2) Ordered logit dependent variable: WTR
Control variables		
Wealth controls	Yes	Yes
Occupation controls	Yes	Yes
Year controls	Yes	Yes
Federal state controls	Yes	Yes
Other controls	Yes	Yes
Constant	3.4345*	
	[0.3758]	
Observations	57,333	57,333
R^2	0.5691	
Adjusted R^2		

Note: Reference categories are: blue-collar workers, year 2004 and Federal State Bavaria (Regression results for control variables are reported in the Supporting Information Appendix). Robust standard errors in brackets.

*$p < .01$.

**$p < .05$.

in the household is not significant. Neither do we detect any impact on the WTR when a child leaves the household. We find that having a first child and having a child living in the household are jointly significant at the 5% level. In an additional regression reported in Supporting Information Appendix A3, we further split up whether the first child is born in or out of wedlock. Interestingly, we find that the birth of the first child only reduces the WTR significantly if individuals are not married.

We do not find any significant estimates for the onset of a domestic partnership or whether an individual lives in a domestic partnership. In addition, these two variables are also not jointly significant.

Next, we consider undesirable life events. These include separation from a partner/spouse, divorce, death of a partner, and the onset of a long-term care relationship. We find that separation from a life partner is associated with a higher WTR. As reported in Table 2, the coefficient estimate for separation from one's partner in Model 1 (2) is about 0.22 (0.27) and is statistically significant at the 1% level. Divorce, however, does not have a significant impact on the WTR. We argue that this could be due to the relatively long time period that a divorce usually requires in Germany. As mentioned before, individuals need to live in separate households for a year before they can receive an official divorce in almost all cases. Interestingly, the death of a partner does not have a significant coefficient estimate either.

The onset of providing care to a sick, disabled, or elderly family member is also not significantly related to an individual's WTR. We find that the onset of providing LTC and the variable whether someone provides LTC are jointly significant at the 5% level. This implies that individual who provides LTC in the first year has a higher WTR compared to an individual who does not provide LTC.

To summarize, we find evidence that separation from a partner/spouse is associated with a statistically significant increase in the WTR in the event year. Note that we further split up in an additional analysis whether the individual that separates from a partner is married. We find Separation is only associated with a higher WTR if the individual was married before as shown in Table A3 in the Supporting Information Appendix. One explanation can be that the separation from a spouse compared to a life partner may come with financial and emotional changes that are more severe. In addition, we find that individuals have a higher WTR in the year that they transition into providing LTC to a family member.

The family event with the greatest coefficient estimate, and thus the highest economic significance, is having a first child. The coefficient estimate ranges between −0.20 and −0.25 depending on the model.

In addition to the above-mentioned events, we control for a variety of additional variables in our analyses. These include wealth, occupation, and place of residence, among others. Our measure of wealth in the tables is not adjusted for family size. Estimating the models with per-capita household wealth does not produce significantly different results. Complete tables are in the Supporting Information Appendix. In addition, we include year fixed effects.

4.1 | Shocks versus long-term changes

The question that we address now is whether the statistically significant changes in the WTR associated with the above-mentioned events—marrying, having a first child, separating from a partner, and providing LTC to a loved one—are permanent changes in the WTR or are transitory. To further explore the long-term impact of these events, we include lagged variables for these life events in our regressions. We are able to track life events for 2 years after the actual event.[14] To answer this question, we first need to discuss the potential inference of lagged past events on the WTR in the future. Generally, there are two ways an event at $t-1$ can impact the WTR in t and $t+1$: the event could impact the WTR in $t-1$ directly, which then impacts the WTR in t and $t+1$. This would call for a dynamic panel estimation approach which should include lagged levels of the WTRs. The other possibility is that the impact of the past event only occurs through a direct causal inference on the WTR in t and $t+1$. As we cannot rule out either approach, we estimated a dynamic panel model using the Arellano-Bond estimation routine in addition to individual fixed effects OLS models and ordered logit models. We, however, do not find that the lagged WTR is significant and therefore only report results from our static panel regressions. Table 3 reports the results.

Models 3 and 4 include coefficient estimates for the life events or family states that we found were significant in our earlier analyses: marriage, birth of a first child, separation from a partner and the onset of providing long-term care. We include dummies for each event for each of the 2 years following the initial event. Model 4 also includes dummies for the year before the event to control for any anticipatory changes that might affect the WTR. We refer to these dummies as anticipatory life events.

