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Essays on the Microeconomic Impact of Armed Conflict:  
Evidence from Ukraine

Lucas Francis Adeoye

A thesis submitted for the degree of  
*Doctor of Philosophy*



School of Economics  
University of Kent  
United Kingdom  
June 2022

# Dedication

To God and my family

# **Declaration**

I declare that, with the exception of specific references to the work of others, the contents of this thesis are original and have not been submitted for consideration for any other degree or qualification at this or any other university. Except as indicated in the text and acknowledgements, this thesis is entirely mine and contains nothing that is the result of collaborative effort with others.

Lucas Francis Adeoye

June 2022

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## **Abstract summary**

### *Chapter 2: Armed conflict and household consumption behaviour*

Focusing on the ongoing conflict in Eastern Ukraine, this chapter investigates the effects of economic shocks caused by the outbreak of an armed conflict on household consumption behaviour. Using the Ukrainian Household Budget Survey data, this paper adopts household's consumption expenditure for eleven categories of goods and services as a proxy to measure household consumption in times of conflict. The empirical analysis applied a modified difference-in-difference (DiD) empirical strategy which uses household distance from the conflict regions as a measure of conflict intensity and level of household exposure to economic shocks to assess the average impact of armed conflict on several household consumption goods and budget shares. Estimation results revealed that households closer to militarized conflict have lower chance of spending on most commodities from 2014 to 2016 compare to households that are further away. Specifically, household budget share allocated to food, clothing and footwear, and healthcare services decrease with proximity to armed conflict. On the other hand, each kilometer closeness to conflict zone increases household budget share for alcohol, education, transport and housing. This study find no effect of household proximity to conflict zone on budget share devoted to utility, leisure, durable and other goods. Most of the household's annual expenditure is allocated to food and housing. Estimations of elasticity of demand confirm that in a war situation, households perceive only food and housing to be necessities, and thus allocate most of their expenditure to those goods whereas spending on other goods is regarded as a luxury.

### *Chapter 3: Analysis of household resilience in armed conflict situation*

This chapter investigates how responses to shocks affect people's livelihood and provides evidence of how household resilience is affected by armed conflict. Employing a modified difference-in-difference estimation technique, the research finds evidence of a link between armed conflict and resilience, and it sufficiently explains how proximity to conflict zone affects a household's ability to mitigate economic shocks. Specifically, the indicators of household resilience: access to basic services, adaptive capacity, assets, social safety network and access to food decline due to the conflict in Donbas. This study provides more evidence that the closeness of a household to armed conflict has a substantial impact on the components of resilience indicators.

### *Chapter 4: The health impact of armed conflict*

This chapter explores the channels through which individual's physical health is affected the armed conflict in Eastern Ukraine. Using a modified difference-in-difference estimation technique, the study argues that armed conflict has a negative impact on physical health. In particular, the self-reported health status for individuals shows significant deterioration due to violent conflict. The effect is stronger for the population closer to the conflict location. Second, results show that access to healthcare service improves during the period of conflict. The study did not find an effect of the conflict on chronic disease.

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# Chapter 1

## General Introduction

### 1.1 Overview

The threat to an economy, household, or individual's livelihood security may be the result of a complex set of drivers. One of these drivers is armed conflict. According to Stewart (2003), "armed conflict" can be defined as organized collective violent confrontation between at least two groups, either state or non-state actors. Every conflict is unique, and much scholarly effort has been expended on categorizing the nature, character, and outcome of conflict. For example, interstate conflict occurs when two governments deploy their respective military forces against one another. Generally, imperialism, limited resources, access to trans-border markets, economic interdependence, and population expansion have historically been the most prominent economic drivers of international conflicts, which are often preceded by a formal declaration of war. Intrastate conflict, on the other hand, occurs inside the state boundaries mostly between the government's military forces and an opposing civil organized group. This conflict is often caused by intolerance on ethnic, religious, or intellectual grounds. Both interstate and intrastate conflicts have the potential to result in the death and destruction of buildings, physical infrastructure, and a country's capital assets, thereby decreasing economic productivity and possibilities for broader development prospects.

Ukraine's conflict started as an internal struggle between the government of Ukraine and pro-Russian separatists. However, due to foreign interference and infiltration, the fighting soon escalated into an interstate conflict, with the separatists being supported by foreign military

personnel-the Russian armed forces. As a result, one would anticipate the economic consequences of such a unique conflict on foreign soil to be distinct. According to research, nations that were invaded during World War II sustained losses in the form of decreased production per capita, decreased GDP, loss of assets, a fall in the working population, and infrastructure damage (see Kuznets's 1964, 1971; Kesternich et al., 2012). The focus of this thesis is to investigate the link between an armed conflict on foreign soil and economic outcomes.

