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Civil War's Impact on the Environment and on Access to Water and Sanitation Services

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Summary:
Civil wars originate from ethnic, religious, or political grievances that escalate to armed confrontation. Civil war may also result from escalated population growth that leads to deteriorated environmental conditions, which in turn translate to increased resource scarcity, competition, and higher risk for violence. Armed conflict may reduce the amount of water available and its quality, affecting the livelihood and health of the population. This paper explores the impacts of civil conflicts on access to water and sanitation services, using a theoretical household model in which civil war enters as a tax both on the household income and the prices of goods. The model is applied to the Demographic Health Surveys (DHS) and internal armed conflict data for Colombia, South America. The theoretical results reveal that households care about access to water and sanitation as long as it leads to different levels of consumption and leisure time through changes in children's health. Decisions are made comparing the gains from healthier children to the households' net real income. The empirical results suggest that there are both negative and positive effects of civil war on access to water and sanitation services, and on the indicators of children's health. The positive effect of conflict proves that households adapt by internalizing the violence experience from the past. No evidence is found regarding the counteracting effect of the institutional variables.

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Abstract

Civil wars originate from ethnic, religious, or political grievances that escalate to armed confrontation. Civil war may also result from escalated population growth that leads to deteriorated environmental conditions, which in turn translate to increased resource scarcity, competition, and higher risk for violence. Armed conflict may reduce the amount of water available and its quality, affecting the livelihood and health of the population. This paper explores the impacts of civil conflicts on access to water and sanitation services, using a theoretical household model in which civil war enters as a tax both on the household income and the prices of goods. The model is applied to the Demographic Health Surveys (DHS) and internal armed conflict data for Colombia, South America. The theoretical results reveal that households care about access to water and sanitation as long as it leads to different levels of consumption and leisure time through changes in children's health. Decisions are made comparing the gains from healthier children to the households' net real income. The empirical results suggest that there are both negative and positive effects of civil war on access to water and sanitation services, and on the indicators of children's health. The positive effect of conflict proves that households adapt by internalizing the violence experience from the past. No evidence is found regarding the counteracting effect of the institutional variables.

Key words: civil war, water, sanitation services, household, health, Colombia, DHS

JEL codes: I15, N46, Q25

[1] Corresponding author: javiersantiago.ortiz@gmail.com. Acknowledgments: Special thanks to Colombian Army Colonel (R) Rodrigo Martinez and Colombian Police Captain Gelga Buitrago for their help in getting the conflict data; thanks to Todd Sorensen at University of Nevada, Reno, for allowing us to run all the econometric procedures on his server; and to Pascaline Dupas at Stanford University for her suggestions for our robustness checks

I. Introduction

Civil wars are rooted in longstanding ethnic or religious grievances, as well as in political differences that escalate to armed confrontation. While the armed groups engage in fighting, the consequences impact the population, the economy, and the environment. The fighting translates into deaths of combatants and the civilian population. It also impacts the economy by disrupting the markets, and the exchange of goods and services. As war develops, the environment is affected by the attacks on infrastructure (water canals, dams, roads, pipelines) and by deforestation, pollution, and stress on the natural resources in the regions the displaced population resettles.

Previous research indicates that civil war changes the trajectories of growth, inflation, and investment (Chen, Loayza and Reynal-Querol 2008) and the level of gross domestic product (GDP) of countries involved in civil wars (Murdoch and Sandler 2002); governments may be forced to cut social expenditure (health, education, and other social services) to face the military challenges (Lai and Thyne 2007). As for the educational impact, children born during civil conflict attain less schooling than those born before or after the conflict (Akresh and de Walque 2008; Chamarbagwala and Moran 2010; Leon 2010). In terms of health consequences, a civil conflict reduces the height of children born during the fighting period (Akresh, Verwimp and Bundervoet 2009), increases child and infant mortality (Urdinola, 2004), rises the probability of miscarriage in pregnant women (Camacho 2007), reduces the ratios of male to female births (Catalano et al. 2005), and reduces the length of pregnancies and birth weights (Smits et al. 2006).

By focusing on the environmental consequences of civil war, this paper explores the impacts of civil war on access to water and sanitation services. Access to water is defined here as the ease by which households can obtain the water they need for their survival and economic activities. Civil war may reduce access to water because of the destruction of infrastructure, deforestation, pollution of water bodies, or higher use of water resources, which altogether lead to costs related to water scarcity. Civil war limits access to water, while also impacting the health and productivity of the society that is bearing the burden of violence. Civil war can destroy sewerage systems and prevent families from using proper sanitation facilities. War can also force its victims to adopt unhealthy practices that increase their contact with excreta and pollute water sources.

Most of the literature on environmental effects of military operations focuses on the study of conventional war (usually, interstate war). In a broad sense, the effects of interstate wars are similar to those of civil wars[2]. Even though this paper explores the effects of civil war on access to water and sanitation services, it references literature on the environmental effects of interstate wars. The commonalities do not exclude the fact that environmental effects may be different (in scope or nature) between interstate and civil wars.

This paper contributes to the literature on the environmental impact of civil war in four ways. First, it develops variables that measure violence intensity. Taking the Colombian internal armed conflict as a case study, conflict is measured by yearly state-level data of leading conflict indicators (extortions, kidnapping, terrorist attacks, mass-murder victims

[2]Two different concepts of war are used throughout this paper: war and civil war (also called internal armed conflict, civil conflict, or armed strife). In a war, two armies are engaged in military operations to try to achieve victory; those armies, usually, follow international conventions of humanitarian law and are the armies of different states (and therefore, internationally recognized). In a civil war, rebel groups fight the army of the state; civil wars are featured by violation of human rights use of the guerrilla war tactics by the rebels and groups with different ideologies. In a civil war, the rebels seek to overthrow the government.

and attacks against the police, per 100,000 inhabitants). Our variables deviate from what has been previously used by Urdinola (2004) and Camacho (2007) as measures of the Colombian conflict. Urdinola (2004) uses the homicide rate per 100,000 inhabitants to estimate the impact of violence on infant mortality. Camacho (2007) uses the explosions of land mines as a measure of the impact of violence on birth outcomes. Our variables follow the arguments by Raleigh and Urdal (2007) about the spatial heterogeneity of both conflict and environmental degradation throughout a country. Conflict intensity calculations are incorporated in the estimations following Biswas (2000) and his statements about the relevance of duration and intensity as determinants of the ultimate environmental footprint of civil war.

The second contribution is the use of the household as the level of analysis. Previous studies (Raleigh and Urdal 2007; Reuveny et al. 2010) only explored the national or regional ecological burden of civil war, ignoring that families residing in those places are obliged to make rational decisions in times of war and ecological stress. Household reactions and behavioral changes may increase or, on the contrary, decrease the environmental consequences of any civil war. A household utility maximization model is proposed to explain how the family bears the burden of civil war through modified behavior to various water-access levels.

The third contribution is attributed to the results of the theoretical model. We found that is possible that conflict has ambiguous effect on households. By having civil war impact presented as a tax on prices and income, unless certain conditions are met, it is entirely possible that civil wars end up having a positive effect, in the case of this paper, on the access to water and sanitation services. Additionally, our modeling of the civil war intensity, as a stock of violence, following the likes of an habit stock, reinforces this finding. Ambiguous effect may indicate that households learn about the intensity of the civil war, adapt appropriately and cope with conflict to maximize their utility.

The fourth contribution is the use of the household level Demographic and Health Survey (DHS) dataset to explore how access to water changes throughout a civil war. DHS captures location, demographic, and socioeconomic features of a household's head and mother; it contains a detailed registry of children morbidity and mortality of children; it reports features of the inhabited dwelling; and it records household health-related behaviors and expenses. DHS datasets have been used in fertility, health, and education research, and now, for the first time, DHS datasets are used in this exploration of changes to water access and sanitation services due to civil war. The theoretical model assumes that households care about the water and its related effects on children health. DHS is preferred over other household-level surveys since its main source of data are women in reproductive age. It is for these women that the health of the children under their supervision is the most relevant.

II. Literature review: The interactions between war, the environment, and households.

The relationship between war and the environment has been addressed in previous research. The deleterious footprint of war on the environment can be extended to armed conflict, in which the engaged factions are rebel groups and the state. The households are caught between the factions, and have to cope with the negative externalities and market disruptions due to increased violence.

II.1 Civil war and the environment

It may be appropriate to mention the institutional and the environmental strands of the literature in the civil war discipline. The first, championed by Collier (1999, 2002), interprets civil conflict as the outcome of an institutional failure. In doing so, conflict unfolds as existing institutions are unable to resolve the grievances or the greed of societal segments. Grievances can arise from ethnic or religious marginalization, from inequalities in the access to political representation, or to resources. When a faction wants to control the government's rents, distribute political favors, or control benefits from natural resources, then the greed factor is driving the civil war. Once civil war erupts, its length is determined by the benefits to the engaged factions, the expectations of a military victory, and the support of the population to the fighting groups.

The second strand of the literature addresses the role of environmental factors in civil conflicts. Gledistch (1998) argues that higher population growth rates lead to deteriorated environmental conditions, which in turn result in increased resource scarcity and competition that altogether translate into higher risk of violence. However, increased scarcity may not necessarily increase the probability of violence, as long as technological change (which reduces the dependence on raw materials and increases agricultural yields), institutional arrangements, international trade, and price changes can compensate and mitigate the scarcity. Gledistch (1998) extends this mechanism of environmental degradation leading conflict to a more complex process in which war leads to further environmental degradation, in a sort of feedback process. In this chain of events, environmental degradation is aggravated by the very same conflicts it created in the past. It is this final feedback – the effects of war on the environment – that is analyzed in this paper.

Two studies involving the environmental causes of civil war are worth mentioning. In a study with spatial data on conflict, land degradation, fresh water availability and population density, Raleigh and Urdal (2007) posit that the likelihood of war increases with medium to high levels of land degradation and very high levels of water scarcity. Miguel et al. (2004) show how environmental shocks that produce severe income variations increase the probability of civil war.

In exploring strengths and weaknesses of environmental origins of war, it has to be noted that there is an institutional mediation stage (Raleigh and Urdal 2007). Environmental scarcity may produce war as institutions are weakened by higher resource competition, causing rebels to fight against the state. However, in a very fragmented society, the state can take an opportunistic approach by increasing its support by mobilizing population groups to capture scarce resources. Institutions act either to prevent war (or to cause it), and institutions are changed as a consequence of war. In the first direction, improving access to services can reduce the probability of future conflict by tackling its structural causes (Baird 2010). In the second direction, changes in the micro-politics due to the armed conflict may alter access to common pool resources, endangering the livelihoods of those dependent on them (Kurf and Funfgeld 2006).

The effects of war on the environment depend on the type of war (conventional, biological, or nuclear), the kind of weapons and strategies being used, duration and intensity, type of terrain over which war is fought, and the prewar environmental conditions (Biswas 2000). There might be an increase in environmental consequences of armed conflict due to increased technological level (Westing 1980) and the process of preparedness for war (Singer and Keating 1999). However, war (and preparedness for it) could have a positive impact on the environment by reducing access to nature reserves, and allowing the recovery of species (Tucker and Russell 2004). Overall, negative effects will occur after massive and extended military disruptions and destruction, or by frequent small disruptions (McNeely 2010). For instance, after the first Gulf War, desert surfaces were disturbed, leading to more sand storms, increased concentration of inhalable dust particles, and lower solar flux (El-Shobokshy and Al-Saedi 1993). Reuveny et al. (2010) estimated that a country hosting an armed conflict may experience an intensified deforestation.

II.2 Household behavior under civil war

Households cope with armed conflicts and, therefore, engage in coping strategies that also take a toll on the natural setting. In general, the coping strategies will be defined according to the risk of being targeted by the armed groups in the conflict, and by the risk of poverty due to the conflict (Justino 2009). Given a high risk of being targeted by armed groups or an equally high risk of facing poverty, either by the destruction of assets or by loss of income, households may decide to relocate in order to improve their welfare. However, under civil war circumstances, households most likely will move to places where they face unhealthy living conditions, and uncertain income and social support. The increased population in the receiving sites brings more stress to the environment, which in turn reduces the household welfare. The increase in population density causes deforestation, land erosion, and water pollution and shortages. Refugee's impact on the environment could be explained by their short-sighted decisions and ignorance of the local environmental and resource management institutions (Jacobsen 1997).

When conflict destroys water sources and infrastructure, or implies their pollution, households may be forced to modify the way they obtain water, and are forced to reduce water usage. This situation may increase the opportunity costs of collecting water (Nauges and Van Den Berg 2009). Higher opportunity costs of collecting water can translate into reduced school enrollment for children, reduced participation of females in the labor force, and higher costs for water-collection equipment (cans, ropes) and water access fees. Lack of water may also prevent households from practicing proper hygiene habits. Access to improperly treated or polluted water is linked with infectious diseases, and blamed for high infant mortality rates worldwide (Montgomery and Elimelech 2007). Nevertheless, the actual effect of better water quality on children's health, for instance piped water, ultimately depends on how spending on their children's health enters into the parental utility function (Jalana and Ravallion 2003).

III. The Colombian context

The Colombian internal armed conflict has evolved over phases of low intensity, building up, and, currently, a phase of state offensive and rebel's reorganization. Surprisingly, and despite the economic costs the conflict has inflicted on the country, Colombia scores well on access to water and sanitation services.

III.1 Colombian internal conflict

In Colombia, the high concentration of land property and various institutional failures lead to armed conflict as the only outlet (Nahzri 1997). Three main groups have been engaged in the fighting: the state army, the left-wing terrorist (LWT) and the right-wing terrorist (RWT) groups. Conflict intensified after the 1980s, as the RWT and LWT groups became involved in drug production and drug trafficking (Ortiz 2002). Terrorist groups were actually controlling large parts of the country, and violence spread everywhere. Large populations were forcefully displaced from the rural areas, and terrorism targeted cities and infrastructure. After the collapse of peace talks conducted during 1999-2002, the state's army was finally ready to take on an offensive. With the help of the United States, the "Plan Colombia" was designed and aimed at promoting peace, increasing security, and ending drug trafficking (Veillette 2005) by strengthening the army and the state institutions.

The evolution of the Colombian armed conflict is presented in **Figure 1** and **Figure 2**. **Figure 1** displays the yearly value of the leading indicators of the conflict (kidnapping, terrorist attacks, extortions, mass-murder victims, and attacks against the police per 100,000 inhabitants). All indicators are very low from the early 1960s to the early 1980s. However, all indicators increase throughout the 1980s, reaching a peak in early 2000s, corresponding to the period of maximum strength of the terrorists and the peace talks. After 2002-2004, the first years of President Uribe's government, the indicators showed a sharp decrease. **Figure 2** exhibits how the government fought the terrorists. With a more effective army in eliminating or capturing terrorists, fewer people were displaced as safety increased. Since 2010, the country has experienced a more urban conflict, whose main purpose is territorial control to facilitate the urban drug trafficking, and to extort businesses.

III.2 Access to water and sanitation services in Colombia

Colombian legislation on water and sanitation is primarily based on the national constitution (Articles 361 and 366) that obliges the national government to invest in water and sanitation as fundamental to the rights of life and health (Constitutional Court, T-232, 1993). Besides, the national government established state-level water plans (planes departamentales de agua) as the tools to design and to coordinate with the municipalities the investments aimed at increasing access to drinkable water and improved sanitation services.

According to the World Development Indicators (World Bank 2012: **Table 1**), Colombia has increased the percentage of population with access to improved sanitation facilities (from 68 percent in 1990, to 74 percent in 2008) and with access to improved water sources (from 88 percent in 1990, to 92 percent in 2008). Water scarcity is not an issue in Colombia, since the total withdrawal of freshwater only accounts for 0.59 percent of the total internal resources, and the country experiences high volumes of yearly rainfall (Ministerio del Medio Ambiente y Desarrollo Sostenible 2010). However, figures from the 2005 Colombian Census (DANE 2011), presented in **Table 2** (standard deviation), indicate a great level of variation across states, explained by the geography, population density and the proportion of urban dwellers per state. An important element driving this variation is a disorganized urban expansion and the growth of the rural-to-urban migration that is explained partially by the armed conflict. Despite the disparity in access to piped water and access to improved sanitation services, Colombia has fared well in reducing child and infant mortality (**Graph 3**). Additionally, in 2008, the incidence of diarrhea was responsible for only 4 percent of the child mortality in the country (WHO 2012).

IV. Household utility maximization model for estimation of civil war effects

We start by defining first some key concepts. According to the World Health Organization (WHO), access to water is defined as the availability of at least 20 liters per person per day from a source within one kilometer of her dwelling (WHO, 2011a). In the Guidelines for Drinking Water Quality (WHO, 2011b), water quality is defined in terms of microbial water quality (pollution levels from fecal microorganisms) and chemical water quality (pollution originating from the additives, the materials used in the potabilization and distribution of water). WHO also categorizes the sanitation facilities into: improved sanitation (connection to a public sewers, connection to septic systems, pour-flush latrines, simple pit latrines and ventilated improved pit latrines) and unimproved sanitation (service or bucket latrines where excreta is manually removed, public latrines and open latrines).

IV.1 The household maximization problem

We assume that households maximize a utility $U(.)$ that is a function of a composite good X, a quality-adjusted amount of water $\overline{q}w$, the health of children in the household H_c, and leisure time ℓ. The composite good is priced in the market at a price p_X, and households act as price takers. The quality-adjusted amount of water is used for household consumption. Children's health is assumed to be a direct function of water consumption because the better the water quality and availability, the more likely households are to engage in health-improving practices. Households act as price takers. The price of water p_w is also given and affects the household through the budget constraint. The utility function can be expressed as:

$$U\left(X, \overline{q}w, H_c\left(\overline{q}w\right), \ell\right) \tag{1}$$

Water quality $\overline{q}$, observed by the household, captures both the quality of the drinking water and the level of sanitation available. It is assumed that $0 < \overline{q} < 1$, such that $\overline{q} < \widetilde{q}$ (with $\widetilde{q}$ representing the WHO standards) represents unimproved sanitation and microbial water pollution, and $\overline{q} \geq \widetilde{q}$ represents the appropriate sanitation technologies and levels of water quality (as described above). War may affect sanitation infrastructure, which creates a source of water pollution. Any effect of civil war on sanitation will be captured by the value of the quality parameter. Households will not consume water, $w = 0$, if $\overline{q} < \widetilde{q}$, and the marginal utility of children's health will be negative.

Income originates from a monetary endowment Y that may be provided by family savings or from other types of assets the family owns, and wages r from participation in the labor market. Households observe the level of the wages in the market, and decide to allocate their total time between work, L, and leisure, ℓ (such that $L + \ell = 1$). The total budget constraint can be expressed as:

$$Y + (1 - \ell)\, r = p_X X + p_w w \tag{2}$$

Civil War is introduced into this model as a taxing mechanism that impacts both the total income, the prices of water, and of the composite good. For instance, Chen et al. (2008) mentioned that prices increase during civil war because of loose government monetary policy to fund the military campaigns. Justino (2008) points out changes in the prices of goods sold and purchased as one of the channels by which civil war reduces welfare of households. Another type of tax is on income. This tax might be the result of the actual destruction of assets and infrastructure, or it might be levied indirectly by the reduction of government expenditure on education (Lai and Thyne 2007), health, or other social/welfare services. Governments may impose extra taxes on firms and wealthy citizens. It is relevant to mention that extortions and kidnappings act as a tax, reducing the available income of households. Perhaps, by increasing uncertainty and risks, war acts as a tax by reducing the overall level of economic activity (lower GDP growth), and by disrupting the smooth functioning of markets.

IV.2 The civil war taxes

The civil war taxes and the overall environmental footprint of civil war will be defined by the intensity of the conflict itself. Following Gleditsch (1998, p. 393), war acts as an echo and the effects of violence weaken as time passes by. According to Mcneely (2010), the environmental effects can be created from massive disruptions or from small disruptions that are self-regenerated. It could be expected that the environmental impact of civil war at time t depends on the criminal or war events at time t, plus the echo or regeneration of violent and war events that occurred in time $t-1, t-2, \ldots, t-\tau$.

This paper deviates from the time series modeling of conflict, because the focus is not on the data generated process of the conflict data series, nor on the prediction of future conflict levels (as in Odhuno 2012). Time series motivates the need to incorporate some sort of lag structure for the representation of the medium-term and long-term conflict dynamics.

Because the conflict data will be used in the framework of a household utility maximization model, we adapt and apply the concept of "habit formation" to the case of civil war. According to Carroll et al. (2000), individuals make their consumption decisions based on a habit stock, which is the weighted average of past consumption. The habit stock is, in this case, a stock of conflict-related events that impact a household's decisions by changing prices and income, acting as a tax. The stock is computed as an aggregation or weighted average for different lengths of time (1, 5, 10, and 20 years.). When using the weighted average, it is proposed that weights grow either at 10 percent or at 20 percent per year. Lower growth rates occur in values closer to a simple aggregation. Higher weights occur when the impact of conflict is in the year prior to the survey.

Therefore, at any year t, the environment deteriorates due to a stock of violence SV_t, which households need to consider when coping with civil war. In computing this stock of violence, weights are given in such a way that the closer the civil war event is to year t, the more important the impact will be. The stock of violence is defined as $SV_t = \sum_{t-\tau}^{t} \beta_t V_t$, where β_t stands for the weight assigned to year t and V_t is the civil war intensity in year t, $t-1, t-2, \ldots, t-\tau$. τ is the length in years for which the individual calculates the stock of violence and that can be $\tau = \tau_1, \ldots, \tau_n$ years. To account for a higher weight in years closer to t, the weights are proposed to grow at a fixed rate such that $\beta_0 + (1+\eta)^{t-\tau} \beta_0 + \ldots + (1+\eta)^t \beta_0 = 1$ and $\eta = \eta_0, \eta_1, \ldots, \eta_n$.

Keeping the assumption that civil war taxes incomes and prices, it is expected that the income tax of civil war can be defined as a function $g(.)$ increasing in the stock of violence (SV_t) and decreasing in the quality of state and local/family institutions (QI_t). Better government and social institutions can support households in coping with conflict: governments can provide assistance in time of distress; households can support each other through kinship or social networks.

The income tax is bounded between 0 and 1, such that

$$T_\theta = g(QI_t, SV_t) \in \{[0 \ldots 1]\} \tag{3}$$

The price tax of civil war is a function $h(.)$ decreasing in the quality of institutions and increasing in the stock of violence and, like the income tax, will be bounded between 0 and 1, such that

$$\pi_\alpha = h(QI_t, SV_t) \in \{[0 \ldots 1]\} \tag{4}$$

Subscripts α and θ are used to simplify the notation for the derivation of comparative statics. These taxes are independent from each other ($Cov(T_\theta, \pi_\alpha) = 0$)

The utility maximization problem for the household during civil war is

$$\underset{X, w, \ell}{Max} \quad U(X, \overline{q}w, H_c(\overline{q}w), \ell)$$

$$s.t. \ (1-T_\theta) Y + (1-T_\theta)(1-\ell) r - (1+\pi_\alpha) p_X X + (1+t_\alpha) p_w w = 0 \tag{5}$$

IV. 3 The comparative statics

After setting up the Lagrangian and deriving the First Order and Second Order Conditions, the comparative statics are calculated. The maximization and the derivation of the comparative statics are provided in **Appendix 1**, and a summary of the results is presented in **Table 3**.

The Second Order Conditions involve three terms. First, $\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$ stands for the net real income from labor of the household. It is a real income, because it is adjusted by the price of the composite good and it is net, since the civil war taxes are applied. Note that the household monetary endowment does not enter into this income term. This is a very interesting result, indicating that civil war impacts the household through its participation in the labor and goods markets. It also indicates that civil war acts by modifying the labor participation of the household and, therefore, the allocation of time. By changing the time allocation, civil war modifies the availability of household members to haul water or to supervise the children.

The second term, $\frac{U_{\ell w}+U_{\ell H_c}H_c'}{U_{Xw}+U_{XH_c}H_c'}$, has two components. The numerator is the gains in leisure from children's health and from quality-adjusted water availability; the denominator includes the changes in the marginal utility of the composite good from variations in quality-adjusted water availability and from children's health. More availability of water can enhance leisure through more hygienic habits and/or spending less leisure time on hauling water ($U_{\ell w} > 0$). The positive effect of children's health on a household's marginal utility from leisure is represented by $U_{\ell H_c}$. A positive U_{Xw} may indicate a complementarity between water and the composite good. Finally, U_{XH_c} captures variations in the marginal utility of the consumption of the composite good through changes in children's health. Note that the effects of children's health on leisure, and the consumption of the composite good, are amplified by H_c', and supposed to be directly dependent on the quality-adjusted quantity of water.

Finally, the third term is $\frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}$. The positive effect of leisure on the marginal utility of water is captured by $U_{w\ell}$; leisure time helps families get water (if the water source is not on the premise) or to treat the water to make it drinkable, if necessary. A positive $U_{H_c\ell}$ indicates how leisure time can be used to enhance the health of the children in the household through more hygiene or healthier practices (more exercise and more supervision). More consumption of the composite good has a positive effect on the marginal utility of water, a positive U_{wX}, in so far some elements of the composite good are necessary for the consumption of water, such as treating, storing or transporting water. U_{H_cX} stands for the variations in the marginal utility of the children's health, as the consumption of the composite good is increased or reduced. Altogether, $\frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}$ is the ratio of the changes in the marginal utility of water and children's health, resulting from changes in the amount of leisure and level of consumption of the composite good.

