THE ECONOMIC JOURNAL

The Economic Journal, **134** (*November*), 3390–3427 https://doi.org/10.1093/ej/ueae029

Advance Access Publication Date: 9 April 2024

DISABILITY AND RISK PREFERENCES: EXPERIMENTAL AND SURVEY EVIDENCE FROM VIETNAM*

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We investigate whether experiencing a disability incidence in the household affects economic risk preferences in Vietnam, leveraging (*i*) ten years of individual-level panel data and (*ii*) data from a lab-in-the-field experiment. We find that individuals who experience a disability event in the household behave in a more risk-averse manner than individuals without such an experience. Examining potential underlying mechanisms, we demonstrate that a household disability shock leads to lower wealth, which in turn is related to higher levels of risk aversion. Furthermore, we provide evidence that cognitive mechanisms—fearful emotions and the updating of beliefs (becoming more pessimistic about the future)—are another, perhaps even more important channel through which disability shocks affect risk preferences.

More than a billion people in the world experience some type of disability (WHO, 2011). While people with disabilities have on average poorer health outcomes, lower educational achievements and fewer economic opportunities than people without disabilities (Filmer, 2008; WHO, 2011; Mizunoya *et al.*, 2018), recent evidence suggests that disability-related health shocks in the family affect outcomes and behaviours of all household members. For instance, households in which a member is disabled have been found to experience higher living costs (Zaidi and Burchardt, 2005; Cullinan *et al.*, 2011; Mitra *et al.*, 2017) and financial distress (Deshpande *et al.*, 2021), be poorer (Mitra *et al.*, 2013), adjust labour supply (Powers, 2001; 2003) and shy away from risky investments (Bogan and Fernandez, 2017). Moreover, children of disabled parents are less likely to finish school (Mont and Nguyen, 2013; Bratti and Mendola, 2014).

In this paper, we examine the impact of disability incidences on risk preferences. More specifically, we investigate whether individual risk preferences change if another household member becomes disabled. With the stability of risk preferences being conceptually at the heart of microeconomics (Barseghyan *et al.*, 2018; Schildberg-Hörisch, 2018), this research question is relevant for the following reasons. First, individual risk preferences can have real-world consequences as they have been found to influence individual- and household-level welfare and behaviour with respect to labour market and health outcomes, addictive behaviour, compliance

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This paper was received on 14 December 2021 and accepted on 7 April 2024. The Editor was Steffen Huck.

The data and codes for this paper are available on the Journal repository. They were checked for their ability to reproduce the results presented in the paper. The replication package for this paper is available at the following address: https://doi.org/10.5281/zenodo.10911278.

We would like to thank the Health Economics Research Group at BNITM and the Development Economics Research Group at the University of Göttingen for valuable comments. The paper benefited from discussions with Werner Bönte, Krisztina Kis-Katos, Stephan Klasen, Holger Rau, Gerhard Riener and Hannah Schildberg-Hörisch. Excellent work in the implementation of the experiments was provided by Le Thanh Ngan and Tham Le Thi. The research was financially supported by the German Research Foundation (DFG) through project RTG 1723 ('Globalization and Development'). This study relies on data from long-term project No. 20220831434900116103, funded by the DFG. For more detailed information, see https://www.tvsep.de. The views expressed in this paper are those of the authors alone and do not present the views of BNITM. HCHE, the University of Göttingen and the World Bank. IRB approval was obtained from the German Institute for Global and Area Studies (GIGA). Additional approval was obtained from the University of Hanover (TVSEP add-on project).

with laws and investment decisions (Barsky *et al.*, 1997; Hong *et al.*, 2004; Bonin *et al.*, 2007; Anderson and Mellor, 2008; Dohmen *et al.*, 2011; Dohmen and Falk, 2011; Müller and Rau, 2021). Consequently, changes in risk preferences due to a disability incidence in the household might help explain many of the differences in behaviours and socio-economic outcomes between disabled and non-disabled households.

Second, individual risk preferences matter for the formulation of effective government policies. For instance, the literature on the design of optimal social insurance policies has highlighted that the welfare impact of government interventions is to an important degree determined by individuals' risk preferences in a society or target population, since these preferences eventually determine the welfare effects of having a smoother consumption path as a consequence of being insured (Baily, 1978; Acemoglu and Shimer, 1999; Chetty, 2006). In this context, changes in risk preferences as a result of a disability event in the household can help to inform discussions around the expansion of public social insurance coverage.

In principle, it is an open empirical question whether, in which direction and why individual risk preferences might change following a disability incidence in the household. While earlier economic models assumed that risk preferences are stable (Stigler and Becker, 1977), empirical research has challenged this view (Chuang and Schechter, 2015; Barseghyan *et al.*, 2018; Schildberg-Hörisch, 2018). In our context, experiencing a disability incidence in the household might lead to a decline in wealth, affect a person's perception of risk related to their environment and own health, and can therefore be thought of as adding background risk. If people are 'risk vulnerable' in the sense of Eeckhoudt *et al.* (1996) and Gollier and Pratt (1996), a disability shock would contribute to more risk-averse behaviour. In contrast, economic and psychological theories suggest that individuals who are already poor or live in high-risk environments—as in our study context—may neither be concerned about an additional income shock nor about additional risks. They therefore might act emotionally (as opposed to cognitively) and therefore exhibit more risk-loving behaviour in response to a household disability shock (Kahneman and Tversky, 1979; Lerner and Keltner, 2001; Quiggin, 2003; Chetty and Szeidl, 2007).

The setting of our study is rural Vietnam. To examine the impact of a disability event in the household on individual risk preferences, we employ two distinct empirical approaches. The first approach leverages micro-panel data in which the same individuals were interviewed during multiple survey rounds between 2008–17. Individual risk measures are obtained from self-reports to an eleven-point Likert scale question on general risk as in Dohmen *et al.* (2011) and Falk *et al.* (2018). To account for possible endogeneity between a disability event in the household and individual risk preferences, we rely on two-way fixed-effect specifications.

The second approach is based on an incentivised lab-in-the-field experiment that uses a within-subject design to collect unincentivised (general risk questions) and two types of incentivised risk preference measures, which follow Eckel and Grossman (2002; 2008) and Bruner (2009). Besides allowing us to compare risk preferences across different individuals (with and without a disability event in the household), the lab-in-the-field experiment was designed to explore the role of cognitive-emotional mechanisms in driving the disability incidence versus risk preference relationship. More specifically and following the earlier work of Callen *et al.* (2014) and Cohn *et al.* (2015), we investigate the role of fear on risk preferences across individuals in a randomised setup. The applied primes are associative in nature and are meant to provide small cues to stimulate individuals into thinking about the health and well-being of other household members and the possible implications for themselves.

Across both empirical approaches our results suggest that individuals who experience a disability event in the household behave in a more risk-averse manner than individuals without such an experience. Examining mechanisms in more detail, we show that a disability event in the household makes households poorer, with lower levels of wealth being positively correlated with a lower willingness to take risks. Furthermore, we demonstrate that changes in wealth are likely not the only channel at work. Turning towards the role of cognitive mechanisms, we obtain evidence that fear (emotions) and the updating of beliefs—becoming more pessimistic with respect to future shocks—seem to play an important role in explaining our main results.

Our paper advances the literature in four ways. First, we contribute to the broader literature in health economics (beyond disability) that examines the impact of idiosyncratic health shocks on individual risk preferences. The relevant studies that we are aware of have exclusively relied on longitudinal data with unincentivised risk preference measures (Sahm, 2012; Chuang and Schechter, 2015; Gloede *et al.*, 2015; Decker and Schmitz, 2016; Dohmen *et al.*, 2016; Kettlewell, 2019). Likewise, all of these studies have exclusively focused on changes in an individual's own health or her/his risk preferences. In contrast, we investigate spillover effects of idiosyncratic health shocks (how a disability event in the household affects one's own risk preferences), while empirically adding causal estimates on the mechanisms that might drive changes in risk preferences.[1]

Second, we add to the scarce literature on disability that investigates the spillovers of a disability incidence in the household to other household members. In fact, we are only aware of four studies (Powers, 2001; 2003; Bratti and Mendola, 2014; Bogan and Fernandez, 2017) that went beyond descriptive statistics and cross-sectional regressions in this context. While Bratti and Mendola (2014) examined the impact of parental disability on children's education outcomes, Bogan and Fernandez (2017) investigated the effect of a child's disability on a household's investment decisions. Similarly, Powers (2001; 2003) focused on child disability and looked into its implication for female labour supply. In contrast, our study focuses on a different group (other household members) and outcome (risk preferences).[2]

Third, the paper speaks to the social insurance literature and in particular to the strand of theoretical models that emphasise the benefit of social insurance in settings with frequent shocks, borrowing constraints, consumption commitments and sizeable income fluctuations (Flemming, 1978; Chetty and Looney, 2006; Chetty and Szeidl, 2007; Crossley and Low, 2011). Existing theoretical frameworks tend to model the impact of shocks exclusively via the wealth channel with the underlying structure of risk preferences assumed to remain stable. For instance, in the relevant literature a shock might lead to a decrease in wealth that in turn has different implications for the optimal level of social insurance depending on whether individuals are risk averse, risk neutral or risk loving. In this regard, we provide evidence that risk preferences are not stable, but change as a result of a disability shock in the household with likely consequences for the optimal level of social insurance.

[1] It is noteworthy that, with respect to market-wide/global economic and health shocks, the COVID-19 pandemic in the years 2019–22 gave rise to a number of papers that examined its impact on risk preferences. While most studies rely on unincentivised survey-based risk measures (Angrisani *et al.*, 2020; Bu *et al.*, 2021; Hanspal *et al.*, 2021), we are aware of two studies that examine the impact of the pandemic on incentivised risk preference measures (Huber *et al.*, 2021; Shachat *et al.*, 2021), and one study that uses both unincentivised and incentivised risk measures (Adema *et al.*, 2022). Overall, the current empirical evidence of the COVID-19 pandemic on risk preferences appears to be mixed.

[2] Traditionally, studies in health economics have focused on illnesses and chronic diseases. Regarding disability, a more developed literature examines the impact of disability onset on the disabled person's own socio-economic outcomes (Stern, 1989; Stephens, 2001; Mitra and Sambamoorthi, 2008; Mitra *et al.*, 2009; Singleton, 2012; Oster *et al.*, 2013; Bjorvatn and Tungodden, 2015; Mani *et al.*, 2018; Meyer and Mok, 2019).

Lastly, we contribute to the literature examining the stability of risk preferences. A growing body of research has examined whether risk preferences change as a result of conflict, financial, environmental, health, labour market, macroeconomic and wealth shocks (Chuang and Schechter, 2015; Barseghyan *et al.*, 2018; Schildberg-Hörisch, 2018). A feature that almost all of these studies share is that results largely rely on a single risk preference measure, a single data set and a single identification strategy.[3] Considering that in social sciences particular findings frequently hinge on the adopted empirical identification strategy, underlying data and measurement, it is fair to say that, for many pressing policy questions regarding the role of shocks on risk preferences, the available evidence is not yet abundant and perhaps solid enough.[4] In this regard, we believe that this is one of the first studies on the impact of shocks on risk aversion that is able to leverage different data sets, samples (a longitudinal survey and a cross-sectional incentivised experiment) and econometric identification strategies to shed light on the same research question within the same context.[5]

The remainder of the paper is structured as follows. Section 1 provides background information on Vietnam and the study context. Section 2 presents results from the longitudinal survey on the relationship between disability events and risk preferences. Section 3 discusses our lab-in-the-field experiment and its main findings. Section 4 elaborates on mechanisms that help explain our results and shows empirical evidence on the consequences of disability events in the household for real-life decision-making. Section 5 concludes.