There is a bidirectional link between the onset of armed conflict and economic consequences. On the one hand, armed conflict can be triggered by economic factors. For instance, as Collier and Hoeffler (1998, 2001, 2002) illustrate, violent conflict may be sparked by poor economic development and low per capita income. Research also indicates that poverty may increase the risk of conflict when hardship and inequality coincide with people's social identities. Pinstrup-Andersen and Shimokawa (2008) examine the link between socioeconomic factors and violence and find evidence that income poverty, poor health, and nutritional status are significantly associated with armed conflict onset. Poverty also increases individual and group susceptibility to insurgency by decreasing the opportunity cost of mobilisation for violence. Unemployment and inequality, along with poor levels of education and development, are believed to provide an enabling environment for recruitment and desire to fight. (Humphreys and Weinstein, 2008). Inequalities at the group level may result in social and economic divisiveness, which enhances the probability of violent conflict. This is most often the case when members of religious or ethnic groups lack equitable access to public goods and economic resources such as agricultural land, oil, metals, and diamonds (Stewart, 2009).

On the other hand, the onset of armed conflict may have a major effect on economic indicators. Armed conflict has significant impacts on people's health, educational infrastructure,

agricultural production, population displacement, and, in the long run, a decline in a country's economic growth and development. (Serneels and Verpoorten, 2015; Cervantes-Duarte and Fernández-Cano, 2016; Baumann and Kuemmerle, 2016). Aside from the destruction caused to physical infrastructure, armed conflict has been identified as a primary source of poor macroeconomic indicators, such as high inflation, distorted currency markets, large budget deficits, and decreased domestic investment (Alesina and Tabellini, 1990; Imai and Weinstein, 2000). Furthermore, violent conflict has a significant influence on the national economy by lowering GDP per capita (Collier, 1999).

Micro-economic analyses reveal that armed conflict has considerable impacts on an individual's financial well-being as it contributes to the loss of livelihoods through unemployment and loss of income (Osiichuk and Shepotylo, 2018). Recent socioeconomic analyses of the impact of armed conflicts indicate that people are predisposed to poverty due to hunger and other hardships during violent crisis (Rindebaek, 2017; Havari and Peracchi, 2017). Thus, it can be argued that armed conflicts come at a cost, not just for a country, but for households and individuals as well, and the benefits of analyzing the consequences cannot be undermined. This research examines the latter side of the two-way relationship between outbreaks of armed conflict and economic outcomes, and the nature of the conflict between Ukraine and Russia provides a quasi-natural experiment for examining a possible causal relationship.

## **1.2 Background to Ukraine-Russia conflict**

Understandably, armed conflicts have been recorded in a number of countries around the world. However, the Ukraine-Russia feud stood out and has received enormous attention from the academics and policymakers. The poor bilateral relationship between Ukraine and Russia have their origins in the 1990s following the collapse of the Soviet Union (USSR). As one of the founding states of the Soviet Union, Ukraine had been an important contributor to the Soviet Union's economy between 1920–1991. A power struggle between factions within Ukraine is the primary trigger for the armed conflict in Eastern Ukraine (Yekelchuk, 2014). The conflict is further exacerbated by the advancement of the partisan interests between the European Union (EU) and Russia; one wants to align with the European Union and the other with Russia (Haukkala, 2015). Eventually, the Ukrainian government countered Russian aggression through the pursuit of European integration – a prospect that appears unacceptable for Moscow.

In November 2013, President Yanukovich decided to abandon the partnership agreement between Ukraine and the EU a few days before its conclusion and instead opted to pursue closer relations with Russia. This decision stirred up extensive protests by pro-European forces in Kyiv and calls for the ousting of the President and removal of the legislative body. The protests escalated into violence when the government tried to stop the protesters with the use of special forces, leading to the upsurge of conflict over the government and the ousting of President Yanukovich in January 2014. A new pro-EU government was formed following snap-elections which signed an association agreement with the EU. However, the dissatisfied pro-Russia supporters in Eastern Ukraine and Crimea escalated the violence by protesting, calling that the change in government was unlawful. This led to the formation of the pro-Russian separatist militias on the east.

Russia responded with the annexation of Crimea<sup>1</sup> with no violence in March 2014 when the separatist groups took control of the region. This motivated other pro-Russian groups in other regions to call for independence from Ukraine resulting in self-declaration of Donetsk and Lugansk People's Republic in April-May 2014 to take over the industrial areas of Donbas<sup>2</sup>. Figure 1.1 shows where the conflict is localized in Eastern Ukraine and the areas occupied by the separatists. The conflicts escalated to war, leading to a large number of civilian casualties from indiscriminate shelling by mainly untrained militias.

Ukraine's economy was substantially impacted by the declaration of independence by the two dominant regions in Donbas and in particular by the annexation of Crimea as revealed in Figure 1.2. The impact on the economy is attributed to the loss of resources (natural resources, landmass, human capital, and intellectual resources), efficiency and productivity. The value of human resources lost was estimated to be insignificant, given that the Crimean labour force constituted five per cent of the national workforce (Olekseyuk and Schürenberg-Frosch, 2019). However, the reduced economic growth was attributed mainly to suppressed foreign direct investments among other factors. Beyond the economic considerations, the Crimea region offered strategic military and geopolitical benefits to Ukraine all of which were lost to Russia due to the annexation.

