Violent Trauma and Risk Preference: Artefactual and Experimental Evidence from Afghanistan

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Abstract

We investigate the relationship between violent trauma and economic risk preferences in Afghanistan combining: (i) a two-part experimental procedure identifying risk preferences, violations of Expected Utility (EU), and specific preferences for certainty; (ii) controlled recollection of fear based on established methods from psychology; and (iii) artefactual violence data from precisely geocoded military records. We document a specific preference for certainty in violation of EU. The preference for certainty, which we term a Certainty Premium, is exacerbated by the combination of violent exposure and controlled fearful recollections. The results have implications for risk-taking and are potentially actionable for policymakers and marketers.

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1 Introduction

Documenting, analyzing, and understanding the effects of trauma lie primarily in the medical and psychiatric fields. Clinicians recognize that exposure to trauma can have complex and lasting effects on both mental and physical health (Boscarino, 2006; Yehuda, 2002). Dramatically, Post-Traumatic Stress Disorder (PTSD), is estimated to affect 5-6 percent of men and 10-14 percent of women in the United States at some point during their lives (Kessler, Sonnega, Bromet, Hughes and Nelson, 1995; Yehuda, 2002). Estimates from the National Vietnam Veterans Readjustment Survey indicate that the lifetime PTSD prevalence for veterans is much higher, 30.9 percent for males and 26.9 percent for females (Schlenger, Kulka, Fairbank, Hough, Jordan, Marmar and Weiss, 1992). The disorder is linked to depression, generalized anxiety disorder, panic disorder, substance abuse, and a range of health conditions including hypertension, asthma, and chronic pain syndrome (Kessler et al., 1995; Yehuda, 2002).

Given the volume of trauma-affected individuals in both the civilian and military populations, there is reason to be interested in the socio-economic implications of traumatic exposure. Comorbidity studies suggest that trauma leads to severe economic consequences because of associated psychiatric, psychosocial, and occupational impairments (Brunello, Davidson, Deahl, Kessler, Mendlewicz, Racagni, Shalev and Zohar, 2001). Exploring the mechanisms underlying these phenomena may help design policy interventions and lead to greater insight on individual decision-making.

Recent research in both economics and psychology points to a potential relationship between trauma and the economic risk preferences central to decision-making. Early life financial experiences such as the Great Depression are linked to more conservative later life investing behavior (Malmendier and Nagel, Forthcoming), potentially suggesting an increase in risk aversion.\(^1\) Conversely, artefactual field experiments from zones of natural disaster or conflict

\(^1\)A clear alternative, however, is that such experiences change beliefs about the process of returns. See Malmendier and Nagel (Forthcoming) for further discussion. Such evidence relates closely to genetic evidence indicating that though some heritability in risk preferences and financial behavior is observed, much of the variation remains unexplained (Cesarini, Dawes, Johannesson, Lichtenstein and Wallace, 2009; Cesarini, Johannesson, Lichtenstein, Sandewall and Wallace, 2010; Kuhnen, Samanez-Larkin and Knutson, 2011).
suggest that traumatized individuals are more risk seeking in standard economic risk experiments (Eckel, Gamalb and Wilson, 2009; Voors, Nillesen, Verwimp, Bulte, Lensink and van Soest, Forthcoming). Though causality is difficult to establish, as issues of mobility and selective migration present natural confounds, and a central stylized fact has yet to appear, these correlational studies compellingly suggest that individuals exposed to trauma may have their risk preferences lastingly altered. This sustained change in fundamental economic decision-making carries the implication that economic consequences of broad-based exposure to trauma may be extremely large.

By contrast, psychology has taken a more controlled experimental approach to investigating the relationship between trauma and risk. Though trauma cannot be experimentally administered, it can be experimentally recalled. Fitting in to a broader agenda inducing positive and negative affect and observing effects on decision-making (Isen and Geva, 1987; Johnson and Tversky, 1983; Lerner, Small and Loewenstein, 2004; Slovic and Peters, 2006), one priming mechanism employed in the literature has been the controlled recollection of traumatic episodes. Lerner and Keltner (2001) and Lerner, Gonzalez, Small and Fischhoff (2003) ask individuals to recall specific, potentially traumatic events with corresponding emotions, such as anger or fear. These recollections both induce the relevant emotion in self-reports (Lerner and Keltner, 2001; Lerner et al., 2003), and have startling effects on decision-making under uncertainty. Fearful recollections induce more pessimistic likelihood judgements about a variety of events, and, in related studies, self-reported fear and anxiety correlate highly with risk averse choices in famous psychology questions such as the ‘Asian disease problem’ (Lerner and Keltner, 2001, Study 1). Based on these findings, Lerner and Keltner (2001) conjecture “the sense of uncertainty and

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2In contrast, using identical experimental methods to those implemented by Eckel et al. (2009) in the aftermath of Hurricane Katrina, Cameron and Shah (2010) show in Indonesia an increase in risk aversion associated with exposure to earthquakes and floods and document long-lasting effects.

3Eckel et al. (2009) note that changed risk preferences appear to attenuate within one year while Cameron and Shah (2010) document effects up to nine years after exposure.

4For example, after September 11th 2001, Lerner et al. (2003) ask “The terrorist attacks evoked a lot of emotion in Americans. We are particularly interested in what makes you most AFRAID about the attacks. Please describe in detail the one thing that makes you most AFRAID about the attacks. Write as detailed a description of that thing as possible. If you can, write your description so that someone reading it might even get AFRAID from learning about the situation.”
lack of control associated with fear should lead fearful individuals to make risk-averse (certainty enhancing) choices.”

Though the type of questions asked differs greatly across experimental economics and psychology, the psychological finding that recalling fearful or anxious events is linked to more risk aversion, and the economic finding that living through such trauma is linked to less risk aversion presents a potential inconsistency. This inconsistency helps to motivate our research design. As economic risk experiments are primarily focused on the domain of uncertainty, while in psychology attention is paid to ‘certainty enhancing’ decisions, our design elicits utility under both uncertainty and certainty.

Behavioral economics is predicated on combining psychological and economic insights and so can bring to bear a variety of useful tools for analyzing the relationship between trauma and risk preferences. In this paper, we combine three critical tools. First, we introduce an experimental procedure based on the uncertainty equivalents of Andreoni and Sprenger (2011b). This procedure generates non-parametric measures of risk aversion and can be used to test the predictions of a variety of competing decision theories including Expected Utility (EU), Cumulative Prospect Theory (CPT) (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992), Disappointment Aversion (DA) (Bell, 1985; Loomes and Sugden, 1986; Gul, 1991; Koszegi and Rabin, 2006, 2007)6, and “u-v” preferences (Neilson, 1992; Schmidt, 1998; Diecidue, Schmidt and Wakker, 2004).7 Several of these models make predictions of changing patterns of risk

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5Methods like the uncertainty equivalent were discussed in Farquhar’s (1984) excellent survey of utility assessment methods and, to our knowledge, were implemented experimentally in only one study of nine subjects using hypothetical monetary rewards (McCord and de Neufville, 1986), and a number of medical questionnaires (Magat, Viscusi and Huber, 1996; Oliver, 2005, 2007; Bleichrodt, Abellan-Perinan, Pinto-Prades and Mendez-Martinez, 2007).

6We include the Koszegi and Rabin (2006, 2007) model in the broad class of disappointment averse preferences as the model’s predictions will closely resemble those of Bell (1985); Loomes and Sugden (1986); Gul (1991) in the present context as well as most other experimental environments (Ericson and Fuster, Forthcoming; Gill and Prowse, 2010; Abeler, Falk, Goette and Huffman, Forthcoming). For specific evidence distinguishing Koszegi and Rabin (2006, 2007) preferences from Bell (1985); Loomes and Sugden (1986); Gul (1991), see Sprenger (2010).

7u-v preferences are less well-known than the other preference models. For a discussion of the early history of u-v preferences, see Schoemaker (1982). These models capture the intuition of Allais (1953) that when options are far from certain, individuals act effectively as EU maximizers but, when certainty is available, it is disproportionately preferred. The u-v model differs in important ways from extreme or even discontinuous probability weighting and prior experiments have demonstrated these differences (Andreoni and Sprenger, 2011a).
aversion over certainty and uncertainty. Our design—which measures risk aversion in both domains—permits an investigation of whether the *prima facie* inconsistency between the psychological and economic investigations discussed above reflects such systematically changing patterns of risk aversion.

Second, we conduct our experiments in Afghanistan, a nation with widespread exposure to violent trauma, on a sample of 1,127 Afghan civilians across 12 of the 34 provincial capitals.\(^8\) Importantly, we have access to detailed data on violent incidents from the International Security Assistance Force (ISAF), with precise geocoded locations and timestamps of both successful and failed insurgent attacks. The richness of the violence data provides for artefactual analysis based on administrative, as opposed to self-reported data, and for plausible placebo tests based on the correlation between risk preferences and failed and successful attacks.

Third, psychological methods that randomize the controlled recollection of fearful episodes are deployed in the field and stratified geographically to permit estimation of the interaction between exposure to violence and priming. One-third of our sample was asked to recall a fear or anxiety-inducing episode using methods validated in the psychological literature immediately prior to completing the experimental tasks. Administration of the primes is random so that primed and un-primed individuals can be compared to measure the average causal effect of recalling trauma on risky decisions. Critically, the design allows artefactual and experimental data to be combined so that trauma-affected and unaffected individuals can be compared with and without experimental primes. This may provide the necessary machinery to speak to the permanence of the effects of trauma on risk preferences and the potential triggering of specific risk-taking behaviors.

The combination of methods provides a series of interesting results. To begin, we document substantial differences between utility elicited under uncertainty and utility elicited under certainty. Individuals are systematically more risk averse under certainty compared to uncertainty.\(^8\) In 2007, 1,523 civilian deaths were recorded in Afghanistan (UNAMA, 2008). This number increased to 2,118 in 2008, 2,415 in 2009 and 2,777 in 2010 (UNAMA, 2010). During this period, instability has spread from the south to the northern, eastern and western regions of the country such that Afghans throughout the country have become exposed to violence.
This baseline finding is in contradiction to both EU and CPT, indicating a specific preference for certainty as in DA and $u$-$v$ preferences. Interestingly, the preference for certainty, which we term a Certainty Premium, is exacerbated by recollection of fearful events. The nature of the results suggest that when everything is uncertain, fearful recollections increase risk tolerance, but that when certainty is available it remains attractive, increasing measured Certainty Premia. A similar investigation of our artefactual data indicates limited correlation between experimentally elicited preferences and violence defined as the administrative recording of a violent episode within 1 km of the interview location in our window of observation, April 2002 to February 2010. However, when exploring the interaction between violence and fear, we find the effects of fearful recollections are localized to those who have experienced violence. Fearful recollections trigger changes in risk and certainty preferences specifically for those individuals exposed to violent trauma. The results are robust to a variety of alternate specifications including exploring issues of selective migration, social cohesion, and changing definitions and vintages of violence. We additionally stratify prime administration at a highly localized level in line with best-practice from the field experimental literature (Bruhn and McKenzie, 2009), and document robustness to using only within-location variation. Finally, we conduct a placebo exercise documenting that planned but unsuccessful attacks have no measurable effect on behavior, limiting the set of potential alternative explanations for our findings.

