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The Cost of Fear: The Welfare Effects of the Risk of Violence in Northern Uganda*

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HiCN Working Paper 109

October 2011

Abstract: The micro-conflict literature focuses almost exclusively on direct exposure to violence and post-conflict outcomes. By focusing only on directly exposed households, the literature ignores the effects of risk on households in surrounding areas. This paper presents the first estimates of the economic costs of the risk of violence separate from the costs of the actual experience of violence, and finds that it is a significant mechanism by which conflict influences development. Using representative community and household data from Northern Uganda, I estimate measures of objective and subjective risk using geo-spatial variation in the distribution of violence over time. On average, the risk of violence lowers per capita household expenditure by 2 to 6 percent. Even within households that are attacked, risk alone accounts for a significant share, between 17 and 38 percent, of their losses. On aggregate, half of conflict-related losses are due to risk as opposed to direct exposure to violence, with much of these risk-related losses in households that are not directly attacked. Compounding these losses over the duration of the conflict, the risk of violence has reduced per capita expenditure in the affected region by roughly 70 percent and national GDP by 4.6 to 8.2 percent. Lastly, I find that food aid reduces risk-related losses by 17 to 30 percent.

Keywords: Welfare and Poverty, Economic Development, Conflict, Risk

JEL codes: I3, O10, D74, D81

* The author thanks Pius Bigirimana, the Office of the Permanent Secretary to the Prime Minister of Uganda, and the Ugandan Bureau of Statistics for generously making the Northern Uganda Survey data available. Chris Barrett has provided guidance and advice throughout the project. Jim Berry, Brian Dillon, George Jakubson, Daniel Lumonya, Jordan Matsudaira, Kevin Morrison, James Muwonge, Christophe Rockmore, Russell Toth, and seminar participants at Binghamton University and Cornell University have all provided useful comments. Any remaining errors are solely attributable to the author. The research was partially funded by a travel grant from the Mario Einaudi Center.
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I. Introduction

The 2011 World Development Report notes that one in four individuals live in fragile and conflict-affected countries, or in countries with very high levels of violence. Moreover, not a single Millennium Development Goal (MDG) has been achieved by a low income fragile or conflict-affected country (World Bank 2011). Despite the wide ranging influence of conflict and its importance to country and individual-level outcomes, economists have a very limited empirical understanding of the effects of conflict, especially at the household level. The existing literature examines aggregate national measures of the economy or focuses on post-conflict outcomes; the behavior of households during conflict remains almost unstudied. In particular, since the majority of people in conflict and violence-prone countries do not experience violence directly, the near-exclusive focus of the literature on the experience of violence[3] ignores losses due to the persistent insecurity and uncertainty.

The potential importance of conflict-related risk is underlined by an extensive literature that finds that other types of risk significantly affect both household behavior and welfare in a variety of settings, accounting for up to 30 percent of household expenditure (Rosenzweig and Binswanger 1993). Due to its magnitude and its covariate[4] nature, the risk of violence can have particularly large effects on household behavior and outcomes. Since covariate shocks reduce the effectiveness of informal insurance networks and *ex post* coping strategies, households are forced to rely further on *ex ante* risk mitigation strategies such as forgoing opportunities, delaying investments and diversifying livelihoods. Consequently, large covariate shocks should result in greater changes in *ex ante* household behavior than large idiosyncratic shocks.

This paper provides the first estimates of the effects of the risk of violence during conflict using representative data from Northern Uganda. Empirically, this builds on a broader literature on household *ex ante* risk mitigation. Within the conflict literature, it extends the handful of papers that examine the effects of violence on investment choices and the composition of assets.

[3] Throughout the paper, the experience of violence refers to first-hand exposure to attacks. Being present at an attack without being directly attacked is not considered as "experiencing violence" in this paper.
[4] Covariate shocks are shocks that are correlated across households, such as drought. In contrast, idiosyncratic shocks, such as illness, affect individual households or persons.

Moreover, while the conflict literature conflates the effects of the risk and realization of violence, this paper disentangles these by explicitly modeling risk. Additionally, I present the first evidence of within-country spillovers of conflict-related losses onto households that are not directly exposed to violence. Lastly, this research adds to the literature on food aid by providing rough estimates on the effectiveness of food aid in mitigating conflict-related economic losses among households in Northern Uganda.

I use a two-stage model to decompose the effects of conflict into the risk and realization of violence. The first stage estimates community-level objective and subjective risk using historical geo-spatial variation in violence. I present qualitative and quantitative evidence suggesting that exposure to violence within communities is largely homogenous and independent of household attributes. I then use the estimates of community level risk to estimate the separate welfare effects of the risk and realization of violence after controlling for a variety of household and community characteristics. I find that the risk of violence reduces per capita household expenditure by 2 to 6 percent on average. Although the experience of violence has a larger negative effect than its risk at the individual, at the aggregate level, risk accounts for at least as much of the conflict related losses. This is due to the large risk related losses in households that do not experience violence directly. I also present evidence suggesting that food aid is only partially effective at reducing these losses.

The remainder of the paper is structured as follows. Section II briefly considers how conflict-related risk can affect household behavior. Section III discusses the heterogeneity in the risk of experiencing violence and reviews the relevant economics literature. Section IV briefly highlights the history of conflict in Northern Uganda before section V presents the empirical strategy. Sections VI and VII discuss the underlying data and the estimation results, respectively. Section VIII concludes and discusses policy implications.

II. Risk, Shocks, and Conflict

The literature on choice under uncertainty provides a framework for understanding the role of risk in household decisions. This literature views households as living in uncertain environments

where choices regarding asset and activity portfolios are made before the uncertainty regarding future shocks is resolved. Households make decisions at two discrete points in time. First, households make choices before knowing which, if any, shocks will occur. *Ex ante* strategies, such as diversifying crops or delaying planting, are used to manage the risk[5], that is, to reduce the probability of the shock or the magnitude of its effects. A second choice takes place after any shocks have occurred, whether positive or negative. At this time, households use *ex post* risk coping strategies (e.g., selling assets) to smooth incomes (Deaton 1992, Dercon 2002, or Townsend 1994).

Conflicts can affect both *ex ante* and *ex post* decisions. For instance, assets that support peacetime livelihoods may become liabilities during conflicts (Lautze and Raven-Roberts 2007). Certain assets, such as livestock, are not only more likely to be looted, but they may also increase the risk of being attacked, especially if they are difficult to conceal. The composition of crops is also likely to change as crops whose harvest may be delayed at low cost, such as cassava, may be particularly advantageous in conflict zones. In contrast, perishable crops, such as fruits or vegetables, often need to be harvested within a short period of time. If households are forced to choose between venturing to exposed fields to harvest and remaining in the relative safety of their village, they may choose to not cultivate such crops in the face of the risk of violence. More broadly, conflict-related risk should lead households to avoid otherwise profitable activities with sunk costs, or assets that cannot be easily hidden, transported or liquidated (Dercon 2008). This suggests that as perceived risk increases, income and consumption should decrease below their risk-free optimal levels. In certain cases, households might consume more in order to prevent looting although this strategy is unlikely in the poorest households, who save little.

Conflict also reduces the effectiveness of *ex post* risk coping strategies thereby increasing the importance of *ex ante* risk mitigation. Markets for asset sales[6] or for labor may no longer function well, while migration may become restricted. Similarly, both community and informal insurance networks may weaken due to the death or migration of members, or the increase in

[5] Risk refers to the possibility that a particular shock may occur.
[6] Verpooten (2009) reports that cattle prices in Rwanda decreased by 50 percent during the genocide. This may be caused by the widespread sale of cattle as well as by the difficulty in protecting livestock during times of conflict.

shocks experienced by network members due to the conflict (Verpoorten and Berlage 2007). Additionally, the risk associated with travel, even over short distances, may also weaken ties between members.