A ceasefire agreement known as Minsk protocol was reached in Minsk, Belarus, in September 2014 between the Russian backed rebels and the Ukrainian government. However, the ceasefire did not ease violence by much as over 1000 battle-related deaths were recorded after the

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<sup>1</sup> Crimea was transferred by Russia to Ukraine in 1954 and consequently, according to Russian 2014 census, most of the population (67.9%) are Russians (Yarmysh and Cherviatsova, 2016).

<sup>2</sup> Donbas is an industrial region in Eastern Ukraine, specifically Donetsk and Lugansk regions. Donbas is known for production of metal, coal, and machine-building industries, which are key contributors to the economy of Ukraine.



agreement. A new Minsk II ceasefire agreement was reached in Minsk on 11 February 2015. Again, the fighting did not stop, as rebels continued their offensive attack on Ukrainians in the east (Adomeit, 2020). Since the conflict started, estimates indicate that at least 2,500 soldiers have been killed (Colborne, 2015). Other estimates suggest that about 10,090 civilians have died during the conflict (Yakovlieva, 2017). In 2019, the United Nations High Commissioner for Refugees in Ukraine (UNHCR-Ukraine), stated that at least 1.9 million people were displaced by the conflict. Presently, Ukraine is ranked among the top ten leading countries where the number of internally displaced persons (IDPs) is the highest (UNHCR-Ukraine, 2020). Thus, the broad objective of this thesis is to examine the nexus between an ongoing conflict and some microeconomic outcomes in the context of Ukraine. This is done in the following research chapters 2,3 and 4, which includes papers investigating the consequences of the conflict on household consumption behaviour, household resilience and individual health status employing different econometric models and estimations methods to enhance the robustness of the findings.

### **1.3 Data Description**

This thesis employs the Ukrainian Household Budget Survey (UHBS) from 2003-2016. The UHBS is a repeated cross-section conducted in 24 regions<sup>3</sup> within Ukraine, using a sample method that covers 12,000 households annually within urban and rural settlements. The important objective of the UHBS is to give a picture of the distribution of income/consumption for the purpose of examining living conditions of individuals and private households. The questionnaire

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<sup>3</sup> Ukraine is administratively organized into 24 regions (oblasts), one autonomous republic (Crimea), and two oblast-level municipalities (Kiev and Sevastopol). This study did not include Crimea or Sevastopol in the analysis.

for the UHBS is structured to contain mainly two groups of data: the household variables and household members' variables. The UHBS defines household as a social unit, which meets one or more conditions of 'living together such as sharing of expenditures including joint provision of essentials of living in addition to having a common residence. Variables at the household level provide information about the households as they relate to demographic characteristics of the households, income, household consumption expenditure and household consumption in quantities over a given reference period. The UHBS also captures the household socio-economic characteristics such as age, sex, income, size and composition, degree of urbanization, and region of residence. It further contains information on a subjective measure of health indicators based on individual respondent's self-reported physical and mental health status, as well as information on morbidity, access to healthcare facilities and household expenditure on health care.

The construction of a regional sample of households is based on a two-stage model of probabilistic (random) sampling using a stratification procedure at each of the selection stages. The stratification procedure is aimed at forming a representative sample of households that adequately reflects the regional features of the stratification of the population<sup>4</sup>, its demographic and socio-economic structure.

As the focus of this study is on the microeconomic impact of armed conflict and the UHBS lacks information on armed conflict, households in Donbas (Donetsk and Luhansk), where the conflict is concentrated, are coded as exposed to armed conflict, whereas households in other parts of Ukraine are coded as not exposed to armed conflict. From 2014-2016, the UHBS only includes data for population in the Government-Controlled Areas (GCA) of Donetsk and Lugansk regions

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<sup>4</sup>The annual UHBS data after the most recent 2001 Ukrainian census is based on estimated population. In January 2020, an electronic census estimated the population of Ukraine at 37.3 million (excluding Crimea and separatist-occupied portions of the Donbas).

but excludes information for population of the separatist occupied areas of (NGCA)<sup>5</sup> and Crimea. This is because access to conduct survey in the NGCA is limited because of shelling and landmine contamination. Therefore, this study limits the analysis of the conflict regions to the GCA.

#### **1.4 Overview of the Essays**

The first essay of this thesis estimates the effects of armed conflict on household consumption behaviour. Using the micro data from the UHBS, I adopt household's expenditure for eleven categories of goods and services namely food, alcohol and tobacco, clothing and footwear, utilities, health, education, transport, leisure, housing, durables, and other items as proxies to measure household consumption in times of conflict. I then used a modified difference-in-difference (DiD) technique to investigate if households that were closer to the Donbas conflict from 2014 to 2016 had lower consumption. The DiD approach uses a balanced randomized sample with common trends to mitigate biases from unobserved heterogeneity that could result from permanent differences between the control and the treatment groups. I then modified the standard DiD model by using individual distance from the conflict regions to measure the intensity of the conflict on the population health. This technique addresses the unbalanced nature of the data and removes the bias that may exist between the treatment and the comparison groups. It also reveals whether changes in distance from the conflict regions affect the degree of the impact of the conflict on the population.