In order to fulfill the second order condition one of two results has to hold. Either $\frac{U_{\ell w}+U_{\ell H_c}H_c'}{U_{Xw}+U_{XH_c}H_c'} < \frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$ or $\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)} < \frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}$. The first result is $\frac{U_{\ell w}+U_{\ell H_c}H_c'}{U_{Xw}+U_{XH_c}H_c'} < \frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$ or, in other words, the ratio of the gains in leisure to the gains in the composite good consumption derived from children's health, and water consumption is smaller than the net real income. Three possible interpretations of this result can be offered. The first is that households require sufficient income to afford the water needed to have healthy children in order to enjoy their leisure time and the consumption of the composite good, after adjusting for the effects of the civil war through reduced income and increased prices. The second interpretation is that household members cannot fully capture the benefits of healthy children at home (and that is why the effect only happens through leisure and composite good consumption). The third interpretation is that the household does not value the consumption of water by itself, even though it is a choice variable in its utility function. But, rather, it values water through its impact on leisure and consumption of the composite good.

The second possible result of the comparative statics is $\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)} < \frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}$. This is the mathematical representation of the fact that it is impossible for all household members (not the children) to fully capture the benefits from healthier children and water availability. It is through decisions on tradeoff between leisure time and level of consumption of the composite good – both of which allow households to cope with the negative externalities of war. This term means that the changes in the marginal utilities of water and health of the children as a result of the variations in the consumption of leisure and composite good have a higher value than the net real income. This result implies that it is through the leisure time and the consumption of the composite good that households cope with the civil war.

Together, the first and second results of the second order conditions imply that $\frac{U_{\ell w}+U_{\ell H_c}H_c'}{U_{Xw}+U_{XH_c}H_c'} < \frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)} < \frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}$. That is, the lower bound of the net real income is the ratio of the gains in leisure and composite good consumption, originating from changes in the health of children and the quality-adjusted quantity of water. The upper bound is the ratio of variations in the marginal utility of water and children's health, resulting from leisure and the consumption of the composite good. Since the effects of civil war are experienced through market mechanisms, lower wages and higher prices, households value more their leisure and the consumption of the composite good. Households, even with a strong altruistic motive, value the health of children and access to water as long as these are critical in defining participation in the labor market and consumption.

An increase in the price of water will decrease the amount of water consumed, $\frac{\partial w}{\partial p_w} < 0$, if $U_{XX}U_{\ell\ell} > U_{X\ell}U_{\ell X}$ (the product of the second derivatives is larger than the product of the cross derivatives of leisure and the composite good). This comes from the convexities of preferences: since leisure and the composite good are needed for the consumption of water, households prefer more balanced bundles than having all the utility coming from only one of the two. Higher civil war tax on prices of goods or on income leads to less water consumed, $\frac{\partial w}{\partial \pi_\alpha} < 0$ and $\frac{\partial w}{\partial T_\theta} < 0$, if: first, the product of the second derivatives is larger than the one of the crossed derivatives ($U_{XX}U_{\ell\ell} > U_{X\ell}U_{\ell X}$); and, second, the ratio of gains in the marginal utilities of water to health of children from leisure and the composite good is greater than the net real income ($\frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}} > \frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$).

The final comparative static indicates a positive relationship between water consumed and water quality ($\frac{\partial w}{\partial \bar{q}} > 0$). This relationship holds if one of two conditions is met: either the net real income is larger than the ratio of changes in the marginal utility of leisure to the marginal utility of consumption of the composite good, both resulting from changes in the health of children and the quantity of water ($\frac{U_{\ell w}+U_{\ell H_c}H_c'}{U_{Xw}+U_{XH_c}H_c'} < \frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$); or that the gains in water consumption and health produced by changes in leisure and the composite good are higher than the net real income ($\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)} < \frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}$). Water quality influences through leisure and the consumption of the composite good. With a lower level of water quality, households may be forced to spend more of their leisure time trying to get better quality water or to improve their sanitation facilities.

The children's health is defined as a function of the quality-adjusted water quantity ($H_c(\bar{q}w)$), any impact of either the civil war tax on income or on prices works through changes in the quantity of water. Another source of variation in the children's health is the water quality ($\bar{q}$) as households consume different quantities of water when a new water quality is observed. Deterioration of children's health occurs when the household faces higher prices and lower income, and cannot afford purchasing what is required for the proper nutrition and wellbeing (like medicine and visits to the doctor) of the children. Bad water quality is a source of infections for the children, due to the destruction of potable systems or sanitary services. Even if the quality is not reduced, less water consumed may imply that households cannot undertake proper hygiene practices and, therefore, children are more prone to infectious diseases.

IV.4 The hypotheses

The following hypotheses are formulated based on the interpretation of the comparative statics and are tested using the DHS sample and the internal armed conflict indicators for Colombia:

Hypothesis 1: The civil war tax on prices of goods and the civil war tax on income reduce the quantity and the quality of water consumed by households.

Hypothesis 2: An increase in any of the civil war taxes reduces the access to improved sanitation facilities and further reduces the quality of water.

Hypothesis 3: Children's health deteriorates when the civil war taxes increase.

Hypothesis 4: The quality of institutions counteracts with increases in the conflict intensity (i.e., its effect, in absolute value, is larger than the effect of the stock of violence).

V. Data sources

Two main sources of data were used for the empirical verification. First, the state-level yearly values of the selected conflict indicators, as reported by the Colombian national police. Second, the six waves of the DHS for Colombia. Conflict data was processed, as explained, to construct a stock of violence (total or per indicator) by the year each survey data was collected. These sources of data were supplemented with data reported by the Colombian Statistical Bureau (DANE).

V. 1 Internal armed conflict data

The conflict data is reported by the Colombian national police[3]. The variables elected for our analysis are the most representative of the Colombian internal armed conflict (extortion, kidnappings, terrorist attacks, mass-murder victims, and attacks against the police). For each conflict indicator, the stock of violence was computed as explained in the previous section. The stock was computed per state and, according to the DHS survey year, either as an aggregated or as a weighted average value for the entire period with a 10 percent growing weight ($\eta = 0.1$) or a 20 percent growing weight ($\eta = 0.2$), over different lengths ($\tau = 1, 5, 10, 20$ years). A stock of violence was also computed by applying principal component analysis on all the conflict variables at the state level, after using the proposed aggregation or averaging procedure.

[3]The Police codes the criminal events per year and per police units. Most of the police units are of state-level jurisdiction. The police units with national jurisdiction were discarded for the purpose of this paper. Data from police units with jurisdiction in the capital city of a state was added to the data of the state in which the city is located. Far more difficult to handle is the data reported for some police units with jurisdiction in more than one state; these units are usually located in violent regions covering bordering regions of two or more states. As the identification of the environmental effect of the internal armed conflict on access to water and sanitation services is intended to be estimated at the state level, information was gathered from Colombian police and military personnel to assign a weight for each of the states that have a share of its territory covered by one of these special police units. For instance a special police unit has jurisdiction over some municipalities of state X, and over some of state Y; the educated guess is that 60 percent of the criminal incidents happened in state X, and the remaining in state Y; then 60 percent of the conflict indicators reported in that unit go to the data of state X, and 40 percent to the data of state Y.

Figure 4 exhibits the stock of violence using a simple aggregation. The average values for extortion are very similar by survey year, regardless of the aggregation length, although they are all trended upward. There is a lot of dispersion in the average values for terrorism and kidnapping after 1995, and all values tend to decline after 2000. The same is true for the number of mass-murder victims and the attacks against the police, also with rapid declines after 2000.

Figure 5 presents weighted averages with weights growing at 10 percent per year ($\eta = 0.1$) for the different time lengths considered. This graph has two main features. First, the difference between the various averaging lengths at each survey year is smaller. Second, the graphs present a smoother version of the stock of violence by survey year when compared to the simple aggregation graphs. The differences among the various lengths are further reduced when the weights grow at 20 percent per year ($\eta = 0.2$), as can be seen in **Figure 6**. Higher weights assign higher importance to violence events closer to the survey year. It is because of this that the trends over time seem to be smoother than when the data is simply aggregated. Environmentally speaking, putting higher weight on recent violent events accelerates the decay of the environmental impact of violence from previous years, and increases the relevance of the violence data from years closer to the survey year. Such a decay can be explained by the recuperation of natural systems or because households learn to react or to cope with conflict in the long run.

V. 2 Demographic and Health Surveys

The second source of data is the DHS (Demographic and Health Surveys). We use all six waves of surveys of the DHS that correspond to different stages of the Colombian internal armed conflict. The wave of 1986 was collected during the last years of the low-intensity conflict period. The wave of 1990 has data gathered during the peak years of the drug-cartels terrorist offensive. By 1995 (the third wave), LWT were fully involved in drug trafficking and the RWT were rapidly expanding. The highest levels of LWT- and RWT-committed crimes took place around the fourth wave of 2000. The last two waves, in 2005 and 2010, were collected during the years of the government offensive on all terrorist groups.

DHS offers a full picture of the households sampled, its location and its composition, some physical features of the dwelling, and very detailed information about the reproductive history and main features of the mother and the head of the household (such as education, age, place of residence during childhood). Nonetheless, DHS is not a panel data and does not track households over time; moreover, it does not record changes in mother's and father's features as every child was born. DHS only asks for details about health of the children born during the five years prior to the survey. Another weakness, and perhaps the most important when considering the impacts of armed conflict, is that DHS does not report any path of migration or relocation. This last weakness is not a major obstacle, since the focus of this paper is on the access to water and sanitation services at the time of the survey and not over time. A final point is that the newer (2005 and 2010) survey waves covered more states and, as a consequence, the number of households drastically increased.

The following variables were used or created, based on the DHS reported variables. First, water on premise is a dummy for all households whose main source of water is piped water, a well in the residence, the yard or the plot, rainwater, or bottled water. When the water source is not on premise, the DHS asks for the time spent going back and forth from the water source. The time to water source is used as an opportunity cost of water, because that is a time the household cannot allocate to the labor market or leisure activities. The last variable measuring access to water is having piped water to the premise as the main source. This variable takes the value of 1 for households that use the publicly operated or private (rural) aqueducts, and 0 otherwise. Piped water is presumed to supply water of higher quality. Only one variable is related to the sanitary services – the type of toilet at the household. We devised a dummy variable that takes the value of 1 for households that have their toilets connected to the sewerage system, and the value 0 otherwise.

Households are classified as urban, when living in major cities or in what DHS considers urban areas (not towns, villages, or countryside). Living in an urban area is likely to translate into a higher probability of access to piped water and sanitation services connected to the sewerage system. The mother in the household is classified as married, if she is actually married or is living with her partner. This marriage variable is an indication of income and access to family related support networks. Education variables for the mother of the household are also constructed given the highest schooling level completed: no education, primary, secondary, or higher education. The last two variables are the children's health indicators. DHS asks whether the children born during the five years prior to the survey had diarrhea in the last 24 hours or within the last two weeks, and whether or not they had fever during the last two weeks.

Table 4 presents the summary statistics (proportion and averages) of all variables. With respect to water on premises, there is an overall increase since 1986. Interestingly, the time to water source has risen for those households that do not have their water sources on the premises. We tested, empirically, if the conflict-driven effects were behind this hike. Piped water seems to be the main source of water for most Colombian households. Most households have electricity and their toilet connected to the sewerage system. Certainly the high values for the access to water-related variables are explained by the large proportion of households located in urban areas.

Larger proportions of women have secondary and higher education. More women are head of households (the proportion of male head of household has been on the decline) and less of them are married or living with their partners. Perhaps, as more women are head of households and are not bonded by marriage, they prefer to stay living in the same place they were born in order to enjoy the support of the extended family or kinship networks. As for the two indicators of children's health related to water, diarrhea and fever, there seems to be an abatement when comparing the proportion of children with diarrhea or fever in 1986 to the proportion in 2010. This overall reduction is intertwined with variability in the years in between. This irregular pattern might be caused, as it will be tested, by the variation in conflict intensity.

V.3 Institutional quality variables

The last source of data is composed by the Colombian bureau of statistics (DANE) figures on what we define as "quality of institutions." This term includes all those government-level or social-level variables than can help households cope with conflict or, in terms of our theoretical model, reduce the effect of the war taxes on price and income. The choice of these variables was based only on data availability. The only data available, covering most of the period of analysis is data on education and growth of GDP per capita[4]. Education indicators at the state level can be a proxy variable for a better government effort in providing services households need during conflict. Better education can also signal higher social capital and, therefore, stronger social networks supporting and helping the households (Holzmann 2001).

[4]Auxiliary regressions that are not reported in this paper but available upon request indicate that the education data does not seem to be impacted by any of the measures of the stock violence.

A state with a more educated population can be one in which citizens tend to cooperate with the authorities and, by doing so, help in the fight against the criminals and the terrorists (by reducing underreporting, as in Fajnzylber et al. 1998) . Better-educated citizens make better decisions about sanitation, hygiene, and about the use of water and natural resources. Finally, a state with higher GDP growth per capita is a state in which households have more labor opportunities and more income available. Furthermore, higher GDP growth may indicate that the state can provide better services to its citizens, helping them cope with the violent conflict.

The variables chosen for primary and secondary education were: gross enrollment rate, students-to-teacher ratio, the students-to-school ratio, and the teachers-to-school ratio. The value of each of these variables is for the year before the survey. Summary statistics of these variables are presented in **Table 5**. There is a reduction in the average GDP growth per capita after 1990, which ended in the economic crisis of 1990-2000, but there is a sustained growth after 2002. As for gross enrollment, almost all children are enrolled in primary education. Some values are larger than 1, due to grade repetition and because some children may start older than expected. Secondary education is problematic, although the enrollment figures show an overall improvement in the period under analysis. Student-to-teacher ratios show improvements until 2002, but they have worsened in recent years.

VI. Identification strategy

VI.1 Econometric model

We developed the following model to test the validity of the hypothesis about the effect of armed conflict on the access to water and sanitation services, as well as on children's health, using the data from Colombia:

$$Indicator_{hst} = \beta_0 + \beta_1 SV_{st} + \beta_2 PrimStudTeach_{st-1} + \beta_3 SecStudTeach_{st-1} + \beta_4 Growth_{st-1} + \gamma X_{hst} + \theta_s + \delta_t + Statetrend_{st} + \varepsilon_{hst} \qquad (6)$$

where the dependent variable, $Indicator_{hst}$, is a dummy variable taking into account whether household h in state s surveyed in year t has access either to water on the premise (Hypothesis 1), to piped water (Hypothesis 1) or to a toilet connected to the sewerage system (Hypothesis 2). SV_{st} is the stock of violence computed as a 1, 5, 10, or 20 years aggregation, or as a weighted average as described in the previous sections. As for the institutional level variables, the quality of institution is proxied by $PrimStudTeach_{st-1}$and $SecStudTeach_{st-1}$, respectively, namely the primary and secondary education students-to-teacher ratio in the year before the survey in state s; and by, $Growth_{st-1}$, which is the GDP growth per capita, also in the year before the survey in the state s. X_{hst} represents household level controls (related to the location). θ_s are the state fixed effects to control for the state level invariant features; δ_t stand for the survey year fixed effects to control for shocks in the year of the survey that are common to all the households. Since there might be other time-variant variables correlated with access to water and sanitation services, state-specific trends, $Statetrend_{st}$, are included in the estimations, allowing each state to have a different trend in terms of access to water and sanitation services. The equation will change when testing the impact of conflict on the price of water. The impact on the price of water is going to be tested by using the time to and from water source, for those households with no access to water on the premise, as a dependent variable.

It is expected that the coefficient of the stock of violence is of a negative sign, whether using each conflict indicator or an aggregate measure of conflict (by adding the criminal events per year per state or by principal components analysis). Terrorist attacks may delay the construction of water systems. Even worse, the destruction can result in the pollution of water sources as an indirect effect. Attacks against the police are a proxy of the vulnerability of the government to provide services. If the police forces are attacked, they cannot assure the safety the government institutions need; for instance, to build or to maintain water and sewerage systems. There is a random element in mass-murder or massacre cases because many of the victims could not be directly related to the main assassination target. The risk of being a mass-murder victim may prevent households from going to places where there is a high risk of a massacre occurring, restricting their access to the water sources or the purchases of items needed for sanitation and hygiene.

Access to water and sanitation services is affected from increases in kidnapping, due to the reduction in the overall economic activity as uncertainty increases. It can be entirely possible that utility companies can no longer perform maintenance of water and sanitation services out of fear for their staff being kidnapped; even households can no longer approach their traditional sources of water as they also fear being apprehended by the terrorist groups. Mainly in urban areas (particularly poor neighborhoods), but still common in rural areas (especially those with agribusiness or mining), terrorist groups may extort business owners and residents through a tax on the price of goods or demanding frequent payments. With the higher prices and frequent payments, households may not afford to get better quality water or to build better sanitary services at their dwellings.

Testing Hypothesis 4 is not straight forward. When GDP growth per capita is higher, the government and households spend more on water and sanitation, and other supporting services. The situation is more complicated when it comes to the education variables. The students-to-teacher ratios are better measures of the quality of institutions, since they provide information about the resources the government spends in providing a higher quality education. Enrollment figures, although relevant, are not as indicative of the resources the state allocates to provide and to enhance the educational services. Nevertheless, the armed conflict may force the government to face a tradeoff – in order to fund the military campaigns or due to the reduced income brought about by conflict, the government may not have sufficient funds to improve education and access to water and sanitation services all together. In this case, an improvement in education (a reduction in teacher-to-student ratio) can only be feasible by worsening access to water and sanitation services indicators. Then, the coefficients of the students-to-teacher ratios are of a positive sign. On the contrary, improved education ratios enhance access to water, either because it signals more government expenditure or because more educated people care more about water and sanitation; thus, the coefficients will be negative.

As for children's health (Hypothesis 3), the equation is:

$$Health_{ihst} = \beta_0 + \beta_1 SV_{st} + \beta_2 PrimStudTeach_{st-1} + \beta_3 PrimStudTeach_{st-1} + \beta_4 Growth_{st-1} + \gamma X_{hst} + \alpha \Pi_{ihst} + \theta_s + \delta_t + Statetrend_{st} + \varepsilon_{ihst} \qquad (7)$$

The dependent variable, $Health_{ihst}$, takes two forms – an indicator variable for children that had diarrhea in the last 24 hours or within the last two weeks prior to the survey day, or an indicator for children who had fever in the last two weeks prior to the survey day, as in the DHS questionnaire. Notice that this regression is at the individual level, namely, child i in household h in state s surveyed in year t. For that reason, individual level control variables, in vector Π_{ihst}, are included in Equation 7. Signs switch for the coefficients of interest in this equation. For example, higher conflict intensity leads to more children with fever or diarrhea (a positive sign of the stock of violence coefficient). Positive signs are also expected for the coefficients of the education variable, because improvements in education could indicate that the government spends more in social services, which may reduce the incidence of fever and diarrhea. Finally, higher GDP per capita growth rates reduce the number of children having water-related illnesses through better nutrition or access to higher quality water.

VI. 2 Threats to validity

Differences in access to water and sanitation services across states may also be explained by unobserved variables. As long as those unobserved variables are time invariant at the state level, for instance geography or political institutions, those differences are ruled out by using state-fixed effects. Additionally, any invariant factor that might be related to both the internal armed conflict and the delivery of services is controlled by using the state-fixed effects. If differences arise from changes that are common to all households, regardless of their state of residence in the year of the survey, those differences are purged by using survey-year fixed effects. The latter can be understood as changes of legislation or new technology available for the provision of water and sanitation services. The use of the state- and survey-year fixed effects can be extended also to the case of children's health. State-fixed effects and survey-year fixed effects control for differences in the incidence of fever or diarrhea explained by state time invariant factors (like climate) or by shocks common to all children in the year of the survey (e.g., new treatments or medicines that reduce the future morbidity).

Access to water and sanitation involves a demand and a supply side. Regarding the demand side, it is assumed that households have the same preferences over water and sanitation services: households would prefer higher quality water and, in consequence, better sanitation facilities, as well as having the water sources as close as possible to their dwellings. This can be explained by the theoretical model, since water was introduced as a quality-adjusted variable and since households need to allocate their time between leisure and labor. Satisfying the demand requires the availability of infrastructure necessary to provide higher-quality and closer sources of water. Given the Colombian water market legislation, the construction and development of water and sanitation infrastructure can take different paths across states and, more importantly, subject to political cycles. All of these differences will be controlled by allowing state-specific paths of access to water and sanitation services, assuming that households' preferences over water and sanitation remain the same regardless of conflict intensity.

This paper focuses on access to water and sanitation services at the moment of the survey and not on the pattern over time. This is not to say that such a pattern does not exist, and it is entirely possible that households experienced changes in the access to water because of conflict. For instance, terrorist attacks may have destroyed water pipe infrastructure and forced the households to use other sources of water. Furthermore, it is possible that conflict could have forced the relocation of the household in a different state. Relocation can pose a problem for the estimation and biased the results. Households that are observed with lower access to water and sanitation services in more violent states, may end up being observed in less violent states and with a higher access to water and sanitation services. For this to be true, authorities in the receiving states need to fund the expansion of water and sanitation services, which is highly unlikely, and in Colombia, where displaced populations have settled in marginalized neighborhoods. The DHS data does not suggest a clear pattern about time living in the same place and access to water and sanitation services. For instance, households with access to piped water, toilet connected to the sewerage, and water on premises have, indeed, lived for longer in the region they dwell. However, the households that have always lived in the same place exhibit a lower access to the same set of services.

Another threat to identification refers to the regression at the individual level – those for the health of children. Parents may have different preferences over the investments needed for their children's development, or their health. A strategy in this case would be to include a household fixed effect, assuming that those preferences are time invariant at the household level. Unfortunately, since the empirical design implies that all children share the same stock of violence at the year of the survey, a household fixed effect will take the violence intensity out of the equation. Instead, the strategy chosen is to include as controls the maternal level of education and the location of the household. More educated mothers may care more about the hygiene and health of their children. Urban households are able to more easily invest in children as more services are available. Rural household, however, may need to engage children more in agricultural production.

DHS surveys households with women in reproductive age. Other households, with women in older age, are not included in the sample. The main concern is the exclusion of the households with older women (45 years and older) because it is possible to assume that women of younger age (from 0 to 14 years) are included as offspring in the households of women of reproductive age. With figures from the Colombian bureau of statistics (DANE 2012, Population series 1985-2020) for the years DHS were collected, women of reproductive age are roughly 46% of the total women population. The percentages of the 0 to 14 years old women went down from 36% in 1986 to 27.6% in 2010, while the percentages of the 45 years and older women went up from 17.5% in 1986 to 26% in 2010. How relevant is the health of the children for this last group of women? Most likely, their kids are older than 5 years old and less prone to the grave consequences of water borne diseases. By excluding this group, DHS allows to focus on the groups of women for whom access to water really make a difference in their parenting or their survival.

The final threat to the identification strategy comes from a measurement error in the conflict data. It is possible that the conflict indicators may suffer from underreporting. This would be true in the case of extortions (not all households may have incentives to report of being extorted), but not the rest of the indicators, when the whole society and the news media keep track of terrorist incidents and kidnappings. It is also possible that violence is not homogenous throughout the state. It is possible that only some regions of the state are under the burden of conflict, while other regions do not experience conflict-related events at all. If so, not all households are directly exposed. However, the theoretical model is not based on direct exposure to conflict, but on how conflict impacts a household's income and the prices that exist in the markets. Direct exposure is not ruled out, but it is only one possibility. Households are exposed as long as they experience the conflict-related changes in the markets. As some measurement of error can still be possible, the results to be presented have to be considered a lower bound.

Finally, standard errors could be correlated at the state level, since the stock of violence is computed for each state. More precise standard errors are obtained by clustering the standard errors at the state level.

VII. Estimation results

This section presents the results of the estimations at the household level (for access measures), and the individual level (for the health variables). The baseline models presented in equations 6 and 7 were estimated using Logit for the categorical-dependent variables (access to water on premise, access to piped water, access to toilet connected to the sewerage, and incidence of fever and diarrhea), while regular panel data estimation was employed for the regression on the time spent to and from the water source (measured in minutes). Those equations were modified to account for possible nonlinearities. If civil war leaves its impact on the environment and the water systems, having an echo tail, then a nonlinear relationship is needed. We employed a quadratic term for the stock of violence.

The results from the Logit estimations report the marginal effects, which represent a net state average effect of conflict on the access to water and sanitation services. It is the net effect after purging out some institutional, economic, and household features variables, because the data does not allow capturing independently all the income and price effects that take place while households make decisions. It is an average effect, due to the inclusion of state-fixed effects. The coefficient of the stock of conflict should be read as the average effect of civil conflict on access to water and sanitation services, as well as on children's health indicators across states, after controlling for time and state-fixed effects, and for state-specific trends.

The following tables contain only the marginal effects of the coefficients on the conflict indicators[5]. The discussion of the results is based on the total probability change (linear plus quadratic terms of the stock of conflict).

VII.1 Household-level regressions

These regressions estimate how civil conflict affects a household's access to water on the premise, piped water, toilet connected to the sewerage, and time spent to and from the water source.

Household's access to water on premise (Table 6)

Among the control variables, only the dummy variable for urban households is significant and indicates higher probability (7 percent) of urban households having water on premises than their rural counterparts. As for the conflict indicators, kidnapping, aggregated or averaged over five years, increases the probability of water on premises by 0.4 percent. Another positive relation, only around 0.6 percent, exists between the attacks against the police and the access to water on the premise. When the risk of being kidnapped is higher and the police are under attack and cannot provide safety to the citizens, households will invest in getting the water inside their dwellings to avoid being targeted by violence while searching for water outside their premises.

Household's access to pipped water (Table 7)

As can be expected, urban households have a higher probability (32 percent) of having piped water, compared with rural households. Another interesting finding is that an increase in the students-to-teacher ratio leads to an increase in piped water of around 0.1 percent. There might be, at some level, a tradeoff between government spending on education and in water systems, which is reasonable in a country with a budget under the pressure of military expenditure. On the conflict variables side, the aggregation of extortions over 20 years reduces the probability of access to piped water by 7.7 percent (significant at a 5 percent level). Another negative relationship is found with the number of mass-murder victims. Aggregating or averaging mass murder victims over five and 10 years reduces access to piped water by 2 percent and 9 percent, respectively. By increasing prices or reducing the households' incomes, extortion makes it difficult for the households to afford having access to piped water. The effect through the number of mass-murder victims may indicate that massacres bring such a disruption in the functioning of the society that the government and the water utilities cannot provide water services or cannot extend the water systems coverage.