1. Country Context

Vietnam is a lower middle-income country home to 97 million people of which 63% reside in the rural areas of the country. Since the mid-1980s the country has witnessed remarkably high rates of economic and inclusive growth. While most countries struggled to fulfil the UN Millennium Development Goal's poverty reduction targets, Vietnam achieved its targets in 2005; ten years ahead of the targeted benchmark. In the period 2010–20 Vietnam continued its success story, decreasing poverty further from 16.8% (22.1% in rural Vietnam) to 5% (7.0% in rural Vietnam) with average wage incomes tripling. Despite its impressive track record regarding welfare improvements, challenges remain such as rural-urban inequalities and the lack of a

[3] For studies involving self-reported risk measures, see Nagel and Malmendier (2011), Gloede *et al.* (2015), Decker and Schmitz (2016), Dohmen *et al.* (2016), Necker and Ziegelmeyer (2016), Bucciol and Miniaci (2018), Guiso *et al.* (2018), Hanaoka *et al.* (2018), Brown *et al.* (2019), Kettlewell (2019), Hetschko and Preuss (2020) and Jetter *et al.* (2020); for hypothetical choices, see Sahm (2012), Callen *et al.* (2014), Kim and Lee (2014), Chuang and Schechter (2015) and Jakiela and Ozier (2019); and for single incentivised experiments, see Voors *et al.* (2012), Cameron and Shah (2015), Cohn *et al.* (2015) and Moya (2018).

[4] With respect to risk preference measures, several studies have pointed out that relying on a single measure of risk preference is problematic. It is well established that different measures have their own weaknesses (Andersen *et al.*, 2006; Dave *et al.*, 2010; Charness *et al.*, 2013; Lönnqvist *et al.*, 2015; Zhou and Hey, 2018), that measures are prone to noise stemming from inattention and measurement error (Gillen *et al.*, 2019; Snowberg and Yariv, 2021) and that they are only imperfectly correlated with each other (Dohmen *et al.*, 2011; Reynaud and Couture, 2012; Lönnqvist *et al.*, 2015; Csermely and Rabas, 2016; Schildberg-Hörisch, 2018; Holzmeister and Stefan, 2021). Consequently, estimated effects, in terms of magnitude, direction and statistical significance, can be highly sensitive to the particular risk measure employed (Dohmen *et al.*, 2018; Gillen *et al.*, 2019). Therefore, conflicting findings in the empirical literature of shocks on risk preferences might in part be attributable to the selected risk measure (Schildberg-Hörisch, 2018) and its reliability in the field (Snowberg and Yariv, 2021).

[5] Notable exceptions are Cameron and Shah (2015) and Adema *et al.* (2022). The former study uses two different risk measures, but one data set and one identification strategy. The latter study uses two different data sets (a survey and a lab-in-the field experiment), but is restricted to reporting cross-sectional correlations between shocks (earthquakes) and risk preference measures only.

formal social protection and insurance system that covers informal workers and family members. Furthermore, many people are still vulnerable to poverty, while the fear of destitution and hunger has remained a major concern for many (WB, 2018; 2022).

Recent estimates suggest that about 6.2 million individuals aged two years or older (about 7% of the population) have a disability, while nearly 12 million individuals (about 13% of the population) live in a household that contains a disabled person (GSO, 2018). In international comparisons—due to the Vietnam War and its long-term effects via bombings and chemical agents—the disability prevalence rate is slightly higher than in other countries with a similar population age structure (WHO, 2011; Palmer *et al.*, 2019; Singhal, 2019).

Empirical evidence from Vietnam suggests that households with a disabled person are typically poorer than households without a disability incidence (Mont and Nguyen, 2011; GSO, 2018), particularly in rural areas where access to public support services is often lacking (Mont and Nguyen, 2018). A further result from the war concerns disability stereotypes. In many parts of the world people and households with a disability incidence might face substantial stigmas originating from misconceptions regarding witchcraft, symbolising bad luck, and contagiousness, which can lead to an underreporting of disability incidences in surveys (WHO, 2011; Rohwerder, 2018). While such stereotypes about disability also exist in Vietnam, their prevalence is comparatively low due to higher visibility and a better understanding of disability through the war (ISEE, 2017).

The setting of our study is rural Vietnam; more specifically, farm households in three provinces. Farm households in Vietnam possess relatively high education levels compared to other developing countries, which helps ensure that they understand survey questions and experimental instructions. In this context a number of studies have examined risk preferences of Vietnam's rural population (Tanaka *et al.*, 2010; Gloede *et al.*, 2015) and shown that rural Vietnamese households tend to be moderately risk averse, which is in line with empirical evidence on farm households from other countries.[6]

2. Panel Data Evidence

2.1. *Data and Sample*

2.1.1. *Data*

Our principal data source comes from six rounds of the Thailand Vietnam Socio Economic Panel (TVSEP), which constitutes one of the most established long-term panel datasets for developing countries (Thailand Vietnam Socio Economic Panel, 2023). The Vietnamese data were collected in 220 villages in the years 2008, 2010, 2011, 2013, 2016 and 2017 and are designed to be representative of the rural population in the three provinces of Ha Tinh, Thua Thien Hue and Dak Lak (Hardeweg *et al.*, 2013).[7]

TVSEP collects a wide range of demographic, socio-economic and health variables. Moreover, the survey gathers detailed information on household farm and non-farm activities, income and expenditure, labour supply, assets, remittances, loans, insurances and comprises an extensive

[6] Typically, rural households are considered to be particularly prone to income shocks and background risk stemming from weather and crop conditions, in addition to factors commonly found in industries (e.g., price fluctuations from variability in consumer tastes, inputs and supply). While the added background risk that rural households face could result in higher risk tolerance, most studies on farm households seem to suggest that rural households are more risk averse compared to other parts of the population (Binswanger, 1980; Cardenas and Carpenter, 2008; Yesuf and Bluffstone, 2009; Herberich and List, 2012; Reynaud and Couture, 2012).

[7] See Figure B.1 in the Online Appendix for a map regarding survey locations and Gloede *et al.* (2015) for a more detailed description of the survey's sampling process. More information on TVSEP is available from https://www.tvsep.de.

'shock' module that captures household's ex ante and ex post coping strategies and risk perceptions. TVSEP interviews were conducted with the head of the household. If the head of household was absent during the time of interview, the survey was conducted with the spouse or another adult member of the household.

2.1.2. *Sample construction*

The 2008 TVSEP round interviewed about 2,150 households—about 9–10 households per village—which constitute the core sample. Each follow-up survey round aims to re-interview all of the original households. An exception concerns the 2011 TVSEP round that, due to budget constraints, re-interviewed only about a third of the original sample (randomly selected). In general, attrition rates at the household level are very low. Over the period 2008–17 only about 5% of households could not be re-interviewed (see Table A1 in Appendix A).

The construction of our core sample follows the requirements of our empirical identification strategy. Consequently, we only consider surveyed individuals who were interviewed in at least two different survey rounds. As shown in Table A1 in Appendix A and Online Appendix Table B.1, attrition rates are higher at the individual level. While some individuals left the household (about 20% of individuals), the principal reason for individual-level attrition relates to the circumstance that another household member got interviewed during a follow-up visit (about 40% of individuals). Furthermore, due to our estimation strategy, we exclude households that consist of only a single individual at any point in time (thirty-four households).

Overall, our final sample yields 9,376 observations (# respondents $\times$ survey rounds). As shown in Online Appendix Table B.1, the sample mainly consists of persons who were interviewed for the first time in 2008 or 2010. Also, about three-quarters of respondents were interviewed more than twice. In particular, household heads tended to be more likely to be interviewed multiple times (Online Appendix Table B.1).

2.2. *Variable Construction*

2.2.1. *Risk preferences*

Preferences are measured based on self-reports to a general risk question that is identical to the simple risk question used in the Global Preference Survey Module (Falk *et al.*, 2018) and the German Socio-Economic Panel (Dohmen *et al.*, 2011). The survey item captures risk on an eleven-item Likert scale. More specifically, respondents are asked to rate their willingness to take risks in life on a scale from 0 (completely unwilling to take risks) to 10 (very willing to take risks). Hardeweg *et al.* (2013) showed that the risk question was a suitable and reliable survey item for the TVSEP population.

2.2.2. *Disability shock*

As recommended by disability measurement experts such as the WHO and the Washington Group on Disability Statistics (Mont, 2007; WHO, 2011; WG, 2017), our definition of disability relies on health information in six domains for each individual (seeing, even if wearing glasses; hearing, even if using a hearing aid; walking or climbing steps; remembering or concentrating; self-care such as washing all over or dressing; communicating, e.g., understanding or being understood even when using your usual customary language).[8] Information on each household

[8] The specific wording of questions are as follows. (1) Does he/she have difficulty seeing, even if wearing glasses? (2) Does he/she have difficulty hearing even if using hearing aid(s)? (3) Does he/she have difficulty walking or climbing

member's disability status is derived from (self-)reports of the respondent. The response options to each of the domain-specific questions are ordinal from 0 (no difficulty) to 3 (cannot do at all).[9]

Following WHO guidelines we classify individuals (Is) in terms of the severity of their disability status as follows.

(*1*) Severe: I has a '2' (a lot of difficulty) in at least one of the six dimensions.
(*2*) Very severe: I has a '3' (cannot do at all) in at least one of the six dimensions.

Based on the individual classifications, we construct our principal disability shock variable. The variable is binary and takes the value 1 if any member (excluding the respondent) is severely or very severely disabled at time *t*.

The construction of our household disability shock variable requires considerations about (*i*) the disability threshold, (*ii*) endogenous sorting of household members and (*iii*) the unexpectedness of a disability incidence. Regarding (*i*), we run a sensitivity analysis that leverages an alternative disability shock variable that only considers very severe disability cases. Regarding (*ii*), our main household disability indicator uses the household's baseline member composition as reference, and therefore only tracks changes in the disability status among initial members of the household. While this decision can introduce measurement error, our analysis will be less affected by issues around the endogenous sorting of new members into the household.[10] As part of the sensitivity analyses, we additionally show results based on definitions that include all current members of a household.

Regarding (*iii*), our disability definition considers disability as a lack of functioning in aspects related to daily life, which may occur abruptly or gradually (e.g., as part of an ageing process). While we follow the WHO's guidelines in our main specifications, as described above, we show robustness checks in which we only consider disability cases that, according to the respondent, were entirely unexpected.[11]

2.3. *Descriptive Evidence*

Table 1 provides descriptive background statistics on our study sample. As shown in panel A (column (1)), the initial respondents in 2008 were on average forty-seven years old, male (55%)

steps? (4) Does he/she have difficulty remembering or concentrating? (5) Does he/she have difficulty with self-care, such as washing all over or dressing? (6) Using usual language, does he/she have difficulty communicating, for example understanding or being understood?

[9] Information on the disability status of each household member was collected in the 2017 TVSEP survey round. The implemented disability module gathered information on the type, severity, onset, changes and origin of each member's disability. This information allows us to infer the disability status of each household member for all past periods. Since households have experience with TVSEP for many years, they are well aware of the circumstance that the surveys are unrelated to any possible financial incentives such as welfare payments. Therefore, households are unlikely to overreport disability incidences; a phenomenon that has been studied in richer countries (Autor and Duggan, 2006; Black *et al.*, 2017).

[10] The data, however, do not allow us to track the disability status of members that have left the household.

[11] The TVSEP disability module asks the respondent whether the disability status (based on the respective rating in each of the six dimensions) was expected or unexpected to the household at the time it occurred. Based on this information, we constructed additional household-level disability variables that only consider unexpected disability incidences. On the one hand, such a measure might be preferable since it can proxy abrupt shocks better; a line of reasoning that is discussed in more detail in Takasaki (2020). On the other hand, the measure potentially introduces additional measurement error since a respondent's risk preferences could be correlated with her/his view on whether a shock was predicable/to be expected or not.