We point to three implications of these findings. First, as we obtain both increased risk tolerance under uncertainty and increased preferences for certainty, our findings may help to rationalize potential inconsistencies across psychology and economics. Second, our data speak to the permanence of traumatic exposure’s influence on risk preference. Violence-exposed individuals may be altered, but it is the susceptibility of their behavior to priming triggers that is altered, not their risk preferences per se. Third, if a specific pattern of behavior can be triggered for trauma-exposed individuals, then this information is potentially actionable by both marketers and policy-makers in product design and policy intervention.

The paper proceeds as follows. Section 2 presents our broad research design combining
utility elicitation procedures, priming mechanisms borrowed from psychology, and objective violence data from ISAF. Section 3 presents results and Section 4 provides a discussion and conclusion.

2 Research Design

In this section, we describe our broad research design exploring exposure to violent trauma and risk preferences in three sub-sections. First, we describe our methodology for utility elicitation. Second, we discuss the priming methods borrowed from psychology for manipulating traumatic recollections. Third, we present our violence data obtained from military records and introduce our artefactual structure.

2.1 Utility Elicitation

Researchers have long been interested in eliciting utility and measuring risk aversion.9 A key contribution from experimental economics is the risk preference Multiple Price List (MPL) methodology of Holt and Laury (2002). Subjects make a series of decisions between Option A, a safe binary gamble with outcomes close together, and Option B, a risky binary gamble with more variable outcomes. As subjects proceed through the task, the probability of the high outcome in each gamble moves from zero to one, such that the difference in expected value, \( EV(A) - EV(B) \), moves from positive to negative. Therefore, where a subject switches from Option A to Option B in a given Holt and Laury (2002) task carries interval information on their risk aversion.

The choices in Holt and Laury (2002) tasks are often used to infer a parametric measure of risk aversion such as the coefficient of relative risk aversion. That is, EU is imposed, a functional form for utility is assumed, and the shape of the utility function is calculated or estimated at either the group or individual level. Harrison and Rutstrom (2008) provide a detailed summary

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of the estimation exercises associated with the Holt and Laury (2002) task, and other tasks similar to those employed in the study of trauma (Voors et al., Forthcoming; Eckel et al., 2009; Cameron and Shah, 2010).\footnote{Distinctions exist between these tasks and the Holt and Laury (2002) task. Certainty does not play a role in the Holt and Laury (2002) task as individuals, with the exception of the last row, are always choosing between positive variance gambles. In Eckel et al. (2009), and Cameron and Shah (2010) individuals make a choice between six binary gambles, one of which pays the same in both states. Voors et al. (Forthcoming) implement a variant of a task implemented in Harbaugh, Krause and Vesterlund (2010) where individuals choose make six choice between a changing certain amount and a 30%-70% gamble over a high outcome and zero. In section 3.1 we relate our findings to those obtained with prior methods.}

A potential difficulty in parametrically identifying utility values lies in the validity of the underlying EU assumptions. Particular attention should be given to the independence axiom and its implication of linearity-in-probabilities.\footnote{The independence axiom is closely related to the Savage (1954) ‘sure-thing principle’ for subjective expected utility (Samuelson, 1952). Expected utility became known as von Neumann-Morgenstern (vNM) preferences after the publication of von Neumann and Morgenstern (1944). Independence, however, was not among the discussed axioms, but rather implicitly assumed. Samuelson (1952, 1953) discusses the resulting confusion and his suspicion of an implicit assumption of independence in the vNM treatment. Samuelson’s suspicion was then confirmed in a note by Malinvaud (1952). For an excellent discussion of the history of the independence axiom, see Fishburn and Wakker (1995).} Beginning with the Allais (1953) common-ratio and common-consequence paradoxes, research consistently demonstrates failures of linearity-in-probabilities (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992; Tversky and Fox, 1995), particularly in decisions involving certainty (Conlisk, 1989; Camerer, 1992; Harless and Camerer, 1994; Starmer, 2000). A number of behavioral decision theories, designed to account for these so-called ‘certainty effects’ have arisen, including CPT (Kahneman and Tversky, 1979; Tversky and Kahneman, 1992), DA (Bell, 1985; Loomes and Sugden, 1986; Gul, 1991; Koszegi and Rabin, 2006, 2007), and u-v preferences (Neilson, 1992; Schmidt, 1998; Diecidue et al., 2004). Under these alternative models, behavior in Holt and Laury (2002) tasks as well as those employed by Voors et al. (Forthcoming), Eckel et al. (2009), and Cameron and Shah (2010) is not attributable to utility function curvature alone. Hence, one cannot make unconfounded inference with respect to the relationship between trauma and risk preferences.

We introduce experimental methodology designed to elicit risk preferences, and to test the predictions of EU and competing behavioral models designed to accommodate certainty effects. The task is a field-ready, two-question modification of the uncertainty equivalent presented in...
series of choices between a relatively safe Option A and a relatively risky Option B. However, un-
like a Holt and Laury (2002) task, for a given gamble the objective in an uncertainty equivalent
is to identify the probability mixture over the gamble’s best outcome and zero that generates
indifference. Consider a \((p, 1 - p)\) gamble over \(X\) and \(Y > X\), \((p; X, Y)\). The uncertainty
equivalent identifies the \((q, 1 - q)\) gamble over \(Y\) and 0, \((q; Y, 0)\), that generates indifference.
The uncertainty equivalent draws its motivation from the derivation of expected utility, where
the cardinal index for a gamble is derived as the probability mixture over the best and worst
options in the space of gambles.\(^{12}\) Hence, the elicited \(q\) in \((q; Y, 0)\) can be interpreted as a utility
index for the \(p\) gamble, \((p; X, Y)\), and can be used as a measure of risk aversion.

**Task 1: Eliciting Utility Under Uncertainty:** In Task 1, we fix \(p = 0.5\). Under the EU
framework, the uncertainty equivalent establishes the indifference condition

\[
0.5 \cdot v(X) + 0.5 \cdot v(Y) = q \cdot v(Y) + (1 - q) \cdot v(0).
\]

As EU is unique up to an affine transformation, we fix the values \(v(0) = 0\) and \(v(Y) = 1\) and
rearrange to obtain the utility of \(X\),

\[
v(X)_U \equiv \frac{q - 0.5}{0.5},
\]

where the \(U\) subscript refers to the utility being elicited under uncertainty.\(^{13}\) Note that \(v(X)_U\)
can be compared to a risk neutral level, \(X/Y\). A risk neutral individual will exhibit \(v(X)_U = X/Y\),
a risk averse individual will exhibit \(v(X)_U > X/Y\), and a risk loving individual will
exhibit \(v(X)_U < X/Y\). This is a non-parametric measure of risk aversion as \(v(X)_U\) values can
be compared across individuals, but no assumptions are necessary for utility’s functional form.

**Task 2: Eliciting Utility Under Certainty:** In Task 2, we fix \(p = 1\). Again, under the EU

\(^{12}\)Such derivations are provided in most textbook treatments of expected utility. See, e.g. Varian (1992).

\(^{13}\)Note that this is a definition. The object \(v(X)_U\) will be estimated in subsequent analysis.
framework the uncertainty equivalent establishes the indifference condition

\[ v(X) = q' \cdot v(Y) + (1 - q') \cdot v(0). \]

We make the EU substitutions \( v(0) = 0 \) and \( v(Y) = 1 \) to obtain

\[ v(X)_C \equiv q', \tag{2} \]

where the \( C \) subscript refers to the utility being elicited under certainty.\(^{14}\) This utility value again acts as a non-parametric measure of risk aversion.

Importantly, EU’s prediction of linearity-in-probabilities implies the equality

\[ v(X)_U = v(X)_C \]

will hold. This is a critical prediction of EU’s independence axiom testable in the uncertainty equivalent environment. Interestingly, alternative preference models provide differing predictions as to the relationship between \( v(X)_U \) and \( v(X)_C \). We consider these next.

2.1.1 Alternative Preference Models

Alternative preference models such as CPT, DA, and \( u\)-\( v \) preferences make differing predictions in uncertainty equivalents (Andreoni and Sprenger, 2011b). In our two question environment, these arguments reduce to sign predictions for the inequality between \( v(X)_U \) and \( v(X)_C \). To preview the results we define the signed distance between the two as the

\[ Certainty \ Premiun \equiv v(X)_C - v(X)_U, \tag{3} \]

and note the following predictions

1. Cumulative Prospect Theory predicts \( v(X)_C < v(X)_U \) or \( Certainty \ Premiun < 0 \)

\(^{14}\)Note that this is a definition. The object \( v(X)_C \) will be estimated in subsequent analysis.
2. Disappointment Aversion and $u$-$v$ preferences predict $v(X)_C > v(X)_U$ or 

Certainty Premium > 0.

Note that that Certainty Premium, $v(X)_C - v(X)_U$, is defined in probability units of the high outcome, Y, such that one can refer to certainty of X being worth a specific percent chance of Y relative to its uncertain value. Of course, EU predicts Certainty Premium = 0.

To clarify the first prediction, we note that CPT attributes violations of EU to a non-linear probability weighting scheme.\footnote{We abstract away from loss aversion around a fixed-reference point that is part of the CPT formulation.} In particular, it is argued that individuals ‘edit’ probabilities, up-weighting low probabilities and down-weighting high probabilities, giving rise to an inverted $S$-shaped weighting transformation, $\pi(p)$. In CPT, decision weights are applied to the higher outcome of a binary gamble and probabilities zero and one are unweighted. Identifying the $S$-shape of the weighting function and determining its parameter values has received significant attention both theoretically and in experiments (Wu and Gonzalez, 1996; Prelec, 1998; Gonzalez and Wu, 1999; Abdellaoui, 2000). Consensus establishes the region of up-weighting to be probabilities less than one-third, with down-weighting thereafter. For Task 1, with $p = 0.5$, the probability of receiving the high outcome, Y, in the $(p; X, Y)$ gamble would be down-weighted.

Given that $q \geq 0.5$ is expected in order for the utility function to be monotonic, the probability of receiving Y in the $(q; Y, 0)$ gamble would also be down-weighted. The relative effects of these down-weighting forces, in combination with standard utility function curvature, will determine risk aversion in Task 1.