Household's access to toilet connected to the sewerage system (Table 8)

Households dwelling in urban areas have a 71 percent higher probability of getting the toilet connected to the sewerage system. The number of terrorist attacks aggregated over 20 years

[5] Tables with full results are available in Appendix 2

before the survey increases by 10 percent the probability of connection to the sewerage system, but reduces it by 20 percent when using the 10 percent weighted average procedure. When attacks against the police are aggregated for 10 years, there is a 16 percent higher probability of connection. Surprisingly, there is a sign switch in the case of mass-murder victims aggregated for 10 years before the survey: the aggregation leads to a 68 percent increase in the probability, but the 10 and 20 percent averaging result, respectively, led to a 14 and 38 percent reduction in the probability. It has to be noted that the series for the mass-murder victims is relatively shorter, when compared to the other series of conflict indicators, and the coefficients may respond to a change in the sample. This result is surprising, since it would be reasonable to assume that mass murders and attacks against the police disrupt the delivery of essential services. One explanation is that the government and the households have internalized the effect of terrorism, either by rebuilding the sewerage network or by expanding the service. The sign switch calls attention to the relevance of the kind of conflict information households use in order to make their decisions.

Households' time spent to and from the water source (Table 9)

Kidnapping events one year before the survey reduce the time spent by 1.5 minutes, and later increase the time spent by 1.6 minutes and up to 4.3 minutes, when the figures of kidnappings are aggregated for 10 and 20 years, respectively. Households may react by changing the water sources to closer ones, but may resort again to further water sources after processing the information about the likelihood of being kidnapped by terrorist groups. Paradoxically, the attacks against the police increase the time spent by 5 minutes, in the case of the 5 years aggregation, and reduce it to 4 minutes, in the case of the 10 years aggregation. Families may be forced to substitute water sources, when they do not have access to water on premise, or piped water, and they may go to sources that are away from locations police are clashing with the terrorist groups. The coefficients skyrocket for the 10 years aggregation and averaging of mass-murder victims, with reductions taking values of 95 minutes (10 years aggregation), 44 minutes (10 percent averaging for 10 years), or 32 minutes (20 percent averaging for 10 years). With the same reasoning, households may prefer to spend less time in getting the water they need rather than being around water sources where they can be victims of massacres. This is particularly relevant, if women and children are responsible to haul the water from the water source, as forced recruitment and sexual abuses are common during civil war.

VII.2 Individual level regressions (children's health)

The following results use the individual level data on incidence of diarrhea and fever occurring in children during the last two weeks before the survey. DHS only asks for detailed information of children born during the five years prior to the date of the survey. The structure of the DHS may act as strength for the estimation, since this group (aged 5 years or younger) is the most vulnerable to diarrhea and infectious diseases. Nonetheless, the structure of the DHS also acts as a weakness, since the proposed theoretical model focuses on all the children of the household. As a consequence, this section of the results has to be taken with caution, and as a sort of a lower bound due to the sample restriction.

Incidence of diarrhea in children (Table 10)

Children living in urban settings have a 1.8 percent less probability of developing fever. Higher GDP per capita growth during the previous year increases the probability of diarrhea, with values that range between 25 and 28 percent. Since coefficients represent net average effects, it may be that the gains in nutrition explained by a higher income are offset by the increased labor opportunities for the parents that, in turn, reduce the time they spend taking care of the children. As for the conflict indicators, the number of the extortions in the year before the survey increases the likelihood of diarrhea by 7.4 percent; however, when aggregating the number of extortions over 10 years, the probability is reduced by 10 percent. It seems that the immediate threat of extortion, through its price and income effects, reduces the welfare and worsens the health of children; on the contrary, in the long run, households may adapt to the threat of being extorted, and that explains the sign switch. The terrorist attacks in the year before the survey reduced the probability of diarrhea by 1 percent. The 10 years averaging of attacks against the police also reduced the probability by 11 percent (for the 10 percent averaging) and 8 percent (for the 20 percent averaging). This reduction could be caused by the fact that parents may take precautionary measures (such as increasing the leisure time they spend with children, which translates into more parental supervision and better health).

Incidence of fever in children (Table 11)

The control variables suggest that children living in urban areas face a 2.1 percent higher risk of experiencing fever over the two weeks prior to the survey. It is possible that more agglomeration makes easier the contagion of the infectious processes causing fever. In this line, larger secondary students-to-teacher ratios raise the likelihood of fever by values ranging from 1 to 2 percent. The aggregation or averaging of the terrorist attacks for five and 10 years reports an increase of the fever probability around 2 percent. It may be that the terrorist attacks cause pollution (due to the debris and the destruction of infrastructure), but also that children experience the post-traumatic stress disorder that weakens their health. Finally, the number of mass-murder victims in the year before the survey reduces the probability of fever (close to 3 percent), but the aggregation for five and 10 years consistently increases up to 19 percent. Using the 10 percent and 20 percent weighted average for five and 10 years raises the probability around 6.5 percent. Again, the post-traumatic stress disorder may explain this result.

VII.3 Robustness checks

Total conflict and total conflict factorial

The first robustness check deviates from the use of the leading conflict indicators for Colombia and creates a measure of total conflict. This strategy takes into consideration that the environment and the population may suffer from the overall violent climate created by the civil war. It assumes that the whole process of violent conflict, operating jointly through the different types of crimes, is the one causing the negative externalities for the environment and the households. A variable named "total conflict" was computed by adding all the criminal incidents per state per year, assuming equal impact for each. It then applies the proposed one, five, 10, and 20 years aggregation or weighted average (10 percent and 20 percent growing weights). Since it is not clear how the aggregation process works, and since the five measures of conflict are correlated, a principal component analysis was applied. The first factor of a factorial analysis over the chosen five measures of conflict per state and per year was then computed. This factorial measure was also aggregated or averaged as described in the data section.

The coefficients suggest that total conflict and total conflict factorial increase the probability of having water on premise by 0.5 percent. A sign switch occurs during time spent traveling to and from the water source: the total conflict measures during the previous year translates into a 1.4-minute reduction in the time the household spends, but the total conflict during the previous 20 years increases the time by 2.8 minutes. The factorial measure of the conflict aggregation results in a 9-minute increase, but a 16-minute and 42-minute reduction in time spent when the aggregation is made for 10 and 20 years before the survey. All these values may hide a tradeoff between quantity and quality, with households preferring closer water sources with low quality. The lower the quality, the more the households have to spend on treating the water at home (boiling the water or using bleach), but this might be the only option when the civil war level is high.

As for the individual level regressions, total conflict during the year before the survey increases the probability of children having fever by 0.5 percent, while total conflict factorial over the same period reduces the probability by 5 percent. The difference in sign and in magnitude between these two measures can be an indication of how households may react to different conflict intensity information and, moreover, how they can help their children to cope with the post-traumatic stress.

Difference in difference procedure (Table 12)

In 2002, the government of President Alvaro Uribe took office and launched an offensive against the LWT and RWT groups throughout the country. Although the offensive had a national reach, it was specially focused on the territories in which the terrorist groups carried out most of their criminal activities. The offensive went on until the end of Uribe's government in 2010, a period that has seen the most drastic reduction in the conflict indicators. Using this quasi-natural experiment, a difference-in-difference estimation is carried out as a robustness check of the results. The year of the beginning of the offensive, 2002, will divide the surveys into two groups: surveys that took place before the offensive (1986, 1990, 1995, and 2000) and surveys that took place after the offensive started (2005 and 2010). The treatment group contains the states that received the main burden of the offensive, while the control group includes those states in which the offensive was not as intense. States were classified within these groups according to two criteria: first, whether the state was traditionally a place for the high intensity of the terrorist activities; and second, whether the state had a total conflict indicator per year that was above the national average in more than 50 percent of the years up until the offensive. Not presented here, but available upon request, is a summary of statistics indicating that there are no observable differences (from the DHS and quality institutional variables) between the treatment and the control groups before the offensive.

The regression equations for the difference-in-difference include the institutional quality variables (GDP growth per capita and the students-to-teacher ratios for primary and secondary education), and state-specific trends. The results indicate that the offensive during the Uribe government led to an increase of nearly 9 percent in the incidence of fever. Such an increase in fever could be explained by the possible post-traumatic disorder that children living in the offensive states could have experienced. It seems that intensity, measured in the civil war events per 100,000 inhabitants per state and per year, does matter in order to measure the impact of conflict on access to water and sanitation services. Besides, it can be that the government offensive may have, at most, offset the negative impact of conflict on access to water and sanitation.

VIII. Conclusion

Civil war takes a toll on the environment through the destruction of infrastructure and the pollution generated from combats and preparedness for war. Additionally, civil war forces the relocation of populations, thus abandoning natural resources and infrastructure, or conversely, leading to massive inflows of refugees that places extra pressure on the resources in the receiving communities. Water sources and systems, as well as sanitation services, suffer directly from the destruction and pollution, and indirectly through the changes in the expenditure of government and households. Governments relocate their expenditure to fund the military efforts, leading households to suffer from increased prices and reduced incomes, due to war. Because of the changes in access to water and sanitation, children may experience water-borne diseases, as well as diseases caused by poorer nutrition and post-traumatic stress disorder.

This research proposed a household utility maximization model. It is assumed that households' decisions are aimed at coping with the negative externalities of war violence and that the environmental effect of the civil war stays as an echo in the natural systems. Another assumption is that civil war violence acts, simultaneously, as a price and income tax on the households. Out of the theoretical model, four hypotheses are tested with the econometric models. In summary, higher civil war intensity reduces the access and the quality of water; access to toilets connected to the sewerage system is reduced by higher conflict intensity; civil war leads to deterioration of the health of children; and, the quality of institutions can counteract the negative effects of civil war on access to water and sanitation services.

Using the Colombian civil war as case study and using six waves of the DHS for that country, the effect of civil war is estimated on the access and sanitation services at the household level and on the health-related variables at the individual level. The main results indicate that the effect of civil war is significant and its sign, whether negative or positive, depends on the length of the aggregation or averaging of conflict indicators. Furthermore, the relationship is not linear, as significant squared terms are found for most of the estimations. With respect to the hypotheses, it can be said that civil war does reduce the access to water and sanitation services and worsens the health of children; however, there is evidence of some positive effects that ought to be interpreted as the result of households' strategic behavior and adaptation to the reality imposed by conflict. The up to 9-minute increase in the time households have to spend to and from the water sources points out an increase in an opportunity cost. With a back of the envelope calculation, using the monthly $317 minimum monthly wage and assuming that households may need to get water at least three times a week, the effect of conflict represents 27 more minutes per week or 108 minutes a month, which has a labor equivalent value of $3.56, nearly 1 percent of the monthly wage. Given that the change in the quality of water is not directly controlled, it can only be assumed that the exposure to lower-quality water forces the household to reallocate resources for potabilization and purification. Finally, it seems that the institutions, or at least the institutional variables considered in this paper, have no significant effect on the access and health measures and, therefore, cannot counteract the negative effect of conflict.

Possible interventions are necessary during any war, but war itself makes it difficult for any government to solve the trade-off between military expenditure and investment in health, education, water, and other social needs. Nevertheless, as part of the strategy to win minds and hearts during civil war, governments should invest in granting access to water and sanitation services to households – especially for those who were forced to relocate – and to increase the health services for children. Feasible interventions can be of the sort of investing in the maintenance of water systems in pacified areas or in areas that can be receiving refugees. To avoid shortages or to reduce the time households spend on getting water, government could deliver tank trucks that distribute water where needed. Finally, governments should design programs, such as health brigades or the distribution of nutrition supplements, targeting children and their caretakers.

Further research needs to use panel data at the household level, where available, from countries under war or civil war, as well as other methods for aggregations or averaging various conflict indicators. Panel data will allow researchers to track the access to water and sanitation services of a household over time, offering a more complete picture of the household's strategic behavior. The use of several conflict indicators can help find the measure households use as a basis for making their decisions and to account for the environmental effect of war. Additional research may also explore the differential impact according to the household composition, the ages of the children and the age of parents in order to assess the relevance of fertility as a reason to have access to improved water sources and improved sanitation services. Further research should address the problem of the institutional variables at the community or extended-family level to control for the support networks households rely upon when living under civil war conditions.

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TABLES AND FIGURES

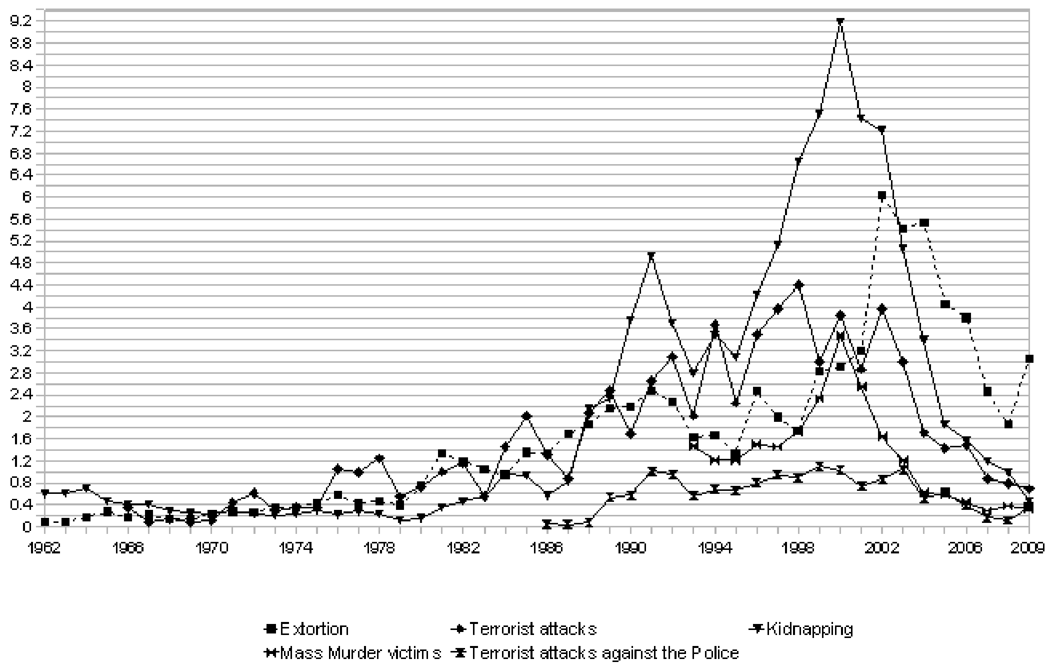

Figure 1: Main conflict indicators 1962-2010 (per 100,000 inhabitants)[a]

[a]Source: Policia Nacional de Colombia, Revista Criminalidad, 2008-2010

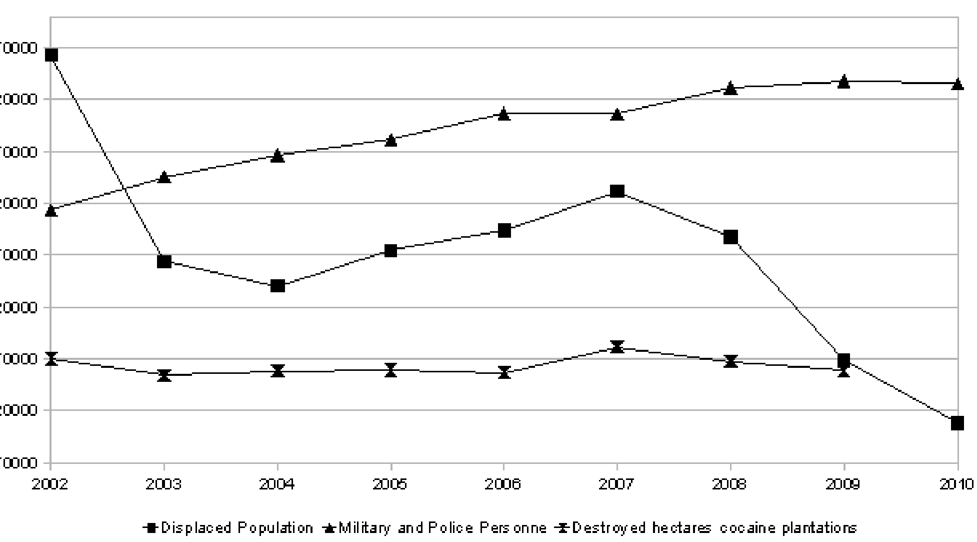

Figure 2: Military campaign indicators (2002-2010)[a]

[a]Source: Ministerio de Defensa Nacional, 2010

Table 1: Access to improved water source and improved sanitation facility (share of population)[a]

Year	Improved sanitation facilities	Improved water sources
1990	0.68	0.88
1995	0.70	0.90
2000	0.74	0.91
2005	0.74	0.92
2008	0.74	0.92

[a]Source: World Development Indicators, 2012

Table 2: 2005 Census variables on access to water and sanitation facilities (share of households)[a]

Indicator	Water in the house	Water on premises	Pipped Water	Connected to public sewerage	Connected to septic system	Exclusive
Total Country	0.760	0.157	0.786	0.725	0.152	0.845
Maximum	0.940	0.495	0.939	0.975	0.845	0.964
Minimum	0.150	0.025	0.042	0.067	0.018	0.384
Average	0.593	0.261	0.599	0.556	0.252	0.763
Standard Deviation	0.224	0.124	0.282	0.244	0.164	0.153

[a]Source: DANE, Censo 2005.

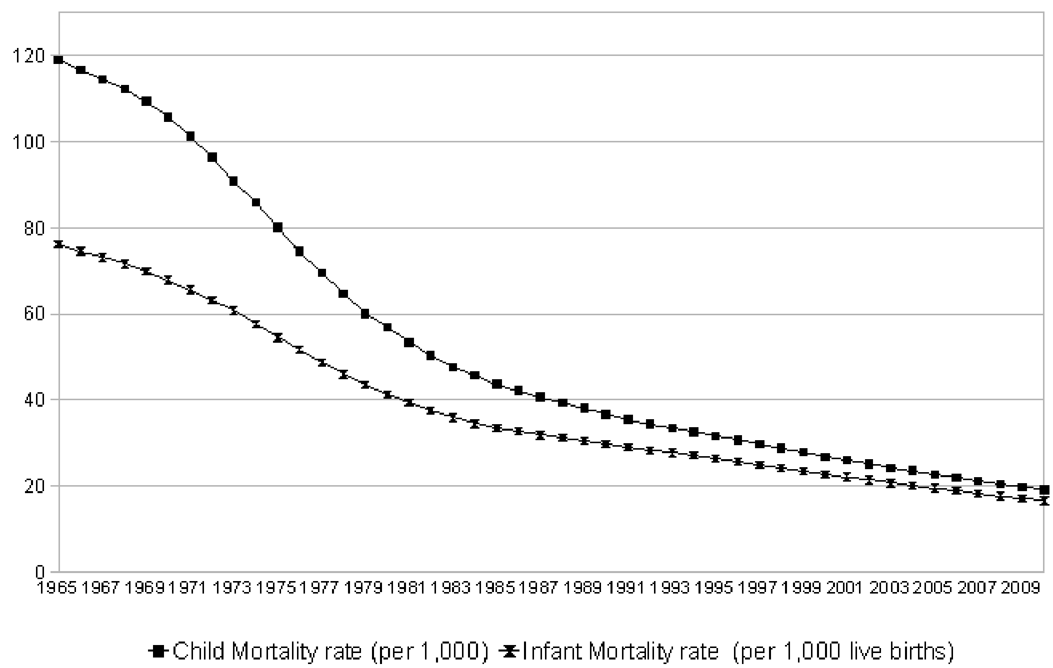

Figure 1: Evolution of child and infant mortality (1965-2010)[a]

[a]Source: World Bank Development Indicators, 2012

Table 3: Conditions for the comparative statics

Condition	Formula
Second Order Conditions for a maximum	$\frac{U_{\ell w}+U_{\ell H_c}H'_c}{U_{Xw}+U_{XH_c}H'_c} < \frac{r(1-T_\theta)}{p_X(1+t_\alpha)}$
	or $\frac{r(1-T_\theta)}{p_X(1+t_\alpha)} < \frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}$
$\frac{\partial w}{\partial p_w} < 0$	$U_{XX}U_{\ell\ell} > U_{X\ell}U_{\ell X}$
$\frac{\partial w}{\partial t_\alpha} < 0$	$U_{XX}U_{\ell\ell} > U_{X\ell}U_{\ell X}$
	$\frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}} > \frac{r(1-T_\theta)}{p_X(1+t_\alpha)}$
$\frac{\partial w}{\partial T_\theta} < 0$	$U_{XX}U_{\ell\ell} > U_{X\ell}U_{\ell X}$
	$\frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}} > \frac{r(1-T_\theta)}{p_X(1+t_\alpha)}$
$\frac{\partial w}{\partial \overline{q}} > 0$	$\frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}} > \frac{r(1-T_\theta)}{p_X(1+t_\alpha)}$
	or $\frac{U_{\ell w}+U_{\ell H_c}H'_c}{U_{Xw}+U_{XH_c}H'_c} < \frac{r(1-T_\theta)}{p_X(1+t_\alpha)}$

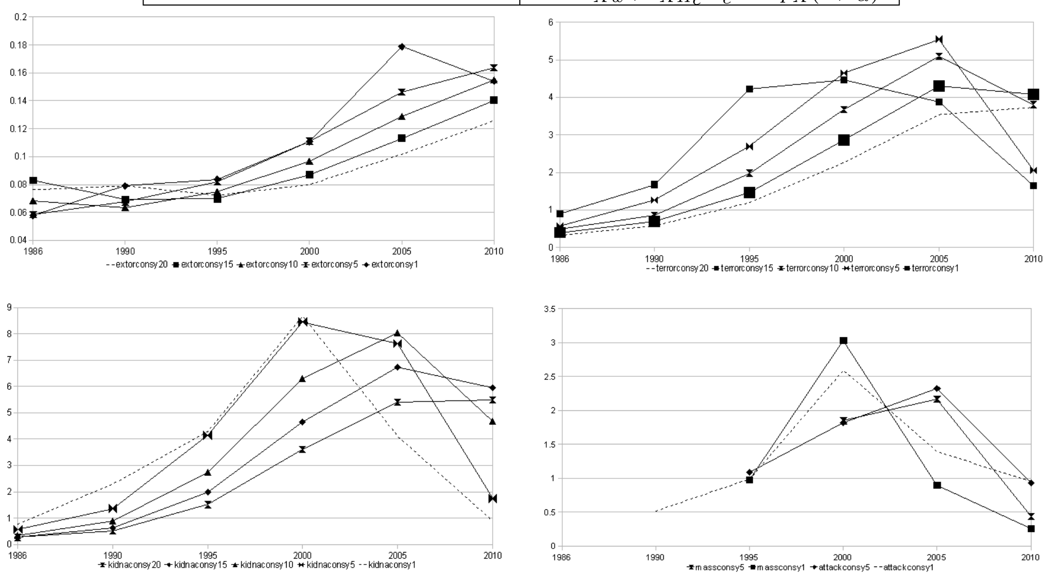

Figure 4: Simple aggregation for each conflict indicator by survey year (figures per 100,000 inhabitants)

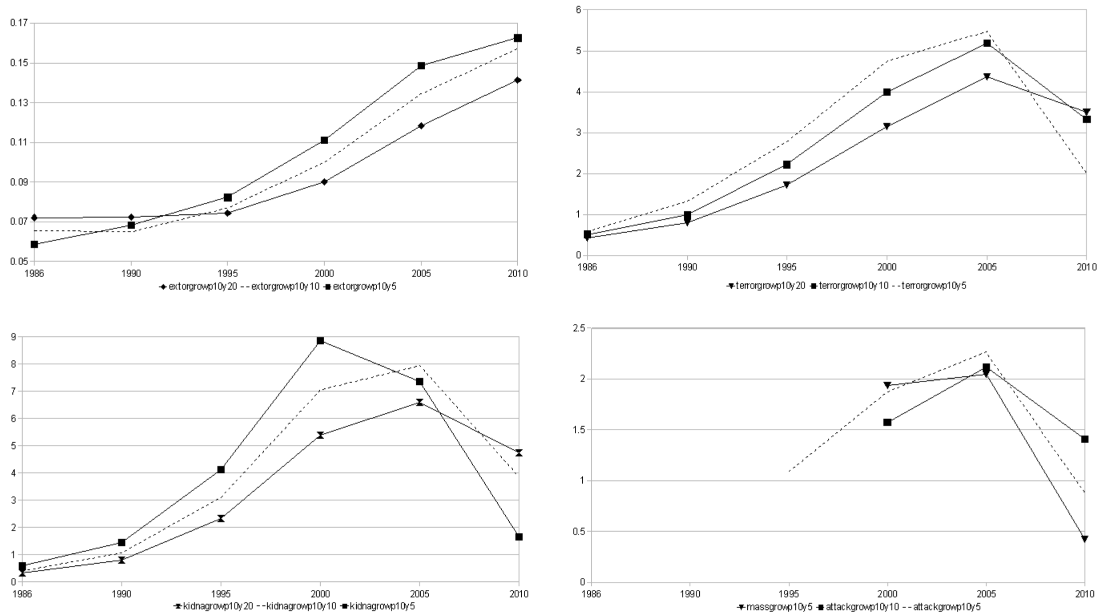

Figure 5: Averaging of each conflict indicator with 10% growing weight ($\beta = 0.1$) by survey year (Figures per 100,000 inhabitants)