III. The Empirical Conflict Literature

Although the effects of conflict have been examined at both the micro and macro levels, conflict risk has never been explicitly considered. For aggregate studies, the effects of conflict are typically measured using changes in GDP and therefore reflect the risk and experience of violence as well as conflict-induced changes in trade, exchange rates and foreign direct investment. Consequently, it is difficult to understand how estimates of 1.25 to 2.2% lower per capita GDP each year of conflict translate to the micro-level (Collier 1999; Imai and Weinstein 2000; Hoeffler and Reynal-Querol 2003). In particular, these studies are unable to study the distributional effects of conflict on welfare.

At the household level, the absence of measures of conflict risk leads studies to overestimates of the direct effect of violence. Since households that experience violence also suffer from its risk, the effect of *ex ante* risk management is included in the estimates of the effects of exposure to violence. At the same time, despite overestimating the effect of the experience of violence, the overall impact of violence is underestimated. Since losses are only measured in households or regions that experience violence, these studies leave out the effects of risk of violence in those households that do not experience violence. Lastly, these studies typically focus on post-conflict outcomes and find important consequences from conflict. However, they are unable to separate the mechanisms. What are the relative contributions of the violence, the *ex ante* risk mitigation or the *ex post* coping mechanisms?

To the best of my knowledge, there are no papers that formally test for the effects of conflict risk separate from the direct experience of violence; however, many results are consistent with households sacrificing returns in response to this risk. Examining rural agriculture during the conflict in Burundi, Bundervoet (2007) finds a shift from maize towards cassava production that he interprets as household increasing the share of low-risk low-return crops in their portfolio.

McKay and Loveridge (2005) find similar results looking at changes in the composition of production in Rwanda pre- and post- genocide (1990 and 2000). Although they do not control for violence, they also find that households shifted away from "risky" cash crops such as coffee and beer bananas towards "safer" crops such as cassava and Irish potatoes.

A related literature examines peace dividends by looking at the effect of violence on housing prices (Besley and Mueller 2011; Collins and Margo 2007), and stock prices (Abadie and Gardeazabal 2003; Guidolin and La Ferrara 2007; Zussman and Zussman 2008; Zussman, Zussman, and Nielsen). These studies find strong effects of peace on prices, especially as it becomes credible, or surrounding key events such as assassinations. While these studies do not explicitly model the effects of the risk of violence, as a group, they suggest strong financial responses to conflict risk.

Since violence is typically not random, regions or households face different risks of exposure. Conceptually, violence can be thought of as occurring on two separate but related levels: geographic and within area. The former "placement effect" encompasses the reasons that determine which areas experience violence (see Jacoby 2000 for discussion of placement effects). In the context of conflict, the characteristics of an area, such as the physical geography or its ethnic homogeneity, may influence both its likelihood of being attacked as well as the observed outcomes. The second effect is the within community heterogeneity as even within a community that is attacked, households may face very different risks of experiencing violence. For instance, in ethnic or religious conflicts, such as genocide in Rwanda or inter-communal violence in India, this risk may vary greatly among households within a community and will therefore result in different household responses.

To address the location of violence, the micro-conflict literature has relied on geographical variables such the distance to the capital or the altitude (Voors *et al.* 2010), or the distance to a neighboring country (Akresh and de Walque 2008). While these effectively address the placement of the violence, they do not address any potential within-community heterogeneity. Consequently, this approach only fully explains the likelihood of exposure to violence if the household or individual risk of violence, conditional on the community being attacked, is largely homogenous or random.

The handful of empirical studies that examine household livelihood portfolios or investment decisions during conflict typically do not fully address this issue. For instance, Singh (2010) and Deininger (2003) only use community (or more aggregate) indicators of violence and do not control for either any placement effects or individual heterogeneity in the risk of exposure to violence. Grun (2008) examines asset holdings in rural Colombia. She finds that households reduce investment and shift from fixed to mobile assets in response to violence. Grun's on observable characteristics to control for the selection of households to experience violence. It is not clear that this is successful, since household responses may be directly affected by violence in unobserved ways, such as by changing risk preferences (Voors *et al.* 2010). Moreover, exposure at the individual level is assumed to be orthogonal to asset holdings and composition.

Nillesen and Verwimp's (2010) study of crop choice in post-conflict Burundi is a notable exception in the literature, since it demonstrates that community level violence is uncorrelated with village level characteristics and prewar population density. With respect to within community variation, they argue that although Hutu ethnicity is positively correlated with being personally attacked, Hutu ethnicity is unlikely to be correlated with crop portfolio or investment choices.[7]

IV. Conflict in Northern Uganda

Although conflict in Northern Uganda pre-dates the emergence of the Lord's Resistance Army (LRA) in 1986, the rise of the LRA from the remnants of Alice Lakwena's short lived rebellion began a near-continuous cycle of violence in Northern Uganda. Initially, the LRA sought to capitalize on the tensions between the North and the newly installed government in the center of the country, and claimed to represent the interests of the Acholi, one of the main Northern ethnic groups. The inability of the LRA to obtain support from the local population quickly led to the

[7] They note that once coffee trees were planted, farmers were forbidden to rip them out regardless of price variation. Additionally, they note that armed groups often destroyed or looted trees. Insofar as Hutus and Tutsis perceived different possibilities to sell their crop or to receive protection from local police, they may have differential experiences with cash crops. This is particularly important since the genocide in Burundi occurred along these ethnic lines.

LRA targeting the local population for supplies and recruits. Throughout this period, attacks are fairly widespread. Representative data finds that 16, 25 and 25 percent of Northern communities suffered attacks by the LRA in 1992, 1999 and 2004 respectively (Ssewanyana *et al.* 2007).

Unlike many other insurgencies, the LRA typically did not seek to engage government forces, preferring instead to target the local population especially for forced recruitment through abductions. Youths were typically permanently abducted and forced into the LRA, while older individuals were often used as temporary porters or as guides. The length of the conflict and the absence of reliable data complicate estimates of the level of abductions, however, they are believed to range from 20,000 to 80,000 (Lomo and Hovil 2004, Pham *et al.* 2007, and Blattman and Annan 2010).

The prolonged violence resulted in several types of migration. Wealthier household were able to flee towards urban areas. Poorer groups tended to move to internally displaced persons (IDP) camps located within Northern Uganda (Fiala 2009). Additionally, since the LRA often attacked at night, a large number of children commuted nightly to the relative safety of urban areas or to the centers of IDP camps. At its peak, there were an estimated 30,000 "night commuters" (Amnesty International 2005).

Beginning in 2002, the government displaced large numbers of individuals, primarily from conflict prone areas, to IDP camps. Between voluntary and involuntary movements, certain districts virtually emptied. For instance, by 2004, approximately 90 percent of the original populations of Gulu and Kitgum districts were no longer in their original districts (Pham *et al.*, 2005). Although the reasons for the government's choices of particular districts are not known, it is reasonable to assume that these areas were among the areas with the highest risk of future attacks. Consequently, *ex ante* losses from the risk of conflict may be underestimated as the individuals in the high risk communities were moved to lower risk communities.

V. Empirical Strategy

Building on the earlier discussion, the effects of conflict on household welfare can be thought of as being composed of two parts: the responses to risk (*Risk*: *ex ante* risk mitigation), and the effects of the shock including household responses (*Experience*: losses from both the exposure and the *ex post* risk coping).

Formally, this can be estimated using the following equation:

$$(1)\ Welfare_{ij} = a + b_1 Risk_{ij} + b_2 Experience_{ij} + b_3 X_{ij} + e_{ij}$$

where the subscripts refer to community *i* and household *j*. *X* reflects the other observed factors that influence welfare. While the questionnaire contains questions regarding the exposure of communities and households to violence, there is only limited information regarding risk. Consequently, I estimate the risk levels.

Two different types of risk can be estimated: objective and subjective risk. The former refers to the observed likelihood of a particular shock occurring. In this paper, this is based on the (limited) observed distribution of attacks within the data. The latter is the *a priori* belief that a specific shock will occur. In general, the two types of risk may differ for a variety of reasons including incomplete information or behavioral biases such as the proximity or vividness of events. In general, households make decisions based on their beliefs of future shocks. Consequently, subjective risk should have a stronger effect on household behavior.