As the literature has followed a primarily parametric path, we consider one popular form for CPT probability weighting popularized by Tversky and Kahneman (1992), 

$$\pi(p) = \frac{p^\gamma}{(p^\gamma + (1 - p)^\gamma)^{1/\gamma}}, \quad 0 < \gamma < 1,$$

where $\gamma$ represents the intensity of probability weighting. For ease of exposition and to foreshadow our implementation, we assume linear utility, $X = 1$, and $Y = 3$, and the Tversky and Kahneman (1992) estimate of $\hat{\gamma} = 0.61$ such that the CPT indifference
condition in Task 1 is written

\[(1 - \pi(0.5)) \cdot 1 + \pi(0.5) \cdot 3 = \pi(q) \cdot 3 + (1 - \pi(q)) \cdot 0.\]

We solve for \(v(X)_U\) as

\[v(X)_U = \pi^{-1}\left(\frac{(1-\pi(0.5)) \cdot 1 + \pi(0.5) \cdot 3}{3}\right) - 0.5 = \frac{0.81 - 0.5}{0.5} = 0.62,\]

which can be compared to the risk neutral level \(X/Y = 1/3\) such that CPT predicts risk aversion, \(v(X)_U > X/Y\), under uncertainty.\(^{16}\)

Interestingly, the risk aversion prediction above is not maintained under certainty. Note that in Task 2 under our assumed forms, the CPT indifference condition is written

\[1 = \pi(q') \cdot 3.\]

Hence,

\[v(X)_C = \pi^{-1}\left(\frac{1}{3}\right).\]

Importantly, under most functional forms for \(\pi(\cdot)\) considered in the literature, probabilities are neither up-weighted nor down-weighted for probabilities around \(1/3\). Hence, near risk neutrality should be expected. Indeed, under the Tversky and Kahneman (1992) weights, we predict \(v(X)_C = 0.33\) leading to the observation that under common functional forms and parameter values for CPT

\[v(X)_C < v(X)_U \ ; \ Certainty\ Premiuim < 0.\]

The prediction from CPT is in contrast to the prediction for DA and \(u-v\) preferences. These models both feature specific preferences for certainty in order to accommodate certainty effects.

\(^{16}\)Indeed, for all \(\gamma < 1\) this relationship is maintained. Andreoni and Sprenger (2011b) provide more detailed discussion as well as model predictions without appeal to specific functional forms and parameter values.
Under disappointment averse preferences, the prospect of losses are eliminated at certainty, leading certainty to be preferred. Under u-v preferences, certainty per se yields a utility boost. Though in a richer environment such as that presented in Andreoni and Sprenger (2011b) the two models can be distinguished, in the present environment they both generate the prediction that utility under certainty is greater than utility under uncertainty,

\[ v(X)_C > v(X)_U \ ; \ \text{Certainty Premium} > 0. \]

With our modified two-task uncertainty equivalent, we are able to provide measures of risk aversion as well as test for violations of EU, provide some separation between competing non-EU decision theories, and generate a measure of the preference for certainty, Certainty Premium.

### 2.1.2 Implementation and Protocol

In order to implement our two-task uncertainty equivalent, two MPLs were designed. These experimental tasks were placed in fixed order, Task 2 then Task 1, in a broad survey of household experiences, attitudes, and beliefs, administered to 2,027 respondents in 12 of Afghanistan’s 34 provincial centers from December 18 - 27, 2010.

In each task, subjects made a series of ten decisions between Option A, a fixed \((p; X, Y)\) gamble, and Option B, a changing \((q; Y, 0)\) gamble. The probability, \(q\), increased from 0.1 to 1 through a task. The values of \(X\) and \(Y\) were chosen to be 150 and 450 Afghanis, respectively. These values correspond to around 1 and 3 days wages in provincial centers, according to prior household surveys (NRVA, 2005, 2007).

Table 1 provides the multiple price lists as they appeared, translated into English.\(^{17}\) Where an individual switches from Option A to Option B in each task carries interval information on their uncertainty equivalent, and so the utility values, \(v(X)_U\) and \(v(X)_C\), and their Certainty Premium.

\(^{17}\)The language of experimentation, Dari, reads right to left such that the reading of the task may have differed from standard populations. Enumerators were told to describe each question in turn as a choice between Option A and Option B. Appendix Figure A1 shows the original instruments.
The primary sampling unit for our survey was polling centers open on election day, September 18th 2010, and deemed secure by the International Security Assistance Force (ISAF) and Afghan National Police (ANP) for the safety of our field staff. These polling centers were generally neighborhood landmarks such as mosques, schools or markets. Survey enumerators were told to begin at the polling center and survey either 6 or 8 subjects. Enumerators adhered to the right hand rule random selection method and respondents within houses were selected according to a Kish grid (Kish, 1949). In keeping with Afghan custom, men and women were interviewed by field staff of their own gender.

Critical to implementing surveys and experiments with non-standard subject pools, particularly in zones of conflict, are cultural differences, enumerator training, and subject comprehension. One of our largest worries in design was the potential sensitivity of questions involving risk in a predominantly Muslim country. For this reason, we opted only to administer the questions in 12 less conservative provinces of Badakhshan, Balkh, Bamyan, Daikondi, Faryab, Herat, Juzjan, Kabul, Kapisa, Panjshir, Parwan, and Samangan. Additionally, we had our in-

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18Our experiment fit in with a broader survey of Afghan civilians conducted in relation to the Afghan elections.
Interviewers read a fixed informed consent script, asking individuals if they were willing to answer a few questions about uncertain outcomes. Reflecting sensitivities regarding gambling, of the 2,027 respondents contacted only 1,127 respondents consented to participate in the experimental component of the survey. Respondents therefore are from 278 polling center precincts. Of these 1,127 respondents 977 completed both Task 1 and Task 2.

A second major concern was the use of incentivized methods and safety. We chose to use hypothetical tasks as we determined, in collaboration with our field staff, that it was too dangerous for our survey enumerators to carry substantial sums on the street and were particularly worried about the potential for conflicts between respondents receiving different amounts. Though we cannot be sure of any potential bias induced by this choice, it clearly suggests the need for further research with incentivized payments. Importantly, we can compare the hypothetical responses of our subjects with the incentivized responses of Andreoni and Sprenger (2011b) for qualitative differences in behavior.

In order to increase survey quality, 247 enumerators were trained in the experimental methods in a series of 4 training sessions. These sessions provided enumerators with a script for explaining the tasks and a mechanism for visualizing the gambles for subjects. Additionally, the 38 survey supervisors for the project trained for two days with the authors, receiving both translated instruction from the US authors and direct instruction in Dari from the Afghan author. Before deploying to the field, both supervisors and enumerators also carried out group

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19 The script read “We are interested in understanding how Afghans make decisions involving uncertain outcomes and some normal risks that people face every day. We would like to ask you some hypothetical questions that will help us understand these decisions. There is no real money involved and you will not receive any money for answering these questions. Are you willing to answer these questions?”

20 Attrition from the experiment is discussed in subsection 3.3. As in most consented experiments where respondents are allowed to select into the survey, we naturally cannot claim that our sample is representative even of the non-representatively selected neighborhoods where the survey took place.

21 For example, when describing a gamble, enumerators were told to rip 10 small pieces of paper, number them 1 to 10 and place them in a bag. When discussing say the (1:150, 450) gamble against the (q; 450, 0) gamble, they would describe it as follows: First we will ask you a hypothetical question over an amount for certain, or an amount that will be awarded depending on which of ten numbers you draw from a bag. We have deposited 10 cards numbered 1 through 10 into a bag. You have an even chance of drawing any of the 10 numbers. The numbers in parentheses indicate the winning numbers. For each Option No., please indicate whether you would prefer Choice A or Choice B. For each Option No., there will be 10 numbers in the bag and you are only able to draw one. This is not for real money and we are not asking you to make a gamble, we just want to understand how you would respond to naturally occurring risk.
mock elicitations to ensure proper explanation.

The employed methodology appears to have helped subject comprehension. One potential way of measuring miscomprehension is to measure the proportion of individuals who switch from Option A to Option B more than once in a given price list. Such multiple switching is difficult to rationalize using standard choice theory and may indicate subject confusion. About 9.7 percent of our subjects switched more than once in Task 1 and 12.7 percent switched more than once in Task 2, while Holt and Laury (2002) document around 10 percent multiple switching from a standard subject pool. Another way of identifying miscomprehension is identifying individuals with non-monotonic utility functions. That is, individuals for whom \( v(X)_U = (q - 0.5)/0.5 < 0. \) 12.9 percent of our subjects exhibit such behavior.\(^{22}\) 87 respondents (8.9 percent of the sample completing the tasks) have both non-monotonic utility functions and exhibit multiple switching on both tasks, consistent with miscomprehension. As these two behaviors both suggest failure to understand the experimental paradigm, our main analysis focuses on the 816 of 977 individuals who completed both tasks and did not multiply switch or exhibit non-monotonic utility. In subsection 3.3, we discuss the remaining individuals and show that attrition from the sample of 977 is not associated with treatment.

### 2.2 Psychological Primes

Psychology has developed a series of methodologies for priming, the objective of which is to cue an emotional state or identification. In a representative survey of 973 U.S. individuals in the aftermath of September 11th conducted by Lerner et al. (2003), one-third of subjects were randomly asked to recall and write down the one thing about the event that made them the most fearful or anxious, one-third were asked what made them most angry, and one-third were asked what made them most sad. The evidence suggested that those primed with fear and

\(^{22}\)This classification recognizes the interval nature of the uncertainty equivalent data. As individuals are not allowed to express indifference, we classify utility as monotonic if an individual switches at the 5th row, \( q' \in [0.4, 0.5] \), or higher in Task 2. Importantly, in robustness tests we document that non-monotonicities are uncorrelated with either exposure to violence or priming. Further, the central results of Table 4 are maintained if we admit non-monotonic individuals.
anxiety in this way became more fearful in self-reports than the other groups and believed that terrorist attacks were substantially more likely. Given the documented effects and validation of the fearful recollections of trauma in both Lerner et al. (2003) and Lerner and Keltner (2001), we implemented small modifications of these priming mechanisms.

Just prior to completing the utility elicitation tasks described above 1/3 of subjects at random were asked: “We are interested in understanding your daily experiences that may make you fearful or anxious. This could be anything, for example getting sick, experiencing violence, losing a job, etc. Could you describe one event in the past year that caused you fear or anxiety?” (FEAR)

Another 1/3 were asked: “We are interested in understanding your daily experiences that make you happy or joyous. This could be anything, for example birth of child, marriage of a relative, or success in your job. Could you describe an event in the past year that caused you happiness?” (HAPPY)

And another 1/3 were asked: “We are interested in understanding your general daily experiences. This could be anything. Could you describe an event from the past year.” (NEUTRAL)

2.2.1 Implementation and Protocol

Primes were given to all individuals who agreed to the consent discussed above asking individuals if they were willing to answer questions on their daily experiences and on risky decisions.

In order to implement the randomized psychological primes, several baseline steps were taken to ensure randomness and maximize statistical power. First, following procedures from the field experimental literature (Bruhn and McKenzie, 2009), we stratified our assignment of primes at the polling center level. Hence we are able to provide within-polling center estimates, limiting the set of plausible alternatives for our interacted results to those operating on a small, and precise, geographical scale. Second, we implemented this stratified randomization by setting a random seed for each polling center. That is, the prime of the first survey was randomly set and then a fixed order was followed such that HAPPY followed FEAR, NEUTRAL
followed HAPPY, and FEAR followed NEUTRAL. This fixed pattern and random seeding helps to alleviate potential concerns about enumerators selectively altering the order of primes. Additionally, interviews were time stamped with an enumerator self-report. Of course, this does not fully remove threats to the randomization, so we added a standard random monitoring campaign with supervisors present for around 16 percent of all surveys and personally back-checking an additional 11 percent.