Table 1. *TVSEP Sample Descriptives by Round: Means and SDs.*

Variable	2008 (1)	2010 (2)	2011 (3)	2013 (4)	2016 (5)	2017 (6)
Panel A: respondent characteristics						
Risk taking (Likert scale)	3.72	4.20	5.15	5.81	6.17	5.98
	(3.15)	(2.75)	(2.64)	(2.66)	(2.30)	(2.56)
Age (years)	46.57	48.58	49.41	51.31	55.27	54.68
	(13.39)	(13.22)	(13.72)	(13.10)	(12.43)	(12.66)
Female (0/1)	0.43	0.45	0.48	0.46	0.21	0.49
	(0.49)	(0.50)	(0.50)	(0.50)	(0.41)	(0.50)
Married (0/1)	0.87	0.87	0.85	0.84	0.80	0.81
	(0.33)	(0.34)	(0.36)	(0.37)	(0.40)	(0.39)
Primary (0/1)	0.34	0.36	0.54	0.35	0.36	0.36
	(0.48)	(0.48)	(0.50)	(0.48)	(0.48)	(0.48)
Secondary (0/1)	0.45	0.45	0.32	0.45	0.44	0.45
	(0.50)	(0.50)	(0.47)	(0.50)	(0.50)	(0.50)
High school (0/1)	0.13	0.13	0.09	0.15	0.15	0.13
	(0.33)	(0.33)	(0.29)	(0.36)	(0.36)	(0.34)
Professional (0/1)	0.00	0.00	0.00	0.02	0.02	0.02
	(0.00)	(0.00)	(0.00)	(0.14)	(0.13)	(0.14)
University (0/1)	0.05	0.06	0.05	0.02	0.04	0.03
	(0.23)	(0.23)	(0.21)	(0.15)	(0.19)	(0.18)
Household head (1 = yes, 0 = no)	0.67	0.66	0.61	0.66	0.97	0.66
	(0.47)	(0.47)	(0.49)	(0.47)	(0.18)	(0.47)
Household size	5.05	5.31	5.72	4.65	4.46	4.46
	(1.79)	(1.90)	(1.98)	(1.79)	(1.74)	(1.77)
Household expenditure (log)	8.65	10.73	10.90	7.79	11.30	11.44
	(0.74)	(0.66)	(0.82)	(2.23)	(0.78)	(0.77)
Panel B: disability characteristics						
Respondent severe disability (0/1)	0.01	0.02	0.02	0.03	0.05	0.05
	(0.12)	(0.13)	(0.12)	(0.16)	(0.22)	(0.21)
HH disability shock (0/1)	0.04	0.04	0.04	0.05	0.06	0.08
	(0.19)	(0.20)	(0.19)	(0.22)	(0.24)	(0.27)
Respondent very severe disability (0/1)	0.00	0.00	0.00	0.00	0.00	0.00
	(0.02)	(0.02)	(0.00)	(0.03)	(0.05)	(0.04)
HH disability shock (definition 2) (0/1)	0.00	0.01	0.00	0.01	0.01	0.01
	(0.07)	(0.08)	(0.04)	(0.08)	(0.08)	(0.10)
Respondent unexpected severe disability (0/1)	0.01	0.01	0.01	0.02	0.04	0.04
	(0.11)	(0.12)	(0.10)	(0.15)	(0.20)	(0.18)
HH disability shock (definition 3) (0/1)	0.03	0.04	0.03	0.04	0.05	0.06
	(0.17)	(0.18)	(0.18)	(0.20)	(0.21)	(0.24)
Observations	1,864	1,868	596	1,762	1,672	1,614

Notes: Scale on risk preferences (eleven-point Likert scale) is coded from '0' (unwilling to take risks) to '10' (fully prepared to take risks). Education levels refer to completed degrees. See Online Appendix Table B.3 for the coding and definition of each variable. Household-level disability excludes the disability status of the respondent and is based on the original household composition. The household disability refers to a 'severe' or 'very severe' disability. Definition 2 includes only 'very severe' cases. Definition 3 comprises 'unexpected and severe' and 'unexpected and very severe' cases. Correspondingly, respondent 'severe' disability also includes 'very severe' disabilities.

and finished secondary school (44%). On average, a household consists of five members. Over time we observe a typical 'panel-ageing' effect. By 2017 (column (6)), the average respondent was 53.5 years old.[12]

[12] See Table A2 in Appendix A and Online Appendix Table B.3 for a detailed description on the construction of variables and for further descriptive statistics on all TVSEP variables that are used in this study. Throughout, we transform most continuous variables (such as expenditures or assets) by inverse hyperbolic sine (henceforth *asinh*), to account for outliers in our analysis (Bellemare and Wichman, 2020).

2.3.1. *Risk preferences*

Panel A of Table 1 and Online Appendix Figure B.2 depict descriptive information on our measure of risk preferences. We observe an increase in the willingness to take risks over time. While in 2008 the average respondent tended to be rather averse, the average respondent became more risk loving over time. Given that the survey implementation remained highly comparable over time (instruments, training, enumerators), we speculate that the increase in the willingness to take risks is reflective of the development of background risk factors such as the massive reduction of poverty in the country with higher wealth being positively correlated with the willingness to take risks (Guiso and Paiella, 2008).[13]

2.3.2. *Disability incidence*

Panel B of Table 1 describes our disability variables. Consistent with the circumstance that our respondents become older, we observe an increase in the incidence of disability over time irrespective of the selected definition. While in 2008 only 1% of respondents had a severe or very severe disability, this number increases to 5% in 2017. We observe similar trends in our household disability shock variable; an increase in the incidence of a severe or very severe disability from 4% in 2008 to 8% in 2017. Furthermore, the table shows that incidences of very severe disabilities are rare (about 1% in 2017), while the majority of disability onsets were perceived as unexpected (about 75% of all household-level disability incidences).

To better understand the underlying mechanisms of our household disability shock variable, we display descriptive statistics of the six domains of disability in Table A2 in Appendix A. The table allows two main observations. First, initially (2008 round), the various functional dimensions seem to rather equally determine why a household member was disabled. Second, over time and as our household members become older, we find that in particular an increase in problems relating to walking and to some extent increases in disabilities related to seeing, communication and self-care are responsible for an increase in household disability incidences over time.

Next, we explore the relationship between our disability measure and chronic illnesses in order to better understand (*i*) what our disability variable captures and (*ii*) to what extent household-level variables comprise a 'shock component'. Bearing in mind that disability onsets are frequently related to illnesses, we show in Table B.4 in the Online Appendix that a majority of individuals had no major illness prior to the occurrence of a disability incidence. Among those who had prior major illnesses, they are related to hypertension (7% and 6.7%), chronic backache (5% and 3.4%) and accidents (5.7% and 4.5%).

2.4. *Identification and Results*

Our main specification is based on two-way fixed-effect OLS regressions. We estimate

$$R_{ivt} = \beta DS_{ivt} + X'_{ivt}\theta + \alpha_i + \delta_{dt} + \epsilon_{ivt}, \tag{1}$$

where R_{ivt} refers to the outcome variable (risk preferences) for individual i in village v at time t and X_{ivt} refers to time-varying individual and household-level control variables. Individual

[13] As part of our validity checks, we provide cross-correlations of the TVSEP risk measure with other socio-demographic variables of the respondent in Table B.2 in the Online Appendix. As in Dohmen *et al.* (2017) and Falk *et al.* (2018), we observe that wealth is positively correlated with the willingness to take risks, while age is negatively correlated with the willingness to take risks, as is the gender of the respondent (being female).

fixed effects α_i control for all time-invariant individual and household characteristics, and the δ_{dt} refer to district-time fixed effects, which account for developments over time at the district level (ADM2). Here DS_{ivt} is a dummy variable indicating a disability event in the household (whether a family member of respondent i is disabled). SEs (ϵ_{ivt}) are clustered at the village level.

Estimation of (1) will deliver consistent estimates of the impact of a disability event in the household on risk preferences, provided that the standard conditional expectation assumption holds. That is, conditional on time-varying controls (X_{ivt} and δ_{dt}) and unobserved time-invariant heterogeneity (α_i), the occurrence of a disability event in the household is uncorrelated with unobserved time-varying determinants of individual risk preferences (ϵ_{ivt}).[14]

Controlling for α_i is important since innate characteristics might influence the occurrence of disability events in the household and the respondent's risk preferences. It can also pick up individual differences in the way people interpret the risk preference scale that could be influenced by heterogeneous beliefs about risks. Common time trends in each district are captured by the district-year dummies (δ_{dt}).

Table 2 depicts our main results. The main specification is column (2), which includes a basic set of control variables. In contrast, columns (3) to (7) contain specifications that include additional covariates, which on the one hand might be important time-varying omitted variables, but on other hand might constitute channels through which a disability event in the household affects changes in the willingness to take risks.

Across all empirical specifications we observe a negative impact of a disability shock in the household on an individual's willingness to take risks. Our preferred specification (column (2)) indicates that a household-level disability shock reduces the willingness to take risks by 0.85 points.

2.5. *Robustness Checks*

In this subsection we report results from various sensitivity checks.

2.5.1. *Selective attrition and sorting*

First, we shed light on the determinants of attrition and selection effects (Table A3 in Appendix A). We show in columns (1) and (2) that being a TVSEP respondent only once—observations that do not enter our respondent sample due to individual FEs—and that changes in the person who becomes a respondent in the next follow-up round appear to be unrelated to three key variables: risk preferences, the respondent's disability status and the household disability shock variable. In column (3) we examine factors that are correlated with individual-level attrition from the household. Here, we observe that individuals with a disability are slightly less likely to leave the household (about 2.3 percentage points). Since our specifications control for household size and the respondent's disability status, we believe that this pattern does not bias our main results. Lastly, we show in column (4) that respondents who are the household head (HH; in contrast to being other HH members) tend to be older and less likely to be female, but do not differ in terms of risk preferences and disability indicators.

[14] Our preferred main specification uses the following basic control variables for X_{ivt}: the respondent's disability status, age, marital status, household size and education level. As shown below, additional control variables relate to concepts such as household wealth, the demographics of disabled household members, an illness event in the household and the availability of safety nets.

Table 2. *Impact of Disability Shocks on the Willingness to Take Risks (TVSEP): OLS Results Based on TWFE Specifications.*

	Willingness to take risks (0–10)						
Outcome:	(1)	(2)	(3)	(4)	(5)	(6)	(7)
HH disability shock	−0.872**	−0.850**	−0.861**	−1.163**	−0.894**	−0.846**	−1.246**
	(0.363)	(0.362)	(0.363)	(0.489)	(0.362)	(0.362)	(0.496)
Individual disability	0.154	0.196	0.217	−0.127	0.220	0.233	−0.074
	(0.316)	(0.322)	(0.323)	(0.531)	(0.322)	(0.323)	(0.535)
Age (years)		0.034*	0.033*	0.034*	0.039**	0.033*	0.037**
		(0.019)	(0.019)	(0.019)	(0.018)	(0.019)	(0.018)
Married (0/1)		0.012	0.000	0.011	−0.045	−0.009	−0.076
		(0.183)	(0.182)	(0.183)	(0.178)	(0.183)	(0.179)
Household size		0.068**	0.053*	0.068**	0.069**	0.067**	0.052*
		(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)
High school graduate		0.245	0.224	0.241	0.231	0.240	0.199
		(0.193)	(0.192)	(0.192)	(0.195)	(0.193)	(0.194)
Household expenditure (log)			0.111***				0.114***
			(0.027)				(0.028)
Observations	9,376	9,376	9,376	9,376	9,315	9,376	9,315
Dependent mean	5.1	5.1	5.1	5.1	5.1	5.1	5.1
R^2	0.53	0.53	0.53	0.53	0.53	0.53	0.54
Unique individuals	1,874	1,874	1,874	1,874	1,829	1,874	1,829
Unique households	1,258	1,258	1,258	1,258	1,228	1,258	1,228
Individual FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District × year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Demographics of disabled	No	No	No	Yes	No	No	Yes
Illness events	No	No	No	No	Yes	No	Yes
Safety nets	No	No	No	No	No	Yes	Yes

Notes: The outcome variable is a measure of the willingness to take risks in life on a scale from 0 (completely unwilling to take risks) to 10 (very willing to take risks). Household-level disability excludes the disability status of the respondent and is based on the original household composition. Disability refers to a 'severe' or 'very severe' disability. Basic controls are the respondents' disability status, age, marital status, household size and educational attainment. Column (3) adds household expenditure (asinh), column (4) the age and gender of the individual with the disability, column (5) household-level illness events and impairments of the respondent and within the household as controls, column (6) net remittances received (asinh) and an indicator for whether the household has a business. In column (7), all controls are jointly included in the estimation. SEs, reported in parentheses, are clustered at the village level. * $p < .1$, ** $p < .05$, *** $p < .01$.