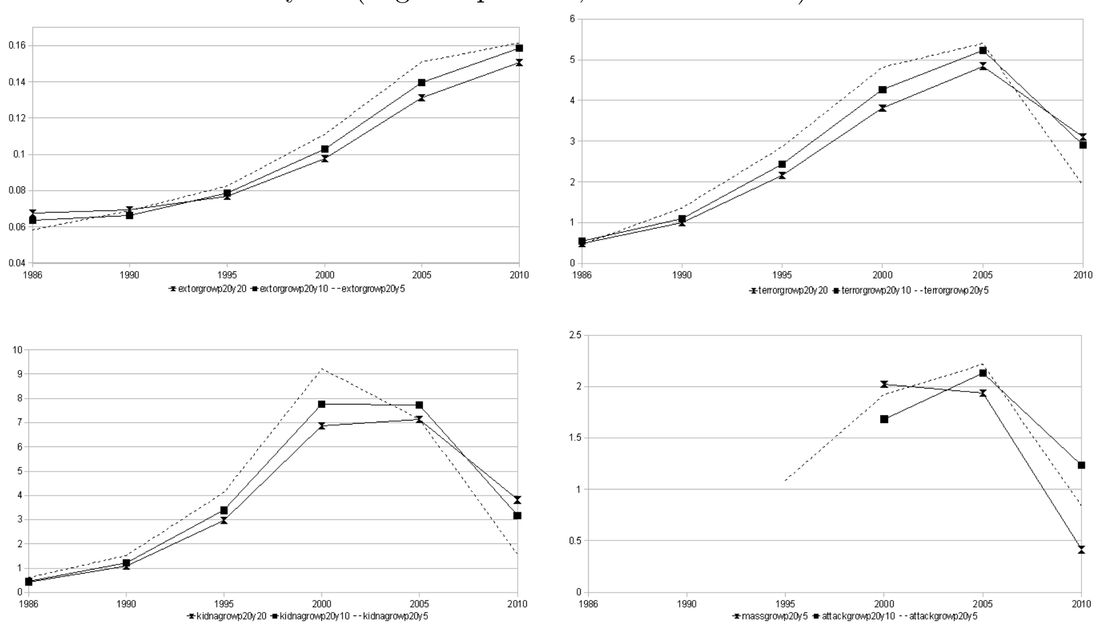

Figure 6: Averaging with 20% growing weight ($\beta = 0.2$) by survey year (Figures per 100,000 inhabitants)

Table 4: DHS Variables of Interest summary statistics[a]

Variable	1986	1990	1995	2000	2005	2010
Household level						
Pipped water main source of water	0.742	0.879	0.801	0.853	0.758	0.714
Water on the premise	0.809	0.952	0.912	0.952	0.938	0.946
Time to water source (minutes)	13.461	19.756	16.737	18.990	17.649	17.800
Sanitary services connected to sewerage system	0.625	0.786	0.674	0.693	0.690	0.652
Electricity in the household	0.849	0.942	0.919	0.957	0.963	0.950
Household located in urban area	0.694	0.859	0.719	0.734	0.751	0.705
Respondent always living in the sample place	0.328	0.387	0.377	0.420	0.438	0.431
Respondent with no education	0.081	0.045	0.053	0.047	0.041	0.030
Respondent with primary education	0.586	0.448	0.448	0.407	0.353	0.329
Respondent with secondary education	0.302	0.429	0.427	0.449	0.467	0.472
Respondent with higher education	0.030	0.077	0.072	0.096	0.139	0.168
Respondent currently married	0.800	0.776	0.755	0.715	0.697	0.716
Male head of household	NA	0.801	0.791	0.737	0.705	0.677
Number of households	3043	5086	7109	7825	24241	35126
Individual level						
Children with diarrhea	0.188	0.121	0.168	0.142	0.151	0.143
Children with fever	0.299	0.197	0.273	0.254	0.256	0.270

[a]Source: DHS. Authors' computations

Table 5: Summary statistics of quality of institutional proxy variables (averages)[a]

Variable	Year of the survey					
	1986	1990	1995	2000	2005	2010
GDP percapita growth	0.037	0.045	0.019	-0.039	0.013	0.014
Primary gross enrollment rate	0.933	1.044	1.059	1.145	1.163	1.103
Secondary gross enrollment rate		0.387	0.544	0.668	0.816	0.730
Primary students-to-teachers ratio	27.713	25.225	23.546	21.900	26.368	24.857
Secondary students-to-teachers ratio		18.301	19.179	16.863	24.363	20.159
Primary teachers-to-school ratio	3.604	4.057	3.724	3.586	3.311	3.226
Secondary teachers-to-school ratio		17.803	17.304	14.604	7.244	10.321
Primary students-to-school ratio	100.121	102.801	88.015	78.690	87.616	81.464
Secondary students-to-school ratio		326.635	326.365	246.704	185.738	209.031

[a]Source: DANE. All variables computed in the year before the survey to be consistent with the armed conflict intensity data

Table 6: Effect of conflict on household's access to water on premises[a]

Conflict Indicator	Regression Information	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
		1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Kidnappings	Linear	0.001	0.003	-0.001	0.000	0.004	-0.001	0.002	0.003	-0.001	0.002
		(0.001)	(0.001)**	(0.001)	(0.002)	(0.001)***	(0.001)	(0.003)	(0.001)***	(0.002)	(0.002)
	Quadratic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
		(0.000)	(0.000)**	(0.000)	(0.000)	(0.000)***	(0.000)	(0.000)	(0.000)**	(0.000)	(0.000)
	Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
	R-Squared	0.305	0.3120	0.3060	0.3038	0.3125	0.3046	0.3041	0.3117	0.3038	0.3044
Attacks against the Police	Linear	0.006	-0.002	0.045		-0.003	-0.005		-0.003	-0.006	
		(0.002)***	(0.003)	(0.022)*		(0.004)	(0.003)		(0.004)	(0.003)*	
	Quadratic	0.000	6.97e-06	-0.011		4.97e-06	0.000		0.000	0.000	
		(0.000)***	(0.000)	(0.005)*		(0.000)	(0.000)		(0.000)	(0.000)	
	Observations	77464	73225	66116		73225	66116		73225	66116	
	R-Squared	0.3124	0.2998	0.3196		0.3006	0.2857		0.3014	0.2867	
Total Conflict	Linear	0.002	0.001	0.000	0.000	0.002	0.000	0.001	0.002	0.000	0.001
		(0.001)*	(0.001)*	(0.001)	(0.002)	(0.001)**	(0.001)	(0.001)	(0.001)*	(0.001)	(0.001)
	Quadratic	0.000	0.000	0.000	-8.68e-06	0.000	-5.09e-06	0.000	0.000	-5.42e-06	0.000
		(0.000)	(0.000)**	(0.000)	(0.000)	(0.000)**	(0.000)**	(0.000)	(0.000)**	(0.000)	(0.000)
	Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
	R-Squared	0.3089	0.3081	0.3055	0.3038	0.3082	0.3042	0.3041	0.3079	0.3039	0.3044
Total Conflict (Factorial)	Linear	0.008	0.011	-0.004	0.004	0.012	-0.002	0.007	0.012	0.001	0.007
		(0.004)*	(0.005)**	(0.004)	(0.006)	(0.006)**	(0.006)	(0.008)	(0.005)**	(0.007)	(0.008)
	Quadratic	-0.003	-0.001	-0.001	0.000	-0.001	0.000	-0.001	-0.001	0.000	-0.001
		(0.001)*	(0.001)**	(0.001)	(0.002)	(0.001)**	(0.001)	(0.001)	(0.001)**	(0.001)	(0.001)
	Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
	R-Squared	0.3087	0.3086	0.3057	0.3041	0.3088	0.3044	0.3043	0.3085	0.3039	0.3045

[a] Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table 7: Effect of conflict on household's access to pipped water[a]

Conflict Indicator	Regression Information	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
		1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	Linear	-0.127	-0.153	0.002	-0.775	-0.168	-0.066	-0.390	-0.178	-0.121	-0.238
		(0.122)	(0.169)	(0.159)	(0.370)**	(0.172)	(0.158)	(0.245)	(0.173)	(0.172)	(0.210)
	Quadratic	0.141	0.199	-0.092	0.560	0.214	0.024	0.191	0.222	0.117	0.181
		(0.118)	(0.209)	(0.142)	(0.408)	(0.204)	(0.163)	(0.239)	(0.197)	(0.203)	(0.235)
	Observations	81470	81470	81470	81470	81470	81470	81470	81470	81470	81470
	R- Squared	0.3342	0.3342	0.3340	0.3357	0.3342	0.3340	0.3347	0.3343	0.3340	0.3342
Attacks against the Police	Linear	0.031	-0.015	0.265		-0.017	-0.023		-0.016	-0.032	
		(0.011)***	(0.016)	(0.154)*		(0.018)	(0.028)		(0.019)	(0.026)	
	Quadratic	-0.002	0.001	-0.045		0.001	0.001		0.001	0.001	
		(0.001)***	(0.001)	(0.041)		(0.001)	(0.001)		(0.001)	(0.001)	
	Observations	81470	77000	69513		77000	69513		77000	69513	
	R- Squared	0.3372	0.3309	0.3239		0.3309	0.3266		0.3309	0.3267	
Mass murder victims	Linear	0.026	-0.046	-0.090		-0.048	-0.113		-0.049	-0.118	
		(0.025)	(0.019)***	(0.058)		(0.019)**	(0.039)***		(0.020)**	(0.032)***	
	Quadratic	-0.004	0.007	0.011		0.007	0.014		0.008	0.015	
		(0.004)	(0.002)***	(0.006)*		(0.003)***	(0.004)***		(0.003)***	(0.004)***	
	Observations	77000	69513	61685		69513	61685		69513	61685	
	R- Squared	0.3311	0.3277	0.3253		0.3278	0.3263		0.3278	0.3269	

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table 8: Effect of conflict on household's access to toilet connected to the sewerage system[a]

Conflict Indicator	Regression Information	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
		1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	Linear	0.048	0.190	0.203	-0.217	0.193	0.218	0.283	0.187	0.227	0.250
		(0.182)	(0.214)	(0.237)	(0.529)	(0.215)	(0.230)	(0.362)	(0.213)	(0.242)	(0.290)
	Quadratic	-0.025	0.155	0.361	0.645	0.098	0.457	0.603	0.063	0.296	0.411
		(0.182)	(0.213)	(0.256)	(0.483)	(0.211)	(0.237)*	(0.280)**	(0.205)	(0.262)	(0.305)
	Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
	R- Squared	0.4614	0.4622	0.4620	0.4616	0.4621	0.4622	0.4620	0.4620	0.4622	0.4622
Terrorist attacks	Linear	0.015	0.009	0.034	0.163	0.009	0.023	0.107	0.009	0.017	0.039
		(0.026)	(0.029)	(0.025)	(0.094)*	(0.028)	(0.027)	(0.052)**	(0.028)	(0.027)	(0.036)
	Quadratic	0.000	0.000	-0.003	-0.024	0.000	-0.002	-0.011	0.000	-0.001	-0.003
		(0.002)	(0.003)	(0.002)	(0.011)**	(0.003)	(0.003)	(0.005)**	(0.003)	(0.003)	(0.003)
	Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
	R- Squared	0.4617	0.4616	0.4615	0.4622	0.4616	0.4615	0.4619	0.4615	0.4615	0.4615
Kidnappings	Linear	-0.004	0.003	0.006	0.007	0.000	0.001	0.004	0.000	0.001	0.003
		(0.006)	(0.007)	(0.012)	(0.025)	(0.009)	(0.014)	(0.022)	(0.009)	(0.012)	(0.015)
	Quadratic	0.001	0.000	0.000	-0.002	0.000	0.000	-0.001	0.000	0.000	0.000
		(0.000)**	(0.000)	(0.000)*	(0.001)***	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
	Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
	R- Squared	0.4623	0.4616	0.4618	0.4626	0.4615	0.4617	0.4618	0.4615	0.4616	0.4616
Attacks against the Police	Linear	0.031	-0.083	-0.349		-0.071	0.079		-0.061	0.031	
		(0.054)	(0.112)	(0.027)***		(0.115)	(0.339)		(0.115)	(0.269)	
	Quadratic	-0.002	0.044	0.381		0.041	0.045		0.040	0.045	
		(0.003)	(0.024)*	(0.013)***		(0.024)	(0.057)		(0.025)	(0.047)	
	Observations	81491	77009	69511		77009	69511		77009	69511	
	R- Squared	0.4616	0.4613	0.4599		0.4614	0.4519		0.4614	0.4520	
Mass murder victims	Linear	-0.024	-0.110	-0.452		-0.120	-0.633		-0.124	-0.741	
		(0.041)	(0.066)*	(0.131)***		(0.078)	(0.054)***		(0.091)	(0.038)***	
	Quadratic	0.005	0.010	0.712		0.013	0.302		0.015	0.225	
		(0.006)	(0.006)	(0.037)***		(0.008)	(0.015)***		(0.010)	(0.011)***	
	Observations	77009	69511	61685		69511	61685		69511	61685	
	R- Squared	0.4601	0.4512	0.4476		0.4510	0.4476		0.4510	0.4476	
Total Conflict	Linear	0.002	0.004	0.010	0.018	0.001	0.007	0.015	0.000	0.005	0.009
		(0.008)	(0.005)	(0.008)	(0.017)	(0.006)	(0.009)	(0.013)	(0.006)	(0.008)	(0.009)
	Quadratic	0.000	0.000	0.000	-0.002	0.000	0.000	-0.001	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)***	(0.000)***	(0.000)	(0.000)	(0.000)**	(0.000)	(0.000)	(0.000)*
	Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
	R- Squared	0.4621	0.4615	0.4618	0.4626	0.4614	0.4616	0.4619	0.4614	0.4615	0.4616

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table 9: Effect of conflict on household's time spent to and from water source[a]

Conflict Indicator	Regression Information	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
		1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	Linear	17.864	-4.542	34.544	-34.542	-3.871	32.859	19.840	-1.892	17.249	17.806
		(9.932)*	(29.809)	(25.648)	(81.358)	(30.339)	(33.712)	(57.629)	(30.101)	(36.381)	(47.016)
	Quadratic	-12.977	-17.946	-137.071	27.193	-12.716	-125.813	-107.552	-10.673	-65.374	-76.747
		(9.899)	(35.285)	(81.338)*	(98.159)	(31.831)	(82.440)	(95.047)	(29.501)	(59.924)	(75.242)
	Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
	R- Squared	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Terrorist attacks	Linear	-1.969	-2.664	-3.043	7.875	-2.401	-3.953	-3.884	-2.208	-3.649	-4.723
		(1.427)	(1.783)	(2.597)	(9.279)	(1.681)	(2.530)	(4.072)	(1.626)	(2.125)*	(2.925)
	Quadratic	0.122	0.322	0.393	-0.701	0.280	0.498	0.575	0.248	0.442	0.594
		(0.097)	(0.172)*	(0.289)	(1.097)	(0.148)*	(0.300)*	(0.421)	(0.132)*	(0.230)*	(0.326)*
	Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
	R- Squared	0.001	0.0006	0.0007	0.0003	0.0006	0.0007	0.0005	0.0006	0.0006	0.0006
Kidnappings	Linear	-1.850	0.574	1.832	5.110	0.604	1.617	2.901	0.341	1.032	1.346
		(0.509)***	(0.591)	(0.896)**	(2.148)**	(0.729)	(1.015)	(1.757)*	(0.730)	(0.958)	(1.235)
	Quadratic	0.119	-0.024	-0.060	-0.284	-0.025	-0.053	-0.110	-0.016	-0.037	-0.051
		(0.024)***	(0.018)	(0.024)**	(0.087)***	(0.024)	(0.029)*	(0.055)**	(0.025)	(0.029)	(0.039)
	Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
	R- Squared	0.0013	0.0004	0.0004	0.0001	0.0005	0.0003	0.0002	0.0001	0.0000	0.0000
Attacks against the Police	Linear	-3.080	9.571	11.356		7.773	23.865		6.285	19.503	
		(2.775)	(4.378)**	(5.051)**		(4.643)*	(13.096)*		(4.895)	(9.983)*	
	Quadratic	0.106	-4.065	-11.300		-3.571	-7.588		-3.163	-6.544	
		(0.162)	(1.070)***	(2.082)***		(1.067)***	(2.973)**		(1.090)***	(2.250)***	
	Observations	4674	4457	3827		4457	3827		4457	3827	
	R- Squared	0.0074	0.0045	0.0004		0.0047	0.0062		0.0052	0.0058	
Mass murder victims	Linear	0.696	1.817	-197.061		-1.401	-90.969		-4.359	-65.470	
		(3.054)	(6.597)	(1.093)***		(8.457)	(0.243)***		(9.813)	(0.167)***	
	Quadratic	0.185	-0.366	63.408		-0.031	31.822		0.293	24.925	
		(0.479)	(0.659)	(0.148)***		(0.890)	(0.074)***		(1.103)	(0.087)***	
	Observations	4457	3827	3435		3827	3435		3827	3435	
	R- Squared	0.0004	0.0014	0.0013		0.0010	0.0013		0.0007	0.0007	
Total Conflict	Linear	-1.868	0.108	0.907	3.796	-0.110	0.531	1.501	-0.415	0.087	0.385
		(0.634)***	(0.501)	(0.750)	(1.806)**	(0.574)	(0.804)	(1.386)	(0.582)	(0.739)	(0.965)
	Quadratic	0.082	-0.003	-0.022	-0.143	0.005	-0.013	-0.043	0.016	-0.000	-0.010
		(0.028)***	(0.014)	(0.018)	(0.060)**	(0.017)	(0.020)	(0.036)	(0.018)	(0.020)	(0.027)
	Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
	R- Squared	0.0054	0.0001	0.0002	0.0001	0.0000	0.0001	0.0005	0.0002	0.0000	0.0001
Total Conflict (Factorial)	Linear	-5.784	2.644	11.688	20.512	1.345	8.081	15.342	-0.612	3.661	5.701
		(2.136)***	(3.094)	(4.845)**	(6.673)***	(3.489)	(5.401)	(7.459)**	(3.234)	(4.653)	(5.428)
	Quadratic	2.787	-0.931	-3.412	-9.146	-0.356	-2.249	-4.427	0.471	-0.951	-1.607
		(0.903)***	(0.978)	(1.161)***	(1.866)***	(1.162)	(1.410)	(1.753)**	(1.117)	(1.334)	(1.437)
	Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
	R- Squared	0.0056	0.0004	0.0001	0.0006	0.0002	0.0001	0.0012	0.0000	0.0001	0.0004

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table 10: Effect of conflict on incidence of diarrhea in children[a]

Conflict Indicator	Regression Information	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
		1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	Linear	0.098	-0.016	-0.151	-0.142	0.004	-0.100	-0.099	0.021	-0.040	-0.040
		(0.037)***	(0.081)	(0.088)*	(0.160)	(0.080)	(0.089)	(0.115)	(0.077)	(0.102)	(0.114)
	Quadratic	-0.127	0.036	0.323	0.328	0.003	0.219	0.295	-0.022	0.093	0.112
		(0.043)***	(0.162)	(0.099)***	(0.231)	(0.152)	(0.160)	(0.198)	(0.140)	(0.209)	(0.255)
	Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
	R- Squared	0.0134	0.0132	0.0134	0.0133	0.0132	0.0133	0.0133	0.0132	0.0132	0.0132
Terrorist attacks	Linear	-0.013	-0.006	-0.011	-0.022	-0.007	-0.010	-0.031	-0.008	-0.010	-0.018
		(0.004)***	(0.006)	(0.007)	(0.019)	(0.006)	(0.007)	(0.013)**	(0.007)	(0.007)	(0.009)**
	Quadratic	0.001	0.000	0.001	0.004	0.000	0.001	0.003	0.000	0.001	0.002
		(0.000)**	(0.000)	(0.001)*	(0.002)*	(0.001)	(0.001)*	(0.001)**	(0.001)	(0.001)	(0.001)**
	Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
	R- Squared	0.0135	0.0132	0.0132	0.0133	0.0132	0.0132	0.0133	0.0133	0.0132	0.0133
Attacks against the Police	Linear	-0.010	-0.046	0.306		-0.046	-0.144		-0.045	-0.114	
		(0.009)	(0.025)*	(0.029)		(0.025)*	(0.057)**		(0.024)*	(0.046)**	
	Quadratic	0.001	0.011	-0.320		0.010	0.029		0.010	0.024	
		(0.001)	(0.006)*	(0.016)**		(0.006)*	(0.013)**		(0.006)*	(0.011)**	
	Observations	44324	41251	36289		41251	36289		41251	36289	
	R- Squared	0.0132	0.0136	0.0171		0.0136	0.0147		0.0136	0.0147	
Mass murder victims	Linear	0.000	0.013	0.561		0.018	0.296		0.022	0.214	
		(0.009)	(0.016)	(0.021)***		(0.017)	(0.009)***		(0.018)	(0.006)***	
	Quadratic	-0.001	0.001	-0.209		0.000	-0.126		0.000	-0.103	
		(0.001)	(0.002)	(0.006)***		(0.002)	(0.003)***		(0.002)	(0.002)***	
	Observations	41251	36289	31732		36289	31732		36289	31732	
	R- Squared	0.0135	0.0148	0.0162		0.0148	0.0162		0.0148	0.0162	

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table 11: Effect of conflict on incidence of fever in children[a]

Conflict Indicator	Regression Information	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
		1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Terrorist attacks	Linear	-0.003	0.023	0.021	-0.046	0.020	0.028	0.005	0.017	0.029	0.028
		(0.005)	(0.011)**	(0.010)**	(0.042)	(0.011)*	(0.013)**	(0.024)	(0.011)	(0.013)**	(0.016)*
	Quadratic	0.000	-0.002	-0.001	0.010	-0.002	-0.002	0.001	-0.002	-0.003	-0.002
		(0.000)	(0.001)**	(0.001)	(0.006)*	(0.001)**	(0.001)*	(0.002)	(0.001)*	(0.001)**	(0.002)*
	Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
	R- Squared	0.0109	0.0110	0.0109	0.0112	0.0110	0.0109	0.0109	0.0109	0.0110	0.0109
Kidnappings	Linear	0.003	-0.001	-0.003	0.001	0.000	-0.002	-0.003	-0.001	-0.002	-0.002
		(0.003)	(0.003)	(0.005)	(0.009)	(0.004)	(0.006)	(0.009)	(0.005)	(0.006)	(0.007)
	Quadratic	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
		(0.000)**	(0.000)	(0.000)***	(0.000)***	(0.000)**	(0.000)*	(0.000)	(0.000)	(0.000)	(0.000)
	Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
	R- Squared	0.0109	0.0111	0.0112	0.0113	0.0111	0.0111	0.0112	0.0110	0.0111	0.0111
Attacks against the Police	Linear	-0.010	-0.024	0.068		-0.024	-0.008		-0.025	-0.022	
		(0.013)	(0.034)	(0.042)		(0.033)	(0.096)		(0.032)	(0.067)	
	Quadratic	0.001	0.008	-0.206		0.008	0.006		0.008	0.008	
		(0.001)	(0.007)	(0.024)***		(0.007)	(0.018)		(0.006)	(0.013)	
	Observations	44324	41251	36289		41251	36289		41251	36289	
	R- Squared	0.0108	0.0098	0.0104		0.0098	0.0107		0.0098	0.0107	
Mass murder victims	Linear	-0.033	0.060	0.260		0.068	0.067		0.072	0.047	
		(0.010)***	(0.016)***	(0.028)***		(0.022)***	(0.012)		(0.028)**	(0.008)***	
	Quadratic	0.003	-0.004	-0.043		-0.005	-0.004		-0.006	0.013	
		(0.001)**	(0.002)**	(0.008)***		(0.003)**	(0.008)		(0.004)*	(0.002)***	
	Observations	41251	36289	31732		36289	31732		36289	31732	
	R- Squared	0.0103	0.0112	0.0123		0.0111	0.0123		0.0110	0.0123	
Total Conflict	Linear	0.005	0.000	-0.003	-0.005	0.002	-0.002	-0.004	0.003	-0.001	-0.002
		(0.003)***	(0.003)	(0.004)	(0.007)	(0.004)	(0.005)	(0.007)	(0.004)	(0.005)	(0.006)
	Quadratic	0.000	0.000	0.000	0.001	5.35e-06	0.000	0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)***	(0.000)***	(0.000)	(0.000)	(0.000)*	(0.000)	(0.000)	(0.000)
	Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
	R- Squared	0.0111	0.0110	0.0111	0.0113	0.0109	0.0110	0.0111	0.0109	0.0110	0.0110
Total Conflict (Factorial)	Linear	0.011	0.002	0.009	0.093	0.006	0.003	0.012	0.009	0.001	0.000
		(0.012)	(0.015)	(0.022)	(0.039)	(0.018)	(0.023)	(0.033)	(0.017)	(0.021)	(0.024)
	Quadratic	-0.010	0.007	0.012	0.021	0.005	0.010	0.013	0.003	0.009	0.010
		(0.004)**	(0.005)	(0.006)**	(0.012)*	(0.006)	(0.006)*	(0.008)*	(0.006)	(0.006)	(0.006)*
	Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
	R- Squared	0.0111	0.0110	0.0111	0.0113	0.0109	0.0111	0.0111	0.0109	0.0110	0.0110

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table 12: Difference-in-Difference using additional controls[a]

Variables	Diarrhea	Fever	Pipped Water	Water on Premises	Sewerage	Time to water
Violent State	0.018	0.038	-0.016	-0.027	0.002	-7.159
	(0.028)	(0.042)	(0.078)	(0.049)	(0.097)	(7.767)
After Uribe Government	-0.021	-0.097	-0.016	-0.014	0.029	1.026
	(0.021)	(0.021)***	(0.059)	(0.030)	(0.066)	(3.173)
Violent State after Uribe Government	0.022	0.090	-0.037	-0.045	-0.044	0.397
	(0.023)	(0.027)***	(0.054)	(0.031)	(0.064)	(5.808)
Observations	44352	44352	81470	78540	81491	4674
R-squared	0.01	0.01	0.36	0.14	0.49	0.09

[a] Robust standard errors in parentheses. * significant at 10%; ** significant at 5%; *** significant at 1%.