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<sup>5</sup> The contact line in the conflict regions divides Donbas into Government-Controlled Areas (GCA) and non-Government Controlled Areas (NGCA). GCA is controlled by Ukrainian government forces while the NGCA is controlled by Russian backed separatist

Next, I explore household consumption pattern by estimating the average impact of the conflict on the household budget share allocation for different categories of the 11 items. Further, I extend the analysis to estimate the impact of the conflict on household expenditure behaviour at the margin. Finally, I estimate demand elasticity to see how different categories of goods and services are perceived by households during a conflict. I concluded the chapter by presenting the study's findings as a roadmap to guide policymakers in implementing action plans to alleviate the adverse effects of violent conflicts on household consumption.

In the second essay, I hypothesize that estimating the link between armed conflict and consumption may not be sufficient to properly understand how households and individuals are economically affected by violence. Thus, this second essay further investigates how conflict may influence the capacity of households to cope with adverse shocks. This knowledge is important for the field of microeconomics to illustrate how a household can retain its optimal function, after experiencing economic losses due to exposure to stresses or shocks.

Therefore, this essay focuses on addressing these knowledge gaps by assessing household's resilience in conflict situation. Specifically, this paper analyses the resilience capacity of local residents to cope with possible economic consequences of the conflict three years after it started. To achieve this objective, I employed the Principal Component Analysis (PCA) to construct the indicators of household resilience from observed variables. These indicators are Access to Basic Services, Adaptive Capacity, Food Access, Assets, and Social Safety Network. Next, a modified difference-in-difference (DiD) empirical strategy is used to estimate the effect of the conflict on each of the resilience indicators. Further, I estimate the effect of the conflict on the observed variables that form the components of the resilience indicators to investigate how household

coping strategies have been affected in contexts of the violent conflict in Eastern Ukraine. Finally, I present the findings of the study, the policy implications and suggestions for future research.

The final essay of the thesis focuses on the health consequences of armed conflict. Specifically, I am interested in exploring the channels through which individual's physical health is affected when exposed to armed conflict. This knowledge is important for two crucial reasons. First, the outcome of the study has the potential to provide information for understanding population-based risk factors present during the outbreak of armed conflict. Second, this information can help policymakers and practitioners to initiate intervention measures to mitigate the health impacts of violent conflicts and to find cost-effective mechanisms for the provision of health services and the reallocation of health resources in such a way as to optimize the gains from health spending.

In order to understand how armed conflicts initiates the spread of diseases and/or deteriorates people's health status, I focus on three key health indicators: self-evaluated health status, diagnosed chronic diseases and access to healthcare during the conflict. I employ the difference-in-difference (DiD) identification strategy to exploit the variation in the impact of the conflict on the population health across the regions of the Ukraine. Following the presentation of the findings of the study, the implications for economic policy and recommendations for further research are discussed.

## **1.5 Key findings and Conclusions**

This thesis made important contributions to existing literature on the microeconomic effects of armed conflict. The findings reveal that whenever there is conflict outbreak, some important microeconomic indicators are negatively impacted. For instance, household's consumption expenditure and budget shares are adversely affected and household will show preference for goods and services that are essential for survival in times of armed. The thesis also find evidence that conflict shocks adversely affects different elements of resilience such as household's access to basic services, assets, adaptive capacity and social safety network. The findings support the argument that when violent conflicts destroy public infrastructure and people's assets, people are deprived of their livelihoods during and after conflicts. Finally, this study finds evidence that armed conflict has a negative impact on people's health. In particular, individual's self-reported health status suffers significant deterioration as the conflict progresses. In contrast, this study finds that access to healthcare service improve during the period of the conflict. That is, the closer an individual is to the conflict the more access to healthcare service.

The findings of this study suggest that, in addition to identifying the effects of armed conflict on household consumption behaviour, understanding how violence affects people's health and capacity to cope with adverse shocks is important for developing economic policies to enhance household wellbeing. For instance, changes in household budget shares for food and housing as a result of violent conflict can be transformed to increases in food aid supplies to minimize hunger and provision of shelter for protection, and relief of household suffering during and after armed conflict. In particular, international donors and humanitarian organizations should take necessary measures to ensure that food and housing assistance reach the most vulnerable such as children, women and the elderly in conflict situations.

In addition, policies should promote interventions and strategies that lead to household resilient recovery and addresses setbacks caused by armed conflict, offers opportunities and strengthens capacities to deal with future risks and bounce back quickly. International donors should support the reconstruction or maintenance of private assets (e.g., houses, farmland, and businesses) and public amenities such as schools, water supplies, sewage systems, electricity, and heating systems among others that have been destroyed during the conflict. Furthermore, the policies should be adaptable for immediate response to vulnerable people in the event of future conflict. Humanitarian organizations can provide cash-based assistance, rental support and building materials to support affected households and regions.