The transition variable Marriage, representing the year that one entered a marriage, is not significant. Further, the variable representing the year before marriage and the two representing the years immediately following marriage are all insignificant. Yet, the state of being married is associated with a −0.17 coefficient that is statistically significant at the 1% level in

[14]We do not have more data for some of these events (e.g., providing LTC).

Model 3, suggesting that only the state of being married influences the WTR. The coefficient is −0.14 and is significant at the 5% level in Model 4.

We find a statistically significant decrease in the WTR the year a first child is born. The coefficient is equal to −0.20 and significant at the 5% level in the year of birth. In subsequent years, this effect vanishes, but there is no further statistically significant relationship between the birth of one's first child and the WTR.

When not controlling for anticipatory separation (Model 3), separation from a partner is significant in the year of the separation at the 1% level and significant at the 5% level 1 year later. The coefficient is insignificant in the following year. The anticipatory effect in Model 4 is not significant and the coefficient estimate is very similar to that of Model 3 in the year of the separation.

Beginning to provide long-term care to a loved one is associated with a statistically significant increase in WTR the year providing care begins at the 10% level in Model 3% and 5% level in Model 4. There is no statistically significant relationship in the preceding year or in either of the 2 succeeding years.

As mentioned before, we also control for anticipatory changes in the WTR in Model 4. Since our data are on an annual basis, as opposed to a daily basis, and we observe the WTR and the life events during the same year, we cannot establish whether individuals change their WTR before, during or after the life event. To shed further light on whether the changes may occur in the year before the actual events, we rerun the regressions including a dummy for whether one of the significant life events will occur in the following period. Model 4 reports coefficient estimates for the life events. Coefficient estimates and significance levels are highly robust; we find only a slight difference in the reversal of the WTR after the onset of providing long-term care. We do not find evidence that marriage, separation or the provision of long-term care in the following year t_1 imply changes in the WTR in t_0. This is not the case with respect to the birth of a first child: the birth of a first child is associated with a change in the WTR also in t_0. We attribute this to the fact that since pregnancy typically lasts 9 months, changes in WTR may occur earlier, potentially even before conception.

With each major life event that we consider—marriage, birth of a first child, separation, and the onset of providing long-term care—there is a statistically significant relationship between the event and the WTR. Desirable events—marriage and the birth of a first child—are associated with decreases in the WTR. Undesirable events—separation and the onset of providing long-term care to a loved one—are associated with increases in the WTR. In all cases, the most pronounced change in the WTR is in the year of the event. Further, in each case, the change in WTR vanishes with the passage of time. These findings strongly support that changes in the WTR are most pronounced directly following a life event and do not last.

4.2 | Further robustness checks

In addition, we conduct several other robustness checks in which we restrict the sample, add a variable for potential confounding factors and test the validity of our findings by investigating other risk taking activities. We discuss the findings briefly below.

First, we limited our data years to 2008–2013. These are the years when the SOEP reported our WTR variable annually. This addresses concerns about the 2-year time gap between 2004, 2006, and 2008. We find very consistent coefficient estimates which we omit here in the interest of brevity.[15]

[15] Results are available from the authors upon request.

One question that comes to mind is whether the reported changes in the WTR are due to actual changes in the underlying risk preferences or whether some other, unobserved factors change and imply changes in the risk preferences. For example, the birth of a child may increase stress levels or an individual's level of patience. For some of the years in our observation period, the SOEP provides proxies for stress levels. We rerun regressions controlling for the two factors separately and find coefficient estimates and significance levels to be extremely robust. This alleviates concerns whether changes in stress levels are a major, unobserved source of observed changes in the WTR. There could potentially be other confounding factors—such as changes in patience, for which we are unable to control—that await future research.

As another robustness check, we use smoking habits instead of the survey's WTR measure as a gauge of one's WTR.[16] We specifically find support that the life events marriage and childbirth decrease risk taking[17] while separation from a partner increases risk taking. Interestingly, starting to provide long-term care is associated with a reduction in smoking, which is contradictory to our findings with respect to the WTR. A possible explanation is that providing long-term care may trigger a pronounced awareness of one's own mortality and consequently result in less smoking.