The estimation of risk relies on the assumption that, in the context of Northern Uganda, while the risk of violence is heterogeneous at the community level, it is largely homogenous within communities. This assumption is supported by a variety of qualitative and quantitative evidence.

Although the LRA operated throughout Northern Uganda, it primarily operated in the Acholi districts. While the tactics and motivations of the LRA are unclear, there are several plausible explanations for this targeting such the substantial linguistic differences throughout Northern Uganda. Since the original LRA members primarily came from the Acholi districts, it was easier

for the LRA to operate in these areas and to communicate with abducted individuals from these districts. Moreover, although the main bases for the LRA were in Southern Sudan, they had a number of smaller bases in the area including in Pader district (Fiala 2009). Over time, especially after 2002, LRA attacks became more frequent in other parts of the country (Ssewanyana *et al.* 2007). This is partially the result of the forced displacement of districts by the government, thereby depriving the LRA of potential targets for supplies and abductees and forcing them to follow the migration.

In contrast to the "placement" of attacks, within community risk was largely homogenous as the evidence suggests that attacks and abductions were random within the same village, or at least uncorrelated with individual observed and unobserved characteristics. Interviews of former LRA officers indicate that the LRA would attack any households encountered and abduct all able-bodied civilians (Blattman and Annan 2010). Once a village or homestead was attacked, the LRA's "strategy was to abduct first and sort out later" (Blattman and Annan, 2010: p. 8-9).

This is supported by Blattman and Annan's (2010) quantitative analysis of youth abductions using a pre-abduction representative data set for one of the most affected districts in Northern Uganda.[8] They find no statistically significant differences in the mean of pre-war characteristics that predict abductions in other conflicts, such as pre-war wealth or parental characteristics. The only exceptions were the year of birth and the size of the household. The former reflects the preference of the LRA for youths between the ages of 10 and 24 as forcible recruits; younger children were less useful while older youth were perceived as being difficult to indoctrinate. The significance of the size of household is driven by the sub-sample of household with 25 or more members. This is not only a rare occurrence in their data but also overall in Northern Uganda; less 1 percent of households, rural or urban, have 15 or more members. In rural areas, this represents roughly 0.5% of the sample. Blattman and Annan's (2010) findings suggest that

[8] The Blattman and Annan study is particular unique since in most data, including the one used for this research, it is not possible to empirically verify the exogeneity of attacks. Any post-attack variables are potentially endogeneous to the violence. Additionally, since certain households or individuals may disappear from the data, the post-attack population is not representative of the pre-attack population. Consequently, any analysis requires both a pre-attack representative sample and pre-attack characteristics.

variation of individual and household characteristics within village did not affect the likelihood of being abducted.

Since the evidence supports the assumption that within community conflict risk is largely homogenous, risk is estimated at the community level using the following logistic regression:

(2) $Indicator_i = f(A + BZ_i + E_i)$

where the dependent variable, *Indicator*, is measured at the community level. For objective risk, *Indicator* is a binary variable for whether or not community *i* was attacked in 2004. In this case, the predicted value (or fitted value) from equation (2) is the estimated probability of the community experiencing an attack in 2004. For subjective risk, the dependent variable is a binary variable for whether any section of the community found it hard to cultivate their land in 2004 because of insecurity. The predicted value represents the probability that the community would report being insecure in 2004 and therefore represents subjective risk. The risk levels are predicted using the distance of community i from LRA attacks in previous year as explanatory variable, *Z*.

As previously mentioned, the work of Blattman and Annan (2010) directly implies that objective risk is homogenous within communities; subjective risk, however, may be less homogenous than objective risk. In the context of Northern Uganda, however, this is less of concern. As previously noted, attacks by the LRA were indiscriminate. Consequently, conditional on an area being attacked, everyone was liable to be a victim. The widespread attacks and abductions in the area – close to 40 percent of males and 20 percent of females aged between 14 and 30 were abducted in the most affected areas – implies that the indiscriminate strategies of the LRA were widely known (Beber and Blattman 2010).

In the second stage, I control for many of the major potential remaining sources of within community variation for subjective risk. For instance, this may vary based on the household demographic structure. Households with younger members might be at greater risk of suffering a

prolonged abduction or might have members working in multiple locations or attending school thereby increasing the risk of abduction.

Similarly, the gender of the head of the household might influence perceptions of risk as the experience of abductees often varied based on their gender. Males often were indoctrinated and turned into fighters. Others primarily carried loads or performed domestic duties in the camps. Although some females also became fighters, they frequently were used as sex slaves or as cooks within the camps. Moreover, since these camps were located in Southern Sudan, it was typically more difficult for females to escape due to the added distance from their homes and the fewer opportunities to slip away in camps.

After controlling for the age profile of the household members and the gender of the head of the household, the fitted values for subjective risk are arguably also largely homogenous within communities. Consequently, despite being measured at the community level, the fitted values from equation (2) are treated as measures of individual risk for the remainder of the paper.

In the second stage of the estimation, the predicted risk values from equation (2) are inserted into equation (1) resulting in equation (3):

$$(3)\ Welfare_{ij} = a + b_1\widehat{Risk}_i + b_2 Experience_{ij} + b_3 X_{ij} + e_{ij}$$

Welfare is measured as the log of per capita household expenditure for household j in community i. While household welfare can be measured using different measures, per capita consumption is arguably highly correlated with many of the alternative choices and directly linked to poverty measures. $\widehat{\text{Risk}}_i$ is a vector containing the fitted risk value and its square from the first stage (equation (2)). This choice reflects the intuition that there is a natural limit to the amount that households can decrease their expenditure. Initially, households are able to adopt a variety of strategies to reduce *ex ante* risk but that also reduce income (and expenditures). As risk increases, their ability to further adapt is limited both by the availability of strategies and by the

expenditure required to survive. Due to the high correlation between measures of objective and subjective risk, equation (3) is estimated separately for each type of risk.

The vector also includes an interaction term between female head of household and the fitted value of risk. This reflects both the specific context in the Northern Uganda as well the literature. As previously noted, the very different consequences of abduction faced by women suggest that they might be more affected by the risk of violence. There are, however, also reasons to believe that women might be relatively less affected by this risk. In contrast to men, women in Northern Uganda often remained within their villages or homesteads. Men traveled more extensively potentially giving them access to more information about neighboring attacks.[9] The broader risk literature has also examined gender difference in response to risk although no consensus has emerged (Doss *et al.* 2008).

The *Experience* vector measures the experience of violence in community i and household j. These variables are separated based on the level of aggregation (community or household). Community and household experiences of violence may differ for a variety of reasons including migration, the spatial distribution of household or even the nature of raid. Additionally, whereas community level raids may affect the broader economy and public goods, household attacks may lead to the destruction or theft of personal assets, the abduction or death of household members or psychological trauma.

The experiences are divided based on the time elapsed since the shock. In particular, binary variables are included for whether community i and household j have experienced an attack from rebels since 1992. A binary variable for whether community i was attacked by rebels in 2004 is included. The survey did not contain a similar question for households. There are questions regarding abductions in 2004 as well as abductions since 1992 which are included in the control vector, X_{ij}.

[9] This difference was apparent in qualitative work by the author after the end of conflict. Whereas men had knowledge of abductions in the surrounding area, women often only knew the history of the village. In the extreme case, a woman did not know of the abductions in a village located less than 10 minutes away by foot.

Equation (3) therefore separates the effect of *ex ante* risk exposure ($\widehat{Risk}$) from the experience of being attacked (*Experience*). When objective risk is used, equation (3) contains both the dependent variable and the fitted value for equation (2). Mechanically, the predicted value of risk used in equation (3) represents the part of the experience that is correlated with the proxies used in equation (2). Therefore, although the experience variable and the fitted values are highly correlated, they have distinct interpretations. The former reflects the effect of risk on expenditure while controlling for the experience of households and communities. Similarly, the latter reflects the effect of the experience of violence after controlling for risk.

The control vector, X_{ij}, contains a variety of household and community-level controls. The controls for the demographic structure of the household reflect both the differences in productivity and required consumption levels of different age groups but also their varying risk for abduction. As noted earlier, the LRA systematically targeted youth between the ages of 10 and 24. Consequently, households with members in this age group might experience greater (perceived) risk. Depending on specification, it also includes measures of productive household assets.