Appendix I: The household maximization problem

The Lagrangian is:

$\mathcal{L} = U\left(X, \overline{q}w, H_c\left(\overline{q}w\right), \ell\right) + \lambda\left[\left(Y + \left(1-\ell\right)r\right)\left(1-T_\theta\right) - \left(1+\pi_\alpha\right)\left(p_X X + p_w w\right)\right]$

Where the variables are X, w, ℓ and the parameters are $Y, r, p_X, p_w, \pi_\alpha, T_\theta, \overline{q}$

$\frac{\partial \mathcal{L}}{\partial \lambda} = \left(Y + \left(1-\ell\right)r\right)\left(1-T_\theta\right) - p_X\left(1+\pi_\alpha\right)X - p_w\left(1+\pi_\alpha\right)w = 0$

$\frac{\partial \mathcal{L}}{\partial X} = \frac{\partial U}{\partial X} - p_X\left(1+\pi_\alpha\right)\lambda = 0$

$\frac{\partial \mathcal{L}}{\partial w} = \overline{q}\frac{\partial U}{\partial w} + \overline{q}\frac{\partial U}{\partial H_c}\frac{\partial H_c}{\partial w} - p_w\left(1+\pi_\alpha\right)\lambda = 0$

$\frac{\partial \mathcal{L}}{\partial \ell} = \frac{\partial U}{\partial \ell} - \left(1-T_\theta\right)r\lambda = 0$

if $\mid Jf \mid \neq 0$ then $X = X^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right), w = w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right), \ell = \ell^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right), \lambda = \lambda^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right)$

And the first order conditions are:

$$\left(Y + \left(1-\ell^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right)\right)r\right)\left(1-T_\theta\right) - \left(1+\pi_\alpha\right)p_X X^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) - \left(1+\pi_\alpha\right)p_w w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) = 0 \quad (1)$$

$$U_X\left(\begin{array}{c} X^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right), \overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \\ H_c\left(\overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right)\right), \ell^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \end{array},\right) - p_X\left(1+\pi_\alpha\right)\lambda^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) = 0 \quad (2)$$

$$\overline{q}U_w\left(\begin{array}{c} X^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right), \overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \\ H_c\left(\overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right)\right), \ell^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \end{array},\right) + \overline{q}U_{H_c}\left(\begin{array}{c} X^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right), \overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \\ H_c\left(\overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right)\right), \ell * \left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \end{array},\right)$$
$$- p_w\left(1+\pi_\alpha\right)\lambda^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) = 0 \quad (3)$$

$$U_\ell\left(\begin{array}{c} X^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right), \overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \\ H_c\left(\overline{q}w^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right)\right), \ell^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) \end{array},\right) - \left(1-T_\theta\right)r\lambda^*\left(p_w, \pi_\alpha, T_\theta, \overline{q}\right) = 0\,(4) \quad (4)$$

1 - The derivative with respect to the price of water, p_w:

From (1):

$$-p_X\left(1+\pi_\alpha\right)\frac{\partial X}{\partial p_w} - \left(1+\pi_\alpha\right)w * - p_w\left(1+\pi_\alpha\right)\frac{\partial w}{\partial p_w} - \left(1-T_\theta\right)r\frac{\partial \ell}{\partial p_w} = 0$$

From (2)

$$U_{XX}\frac{\partial X}{\partial p_w} + \overline{q}U_{Xw}\frac{\partial w}{\partial p_w} + \overline{q}U_{XH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial p_w} + U_{X\ell}\frac{\partial \ell}{\partial p_w} - p_X\left(1+\pi_\alpha\right)\frac{\partial \lambda}{\partial p_w} = 0$$

From (3)

$$\overline{q}U_{wX}\frac{\partial X}{\partial p_w} + \overline{q}^2U_{ww}\frac{\partial w}{\partial p_w} + \overline{q}^2U_{wH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial p_w} + \overline{q}U_{w\ell}\frac{\partial \ell}{\partial p_w} + \overline{q}U_{H_cX}\frac{\partial X}{\partial p_w} + \overline{q}^2U_{H_cw}\frac{\partial w}{\partial p_w}$$
$$+ \overline{q}^2U_{H_cH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial p_w} + \overline{q}U_{H_c\ell}\frac{\partial \ell}{\partial p_w} - \left(1+\pi_\alpha\right)\lambda * - p_w\left(1+\pi_\alpha\right)\frac{\partial \lambda}{\partial p_w} = 0$$

From (4)

$$U_{\ell X}\frac{\partial X}{\partial p_w}+\overline{q}U_{\ell w}\frac{\partial w}{\partial p_w}+\overline{q}U_{\ell H_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial p_w}+U_{\ell\ell}\frac{\partial \ell}{\partial p_w}-(1-T_\theta)\,r\frac{\partial \lambda}{\partial p_w}=0$$

Reorganizing the system:

$$\begin{bmatrix} 0 & -p_X(1+\pi_\alpha) & -p_w(1+\pi_\alpha) & -(1-T_\theta)\,r \\ -p_X(1+\pi_\alpha) & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}\frac{\partial H_c}{\partial w}\right) & U_{X\ell} \\ -p_w(1+\pi_\alpha) & \overline{q}\,(U_{wX}+U_{H_cX}) & \overline{q}^2\left(U_{ww}+U_{H_cw}+(U_{wH_c}+U_{H_cH_c})\frac{\partial H_c}{\partial w}\right) & \overline{q}\,(U_{w\ell}+U_{H_c\ell}) \\ -(1-T_\theta)\,r & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}\frac{\partial H_c}{\partial w}\right) & U_{\ell\ell} \end{bmatrix}\begin{bmatrix} \frac{\partial \lambda}{\partial p_w} \\ \frac{\partial X}{\partial p_w} \\ \frac{\partial w}{\partial p_w} \\ \frac{\partial \ell}{\partial p_w} \end{bmatrix}$$
$$=\begin{bmatrix} (1+\pi_\alpha)\,w* \\ 0 \\ (1+\pi_\alpha)\,\lambda* \\ 0 \end{bmatrix}$$

Solving for $\frac{\partial w}{\partial p_w}$:

$$\frac{\begin{bmatrix} 0 & -p_X(1+\pi_\alpha) & (1+\pi_\alpha)\,w* & -(1-T_\theta)\,r \\ -p_X(1+\pi_\alpha) & U_{XX} & 0 & U_{X\ell} \\ -p_w(1+\pi_\alpha) & \overline{q}\,(U_{wX}+U_{H_cX}) & (1+\pi_\alpha)\,\lambda* & \overline{q}\,(U_{w\ell}+U_{H_c\ell}) \\ -(1-T_\theta)\,r & U_{\ell X} & 0 & U_{\ell\ell} \end{bmatrix}}{\begin{bmatrix} 0 & -p_X(1+\pi_\alpha) & -p_w(1+\pi_\alpha) & -(1-T_\theta)\,r \\ -p_X(1+\pi_\alpha) & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}\frac{\partial H_c}{\partial w}\right) & U_{X\ell} \\ -p_w(1+\pi_\alpha) & \overline{q}\,(U_{wX}+U_{H_cX}) & \overline{q}^2\left(U_{ww}+U_{H_cw}+(U_{wH_c}+U_{H_cH_c})\frac{\partial H_c}{\partial w}\right) & \overline{q}\,(U_{w\ell}+U_{H_c\ell}) \\ -(1-T_\theta)\,r & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}\frac{\partial H_c}{\partial w}\right) & U_{\ell\ell} \end{bmatrix}}$$

The numerator has to be positive

$$-\left(p_w w*(1+\pi_\alpha)^2 U_{\ell X}U_{X\ell}\right)+\left(p_w w*(1+\pi_\alpha)^2 U_{XX}U_{\ell\ell}\right)>0$$

$$\Rightarrow\left(p_w w*(1+\pi_\alpha)^2 U_{XX}U_{\ell\ell}\right)>\left(p_w w*(1+\pi_\alpha)^2 U_{\ell X}U_{X\ell}\right)$$

$$\Rightarrow\frac{p_w w*(1+\pi_\alpha)^2 U_{XX}U_{\ell\ell}}{p_w w*(1+\pi_\alpha)^2 U_{\ell X}U_{X\ell}}>1\Rightarrow\frac{U_{XX}U_{\ell\ell}}{U_{\ell X}U_{X\ell}}>1\Rightarrow U_{XX}U_{\ell\ell}>U_{\ell X}U_{X\ell}$$

The denominator has to be negative

$$\begin{aligned}&\left(rp_X\overline{q}^2(1+\pi_\alpha)(1-T_\theta)(U_{wX}+U_{H_cX})(U_{\ell w}+U_{\ell H_c}H_c')\right)+\left(p_w^2(1+\pi_\alpha)^2U_{\ell X}U_{X\ell}\right)\\&\quad+\left(rp_X\overline{q}^2(1-T_\theta)(1+\pi_\alpha)(U_{Xw}+U_{XH_c}H_c')(U_{w\ell}+U_{H_c\ell})\right)\\&\quad-\left(\overline{q}^2r^2(1-T_\theta)^2(U_{wX}+U_{H_cX})(U_{Xw}+U_{XH_c}H_c')\right)-\left(p_w^2(1+\pi_\alpha)^2U_{XX}U_{\ell\ell}\right)\\&\quad-\left(\overline{q}^2p_X^2(1+\pi_\alpha)^2(U_{\ell w}+U_{\ell H_c}H_c')(U_{w\ell}+U_{H_c\ell})\right)\end{aligned}$$

Which implies

$$\begin{aligned}&r\overline{q}^2(1-T_\theta)(U_{wX}+U_{H_cX})\left[p_X(1+\pi_\alpha)(U_{\ell w}+U_{\ell H_c}H_c')-r(1-T_\theta)(U_{Xw}+U_{XH_c}H_c')\right]\\&\quad-p_w^2(1+\pi_\alpha)^2\left[U_{XX}U_{\ell\ell}-U_{\ell X}U_{X\ell}\right]\\&\quad-\overline{q}^2p_X(1+\pi_\alpha)(U_{w\ell}+U_{H_c\ell})\left[p_X(1+\pi_\alpha)(U_{\ell w}+U_{\ell H_c}H_c')-r(1-T_\theta)(U_{Xw}+U_{XH_c}H_c')\right]\end{aligned}$$

Or

$$[p_X(1+\pi_\alpha)(U_{\ell w}+U_{\ell H_c}H_c')-r(1-T_\theta)(U_{Xw}+U_{XH_c}H_c')]$$
$$\overline{q}^2[r(1-T_\theta)(U_{wX}+U_{H_cX})-p_X(1+\pi_\alpha)(U_{w\ell}+U_{H_c\ell})]$$
$$-p_w^2(1+\pi_\alpha)^2[U_{XX}U_{\ell\ell}-U_{\ell X}U_{X\ell}]<0$$

For it to be negative

$$p_X(1+\pi_\alpha)(U_{\ell w}+U_{\ell H_c}H_c')<r(1-T_\theta)(U_{Xw}+U_{XH_c}H_c')\Rightarrow\frac{(U_{\ell w}+U_{\ell H_c}H_c')}{(U_{Xw}+U_{XH_c}H_c')}<\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$$

or

$$r(1-T_\theta)(U_{wX}+U_{H_cX})<p_X(1+\pi_\alpha)(U_{w\ell}+U_{H_c\ell})\Rightarrow\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}<\frac{(U_{w\ell}+U_{H_c\ell})}{(U_{wX}+U_{H_cX})}$$

and to be consistent with a positive numerator $U_{XX}U_{\ell\ell}>U_{X\ell}U_{\ell X}$

The denominator is the bordered Hessian Matrix for the three variables of choice (consumption, water and leisure) and assuming it meets the Second Order conditions it will have a negative determinant. .

2- The derivative with respect to the price tax of war, π_α:

From (1):

$$-p_X\frac{\partial X}{\partial\pi_\alpha}-p_XX*-\pi_\alpha p_X\frac{\partial X}{\partial\pi_\alpha}-p_w\frac{\partial w}{\partial\pi_\alpha}-p_ww*-t_\alpha p_w\frac{\partial w}{\partial\pi_\alpha}-(1-T_\theta)r\frac{\partial\ell}{\partial\pi_\alpha}$$

From (2):

$$U_{XX}\frac{\partial X}{\partial\pi_\alpha}+\overline{q}U_{Xw}\frac{\partial w}{\partial\pi_\alpha}+\overline{q}U_{XH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial\pi_\alpha}+U_{X\ell}\frac{\partial\ell}{\partial t_\alpha}-p_X\frac{\partial\lambda}{\partial\pi_\alpha}-p_X\lambda*-p_X\pi_\alpha\frac{\partial\lambda}{\partial\pi_\alpha}=0$$

From (3):

$$\overline{q}U_{wX}\frac{\partial X}{\partial\pi_\alpha}+\overline{q}^2U_{ww}\frac{\partial w}{\partial\pi_\alpha}+\overline{q}^2U_{wH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial\pi_\alpha}+\overline{q}U_{w\ell}\frac{\partial\ell}{\partial\pi_\alpha}+\overline{q}U_{H_cX}\frac{\partial X}{\partial\pi_\alpha}+\overline{q}^2U_{H_cw}\frac{\partial w}{\partial\pi_\alpha}$$
$$+\overline{q}^2U_{H_cH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial\pi_\alpha}+\overline{q}U_{H_c\ell}\frac{\partial\ell}{\partial\pi_\alpha}-p_w\frac{\partial\lambda}{\partial\pi_\alpha}-p_w\lambda*-p_w\pi_\alpha\frac{\partial\lambda}{\partial\pi_\alpha}$$

From (4)

$$U_{\ell X}\frac{\partial X}{\partial\pi_\alpha}+\overline{q}U_{\ell w}\frac{\partial w}{\partial\pi_\alpha}+\overline{q}U_{\ell H_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial\pi_\alpha}+U_{\ell\ell}\frac{\partial\ell}{\partial\pi_\alpha}-(1-T_\theta)r\frac{\partial\lambda}{\partial\pi_\alpha}$$

Reorganizing the system

$$\begin{bmatrix}0 & -p_X(1+\pi_\alpha) & -p_w(1+\pi_\alpha) & -(1-T_\theta)r\\ -p_X(1+\pi_\alpha) & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}\frac{\partial H_c}{\partial w}\right) & U_{X\ell}\\ -p_w(1+\pi_\alpha) & \overline{q}(U_{wX}+U_{H_cX}) & \overline{q}^2\left(U_{ww}+U_{H_cw}+(U_{wH_c}+U_{H_cH_c})\frac{\partial H_c}{\partial w}\right) & \overline{q}(U_{w\ell}+U_{H_c\ell})\\ -(1-T_\theta)r & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}\frac{\partial H_c}{\partial w}\right) & U_{\ell\ell}\end{bmatrix}\begin{bmatrix}\frac{\partial\lambda}{\partial t_\alpha}\\ \frac{\partial X}{\partial t_\alpha}\\ \frac{\partial w}{\partial t_\alpha}\\ \frac{\partial\ell}{\partial t_\alpha}\end{bmatrix}$$
$$=\begin{bmatrix}p_XX^*+p_ww^*\\ p_X\lambda^*\\ p_w\lambda^*\\ 0\end{bmatrix}$$

Solving for $\frac{\partial w}{\partial t_\alpha}$

$$\frac{\begin{bmatrix} 0 & -p_X(1+t_\alpha) & p_X X*+p_w w* & -(1-T_\theta)r \\ -p_X(1+t_\alpha) & U_{XX} & p_X\lambda* & U_{X\ell} \\ -p_w(1+t_\alpha) & \overline{q}(U_{wX}+U_{H_cX}) & p_w\lambda* & \overline{q}(U_{w\ell}+U_{H_c\ell}) \\ -(1-T_\theta)r & U_{\ell X} & 0 & U_{\ell\ell} \end{bmatrix}}{\begin{bmatrix} 0 & -p_X(1+\pi_\alpha) & -p_w(1+\pi_\alpha) & -(1-T_\theta)r \\ -p_X(1+\pi_\alpha) & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}\frac{\partial H_c}{\partial w}\right) & U_{X\ell} \\ -p_w(1+\pi_\alpha) & \overline{q}(U_{wX}+U_{H_cX}) & \overline{q}^2\left(U_{ww}+U_{H_cw}+(U_{wH_c}+U_{H_cH_c})\frac{\partial H_c}{\partial w}\right) & \overline{q}(U_{w\ell}+U_{H_c\ell}) \\ -(1-T_\theta)r & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}\frac{\partial H_c}{\partial w}\right) & U_{\ell\ell} \end{bmatrix}}$$

The numerator is:

$$-\left(p_w(1+\pi_\alpha)(p_X X^*+p_w w^*)U_{\ell X}U_{X\ell}\right)+\left(\overline{q}rp_X^2\lambda^*(1+\pi_\alpha)(1-T_\theta)(U_{w\ell}+U_{H_c\ell})\right)$$
$$-\left(r^2p_X\overline{q}\lambda^*(1-T_\theta)^2(U_{wX}+U_{H_cX})\right)+\left(p_w(1+\pi_\alpha)(p_X X^*+p_w w^*)U_{XX}U_{\ell\ell}\right)$$

For a positive numerator:

$$p_w(1+\pi_\alpha)(p_X X^*+p_w w^*)\left[U_{XX}U_{\ell\ell}-U_{\ell X}U_{X\ell}\right]$$
$$+rp_X\overline{q}\lambda^*(1-T_\theta)\left[p_X(1+\pi_\alpha)(U_{w\ell}+U_{H_c\ell})-r(1-T_\theta)(U_{wX}+U_{H_cX})\right]>0$$

The first term is positive because it was found that $U_{XX}U_{\ell\ell}>U_{X\ell}U_{\ell X}$
From the negative denominator, it is known that:

$$p_X(1+\pi_\alpha)(U_{w\ell}+U_{H_c\ell})>r(1-T_\theta)(U_{wX}+U_{H_cX})\Rightarrow\frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}}>\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$$

3 - The derivative with respect to the war income tax, T_θ:
From (1):

$$-Y-r\frac{\partial\ell}{\partial T_\theta}-r+r\ell^*+rT_\theta\frac{\partial\ell}{\partial T_\theta}-(1+\pi_\alpha)p_X\frac{\partial X}{\partial T_\theta}-(1+\pi_\alpha)p_w\frac{\partial w}{\partial T_\theta}=0$$

From (2):

$$U_{XX}\frac{\partial X}{\partial T_\theta}+\overline{q}U_{Xw}\frac{\partial w}{\partial T_\theta}+\overline{q}U_{XH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial T_\theta}+U_{X\ell}\frac{\partial\ell}{\partial T_\theta}-p_X(1+\pi_\alpha)\frac{\partial\lambda}{\partial T_\theta}=0$$

From (3):

$$\overline{q}U_{wX}\frac{\partial X}{\partial T_\theta}+\overline{q}^2U_{ww}\frac{\partial w}{\partial T_\theta}+\overline{q}^2U_{wH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial T_\theta}+\overline{q}U_{w\ell}\frac{\partial\ell}{\partial T_\theta}+\overline{q}U_{H_cX}\frac{\partial X}{\partial T_\theta}+\overline{q}^2U_{H_cw}\frac{\partial w}{\partial T_\theta}$$
$$+\overline{q}^2U_{H_cH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial T_\theta}+\overline{q}U_{H_c\ell}\frac{\partial\ell}{\partial T_\theta}-p_w(1+\pi_\alpha)\frac{\partial\lambda}{\partial T_\theta}=0$$

From (4):

$$U_{\ell X}\frac{\partial X}{\partial T_\theta}+\overline{q}U_{\ell w}\frac{\partial w}{\partial T_\theta}+\overline{q}U_{\ell H_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial T_\theta}+U_{\ell\ell}\frac{\partial\ell}{\partial T_\theta}-r\frac{\partial\lambda}{\partial T_\theta}+r\lambda^*+rT_\theta\frac{\partial\lambda}{\partial T_\theta}$$

Reorganizing the system

$$\begin{bmatrix} 0 & -p_X(1+\pi_\alpha) & -p_w(1+\pi_\alpha) & -r(1-T_\theta) \\ -p_X(1+\pi_\alpha) & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}\frac{\partial H_c}{\partial w}\right) & U_{X\ell} \\ -p_w(1+\pi_\alpha) & \overline{q}\left(U_{wX}+U_{H_cX}\right) & \overline{q}^2\left(U_{ww}+U_{H_cw}+\left(U_{wH_c}+U_{H_cH_c}\right)\frac{\partial H_c}{\partial w}\right) & \overline{q}\left(U_{w\ell}+U_{H_c\ell}\right) \\ -r(1-T_\theta) & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}\frac{\partial H_c}{\partial w}\right) & U_{\ell\ell} \end{bmatrix} \begin{bmatrix} \frac{\partial \lambda}{\partial T_\theta} \\ \frac{\partial X}{\partial T_\theta} \\ \frac{\partial w}{\partial T_\theta} \\ \frac{\partial \ell}{\partial T_\theta} \end{bmatrix} = \begin{bmatrix} r(1-\ell^*)+Y \\ 0 \\ 0 \\ -r\lambda^* \end{bmatrix}$$

Solving for $\frac{\partial w}{\partial T_\theta}$

$$\frac{\begin{bmatrix} 0 & -p_X(1+\pi_\alpha) & r(1-\ell^*)+Y & -r(1-T_\theta) \\ -p_X(1+\pi_\alpha) & U_{XX} & 0 & U_{X\ell} \\ -p_w(1+\pi_\alpha) & \overline{q}\left(U_{wX}+U_{H_cX}\right) & 0 & \overline{q}\left(U_{w\ell}+U_{H_c\ell}\right) \\ -r(1-T_\theta) & U_{\ell X} & -r\lambda^* & U_{\ell\ell} \end{bmatrix}}{\begin{bmatrix} 0 & -p_X(1+\pi_\alpha) & -p_w(1+\pi_\alpha) & -r(1-T_\theta) \\ -p_X(1+\pi_\alpha) & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}\frac{\partial H_c}{\partial w}\right) & U_{X\ell} \\ -p_w(1+\pi_\alpha) & \overline{q}\left(U_{wX}+U_{H_cX}\right) & \overline{q}^2\left(U_{ww}+U_{H_cw}+\left(U_{wH_c}+U_{H_cH_c}\right)\frac{\partial H_c}{\partial w}\right) & \overline{q}\left(U_{w\ell}+U_{H_c\ell}\right) \\ -r(1-T_\theta) & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}\frac{\partial H_c}{\partial w}\right) & U_{\ell\ell} \end{bmatrix}}$$

The numerator is

$$-\left(r^2\overline{q}p_X\lambda^*(1+\pi_\alpha)(1-T_\theta)\left(U_{wX}+U_{H_cX}\right)\right)-\left(p_w(1+\pi_\alpha)\left(r(1-\ell^*)+Y\right)U_{\ell X}U_{X\ell}\right) \\ +\left(p_w(1+\pi_\alpha)\left(r(1-\ell^*)+Y\right)U_{XX}U_{\ell\ell}\right)+\left(r\overline{q}p_X^2\lambda^*(1+\pi_\alpha)^2\left(U_{w\ell}+U_{H_c\ell}\right)\right)$$

Or

$$p_w(1+\pi_\alpha)\left(r(1-\ell^*)+Y\right)\left(U_{XX}U_{\ell\ell}-U_{\ell X}U_{X\ell}\right) \\ +r\overline{q}p_X\lambda^*(1+\pi_\alpha)\left(p_X(1+\pi_\alpha)\left(U_{w\ell}+U_{H_c\ell}\right)-r(1-T_\theta)\left(U_{wX}+U_{H_cX}\right)\right)$$

It is known that the first term is positive because $U_{XX}U_{\ell\ell}>U_{\ell X}U_{X\ell}$
The second term has to be positive

$$p_X(1+\pi_\alpha)\left(U_{w\ell}+U_{H_c\ell}\right)>r(1-T_\theta)\left(U_{wX}+U_{H_cX}\right)\Rightarrow\frac{\left(U_{w\ell}+U_{H_c\ell}\right)}{\left(U_{wX}+U_{H_cX}\right)}>\frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$$

4 - The derivative with respect to the quality of water, $\overline{q}$:
From (1):

$$-r(1-T_\theta)\frac{\partial \ell}{\partial \overline{q}}-(1+\pi_\alpha)p_X\frac{\partial X}{\partial \overline{q}}-(1+\pi_\alpha)p_w\frac{\partial w}{\partial \overline{q}}=0$$

From (2):

$$U_{XX}\frac{\partial X}{\partial \overline{q}}+\overline{q}U_{Xw}\frac{\partial w}{\partial \overline{q}}+w^*U_{Xw}+\overline{q}U_{XH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial \overline{q}}+w^*U_{XH_c}\frac{\partial H_c}{\partial w}+U_{X\ell}\frac{\partial \ell}{\partial \overline{q}}-p_X(1+\pi_\alpha)\frac{\partial \lambda}{\partial \overline{q}}=0$$

From (3):

$$\overline{q}U_{wX}\frac{\partial X}{\partial \overline{q}}+\overline{q}^{2}U_{ww}\frac{\partial w}{\partial \overline{q}}+\overline{q}U_{ww}w^{*}+\overline{q}^{2}U_{wH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial \overline{q}}+\overline{q}U_{wH_c}\frac{\partial H_c}{\partial w}w^{*}+\overline{q}U_{w\ell}\frac{\partial \ell}{\partial \overline{q}}$$
$$+U_{w}+\overline{q}U_{H_cX}\frac{\partial X}{\partial \overline{q}}+\overline{q}^{2}U_{H_cw}\frac{\partial w}{\partial \overline{q}}+\overline{q}U_{H_cw}w^{*}+\overline{q}^{2}U_{H_cH_c}\frac{\partial H_c}{\partial w}\frac{\partial w}{\partial \overline{q}}$$
$$+\overline{q}U_{H_cH_c}\frac{\partial H_c}{\partial w}w^{*}+\overline{q}U_{H_c\ell}\frac{\partial \ell}{\partial \overline{q}}+U_{H_c}-p_w\left(1+\pi_\alpha\right)\frac{\partial \lambda}{\partial \overline{q}}=0$$