Second, we investigate to what extent our main results are sensitive to the particular sample used (panel A of Table A4 in Appendix A). Column (1) depicts specifications in which all contemporaneous household members are considered in the construction of the disability shock variable (not just the initial members), column (2) shows specifications in which the estimation sample only includes household heads, column (3) contains results in which we use a balanced sample across all survey waves (excluding the smaller 2011 round), column (4) depicts findings for a sample that excludes observations in which a disabled household member has left the household, while column (5) shows results in which the disability shock indicator is set to '1' in cases that a disabled member has left the household. Column (6) additionally controls for the number of remaining original household members, as our disability measure is based on the original composition of household members. In general, we find that our main results are fairly robust to the use of alternative samples and coding strategies.[15] While concerns about

[15] In total, over the entire TVSEP period, in six households a household member died who was previously classified as severely disabled in our data. Excluding these six households from the analysis does not affect our results. Furthermore,

time-varying unobservables affecting both attrition and disability or risk preferences cannot be completely ruled out with the data at hand, the analysis above strengthens our confidence that our main results are not biased by attrition patterns.[16]

2.5.2. *Measurement of disability shock and risk preferences*

Results from columns (5) and (7) of Table 2 indicate that our disability variable captures something else than just the plain deterioration in household members' individual health. As shown in columns (1) and (2) of panel B of Table A4 in Appendix A, our results prevail when using two alternative disability shock definitions (when only considering very severe incidences and when only considering incidences that were unexpected). Regarding our measure of risk preferences, we show in columns (3) and (4) of panel B of Table A4 in Appendix A results from specifications that exclude observations from the 2008 and 2010 rounds that had reported a '0' willingness to take risks (column (3)) and results in which we use a binary indicator of the willingness to take risks (instead of the original ordinal scale; column (4)). The former specification aims to address the issue that we observe a surprising strong gap in reported '0's between the early and later TVSEP rounds. While we observe changes in the magnitude of our coefficient of interest in columns (3) and (4), our main insights seem to remain valid. Furthermore, we show in Online Appendix Figure B.3 results when defining the willingness to take risks in terms of binary indicators for all values. Partially in contrast to Kimball *et al.* (2009), we find that our impacts are driven by changes in the middle of the willingness-to-take-risks distribution.[17]

2.5.3. *Econometric specifications*

Next, we investigate the robustness of our main results to alternative SE adjustments. Using Conley-style SE adjustments to account for spatial correlations (Conley, 1999) and clustering SEs at the subdistrict level (columns (5) and (6) of panel B of Table A4 in Appendix A) does not change our main results. Note that in the case of Conley SE adjustments our sample is slightly smaller since GPS coordinates were not available for all villages.

2.5.4. *Alternative econometric setup: an event study design*

Our previous estimation strategy relies on the assumption that a disability event is not correlated with other time-varying factors that affect respondents' risk preferences and are specific to individuals, conditional on our included control variables. To test whether there are any individual pre-trends related to risk preferences subject to the occurrence of a disability shock that could bias our results, we use an alternative estimation approach, namely, a staggered difference-in-difference (DiD) setting.

A surge in the recent literature has demonstrated that the standard DiD assumptions are often violated in settings that follow staggered treatment roll-out settings (De Chaisemartin

over time twenty-two households witnessed a disabled individual moving into the household. While the main specification and presented robustness checks partially address this issue, the results are robust to dropping these twenty-two households from the analysis. Results are available from the authors upon request.

[16] TVSEP collects information on risk and shock coping strategies that households adopt. We find that less than 1% of households (conditional of having experienced an illness event in the household) list the migration of household members as a coping strategy. Results are available from the authors upon request.

[17] In Figure B.5 in the Online Appendix we briefly explore the bi-variate relationship between the willingness to take risks and four other variables (household expenditures, remittances, insurance holding and asset possession) that—among others—have been discussed in the literature as potential real-world outcomes of risk preferences. Except for the case of self-employed business activities, we otherwise do not find evidence for a particular association between extreme values in the risk distribution and real-world outcomes. Considering this finding and given that the majority of our sample is clustered around the centre of the risk distribution, we consider small changes in this part of the distribution as important.

Table 3. *Impact of Disability Shocks on the Willingness to Take Risks (TVSEP): Estimates from an Event Study Design.*

	Willingness to take risks (0–10)					
Outcome:	(1)	(2)	(3)	(4)	(5)	(6)
HH disability shock	−0.897***	−0.879***	−0.891***	−0.582	−0.836**	−0.877**
	(0.342)	(0.339)	(0.342)	(0.626)	(0.356)	(0.341)
Pre-trend 1	0.752	0.746	0.736	0.747	0.698	0.747
	(0.465)	(0.465)	(0.465)	(0.468)	(0.470)	(0.464)
Pre-trend 2	0.109	0.113	0.088	0.117	0.037	0.111
	(0.670)	(0.668)	(0.670)	(0.670)	(0.674)	(0.669)
Pre-trend 3	−0.102	−0.092	−0.094	−0.093	−0.111	−0.095
	(0.551)	(0.548)	(0.549)	(0.552)	(0.558)	(0.550)
Pre-trend 4	−0.009	0.013	0.007	0.005	−0.014	0.016
	(0.571)	(0.568)	(0.570)	(0.569)	(0.583)	(0.569)
Observations	9,893	9,893	9,893	9,893	9,824	9,893
Joint pre *p*-value	0.46	0.47	0.48	0.46	0.51	0.46
Individual FEs	Yes	Yes	Yes	Yes	Yes	Yes
District × year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	No	Yes	Yes	Yes	Yes	Yes
Household expenditure	No	No	Yes	No	No	No
Demographics of disabled	No	No	No	Yes	No	No
Illness events	No	No	No	No	Yes	No
Safety nets	No	No	No	No	No	Yes

Notes: Estimations are run following the methodology developed by Borusyak *et al.* (2024). The outcome variable is a measure of the willingness to take risks in life on a scale from 0 (completely unwilling to take risks) to 10 (very willing to take risks). Household-level disability excludes the disability status of the respondent and is based on the original household composition. The estimator excludes households that change their status from disability to non-disability. Disability refers to a 'severe' or 'very severe' disability. All specifications include individual and district-year fixed effects. Basic controls are the respondents' disability status, age, marital status, household size and educational attainment. Column (3) adds household expenditure (hyperbolic sine transformed), column (4) the age and gender of the individual with the disability, column (5) household-level illness events and impairments of the respondent and within the household, and column (6) net remittances received (hyperbolic sine transformed) and an indicator for whether the household has a business as controls. The specification corresponding to column (7) of Table 2 is not included, as convergence is not achieved when all controls are jointly included in the imputation. SEs, reported in parentheses, are clustered at the village level. ** $p < .05$, *** $p < .01$.

and d'Haultfoeuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021; Borusyak *et al.*, 2024). De Chaisemartin and d'Haultfoeuille (2020) showed that in two-way fixed-effect models, heterogeneity in treatment effects across time or groups of treated units may therefore produce biased estimations. To address this concern, we make use of the estimator developed by Borusyak *et al.* (2024), which accounts for heterogeneous timing in disability shocks by imputing non-treated outcomes for individuals in shock-affected households, and then estimates disability treatment effects based on differences between imputed and observed risk preferences.

Table 3 shows the DiD estimation results for the same specification as in Table 2. The average treatment effect of the household-level disability shock remains statistically significant and is precisely estimated at the 1% level, with the exception of including demographic variables of the individual with a disability. Figure B.4 in the Online Appendix shows a graphical representation of the results. We find that a disability shock in the household leads to a decline in risk-taking preferences up to at least three periods after the shock. That the effect diminishes in period 4 is likely driven by the relatively small sample over the whole time horizon in our data.

The reliability of the results from the adopted DiD setup hinges on pre-trends and parallel-trend assumptions. As shown in Table 3, all pre-trend coefficients as well as the joint p-value (see the bottom of the table) are statistically insignificant. We observe for one period prior to the household disability event, however, a positive and economically meaningful coefficient that is on the verge of being statistically significant at the 10% level. In the following we discuss the robustness of our results to this pattern. First, a number of recent papers have adjusted conventional DiD estimates to allow for differential pre-trends by incorporating (exact or approximate) interpolations of pre-trends for untreated versus treated observations (Bilinski and Hatfield, 2020; Bhalotra *et al.*, 2023; Rambachan and Roth, 2023). Given that our pre-trends—if at all—indicate that individuals with a disability incident in the household (compared to those without such an incident) might possibly have been on a path towards a relatively higher willingness to take risks, any plausible interpolation of pre-trends would suggest that our obtained DiD coefficient is a lower-bound estimate of the true effect of a household disability shock on the willingness to take risks. Second, the positive coefficient on $t-1$ could possibly reflect anticipation effects. For instance, individuals might suspect that another family member will become disabled due to genetic predispositions that were not yet reflected in our survey-based health indicators in the respective survey round. Likewise, individuals might simply start assuming that other family members might simply become more prone to disabilities due to the normal ageing process. We explore the role of anticipation effects in driving our main results by re-estimating our previous specification, relying on an alternative disability definition that only considers household members for which the disability incidence was entirely unexpected according to the respondent, in Table A5 in Appendix A. We find similar magnitudes and directions of the main treatment effect, while we observe no meaningful pre-trend differences (pre-trend coefficients become much smaller). We think that these results indicate that our previous estimate rather tends to be a lower bound estimate for contexts in which disability shocks were less likely to be anticipated.

By and large we conclude that the results of the adopted event study setup seem to strengthen the confidence in our main results.

3. Lab-in-the-Field Experiment

The second empirical approach rests on a lab-in-the-field experiment that we conducted from August to September 2018 in rural Vietnam; more specifically, in the province of Ha Thinh (one out of three TVSEP provinces).[18] The experiment was designed to shed light on the external validity of our TVSEP results in terms of the sample, risk measures and empirical identification strategy.

3.1. *Sample*

The experiment was conducted with 833 individuals in eighty-three villages. Villages were randomly selected from a regional sampling frame that comprised 160 villages from which TVSEP villages were deliberately excluded.[19]

[18] Because of budget constraints, the experiment could only be conducted in one province. From the three TVSEP provinces, Ha Tinh was randomly selected.

[19] The experiment provided financial incentives. In order to avoid households forming expectations about possible financial rewards in future TVSEP rounds, it was decided to focus on neighbouring villages instead.

The sampling of individuals was done as follows. First, we conducted a household listing exercise. More specifically, we consulted village officials and village elders to provide us with a complete list of all households in their village and to rank each household in terms of household size, the household head's education level and the household wealth level. Furthermore, we trained village officials and elders in the disability concepts of WHO (2011) and WG (2017), and asked them to identify households with disabled household members. After the listing was completed, our field team briefly visited all households to verify the reported disability status. As moderate disability incidences are more difficult to identify for village heads and village elders, our disability sample is ultimately more reflective of severe and very severe disability incidences in the household. Second, in each village we randomly selected an equal share of households with and without a disabled household member (excluding the household head).[20] Third, from each selected household we aimed to recruit the household head—similar to TVSEP—for the experiment. If the household head was not present, the experiment was conducted with the spouse or another adult member of the household.

In total 833 individuals were sampled. Dropping twenty-nine individuals who failed comprehension checks related to the experiment, our final sample comprised 804 individuals.

3.2. *Experimental Design*

The experiment aims to provide correlational and causal evidence on the relationship between a household member's disability incidence and an individual's risk preferences. In this subsection we describe the implementation, risk measures and causal identification strategy in more detail.

3.2.1. *Implementation*

The experiment was conducted in each participant's home. Upon arrival, the enumerator informed participants about the confidentiality of the data, conducted a short interview and provided participants with appropriate details of the potential earnings, including the possibility of cash payments.[21] Care was taken that subjects understood the decisions they were to make. Because these decisions were unfamiliar, several practice examples were demonstrated to ensure that subjects understood the nature of the decisions and how payment was linked to their choices.

Table 4 provides an overview of the structure of the experiment. Incentivised risk measures were collected as part of steps 6 and 9, while unincentivised risk measures were collected during steps 1 and 10. The order of the incentivised risk games—which game was implemented first—was randomised at the individual level.

The causal identification strategy (discussed below) employed psychological primes that involved two tasks (step 5 and step 8). The order of the tasks was randomised at the individual level. Moreover, prior to the visit of any study subject, individuals were randomised into one out of three prime groups.

[20] A stratified sample selection process was implemented involving two strata: household size and education level of the household head. Since the number of households differs across villages, the number of participants in our experiment varies across villages. At minimum six persons per village participated in the experiment, while in one village up to thirty-eight persons participated.