The data allow me to largely control for migration within rural communities or IDP camps in Northern Uganda. In particular, the migration of individual members is controlled for using a variable for the number of absent working age household members (14-60). I also control for the motivation for any migration by including binary variables for migration due to insecurity by the head of the household in 2004 or ever. While there is no data on forced migration, this is likely included in the category for migration due to insecurity.

It is not possible to link migrants with their former communities. Consequently, the variables regarding their community's experience with violence relate to their current community. Therefore, certain households may have experienced an attack in 2004 but currently reside in a community that has not currently experienced an attack. This is part of the variation that allows for the separate estimation of household and community experiences of violence.

Households that either migrated to urban areas in Northern Uganda or left Northern Uganda are not included in the sample. The sample therefore only represents non-urban rural households (including IDP households) in 2004. Since the conflict has been ongoing since 1986, it is likely that most households that could leave Northern Uganda (or even move to cities) would have left before 2004

VI. Data

The household and community data are drawn from the Northern Uganda Survey (NUS) that was administered by the Uganda Bureau of Statistics in 2004. The NUS data are one of the largest, if not the largest, representative datasets of any country during a conflict. Large surveys administered during conflicts typically omit the most dangerous areas.[10] As a result, arguably the most relevant households for studies on the effects of conflict are not included. In contrast, the NUS contains representative data for 386 geo-referenced rural communities and 3,867 households.

Since the empirical strategy relies on the community geographical coordinates, the data are restricted to the communities (and associated households) for which these data are available and correct[11]. Additionally, households without any consumption of food or which had abnormally high holdings of land (>200 acres as compared to mean holdings of 3.7 acres with a standard deviation of 5.4) are not included. The remaining analysis is based on 353 communities and 3,509 households for which data were available.[12]

The NUS data are supplemented with data from the Armed Conflict Location and Event Data (ACLED) for Uganda (Raleigh and Hegre 2005). The NUS data only include data on community

[10] For instance, despite being a nationally representative survey, the 1999/2000 Uganda National Household Survey used by Deininger (2001) omitted several conflict areas. This is based on personal correspondence with the Ugandan Bureau of Statistics.

[11] For 33 communities, the recorded coordinates fall outside of the boundaries of Uganda and therefore these communities have been dropped. Since this is based solely on the recorded coordinates, there is no reason to believe that any systematic differences exist in these observations.

[12] The variables for the distance to the nearest attack are an exception. These were created using all the data – rural or urban – for which correct geographical coordinates were available.

level attacks in 1992, 1999 and 2004. By providing additional geo-referenced data for the location of LRA attacks from 1997 until 2003, ACLED allow both for a larger set of instruments and a more accurate "map" of violence. Additionally, insofar as the behavior of households changes based on their distance from violence, ACLED should result in more precise estimates of the effects of the risk of violence. The ACLED data are drawn from a variety of sources including press accounts, books, and humanitarian worker accounts. The data are disaggregated by event type, year, participants, and geographical coordinates. This paper only uses the events that are violent, include the LRA, and occurred in 2003 or earlier. Additionally, since the precision of the geographical coordinates varies, I only include those that are precise to the village or sub-region location and exclude those which are only recorded at the regional level.

Table 1 reports the weighted descriptive statistics for the variables used in the estimation of equation (2). LRA attack in 2004 is a binary variable for whether or not community i was attacked by rebels in 2004. Insecurity is a binary variable for whether "any section of the community found it difficult to cultivate their land in 2004 because of insecurity." This measures the perceived risk of violence within the community.

The instruments used in equation (2) are drawn from the NUS and the ACLED datasets. These measure the distance (in arc degrees) from community i to the nearest attacked community (excluding community i). For the NUS data, these are created for the rebel attacks in 2004, 1999 and 1992. The ACLED data represent the distance (in arc degrees) from community i to the nearest LRA attack in each year from 1997 to 2003. Objective and subjective risk are the fitted values for the estimation of equation (2) using the binary variables for whether community experience of violence and perceived insecurity, respectively, as dependent variables.

As can be seen in table 1, close to one third of the survey communities were attacked in 2004. A similar number of communities reported being insecure. On average, communities were relatively close to attacks by the LRA as the average distance varied between 0.20 and 0.90 decimal degrees (approximately 22 and 100 kilometers, respectively). For the closest communities, this was as low as approximately 3.6 kilometers.

Table 2 reports the weighted descriptive statistics for the variables used in the estimation of equation (3). Expenditures are measured as the natural log of per capita annual total household expenditure, defined as the sum of food expenditures (purchased, home production, and free), non-durable goods and frequently purchased services (including rent), semi-durable and durable goods and services, and non-consumption expenditures (such as remittances and taxes). Although food aid is not directly measured, free food is used as proxy. The recall periods vary across the components of expenditure from the past week for food to the past year for semi-durables and durable goods and services as well as for non-consumption expenditures. The aggregate expenditure annualizes components and assumes that behavior over the recall period is representative for the entire year. Livestock holding are aggregated into Tropical Livestock Units[13] (TLU). Household members are defined as all household members who have lived in the house 6 months or more during the past 12 months. This also includes those who have come to stay in the household permanently even if they have lived in the household less than 12 months. Households[14] are relatively small, with only 5 members.

Household members are defined as all household members who have lived in the house 6 months or more during the past 12 months. This also includes those who have come to stay in the household permanently even if they have lived in the household less than 12 months. Regular members are defined by NUS as “close relatives and would have been usual members of the household but have been away more than six months during the last 12 months”. Regular members are not included in the household for the purposes of calculating per capita expenditure. On average, households were relatively small with only 5 members on average.

VII. Results

[13] Tropical livestock units are aggregated as follows: head of cattle=0.70, sheep and goats=0.10, pigs=0.20, poultry=0.01.

14 Regular members are defined by NUS as “close relatives and would have been usual members of the household but have been away more than six months during the last 12 months”. Regular members are not included in the household for the purposes of calculating per capita expenditure.

As discussed above, the estimates of the objective and subjective risks of attack from equation (2) are used as regressors in equation (3). By their very nature, predicted regressors are estimated with error and therefore the standard errors need to be adjusted (Pagan 1984). This is addressed using a bootstrap with 2000 replications. Typically, since the same sample is used in both stages, sampling with replacement alters the composition of the sample in both stages. This paper differs in that different samples are used in each stage; the first stage uses community level data while second stage uses household data. Consequently, the bootstrap only changes the composition of the first stage while the second stage remains unchanged. The different estimates of risk generated from the bootstrapping of the first stage are used in the second stage.

The estimates of the objective and subjective risks of attack are created using the coefficients from the estimation of equation (2) (table 3). In each case the independent variables measure the distance of the community from violent attacks by the LRA in various years. The errors in the logit regression are clustered at the community level. In the first column, the dependent variable is a binary variable for whether or not a community was attacked by the LRA in 2004. Consequently, as previously discussed, the predicted values represent the probability of the community being attacked in 2004, that is the objective risk. Similarly, the second column uses a binary variable for the perceived insecurity within the community. As previously noted, the fitted values from column (2) are estimates of the likelihood that the community feels insecure and therefore of the subjective risk.

Overall, while the variables are strongly jointly statistically significant, only several of the variables are individually significant reflecting the multicollinearity among the instruments used. The fit of the model can be assessed by looking at what percent of attacks in 2004 are correctly classified[15] in each specification. For objective risk, this is a direct measure of accuracy since the fitted values represent the probability of being attacked in 2004. For subjective risk, it is suggestive as subjective risk is likely to be strongly and positively correlated with actual attacks.

[15] To calculate correct classification, the fitted values are compared with the actual values (here the binary variable for a community bring attacked in 2004). Since actual attacks are binary while the estimates of the risk are continuous and bounded by 0 and 1, values of less than 0.5 for the estimated risk are counted as 0 and values greater than 0.5 as 1 for the purpose of checking the accuracy.