From (4):

$$U_{\ell X}\tfrac{\partial X}{\partial \overline{q}}+\overline{q}U_{\ell w}\tfrac{\partial w}{\partial \overline{q}}+U_{\ell w}w^{*}+\overline{q}U_{\ell H_c}\tfrac{\partial H_c}{\partial w}\tfrac{\partial w}{\partial \overline{q}}+U_{\ell H_c}\tfrac{\partial H_c}{\partial w}w^{*}+U_{\ell\ell}\tfrac{\partial \ell}{\partial \overline{q}}-\left(1-T_\theta\right)r\tfrac{\partial \lambda}{\partial \overline{q}}$$

Reorganizing the system

$$\begin{bmatrix} 0 & -\left(1+\pi_\alpha\right)p_X & -\left(1+\pi_\alpha\right)p_w & -r\left(1-T_\theta\right) \\ -\left(1+\pi_\alpha\right)p_X & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}H_c'\right) & U_{X\ell} \\ -p_w\left(1+\pi_\alpha\right) & \overline{q}\left(U_{wX}+U_{H_cX}\right) & \overline{q}^{2}\left(U_{ww}+U_{H_cw}+\left(U_{wH_c}+U_{H_cH_c}\right)H_c'\right) & \overline{q}\left(U_{w\ell}+U_{H_c\ell}\right) \\ -r\left(1-T_\theta\right) & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}H_c'\right) & U_{\ell\ell} \end{bmatrix}\begin{bmatrix} \frac{\partial \lambda}{\partial \overline{q}} \\ \frac{\partial X}{\partial \overline{q}} \\ \frac{\partial w}{\partial \overline{q}} \\ \frac{\partial \ell}{\partial \overline{q}} \end{bmatrix}$$
$$=\begin{bmatrix} 0 \\ -w*\left(U_{Xw}+U_{XH_c}H_c'\right) \\ -w*\overline{q}\left(U_{ww}+U_{H_cw}+\left(U_{H_cH_c}+U_{wH_c}\right)H_c'\right) \\ -\left(U_w+U_{H_c}\right) \\ -w*\left(U_{\ell w}+U_{\ell H_c}H_c'\right) \end{bmatrix}$$

Solving for $\frac{\partial w}{\partial \overline{q}}$:

$$\frac{\begin{bmatrix} 0 & -\left(1+\pi_\alpha\right)p_X & 0 & -r\left(1-T_\theta\right) \\ -\left(1+\pi_\alpha\right)p_X & U_{XX} & -w*\left(U_{Xw}+U_{XH_c}H_c'\right) & U_{X\ell} \\ -p_w\left(1+\pi_\alpha\right) & \overline{q}\left(U_{wX}+U_{H_cX}\right) & -w*\overline{q}\left(U_{ww}+U_{H_cw}+\left(U_{H_cH_c}+U_{wH_c}\right)H_c'\right)-\left(U_w+U_{H_c}\right) & \overline{q}\left(U_{w\ell}+U_{H_c\ell}\right) \\ -r\left(1-T_\theta\right) & U_{\ell X} & -w*\left(U_{\ell w}+U_{\ell H_c}H_c'\right) & U_{\ell\ell} \end{bmatrix}}{\begin{bmatrix} 0 & -\left(1+\pi_\alpha\right)p_X & -\left(1+\pi_\alpha\right)p_w & -r\left(1-T_\theta\right) \\ -\left(1+\pi_\alpha\right)p_X & U_{XX} & \overline{q}\left(U_{Xw}+U_{XH_c}H_c'\right) & U_{X\ell} \\ -p_w\left(1+\pi_\alpha\right) & \overline{q}\left(U_{wX}+U_{H_cX}\right) & \overline{q}^{2}\left(U_{ww}+U_{H_cw}+\left(U_{wH_c}+U_{H_cH_c}\right)H_c'\right) & \overline{q}\left(U_{w\ell}+U_{H_c\ell}\right) \\ -r\left(1-T_\theta\right) & U_{\ell X} & \overline{q}\left(U_{\ell w}+U_{\ell H_c}H_c'\right) & U_{\ell\ell} \end{bmatrix}}$$

The numerator is

$$-\left(rp_X\overline{q}w^{*}\left(1-T_\theta\right)\left(1+\pi_\alpha\right)\left(U_{wX}+U_{H_cX}\right)\left(U_{\ell w}+U_{\ell H_c}H_c'\right)\right)$$
$$-\left(rp_X\overline{q}w^{*}\left(1-T_\theta\right)\left(1+\pi_\alpha\right)\left(U_{Xw}+U_{XH_c}H_c'\right)\left(U_{w\ell}+U_{H_c\ell}\right)\right)$$
$$+\left(r^{2}\overline{q}w^{*}\left(1-T_\theta\right)^{2}\left(U_{wX}+U_{H_cX}\right)\left(U_{Xw}+U_{XH_c}H_c'\right)\right)$$
$$+\left(\overline{q}p_X^{2}w^{*}\left(1+\pi_\alpha\right)^{2}\left(U_{\ell w}+U_{\ell H_c}H_c'\right)\left(U_{w\ell}+U_{H_c\ell}\right)\right)$$

Which implies:

$$p_X\overline{q}w^{*}\left(1+\pi_\alpha\right)\left(U_{\ell w}+U_{\ell H_c}H_c'\right)\left[\left(p_X\left(1+\pi_\alpha\right)\left(U_{w\ell}+U_{H_c\ell}\right)\right)-\left(r\left(1-T_\theta\right)\left(U_{wX}+U_{H_cX}\right)\right)\right]$$
$$-r\overline{q}w^{*}\left(1-T_\theta\right)\left(U_{Xw}+U_{XH_c}H_c'\right)\left[p_X\left(1+\pi_\alpha\right)\left(U_{w\ell}+U_{H_c\ell}\right)-r\left(1-T_\theta\right)\left(U_{wX}+U_{H_cX}\right)\right]$$

Assuming $\overline{q} \geq \widetilde{q}$ for an interior solution, then, $w* > 0$, increases in the quality of water will lead to increase in consumption if the numerator is negative:

$$[p_X (1 + \pi_\alpha) (U_{w\ell} + U_{H_c\ell}) - r (1 - T_\theta) (U_{wX} + U_{H_cX})]$$
$$\overline{q}w^* [p_X (1 + \pi_\alpha) (U_{\ell w} + U_{\ell H_c} H_c') - r (1 - T_\theta) (U_{Xw} + U_{XH_c} H_c')] < 0$$

From the previous conditions, it was found that the first term is positive:

$$p_X (1 + \pi_\alpha) (U_{w\ell} + U_{H_c\ell}) - r (1 - T_\theta) (U_{wX} + U_{H_cX}) > 0 \Rightarrow \frac{U_{w\ell}+U_{H_c\ell}}{U_{wX}+U_{H_cX}} > \frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$$

Then the second term has to be negative,

$$p_X (1 + \pi_\alpha) (U_{\ell w} + U_{\ell H_c} H_c') - r (1 - T_\theta) (U_{Xw} + U_{XH_c} H_c') < 0 \Rightarrow \frac{U_{\ell w}+U_{\ell H_c}H_c'}{U_{Xw}+U_{XH_c}} < \frac{r(1-T_\theta)}{p_X(1+\pi_\alpha)}$$

APPENDIX II: Tables with full estimation results

Table AI-1: Effect of extorsion on household's access to water on premises[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	0.006	-0.026	0.020	-0.099	-0.023	0.001	-0.036	-0.021	-0.010	-0.022
	(0.021)	(0.025)	(0.049)	(0.075)	(0.024)	(0.043)	(0.052)	(0.024)	(0.037)	(0.041)
ExtortionSquared	0.006	0.042	-0.015	0.022	0.039	0.013	0.012	0.036	0.028	0.035
	(0.015)	(0.029)	(0.058)	(0.095)	(0.026)	(0.052)	(0.061)	(0.024)	(0.043)	(0.049)
GDP per capita growth	0.027	0.025	0.029	0.033	0.025	0.028	0.028	0.025	0.028	0.027
	(0.053)	(0.053)	(0.053)	(0.047)	(0.053)	(0.053)	(0.052)	(0.053)	(0.053)	(0.053)
Primary Students to	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	-8.24e-06	-9.75e-06	0.000	0.000	0.000	0.000	-7.94e-07	0.000	0.000	-9.48e-06
teacher ratio	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban Household	0.073	0.073	0.073	0.073	0.073	0.073	0.074	0.073	0.073	0.074
	(0.007)***	(0.006)***	(0.006)***	(0.007)***	(0.006)***	(0.006)***	(0.007)***	(0.006)***	(0.006)***	(0.006)***
Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.304	0.3044	0.3039	0.3073	0.3043	0.3039	0.3042	0.3043	0.3040	0.3039

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AI-2: Effect of terrorist attacks on household's access to water on premises[a]

Independent Variables		Aggregation			Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Terrorist Attacks	0.001	0.000	0.000	-0.005	0.000	0.000	0.001	0.000	0.000	0.000
	(0.002)	(0.002)	(0.002)	(0.005)	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)	(0.002)
Terrorist Attacks	0.000	1.25e-06	-3.37e-06	0.001	1.55e-06	-7.06e-07	-7.70e-06	1.41e-06	4.48e-07	-4.39e-06
Squared	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita	0.005	0.028	0.026	-0.003	0.028	0.027	0.021	0.028	0.028	0.026
growth	(0.054)	(0.052)	(0.051)	(0.036)	(0.052)	(0.051)	(0.047)	(0.053)	(0.052)	(0.050)
Primary Students to	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	-2.75e-06	0.000	-9.95e-06	0.000	0.000	0.000	0.000	0.000	0.000	-9.91e-06
teacher ratio	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban Household	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074	0.074
	(0.008)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***
Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.306	0.3038	0.3038	0.3052	0.3038	0.3038	0.3040	0.3038	0.3038	0.3038

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AI-3: Effect of kidnappings on household's access to water on premises[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Kidnappings	0.001	0.003	-0.001	0.000	0.004	-0.001	0.002	0.003	-0.001	0.002
	(0.001)	(0.001)**	(0.001)	(0.002)	(0.001)***	(0.001)	(0.003)	(0.001)***	(0.002)	(0.002)
Kidnappings Squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)**	(0.000)	(0.000)	(0.000)***	(0.000)	(0.000)	(0.000)**	(0.000)	(0.000)
GDP per capita	0.027	0.006	0.018	0.028	0.008	0.023	0.025	0.011	0.027	0.026
growth	(0.051)	(0.040)	(0.045)	(0.054)	(0.040)	(0.047)	(0.055)	(0.042)	(0.051)	(0.054)
Primary Students to	-0.001	0.000	-0.001	-0.001	0.000	-0.001	-0.001	0.000	-0.001	-0.001
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	0.000	0.000	-7.38e-07	0.000	0.000	0.000	-6.22e-06	0.000	0.000	-2.86e-07
teacher ratio	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban Household	0.074	0.076	0.075	0.074	0.076	0.075	0.074	0.076	0.074	0.074
	(0.007)***	(0.006)***	(0.007)***	(0.007)***	(0.006)***	(0.007)***	(0.007)***	(0.006)***	(0.007)***	(0.007)***
Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.305	0.3120	0.3060	0.3038	0.3125	0.3046	0.3041	0.3117	0.3038	0.3044

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AI-4: Effect of attacks against the police on household's access to water on premises[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Attacks against the Police	0.006	-0.002	0.045	-0.003	-0.005	-0.003	-0.006
	(0.002)***	(0.003)	(0.022)*	(0.004)	(0.003)	(0.004)	(0.003)*
Attacks against the Police Squared	0.000	6.97e-06	-0.011	4.97e-06	0.000	0.000	0.000
	(0.000)***	(0.000)	(0.005)*	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita growth	-0.033	0.033	0.074	0.025	0.042	0.015	0.030
	(0.033)	(0.050)	(0.052)	(0.044)	(0.065)	(0.046)	(0.061)
Primary Students to teacher ratio	-0.001	0.000	0.000	0.000	-0.001	0.000	-0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to teacher ratio	0.000	7.52e-06	0.003	7.94e-06	0.000	7.08e-06	0.000
	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)
Urban Household	0.075	0.076	0.111	0.076	0.073	0.076	0.074
	(0.006)***	(0.008)***	(0.012)***	(0.008)***	(0.007)***	(0.010)***	(0.008)***
Observations	77464	73225	66116	73225	66116	73225	66116
States	33	33	30	33	33	33	33
Pseudo R-squared	0.3124	0.2998	0.3196	0.3006	0.2857	0.3014	0.2867

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AI-5: Effect of mass murder victims on household's access to water on premises[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Mass Murder Victims	0.002	-0.002	0.001	-0.002	-0.002	-0.002	-0.004
	(0.005)	(0.005)	(0.011)	(0.005)	(0.009)	(0.005)	(0.008)
Mass Murder Victims Squared	0.000	0.001	0.001	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita growth	0.048	0.063	0.089	0.063	0.084	0.063	0.080
	(0.056)	(0.062)	(0.069)	(0.062)	(0.073)	(0.063)	(0.074)
Primary Students to teacher ratio	0.000	-0.001	0.000	-0.001	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to teacher ratio	7.39e-06	-2.23e-06	0.000	-2.40e-06	3.73e-06	-2.74e-06	-4.91e-06
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban Household	0.074	0.072	0.072	0.072	0.071	0.072	0.071
	(0.006)***	(0.006)***	(0.007)***	(0.006)***	(0.007)***	(0.006)***	(0.007)***
Observations	73225	66116	58291	66116	58291	66116	58291
States	33	33	32	33	32	33	32
Pseudo R-squared	0.2989	0.2862	0.2801	0.2862	0.2794	0.2862	0.2790

[a]Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AI-6: Effect of total conflict on household's access to water on premises[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	0.002	0.001	0.000	0.000	0.002	0.000	0.001	0.002	0.000	0.001
	(0.001)*	(0.001)*	(0.001)	(0.002)	(0.001)**	(0.001)	(0.001)	(0.001)*	(0.001)	(0.001)
Total Conflict Squared	0.000	0.000	0.000	-8.68e-06	0.000	-5.09e-06	0.000	0.000	-5.42e-06	0.000
	(0.000)	(0.000)**	(0.000)	(0.000)	(0.000)**	(0.000)**	(0.000)	(0.000)**	(0.000)	(0.000)
GDP per capita	-0.002	0.014	0.023	0.026	0.017	0.026	0.023	0.019	0.027	0.024
growth	(0.035)	(0.043)	(0.049)	(0.052)	(0.044)	(0.051)	(0.054)	(0.045)	(0.053)	(0.053)
Primary Students to	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	0.000	0.000	-1.01e-06	0.000	0.000	-9.77e-06	-9.14e-06	0.000	-8.69e-06	-3.57e-06
teacher ratio	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban Household	0.074	0.074	0.075	0.074	0.074	0.074	0.074	0.074	0.074	0.074
	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.006)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***	(0.007)***
Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.3089	0.3081	0.3055	0.3038	0.3082	0.3042	0.3041	0.3079	0.3039	0.3044

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AI-7: Effect of total conflict (factorial analysis) on household's access to water on premises[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	0.008	0.011	-0.004	0.004	0.012	-0.002	0.007	0.012	0.001	0.007
	(0.004)*	(0.005)**	(0.004)	(0.006)	(0.006)**	(0.006)	(0.008)	(0.005)**	(0.007)	(0.008)
Total Conflict Squared	-0.003	-0.001	-0.001	0.000	-0.001	0.000	-0.001	-0.001	0.000	-0.001
	(0.001)*	(0.001)**	(0.001)	(0.002)	(0.001)**	(0.001)	(0.001)	(0.001)**	(0.001)	(0.001)
GDP per capita growth	0.002	0.011	0.022	0.021	0.014	0.026	0.022	0.017	0.026	0.022
	(0.034)	(0.042)	(0.049)	(0.050)	(0.043)	(0.051)	(0.054)	(0.044)	(0.053)	(0.053)
Primary Students to	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	0.000	0.000	-1.99e-06	0.000	0.000	0.000	-5.48e-06	0.000	-7.73e-06	8.99e-07
teacher ratio	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Urban Household	0.075	0.075	0.075	0.074	0.075	0.074	0.074	0.075	0.074	0.074
	(0.007)***	(0.006)***	(0.007)***	(0.007)***	(0.006)***	(0.007)***	(0.007)***	(0.006)***	(0.007)***	(0.007)***
Observations	77464	77464	77464	77464	77464	77464	77464	77464	77464	77464
States	32	32	32	32	32	32	32	32	32	32
Pseudo R-squared	0.3087	0.3086	0.3057	0.3041	0.3088	0.3044	0.3043	0.3085	0.3039	0.3045

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section. Conflict factor constant 1 year: Eigenvalue:1.36413, Proportion: 0.4547; KMO: 0.4897. Conflict factor constant 5 years:Eigenvalue: 1.410, Proportion: 0.470, KMO: 0.513. Conflict factor constant 10 years: Eigenvalue: 1.491, Proportion: 0.497, KMO: 0.525. Conflict factor constant 20 years: Eigenvalue: 1.613, Proportion: 0.538, KMO: 0.515. Conflict factor averaging 10% 5 years: Eigenvalue: 1.415, Proportion: 0.472, KMO: 0.509. Conflict factor averaging 10% 10 years: Eigenvalue: 1.490, Proportion: 0.497, KMO: 0.521. Conflict factor averaging 10% 20 years: Eigenvalue: 1.566, Proportion: 0.522, KMO: 0.522. Conflict factor averaging 20% 5 years: Eigenvalue: 1.420, Proportion: 0.473, KMO: 0.507. Conflict factor averaging 20% 10 years: Eigenvalue: 1.483, Proportion: 0.494, KMO: 0.517. Conflict factor averaging 20% 20 years: Eigenvalue: 1.524, Proportion: 0.508, KMO: 0.520.

Table AII-1: Effect of extorsion on household's access to pipped water[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	-0.127	-0.153	0.002	-0.775	-0.168	-0.066	-0.390	-0.178	-0.121	-0.238
	(0.122)	(0.169)	(0.159)	(0.370)**	(0.172)	(0.158)	(0.245)	(0.173)	(0.172)	(0.210)
Extortion Squared	0.141	0.199	-0.092	0.560	0.214	0.024	0.191	0.222	0.117	0.181
	(0.118)	(0.209)	(0.142)	(0.408)	(0.204)	(0.163)	(0.239)	(0.197)	(0.203)	(0.235)
GDP per capita growth	0.101	0.111	0.111	0.165	0.108	0.115	0.126	0.105	0.114	0.116
	(0.237)	(0.239)	(0.238)	(0.236)	(0.238)	(0.238)	(0.235)	(0.238)	(0.238)	(0.236)
Primary Students to	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
teacher ratio	(0.005)	(0.239)	(0.005)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Secondary Students to	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
teacher ratio	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Urban Household	0.329	0.329	0.328	0.328	0.329	0.328	0.328	0.329	0.329	0.329
	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.040)***	(0.039)***	(0.039)***	(0.039)***
Observations	81470	81470	81470	81470	81470	81470	81470	81470	81470	81470
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.3342	0.3342	0.3340	0.3357	0.3342	0.3340	0.3347	0.3343	0.3340	0.3342

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AII-2: Effect of terrorist attacks on household's access to pipped water[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Terrorist Attacks	0.000	-0.003	-0.001	-0.018	-0.004	-0.002	-0.001	-0.005	-0.003	-0.003
	(0.008)	(0.009)	(0.011)	(0.044)	(0.008)	(0.011)	(0.019)	(0.008)	(0.011)	(0.014)
Terrorist Attacks Squared	0.000	0.000	0.000	0.003	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita growth	0.100	0.121	0.113	0.014	0.118	0.120	0.109	0.113	0.121	0.122
	(0.250)	(0.228)	(0.209)	(0.207)	(0.237)	(0.215)	(0.188)	(0.243)	(0.226)	(0.216)
Primary Students to teacher ratio	-0.006	-0.006	-0.006	-0.005	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Secondary Students to teacher ratio	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Urban Household	0.329	0.327	0.327	0.329	0.327	0.327	0.327	0.328	0.327	0.327
	(0.039)***	(0.039)***	(0.039)***	(0.038)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***
Observations	81470	81470	81470	81470	81470	81470	81470	81470	81470	81470
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.3340	0.3341	0.3341	0.3341	0.3341	0.3341	0.3341	0.3342	0.3341	0.3341

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AII-3: Effect of kidnappings on household's access to pipped water[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Kidnappings	-0.009	0.008	-0.005	-0.005	0.011	-0.003	0.007	0.010	-0.001	0.006
	(0.006)	(0.007)	(0.009)	(0.012)	(0.008)	(0.011)	(0.015)	(0.008)	(0.011)	(0.013)
Kidnappings Squared	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
GDP per capita	0.138	0.062	0.082	0.130	0.052	0.096	0.243	0.062	0.104	0.099
growth	(0.232)	(0.223)	(0.207)	(0.237)	(0.225)	(0.221)	(0.430)	(0.231)	(0.235)	(0.245)
Primary Students to	-0.006	-0.006	-0.005	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
teacher ratio	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Secondary Students to	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
teacher ratio	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Urban Household	0.328	0.330	0.330	0.328	0.330	0.330	0.329	0.329	0.329	0.329
	(0.039)***	(0.040)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***
Observations	81470	81470	81470	81470	81470	81470	81470	81470	81470	81470
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.3343	0.3345	0.3348	0.3340	0.3347	0.3345	0.3342	0.3345	0.3343	0.3343

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AII-4: Effect of attacks against the police on household's access to pipped water[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Attacks against the	0.031	-0.015	0.265	-0.017	-0.023	-0.016	-0.032
Police	(0.011)***	(0.016)	(0.154)*	(0.018)	(0.028)	(0.019)	(0.026)
Attacks against the	-0.002	0.001	-0.045	0.001	0.001	0.001	0.001
Police Squared	(0.001)***	(0.001)	(0.041)	(0.001)	(0.001)	(0.001)	(0.001)
GDP per capita	0.027	0.132	-0.069	0.116	0.090	0.104	0.061
growth	(0.181)	(0.247)	(0.455)	(0.237)	(0.296)	(0.230)	(0.286)
Primary Students to	-0.006	-0.006	-0.003	-0.006	-0.013	-0.006	-0.013
teacher ratio	(0.005)	(0.006)	(0.007)	(0.006)	(0.008)	(0.006)	(0.008)
Secondary Students to	0.001	0.001	-0.003	0.001	0.001	0.001	0.001
teacher ratio	(0.000)***	(0.000)***	(0.012)	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Urban Household	0.329	0.324	0.324	0.324	0.302	0.325	0.303
	(0.039)***	(0.038)***	(0.037)***	(0.038)***	(0.039)***	(0.038)***	(0.039)***
Observations	81470	77000	69513	77000	69513	77000	69513
States	33	33	33	33	33	33	33
Pseudo R-squared	0.3372	0.3309	0.3239	0.3309	0.3266	0.3309	0.3267

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AII-5: Effect of mass murder Victims on household's access to pipped water[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Mass Murder Victims	0.026	-0.046	-0.090	-0.048	-0.113	-0.049	-0.118
	(0.025)	(0.019)***	(0.058)	(0.019)**	(0.039)***	(0.020)**	(0.032)***
Mass Murder Victims Squared	-0.004	0.007	0.011	0.007	0.014	0.008	0.015
	(0.004)	(0.002)***	(0.006)*	(0.003)***	(0.004)***	(0.003)***	(0.004)***
GDP per capita growth	0.211	0.148	0.062	0.137	0.068	0.125	0.085
	(0.263)	(0.288)	(0.402)	(0.285)	(0.380)	(0.283)	(0.358)
Primary Students to teacher ratio	-0.006	-0.009	-0.009	-0.009	-0.007	-0.009	-0.006
	(0.007)	(0.008)	(0.012)	(0.008)	(0.011)	(0.007)	(0.011)
Secondary Students to teacher ratio	0.001	0.001	0.001	0.001	0.001	0.001	0.001
	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Urban Household	0.324	0.303	0.283	0.303	0.284	0.303	0.284
	(0.038)***	(0.038)***	(0.041)***	(0.038)***	(0.041)***	(0.038)***	(0.041)***
Observations	77000	69513	61685	69513	61685	69513	61685
States	33	33	33	33	33	33	33
Pseudo R-squared	0.3311	0.3277	0.3253	0.3278	0.3263	0.3278	0.3269

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AII-6: Effect of total conflict on household's access to pipped water[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	-0.001	0.000	-0.005	-0.002	0.000	-0.004	-0.002	0.000	-0.003	-0.002
	(0.005)	(0.003)	(0.004)	(0.009)	(0.003)	(0.004)	(0.006)	(0.003)	(0.004)	(0.005)
Total Conflict Squared	-4.51e-06	0.000	0.000	0.000	8.24e-06	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita	0.091	0.120	0.126	0.130	0.118	0.125	0.131	0.119	0.123	0.127
growth	(0.215)	(0.229)	(0.226)	(0.218)	(0.232)	(0.232)	(0.230)	(0.235)	(0.235)	(0.234)
Primary Students to	-0.006	-0.006	-0.005	-0.006	-0.006	-0.005	-0.006	-0.006	-0.006	-0.006
teacher ratio	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Secondary Students to	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
teacher ratio	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Urban Household	0.329	0.328	0.329	0.328	0.328	0.329	0.328	0.328	0.329	0.328
	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***
Observations	81470	81470	81470	81470	81470	81470	81470	81470	81470	81470
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.3340	0.3340	0.3343	0.3339	0.3340	0.3341	0.3340	0.3340	0.3341	0.3340

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AII-7: Effect of total conflict (factorial analysis) on household's access to pipped water[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	-0.008	0.000	-0.028	0.013	0.003	-0.020	0.013	0.001	-0.015	-0.001
	(0.020)	(0.024)	(0.035)	(0.039)	(0.025)	(0.032)	(0.039)	(0.024)	(0.028)	(0.033)
Total Conflict Squared	0.000	0.000	0.000	0.005	0.000	0.001	-0.001	0.000	0.001	0.000
	(0.006)	(0.002)	(0.007)	(0.015)	(0.002)	(0.005)	(0.006)	(0.002)	(0.004)	(0.004)
GDP per capita growth	0.095	0.117	0.121	0.083	0.114	0.123	0.106	0.117	0.122	0.118
	(0.210)	(0.229)	(0.228)	(0.220)	(0.231)	(0.234)	(0.231)	(0.233)	(0.236)	(0.235)
Primary Students to	-0.006	-0.006	-0.005	-0.007	-0.006	-0.006	-0.006	-0.006	-0.006	-0.006
teacher ratio	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Secondary Students to	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
teacher ratio	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***	(0.000)***
Urban Household	0.329	0.328	0.330	0.328	0.328	0.329	0.328	0.328	0.329	0.329
	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***	(0.039)***
Observations	81470	81470	81470	81470	81470	81470	81470	81470	81470	81470
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.3340	0.3339	0.3342	0.3340	0.3339	0.3341	0.3340	0.3339	0.3340	0.3339

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section. Conflict factor constant 1 year: Eigenvalue:1.36413, Proportion: 0.4547; KMO: 0.4897. Conflict factor constant 5 years:Eigenvalue: 1.410, Proportion: 0.470, KMO: 0.513. Conflict factor constant 10 years: Eigenvalue: 1.491, Proportion: 0.497, KMO: 0.525. Conflict factor constant 20 years: Eigenvalue: 1.613, Proportion: 0.538, KMO: 0.515. Conflict factor averaging 10% 5 years: Eigenvalue: 1.415, Proportion: 0.472, KMO: 0.509. Conflict factor averaging 10% 10 years: Eigenvalue: 1.490, Proportion: 0.497, KMO: 0.521. Conflict factor averaging 10% 20 years: Eigenvalue: 1.566, Proportion: 0.522, KMO: 0.522. Conflict factor averaging 20% 5 years: Eigenvalue: 1.420, Proportion: 0.473, KMO: 0.507. Conflict factor averaging 20% 10 years: Eigenvalue: 1.483, Proportion: 0.494, KMO: 0.517. Conflict factor averaging 20% 20 years: Eigenvalue: 1.524, Proportion: 0.508, KMO: 0.520.