[21] Individuals were informed that they would receive a cash payment of 50,000 Vietnamese Dong for completing the full interview and experiments. In a few cases subjects lost money as part of their experimental decisions. In these cases the loss was subtracted from the 50,000 Vietnamese Dong. One USD amounts to approximately 23,100 Vietnamese Dong (nominal exchange rate from 31 August 2018).

Table 4. *Overview of the Experimental Structure.*

Step (1)	Activity (2)	Description (3)
1	Interview	Pre-experimental questionnaire
2	Introduction to the experimental session	
3	Randomisation of games	Determining the sequence of risk games
4	Instructions for game 1	Instructions and exercises
5	Prime session I	Prime sets: *Fear* or *Happy* or *Neutral*
6	Game 1	Payment relevant decisions
7	Introduction for game 2	Instructions and exercises
8	Prime session II	Prime sets: *Fear* or *Happy* or *Neutral*
9	Game 2	Payment relevant decisions
10	Interview	Post-experimental questionnaire
11	Payment	
12	Debriefing	

Table 5. *EG Experimental Risk Measure: Descriptives.*

Choice set (1)	Low payoff (2)	High payoff (3)	Expected return (4)	Implied CRRA range (5)	Fraction of subjects (6)
1	130,000	130,000	130,000	$3.46 < r$	11.1
2	115,000	155,000	135,000	$1.16 < r \leq 3.46$	19.3
3	100,000	180,000	140,000	$0.71 < r \leq 1.16$	31.6
4	85,000	205,000	145,000	$0.50 < r \leq 0.71$	20.9
5	70,000	230,000	150,000	$0 < r \leq 0.50$	11.2
6	20,000	280,000	150,000	$r \leq 0$	6.0

Notes: Summary statistics are based on the sample of 804 respondents. 'CRRA range' is calculated as the range of r in the function $U = x^{1-r}/(1-r)$ for which the subject chooses each gamble, assuming a constant relative risk-aversion utility.

After all payment relevant decisions were made, one decision was selected at random for payment based on a coin toss. Subjects were paid in private and average earnings were 135,000 Vietnamese Dong (approximately 5.77 USD). The payment approximately correspondents to the wage for one full day of agricultural labour. Sessions took between 45–70 minutes to complete from instructions to payoff.

3.2.2. *Risk measures*

Overall, we collected four risk measures: two incentivised and two unincentivised ones. Motivated by the circumstance that our study population are mostly rural farmers, we followed the recommendations in Dave *et al.* (2010) and selected risk preference measures that are fairly simple to understand and that do not expect subjects to handle more complex and varying probabilities.

The first incentivised risk measure (denoted 'EG') is borrowed from Eckel and Grossman (2002; 2008). It involves a single choice among six gambles, each with a 50% probability of winning a higher prize (see Table 5). The resulting risk measure is coded to be between 1 (choice set 1) and 6 (choice set 6) with lower values indicating stronger risk aversion.[22]

Our second measure (denoted 'BR') is related to the experiments conducted in Bruner (2009), Dohmen *et al.* (2011) and Callen *et al.* (2014) and introduces an additional safe option. More

[22] See Online Appendix B.4 for the experimental instructions of each game.

Table 6. *BR Experimental Risk Measure: Descriptives.*

Choice number (1)	Acceptance behaviour (2)	Implied acceptable (3)	Implied λ^{risky} if $v(x) = x$ (4)	Fraction of subjects (5)
0	Reject all lotteries	<40,000	<3	24.3
1	Accepted lottery #1, rejected #2 to #6	40,000	3	16.9
2	Accepted lottery #2, rejected #3 to #6	60,000	2	17.9
3	Accepted lottery #3, rejected #4 to #6	80,000	1.5	14.4
4	Accepted lottery #4, rejected #5 to #6	100,000	1.2	7.1
5	Accepted lottery #5, rejected #6	120,000	1	6.0
6	Accepted all lotteries	140,000	<0.86	13.4

Notes: Summary statistics are based on a sample of 804 respondents. Here 'λ' is calculated as in Gächter *et al.* (2010). The calculation assumes constant relative risk aversion.

specifically, subjects had to decide sequentially whether they would like to play a gamble with a 50% probability or prefer a safe payment amount. Similar to Callen *et al.* (2014), we kept the safe amount constant across the six gambles, while the expected return from the gamble decreases across the six choices. In contrast to Callen *et al.* (2014), but consistent with Dohmen *et al.* (2011), we did not alter the probabilities between each gamble in order to induce changes in expected returns, but modified the payment in the 'low-payoff' case.[23]

Table A6 in Appendix A illustrates the 'BR' risk preference measure, while Table 6 depicts the resulting choices of respondents. Once a respondent preferred the safe option to playing the lottery, the enumerator asked whether the respondent would always prefer the safe option in the subsequent gambles and all subjects responded in the affirmative. The switching point reveals a subject's risk preferences. For instance, risk-averse individuals should prefer gambles 1 to 4, while risk-loving subjects would play all six gambles. The resulting risk measure is coded to lie between 0 (select the safe option in first gamble) and 6 (play the lottery in the sixth gamble).

The two unincentivised risk measures are identical to the simple risk question asked in TVSEP. The measure was once collected at the beginning of the initial interview (step 1) and once after the priming interventions (step 10). The measure collected under step 1 provides (*i*) correlational evidence on the pre-intervention relationship between disability status and risk and (*ii*) information about the extent to which treatments—the three prime groups—are balanced at baseline in terms of risk preferences. In contrast, the measure collected under step 10 serves as an additional outcome variable of the priming intervention itself.

3.2.3. *Intervention: priming treatment*

The lab-in-the-field experiment employs a technique from experimental psychology—priming—to create exogenous variation in one channel through which a disability incidence among household members could affect one's own risk preferences: the fear of a negative health shock in the household.[24]

More specifically, in our experimental setup we rely on three distinct prime schemes: *Fear*, *Happy* and *Neutral*. Subjects were randomised into one of the three prime groups and received priming-related tasks at stages 5 (prior to the first incentivised risk game) and 8 (prior to the

[23] Among others, this risk preference measure was adopted in Bruner (2009) and Csermely and Rabas (2016).

[24] The priming of fear has a long history in cognitive psychology (Lerner and Keltner, 2001) and has been frequently applied in empirical economic research (Callen *et al.*, 2014; Bjorvatn and Tungodden, 2015; Cohn *et al.*, 2015; Alempaki *et al.*, 2019).

second incentivised risk game). Similar to the setup in Bjorvatn and Tungodden (2015) we decided to re-prime subjects at step 8 since priming has been found to often result in short-term effects only.

Below, we depict the two priming tasks that relate to the *Fear* prime scheme. Task 1 involved story telling as in Callen *et al.* (2014), while Task 2 consisted of answering a short questionnaire as in Benjamin *et al.* (2010) and Bjorvatn and Tungodden (2015). The order of the two prime tasks was randomised. See Online Appendix B.4 for details on the other two prime schemes (*Happy* and *Neutral*).

EXAMPLE TASK 1 (*Fear*).

> We are interested in understanding your daily experiences that make you fearful or anxious about your family. This could be anything that refers to other family members. For example, if someone gets sick, stigmatised or loses the job due to poor health, etc. Could you describe an event in the past year that caused you fear or anxiety about another family member?

EXAMPLE TASK 2 (*Fear*).

> During the Vietnam War and its long-term consequences were close family members of yours hurt? Is it challenging for you to provide in terms of money, time and work for other members of your family who cannot work anymore? Would you and your family need more assistance from others to take care of any member of your family?

The implementation of these three prime schemes is rather common (Lerner and Keltner, 2001; Lerner *et al.*, 2003; Callen *et al.*, 2014; Cohn *et al.*, 2015) and is derived from the rational that researchers often want to explore the role of positive versus negative affected properties (valence) of an event on an individual's decisions.[25] More generally, the distinction helps to clarify the role of emotions in general versus fear as a specific negative emotion in affecting risk preferences.

Lastly, we would like to elaborate in more detail on the role of the *Fear* prime. While all three prime schemes involve tasks that ask subjects to recall events from the past, the *Fear* prime is meant to stimulate subjects into thinking about the circumstance that a household member has become disabled. Therefore, the related tasks include several key words such as 'sick', 'stigmatisation', 'loses job due to poor health', 'hurt' and 'assistance', which are expected to lead the subject to think about a past disability event in the household.

Importantly, we expect the *Fear* prime to show differential impacts across our two samples (disability versus non-disability sample). In particular, if the *Fear* prime stimulates fear and worries due to a past negative health event in the household then, ceteris paribus, this effect should predominantly be created among those households who witnessed a disability health shock.[26] The psychological mechanisms behind this reasoning are related to memory activation and cognitive processing speed. In particular, subjects who are more familiar with a given topic react, and do so faster. As part of the experiment, subjects had some time—albeit not much time—to cognitively process each prime. We believe that prior exposure to a disability incident in the household allows subjects in the disability sample to process the

[25] Moreover, for psychologists, the *Fear* versus *Happy* priming sheds light on additional cognitive mechanisms as happiness (in contrast to fear) is an emotional state not only associated with positive valence, but with an increase in the appraisal of elevated certainty and individual control with respect to an event (Smith and Ellsworth, 1985).

[26] A similar line of reasoning is presented in Callen *et al.* (2014), who argued that subjects in Afghanistan are more likely to respond to fear priming—the recollection of a traumatic event—if they were previously exposed to an episode of violence in the past.

prime more quickly, which in turn increases the likelihood that the prime affects risk-taking decisions.

3.3. *Empirical Results*

3.3.1. *Description of the sample and randomisation process*

The average subject in our experiment is about fifty-one years old, holds a junior secondary education degree (59%), is married (85%) and is female (58%).[27]

Subjects exhibit a strong albeit not unexpected variation in terms of risk preferences. Moreover, as shown in Table A7 in Appendix A, we find that the employed risk measures differ in their general characterisation of the sample. While the incentivised risk measures (EG, BR) seem to suggest that individuals are moderately risk averse, the unincentivised measures tend to indicate that subjects are on average risk neutral.[28]

Lastly, we explore differences across the various samples. First, we compare individuals with and without a disabled household member (Online Appendix Tables B.9 and B.10). Perhaps not surprisingly, we find that individuals across the two samples differ on a number of characteristics. Among others, individuals living with a disabled household member tend to be somewhat older (about two years), more likely to be married (about 5 percentage points), less satisfied with their life (about 0.4 percentage points) and more likely to have migrated to the village they currently live in (about 7 percentage points). Second, we compare individuals across priming groups (Tables B.11 and B.12 in the Online Appendix). In general, we find that the randomisation process worked well with priming groups being balanced on almost all individual and household characteristics (including the unincentivised pre-prime risk measure).

3.3.2. *Correlational evidence*

The starting point of our analysis is the unconditional difference of our risk preference measures across the two samples (individuals with or without a disabled household member). Figure 1 plots the distribution function of the four measures and two samples. By and large, we observe that individuals in the disability sample exhibit a lower willingness to take risks (a shift of curves to the left).

As individuals across the two samples tend to differ along several observable characteristics, we adopt a multivariate regression approach in which we control for these observable differences. More specifically, by OLS we estimate

$$R_{ivs} = \beta DS_{ivs} + X'_{ivs}\theta + \delta OR_{ivs} + \omega OP_{ivs} + \alpha_s + \epsilon_{ivs}, \tag{2}$$

where R_{ivs} is the outcome variable (risk preference) of individual i in village v and subdistrict s, DS_{ivs} is a dummy variably indicating whether a subject is part of the disability sample, X_{ivs} represents individual- and household-level control variables, OR_{ivs} is a dummy variable indicating whether the EG or the BR task was implemented first, OP_{ivs} is a dummy variable indicating which

[27] See Online Appendix Tables B.5 and B.6 for overall descriptions and summary statistics on the various variables collected during the experiment.

[28] Online Appendix Table B.7 illustrates that the various risk measures are positively correlated with each other, albeit on a low level. In addition, Online Appendix Table B.8 shows that the different risk preference measures tend to be correlated with age (negatively) and gender (being female; negative correlation), which is in line with most studies on risk preferences. Moreover, note that the different risk measures are not directly comparable as they involve very different CRRA scales.