The predicted values for objective risk match very closely with the actual distribution of attacks (90.1%). The predicted subjective risk also does well albeit to a lesser degree (79.9%). In addition to the overall levels, the spatial distribution of objective and subjective risk at the community level are similar to those of actual attacks (Table 4). The higher subjective risk in Karamoja likely reflects the insecurity in the region associated with cattle raiders.

Table 5 presents the key results from the estimation of equation (3). The results are divided into those using objective (columns 1-3) and subjective risk (columns 4-6). All of the regressions contain the same basic set of controls[16] and the errors are clustered at the community level. The first column for each (columns 1 and 4) contains only plausibly exogenous factors that influence expenditure. The second columns introduce binary variables for each of a range of productive assets[17], a variable for the total amount of land owned, and a variable for total livestock holdings in tropical livestock units (TLU). As noted, both theory and prior empirical research suggests that asset holdings may be endogenous. Columns 3 and 6 further add interaction variables between attacks and risk. These allow the effects of risk to differ between attacked and non-attacked households and communities.

As noted earlier, the measures of risk are highly correlated with the measures of exposure to violence at the community level. This underscores the consistent significance of the risk measures across specifications and measures of risk. The coefficients for the linear and squared terms for risk are generally significant. Moreover, since households make decisions based on their subjective expectations, it is not surprising that both the significance and magnitude of the subjective risk estimates are relatively larger.

[16] The controls are for prior abductions, the demographic composition of the household, the gender of the head of household, whether the household had migrated due to insecurity (in 2004 or since 1992), the highest education in the household, residence in an IDP camp, the presence of a major source of employment within 10 kilometers of the community and district fixed effects.

[17] There are separate binary variables for the ownership of at least one unit of the following: a plough, a hoe, a boat, a motor vehicle, a motorbike, a bicycle, and a generator.

Moving to the last columns in each set of specifications, the risk-attack interaction variables are never significant, individually or jointly[18]. This suggests that the losses from risk between affected and non-affected households and communities are not significantly different. This may, however, also result from the high correlation between the interactions variables and the measures of risk and attack. Moreover, the inclusion of the interaction terms only increases the standard errors of the risk variables without affecting their coefficient estimates. Consequently, the remainder of the paper will focus on the specifications in columns (2) and (5).

At the sample means for objective and subjective risk, risk decreased expenditure on average by 3 and 8 percent, respectively, as compared to 10 percent for prior attacks on the household. When taking into account the gender of the head of the household, the average effects decrease to approximately 2 and 6 percent for objective and subjective risk, respectively. Even within households that experience violence, risk remains an important factor as it accounts for between 17 and 38 percent of the conflict related losses. Overall, on average, conflict substantially lowers per capita expenditure (12 and 16 percent). These rates are similar in magnitude to economic effects of terrorism in the Basque country, approximately 10 percent decrease in GDP per capita, reported by Abadie and Gardeazabal (2003).

In contrast to attacks on households, attacks on communities are never significant regardless of the specification. The lack of significance is not caused by the correlation between the measures of the risk and experience of violence as the coefficients for the community-level attacks remain insignificant even when the former measures are omitted. Although several possible explanations exist for the lack of significance, it is not possible to distinguish between them. For instance, this may reflect mechanisms that allow for consumption smoothing. Alternately, this may be unrelated to conflict, reflecting instead the nature of traditional livelihoods in Northern Uganda. The vast majority of individuals work on their farms or family enterprises. Only 10% of sample individuals employed rural Northern Ugandans aged 14-60 work elsewhere. The self-sufficiency of rural households and the general lack of labor markets may naturally limit community economies and the impact of attacks on communities.

[18] They are only significant at 71 and 80 percent levels, respectively.

Lastly, the insignificance of community attacks may be the result of offsetting effects. On the one hand, attacks on communities may be destructive and have negative lasting consequences for household income and consumption. On the other hand, prior attacks may lead to higher consumption as NGOs may focus their activities in previously exposed areas. The considerable effects of food aid are highlighted in the next section.

Three potential sources of concern remain. First, households are interviewed at different times of the year so households interviewed earlier in the year are less likely to have been attacked in the calendar year than those interviewed subsequently. Table 6 demonstrates the robustness of the results to this concern. Columns (1) and (3) report the results from Table 5. Control variables for the month of the survey are added in columns (2) and (4). The magnitude of the effect of risk decreases slightly although, qualitatively, the effects remain similar. Additionally, the significance of the measures of subjective decrease but they remain highly significant.

Another concern is that the bulk of expenditure may have occurred prior to attacks, particularly if attacks occur late in the year. This is examined in Table 7. Columns (1) and (3) recreate the findings from Table 5.[19] Columns (2) and (4) limit expenditure to food expenditure, the only portion of consumption for which the recall period is the past week. Since the probability of experiencing violence in the past week is close to zero, columns (2) and (4) capture only expenditure after attacks. The results for subjective risk remain largely consistent and actually increase. In contrast, objective risk is no longer significant and household experience of violence is no longer significant. Prior community experience becomes significant and is positive in column 2. Although this only occurs in one specification, this result is puzzling and may simply reflect the location of food aid.

Lastly, the first stage imposes a particular structure by using a logitistic regression. The results, however, remain robust with the use of a probit or linear probability model. The results from the 2nd stage are essentially unchanged between the logit and probit specifications. With the linear

[19] The sample size decreases as two households report no expenditure on food.

probability model, the objective measure of risk is no longer significant although it retains the same magnitude as the logit estimation.

The Impact of Food Aid

The large positive coefficients on the squared term for risk in table 5 imply that risk has diminishing marginal effects. The greatest adverse effect of risk occurs at 0.50 and 0.44 for objective and subjective risk, respectively. As shown in figure 1, although the effect of risk is always negative for objective risk, the effect of subjective risk becomes positive after 0.89. In part, this reflects the lower density of data in this area leading to less precise estimates. While the positive coefficient for the estimate of the quadratic risk term reflects the fact that the ability to decrease expenditure decreases as it approaches a lower bound required for survival, it also reflects the food aid in the region. The government, the World Food Programme and other non-governmental organizations were active in Northern Uganda. As can be seen in table 8, these were primarily located in Acholi (the most affected region) and Karamoja (the poorest region). The estimates of the impact of risk on expenditures are affected by both the NGO's work and distribution of food aid. Consequently, the estimates from table 5 reflect the effects of risk after the provision of food aid. That is, these "actual" measured effects represent the effect of risk and of food aid jointly.

Rough estimates of the "absolute" impact of risk, that is the impact of risk in the absence of food aid, can be derived in one of two ways. First, while there is only a limited research on the effect of food aid on household behavior, Abdulai *et al.* (2005) find that food aid does not create food production disincentive effects among recipients. Consequently, expenditures net of food aid might be a good approximation of expenditure in the absence of food aid. If food aid affects either food production or the overall levels of expenditure, then a better estimate might be obtained using the non-IDP population. The bulk of food aid is provided in IDP camps as the median non-IDP camp household did not receive any food aid.

Table 9 provides the estimates of the absolute effects of risk. For ease of comparison, the first column for objective and subjective risk contains the full sample and replicates prior results. The second pair of columns maintains the full sample but uses expenditures net of food aid. The last pair of columns in each sample limits the sample to non-IDP camp households. The dependent variable is actual expenditures, including any food aid. The top section reports the coefficients for the risk and attack variables in each regression. The second section reports the average effect of risk on expenditures (including the effect of the gender of the head of the household where statistically significant).

Several broad results emerge. First, the objective risk variables are no longer significant in the non-IDP camp sub-samples. Although this could reflect the smaller sample size, the magnitude of the coefficients also decreases suggesting that this is not solely due to increased standard errors. In contrast, the magnitude of the measures of subjective risk increases and remains highly significant. This result reinforces the relative importance of subjective as opposed to objective risk. Households make their decisions based upon their perceptions, which may diverge from realizations to date. Second, the absolute impact of risk is significantly higher in the alternate specifications. The average estimated absolute effect of risk increases to roughly 75% of the estimated effect of direct exposure. The increase in the average effect of risk suggests that the provision of food aid appears to erase 17-30% of the overall impact of risk.