Table AIII-1: Effect of extorsion on household's access to toilet connected to the sewerage system[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	0.048	0.190	0.203	-0.217	0.193	0.218	0.283	0.187	0.227	0.250
	(0.182)	(0.214)	(0.237)	(0.529)	(0.215)	(0.230)	(0.362)	(0.213)	(0.242)	(0.290)
Extortion Squared	-0.025	0.155	0.361	0.645	0.098	0.457	0.603	0.063	0.296	0.411
	(0.182)	(0.213)	(0.256)	(0.483)	(0.211)	(0.237)*	(0.280)**	(0.205)	(0.262)	(0.305)
GDP per capita growth	-0.093	-0.046	-0.084	-0.072	-0.056	-0.074	-0.091	-0.065	-0.074	-0.084
	(0.272)	(0.273)	(0.290)	(0.285)	(0.270)	(0.286)	(0.282)	(0.269)	(0.278)	(0.277)
Primary Students to	-0.004	-0.005	-0.006	-0.004	-0.004	-0.005	-0.005	-0.004	-0.005	-0.005
teacher ratio	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)
Secondary Students to	-0.001	-0.007	-0.001	-0.001	-0.007	-0.004	-0.004	-0.006	-0.005	-0.006
teacher ratio	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Urban Household	0.716	0.717	0.717	0.716	0.717	0.717	0.716	0.717	0.717	0.717
	(0.025)***	(0.025)***	(0.024)***	(0.024)***	(0.025)***	(0.025)***	(0.024)***	(0.025)***	(0.025)***	(0.025)***
Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.4614	0.4622	0.4620	0.4616	0.4621	0.4622	0.4620	0.4620	0.4622	0.4622

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIII-2: Effect of terrorist attacks on household's access to toilet connected to the sewerage system[a]

Independent Variables		Aggregation			Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Terrorist Attacks	0.015	0.009	0.034	0.163	0.009	0.023	0.107	0.009	0.017	0.039
	(0.026)	(0.029)	(0.025)	(0.094)*	(0.028)	(0.027)	(0.052)**	(0.028)	(0.027)	(0.036)
Terrorist Attacks Squared	0.000	0.000	-0.003	-0.024	0.000	-0.002	-0.011	0.000	-0.001	-0.003
	(0.002)	(0.003)	(0.002)	(0.011)**	(0.003)	(0.003)	(0.005)**	(0.003)	(0.003)	(0.003)
GDP per capita growth	-0.104	-0.141	-0.114	-0.124	-0.142	-0.114	-0.144	-0.141	-0.122	-0.123
	(0.297)	(0.284)	(0.290)	(0.300)	(0.283)	(0.286)	(0.302)	(0.283)	(0.283)	(0.289)
Primary Students to teacher ratio	-0.005	-0.005	-0.004	-0.003	-0.005	-0.004	-0.003	-0.005	-0.004	-0.004
	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.009)	(0.009)
Secondary Students to teacher ratio	-0.001	-0.002	-0.002	-0.001	-0.002	-0.002	0.000	-0.002	-0.002	-0.001
	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)
Urban Household	0.717	0.716	0.716	0.717	0.716	0.716	0.717	0.716	0.716	0.717
	(0.024)***	(0.024)***	(0.026)***	(0.024)***	(0.024)***	(0.025)***	(0.024)***	(0.024)***	(0.024)***	(0.025)***
Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.4617	0.4616	0.4615	0.4622	0.4616	0.4615	0.4619	0.4615	0.4615	0.4615

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIII-3: Effect of kidnappings on household's access to toilet connected to the sewerage system[a]

Independent Variables		Aggregation			Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Kidnappings	-0.004	0.003	0.006	0.007	0.000	0.001	0.004	0.000	0.001	0.003
	(0.006)	(0.007)	(0.012)	(0.025)	(0.009)	(0.014)	(0.022)	(0.009)	(0.012)	(0.015)
Kidnappings Squared	0.001	0.000	0.000	-0.002	0.000	0.000	-0.001	0.000	0.000	0.000
	(0.000)**	(0.000)	(0.000)*	(0.001)***	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
GDP per capita	-0.133	-0.115	-0.133	-0.192	-0.104	-0.115	-0.132	-0.099	-0.110	-0.118
growth	(0.262)	(0.286)	(0.281)	(0.268)	(0.280)	(0.279)	(0.277)	(0.282)	(0.281)	(0.281)
Primary Students to	-0.004	-0.004	-0.004	-0.003	-0.004	-0.004	-0.004	-0.004	-0.004	-0.004
teacher ratio	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
Secondary Students to	0.002	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
teacher ratio	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Urban Household	0.717	0.717	0.717	0.718	0.716	0.717	0.717	0.716	0.717	0.717
	(0.025)***	(0.025)***	(0.025)***	(0.025)***	(0.024)***	(0.024)***	(0.024)***	(0.024)***	(0.024)***	(0.024)***
Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.4623	0.4616	0.4618	0.4626	0.4615	0.4617	0.4618	0.4615	0.4616	0.4616

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIII-4: Effect of attacks against the police on household's access to toilet connected to the sewerage system[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Attacks against the Police	0.031	-0.083	-0.349	-0.071	0.079	-0.061	0.031
	(0.054)	(0.112)	(0.027)***	(0.115)	(0.339)	(0.115)	(0.269)
Attacks against the Police Squared	-0.002	0.044	0.381	0.041	0.045	0.040	0.045
	(0.003)	(0.024)*	(0.013)***	(0.024)	(0.057)	(0.025)	(0.047)
GDP per capita growth	-0.134	0.051	-0.050	0.036	0.799	0.020	0.804
	(0.315)	(0.296)	(0.177)***	(0.298)	(0.662)	(0.300)	(0.640)
Primary Students to teacher ratio	-0.004	-0.008	0.027	-0.008	-0.002	-0.008	-0.001
	(0.008)	(0.015)	(0.001)***	(0.014)	(0.018)	(0.014)	(0.017)
Secondary Students to teacher ratio	-0.002	0.001	0.099	0.001	0.001	0.001	0.000
	(0.014)	(0.016)	(0.003)***	(0.016)	(0.019)	(0.016)	(0.018)
Urban Household	0.717	0.718	0.693	0.718	0.712	0.718	0.712
	(0.023)***	(0.023)***	(0.036)***	(0.023)***	(0.023)***	(0.023)***	(0.023)***
Observations	81491	77009	69511	77009	69511	77009	69511
States	33	33	33	33	33	33	33
Pseudo R-squared	0.4616	0.4613	0.4599	0.4614	0.4519	0.4614	0.4520

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIII-5: Effect of mass murder victims on household's access to toilet connected to the sewerage system[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Mass Murder Victims	-0.024	-0.110	-0.452	-0.120	-0.633	-0.124	-0.741
	(0.041)	(0.066)*	(0.131)***	(0.078)	(0.054)***	(0.091)	(0.038)***
Mass Murder Victims	0.005	0.010	0.712	0.013	0.302	0.015	0.225
Squared	(0.006)	(0.006)	(0.037)***	(0.008)	(0.015)***	(0.010)	(0.011)***
GDP per capita	-0.114	-0.695	0.983	-0.608	0.699	-0.497	0.870
growth	(0.304)	(0.766)	(0.016)***	(0.793)	(0.024)***	(0.819)	(0.033)***
Primary Students to	-0.003	0.007	-0.123	0.008	0.059	0.008	0.102
teacher ratio	(0.011)	(0.014)	(0.013)***	(0.013)	(0.003)***	(0.013)	(0.001)***
Secondary Students to	0.008	0.016	-0.001	0.013	-0.001	0.011	-0.001
teacher ratio	(0.017)	(0.019)	(0.000)***	(0.019)	(0.000)***	(0.018)	(0.000)***
Urban Household	0.717	0.712	0.712	0.712	0.712	0.711	0.712
	(0.024)***	(0.024)***	(0.022)***	(0.024)***	(0.022)***	(0.024)***	(0.021)***
Observations	77009	69511	61685	69511	61685	69511	61685
States	33	33	33	33	33	33	33
Pseudo R-squared	0.4601	0.4512	0.4476	0.4510	0.4476	0.4510	0.4476

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIII-6: Effect of total conflict on household's access to toilet connected to the sewerage system[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	0.002	0.004	0.010	0.018	0.001	0.007	0.015	0.000	0.005	0.009
	(0.008)	(0.005)	(0.008)	(0.017)	(0.006)	(0.009)	(0.013)	(0.006)	(0.008)	(0.009)
Total Conflict Squared	0.000	0.000	0.000	-0.002	0.000	0.000	-0.001	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)***	(0.000)***	(0.000)	(0.000)	(0.000)**	(0.000)	(0.000)	(0.000)*
GDP per capita	-0.138	-0.099	-0.137	-0.171	-0.090	-0.122	-0.147	-0.086	-0.107	-0.121
growth	(0.283)	(0.292)	(0.288)	(0.279)	(0.284)	(0.287)	(0.287)	(0.284)	(0.288)	(0.289)
Primary Students to	-0.005	-0.004	-0.003	-0.003	-0.004	-0.004	-0.003	-0.005	-0.004	-0.004
teacher ratio	(0.010)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.010)
Secondary Students to	0.000	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
teacher ratio	(0.013)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Urban Household	0.717	0.716	0.717	0.718	0.716	0.717	0.717	0.716	0.716	0.717
	(0.025)***	(0.025)***	(0.025)***	(0.025)***	(0.025)***	(0.024)***	(0.025)***	(0.025)***	(0.024)***	(0.024)***
Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.4621	0.4615	0.4618	0.4626	0.4614	0.4616	0.4619	0.4614	0.4615	0.4616

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIII-7: Effect of total conflict (factorial analysis) on household's access to toilet connected to the sewerage system[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	0.017	-0.022	-0.030	-0.131	-0.046	-0.058	-0.073	-0.046	-0.053	-0.052
	(0.025)	(0.036)	(0.072)	(0.136)	(0.036)	(0.068)	(0.100)	(0.032)	(0.052)	(0.061)
Total Conflict Squared	0.008	0.003	-0.007	-0.047	0.012	0.006	0.000	0.014	0.009	0.005
	(0.010)	(0.012)	(0.017)	(0.025)*	(0.012)	(0.017)	(0.023)	(0.011)	(0.015)	(0.016)
GDP per capita growth	-0.143	-0.078	-0.096	-0.145	-0.049	-0.051	-0.072	-0.051	-0.047	-0.059
	(0.281)	(0.264)	(0.267)	(0.248)	(0.262)	(0.267)	(0.257)	(0.265)	(0.267)	(0.264)
Primary Students to	-0.005	-0.004	-0.005	-0.003	-0.005	-0.005	-0.005	-0.005	-0.005	-0.005
teacher ratio	(0.010)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)
Secondary Students to	0.000	-0.001	0.000	0.001	-0.001	0.001	0.000	-0.001	0.000	0.000
teacher ratio	(0.013)	(0.013)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)	(0.013)	(0.014)	(0.014)
Urban Household	0.717	0.716	0.717	0.718	0.716	0.717	0.717	0.716	0.716	0.716
	(0.025)***	(0.025)***	(0.024)***	(0.025)***	(0.025)***	(0.024)***	(0.024)***	(0.025)***	(0.024)***	(0.024)***
Observations	81491	81491	81491	81491	81491	81491	81491	81491	81491	81491
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.4621	0.4615	0.4617	0.4624	0.4616	0.4616	0.4618	0.4616	0.4616	0.4616

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section. Conflict factor constant 1 year: Eigenvalue:1.36413, Proportion: 0.4547; KMO: 0.4897. Conflict factor constant 5 years: Eigenvalue: 1.410, Proportion: 0.470, KMO: 0.513. Conflict factor constant 10 years: Eigenvalue: 1.491, Proportion: 0.497, KMO: 0.525. Conflict factor constant 20 years: Eigenvalue: 1.613, Proportion: 0.538, KMO: 0.515. Conflict factor averaging 10% 5 years: Eigenvalue: 1.415, Proportion: 0.472, KMO: 0.509. Conflict factor averaging 10% 10 years: Eigenvalue: 1.490, Proportion: 0.497, KMO: 0.521. Conflict factor averaging 10% 20 years: Eigenvalue: 1.566, Proportion: 0.522, KMO: 0.522. Conflict factor averaging 20% 5 years: Eigenvalue: 1.420, Proportion: 0.473, KMO: 0.507. Conflict factor averaging 20% 10 years: Eigenvalue: 1.483, Proportion: 0.494, KMO: 0.517. Conflict factor averaging 20% 20 years: Eigenvalue: 1.524, Proportion: 0.508, KMO: 0.520.

Table AIV-1: Effect of extortion on attacks on household's time spent to and from water source[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	17.864	-4.542	34.544	-34.542	-3.871	32.859	19.840	-1.892	17.249	17.806
	(9.932)*	(29.809)	(25.648)	(81.358)	(30.339)	(33.712)	(57.629)	(30.101)	(36.381)	(47.016)
Extortion Squared	-12.977	-17.946	-137.071	27.193	-12.716	-125.813	-107.552	-10.673	-65.374	-76.747
	(9.899)	(35.285)	(81.338)*	(98.159)	(31.831)	(82.440)	(95.047)	(29.501)	(59.924)	(75.242)
GDP per capita growth	-44.736	-44.461	-43.984	-42.235	-44.310	-43.985	-42.340	-44.134	-43.665	-43.418
	(31.573)	(31.434)	(31.948)	(31.847)	(31.135)	(32.618)	(32.545)	(31.013)	(32.150)	(32.392)
Primary Students to teacher ratio	-0.451	-0.617	-0.493	-0.493	-0.600	-0.517	-0.529	-0.583	-0.540	-0.561
	(0.848)	(0.914)	(0.894)	(0.805)	(0.936)	(0.923)	(0.859)	(0.956)	(0.948)	(0.906)
Secondary Students to teacher ratio	0.533	0.801	0.600	0.520	0.726	0.784	0.607	0.662	0.735	0.719
	(0.764)	(0.784)	(0.737)	(0.803)	(0.784)	(0.743)	(0.747)	(0.781)	(0.746)	(0.740)
Urban Household	0.470	0.498	0.344	0.519	0.516	0.367	0.421	0.527	0.454	0.459
	(1.785)	(1.802)	(1.849)	(1.799)	(1.805)	(1.840)	(1.819)	(1.809)	(1.819)	(1.815)
Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
States	33	33	33	33	33	33	33	33	33	33
R-squared	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIV-2: Effect of terrorist attacks on household's time spent to and from water source[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Terrorist Attacks	-1.969	-2.664	-3.043	7.875	-2.401	-3.953	-3.884	-2.208	-3.649	-4.723
	(1.427)	(1.783)	(2.597)	(9.279)	(1.681)	(2.530)	(4.072)	(1.626)	(2.125)*	(2.925)
Terrorist Attacks	0.122	0.322	0.393	-0.701	0.280	0.498	0.575	0.248	0.442	0.594
Squared	(0.097)	(0.172)*	(0.289)	(1.097)	(0.148)*	(0.300)*	(0.421)	(0.132)*	(0.230)*	(0.326)*
GDP per capita	-43.237	-39.273	-42.362	-48.679	-39.219	-40.959	-42.556	-39.184	-39.967	-39.454
growth	(32.595)	(33.796)	(34.960)	(31.034)	(33.744)	(34.696)	(35.533)	(33.702)	(34.240)	(35.242)
Primary Students to	-0.580	-0.840	-0.743	-0.591	-0.825	-0.848	-0.716	-0.813	-0.870	-0.865
teacher ratio	(0.854)	(0.951)	(0.998)	(0.914)	(0.946)	(0.983)	(0.950)	(0.941)	(0.965)	(0.960)
Secondary Students to	-0.045	0.011	0.503	0.402	0.019	0.316	0.425	0.029	0.163	0.184
teacher ratio	(0.859)	(0.837)	(0.883)	(0.695)	(0.817)	(0.875)	(0.838)	(0.800)	(0.859)	(0.858)
Urban Household	0.618	0.443	0.459	0.565	0.459	0.424	0.461	0.472	0.433	0.420
	(1.775)	(1.768)	(1.783)	(1.792)	(1.769)	(1.780)	(1.770)	(1.771)	(1.774)	(1.771)
Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
States	33	33	33	33	33	33	33	33	33	33
R-squared	0.001	0.0006	0.0007	0.0003	0.0006	0.0007	0.0005	0.0006	0.0006	0.0006

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIV-3: Effect of kidnappings on household's time spent to and from water source[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Kidnappings	-1.850	0.574	1.832	5.110	0.604	1.617	2.901	0.341	1.032	1.346
	(0.509)***	(0.591)	(0.896)**	(2.148)**	(0.729)	(1.015)	(1.757)*	(0.730)	(0.958)	(1.235)
Kidnappings Squared	0.119	-0.024	-0.060	-0.284	-0.025	-0.053	-0.110	-0.016	-0.037	-0.051
	(0.024)***	(0.018)	(0.024)**	(0.087)***	(0.024)	(0.029)*	(0.055)**	(0.025)	(0.029)	(0.039)
GDP per capita	-49.996	-47.308	-50.284	-51.576	-47.935	-51.583	-52.658	-46.212	-48.994	-49.293
growth	(31.333)	(30.614)	(28.421)*	(28.422)*	(32.891)	(32.136)	(32.364)	(33.097)	(32.744)	(32.762)
Primary Students to	-0.730	-0.362	-0.211	-0.411	-0.360	-0.185	-0.197	-0.461	-0.302	-0.296
teacher ratio	(0.950)	(0.980)	(0.902)	(0.889)	(1.049)	(0.998)	(0.994)	(1.061)	(1.037)	(1.041)
Secondary Students to	0.385	0.526	0.323	0.338	0.458	0.277	0.240	0.484	0.395	0.387
teacher ratio	(0.913)	(0.702)	(0.679)	(0.674)	(0.732)	(0.725)	(0.723)	(0.750)	(0.737)	(0.735)
Urban Household	0.284	0.659	0.729	0.715	0.624	0.668	0.673	0.590	0.634	0.638
	(1.797)	(1.730)	(1.759)	(1.766)	(1.733)	(1.746)	(1.746)	(1.734)	(1.742)	(1.741)
Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
States	33	33	33	33	33	33	33	33	33	33
R-squared	0.0013	0.0004	0.0004	0.0001	0.0005	0.0003	0.0002	0.0001	0.0000	0.0000

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIV-4: Effect of attacks against the police on household's time spent to and from water source[a]

Independent Variables		Aggregation		Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Attacks against the Police	-3.080	9.571	11.356	7.773	23.865	6.285	19.503
	(2.775)	(4.378)**	(5.051)**	(4.643)*	(13.096)*	(4.895)	(9.983)*
Attacks against the Police Squared	0.106	-4.065	-11.300	-3.571	-7.588	-3.163	-6.544
	(0.162)	(1.070)***	(2.082)***	(1.067)***	(2.973)**	(1.090)***	(2.250)***
GDP per capita growth	-31.534	-64.046	168.248	-61.838	-27.398	-59.646	-36.553
	(34.189)	(30.682)**	(9.149)***	(31.257)**	(55.483)	(31.748)*	(49.158)
Primary Students to teacher ratio	-0.677	-0.833	-7.545	-0.935	-0.062	-1.025	0.039
	(0.791)	(1.371)	(0.139)***	(1.328)	(2.073)	(1.285)	(1.789)
Secondary Students to teacher ratio	0.071	-0.962	1.251	-1.004	-3.163	-1.052	-3.142
	(0.727)	(1.135)	(0.154)***	(1.150)	(1.166)***	(1.168)	(1.188)***
Urban Household	0.540	0.815	-1.445	0.811	1.374	0.809	1.372
	(1.804)	(1.799)	(2.127)	(1.795)	(2.404)	(1.791)	(2.409)
Observations	4674	4457	3827	4457	3827	4457	3827
States	33	33	33	33	33	33	33
R-squared	0.0074	0.0045	0.0004	0.0047	0.0062	0.0052	0.0058

[a]

Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIV-5: Effect of mass murder victims on household's time spent to and from water source[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Mass Murder Victims	0.696	1.817	-197.061	-1.401	-90.969	-4.359	-65.470
	(3.054)	(6.597)	(1.093)***	(8.457)	(0.243)***	(9.813)	(0.167)***
Mass Murder Victims	0.185	-0.366	63.408	-0.031	31.822	0.293	24.925
Squared	(0.479)	(0.659)	(0.148)***	(0.890)	(0.074)***	(1.103)	(0.087)***
GDP per capita	-64.713	-5.755	122.854	-26.583	172.585	-41.870	185.657
growth	(37.555)*	(85.581)	(3.081)***	(88.685)	(2.549)***	(87.866)	(2.455)***
Primary Students to	-2.640	-1.995	-20.837	-1.496	-8.187	-1.035	-4.862
teacher ratio	(1.268)**	(2.404)	(0.089)***	(2.559)	(0.046)***	(2.680)	(0.070)***
Secondary Students to	-0.658	-2.851	0.139	-2.731	0.105	-2.773	0.097
teacher ratio	(1.522)	(1.562)*	(0.017)***	(1.536)*	(0.017)***	(1.493)*	(0.018)***
Urban Household	0.659	1.247	2.233	1.255	2.233	1.258	2.233
	(1.787)	(2.408)	(2.847)	(2.405)	(2.847)	(2.402)	(2.847)
Observations	4457	3827	3435	3827	3435	3827	3435
States	33	33	33	33	33	33	33
R-squared	0.0004	0.0014	0.0013	0.0010	0.0013	0.0007	0.0007

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIV-6: Effect of total conflict on household's time spent to and from water source[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	-1.868	0.108	0.907	3.796	-0.110	0.531	1.501	-0.415	0.087	0.385
	(0.634)***	(0.501)	(0.750)	(1.806)**	(0.574)	(0.804)	(1.386)	(0.582)	(0.739)	(0.965)
Total Conflict Squared	0.082	-0.003	-0.022	-0.143	0.005	-0.013	-0.043	0.016	-0.000	-0.010
	(0.028)***	(0.014)	(0.018)	(0.060)**	(0.017)	(0.020)	(0.036)	(0.018)	(0.020)	(0.027)
GDP per capita	-57.768	-44.637	-49.077	-52.128	-43.259	-47.509	-50.622	-41.596	-44.510	-46.028
growth	(30.541)*	(32.270)	(30.964)	(28.908)*	(33.909)	(33.560)	(33.089)	(34.104)	(33.989)	(33.670)
Primary Students to	-0.978	-0.511	-0.325	-0.442	-0.596	-0.393	-0.318	-0.708	-0.515	-0.454
teacher ratio	(0.895)	(0.999)	(0.979)	(0.908)	(1.050)	(1.034)	(1.014)	(1.056)	(1.041)	(1.038)
Secondary Students to	-0.164	0.497	0.367	0.286	0.458	0.404	0.343	0.412	0.450	0.448
teacher ratio	(0.876)	(0.738)	(0.710)	(0.677)	(0.760)	(0.750)	(0.731)	(0.777)	(0.762)	(0.750)
Urban Household	0.392	0.571	0.651	0.694	0.530	0.596	0.634	0.485	0.553	0.578
	(1.771)	(1.725)	(1.746)	(1.762)	(1.737)	(1.745)	(1.747)	(1.743)	(1.743)	(1.743)
Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
States	33	33	33	33	33	33	33	33	33	33
R-squared	0.0054	0.0001	0.0002	0.0001	0.0000	0.0001	0.0005	0.0002	0.0000	0.0001

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AIV-7: Effect of total conflict (factorial analysis) on household's time spent to and from water source[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	-5.784	2.644	11.688	20.512	1.345	8.081	15.342	-0.612	3.661	5.701
	(2.136)***	(3.094)	(4.845)**	(6.673)***	(3.489)	(5.401)	(7.459)**	(3.234)	(4.653)	(5.428)
Total Conflict Squared	2.787	-0.931	-3.412	-9.146	-0.356	-2.249	-4.427	0.471	-0.951	-1.607
	(0.903)***	(0.978)	(1.161)***	(1.866)***	(1.162)	(1.410)	(1.753)**	(1.117)	(1.334)	(1.437)
GDP per capita growth	-57.083	-46.532	-53.835	-51.200	-45.402	-52.995	-55.970	-42.942	-48.018	-49.712
	(30.762)*	(30.769)	(29.428)*	(27.256)*	(33.008)	(32.936)	(32.118)*	(33.463)	(33.374)	(32.973)
Primary Students to	-0.936	-0.405	-0.137	-0.298	-0.470	-0.213	-0.109	-0.585	-0.375	-0.317
teacher ratio	(0.896)	(0.895)	(0.908)	(0.868)	(0.949)	(0.950)	(0.924)	(0.975)	(0.963)	(0.955)
Secondary Students to	-0.012	0.599	0.382	0.369	0.495	0.406	0.366	0.426	0.472	0.484
teacher ratio	(0.888)	(0.700)	(0.709)	(0.647)	(0.717)	(0.713)	(0.667)	(0.744)	(0.719)	(0.701)
Urban Household	0.354	0.633	0.685	0.600	0.575	0.631	0.636	0.523	0.597	0.615
	(1.777)	(1.748)	(1.754)	(1.785)	(1.753)	(1.758)	(1.766)	(1.754)	(1.755)	(1.756)
Observations	4674	4674	4674	4674	4674	4674	4674	4674	4674	4674
States	33	33	33	33	33	33	33	33	33	33
R-squared	0.0056	0.0004	0.0001	0.0006	0.0002	0.0001	0.0012	0.0000	0.0001	0.0004

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section. Conflict factor constant 1 year: Eigenvalue:1.36413, Proportion: 0.4547; KMO: 0.4897. Conflict factor constant 5 years: Eigenvalue: 1.410, Proportion: 0.470, KMO: 0.513. Conflict factor constant 10 years: Eigenvalue: 1.491, Proportion: 0.497, KMO: 0.525. Conflict factor constant 20 years: Eigenvalue: 1.613, Proportion: 0.538, KMO: 0.515. Conflict factor averaging 10% 5 years: Eigenvalue: 1.415, Proportion: 0.472, KMO: 0.509. Conflict factor averaging 10% 10 years: Eigenvalue: 1.490, Proportion: 0.497, KMO: 0.521. Conflict factor averaging 10% 20 years: Eigenvalue: 1.566, Proportion: 0.522, KMO: 0.522. Conflict factor averaging 20% 5 years: Eigenvalue: 1.420, Proportion: 0.473, KMO: 0.507. Conflict factor averaging 20% 10 years: Eigenvalue: 1.483, Proportion: 0.494, KMO: 0.517. Conflict factor averaging 20% 20 years: Eigenvalue: 1.524, Proportion: 0.508, KMO: 0.520.