Table 2 reports summary statistics across the three psychological primes as well as t-tests of means. Note that broad balance is achieved across a variety of demographics including age, income, gender, religion, education, and marriage. Additional variables corresponding to social cohesion, if they think it’s important to report insurgent attacks, whether they feel government authority should resolve disputes, are also balanced. These variables are measured prior to the administration of primes and so constitute pre-treatment measures. One exception is that individuals assigned to the NEUTRAL primes do appear more likely to believe that police should resolve disputes. To increase confidence that the experimental effects on risk preference we observe are the result of the administration of primes and do not reflect pre-existing differences, we additionally asked respondents to indicate their risk tolerance on a 0-10 Likert scale, where 0 is anchored at “unwilling to take risks” and the value 10 means “fully prepared to take risks” at a point in the interview substantially before the administration of primes. Balance is achieved on this measure as well. Importantly, unlike in other correlational analyses where measurements are taken sometime after exposure to trauma, the random primes generate a sample that is balanced on both exposure to violence and the share of respondents who were born in the neighborhood of the survey location. Hence mobility of affected individuals is of less concern than in other environments.

\footnote{Of course, with 30 conducted t-tests, such a result could naturally happen by chance. Consistent with this being a random deviation, the means for the FEAR and HAPPY groups are not significantly different from one another (p-value = 0.498).}

\footnote{We were not able to elicit risk preference at this stage using a full price list, as we had not yet provided individuals who were unwilling to participate for religious reasons the option of discontinuing the survey.}
### Table 2: Summary Statistics

<table>
<thead>
<tr>
<th></th>
<th>Neutral Prime (1)</th>
<th>Anxiety Prime (2)</th>
<th>Happiness Prime (3)</th>
<th>t-test of: (P-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Socio-demographics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>29.520 (0.648)</td>
<td>29.592 (0.648)</td>
<td>28.926 (0.576)</td>
<td>0.937 0.495</td>
</tr>
<tr>
<td>Income (1,000 AFs)</td>
<td>12.994 (0.536)</td>
<td>12.303 (0.648)</td>
<td>12.395 (0.573)</td>
<td>0.409 0.445</td>
</tr>
<tr>
<td>Female (=1)</td>
<td>0.370 (0.029)</td>
<td>0.438 (0.031)</td>
<td>0.407 (0.030)</td>
<td>0.108 0.370</td>
</tr>
<tr>
<td>Shia (=1)</td>
<td>0.157 (0.022)</td>
<td>0.140 (0.021)</td>
<td>0.130 (0.020)</td>
<td>0.578 0.368</td>
</tr>
<tr>
<td>Education (Years)</td>
<td>9.719 (0.259)</td>
<td>9.796 (0.261)</td>
<td>10.004 (0.264)</td>
<td>0.834 0.442</td>
</tr>
<tr>
<td>Married (=1)</td>
<td>0.626 (0.029)</td>
<td>0.619 (0.030)</td>
<td>0.593 (0.030)</td>
<td>0.858 0.418</td>
</tr>
<tr>
<td><strong>Social Cohesion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting Insurgent Activity Important</td>
<td>0.496 (0.032)</td>
<td>0.525 (0.032)</td>
<td>0.474 (0.033)</td>
<td>0.521 0.637</td>
</tr>
<tr>
<td>Police Resolve Disputes</td>
<td>0.249 (0.026)</td>
<td>0.189 (0.024)</td>
<td>0.189 (0.024)</td>
<td>0.089 0.088</td>
</tr>
<tr>
<td>Courts Resolve Disputes</td>
<td>0.135 (0.020)</td>
<td>0.174 (0.023)</td>
<td>0.178 (0.023)</td>
<td>0.215 0.170</td>
</tr>
<tr>
<td><strong>Violence and Mobility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violence (=1)</td>
<td>0.473 (0.030)</td>
<td>0.464 (0.030)</td>
<td>0.485 (0.030)</td>
<td>0.689 0.656</td>
</tr>
<tr>
<td>Failed Violence (=1)</td>
<td>0.363 (0.029)</td>
<td>0.355 (0.029)</td>
<td>0.344 (0.029)</td>
<td>0.841 0.650</td>
</tr>
<tr>
<td>Respondent Born Locally</td>
<td>0.786 (0.024)</td>
<td>0.781 (0.025)</td>
<td>0.800 (0.024)</td>
<td>0.880 0.696</td>
</tr>
<tr>
<td><strong>Baseline Risk</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baseline Risk (0-10)</td>
<td>2.246 (0.142)</td>
<td>2.015 (0.149)</td>
<td>2.296 (0.158)</td>
<td>0.263 0.810</td>
</tr>
<tr>
<td># Observations</td>
<td>281</td>
<td>265</td>
<td>270</td>
<td></td>
</tr>
</tbody>
</table>

*Notes: Standard errors reported in parentheses.*
2.3 Violence Data

As a country, Afghanistan has suffered 30 years of unabated violence. Following the military coup of the communist People’s Democratic Party of Afghanistan in 1978 and the subsequent Soviet invasion in 1979, Afghans have lived through large-scale violence, repression, civil war, and ethnic cleansing.

We focus our analysis on violence from April 2002 to February 2010, a period for which we have precisely geocoded and time-stamped data on violent incidents. Our violence data come from incident records of the International Security Assistance Force (ISAF), a multilateral military body present in Afghanistan since December 2001, obtained through the Combined Information Data Network Exchange (CIDNE).

In addition to geocodes at 5 decimal digit precision (accurate to within one meter at the equator), the CIDNE data provide the time and type of the incident. In effect, the CIDNE data capture all types of violence reported to ISAF, including incidents in which ISAF forces were not directly engaged. The CIDNE identifies eight types of incidents: direct fire, Improvised Explosive Device (IED) explosions, indirect fire, mine strikes, suicide attacks, IEDs found and cleared, IED hoaxes, and mines found and cleared. A total of 55,063 incidents are identified in the CIDNE data set during our seven year window.

We separate the type of incidents into two groups. First, we define a Successful Attack as one of: direct fire, IED explosions, indirect fire, mine strikes, and suicide attacks. Second, we define an Unsuccessful Attack as one of: IEDs found and cleared, IED hoaxes, and mines found and cleared. The CIDNE data contain 45,463 Successful Attacks and 9,600 Unsuccessful Attacks during our window of observation.

As noted above, our experimental procedures were localized around specific polling centers. Hence, we attach each incident to its nearest polling center with a 1 kilometer halo. That is, if an incident is further than 1 kilometer from any polling center it will not be used in the analysis and if an incident lies within 1 kilometer of two polling centers, it will be attached to the nearer of the two. For our 278 polling centers, we are able to attach a total of 507 incidents,
of which 363 were Successful Attacks and the remaining 144 were Unsuccessful Attacks. \footnote{While our sample has been exposed to considerable trauma, the regions we could safely send interviewers to are among the safer in Afghanistan. This was particularly important given the sensitive nature of the attacks.} We discuss robustness to alternative assignment protocols in subsection 3.3 below.

As our primary measure of exposure to violence we define the indicator \textit{Violence}, which takes the value 1 if there are one or more Successful Attacks attached to the polling center in the window of observation and zero otherwise. Roughly 47.5 percent of our sample has Violence $= 1$, indicating their polling center experienced a successful attack in our observation window. \footnote{In the robustness tests of subsection 3.3, we consider alternate definitions of violence changing the halo distance, the assignment procedure linking violent episodes to multiple polling centers, and changing the observation period. We also consider a continuous measure of the intensity of violence.}

Unsuccessful Attacks provide the possibility to perform placebo tests. Under the assumption that, conditional on intent, the success or failure of an attack is random, then Unsuccessful Attacks can inform researchers as to whether it is the intention of violence or its realization that correlates with experimental behavior. We define the indicator \textit{Failed Violence}, which takes the value 1 if there was one or more Unsuccessful Attacks attached to the polling center in the window of observation and zero otherwise. Roughly 35.4 percent of our sample has Failed Violence $= 1$, indicating their polling center experienced an unsuccessful attack in our observation window. \footnote{Additionally, 25.7 percent of the sample has both Violence and Failed Violence equal to one.}

The spatial dimension of these violence measures are clearly important for our research design. Given the density of our polling centers, locations that experienced Violence, Failed Violence, both events, or neither event lie geographically close. Figure 1 presents a map of Kabul, Afghanistan’s capital, along with the 75 polling centers and their violence classifications. Violence and Failed Violence and neither of each are observed across the city. In the next section, we explore whether exposure to violence, and its recollection, correlate with experimental responses.
3 Results

We present results in three sub-sections. We begin by documenting the levels of $v(X)_U$, $v(X)_C$, and Certainty Premium, and explore their relationship with experimental priming manipulations, objective measures of violence and their combination. Second, we explore alternate explanations for our obtained results. Third, we provide more standard robustness tests related to decision error and definitions of violence.

3.1 Main Results

Table 3 presents the location of switch points for the sample of 816 individuals with monotonic utility and unique switch points in Task 1 and Task 2. Potentially due to the 10 percentage point intervals used, 63% of subjects switch at the same point in both Task 1 and Task 2. Interestingly, this behavior corresponds closely to that observed in the first two 15 question tasks of the risk preference measures employed by Tanaka, Camerer and Nguyen (2010) to identify probability weighting and utility function curvature where a large number of subjects switched at the same point in the two tasks. See Tanaka et al. (2010) Figure 1 for detail. Here, as there, we attribute such behavior to preferences.\(^\text{28}\)

<table>
<thead>
<tr>
<th>Task 1 Switch Point</th>
<th>&lt; 4</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>23</td>
<td>86</td>
<td>22</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>38</td>
<td>150</td>
<td>35</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>40</td>
<td>163</td>
<td>31</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>1</td>
<td>45</td>
<td>88</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>1</td>
<td>41</td>
<td>30</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task 2 Switch Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Switch</td>
</tr>
</tbody>
</table>

\(^{28}\)Given the interval size, we hesitate to term such behavior an error. Importantly, neither primes nor exposure to violence predicts this behavior and the results obtained in Table 4 are maintained if we examine only individuals with differing switch points. Note, as well, that we also don’t consider an error the behavior of having a higher switch point in Task 1 than Task 2. This behavior indicates a preference for a higher probability of a lower prize and so entails a violation of first order stochastic dominance similar to the recently-debated uncertainty effect (Gneezy, List and Wu, 2006; Simonsohn, 2009; Rydval, Ortmann, Prokosheva and Hertwig, 2009). Importantly, several behavioral decision theory models including $u-v$ preferences and some versions of DA predict such violations of stochastic dominance as individuals hold direct preferences for certainty.
Our primary objects of interest are $v(150)_U$ and $v(150)_C$, and $v(150)_C - v(150)_U$. Given the interval nature of the experimental data, these values are interval-coded based on where an individual switches from Option A to Option B in Task 1 and Task 2. Our analysis accounts for the interval nature of the data by conducting interval regressions (Stewart, 1983), taking as dependent variable the interval of $v(150)_U$, $v(150)_C$, or the Certainty Premium, $v(150)_C - v(150)_U$. Standard errors are clustered at the polling center level.