Lastly, the effect of gender of the household on the effect of risk completely disappears in the specification that excludes households in IDP camps. This is likely explained by differences in the behavior of males and females in IDP camps that was obscured by the high correlation between risk and IDP camps status. The increase in both magnitude and significance of the coefficient in the 2nd specification implies that this is not due to food aid being targeted towards women or female-headed households. Rather, this means that female-headed households have relatively higher expenditure in IDP camps. Lehrer (2010) suggests that this is driven by productivity differences as a gendered work culture tended to develop in IDP camps. Women frequently worked while men were less likely to work and spent their days drinking, playing cards and talking.

Aggregate Effects and Spillovers

Although the estimated effect of the risk of violence is smaller than that of its experience, only a modest fraction of the overall population experience violence. In contrast, the risk of exposure affects virtually the entire population. Consequently, the aggregate effects of risk are considerably higher than implied by cursory comparisons of their estimated coefficients. Table 10 provides a rough estimate of the contributions of the risk of violence and its realization to the aggregate costs of conflict. These are calculated using the coefficients estimated in Table 9 for risk (linear, squared and female headed household when statistically significant), the mean household levels of risk, and the aggregate income by exposure status and gender of the head of household.

The first two columns examine the actual effect of risk. Even in the lower estimate using objective risk, on aggregate, risk accounts for close to 40% of the overall estimated costs of violence. Moreover, there are strong spillovers of risk from those households that have experienced violence to those that have never experienced it; close to a quarter of the overall losses and more than 60 percent of the losses from risk occur in non-directly affected households. When subjective risk is used, the losses from risk are 67% higher than losses due to the experience of violence and losses in houses that have never been attacked exceed those from "direct" losses from attacks. These effects only increase when the "absolute" effects of risk are used. Over 40% of the overall losses occur through spillovers and risk accounts for close to 70% of the overall losses.

The aggregate losses attributable to conflict are substantial with estimates ranging from 0.5 to 0.9 percent of GDP for 2004. Consequently, risk lowered aggregate expenditures by 15 to 53 million US dollars and spillovers accounted for 11 to 37 million dollars. To put these totals into perspective, in 2004, disbursed ODA aid from DAC countries to Uganda amounted to roughly 684 million US dollars. Although it is not possible to solely isolate aid directed to Northern Uganda or resulting from conflict, the stated purpose of individual grants allow for an upper

bound of 126 million US dollars to be calculated. The bulk of the disbursed aid, 102 million US dollars, is categorized as emergency food aid or as food security programmes/food aid and is likely partially used in areas outside of Northern Uganda.

These losses have accumulated and compounded throughout the conflict. Roughly half of the 0.5 to 0.9 GDP losses in 2004 are due to the risk of violence. Over the length of the conflict, this translates into 4.6 to 8.2 percent lower GDP due to the risk of violence. At the household level, the effects are substantially larger since the most of Uganda was not affected by this conflict. Using the estimate for the subjective risk specification (6.2 percent lower per capita expenditure), the risk of violence lowered expenditure levels by 70 percent over the course of the conflict. This likely represents a lower bound estimate as the ability of household to reduce expenditure likely reduces as household expenditure decreases. Consequently, as households became poorer, their ability to mitigate risk decreased leading to weaker expenditure responses to risk. Since the losses compound over time, even small changes in risk-related losses may lead to substantially higher levels of welfare of time. For instance, reducing average losses from 6.2 to 3.1 percent per year reduces the lost per capita expenditure from 70.4 to 45 percent over the course of the conflict.

VIII. Conclusion and Policy Implications

This paper has examined the effect of the risk of violence on welfare, as proxied by per capita expenditure, in Northern Uganda. Depending on the specification, I find that risk reduces per capita expenditure by 2 to 6 percent and accounts for roughly half of the overall costs of conflict. Within households that experience violence, risk still accounts for between 17 and 38 percent of percent of welfare losses. The effects of risk are not limited to households that have experienced violence as risk-related losses in household that have never been attacked account for roughly 40 percent of the overall costs of conflict and 60 percent of the losses due to risk. In aggregate, risk-related losses account are roughly equal to 0.5% of GDP. This suggests that prior studies that focus solely on exposure to violence both substantially underestimate its costs as well as ignore

one of the more important pathways from conflict to the outcomes observed during and post-conflict.

Compounding these losses over the length of the conflict suggests substantial losses at the national level, 4.6 to 8.2% lower GDP, and individual levels, -70% per capita expenditure, due to the risk of violence irrespective of the experience of violence. Despite their size, these losses likely represent a lower bound of losses due to conflict risk. Over time, the ability of household to respond to risk has decreased as household have become poorer (currently the poverty rate is over 70%). Since losses compound over time, even measures which lead to limited decreases in risk-related losses can lead to substantial welfare improvements over time.

The evidence also suggests that food aid appears to be partially effective as it reduce the overall losses attributable to risk by 18 to 30 percent. This suggests an important role for food aid in a period where food aid totals have substantially decreased despite the prevalence of low levels conflicts throughout the development world. Moreover, the strong spillovers of losses into households and areas that do not directly experience violence suggests that aid should not be limited to IDP camp populations although this needs to be balanced with obvious safety concerns for humanitarian workers.

These results suggest that perceptions of risk may be just as important. Careful monitoring of these may allow for proactive responses as opposed to waiting for losses to accumulate. The importance of risk and the limited ability of households and communities to address this risk suggest an important role for government policy. For instance, the loss of customers due to the crisis and violence surrounding the 2007 Kenyan election and the inability of informal insurance networks to compensate led to an increase in unprotected sex by sex workers both during and immediately after the crisis (Dupas and Robinson 2011).

While the LRA is no longer active in Northern Uganda, the population is only slowly beginning to recover from nearly two decades of violence, fear, and uncertainty. Importantly, as subjective risk levels decrease, the process that led to lower welfare during the conflict will reverse itself.

Although this process will not be without difficulties, the resilience of Northern Uganda after two decades of conflict suggests that they are up to the task.

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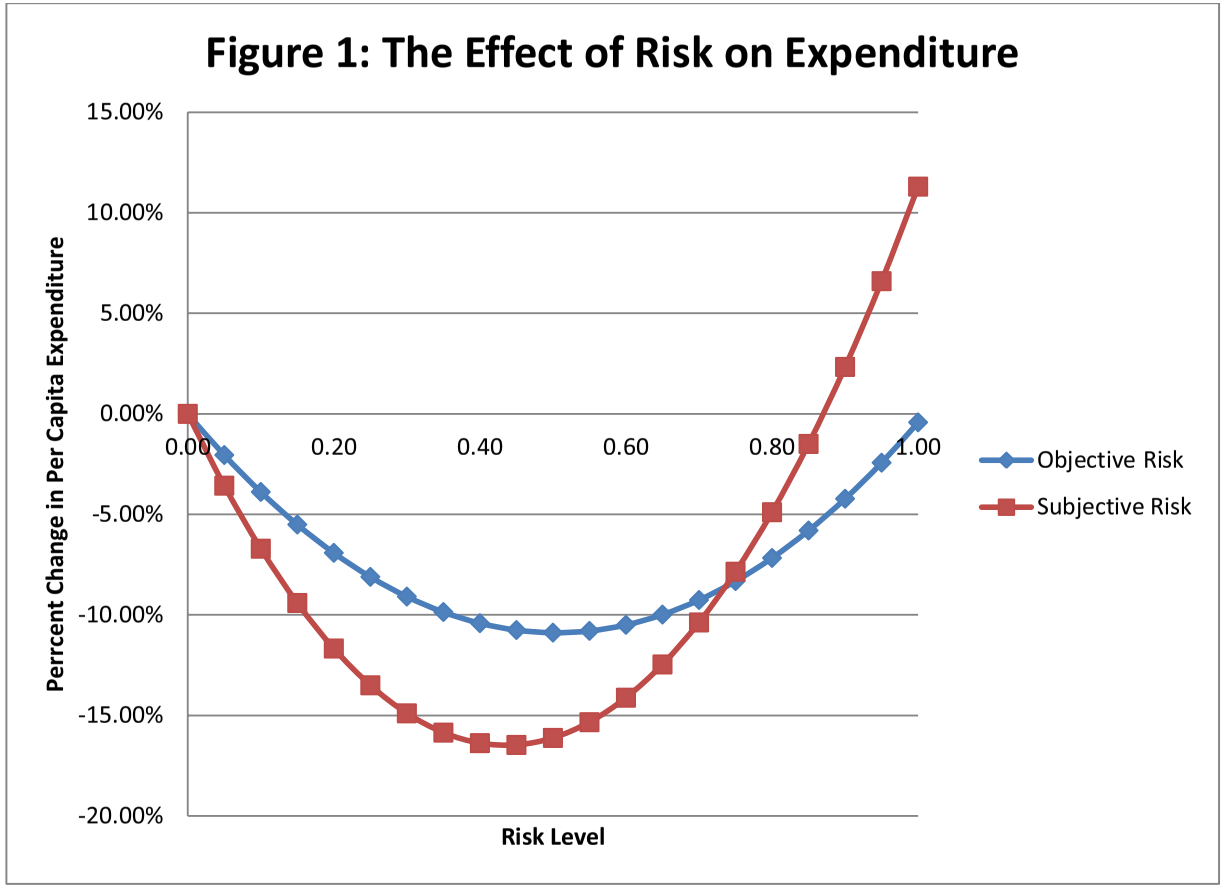
Figure 1: The Effect of Risk on Expenditure
15.00%
10.00%
5.00%
0.00%
-5.00%
-10.00%
-15.00%
-20.00%
0.00
0.20
0.40
0.60
0.80
1.00
Perrcent Change in Per Capita Expenditure
Risk Level
Objective Risk
Subjective Risk