One may argue that the family events we consider lead to a change in risk exposure, which may also result in a different WTR at the next point in time. As an example, consider the events childbirth and separation from a partner. Both events entail additional financial risk in modern societies where children are not considered the primary source of retirement security. Yet, our analysis shows that the birth of a first child and separation from a partner are associated with changes in the WTR in opposite directions; the first with a decrease in the WTR and the second with an increase. This alleviates concern that the change in risk exposure is the primary source of change in the WTR. In addition, we run an additional robustness check in which we include a self-reported measure for how much an individual worries about his or her financial situation. We do not find significantly different results.[18]

Also note that results are extremely robust to either using household income, per capita household income or per-adult household income as well as adding the family states of being widowed or divorced to the model.

5 | APPLYING REGRESSION-ADJUSTED MATCHING

Halek and Eisenhauer (2001) state in their influential study that it is unclear whether risk averse people are more likely to marry or whether marriage leads to people becoming more risk averse. To shed more light on causality, we implement a regression-adjusted matching routine for each of the life events we consider on the cross-section of data.[19]

Regression-adjusted matching consists of two steps: In the first step, we utilize propensity score matching to determine the relevant factors that are associated with the occurrence of the life event.[20] In a second step, we utilize the weights from the matching to rebalance our sample and rerun the regression on the WTR. The rebalancing ensures that the treated and untreated parts of the sample

[16]Results are available upon request from the authors.

[17]We also acknowledge that the reduction of smoking after the birth of a child may primarily reflect health concerns with respect to the (unborn) baby.

[18]Results are available from the authors upon request.

[19]If there are unobservable factors that we cannot rebalance the treated and untreated group on, causality may not be achieved.

[20]Results from propensity score matching are available from the authors upon request.

TABLE 4 Regression results including lagged events

Variables	(3) OLS-dependent variable WTR	(4) OLS dependent variable WTR
Family states		
Married	−0.1681*** [0.0520]	−0.1415** [0.0581]
Child	0.0007 [0.0312]	−0.0139 [0.0340]
Domestic partnership	−0.0400 [0.0520]	−0.0536 [0.0576]
Support person care	0.0429 [0.0457]	0.0247 [0.0503]
Desireable transitions		
Marriage	−0.0432 [0.0675]	−0.0447 [0.0714]
Marriage $t+1$		−0.0006 [0.0247]
Marriage $t-1$	0.0278 [0.0639]	0.0162 [0.0699]
Marriage $t-2$	0.0938 [0.0653]	0.0724 [0.0702]
First child	−0.2030** [0.0889]	−0.1969** [0.0947]
First child $t+1$		−0.1966** [0.0956]
First child $t-1$	−0.0411 [0.0791]	−0.0228 [0.0847]
First child $t-2$	−0.0102 [0.0737]	−0.0189 [0.0788]
Subsequent child	−0.0521 [0.0742]	−0.0030 [0.0779]
Moved together	0.0895 [0.0737]	0.0827 [0.0781]
Undesireable transitions		
Separated partner/spouse	0.2060*** [0.0647]	0.2176*** [0.0696]
Separated partner $t+1$		0.0029 [0.0257]
Separated partner $t-1$	0.1360** [0.0655]	0.1027 [0.0714]
Separated partner $t-2$	0.0675 [0.0624]	0.1327** [0.0650]
Divorce	−0.0504 [0.1137]	−0.0172 [0.1188]
Death partner	−0.0910 [0.1111]	−0.0712 [0.1201]
Start support person care	0.1191* [0.0678]	0.1491** [0.0735]
Start LTC $t+1$		−0.0840 [0.0636]
Start LTC $t-1$	0.0863 [0.0583]	0.0705 [0.0661]
Start LTC $t-2$	0.0518 [0.0601]	0.0547 [0.0648]
Other family changes		
Child moves	0.0003 [0.0406]	−0.0250 [0.0444]
Control variables		
Wealth controls	Yes	Yes
Occupation controls	Yes	Yes
Year controls	Yes	Yes

TABLE 4 (Continued)

Variables	(3) OLS-dependent variable WTR	(4) OLS dependent variable WTR
Federal state controls	Yes	Yes
Other controls	Yes	Yes
Constant	3.3918*** [0.3871]	3.9168*** [0.4307]
Observations	56,744	49,475
R-squared	0.5702	0.5780
adjusted R-squared	0.507	0.506

Note: Reference categories are: blue-collar workers, singles, year 2004, and Federal State Bavaria (Regression results for other control variables are reported in the Supporting Information Appendix). Robust standard errors in brackets.