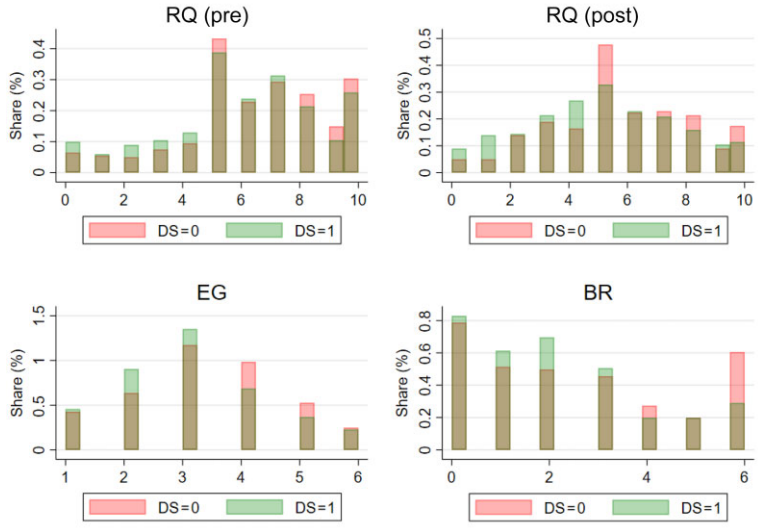

Fig. 1. *Lab-in-the-Field Experiment: Histograms of Different Risk Measures.*
Notes: Data come from the lab-in-the-field experiment and depict the distribution of the four risk measures by sample (DS = 0 versus DS = 1).

priming task was implemented first and α_s refers to subdistrict fixed effects. SEs are clustered at the village level. Our coefficient of interest is β.

For each risk measure, we estimate two different specifications of (2): one with a basic set of individual-level control variables (age, gender, education, marital status, household head status) and one in which we include essentially all variables that we collected with respect to a person's personality traits, subjective health and well-being, migration history and Vietnam War experience. The results are depicted in Table 7.

Overall, we find that the OLS results tend to confirm that individuals in households with a disabled member are more likely to be risk averse. All coefficients are negative and statistically significant at the 10% level or lower. In general, levels of statistical significance are lower with respect to our estimates related to the unincentivised risk measures.

3.3.3. *Causal evidence*

The *Fear* priming treatment aims to shed light on whether fearful emotions, possibly related to the recollection of individual trauma related to a disability incidence in the household, have an effect on risk preferences among individuals with a disabled household member. If such a channel can be established, it provides more confidence towards the conclusion that the positive correlation between a household's disability shock and risk aversion has a causal underpinning. In order to estimate the impact of our *Fear* prime on risk preferences, we estimate the following equation using OLS:

$$R_{ivs} = \beta DS_{ivs} + \lambda FEAR_{ivs} + \gamma DS_{ivs} \times FEAR_{ivs} + X'_{ivs}\theta + \delta OR_{ivs} + \omega OP_{ivs} + \alpha_s + \epsilon_{ivs}. \quad (3)$$

Table 7. *Lab-in-the-Field Experiment: Determinants of Risk Preferences (OLS).*

	EG		BR		RQ (pre)		RQ (post)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Resp. disabled	0.188	0.201	0.554	0.661	−0.277	−0.134	0.561	0.622
	(0.287)	(0.283)	(0.444)	(0.442)	(0.484)	(0.477)	(0.440)	(0.427)
DS	−0.215	−0.226	−0.430	−0.317	−0.451	−0.434	−0.530	−0.519
	(0.100)**	(0.105)**	(0.164)**	(0.179)*	(0.211)**	(0.231)*	(0.206)**	(0.211)**
Observations	804	801	804	801	804	801	804	801
R^2	0.0758	0.1167	0.0903	0.1225	0.0815	0.1348	0.1108	0.1679
Subdistrict FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Personality controls	No	Yes	No	Yes	No	Yes	No	Yes
Migration controls	No	Yes	No	Yes	No	Yes	No	Yes
Welfare controls	No	Yes	No	Yes	No	Yes	No	Yes
Health controls	No	Yes	No	Yes	No	Yes	No	Yes
War controls	No	Yes	No	Yes	No	Yes	No	Yes

Notes: 'EG' refers to the Eckel-Grossman measure, 'BR' to the Bruner measure,and 'RQ' to the simple risk question (willingness to take risks). 'DS' is a binary variable indicating whether an individual belongs to the disability sample. Basic controls include household size and respondent's age, gender, education level, marital status, disability status, household head status and a dummy variable capturing the experimental order of the EK versus BR tasks. 'Personality controls' include five dummy variables for the Big-5 personality measures, one variable on patience and one variable on subjective well-being. 'Migration controls' include five dummy variables that capture individual (migrated to village, migrated to subdistrict, years since living in village) and household (migrated to village, migrated to subdistrict) migration status. 'Welfare controls' include three variables (welfare ranking today, five years ago, five years from now), 'Health controls' include three variables (health today, twelve months ago, twelve months from now), while 'War controls' comprise two variables (death of family member, thinking of war). SEs are clustered at the village level. *, ** Significance at the 10% and 5% levels.

Variables are defined analogous to (2) above. The major difference to (2) concerns the introduction of variables related to the *Fear* prime. Our principal coefficient of interest is γ that captures the differential impact of the *Fear* prime across the two samples.[29] Table 8 presents our main results.

Our results indicate that the *Fear* prime tends to trigger changes in risk preferences. Individuals who were exposed to the *Fear* prime are more likely to become risk averse, while the effect is particularly pronounced among individuals with a disabled family member. This result is further confirmed in our specifications that use split sample estimates (DS = 0 versus DS = 1), as shown in Table B.19 in the Online Appendix.

In general, we believe that the results are consistent with the view that fear related to a previous disability event in the household is leading to more risk aversion.

3.4. *Robustness Checks*

3.4.1. *Econometric specification*

In the following we examine to what extent our previous results are sensitive to a number of econometric decisions we took. First, we assess whether the results change once we estimate (2) and (3) by multinomial logit models or interval regressions (Tables B.13 and B.14 in the Online Appendix). These models reflect that our response variables can be interpreted as ordinal (simple risk question) and interval scaled (incentivised risk measures). While the results suggest that our coefficient of interest (γ) remains negative and large, levels of statistical significance are

[29] Note that similar to Callen *et al.* (2014) we combine the *Neutral* and *Happy* primes into one category. As in Callen *et al.* (2014), the reason behind this decision is based on the circumstance that no significant differences were obtained between these two prime schemes.

Table 8. *Lab-in-the-Field Experiment: Impact of Primes on Risk Preferences (OLS).*

	EG			BR			RQ		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Resp. disabled	0.188	0.168	0.167	0.554	0.532	0.534	0.561	0.533	0.534
	(0.287)	(0.304)	(0.276)	(0.444)	(0.463)	(0.442)	(0.440)	(0.448)	(0.430)
DS	−0.215		−0.011	−0.430		−0.191	−0.530		−0.169
	(0.100)**		(0.126)	(0.164)**		(0.196)	(0.206)**		(0.221)
Fear		−0.238	0.066		−0.223	0.133		−0.274	0.263
		(0.081)***	(0.121)		(0.148)	(0.210)		(0.167)	(0.218)
DS × Fear			−0.612			−0.718			−1.084
			(0.197)***			(0.301)**			(0.343)***
Observations	804	804	804	804	804	804	804	804	804
R^2	0.0758	0.0767	0.0936	0.0903	0.0828	0.0995	0.1108	0.1036	0.1225
Mean control	3.2709	3.2709	3.2709	2.4230	2.4230	2.4230	5.3599	5.3599	5.3599
Subdistrict FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 'EG' refers to the Eckel-Grossman measure, 'BR' to the Bruner measure and 'RQ' to the simple risk question (willingness to take risks). 'Mean control' refers to the control group mean (DS = 0 and prime group = *Neutral/Happy*). Basic controls include household size and respondent's age, gender, education level, marital status, disability status, household head status and a dummy variable capturing the experimental order of the EK versus BR tasks. SEs are clustered at the village level. **, *** Significance at the 5% and 1% levels.

partially lower. In particular, SEs become larger in the interval regressions, where the interaction coefficient is not statistically distinguishable from zero in the case of the BR outcome measure. As the coefficients remain statistically significant in all other specifications, the results seem to underscore our previous findings.

Second, we assess whether our previous results are sensitive to the level of clustering of SEs. Therefore, we re-estimate our regression specifications with SEs clustered at the subdistrict and district levels and with heteroscedastic-robust SEs (Tables B.15 and B.16 in the Online Appendix). Overall, our results appear to be robust.

In addition, we provide results based on specifications that rely on village fixed effects instead of subdistrict fixed effects and that do include specifications in which control variables are selected by lasso procedures (Tables B.17 and B.18 in the Online Appendix).

Lastly, Online Appendix Table B.19 presents split sample estimates (DS = 0 versus DS = 1), while in Online Appendix Table B.20 we additionally show results in which the reference category only includes the *Neutral* prime with the *Fear* and the *Happy* primes included as separate variables. Overall, our main results are robust to these specification checks. The split sample estimates again show that the *Fear* prime is only statistically significant for the sample of disability households.

3.4.2. *Priming channel*

In order to assess the internal validity of the priming intervention, we discuss a number of potential caveats.

***Experimenter demand effect*:** A potential threat to our identification relates to experimenter demand effects. For instance, if individuals in the disability sample exposed to the *Fear* prime become aware of our interest in the impact of a disability incidence in the household, they might be more likely to change their answers and decisions to our risk tasks for strategic reasons. To assess this issue, we conducted qualitative interviews with participants in our pre-test villages. Specifically, we asked each subject participating in the pre-tests (including subjects with and without a disabled household member): 'What do you think we are trying to find out by these questions?' None of the answers suggested that the participants linked the primes to a disability incidence in their household.

***Did the* Fear *prime trigger the anticipated channel?*:** The channel we have in mind implies that the priming of fear related to a household's disability shock is particularly effective among individuals who had experienced a disability event in the household since they are more likely to be reminded about its social and welfare implications for the household. While, unfortunately, our data do not allow us to investigate changes in individuals' fearfulness (e.g., measured through specific psychological scales), we are able to examine whether the prime in particular affected health-related perceptions. Adapting the risk dimension module of Dohmen *et al.* (2011), we integrated seven dimension-specific versions of the simple risk question (own health, other family member's health, riding a motor bike, work, other people, loans, business) in the post-experimental questionnaire (step 10). Re-estimating (3) with each dimension-specific risk question as the dependent variable (Table A8 in Appendix A), we find that our coefficient of interest γ varies strongly across the seven dimensions. Out of all seven dimensions, only in three cases (own health, other household member's health, business activities) we obtain statistically significant γ coefficients. In each of the three cases γ is negative and of relevant economic

magnitude. These results seem to suggest that shifts in general risk preferences are likely to be driven by mental accounting related to health dimensions for persons with a disability event in the household; a result that we believe is consistent with our interpretation of the prime channel.

***Is the* Fear *prime effect related to alternative channels?*:** A difficulty in interpreting γ in terms of a causal relationship between health-related fears and risk preferences is that one cannot entirely rule out (*i*) alternative cognitive channels and (*ii*) relevant correlated factors with a household's disability status (DS = 1). For example, a disability incidence in the household might be correlated with some other critical characteristic such as migration histories, exposure to conflict and war, and personality traits. In the presence of such confounders, it is still the case that the causal effect of priming on risk behaviour is large and statistically significant for individuals who are exposed to a disability incidence in the household, but the disability incidence might not be the reason for it being larger.

In the following we aim to assess the plausibility of such alternative channels. First, we specifically focus on the role of conflict and war. Noting that individuals in our sample are rather old and bearing in mind that the Vietnam War affected almost all parts of the country, the *Fear* prime could have triggered recollection of trauma and fear related to this major event. In that case, our paper would rather sit with the literature that examines changes in risk preferences due to exposure to violent events (Callen *et al.*, 2014; Brown *et al.*, 2019; Jakiela and Ozier, 2019). This worry might be particularly pronounced since the second *Fear* prime task explicitly mentions the war ('During the Vietnam War'). Using the circumstance that the order of the incentivised risk games was randomised, we evaluate whether our estimated effect γ is driven by prime task 2. Examining split-sample estimates (Table B.21 in the Online Appendix), we find that our previous results do not seem to depend on whether individuals where exposed to prime task 1 or 2. We interpret this result as suggestive evidence that the *Fear* primes did not trigger war and violence-related fears besides its potential link to a household's disability status.