Table 1: Descriptive Statistics for Variables in Equation 2

Variable	Mean	Median	SD	Min	Max	Source
LRA attack in 2004 (1=yes)	0.30	0.00	0.46	0.00	1.00	NUS
Hard to cultivate land due to insecurity in 2004 (1=yes)	0.28	0.00	0.45	0.00	1.00	NUS
Fitted value using LRA attack in 2004	0.30	0.06	0.37	0.00	0.98	-
Fitted value using hard to cultivate land	0.28	0.16	0.29	0.00	0.98	-
Distance to nearest attack 2004 (decimal degrees), NUS	0.34	0.26	0.28	0.00	1.09	NUS
Distance to nearest attack 1999 (decimal degrees), NUS	0.28	0.20	0.25	0.00	1.25	NUS
Distance to nearest attack 1992 (decimal degrees). NUS	0.31	0.24	0.26	0.00	1.37	NUS
Distance to nearest attack 1997 (decimal degrees), ACLED	0.83	0.79	0.51	0.02	2.43	ACLED
Distance to nearest attack 1998 (decimal degrees), ACLED	0.44	0.33	0.34	0.00	1.36	ACLED
Distance to nearest attack 1999 (decimal degrees), ACLED	0.86	0.90	0.49	0.01	2.22	ACLED
Distance to nearest attack 2000 (decimal degrees), ACLED	0.92	0.78	0.58	0.00	2.49	ACLED
Distance to nearest attack 2001 (decimal degrees), ACLED	0.69	0.68	0.47	0.01	2.11	ACLED
Distance to nearest attack 2002 (decimal degrees), ACLED	0.37	0.26	0.34	0.00	1.60	ACLED
Distance to nearest attack 2003 (decimal degrees), ACLED	0.21	0.14	0.20	0.00	0.95	ACLED

Author's calculations using the 2004 Northern Uganda Survey. Weighted using community level weights.

Table 2: Descriptive Statistics for Variables in Equation 3

Variable	Mean	Median	SD	Min	Max	Source
Expenditure, ln(per capita annual HH expenditure)	12.10	12.07	0.66	8.66	15.61	NUS
Objective Risk	0.29	0.06	0.37	0.00	0.98	-
Subjective risk	0.26	0.16	0.29	0.00	0.98	-
Community, LRA attack in 2004 (1=yes)	0.29	0.00	0.45	0.00	1.00	NUS
Community, LRA attack since 1992 (1=yes)	0.45	0.00	0.50	0.00	1.00	NUS
HH attacked since 1992	0.43	0.00	0.49	0.00	1.00	NUS
Any abduction in 2004 (1=yes)	0.00	0.00	0.05	0.00	1.00	NUS
Any abduction since 1992 (1=yes)	0.06	0.00	0.23	0.00	1.00	NUS
Number of disabled in HH	0.31	0.00	0.57	0.00	6.00	NUS
Female head of HH	0.31	0.00	0.46	0.00	1.00	NUS
Total number in HH younger than 14	2.61	3.00	1.95	0.00	12.00	NUS
Total number in HH between 14-60	2.28	2.00	1.33	0.00	9.00	NUS
Total number in HH older than 60	0.20	0.00	0.47	0.00	3.00	NUS
Total number in HH older than 60	0.06	0.00	0.28	0.00	3.00	NUS
Number of non-HH members residing in HH	0.02	0.00	0.16	0.00	4.00	NUS
Some schooling but did not finish primary (1=yes)	0.53	1.00	0.50	0.00	1.00	NUS
Finished primary (1=yes)	0.14	0.00	0.35	0.00	1.00	NUS
Some secondary schooling (1=yes)	0.17	0.00	0.37	0.00	1.00	NUS
Finished secondary (1=yes)	0.01	0.00	0.09	0.00	1.00	NUS
Specialized degree or diploma (1=yes)	0.05	0.00	0.22	0.00	1.00	NUS
Finished tertiary (1=yes)	0.00	0.00	0.05	0.00	1.00	NUS
No answer for schooling (1=yes)	0.00	0.00	0.06	0.00	1.00	NUS
Head of HH migrated due to insecurity, 2004 (1=yes)\	0.02	0.00	0.15	0.00	1.00	NUS
Head of HH migrate due to insecurity, ever (1=yes)	0.22	0.00	0.41	0.00	1.00	NUS
Currently reside in an IDP camp (1=yes)	0.17	0.00	0.37	0.00	1.00	NUS
Community with 10 km of major source of employment (1=yes)	0.14	0.00	0.35	0.00	1.00	NUS
Converted livestock units into TLU	1.33	0.20	4.80	0.00	141.15	NUS
Own at least one plough (1=yes)	0.12	0.00	0.32	0.00	1.00	NUS
Own at least one hoe (1=yes)	0.23	0.00	0.42	0.00	1.00	NUS
Own at least one boat (1=yes)	0.00	0.00	0.07	0.00	1.00	NUS
Own at least one vehicle (1=yes)	0.00	0.00	0.03	0.00	1.00	NUS
Own at least one motorbike (1=yes)	0.01	0.00	0.08	0.00	1.00	NUS
Own at least one bicycle (1=yes)	0.39	0.00	0.49	0.00	1.00	NUS
Own at least one generator (1=yes)	0.00	0.00	0.03	0.00	1.00	NUS
Sum of acres of land in 3 largest plots	3.70	2.00	5.37	0.00	88.00	NUS

Weighted using household weights

Table 3: Logit Estimating Objective and Subjective Risk of Community Attacks

	Obj	**Subj**
Distance to nearest attack 1992. NUS	3.14	-0.20
	[3.14]	[1.91]
Distance to nearest attack 1999, NUS	-5.19	1.33
	[5.13]	[2.28]
Distance to nearest attack 1997, ACLED	2.78	8.31***
	[2.11]	[1.88]
Distance to nearest attack 1998, ACLED	-2.94*	-2.54*
	[1.79]	[1.48]
Distance to nearest attack 1999, ACLED	-0.50	-8.30
	[2.20]	[2.27]
Distance to nearest attack 2000, ACLED	-1.08	0.94
	[1.59]	[1.58]
Distance to nearest attack 2001, ACLED	-2.45	0.87
	[2.51]	[1.97]
Distance to nearest attack 2002, ACLED	-0.27	-5.25**
	[3.08]	[1.91]
Distance to nearest attack 2003, ACLED	-16.2***	-1.48
	[5.08]	[1.97]
Constant	3.18***	0.36
	[1.16]	[0.49]
Observations	353	353
Pseudo R^2	0.58	0.35
Percent of LRA attacks in 2004 correctly classified	90.1%	79.9%