***$p < .01$.

**$p < .05$.

*$p < .1$.

TABLE 5 Results from regression adjusted matching

Results regression-adjusted matching	(1) WTR: marriage	(2) WTR: first child	(3) WTR: separation life partner/spouse	(4) WTR: LTC
Coefficient	−0.0534 [0.7137]	−0.2253** [0.0978]	0.3366*** [0.0697]	0.1626** [0.0746]
Number of observations	16,389	16,134	50,149	50,164

Note: Robust standard errors in brackets. Included controls are risk attitude in the previous period, age, age 2, level of education, marital status gender, health, income, occupation, and geographic region. Models (1) compares newly weds to unmarried individuals. Model 2 includes only individuals who are less than 45 years old. We dropped retired as control. Column 1 shows the results from regression adjusted matching.

***$p < .01$.

**$p < .05$.

*$p < .1$.

are balanced with respect to the factors that are associated with the occurrence of each of the family events. Included controls in both of these steps are risk attitude in the previous period, age, age squared, level of education, marital status, gender, health, income, occupation, and geographic region. This enables us to identify the impact of each life event on the WTR. We use regression-adjusted matching as it benefits from the double-robustness property; that is, as long as either the propensity score matching routine or the OLS model are correctly specified, the estimation results are correct. We find that the matching performs sufficiently well for all considered life events with standardized biases well below the acceptable thresholds as discussed in Rubin (2001).

The potential disadvantages of matching are that we can only observe one treatment (in our case the treatments are the life events) at a time. We are also not able to track changes in the WTR with the passage of time. Therefore, the methodology does not allow us to test how the WTR changes after the event with the passage of time, which was presented earlier in the paper. We consequently utilize regression-adjusted matching as a robustness check. We find

that the coefficients and significance levels are extremely similar to those in our earlier reported panel data analyses. These results alleviate concerns about biased estimates that may have resulted from reverse causality in our main models. Table 4reports our results. Please refer to the Supporting Information Appendix for the full table of results.

For the life event marriage, we restrict the sample to individuals age 45 and younger as very few individuals in our sample get married at an older age. This ensures that propensity score matching works reasonably well. Again, we control for the state whether someone is currently married. Accordingly, we chose newlyweds as the treatment group and unmarried individuals as controls. Overall, the results are very similar to those of our panel regressions. Again, we find an insignificant and very small coefficient for the event of getting married.

For the life event of having a first child, we only compare individuals in their childbearing years, age 45 and younger. This ensures that we are able to rebalance the treated and untreated groups sufficiently. In the regression, we control for whether a child currently lives in the household. We find a negative coefficient estimate comparable in size to that reported in Table 3 (−0.2253), which is significant at the 5% level.

The event of getting married is significant at the 5% level and the size of the coefficient estimate is very comparable to that of the panel estimations. In addition, we observe the negative sign as predicted. The birth of the first child is significant at the 5% level. It has a negative sign and reduces the WTR by 0.23.

Separation from a life partner leads to an increase in the WTR of 0.34 and the coefficient is significant at the 1% level. Starting to provide LTC is significant at the 5% level. This implies a 0.16 point increase in the WTR. The size of the coefficient is comparable to that of the panel estimations.

6 | CONCLUSION

Considerable research has focused on how individuals make decisions in the presence of risk. It is widely accepted that risk attitudes influence decision making on a wide variety of choices, including those involving consumption, job search, and investing, to name a few. Risk attitudes have been studied extensively in the fields of economics and psychology. While family status and family ties have been shown to have a considerable impact on risk attitudes, most studies rely on data that are not longitudinal. Scant research has investigated the association between changes in risk attitudes and major life events, such as marriage, the birth of a child and separation from a partner. We find evidence of an association between some life events and changes in risk attitudes. In particular, we find that having a child is associated with a higher WTR, while separating from a partner/spouse decreases the WTR. Our longitudinal data allow us to investigate whether observed changes have a long lasting impact on one's risk attitude or whether the impact is transient. We find that the changes in WTR associated with changes in family structure vanish or significantly diminish with the passing of time. Only the family state of being married, rather than getting married, displays a stable change of preferences.

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ORCID

Petra Steinorth http://orcid.org/0000-0001-8728-2861

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SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

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