Second, we explore more broadly the issue that a household's disability status might be correlated with other characteristics. To assess whether the *Fear* prime operates through additional covariate characteristics, we adopt an empirical strategy that has frequently been applied in the economic priming literature (Benjamin *et al.*, 2010; 2016; Callen *et al.*, 2014) and that involves the extension of (3) to include additional interaction terms of the *Fear* prime indicator variable with a larger set of control variables. In our case we include additional interaction terms with eighteen variables related to personality traits, migration history, household welfare, respondents' health status and respondents' exposure to the Vietnam War. Table B.22 in the Online Appendix contains the results. Overall, we find that our previous results still hold, which we believe underscores that fear from a negative health shock (disability incidence in the household) helps to explain our findings.

4. Discussion

The presented evidence suggests that individuals become more risk averse and are less willing to take risks if another household member becomes disabled. In the following we discuss the relative importance of two potential main channels in more detail.

Table 9. *Impact of Disability Shocks Regarding Perceptions of Future Shocks (TVSEP): OLS Estimates Using TWFE Specification Estimation.*

Shock (next five years):	Any (1)	Illness (2)	Death (3)	Accident (4)	Business (5)
HH disability shock	0.030	0.114**	0.149**	0.052	0.121**
	(0.019)	(0.055)	(0.061)	(0.045)	(0.059)
Observations	9,359	9,359	9,350	9,328	9,353
Romano–Wolf *p*-value	0.099	0.089	0.04	0.17	0.089
Dependent mean	0.97	0.72	0.35	0.12	0.28
R^2	0.35	0.42	0.41	0.36	0.43
Individual FEs	Yes	Yes	Yes	Yes	Yes
District × year FEs	Yes	Yes	Yes	Yes	Yes
Basic controls	Yes	Yes	Yes	Yes	Yes

Notes: The outcome variable is the individual perception about types of shocks happening in the next five years: any, illness, death, accident, or business or farm downturn. Household-level disability excludes the disability status of the respondent and is based on the original household composition. Disability refers to a 'severe' or 'very severe' disability. Basic controls are the respondents' disability status, age, marital status, household size and educational attainment. SEs, reported in parentheses, are clustered at the village level. The *p*-values adjusted for multiple hypothesis testing are shown in the line 'Romano–Wolf *p*-value' and constructed using Stata's rwolf package (Clarke *et al.*, 2020). ** $p < .05$.

4.1. *Updating Beliefs*

Cognitive processes might be fundamental in understanding why individuals become more risk averse following a disability event in the household. The lab-in-the-field experiment seems to suggest that such a processes (fear of health shocks to other household members) can help explain our findings. In this subsection we investigate a more general cognitive channel that might or might not be related to fear: the updating of beliefs regarding future shocks. More specifically, we examine whether a disability event in the household affects individual perceptions of (background) risk that they and their family face.

To examine this channel, we leverage the detailed shock perception module that is part of the TVSEP data. In each survey round TVSEP respondents were asked to state their beliefs about the likelihood that certain types of shocks occur.

Employing the same two-way fixed-effect specifications as above, we regress our principal disability shock indicator on the respondent's risk perceptions related to whether they expect a negative shock to hit their household over the next five years related to five dimensions: any, illness, death, accidents and a downturn of business or farm income.

As shown in Table 9, we observe that individuals who experienced a disability shock in their household tend to become more pessimistic in their expectations of adverse shocks, related to health. In particular, individuals are more likely to believe that the household will experience another illness shock or the death of a household member. The result also holds when we adjust for multiple hypothesis testing (Romana-Wolf *p*-values), albeit the estimated effects become statistically less significant (at the 10% level). Besides being more pessimistic about future illness or death-related events, individuals facing a disability shock in the household appear to also update their beliefs in terms of future business or farm earnings.

4.2. *Wealth Effects*

Besides cognitive channels, a disability incidence in the household can affect an individual's/household's daily life in many ways. In fact, we show in panel A of Table 10—using

Table 10. *Relationships with Alternative Outcome Variables (TVSEP): OLS Estimates Based on TWFE Specifications.*

	Expenditure					Assets		Other	
Outcome:	All (1)	Health (2)	Education (3)	Recreat./Transp. (4)	Remittances net (5)	All (6)	Productive (7)	Business (0/1) (8)	Insurance (0/1) (9)
Panel A: impact of disability shocks on:									
HH disability shock	−0.120	0.688**	−0.915**	−0.768***	2.189**	−0.371***	−0.805***	−0.072**	−0.101
	(0.102)	(0.291)	(0.459)	(0.244)	(0.876)	(0.113)	(0.302)	(0.034)	(0.061)
Romano–Wolf *p*-value	0.72	0.0099	0.11	0.0099	0.0099	0.0099	0.0099	0.0099	0.11
Panel B: relationship of risk measure with:									
Risk taking (Likert scale)	0.020***	0.012	0.059***	0.040***	−0.062*	0.021***	0.065***	0.001	0.001
	(0.005)	(0.012)	(0.018)	(0.010)	(0.033)	(0.004)	(0.013)	(0.002)	(0.003)
Romano–Wolf *p*-value	0.0099	0.53	0.0099	0.0099	0.079	0.0099	0.0099	0.63	0.68
Observations	9,376	9,376	9,376	9,376	9,376	9,368	9,368	9,376	4,267
Dependent mean	10	5.6	4.3	7.4	−2.4	8.9	6.1	0.3	0.52
R^2	0.81	0.65	0.61	0.71	0.48	0.89	0.69	0.73	0.62
Individual FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
District × year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The outcome variables are total expenditure (column (1)), expenditure on health (column (2)), education (column (3)), recreation and transport (column (4)), net remittances (column (5)), household assets (column (6)), assets for business use (column (7)), all transformed by the inverse hyperbolic sine, an indicator for family business (column (8)) and an indicator for having voluntary insurance (column (9)). Household-level disability is based on the original household composition. Disability refers to a 'severe' or 'very severe' disability. The *p*-values adjusted for multiple hypothesis testing are shown in the lines 'Romano–Wolf *p*-value' and constructed using Stata's rwolf package (Clarke *et al.*, 2020). SEs, reported in parentheses, are clustered at the village level. * $p < .1$, ** $p < .05$, *** $p < .01$.

the TVSEP data and our previous TWFE specification—that a disability shock leads households to become poorer, more likely to incur health-related expenses, less likely to engage in risky income-generating activities (running a business) and to rely more on remittances.

Furthermore, we show in panel B of Table 10 that wealth is positively correlated with an individual's willingness to take risks; a finding that is consistent with the majority of empirical evidence from other parts of the world.

The results above suggest that a decline in wealth is a plausible additional channel that may help explain our main findings. We further explore this mechanism, adopting a formal mediation framework as outlined in Online Appendix B.3. Table B.23 in the Online Appendix shows that a household disability shock affects an individual's willingness to take risks directly and indirectly (through changes in household wealth). The related mediation effect is economically meaningful and statistically significant. Since the estimated direct effect of a household disability shock on the willingness to take risks is larger than the mediation effect, and taking into account the fact that the effect of a household disability shock on the willingness to take risks remains negative and statistically significant even when controlling for changes in household wealth (columns (3) and (7) of Table 2), we conclude that other channels (e.g., cognitive processes) remain important alternative channels through which a disability incidence in the household affects an individual's willingness to take risks.

5. Conclusion

This paper shows that individuals who experience a disability event in their household behave in a more risk-averse manner than individuals without such an experience. The result is robust across two econometric identification strategies and data sets, as well as a variety of risk measures and alternative specifications.

Our analysis further suggests that there are two main channels that can explain these findings. First, we show that a disability event in the household leads to reductions in wealth with lower wealth being positively correlated with higher levels of risk aversion. Furthermore, we show that changes in wealth cannot (fully) explain why individuals become more risk averse. Combining evidence from psychological primes and from detailed questions on individuals' perception of future shocks, we show that cognitive processes related to fear about worsening health and increasingly pessimistic views concerning future shocks are likely to play an important additional role in this context.

More than 1 billion people in the world experience some type of disability and an even larger number of people live with a household member with a disability. While descriptive evidence has consistently pointed out the negative welfare consequences of disability events, the underlying mechanisms are not yet well-understood. In this context, our paper provides additional evidence on an possibly important mechanism: the impact of disability events on people's revealed risk preferences.

Finally, we would like to point to some limitations of our study. First, the generalisability of our findings to other country contexts remains unclear. Second, our results provide evidence on short- to medium-term impacts only. Third, our disability measures rely on subjective self-reports. While our measures follow best-practice guidelines on how to measure disability as part of household surveys, there would be a benefit to using alternative definitions that rely on expert judgements (medical doctors, psychologists). Fourth, future studies could improve on how various cognitive mechanisms are measured. While we believe that our measures and empirical

strategies are properly designed, there is significant scope in integrating more comprehensive psychological scales and biomarkers (e.g., the measurement of pulse, heart frequencies, mental imagery) into the analysis.

Appendix A. Background Tables

This appendix includes supporting empirical material to support and understand the main text.

Table A1. *TVSEP Sample: Attrition Rates (Averages).*

	Short term				Long term	
Variable	2008 to 2010 (1)	2010 to 2013 (2)	2013 to 2016 (3)	2016 to 2017 (4)	2008 to 2017 (5)	Obs. (6)
Individual	0.00	0.20	0.06	0.01	0.27	6,870
Resp. change	0.31	0.35	0.42	0.42	0.41	2,057
Household	0.00	0.02	0.01	0.01	0.05	2,077

Notes: Attrition rates at the 'individual' and 'household' levels capture whether a person/household left the TVSEP sample. In contrast, attrition rates at the 'respondent' level capture whether a person was not a respondent anymore. The person, however, could still be part of the household and data on the person were still collected as part of the standard household roster.

Table A2. *TVSEP Sample Descriptives by Round (Additional Variables): Means and SDs.*

Variable	2008 (1)	2010 (2)	2011 (3)	2013 (4)	2016 (5)	2017 (6)
Panel A: health related variables						
HH disability shock	0.04	0.04	0.04	0.05	0.06	0.08
	(0.19)	(0.20)	(0.19)	(0.22)	(0.24)	(0.27)
HH disability related to seeing	0.01	0.01	0.01	0.01	0.01	0.02
	(0.10)	(0.11)	(0.08)	(0.11)	(0.12)	(0.13)
HH disability related to hearing	0.01	0.01	0.00	0.01	0.01	0.01
	(0.07)	(0.07)	(0.04)	(0.08)	(0.09)	(0.11)
HH disability related to walking	0.01	0.01	0.02	0.02	0.03	0.04
	(0.11)	(0.11)	(0.12)	(0.15)	(0.18)	(0.20)
HH disability related to communication	0.01	0.01	0.01	0.02	0.01	0.02
	(0.11)	(0.12)	(0.12)	(0.12)	(0.11)	(0.13)
HH disability related to concentration	0.01	0.01	0.02	0.02	0.02	0.02
	(0.11)	(0.12)	(0.12)	(0.13)	(0.13)	(0.15)
HH disability related to self-care	0.01	0.01	0.01	0.01	0.02	0.02
	(0.10)	(0.10)	(0.10)	(0.11)	(0.13)	(0.15)
Household illness event	0.27	0.30	0.34	0.34	0.32	0.23
	(0.44)	(0.46)	(0.47)	(0.47)	(0.47)	(0.42)
Household major impairment	0.48	0.58	0.69	0.69	0.62	0.61
	(0.50)	(0.49)	(0.46)	(0.46)	(0.48)	(0.49)
Individual major impairment	0.27	0.38	0.45	0.48	0.43	0.42
	(0.44)	(0.48)	(0.50)	(0.50)	(0.50)	(0.49)
Panel B: other variables						
Any HH shock in the next five years (0/1)	0.99	0.97	0.99	0.95	0.97	0.96
	(0.12)	(0.17)	(0.08)	(0.23)	(0.18)	(0.20)
Any HH illness in the next five years (0/1)	0.70	0.71	0.77	0.67	0.73	0.74
	(0.46)	(0.46)	(0.42)	(0.47)	(0.44)	(0.44)
Any HH death in the next five years (0/1)	0.30	0.36	0.42	0.29	0.44	0.34
	(0.46)	(0.48)	(0.49)	(0.45)	(0.50)	(0.47)
Any HH accident in the next five years (0/1)	0.06	0.17	0.25	0.10	0.10	0.14
	(0.24)	(0.38)	(0.43)	(0.30)	(0.30)	(0.34)
Business downturn in the next five years (0/1)	0.37	0.21	0.37	0.23	0.24	0.29
	(0.48)	(0.41)	(0.48)	(0.42)	(0.43)	(0.45)
Remittances net (household)	141.60	−117.55	118.02	−162.64	1,286.28	2571.14
	(979.26)	(1,447.71)	(1,930.14)	(1,622.04)	(32,547.04)	(49002.91)
	0.26	0.31	0.44	0.31	0.29	0.29
	(0.44)	(0.46)	(0.50)	(0.46)	(0.45)	(0.45)
Observations	1,864	1,868	596	1,762	1,672	1,614

Notes: See Online Appendix Table B.3 for the coding and definition of each variable. The 'HH disability' variables are defined by the six dimensions along the disability variables, and reflect a 'severe' or 'very severe' impairment. Risk of business downturn in the next five years is defined as the risk of a business collapse, increase/decrease in input/output prices, or being cheated at work or business.