In Table 4, the three dependent variables are organized in columns and three panels are provided corresponding to analysis based on experimental priming results, artefactual violence data, and their combination. In Panel A, Column (1), we present priming results based on interval regressions of $v(150)_U$ on the FEAR prime and a constant. The HAPPY and NEUTRAL primes are grouped together in the constant as no significant differences were obtained between them. The estimated constant of 0.26 (s.e. = 0.01) in the absence of FEAR can be compared to the risk neutral benchmark of $X/Y = 150/450 = 1/3$, indicating slight risk tolerance. Interestingly, the randomly administered FEAR significantly increases risk tolerance elicited under uncertainty. Individuals asked to recall a fearful episode are significantly more risk tolerant. Consistent with random assignment of the prime, this result is maintained in Column (2) with the addition of the covariates summarized in Table 2.

The risk tolerance elicited under uncertainty is in stark contrast to the preferences elicited under certainty. In Table 4, Panel A, Columns (3) and (4), we present results for $v(150)_C$ and note that the estimated constant in Column (3) of 0.62 (0.01) indicates substantial risk aversion relative to the benchmark of 1/3. FEAR is associated with a marginally significant increase in risk tolerance. However, this effect is only one-third the size of the effect of FEAR under uncertainty.

Taken together these data indicate a substantial positive Certainty Premium. In Column (5), we document an average Certainty Premium of 0.37 (0.01), indicating that 150 Afghanis received with certainty are worth an additional 37 percent chance of receiving 450 Afghanis

\footnote{The individual with no switch point in Task 2 is top-coded at $q' \in [1, 1]$ and therefore has a non-interval response.}
## Table 4: Attacks, Primes, and Elicited Utility

### Panel A - Priming Results

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>(v(150))</th>
<th>(v(150)_c)</th>
<th>(v(150)_c - v(150)_u)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>FEAR (=1)</td>
<td>-0.052***</td>
<td>-0.068***</td>
<td>-0.018**</td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td>(0.018)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.256***</td>
<td>0.071</td>
<td>0.622***</td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.050)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Covariates</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td># Observations</td>
<td>816</td>
<td>718</td>
<td>816</td>
</tr>
<tr>
<td># Clusters</td>
<td>278</td>
<td>267</td>
<td>278</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-1285.164</td>
<td>-1105.430</td>
<td>-1300.302</td>
</tr>
</tbody>
</table>

### Panel B - Artefactual Violence Results

| Violence (=1)       | -0.016      | -0.011        | -0.004                   |
|                     | (0.015)     | (0.017)       | (0.007)                  |
| Constant            | 0.251***    | 0.057         | 0.620***                |
|                     | (0.015)     | (0.052)       | (0.007)                  |
| Covariates          | No          | Yes            | No                       |
| # Observations      | 816         | 718            | 816                      |
| # Clusters          | 278         | 267            | 278                      |
| Log-Likelihood      | -1289.216   | -1112.293      | -1302.126                |

### Panel C - Exposure to Violence and Prime Sensitivity

| FEAR (=1)           | -0.006      | -0.023        | -0.001                   |
|                     | (0.025)     | (0.025)       | (0.012)                  |
| Violence (=1)       | 0.015       | 0.019         | 0.007                    |
|                     | (0.019)     | (0.022)       | (0.009)                  |
| FEAR x Violence     | -0.098***   | -0.096***     | -0.036**                |
|                     | (0.034)     | (0.035)       | (0.018)                  |
| Constant            | 0.253***    | 0.066         | 0.620***                |
|                     | (0.017)     | (0.052)       | (0.008)                  |
| Covariates          | No          | Yes            | No                       |
| # Observations      | 816         | 718            | 816                      |
| # Clusters          | 278         | 267            | 278                      |
| Log-Likelihood      | -1280.901   | -1101.704      | -1298.191                |

**Notes:** Estimates from interval regressions (Stewart, 1983). Robust standard errors clustered at the Polling Center level reported in parentheses. All regressions include province fixed effects. Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April 2002 - February 2010. Sample: 816 individuals with monotonic utility and no multiple switching. \(v(150)_c\) refers to elicited utility under certainty while \(v(150)_u\) refers to elicited utility under uncertainty. The differences \(v(150)_c - v(150)_u\) is the measured Certainty Premium. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, born locally (=1), reporting insurgent activity important (=1), prefer police resolve disputes (=1), prefer courts resolve disputes (=1), married (=1), age, and log(income).
relative to their value under uncertainty. With a sample of U.S. college students, Andreoni and Sprenger (2011b) also document a sizable positive Certainty Premium where certainty of 10 US Dollars is found to be worth an additional 15 - 20 percent chance of winning 30 dollars relative to its uncertain value. This positive Certainty Premium is at odds with both EU and CPT, but consistent with models such as DA and $u-v$ preferences that feature a specific preference for certainty. This result that individuals prefer certainty when primed with fear resonates closely with intuition generated in the psychology literature discussed above.

Table 4, Panel B repeats the above analysis with the key independent variable being the presence of violent activity at the polling center level, Violence (= 1). Strikingly different results are obtained. No significant relationship between administratively measured violence and experimentally elicited risk preferences is observed. Given that prior work in experimental economics has delivered correlations between traumatic exposure and risk preferences, it is important to attempt to resolve our artefactual results with those obtained in prior exercises. One important difference is recency of trauma. Eckel et al. (2009) investigate risk preferences directly after Hurricane Katrina while our window of observation is substantially longer. As Eckel et al. (2009) document an attenuation of effects over time, our measure of violence over the entire window may be too wide to uncover effects.\footnote{However, in robustness tests we examine changing vintages of violence and document no direct effect of either recent or old violence. See Table A1 for details.}

Another important difference is the reliance on self-reported trauma as in Voors et al. (Forthcoming). Relying on self-reports introduces several potential confounds. First, unwillingness to discuss violent episodes is a hallmark symptom of trauma-related conditions (Yehuda, 2002). Second, the self-report itself, depending on when it is conducted, may act as a mechanism for priming fearful recollections. Viewed in this light, our priming results may speak closely to artefactual analyses conducted with self-reports.

In Panel C of Table 4, we combine our data sources, examining the interacted effect of being exposed to violence and being asked to recall fear-inducing episodes. Panel C indicates that FEAR without Violence and Violence without FEAR have limited effect on elicited risk
preferences and Certainty Premium. Individuals exposed to violence who are asked to recall these episodes drive the observed effects. It is these respondents who are more risk tolerant under uncertainty and they who have significantly higher Certainty Premia. Violence exposed individuals, primed to recall fearful episodes have Certainty Premia six percentage points larger than unexposed, unprimed individuals, indicating a sixteen percent greater willingness-to-pay (in probability units of 450 Afs) for certainty. Further, we find that primed, exposed individuals have Certainty Premia that are 5.7 percentage points ($\chi^2 = 20.83, p < 0.01$) larger than primed, unexposed individuals and 6.9 percentage points larger ($\chi^2 = 10.21, p < 0.01$) than unprimed, exposed individuals.\footnote{$\chi^2$ values correspond to tests of the null hypothesis that the coefficients of FEAR and FEAR x Violence (=1) are equal in Panel C, Column (5), and that the coefficients of Violence and FEAR x Violence (=1) are equal in Panel C, Column (5), respectively.}

These results may help to resolve the above-discussed differences between psychological and economic findings. Experimental economics has uncovered increased risk tolerance after exposure to trauma while psychology links fearful recollections to ‘certainty enhancing’ choices. We document effects of fearful recollections for violence-exposed individuals which both increase risk tolerance under uncertainty and increase the preference for certainty. Prior work in economics and psychology relied on single task procedures and differing methods, without the possibility of testing for non-EU behavior. As such, the consistency of simultaneously becoming more risk loving away from certainty, but holding on to certainty when it is available could not be observed.

Additionally, these results have an interesting interpretation. The effect of violence on risk-taking behavior may be mediated through recall. If these recollections can be manipulated, then they can be triggered by external cues such as marketing or policy. In effect, the observed behavior is equivalent to individuals being willing to pay incrementally more for certainty and so has analogs in financial behaviors such as insurance purchasing and portfolio choice.

While we can interpret the coefficients of FEAR and FEAR x Violence as causal effects on two different subsamples, we cannot argue that violence is causing the difference in responses to
priming. Important to the interpretation that the effect of violence is mediated through recall and so can be triggered by external cues, is the possibility that violent incidents are correlated with some other critical characteristic of the polling center, such as migration flows or local willingness to trust military personnel, who can pre-empt an attack. In the presence of such confounds, it is still the case that the causal effect of priming on risk behavior is larger for violence-exposed individuals, but exposure may not be the reason why it is larger. We provide a battery of tests exploring alternative explanations for the difference in responses to priming in the next subsection.

3.2 Testing Alternative Explanations

This subsection reports further tests of whether the effect of violence on experimental behavior is mediated through recall. To begin, we exploit the stratification of experimental primes at the polling center precinct level to test the sensitivity of the results to estimation using only within-polling center variation. Any omitted correlate of violence causing individuals in violent neighborhoods to exhibit more sensitivity to FEAR, if it is not perfectly spatially correlated with patterns of violence, should cause our estimates to be sensitive to the inclusion of polling center fixed effects. Next, we exploit a feature of our data which allows us to identify attacks which were planned but never succeeded in order to perform placebo tests. These data serve two purposes. First, under the assumption that conditional on intent success is random, this represents a test for whether it is the possibility of violence or its realization that has an impact on observed behavior. Second, these data allow for a restriction of plausible confounds. If the omitted correlate of violence which is driving vulnerability to primes is also correlated with the intention to attack, then we should find differential vulnerability to primes based on unsuccessful attacks as well. Last, we directly examine a remaining set of plausible omitted correlates, such as migration, willingness to report attacks to military forces, and willingness to use the Afghan government to adjudicate disputes. These results add further support to the findings and interpretation above.
3.2.1 Within-Polling Center Variation

As a first consistency test, we present Table 5, which corresponds to Panels A and C of Table 4.\textsuperscript{32} All regressions in Table 4 were estimated using within-province variation. As described in subsection 2.2, we stratified the assignment of primes at the polling center level, which permits estimation of experimental effects using only within-polling center variation. Table 5 repeats specifications from Panels A and C of Table 4 adding polling center fixed effects.\textsuperscript{33} If potential confounds that prevent interpreting the interaction terms as causal are not perfectly spatially correlated with violent incidents, then they should be sensitive to estimation using variation at a finer degree of spatial granularity. The results are robust to exploiting only within-polling center variation and, in places, the results grow more significant consistent with spatial stratification permitting the detection of smaller effects.

3.2.2 Placebo Tests of Failed Violence

Our data allows us to identify attacks which were planned but never succeeded in order to perform placebo tests. If unobserved correlates of violence are also correlated with the intention to attack, then we should find differential vulnerability to primes dividing the sample according to this variable as well.