Standard errors in brackets are bootstrapped with 2,000 replications.
Community weights used

*, **, *** statistically significant at the 10%, 5%, 1% levels respectively

Table 4: Attacks and Predicted Risk in Rural Northern Uganda

	Community Attacked in 2004	Predicted Risk	
		Objective	Subjective
West Nile	0.02	0.07	0.08
Acholi	0.87	0.82	0.61
Lango	0.53	0.49	0.34
Teso	0.17	0.16	0.23
Karamoja	0.20	0.22	0.40
Total	0.30	0.30	0.28

Table 5: The Effects of the Risk and Realization of Violence on the Log of Household per Capita Expenditure

	Objective			Subjective		
	(1)	(2)	(3)	(4)	(5)	(6)
Risk of community being attacked, 2004	-0.52**	-0.43*	-0.45**	-0.70***	-0.76***	-0.71***
	[0.23]	[0.23]	[0.23]	[0.26]	[0.26]	[0.26]
Square of risk of community being attack, 2004	0.50**	0.43**	0.35	0.80***	0.87***	0.90***
	[0.22]	[0.22]	[0.23]	[0.28]	[0.28]	[0.27]
Risk*Female	0.15**	0.13*	0.13*	0.17*	0.16**	0.16**
	[0.07]	[0.07]	[0.07]	[0.09]	[0.08]	[0.08]
Community attack in 2004	0.02	-0.01	-0.03	-0.01	-0.03	-0.03
	[0.05]	[0.04]	[0.06]	[0.05]	[0.04]	[0.07]
Community attacked since 1992	0.04	0.05	0.04	0.02	0.04	0.03
	[0.04]	[0.04]	[0.05]	[0.04]	[0.03]	[0.04]
HH attacked since 1992	-0.09**	-0.10***	-0.12***	-0.09***	-0.10***	-0.05
	[0.04]	[0.03]	[0.04]	[0.03]	[0.03]	[0.05]
Productive Assets		X	X		X	X
Interaction terms between attacks and risk			X			X
Observations	3509	3509	3509	3509	3509	3509
Pseudo R^2	0.35	0.38	0.38	0.35	0.38	0.38

The full regressions are reported in Appendix 1

The regressions included control for household composition, migration, highest education, IDP camp residence

The regressions also control for the presence of a major source of employment within 5 km

Standard errors in brackets are bootstrapped with 2,000 replications. Household weights used and models include district fixed effects, and clusters errors by district.

*, **, *** statistically significant at the 10%, 5%, 1% levels respectively

Table 6: Robustness check for time of interview

	Objective Risk		Subjective Risk	
	(1)	(2)	(3)	(4)
Risk of community being attacked, 2004	-0.43*	-0.42*	-0.76***	-0.65***
	[0.23]	[0.22]	[0.26]	[0.26]
Square of risk of community being attack, 2004	0.43**	0.42**	0.87***	0.76***
	[0.22]	[0.21]	[0.28]	[0.28]
Risk*Female	0.13*	0.13*	0.16**	0.16**
	[0.07]	[0.07]	[0.08]	[0.08]
Community attack in 2004	-0.01	-0.002	-0.03	-0.02
	[0.04]	[0.04]	[0.04]	[0.04]
Community attacked since 1992	0.05	0.06	0.04	0.05
	[0.04]	[0.04]	[0.03]	[0.04]
HH attacked since 1992	-0.10***	-0.09***	-0.10***	-0.09***
	[0.03]	[0.03]	[0.03]	[0.03]
Control for month of interview		X		X
Average effect of risk on expenditure	-2.0%	-1.7%	-6.2%	-5.0%
Observations	3509	3509	3509	3509
Pseudo R^2	0.38	0.38	0.38	0.38

The regressions included control for household composition, migration, highest education, IDP camp residence

The regressions also control for the presence of a major source of employment within 5 km

Standard errors in brackets are bootstrapped with 2,000 replications. Household weights used and models include district fixed effects, and clusters errors by district.

*, **, *** statistically significant at the 10%, 5%, 1% levels respectively

Table 7: Robustness check using only expenditure from past 7 days

	Objective Risk		Subjective Risk	
	(1)	(2)	(3)	(4)
Risk of community being attacked, 2004	-0.43*	-0.50*	-0.75***	-0.81***
	[0.23]	[0.29]	[0.26]	[0.29]
Square of risk of community being attack, 2004	0.43**	0.41	0.86***	0.99***
	[0.22]	[0.27]	[0.28]	[0.3]
Risk*Female	0.13*	0.16	0.16**	0.17*
	[0.07]	[0.08]	[0.08]	[0.1]
Community attack in 2004	-0.01	-0.02	-0.03	-0.07
	[0.04]	[0.06]	[0.04]	[0.05]
Community attacked since 1992	0.05	0.08*	0.04	0.06
	[0.04]	[0.05]	[0.03]	[0.04]
HH attacked since 1992	-0.10***	-0.04	-0.10***	-0.04
	[0.03]	[0.04]	[0.03]	[0.04]
Limit to only expenditure in past week		X		X
Average effect of risk on expenditure	-2.0%	-12.8%	-6.2%	-7.2%
Observations	3507	3507	3507	3507
Pseudo R^2	0.38	0.24	0.38	0.24

The regressions included controls for household composition, migration, highest education, IDP camp residence

The regressions also control for the presence of a major source of employment within 5 km

Standard errors in brackets are bootstrapped with 2,000 replications. Household weights used and models include district fixed effects, and clusters errors by district.

*, **, *** statistically significant at the 10%, 5%, 1% levels respectively

Table 8: Relief Efforts in Northern Uganda

	Free food as percent of total expenditures*	Food distribution by within 5km of village center**	Mean Objective Risk**	Mean Subjective Risk**
West Nile	4.1%	6.6%	7.4%	8.4%
Acholi	11.3%	35.3%	82.4%	61.0%
Lango	2.7%	0.8%	49.4%	34.1%
Teso	3.8%	7.2%	16.3%	22.6%
Karamoja	7.6%	35.5%	21.8%	40.3%
Rural	5.0%	11.5%	30.4%	28.1%

* Weighted at household level

** Weighted at community level

Table 9: Estimating the Actual and Absolute Effects of the Risk of Violence

	Objective			Subjective		
	All	**Net Exp**	**No IDP**	**All**	**Net Exp**	**No IDP**
Risk	-0.43*	-0.48**	-0.31	-0.76***	-0.83***	-1.06***
Risk squared	0.43**	-0.48**	0.27	0.87***	0.91***	1.44***
Female headed household * risk	0.13*	0.16**	0.05	0.16**	0.19**	0.04
Household attacked since 1992	-0.10***	-0.10***	-0.12***	-0.10***	-0.10***	-0.11***
Average effect of risk on expenditure	-2.0%	-2.6%	0%	-6.2%	-7.4%	-8.1%
Sample Size	3509	3509	2869	3509	3509	2869

*, **, *** statistically significant at the 10%, 5%, 1% levels respectively

Table 10: Aggregate Costs of Conflict in Northern Uganda for 2004

		Actual Effect		Absolute Effect (Subj)	
		Obj	**Subj**	**No Aid**	**No IDP**
HH never attacked (% of total cost)		22.8%	39.0%	42.2%	48.1%
	From Attack	0.0%	0.0%	0.0%	0.0%
	From Risk	22.8%	39.0%	42.2%	48.1%
HH attacked		77.2%	61.0%	57.8%	51.9%
	From Attack	64.0%	37.4%	33.0%	30.5%
	From Risk	13.2%	23.6%	24.8%	21.4%
Total					
	From Attack	64.0%	37.4%	33.0%	30.5%
	From Risk	36.0%	62.6%	67.0%	69.5%
Total cost (Million Sh)		73,718	127,541	137,452	125,527
% of GDP		0.5%	0.8%	0.9%	0.8%