Table A3. *Determinants of Attrition Rates and Selection Patterns (TVSEP): OLS Estimates.*

Outcome:	Respondent once (0/1) (1)	Respondent attrition (0/1) (2)	Individual attrition (0/1) (3)	Respondent is HH head (0/1) (4)
HH disability shock	0.028	−0.053	0.010	−0.020
	(0.051)	(0.051)	(0.008)	(0.057)
Individual disability	0.081	0.084	−0.023***	−0.005
	(0.049)	(0.058)	(0.006)	(0.050)
Risk taking (Likert scale)	0.001	−0.002		−0.001
	(0.001)	(0.002)		(0.001)
Risk × HH disability	−0.001	0.003		0.005
	(0.006)	(0.007)		(0.004)
Risk × indiv. disability	−0.006	0.004		−0.001
	(0.006)	(0.010)		(0.006)
Age (years)	0.005***	0.000	−0.001***	0.013***
	(0.001)	(0.001)	(0.000)	(0.002)
Female (0/1)	0.110***	−0.072***	−0.005	−0.781***
	(0.021)	(0.022)	(0.003)	(0.017)
Married (0/1)	0.044*	0.006	0.018***	−0.349***
	(0.023)	(0.023)	(0.004)	(0.035)
Primary (0/1)	0.029	0.044	−0.189***	0.305***
	(0.088)	(0.097)	(0.013)	(0.112)
Secondary (0/1)	0.128	0.015	−0.178***	0.282**
	(0.090)	(0.096)	(0.013)	(0.111)
High school (0/1)	0.094	−0.012	−0.181***	0.261**
	(0.091)	(0.098)	(0.013)	(0.113)
Professional (0/1)	0.049	−0.044	−0.163***	0.282**
	(0.100)	(0.105)	(0.015)	(0.120)
University (0/1)	0.006	0.064	−0.149***	0.235**
	(0.094)	(0.100)	(0.013)	(0.116)
Household head	0.257***	−0.114***	−0.037***	
(1 = yes, 0 = no)	(0.020)	(0.023)	(0.003)	
Household size	−0.008***	0.011**	0.022***	−0.003
	(0.003)	(0.004)	(0.001)	(0.003)
Observations	10,366	9,376	35,848	9,376
R^2	0.33	0.42	0.28	0.84
Household FEs	Yes	Yes	Yes	Yes
District × year FEs	Yes	Yes	Yes	Yes

Notes: In column (1), the dependent variable indicates whether the individual is a respondent only once (1 = yes, 0 = no), in column (2), whether there was a change in the respondent between two periods (1 = yes, 0 = no), in column (3), whether the individual left the sample between two periods (1 = yes, 0 = no) and in column (4), whether the respondent is the household head (1 = yes, 0 = no). Household-level disability excludes the disability status of the respondent and is based on the original household composition. Disability refers to a 'severe' or 'very severe' disability. SEs, reported in parentheses, are clustered at the village level. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table A4. *Sensitivity Analyses (TVSEP): OLS Estimates Using TWFE Specification Estimation.*

	Willingness to take risks (0–10)					
Outcome:	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: robustness checks wrt migration and household composition						
	Incl. new HH members	Household head only	Balanced (excl. 2011)	Excl. absence rounds	Recoding absence	No. original HH members
HH disability shock	−0.686**	−0.840*	−0.794**	−0.930***	−0.667**	−0.849**
	(0.308)	(0.428)	(0.387)	(0.355)	(0.316)	(0.363)
Observations	9,376	6,628	7,651	9,337	9,376	9,376
Dependent mean	5.1	5.1	5.2	5.1	5.1	5.1
R^2	0.53	0.54	0.54	0.53	0.53	0.53
Panel B: robustness checks wrt to the disability definition and standard error adjustments						
	Unexpected disability	Very severe disability	Excl. zero risk in 2008/10	High risk indicator	Subdistr. clustering	Conley SE
HH disability shock	−1.490***	−2.405***	−0.954**	−0.164**	−0.850**	−0.850**
	(0.365)	(0.867)	(0.443)	(0.065)	(0.344)	(0.369)
Observations	9,376	9,376	7,016	9,378	9,376	9,376
Dependent mean	5.1	5.1	5.6	0.64	5.1	5.1
R^2	0.53	0.53	0.45	0.49	0.53	0.0025
Individual FEs	Yes	Yes	Yes	Yes	Yes	Yes
District × year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes

Notes: The outcome variable and disability shocks are defined as in Table 2, if not otherwise specified. Starting in panel A, in column (1), all household members are used to calculate household disability, instead of the baseline household only. In column (2), estimations are restricted to incidences when the household head is the respondent. In column (3), the sample is restricted to respondents that are present in all rounds (excl. 2011), in column (4) household rounds are excluded in which the person with a disability is absent and in column (5) in such cases household disability is coded as '1'. Column (6) includes an additional control, which measures the number of remaining original household members in the current survey round. In panel B, shocks are measured only as 'unexpected' (column (1)) and as 'very severe' (column (2)) disability incidents. In column (3), individuals that stated being fully risk averse in 2008 are excluded. In column (4), the outcome variable switches to an indicator of whether the risk measure is 5 or larger. Column (5) uses SEs clustered at the subdistrict level, and column (6) spatially adjusted SEs as in Conley (1999) and implemented as in Hsiang (2010), with a cut-off of 100 km. Basic controls include respondents' disability status, age, marital status and household size. SEs, reported in parentheses, are clustered at the village level, if not otherwise specified. * $p < .1$, ** $p < .05$, *** $p < .01$.

Table A5. *Sensitivity Analyses for the Event Study Design (TVSEP).*

	Willingness to take risks (0–10)					
Outcome:	(1)	(2)	(3)	(4)	(5)	(6)
Unexpected HH disability shock	−1.395***	−1.385***	−1.407***	−1.584***	−1.402***	−1.376***
	(0.337)	(0.334)	(0.335)	(0.482)	(0.337)	(0.337)
Pre-trend 1	0.483	0.471	0.459	0.470	0.478	0.476
	(0.494)	(0.495)	(0.494)	(0.494)	(0.508)	(0.495)
Pre-trend 2	0.003	−0.001	−0.022	0.005	−0.045	0.007
	(0.779)	(0.779)	(0.780)	(0.779)	(0.787)	(0.778)
Pre-trend 3	−0.509	−0.491	−0.492	−0.477	−0.494	−0.484
	(0.565)	(0.565)	(0.562)	(0.568)	(0.598)	(0.569)
Pre-trend 4	−0.202	−0.184	−0.200	−0.166	−0.201	−0.176
	(0.627)	(0.625)	(0.628)	(0.625)	(0.643)	(0.626)
Observations	9,984	9,984	9,984	9,984	9,914	9,984
Joint pre *p*-value	0.61	0.63	0.64	0.65	0.64	0.63
Individual FEs	Yes	Yes	Yes	Yes	Yes	Yes
District × year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	No	Yes	Yes	Yes	Yes	Yes
Household expenditure	No	No	Yes	No	No	No
Demographics of disabled	No	No	No	Yes	No	No
Illness events	No	No	No	No	Yes	No
Safety nets	No	No	No	No	No	Yes

Notes: Estimations are run following the methodology developed by Borusyak *et al.* (2024) and provide robustness tests to results of Table 3. The outcome variable is a measure of the willingness to take risks in life on a scale from 0 (completely unwilling to take risks) to 10 (very willing to take risks). Household-level disability excludes the disability status of the respondent and is based on the original household composition. The estimator excludes households that change their status from disability to non-disability. Disability refers to a 'severe unexpected' or 'very severe unexpected' disability. All specifications include individual and district-year fixed effects. Controls are as defined in Table 2. SEs, reported in parentheses, are clustered at the village level. *** $p < .01$.

Table A6. *BR Experimental Risk Measure: Choice Sets.*

	Gamble			
Choice set	Low payoff	High payoff	Expected return	Safe amount
(1)	(2)	(3)	(4)	(5)
1	80,000	240,000	160,000	120,000
2	60,000	240,000	150,000	120,000
3	40,000	240,000	140,000	120,000
4	20,000	240,000	130,000	120,000
5	0	240,000	120,000	120,000
6	−20,000	240,000	110,000	120,000

Table A7. *Lab-in-the-Field Experiment: Frequency Table on Risk Measures.*

Value	EG (1)	BR (2)	RQ (pre) (3)	RQ (post) (4)
0	0	195	33	28
1	89	136	23	38
2	155	144	28	57
3	254	116	36	81
4	168	57	45	87
5	90	48	165	162
6	48	108	94	91
7	0	0	122	88
8	0	0	94	75
9	0	0	51	39
10	0	0	113	58

Notes: Summary statistics are based on the sample of 804 households. 'EG' refers to the Eckel-Grossman measure, 'BR' refers to the modified measure of Dohmen *et al.* (2011) and Callen *et al.* (2014), and 'RQ' refers to the unincentivised general risk questions that were asked before and after the implementation of primes.

Table A8. *Lab-in-the-Field Experiment: The Impact of Priming by Risk Dimension (OLS).*

	Bike (1)	Work (2)	People (3)	Finance (4)	Business (5)	Health 1 (6)	Health 2 (7)
Resp. disabled	0.760	0.587	0.319	−0.018	0.407	0.364	0.305
	(0.592)	(0.530)	(0.455)	(0.531)	(0.490)	(0.514)	(0.491)
DS	0.002	0.266	−0.155	−0.151	0.322	0.293	0.510
	(0.250)	(0.259)	(0.205)	(0.253)	(0.230)	(0.243)	(0.237)**
Fear	−0.185	−0.183	−0.296	0.127	0.036	0.156	0.355
	(0.300)	(0.279)	(0.264)	(0.251)	(0.280)	(0.243)	(0.280)
DS × Fear	0.245	−0.033	0.009	−0.117	−0.495	−0.685	−1.471
	(0.466)	(0.438)	(0.376)	(0.337)	(0.392)	(0.412)*	(0.452)***
Observations	803	804	804	804	803	804	804
R^2	0.0697	0.0886	0.0865	0.0793	0.1152	0.0916	0.1137
Mean control	4.4907	5.4490	5.4323	4.9239	5.3978	5.5213	5.2542
Subdistrict FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Basic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: 'Mean control' refers to the control group mean (DP = 0). Basic controls include household size, respondent's age, gender, education level, marital status, disability status, household head status and a dummy variable capturing the experimental order of the EK versus BR tasks. The willingness-to-take-risks (WTR) dimensions are 'Bike' (WTR when riding a motor bike), 'Work' (WTR during work), 'People' (WTR with respect to other people), 'Finance' (WTR with respect to financial decisions), 'Business' (WTR with respect to business decisions), 'Health 1' (WTR with respect to the respondent's own health) and 'Health 2' (WTR with respect to other family member's health). SEs are clustered at the village level. *, **, *** Significance at the 10%, 5% and 1% levels.

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Additional Supporting Information may be found in the online version of this article:

Online Appendix
Replication Package

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The Economic Journal, **134** (*November*), 3390–3427 https://doi.org/10.1093/ej/ueae029 © The Author(s) 2024. Published by Oxford University Press on behalf of Royal Economic Society.

Advance Access Publication Date: 9 April 2024