Table 6 reports placebo tests regressing Certainty Premium on the full set of interactions for Violence and Failed Violence, separated by FEAR.\textsuperscript{34} Consistent with violence causing decision-making to be vulnerable to fearful recollections, it is Violence alone and not Failed Violence or the interaction that is correlated with Certainty Premium in the FEAR condition. Not only does this suggest that it is the realization of traumatic episodes that provide the basis for fearful recollection, but also it narrows the set of potential confounds to correlates of realized violent

\textsuperscript{32}As Violence is measured at the polling center precinct level, we cannot repeat the analysis in Panel B of Table 4 as the fixed effects are perfectly collinear with Violence. Additionally, when estimating the relation between Violence x FEAR on Certainty Preference, Violence would be collinear with the polling center fixed effects and so is removed from regression.

\textsuperscript{33}As Bruhn and McKenzie (2009) show, this approach is likely to provide a high powered test of the effect of the prime. Last, because the estimation of effect relies on comparisons between individuals living in the same neighborhood, it is less likely that the result is due to chance.

\textsuperscript{34}Of course, data limitations may restrict detecting effect due to a limited sample size.
Table 5: Attacks and Elicited Utility - Including Polling Center Fixed Effects

**Panel A - Priming Results**

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>( v(150)_{u} )</th>
<th>( v(150)_{c} )</th>
<th>( v(150)<em>{c} - v(150)</em>{u} )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
</tr>
<tr>
<td>FEAR (=1)</td>
<td>-0.059***</td>
<td>-0.077***</td>
<td>-0.020**</td>
</tr>
<tr>
<td></td>
<td>(0.018)</td>
<td>(0.018)</td>
<td>(0.009)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.320***</td>
<td>0.029</td>
<td>0.624***</td>
</tr>
<tr>
<td></td>
<td>(0.084)</td>
<td>(0.111)</td>
<td>(0.043)</td>
</tr>
<tr>
<td>Covariates</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td># Observations</td>
<td>816</td>
<td>718</td>
<td>816</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-1173.515</td>
<td>-985.089</td>
<td>-1193.460</td>
</tr>
</tbody>
</table>

|                     | (4)              | (5)              | (6)              |
|                     | -0.030***        | 0.037***         | 0.047***         |
|                     | (0.009)          | (0.011)          | (0.010)          |
|                     | 0.507***         | 0.305***         | 0.463***         |
|                     | (0.057)          | (0.051)          | (0.066)          |
| Covariates          | No               | Yes              | No               |
| # Observations      | 816              | 718              | 816              |
| Log-Likelihood      | -1193.460        | -1005.554        | -423.597         |

|                     | (2)              | (3)              | (4)              |
|                     | -0.012           | -0.016           | 0.012            |
|                     | (0.013)          | (0.013)          | (0.015)          |
|                     | 0.050**          | 0.047**          | 0.047**          |
|                     | (0.019)          | (0.021)          | (0.021)          |
| Covariates          | No               | Yes              | No               |
| # Observations      | 816              | 718              | 816              |
| Log-Likelihood      | -1192.323        | -1004.562        | -420.812         |

|                     | (5)              | (6)              |
|                     | -0.023           | -0.066           |
|                     | (0.015)          | (0.012)          |
|                     | 0.023            | 0.450***         |
| Covariates          | No               | Yes              |
| # Observations      | 816              | 718              |
| Log-Likelihood      | -315.263         |                   |

Notes: Estimates from interval regressions (Stewart, 1983). Robust standard errors clustered at the Polling Center level reported in parentheses. All regressions include Polling Center fixed effects. There are 278 polling centers in our sample. We do not include Violence in Panel B as it is measured at the polling center level and so is perfectly collinear with the polling center fixed effects. Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April 2002 - February 2010. Sample: 816 individuals with monotonic utility and no multiple switching. \( v(150)_{C} \) refers to elicited utility under certainty while \( v(150)_{U} \) refers to elicited utility under uncertainty. The difference \( v(150)_{C} - v(150)_{U} \) is the measured Certainty Premium. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, born locally (=1), reporting insurgent activity important (=1), prefer police resolve disputes (=1), prefer courts resolve disputes (=1), married (=1), age, and log(income).

activity that are not highly correlated with failed attacks.

### 3.2.3 Measures of Social Cohesion and Selective Migration

A set of possible alternative explanations for our observed effects present themselves. It may be that successful attacks drive migration while planned attacks do not, and that individuals whose preferences are responsive to recall do not migrate. It may be that individuals who
<table>
<thead>
<tr>
<th></th>
<th>FEAR (−1)</th>
<th>FEAR (−0)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Violence (=1)</td>
<td>0.066***</td>
<td>0.054***</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>Failed Violence (=1)</td>
<td>0.001</td>
<td>-0.021</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.030)</td>
</tr>
<tr>
<td>Violence x Failed Violence</td>
<td>0.036</td>
<td>0.035</td>
</tr>
<tr>
<td></td>
<td>(0.038)</td>
<td>(0.040)</td>
</tr>
<tr>
<td>Constant</td>
<td>0.363***</td>
<td>0.367***</td>
</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.019)</td>
</tr>
</tbody>
</table>

| Covariates     | No        | No        | Yes       | No        | No        | Yes       |
| # Observations | 265       | 265       | 238       | 551       | 551       | 480       |
| # Clusters     | 196       | 196       | 181       | 258       | 258       | 239       |

Notes: Estimates from interval regressions (Stewart, 1983). Robust standard errors clustered at the Polling Center level reported in parentheses. All regressions include province fixed effects. Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April 2002 - February 2010. Sample: 816 individuals with monotonic utility and no multiple switching. The difference $v(150)_C - v(150)_U$ is the measured Certainty Premium. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, born locally (=1), reporting insurgent activity important (=1), prefer police resolve disputes (=1), prefer courts resolve disputes (=1), married (=1), age, and log(income).
are susceptible to primes are less likely to report attacks, and so disproportionately live in neighborhoods where attacks succeed. It may be that individuals who are susceptible to primes disproportionately live in areas that are not under government control, and it is in these areas that attacks are more common.

All three potential confounds share the common feature that individuals selectively migrate or settle depending on violence, so the insensitivity of the results to the inclusion of polling center fixed effects reported in Table 5 already provides some evidence against their relevance. Importantly, our data provide additional opportunity to test these hypotheses as we are able to measure social cohesion, the importance of reporting attacks, and migration.

In Table 7, we provide tests of these competing accounts. In regressions of Certainty Premium, we sequentially interact FEAR both with Violence and candidate omitted variables including whether individuals feel that reporting a terror attack is important, whether they use the formal police or court system to resolve disputes and whether they were born in the neighborhood of the survey.\textsuperscript{35} The coefficient on the interaction between Violence and FEAR remains strongly significant and the magnitude is virtually unchanged, suggesting that the effect of FEAR is different according to exposure to violence and not according to these confounds.

To summarize, the tests to here remain consistent with the conclusion that violent exposure creates a triggerability in decision-making of traumatic recollections. The results are retained when relying on within-polling center variation, find support in placebo tests employing Failed Violence, and are robust to potential alternative stories relying on selective migration and settlement. In the following section, we address the issues of decision error, systematic attrition from decision tasks resulting from the prime, and show our results are robust to different definitions of Violence.

\textsuperscript{35}Note that one of these questions, whether reporting insurgent activity is important, appeared to be particularly sensitive as 98 of 816 subjects declined to answer. Unlike the other tables of results where the covariate list is complete, Table 7 omits the other social cohesion variables when estimating.
### Table 7: Social Cohesion and Selective Migration

<table>
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<th>Dependent Variable:</th>
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</thead>
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<td></td>
<td>(1)</td>
</tr>
<tr>
<td>FEAR (=1)</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
</tr>
<tr>
<td>Violence (=1)</td>
<td>-0.010</td>
</tr>
<tr>
<td></td>
<td>(0.015)</td>
</tr>
<tr>
<td>Fear x Violence</td>
<td>0.063***</td>
</tr>
<tr>
<td></td>
<td>(0.022)</td>
</tr>
<tr>
<td>Report. Ins. Act. Imp.</td>
<td>-0.008</td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
</tr>
<tr>
<td>Born Locally (=1)</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
</tr>
<tr>
<td>Fear x Report</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(0.021)</td>
</tr>
<tr>
<td>Fear x Police</td>
<td>-0.018</td>
</tr>
<tr>
<td></td>
<td>(0.029)</td>
</tr>
<tr>
<td>Fear x Court</td>
<td>-0.015</td>
</tr>
<tr>
<td></td>
<td>(0.031)</td>
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<tr>
<td>Fear x Local</td>
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<td>Constant</td>
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<td>(0.015)</td>
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<td>Covariates</td>
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</tr>
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<td># Observations</td>
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</tr>
<tr>
<td># Clusters</td>
<td>267</td>
</tr>
</tbody>
</table>

Notes: Estimates from interval regressions (Stewart, 1983). Robust standard errors clustered at the Polling Center level reported in parentheses. All regressions include province fixed effects. Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April 2002 - February 2010. Sample: 816 individuals with monotonic utility and no multiple switching. The difference \(v(150)_{c} - v(150)_{w}\) is the measured Certainty Premium. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, married (=1), age, and log(income).

### 3.3 Robustness Tests

This section addresses three additional concerns for the main results reported in Table 4. First, it may be that results hinge on this particular definition of Violence. We test the robustness of our results to measuring the intensity of violence, changing the catchment area halo from 0.5 km to 3 km, allowing violent episodes to be linked to multiple polling centers, and changing vintages of violence. Second, the recollection of violent trauma may be mentally taxing and so cause respondents to respond erratically to the price lists. Third, it may be that, because the
FEAR prime raises a sensitive and uncomfortable issue, more risk averse respondents select to discontinue participation, driving the result. We test each of these concerns in turn.

3.3.1 Definition of Violence

So far, we have measured violence as whether or not a military record of an attack exists over the period April 2002 to February 2010. To investigate the importance of violence intensity, we construct a normalized violence intensity measure as the number of local attacks divided by 56, which is the maximum number of attacks in any polling center in our sample. Table A1, Panel A repeats the estimations of Table 4 replacing the Violence dummy with our violence intensity measure. As in Table 4, for more severely exposed individuals fearful recollections increase Certainty Premia.

Table A1, Panel B separates violence by time period, April 2002 to September 2005, October 2005 to December 2007, and January 2008 to February 2010. Separating the data in this way provides evidence that the effect on Certainty Premium is coming primarily from recent violent exposure as opposed to older violence.