Table AV-1: Effect of extortion on incidence of diarrhea in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	0.098	-0.016	-0.151	-0.142	0.004	-0.100	-0.099	0.021	-0.040	-0.040
	(0.037)***	(0.081)	(0.088)*	(0.160)	(0.080)	(0.089)	(0.115)	(0.077)	(0.102)	(0.114)
Extortion Squared	-0.127	0.036	0.323	0.328	0.003	0.219	0.295	-0.022	0.093	0.112
	(0.043)***	(0.162)	(0.099)***	(0.231)	(0.152)	(0.160)	(0.198)	(0.140)	(0.209)	(0.255)
GDP per capita growth	0.277	0.254	0.243	0.253	0.256	0.246	0.251	0.258	0.250	0.252
	(0.060)***	(0.066)***	(0.063)***	(0.066)***	(0.067)***	(0.064)***	(0.065)***	(0.068)***	(0.066)***	(0.066)***
Primary Students to	-0.001	-0.002	-0.001	-0.001	-0.002	-0.001	-0.001	-0.002	-0.002	-0.002
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
teacher ratio	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban Household	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***
Mother Education	0.012	0.012	0.011	0.011	0.012	0.011	0.011	0.012	0.012	0.011
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0134	0.0132	0.0134	0.0133	0.0132	0.0133	0.0133	0.0132	0.0132	0.0132

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AV-2: Effect of terrorist attacks on incidence of diarrhea in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Terrorist Attacks	-0.013	-0.006	-0.011	-0.022	-0.007	-0.010	-0.031	-0.008	-0.010	-0.018
	(0.004)***	(0.006)	(0.007)	(0.019)	(0.006)	(0.007)	(0.013)**	(0.007)	(0.007)	(0.009)**
Terrorist Attacks	0.001	0.000	0.001	0.004	0.000	0.001	0.003	0.000	0.001	0.002
Squared	(0.000)**	(0.000)	(0.001)*	(0.002)*	(0.001)	(0.001)*	(0.001)**	(0.001)	(0.001)	(0.001)**
GDP per capita	0.259	0.274	0.263	0.248	0.277	0.267	0.279	0.280	0.273	0.279
growth	(0.066)***	(0.073)***	(0.064)***	(0.069)***	(0.074)***	(0.067)***	(0.065)***	(0.075)***	(0.071)***	(0.068)***
Primary Students to	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)
Secondary Students to	0.000	0.002	0.002	0.002	0.001	0.002	0.001	0.001	0.002	0.001
teacher ratio	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban Household	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***
Mother Education	0.011	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0135	0.0132	0.0132	0.0133	0.0132	0.0132	0.0133	0.0133	0.0132	0.0133

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AV-3: Effect of kidnappings on incidence of diarrhea in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Kidnappings	-0.001	-0.002	-0.001	-0.006	-0.003	-0.001	-0.099	-0.003	-0.002	-0.003
	(0.002)	(0.002)	(0.003)	(0.007)	(0.002)	(0.003)	(0.115)	(0.002)	(0.003)	(0.004)
Kidnappings Squared	0.000	0.000	0.000	0.000	0.000	0.000	0.295	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.198)	(0.000)	(0.000)	(0.000)
GDP per capita	0.263	0.258	0.256	0.264	0.261	0.256	0.251	0.261	0.258	0.261
growth	(0.068)***	(0.065)***	(0.068)***	(0.068)***	(0.065)***	(0.068)***	(0.065)***	(0.064)***	(0.067)***	(0.066)***
Primary Students to	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.001	-0.002	-0.002	-0.002
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
teacher ratio	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban Household	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***
Mother Education	0.012	0.012	0.012	0.012	0.012	0.012	0.011	0.012	0.012	0.012
	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0134	0.0132	0.0132	0.0132	0.0132	0.0132	0.0133	0.0132	0.0132	0.0132

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AV-4: Effect of attacks against the police on incidence of diarrhea in children[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Attacks against the Police	-0.010	-0.046	0.306	-0.046	-0.144	-0.045	-0.114
	(0.009)	(0.025)*	(0.029)	(0.025)*	(0.057)**	(0.024)*	(0.046)**
Attacks against the Police Squared	0.001	0.011	-0.320	0.010	0.029	0.010	0.024
	(0.001)	(0.006)*	(0.016)**	(0.006)*	(0.013)**	(0.006)*	(0.011)**
GDP per capita growth	0.283	0.326	0.32	0.330	0.389	0.332	0.413
	(0.064)***	(0.092)***	(0.064)***	(0.093)***	(0.155)**	(0.094)***	(0.163)**
Primary Students to teacher ratio	-0.002	-0.002	-0.018	-0.002	0.001	-0.002	0.001
	(0.001)	(0.001)	(0.02)	(0.001)	(0.002)	(0.001)	(0.002)
Secondary Students to teacher ratio	0.001	0.001	-0.009	0.001	-0.001	0.001	0.000
	(0.004)	(0.004)	(0.005)	(0.004)	(0.006)	(0.004)	(0.005)
Urban Household	-0.018	-0.019	-0.023	-0.019	-0.020	-0.019	-0.020
	(0.005)***	(0.005)***	(0.010)***	(0.005)***	(0.006)***	(0.005)***	(0.006)***
Mother Education	0.012	0.014	0.027	0.014	0.018	0.014	0.018
	(0.008)	(0.009)	(0.015)	(0.009)	(0.011)	(0.009)	(0.011)
Observations	44324	41251	36289	41251	36289	41251	36289
States	33	33	33	33	33	33	33
Pseudo R-squared	0.0132	0.0136	0.0171	0.0136	0.0147	0.0136	0.0147

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AV-5: Effect of mass murder victims on incidence of diarrhea in children[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Mass Murder Victims	0.000	0.013	0.561	0.018	0.296	0.022	0.214
	(0.009)	(0.016)	(0.021)***	(0.017)	(0.009)***	(0.018)	(0.006)***
Mass Murder Victims	-0.001	0.001	-0.209	0.000	-0.126	0.000	-0.103
Squared	(0.001)	(0.002)	(0.006)***	(0.002)	(0.003)***	(0.002)	(0.002)***
GDP per capita	0.310	0.656	-0.493	0.658	-0.599	0.648	-0.633
growth	(0.091)***	(0.202)***	(0.007)***	(0.205)***	(0.011)***	(0.205)***	(0.012)***
Primary Students to	-0.002	0.000	0.096	0.000	0.009	0.000	0.060
teacher ratio	(0.001)	(0.001)	(0.003)***	(0.002)	(0.001)***	(0.002)	(0.001)***
Secondary Students to	0.001	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
teacher ratio	(0.004)	(0.005)	(0.000)***	(0.005)	(0.000)***	(0.005)	(0.000)***
Urban Household	-0.019	-0.020	-0.022	-0.020	-0.022	-0.020	-0.022
	(0.005)***	(0.006)***	(0.006)***	(0.006)***	(0.006)***	(0.006)***	(0.006)***
Mother Education	0.014	0.018	0.008	0.018	0.008	0.018	0.008
	(0.009)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)	(0.011)
Observations	41251	36289	31732	36289	31732	36289	31732
States	33	33	33	33	33	33	33
Pseudo R-squared	0.0135	0.0148	0.0162	0.0148	0.0162	0.0148	0.0162

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AV-6: Effect of total conflict on incidence of diarrhea in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	-0.002	-0.001	0.000	-0.003	-0.001	-0.001	-0.002	-0.001	-0.001	-0.002
	(0.002)	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Total Conflict	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Squared	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita	0.261	0.259	0.257	0.263	0.260	0.257	0.263	0.259	0.260	0.264
growth	(0.066)***	(0.066)***	(0.069)***	(0.068)***	(0.067)***	(0.070)***	(0.069)***	(0.067)***	(0.070)***	(0.069)***
Primary Students	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
to teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary	0.001	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Students to teacher	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
ratio										
Urban Household	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***
Mother Education	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0134	0.0132	0.0132	0.0132	0.0133	0.0132	0.0132	0.0133	0.0132	0.0132

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AV-7: Effect of total conflict (factorial analysis) on incidence of diarrhea in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	-0.011	-0.016	-0.012	-0.029	-0.017	-0.014	-0.028	-0.017	-0.016	-0.021
	(0.009)	(0.010)	(0.018)	(0.027)	(0.011)	(0.017)	(0.021)	(0.011)	(0.014)	(0.015)
Total Conflict Squared	-0.001	0.004	0.004	0.014	0.004	0.004	0.007	0.004	0.004	0.005
	(0.003)	(0.003)	(0.005)	(0.007)*	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.004)
GDP per capita growth	0.262	0.273	0.266	0.270	0.273	0.269	0.276	0.272	0.271	0.275
	(0.067)***	(0.067)***	(0.069)***	(0.065)***	(0.067)***	(0.070)***	(0.067)***	(0.067)***	(0.070)***	(0.068)***
Primary Students to	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002	-0.002
teacher ratio	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Secondary Students to	0.001	0.001	0.002	0.002	0.001	0.002	0.002	0.001	0.002	0.002
teacher ratio	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Urban Household	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018	-0.018
	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***	(0.005)***
Mother Education	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012	0.012
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0134	0.0133	0.0132	0.0132	0.0133	0.0132	0.0132	0.0133	0.0132	0.0132

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section. Conflict factor constant 1 year: Eigenvalue:1.36413, Proportion: 0.4547; KMO: 0.4897. Conflict factor constant 5 years:Eigenvalue: 1.410, Proportion: 0.470, KMO: 0.513. Conflict factor constant 10 years: Eigenvalue: 1.491, Proportion: 0.497, KMO: 0.525. Conflict factor constant 20 years: Eigenvalue: 1.613, Proportion: 0.538, KMO: 0.515. Conflict factor averaging 10% 5 years: Eigenvalue: 1.415, Proportion: 0.472, KMO: 0.509. Conflict factor averaging 10% 10 years: Eigenvalue: 1.490, Proportion: 0.497, KMO: 0.521. Conflict factor averaging 10% 20 years: Eigenvalue: 1.566, Proportion: 0.522, KMO: 0.522. Conflict factor averaging 20% 5 years: Eigenvalue: 1.420, Proportion: 0.473, KMO: 0.507. Conflict factor averaging 20% 10 years: Eigenvalue: 1.483, Proportion: 0.494, KMO: 0.517. Conflict factor averaging 20% 20 years: Eigenvalue: 1.524, Proportion: 0.508, KMO: 0.520.

Table AVI-1: Effect of extortion on incidence of fever in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Extortion	0.034	0.016	-0.009	0.175	0.027	0.000	-0.006	0.036	0.013	0.007
	(0.073)	(0.095)	(0.134)	(0.285)	(0.092)	(0.112)	(0.155)	(0.090)	(0.101)	(0.108)
Extortion Squared	-0.023	0.000	-0.116	-0.407	-0.009	-0.068	-0.147	-0.017	-0.030	-0.040
	(0.073)	(0.107)	(0.146)	(0.344)	(0.100)	(0.127)	(0.172)	(0.096)	(0.114)	(0.116)
GDP per capita growth	-0.041	-0.035	-0.032	-0.038	-0.033	-0.037	-0.035	-0.033	-0.038	-0.039
	(0.134)	(0.137)	(0.133)	(0.140)	(0.136)	(0.135)	(0.134)	(0.136)	(0.136)	(0.135)
Primary Students to	0.000	0.000	0.000	0.000	0.000	0.000	-3.08e-06	0.000	0.000	0.000
teacher ratio	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Secondary Students to	0.011	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.011
teacher ratio	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**
Urban Household	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***
Mother Education	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0108	0.0108	0.0108	0.0109	0.0108	0.0108	0.0108	0.0108	0.0108	0.0108

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AVI-2: Effect of terrorist attacks on incidence of fever in children[a]

Independent Variables		Aggregation			Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Terrorist Attacks	-0.003	0.023	0.021	-0.046	0.020	0.028	0.005	0.017	0.029	0.028
	(0.005)	(0.011)**	(0.010)**	(0.042)	(0.011)*	(0.013)**	(0.024)	(0.011)	(0.013)**	(0.016)*
Terrorist Attacks	0.000	-0.002	-0.001	0.010	-0.002	-0.002	0.001	-0.002	-0.003	-0.002
Squared	(0.000)	(0.001)**	(0.001)	(0.006)*	(0.001)**	(0.001)*	(0.002)	(0.001)*	(0.001)**	(0.002)*
GDP per capita	-0.040	-0.077	-0.083	-0.068	-0.072	-0.084	-0.067	-0.066	-0.080	-0.077
growth	(0.124)	(0.137)	(0.139)	(0.114)	(0.139)	(0.140)	(0.139)	(0.140)	(0.140)	(0.144)
Primary Students to	0.000	0.000	0.000	-0.001	0.000	0.000	0.000	0.000	0.000	0.000
teacher ratio	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Secondary Students to	0.010	0.013	0.009	0.010	0.013	0.011	0.010	0.013	0.012	0.011
teacher ratio	(0.005)**	(0.005)***	(0.005)**	(0.004)**	(0.005)**	(0.005)**	(0.005)*	(0.005)**	(0.005)**	(0.005)**
Urban Household	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.007)***	(0.008)***	(0.008)***	(0.008)***
Mother Education	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
	(0.023)	(0.023)	(0.023)	(0.024)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0109	0.0110	0.0109	0.0112	0.0110	0.0109	0.0109	0.0109	0.0110	0.0109

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AVI-3: Effect of kidnappings on incidence of fever in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Kidnappings	0.003	-0.001	-0.003	0.001	0.000	-0.002	-0.003	-0.001	-0.002	-0.002
	(0.003)	(0.003)	(0.005)	(0.009)	(0.004)	(0.006)	(0.009)	(0.005)	(0.006)	(0.007)
Kidnappings Squared	0.000	0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)**	(0.000)	(0.000)***	(0.000)***	(0.000)**	(0.000)*	(0.000)	(0.000)	(0.000)	(0.000)
GDP per capita growth	-0.024	-0.009	-0.003	0.015	-0.014	-0.007	-0.001	-0.016	-0.009	-0.006
	(0.126)	(0.139)	(0.137)	(0.141)	(0.143)	(0.142)	(0.144)	(0.146)	(0.145)	(0.145)
Primary Students to teacher ratio	0.000	0.0800	0.000	-0.001	0.000	0.000	-0.001	0.000	0.000	0.000
	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Secondary Students to teacher ratio	0.009	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
	(0.005)**	(0.005)*	(0.005)*	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)*	(0.005)*	(0.005)**
Urban Household	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***
Mother Education	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0109	0.0111	0.0112	0.0113	0.0111	0.0111	0.0112	0.0110	0.0111	0.0111

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AVI-4: Effect of attacks against the police on incidence of fever in children[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Attacks against the Police	-0.010	-0.024	0.068	-0.024	-0.008	-0.025	-0.022
	(0.013)	(0.034)	(0.042)	(0.033)	(0.096)	(0.032)	(0.067)
Attacks against the Police Squared	0.001	0.008	-0.206	0.008	0.006	0.008	0.008
	(0.001)	(0.007)	(0.024)***	(0.007)	(0.018)	(0.006)	(0.013)
GDP per capita growth	-0.036	-0.094	-0.094	-0.093	-0.093	-0.091	-0.092
	(0.139)	(0.126)	(0.126)	(0.127)	(0.240)	(0.127)	(0.248)
Primary Students to teacher ratio	0.000	0.000	-0.000	0.000	0.002	0.000	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.002)	(0.004)
Secondary Students to teacher ratio	0.011	0.014	-0.013	0.014	0.020	0.014	0.020
	(0.005)**	(0.006)**	(0.006)**	(0.006)**	(0.008)**	(0.006)**	(0.008)**
Urban Household	0.021	0.020	0.021	0.020	0.019	0.020	0.019
	(0.008)***	(0.008)**	(0.012)*	(0.008)**	(0.009)**	(0.008)**	(0.009)**
Mother Education	0.018	0.015	0.022	0.015	0.019	0.015	0.019
	(0.023)	(0.025)	(0.025)	(0.025)	(0.030)	(0.025)	(0.030)
Observations	44324	41251	36289	41251	36289	41251	36289
States	33	33	33	33	33	33	33
Pseudo R-squared	0.0108	0.0098	0.0104	0.0098	0.0107	0.0098	0.0107

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AVI-5: Effect of mass murder victims on incidence of fever in children[a]

Independent Variables	Aggregation			Averaging $\eta = 0.1$		Averaging $\eta = 0.2$	
	1 year	5 years	10 years	5 years	10 years	5 years	10 years
Mass Murder Victims	-0.033	0.060	0.260	0.068	0.067	0.072	0.047
	(0.010)***	(0.016)***	(0.028)***	(0.022)***	(0.012)	(0.028)**	(0.008)***
Mass Murder Victims Squared	0.003	-0.004	-0.043	-0.005	-0.004	-0.006	0.013
	(0.001)**	(0.002)**	(0.008)***	(0.003)**	(0.008)	(0.004)*	(0.002)***
GDP per capita growth	-0.147	0.457	0.685	0.427	0.568	0.370	0.146
	(0.095)	(0.169)***	(0.009)***	(0.191)**	(0.012)***	(0.220)*	(0.013)***
Primary Students to teacher ratio	0.004	-0.001	-0.001	-0.001	-0.001	-0.001	-0.001
	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Secondary Students to teacher ratio	0.014	0.016	-0.016	0.017	-0.001	0.018	-0.001
	(0.005)***	(0.007)**	(0.007)**	(0.007)**	(0.000)**	(0.007)**	(0.000)***
Urban Household	0.021	0.019	0.014	0.019	0.014	0.019	0.014
	(0.008)***	(0.009)**	(0.009)	(0.009)**	(0.009)	(0.009)**	(0.009)
Mother Education	0.016	0.019	0.022	0.019	0.022	0.019	0.022
	(0.025)	(0.031)	(0.035)	(0.031)	(0.035)	(0.031)	(0.035)
Observations	41251	36289	31732	36289	31732	36289	31732
States	33	33	33	33	33	33	33
Pseudo R-squared	0.0103	0.0112	0.0123	0.0111	0.0123	0.0110	0.0123

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AVI-6: Effect of total conflict on incidence of fever in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	0.005	0.000	-0.003	-0.005	0.002	-0.002	-0.004	0.003	-0.001	-0.002
	(0.003)***	(0.003)	(0.004)	(0.007)	(0.004)	(0.005)	(0.007)	(0.004)	(0.005)	(0.006)
Total Conflict	0.000	0.000	0.000	0.001	5.35e-06	0.000	0.000	0.000	0.000	0.000
Squared	(0.000)	(0.000)	(0.000)***	(0.000)***	(0.000)	(0.000)	(0.000)*	(0.000)	(0.000)	(0.000)
GDP per capita	-0.019	-0.030	-0.014	-0.009	-0.046	-0.021	-0.011	-0.054	-0.030	-0.022
growth	(0.104)	(0.139)	(0.137)	(0.129)	(0.138)	(0.142)	(0.143)	(0.137)	(0.144)	(0.146)
Primary Students to	0.001	0.000	-0.001	-0.001	0.000	0.000	-0.001	0.000	0.000	0.000
teacher ratio	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)
Secondary Students to	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010	0.010
teacher ratio	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)**	(0.005)*	(0.005)*
Urban Household	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***
Mother Education	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0111	0.0110	0.0111	0.0113	0.0109	0.0110	0.0111	0.0109	0.0110	0.0110

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section.

Table AVI-7: Effect of total conflict (factorial analysis) on incidence of fever in children[a]

Independent Variables	Aggregation				Averaging $\eta = 0.1$			Averaging $\eta = 0.2$		
	1 year	5 years	10 years	20 years	5 years	10 years	20 years	5 years	10 years	20 years
Total Conflict	0.011	0.002	0.009	0.093	0.006	0.003	0.012	0.009	0.001	0.000
	(0.012)	(0.015)	(0.022)	(0.039)	(0.018)	(0.023)	(0.033)	(0.017)	(0.021)	(0.024)
Total Conflict Squared	-0.010	0.007	0.012	0.021	0.005	0.010	0.013	0.003	0.009	0.010
	(0.004)**	(0.005)	(0.006)**	(0.012)*	(0.006)	(0.006)*	(0.008)*	(0.006)	(0.006)	(0.006)*
GDP per capita growth	-0.019	-0.017	-0.013	-0.012	-0.029	-0.014	-0.011	-0.037	-0.017	-0.011
	(0.106)	(0.144)	(0.137)	(0.132)	(0.146)	(0.143)	(0.143)	(0.146)	(0.146)	(0.147)
Primary Students to	0.001	0.000	0.000	-0.001	0.000	0.000	0.000	0.000	0.000	0.000
teacher ratio	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
Secondary Students to	0.010	0.010	0.010	0.009	0.010	0.010	0.010	0.010	0.010	0.010
teacher ratio	(0.005)**	(0.005)*	(0.005)**	(0.005)*	(0.005)*	(0.005)*	(0.005)**	(0.005)*	(0.005)*	(0.005)*
Urban Household	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021	0.021
	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***	(0.008)***
Mother Education	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018	0.018
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
Observations	44324	44324	44324	44324	44324	44324	44324	44324	44324	44324
States	33	33	33	33	33	33	33	33	33	33
Pseudo R-squared	0.0111	0.0110	0.0111	0.0113	0.0109	0.0111	0.0111	0.0109	0.0110	0.0110

[a] Notes: Robust standard errors in parentheses clustered at the state level. * significant at 10%; ** significant at 5%; *** significant at 1%. Each column represents a different regression. Regressions include state specific trend and survey year fixed effects. Conflict indicators per 100,000 inhabitants averaged or aggregated as explained in the data sources section. Conflict factor constant 1 year: Eigenvalue:1.36413, Proportion: 0.4547; KMO: 0.4897. Conflict factor constant 5 years:Eigenvalue: 1.410, Proportion: 0.470, KMO: 0.513. Conflict factor constant 10 years: Eigenvalue: 1.491, Proportion: 0.497, KMO: 0.525. Conflict factor constant 20 years: Eigenvalue: 1.613, Proportion: 0.538, KMO: 0.515. Conflict factor averaging 10% 5 years: Eigenvalue: 1.415, Proportion: 0.472, KMO: 0.509. Conflict factor averaging 10% 10 years: Eigenvalue: 1.490, Proportion: 0.497, KMO: 0.521. Conflict factor averaging 10% 20 years: Eigenvalue: 1.566, Proportion: 0.522, KMO: 0.522. Conflict factor averaging 20% 5 years: Eigenvalue: 1.420, Proportion: 0.473, KMO: 0.507. Conflict factor averaging 20% 10 years: Eigenvalue: 1.483, Proportion: 0.494, KMO: 0.517. Conflict factor averaging 20% 20 years: Eigenvalue: 1.524, Proportion: 0.508, KMO: 0.520.