Finally, post-conflict health reconstruction should be among the top priorities for donor agencies to meet immediate health needs of the population affected by conflict. For instance, health reform measures that are tailored to increasing local capacity should be introduced by all stakeholders, including international donors and governments. Depending on the magnitude and the complexity of the devastation, the health system should be developed to function effectively across a long timeline. The ultimate goal should be to restore the health-care system to its pre-conflict operational capacity (The World Bank, 1998; Waters et al., 2007; Rutherford and Saleh, 2019). More importantly, if the aforementioned policies are meticulously set up, they have the potential to reduce the likelihood of repeated conflict (Collier, 2004).

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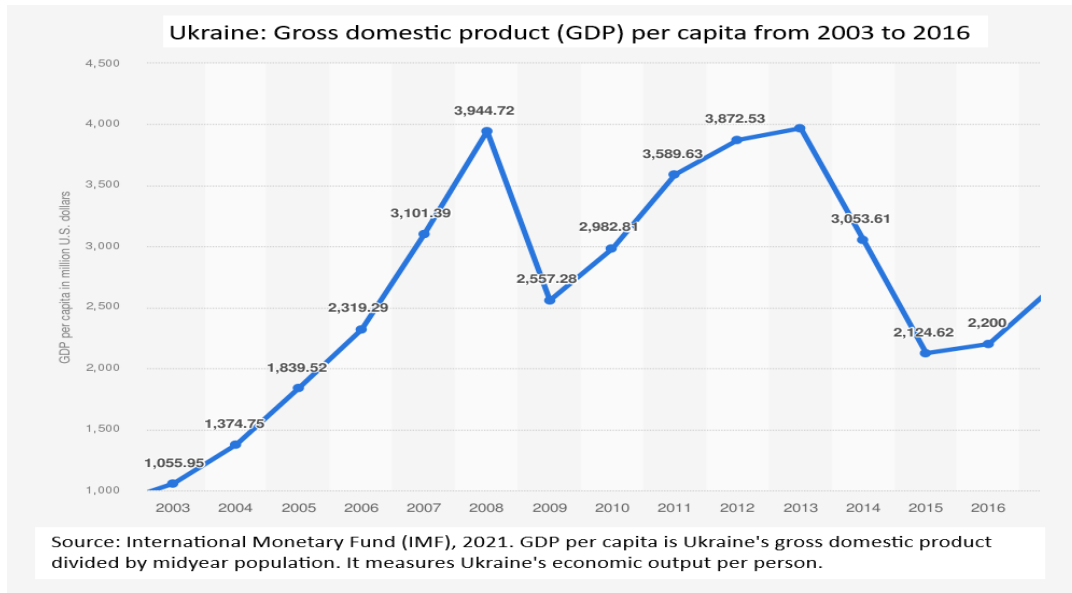
## Appendix

Figure 1.1: Map of Ukraine showing conflict regions and area occupied by separatists



Source: Ukraine National Security and Defence Council (2017)

Figure 1.2: Trend of Ukraine's GDP per capita since the conflict started in 2014



## Chapter 2

### Armed conflict and household consumption behaviour

#### 2.1 Introduction

Armed conflicts have diverse consequences in countries where such incidences occur. There is growing interest in understanding how violence affects a country's economy, the role it plays in households and the consequences for individuals. Several empirical studies find that armed conflict affects household consumption behaviour differently. For instance, Justino (2011) finds that armed conflict affects household by reducing consumption. The study further reveals that households living in conflict zones adjust their consumption patterns to avoid acute situations of food insecurity. On the other hand, Friedman and Schwartz (1980) analysed household spending distribution and find evidence that household expenditure on durable goods more than doubled after the World War II . This research adds to the expanding knowledge about the microeconomic effects of armed conflict.

The purpose of this chapter is to broaden the discussion on how armed conflict affects household consumption. More precisely, this paper aims to investigate household consumption behaviour and how it allocates its expenditure to different commodities in conflict situation. It also seeks to establish whether households perceive goods differently when exposed to violent conflict, i.e. in terms of necessity, normal or luxury goods and whether this perception changes household consumption pattern. The analysis is conducted using the Household Budget Survey (HBS) data from Ukraine. The data is nationally representative and includes information on households expenditure on various consumer goods. The data also captures households located

in the conflict-affected regions <sup>6</sup> of Eastern Ukraine thereby allowing this study to differentiate households into those exposed to armed conflict and those not exposed to armed conflict.

With the assumption that each household allocates its expenditure to several commodities, the purpose of this study is to determine if exposure to armed conflict influences household consumption decisions. Using the Classification of Individual Consumption by Purpose (COICOP 2018) <sup>7</sup> this study identifies eleven types of household goods: food, alcohol and tobacco, clothing and footwear, utilities, health, education, transport, leisure, housing, durables, and other types of items such as expenditure on personal care, insurance, funeral and wedding.