A final concern may be that our results depend on our decision to code Violence based on events within 1 kilometer of the nearest polling center. Table A2 examines additional ways of assigning violence to the polling center. In Panel A, we consider varying definitions of the catchment area to include events occurring within 0.5, 1, and 3 kilometer halos, respectively. The results remain robust across distance definitions. In unreported results, we find that the correlations break down once we expand the halo radius to 5 kilometers, a distance that could introduce substantial measurement error. In Panel B, we assign events to all polling centers within the catchment area, not simply the closest, and examine events occurring within 0.5, 1, and 3 kilometer halos, respectively. We find that at 0.5 km the results are robust to this multiple assignment. However, as the distance grows, significance is lost. Importantly for larger distances, there is little variation in the independent violence measure. For example in Column 6 of Panel B, 89.8 percent of the sample has Violence (3km) equal to one, potentially generating
3.3.2 Decision Error

Recalling a violent episode may be cognitively difficult and so drive respondents to systematically misunderstand the choice tasks used to elicit risk preferences. This problem may be particularly salient in Afghanistan, where literacy, especially for women, is among the lowest in the world. Above, we show that our respondents switch multiple times on a price list about as often as in Holt and Laury (2002), which provides basic indication that our respondents understand the task. We additionally discuss that responses with \( v(X)_U < 0 \) (i.e. non-monotonic utility) indicate miscomprehension. Columns 1 - 4 of Table A3 report results from regressions of an indicator variable equal to 1 for respondents switching multiple times in either choice Task 1 or 2 on FEAR and FEAR interacted with Violence. Columns 5 - 8 repeat Columns 1 - 4 replacing the dependent variable with an indicator variable equal to 1 for respondents exhibiting non-monotonic utility. We find no significant differences in decision error according to treatment status in any specification. However, with only about 10 percent of respondents exhibiting such errors, these tests may be underpowered.

3.3.3 Attrition

Of the 1,127 respondents who consented to questioning about risk, 144 (12.7 percent) did not complete the first task in the protocol and an additional 6 respondents failed to complete the second task. This poses a problem for our result if the attrition is systematically linked to the prime since we would be measuring different portions of the primed and unprimed sample. Table A4 demonstrates that attrition is not systematically linked to priming by regressing an indicator for attrition on FEAR, Violence, and their interaction.

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36 According to year 2000 estimates the CIA World Factbook, 43.1 percent of males, 12.6 percent of females, and 28.1 percent of the total population over 15 can read and write. An earlier survey in our sample of polling centers indicate that 30.3 percent of male respondents and 23.21 of female respondents are literate.
4 Discussion and Conclusion

Trauma has complex and strongly enduring mental, physical, and social consequences, especially among populations with direct exposure to violence. Clinicians have made remarkable progress on diagnostics, treatment, and analyzing comorbidity of trauma-related disorders. Findings suggest that trauma-exposed individuals can suffer severe economic consequences linked to psychiatric, psychosocial, and occupational impairments (Brunello et al., 2001). Understanding the mechanisms linking trauma to economic outcomes may improve policy interventions, allow for the development of economic diagnostics, and additionally provide deeper insights into individual decision-making.

We present data from a three-part study with 1,127 Afghan civilians combining artefactual and experimental techniques from both economics and psychology. First, we implement a two-task risk procedure, eliciting utility under both uncertainty and certainty. The procedure can identify risk preferences without functional form assumptions for utility; test competing decision theories including Expected Utility (EU), Cumulative Prospect Theory (CPT), Disappointment Aversion (DA) and $u$-$v$ preferences; and provide a measure of the specific preference for certainty inherent to non-EU models of decision-making. Second, we borrow priming methods established in psychology, randomly asking 1/3 of subjects to recall a fear or anxiety-inducing episode. Third, we measure exposure to violence in Afghanistan directly by linking experimental data to records of violent incidents recorded by the International Security Assistance Force (ISAF).

The combination of methods provides a series of interesting results. To begin, we document substantial differences between utility elicited under uncertainty and utility elicited under certainty. Individuals are systematically more risk averse under certainty, in contradiction to both EU and CPT. The data indicate a specific preference for certainty as in DA and $u$-$v$ preferences. This departure from EU compares with results obtained from a markedly different experimental sample—American college students. Interestingly, the preference for certainty, which we term a Certainty Premium, is exacerbated by recollection of fearful events. The nature of the results suggest that when everything is uncertain, fearful recollections increase risk tolerance, but that
when certainty is available it remains attractive, increasing measured Certainty Premia. When combining our administrative and experimental data, we find that violence without fear and fear without violence have limited effect on measured risk preferences. Taken together the results indicate that fearful recollections trigger changes in observed risk and certainty preferences for those exposed to violent trauma.

We note three implications of our results. First, an apparent inconsistency exists across prior psychological and economic techniques in obtained findings. Though no stylized fact has emerged, in artefactual field studies in economics, exposure to trauma appears to increase risk tolerance. In priming studies in psychology, however, fearful recollections of traumatic episodes appear to be linked to less risk tolerance. Though the questions asked differ, the dual finding that living through trauma increases risk tolerance, while recalling it decreases risk tolerance presents a potential inconsistency. Our findings may help to reconcile these contrasting findings. We find that the combination of traumatic exposure and fearful recollection increases risk tolerance under uncertainty and increases measured Certainty Premia. As prior work relies on single task procedures and widely varying methods the consistency of inducing both increased risk tolerance away from certainty and heightened certainty preferences could not arise.

Second, artefactual field studies carry with them the implication that individual risk preferences are potentially lastingly altered. Our work demonstrates the importance of both recency of violence and of recollections. Individuals with violent exposure may be changed for a substantial period of time, but what changes is not necessarily their risk preferences, but rather the susceptibility of their behavior to fearful recollections.

Third, if fearful recollections of traumatic episodes trigger a specific profile of behavior, then our results point to the actionability of recall mechanisms. Marketers, policy makers, and others interacting with trauma-affected individuals may be able to trigger specific behaviors. As our observed behavior indicates individuals being willing to pay incrementally more for certainty when triggered, one can imagine close analogs in financial decision-making such as insurance purchasing and portfolio choice. Trauma-affected individuals are known to have broadly worse
economic outcomes, and so future research should explore triggering mechanisms that may generate such phenomena and policy interventions that may reduce negative outcomes.
References


Brunello, Nicoletta, Johnathan R. T. Davidson, Martin Deahl, Ron C. Kessler, Julien Mendlewicz, Giorgio Racagni, Arieh Y. Shalev, and Joseph Zohar, “Post-
traumatic Stress Disorder: Diagnosis and Epidemiology, Comorbidity and Social Consequences, Biology and Treatment,” *Neuropsychobiology*, 2001, 43, 150–162.


A Appendix: Not For Publication

A.1 Task Translations
Figure A1: Dari Translations of Decision Tasks 1 and 2

### Panel A: Task 1

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<tr>
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<th>انتخاب 1</th>
<th>نمبر سوالات</th>
</tr>
</thead>
<tbody>
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<td>10% چانس بردن 0 افغانی (شماره 1 یا 2)</td>
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<td>80% چانس بردن 0 افغانی (شماره 1 یا 2)</td>
<td>8</td>
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<tr>
<td>90% چانس بردن 0 افغانی (شماره 1 یا 2)</td>
<td>90% چانس بردن 0 افغانی (شماره 1 یا 2)</td>
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<td>100% چانس بردن 0 افغانی (شماره 1 یا 2)</td>
<td>100% چانس بردن 0 افغانی (شماره 1 یا 2)</td>
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A.2 Additional Tables
### Table A1: Robustness - Intensity and Time Period of Violence

#### Panel A - Effects by Intensity of Violence

<table>
<thead>
<tr>
<th>Dependent Variable:</th>
<th>( v(150)_u )</th>
<th>( v(150)_c )</th>
<th>( v(150)_u - v(150)_c )</th>
<th>( (1) )</th>
<th>( (2) )</th>
<th>( (3) )</th>
<th>( (4) )</th>
<th>( (5) )</th>
<th>( (6) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEAR (=1)</td>
<td>-0.040**</td>
<td>-0.056***</td>
<td>-0.013</td>
<td>-0.018*</td>
<td>0.027***</td>
<td>0.037***</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(0.019)</td>
<td>(0.019)</td>
<td>(0.010)</td>
<td>(0.010)</td>
<td>(0.012)</td>
<td>(0.012)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violence Intensity (0-1)</td>
<td>0.094*</td>
<td>0.043</td>
<td>0.040</td>
<td>0.019</td>
<td>-0.054</td>
<td>-0.025</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>(0.056)</td>
<td>(0.058)</td>
<td>(0.033)</td>
<td>(0.033)</td>
<td>(0.039)</td>
<td>(0.036)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>FEAR x Violence Intens.</td>
<td>-0.448**</td>
<td>-0.447**</td>
<td>-0.188*</td>
<td>-0.205**</td>
<td>0.262***</td>
<td>0.247***</td>
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<tr>
<td></td>
<td>(0.190)</td>
<td>(0.189)</td>
<td>(0.105)</td>
<td>(0.101)</td>
<td>(0.094)</td>
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<tr>
<td>Constant</td>
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<td>0.065</td>
<td>0.622***</td>
<td>0.515***</td>
<td>0.368***</td>
<td>0.445***</td>
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<tr>
<td></td>
<td>(0.012)</td>
<td>(0.049)</td>
<td>(0.005)</td>
<td>(0.026)</td>
<td>(0.009)</td>
<td>(0.032)</td>
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<tr>
<td>Covariates</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td></td>
<td></td>
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</tr>
<tr>
<td># Observations</td>
<td>816</td>
<td>718</td>
<td>816</td>
<td>718</td>
<td>816</td>
<td>718</td>
<td></td>
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<tr>
<td># Clusters</td>
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<td>267</td>
<td>278</td>
<td>267</td>
<td>278</td>
<td>267</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-1283.412</td>
<td>-1103.342</td>
<td>-1299.113</td>
<td>-1122.255</td>
<td>-571.532</td>
<td>-466.268</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Panel B - Recent Violence and Old Violence

| FEAR (=1) | -0.026 | -0.044* | -0.010 | -0.010 | 0.015 | 0.027* |
|           | (0.023) | (0.024) | (0.012) | (0.012) | (0.015) | (0.015) |
| Violence (4/02 - 9/05) | -0.009 | -0.009  | -0.012 | -0.008 | -0.006 | -0.004 |
|           | (0.023) | (0.027) | (0.011) | (0.012) | (0.016) | (0.019) |
| FEAR x Violence (04/02 - 09/05) | -0.007 | 0.010 | 0.002 | 0.007 | 0.012 | 0.004 |
|           | (0.051) | (0.064) | (0.026) | (0.031) | (0.029) | (0.035) |
| Violence (10/05 - 12/07) | -0.003 | 0.007 | -0.005 | 0.011 | -0.001 | -0.007 |
|           | (0.019) | (0.021) | (0.009) | (0.012) | (0.014) | (0.015) |
| FEAR x Violence (10/05 - 12/07) | -0.026 | -0.030 | -0.017 | -0.050* | 0.005 | 0.004 |
|           | (0.041) | (0.044) | (0.021) | (0.028) | (0.024) | (0.026) |
| Violence (1/08 - 2/10) | 0.006 | -0.002 | 0.005 | 0.013 | -0.001 | 0.001 |
|           | (0.021) | (0.023) | (0.010) | (0.016) | (0.015) | (0.015) |
| FEAR x Violence (1/08 - 2/10) | -0.061* | -0.057 | -0.008 | -0.041 | 0.054** | 0.052** |
|           | (0.037) | (0.038) | (0.021) | (0.027) | (0.025) | (0.026) |
| Constant   | 0.261*** | 0.073 | 0.627*** | 0.517*** | 0.366*** | 0.445*** |
|           | (0.016) | (0.051) | (0.007) | (0.027) | (0.012) | (0.034) |
| Covariates | No    | Yes | No | Yes | No | Yes |
| # Observations | 816 | 718 | 816 | 718 | 816 | 718 |
| # Clusters | 278 | 267 | 278 | 267 | 278 | 267 |