Two major objectives are examined in this study. First, the study investigates whether households that are closer to Donbas from 2014 to 2016 <sup>8</sup> had lower consumption three years into the conflict compared to the households that are further away from the conflict zone. Second, this research analyses household expenditure behaviour by comparing the consumption pattern of household based on proximity to armed conflict. To achieve these, a modified difference-in-difference (DiD) empirical strategy which uses household distance<sup>9</sup> from the conflict regions as a measure of conflict intensity and level of household exposure to economic

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<sup>6</sup> Donetsk and Luhansk oblasts are the two main regions that are typically affected by the conflict in Eastern Ukraine. The contact line separates the regions into government-controlled areas (GCA) and non-government-controlled areas (NGCA). Access to conduct survey in the NGCA is limited because of shelling and landmine contamination. As a result, data for the NGCA is not included in the UHBS.

<sup>7</sup> COICOP is for Classification of Individual Consumption by Purpose, and it was designed by the United Nations Statistics Division to classify and analyze individual consumption expenditures incurred by households, non-profit institutions supporting homes, and the general government. Food, clothing and footwear, housing, water, electricity, and gas and other fuels are all included.

<sup>8</sup> The conflict in Ukraine started in 2014 and is still ongoing 8 years later. However, due to limited access to data, this study is only able to conduct analysis from 2014 to 2016.

<sup>9</sup> The distance (measured in kilometres) between the combat zone and the administrative centre of each region in Ukraine is calculated using a Google map. Other regions are on average 647 kilometres away from the conflict zone.

shocks. First, the model relates budget shares linearly to the logarithm of total household expenditure and thereby permits the observation of how households allocate expenditure to various goods during conflict. Next, the empirical strategy allows the exploration of household consumption behaviour to see if there is variation in how households allocate their marginal expenditure during armed conflict. Finally, demand elasticities is computed, to investigate how households perceive goods and services in terms of necessity, normal or luxury goods in times of war.

Estimation results revealed that households closer to militarized conflict have lower chance of spending on all commodities (with the exception of spending education) from 2014 to 2016 compare to households that are further away from the conflict zone. Further investigation of household consumption pattern according to proximity to economic shocks caused by the outbreak of armed conflict indicate that, household budget share allocated to food, clothing and footwear, and healthcare services decrease with proximity to armed conflict. On the other hand, each kilometer closeness to conflict zone increases household budget share for alcohol, education transport and housing. This study find no effect of household proximity to conflict zone on budget share devoted to utility, leisure, durable and other goods.

Estimates of household expenditure behaviour at the margin show that most annual expenditure is allocated to food, clothing and housing when a household is nearer to conflict zone. Finally, estimations of elasticity of demand suggests that in a war situation, households closer to the epicenter of armed conflict perceive only food as a necessity and therefore allocate most of their expenditure to it. Whereas, spending on goods such as alcohol, clothing and footwear, transportation, and housing is regarded as a luxury in times of war. That is, when exposed to armed conflict, households perceive food as the most essential commodity. Utility,

health, education, leisure, and durable goods all have negative expenditure elasticities, implying that a rise in household budget results in a drop in spending on those commodities, as they are perceived as non-essential in times of war.

The rest of the paper is structured as follows. Section 2.2 reviews the relevant literature on the link between armed conflict and household consumption; section 2.3 describes the dataset used in this study; section 2.4 explains the identification strategy and empirical specification. Section 2.5 discusses the empirical findings and the last section 2.6 concludes the paper.

## **2.2 Literature Review**

Armed conflict can have detrimental effects on household wellbeing. These harmful effects especially on the local people residing in the conflict-affected areas are undeniable. Individuals and households are exposed to significant economic risks and welfare losses in the presence of armed conflict (Dercon, 2004; Verwimp, Justino, and Brück 2018; Blattman and Miguel 2010). Economic shocks to household due to armed conflict is a subject of extensive debate in development economics. Using data from Columbia, Ibáez and Moya (2006) examine the economic costs of armed conflict among households and find evidence that households exposed to armed conflict experience low consumption of goods and services as a result of their limited ability to produce new sources of income.

When we consider the impact of armed conflict on markets, changes in the price of staple goods are critical for household decisions. Empirical evidence on price effects of armed conflict reveals an increase in prices of staple food (see Verpoorten 2005; Bundervoet 2006). When the price of

staple rises, we would expect the households to reduce their consumption of that good. Consequently, a household's attempt to respond to price shocks will result in reductions in consumption and utility.

Wars have a huge impact on the labour market by making the populations less likely to work and thereby limiting further the households' ability to recover from economic losses caused by scarcity (Kondylis 2007 ; Jürges, 2012). An examination of the impact of armed conflict on labour markets reveals that households whose members die, become ill, or are recruited to fight in wars have lower income and consumption. Furthermore, some households are unable to take up new employment, change economic activities or gain access to credit (Vincent de Paul et al., 2020).