**Notes:** Estimates from interval regressions (Stewart, 1983). Robust standard errors clustered at the Polling Center level reported in parentheses. All regressions include province fixed effects where noted. Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April 2002 - February 2010. Temporal violence measures are defined to be exclusive. Sample: 816 individuals with monotonic utility and no multiple switching. The difference \( v(150)_c - v(150)_u \) is the measured Certainty Premium. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, born locally (=1), reporting insurgent activity important (=1), prefer police resolve disputes (=1), prefer courts resolve disputes (=1), married (=1), age, and log(income).
### Table A2: Robustness - Redefining the Polling Catchment Radius

#### Panel A: Assigning Events To Only the Nearest Polling Center

*Dependent Variable:* \( v(150)_c - v(150)_u \)

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<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEAR (=1)</td>
<td>0.022</td>
<td>0.029**</td>
<td>0.004</td>
<td>0.015</td>
<td>0.013</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>(0.014)</td>
<td>(0.015)</td>
<td>(0.016)</td>
<td>(0.016)</td>
<td>(0.017)</td>
<td>(0.017)</td>
</tr>
<tr>
<td>Violence (0.5 km)</td>
<td>0.003</td>
<td>-0.001</td>
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<td>(0.013)</td>
<td>(0.014)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear Prime x Violence (0.5 km)</td>
<td>0.036</td>
<td>0.045**</td>
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</tr>
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<td>(0.022)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Violence (1 km)</td>
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<td>(0.014)</td>
<td>(0.015)</td>
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</tr>
<tr>
<td>Fear Prime x Violence (1 km)</td>
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<td>0.060***</td>
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<tr>
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<td>(0.021)</td>
<td>(0.022)</td>
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<tr>
<td>Violence (3 km)</td>
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<tr>
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<td></td>
<td>(0.014)</td>
<td>(0.015)</td>
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<td></td>
</tr>
<tr>
<td>Fear Prime x Violence (3 km)</td>
<td>0.038*</td>
<td>0.039*</td>
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<td></td>
<td>(0.022)</td>
<td>(0.022)</td>
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<tr>
<td>Constant</td>
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<td>0.442***</td>
<td>0.367***</td>
<td>0.444***</td>
<td>0.366***</td>
<td>0.448***</td>
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<td>(0.035)</td>
<td>(0.015)</td>
<td>(0.035)</td>
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<tr>
<td>Covariates</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td># Observations</td>
<td>816</td>
<td>718</td>
<td>816</td>
<td>718</td>
<td>816</td>
<td>718</td>
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<tr>
<td># Clusters</td>
<td>278</td>
<td>267</td>
<td>278</td>
<td>267</td>
<td>278</td>
<td>267</td>
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</table>

#### Panel B: Assigning Events To All Nearby Polling Centers

*Dependent Variable:* \( v(150)_c - v(150)_u \)

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<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
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</thead>
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<td>FEAR (=1)</td>
<td>0.015</td>
<td>0.023</td>
<td>0.017</td>
<td>0.023</td>
<td>0.009</td>
<td>0.084**</td>
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<td>(0.015)</td>
<td>(0.023)</td>
<td>(0.023)</td>
<td>(0.038)</td>
<td>(0.040)</td>
</tr>
<tr>
<td>Violence (0.5 km)</td>
<td>0.002</td>
<td>-0.004</td>
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<td>(0.014)</td>
<td>(0.015)</td>
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</tr>
<tr>
<td>Fear Prime x Violence (0.5 km)</td>
<td>0.041*</td>
<td>0.043*</td>
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<tr>
<td>Violence (1 km)</td>
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<td>(0.018)</td>
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<tr>
<td>Fear Prime x Violence (1 km)</td>
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<tr>
<td>Violence (3 km)</td>
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<td>Fear Prime x Violence (3 km)</td>
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<td>(0.041)</td>
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<tr>
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<td>0.440***</td>
<td>0.361***</td>
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<td>(0.034)</td>
<td>(0.018)</td>
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<tr>
<td>Covariates</td>
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<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td># Observations</td>
<td>816</td>
<td>718</td>
<td>816</td>
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<td># Clusters</td>
<td>278</td>
<td>267</td>
<td>278</td>
<td>267</td>
<td>278</td>
<td>267</td>
</tr>
<tr>
<td>Log-Likelihood</td>
<td>-570.469</td>
<td>-465.566</td>
<td>-568.666</td>
<td>-463.932</td>
<td>-571.116</td>
<td>-466.230</td>
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</table>

**Notes:** Robust standard errors clustered at the Polling Center level reported in parentheses. Regressions include province fixed effects. Estimates are from single interval regressions (Stewart, 1983). Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April - February 2010. Sample: 816 individuals with monotonic utility and no multiple switching. The difference \( v(150)_c - v(150)_u \) is the measured Certainty Premium. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, born locally (=1), reporting insurgent activity important (=1), prefer police resolve disputes (=1), prefer courts resolve disputes (=1), married (=1), age, and log(income).
Table A3: Robustness - Decision Error

<table>
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<tr>
<th>Dependent Variable:</th>
<th>Multiple Switcher (=1)</th>
<th>Non-monotonic Utility (=1)</th>
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<td>(1)</td>
<td>(2)</td>
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<td>FEAR (=1)</td>
<td>-0.022</td>
<td>(0.021)</td>
</tr>
<tr>
<td>Violence (=1)</td>
<td>-0.037</td>
<td>(0.026)</td>
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<tr>
<td>Fear x Violence</td>
<td>-0.033</td>
<td>(0.042)</td>
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<td>Constant</td>
<td>0.134***</td>
<td>(0.013)</td>
</tr>
<tr>
<td>Covariates</td>
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<td></td>
</tr>
<tr>
<td>Fixed Effects</td>
<td>No</td>
<td>No</td>
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<tr>
<td># Observations</td>
<td>977</td>
<td></td>
</tr>
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<td># Clusters</td>
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</tr>
<tr>
<td>R-Squared</td>
<td>0.001</td>
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</tbody>
</table>

Notes: Estimates from OLS regressions. Robust standard errors clustered at the polling center level reported in parentheses. Polling center or province fixed effects noted. Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April 2002-February 2010. Sample: 977 individuals who completed the experimental tasks. Columns 4 and 8 omit Violence (=1) as it is measured at the PC level. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, born locally (=1), reporting insurgent activity important (=1), prefer police resolve disputes (=1), prefer courts resolve disputes (=1), married (=1), age, and log(income).

Table A4: Robustness - Attrition from Decision Tasks

<table>
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<th>Dependent Variable:</th>
<th>Failed to Complete Choice Task 1 or Choice Task 2 (=1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
</tr>
<tr>
<td>FEAR (=1)</td>
<td>0.011</td>
</tr>
<tr>
<td>Violence (=1)</td>
<td>-0.003</td>
</tr>
<tr>
<td>Fear x Violence</td>
<td>-0.020</td>
</tr>
<tr>
<td>Constant</td>
<td>0.130***</td>
</tr>
<tr>
<td>Covariates</td>
<td>No</td>
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<tr>
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</tr>
<tr>
<td># Observations</td>
<td>1127</td>
</tr>
<tr>
<td># Clusters</td>
<td>287</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Notes: Estimates from OLS regressions. Robust standard errors clustered at the polling center level reported in parentheses. Polling center or province fixed effects noted. Violence data are from ISAF CIDNE. Violence is defined as a violent event occurring within one kilometer of interview location over the period April 2002-February 2010. Sample: 1127 who consented to participate. Individuals with positive v(150) and no multiple switching. v(150)C Column 5 omits Violence (=1) as it is measured at the PC level. The covariates are pre-prime risk (0 - 10), female (=1), shia (=1), years of education, born locally (=1), reporting insurgent activity important (=1), prefer police resolve disputes (=1), prefer courts resolve disputes (=1), married (=1), age, and log(income).
A.3 Robustness Questions

1. How willing are you to take risks regarding your households finances? Please tick a box on the scale, where the value 0 means: “unwilling to take risks” and the value 10 means: ”fully prepared to take risks.”

2. In your opinion, how important is it for you to share information about insurgents to ISAF (for example, pending IED attacks or the location of weapons caches): is it very important, somewhat important, or not at all important? 1. Very important 2. Somewhat important 3. Not at all important 98. Don’t know 99. RTA

3. If you had a dispute with a neighbor, who would you trust to settle it (randomize ordering): head of family, police, courts, religious leaders, shura, elders, ISAF, or other?
   1. Head of family
   2. Police
   3. Courts
   4. Religious leaders
   5. Shura
   6. Elders
   7. ISAF
   8. Other (record verbatim)
   98. Don’t know
   99. RTA

4. Were you born in this village, or did you move here from somewhere else?
   1. Born here
   2. Moved
   3. Don’t know
   99. RTA

A.4 Screen and Instructions

THE FOLLOWING QUESTIONS SHOULD ONLY APPEAR FOR THE FOLLOWING PROVINCES: BAKAHSHAN, BALKH, BAMYAN, DAIKONDI, FARYAB, HERAT, JUJZIAN, KABUL, KAPISA, PANJSHER, PARWAN, SAMANGAN

D1. We are interested in understanding how Afghans make decisions involving uncertain outcomes and some normal risks that people face every day. We would like to ask you some hypothetical questions that will help us understand these decisions. There is no real money involved and you will not receive any money for answering these questions. Are you willing to answer these questions?
   1. Yes (Proceed with survey))
   2. No (Conclude Survey)
65a: “We are interested in understanding your daily experiences that may make you fearful or anxious. This could be anything, for example getting sick, experiencing violence, losing a job, etc. Could you describe one event in the past year that caused you fear or anxiety?”

65b: “We are interested in understanding your daily experiences that make you happy or joyous. This could be anything, for example birth of child, marriage of a relative, or success in your job. Could you describe an event in the past year that caused you happiness?”

65c “We are interested in understanding your general daily experiences. This could be anything. Could you describe an event from the past year.

[Show Card] First we will ask you a hypothetical question over an amount for certain, or an amount that will be awarded depending on which of ten numbers you draw from a bag. We have deposited 10 cards numbered 1 through 10 into a bag. You have an even chance of drawing any of the 10 numbers. The numbers in parentheses indicate the winning number. For each Option No., please indicate whether you would prefer Choice 1 or Choice 2. For each Option No. there will be 10 numbers in the bag and you are only able to draw one. This is not for real money and we are not asking you to make a gamble, we just want to understand how you would respond to naturally occurring risk.