Human and physical capital destruction are some other key channels through which conflict affects household consumption. The loss of human life; destruction of infrastructure and institutions can directly impact fortunes and impede investment and economic activities not only during conflict but also afterward, thereby affecting household consumption decisions (Serneels and Verpoorten, 2013; Frolov & Bosenko, 2020). Displacement of skilled labor; disruption and weakening of institutions; and a rise in general economic and political uncertainty leads investors to delay long-horizon investment implying larger and more persistent economic costs as a result of reduced investment, trade, and productivity (Petrao and Schweiger, 2012; Giesberg, 2013; Power, 2013). Accounting for the loss of market activity caused by the destruction of existing physical and human capital presupposes that war can decrease total factor productivity, reduce household income and lower household consumption per capita (Imai and Weinstein, 2000; Koubi, 2005; Swee, 2016)

Along with income levels, education levels, and other demographic variables, armed conflict outbreak has been included among the determinants for savings rates and as a factor that influences individual and household spending behaviour (Thimann and Dayal-Gulati, 1997; Carlin and Mayer, 2003; Grigoli, Herman and Schmidt-Hebbel, 2018; Torres-Garcia, Vanegas-Arias and Builes-Aristizabal, 2019). When a conflict ends, inflation is usually the aftermath. In many cases, conflict causes hyperinflation, which results in the loss of household savings, increased debt and uncertainty, as well as lack of confidence in the financial system (Torres-Garcia, Vanegas-Arias and Builes-Aristizabal, 2019). For example, Hungary and Austria among other European countries saw the greatest rates of hyperinflation on record due to crippled economy that followed the World War I (Lopez and Mitchener, 2020).

On the other hand, the outbreak of war has been found to lower unemployment by diverting labour away from non-economic activities to wartime military production thereby boosting GDP per capita (Higgs, 2006; de Walque and Verwimp, 2010). The US-Vietnam conflict in the 1950s resulted in a rise in military spending, which was partly responsible for strong domestic labour demand, increased household income and consumption, and high rates of economic growth (Baker et al., 1996). Indeed, one of the unintended positive consequences of the First and Second World Wars was an increase in female employment as women took on jobs that had previously been reserved exclusively for men. After the Second World War, both the UK and the US economies quickly attained full employment, with shortages in vital areas as men enlisted in the army (Acemoglu et al., 2004).

## 2.3 Data

The Ukrainian Household Budget Survey (UHBS, 2003-2016) is used in this study. The UHBS provides essential information on economic conditions of households and individuals (see chapter one for detailed explanation of the data). Since the focus of this paper is primarily to investigate the pattern of expenditure across a population during a violent conflict, this makes the survey data a useful measure of household consumption. Consumption in this study is defined as a household's annual expenditure on eleven categories of goods and services, as described in Deaton and Grosh (2000). This includes expenditure on food, alcohol and tobacco, clothing and footwear, utilities, health, education, transport, leisure, housing, durables, and other type of items such as personal care, insurance, funerals and weddings. As the aim of this study is to analyze how armed conflict affect household consumption behaviour, it further examines the impact of the conflict on the overall average budget share of each commodity category.

Table 1 describes each category of expenditure and shows how much each household spends on average on various expenditures. It also reveals the overall average household budget share for each commodity group. Annually, household spends an average of \$1,548 on food items, \$99.7 on alcohol and tobacco, \$207.9 on clothing and footwear, \$66.7 on utilities, \$104.5 on health, \$18.4 on education, \$121.2 on transport, \$66.7 on leisure, \$319.9 on housing, \$85.2 on durables and \$79.8 on other goods. In terms of mean budget share, household devotes 58.5 per cent of its total annual expenditure to food commodities, 3 per cent goes towards alcohol and tobacco, 7 per cent to clothing and footwear, 2 per cent to utilities, 4 per cent to health, 0.5 per cent to education, 3 per cent to transport, 2 per cent to leisure, 12 per cent to housing, 3 per cent to durables and 2.5 per cent to other goods.



According to empirical studies, differences in household size have a considerable impact on household spending behaviour, depending on the commodities in consideration. Manchester, (1977) finds evidence that when household size increases, average household consumption declines. On the other hand, Randazzo and Piracha (2019) establish that when the size of the household increases, the average budget share for food falls. Thus to accounts for differences in household consumption patterns due to the number of family members by incorporating household size variable in the analysis.

The material benefits of education to individuals are primarily in the form of increased productivity and earnings (Schultz, 1963). Some studies also suggest that education might influence household tastes and preferences, family budget management, child care, and health care (House and Grossman, 1972; Psacharopoulos and Michael, 1973). This research therefore includes household head's education variable in the estimation. As permitted by data, this empirical estimation divides the years of education of the household head into eight categories: no formal education (0 years); completed primary school (6 years), incomplete junior secondary school (7 years), completed junior secondary school (9 years), completed secondary school (12 years), incomplete basic higher (13 years), completed basic higher education (14 years), completed higher education (16 years).

Household composition is likely to determine how income is generated and how expenditure is allocated. The per capita consumption of goods typically consumed by children depends on the number and the age group of the children in a household. For instance, households with infants and toddlers are less likely to spend so much on education compared to households with school-age children (Kornrich and Furstenberg, 2012). This study splits children into 3 groups

and include them as different stand-alone variables in the model. The groups are as follows: infant, toddler and pre-schooler (0 to 5 years), school-age child (6 to 13 years) and adolescent (14 to 18 years).

Agricultural land ownership plays an important role in household consumption. In Ukraine, for example, 96 per cent of agricultural land is under moratorium<sup>10</sup> except small farmlands and gardens. This implies that part of household farm production will be consumed within the household. It is therefore important that the differences in household consumption due to farmland ownership be taken into consideration. A dummy variable that represents one if a household own an agricultural land and zero otherwise is included in the model.

Finally, this paper includes dummies to capture differences in residential location as this has been found to influence household consumption behavior. Redman (1980) argues that households in urban regions of the United States of America spend more on prepared foods than those in rural areas. Other studies also found that households in central cities allocated larger budget shares of expenditures to durable goods, while households residing in rural areas allocated larger budget shares to non-durables (Zhang, 2016; Gonzalez-Navarro and Quintana-Domeque, 2010). The household characteristics included in this study are presented in Table 2.2.

Figure 2.1 shows the trend of household's total annual consumption expenditure before and during the Donbas conflict. The diagram reveals that, although western Ukraine in comparison to Eastern Ukraine have different consumption levels prior to the start of the conflict, their trends pre-conflict are identical. The diagram further reveals sharp decline in total annual household expenditure for

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<sup>10</sup> In 2001, a moratorium was enacted in Ukraine prohibiting individuals and legal entities from selling or otherwise transferring of agricultural land other than through inheritance, swaps, or government appropriation. It was purportedly created to safeguard those who had been given agricultural land after the Soviet kolkhozes (collective farms) were disbanded.

both western and Eastern Ukraine households from when the conflict started in the beginning of 2014 but the decline in total annual household expenditure is greater for Eastern Ukraine households in comparison to western Ukraine households.

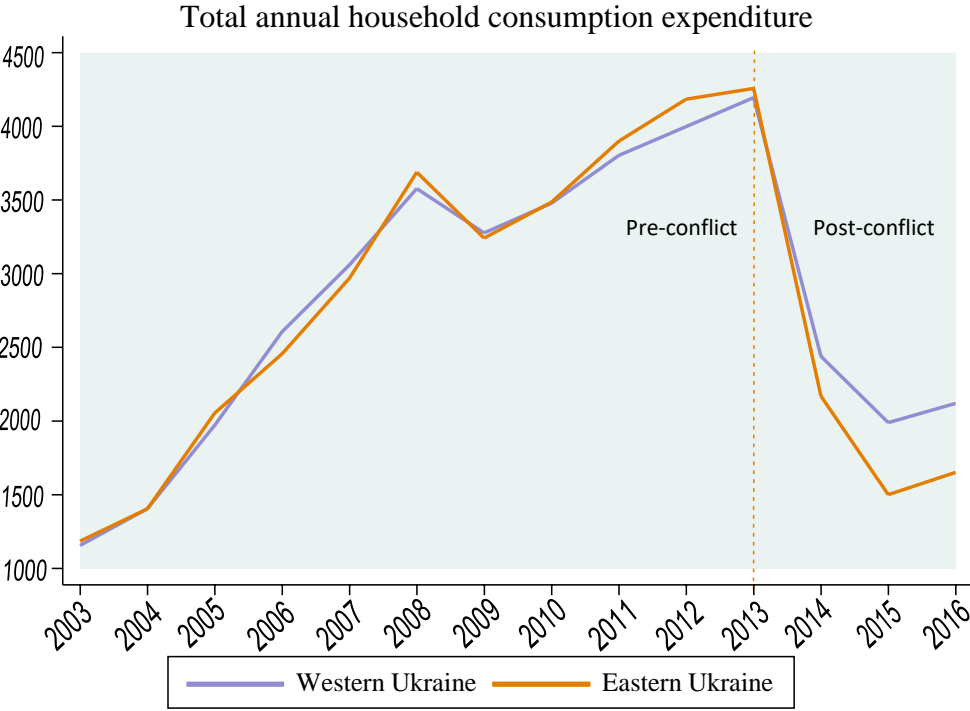


Figure 2.3: Parallel trend analysis of annual household consumption expenditure

**2.4 Methods**

2.4.1 Identification Strategy

This study employs a modified difference-in-difference (DiD) empirical strategy to explore the effect of armed conflict on household consumption pattern. This technique addresses the unbalanced nature of the data employed in this study. The 2014 to 2016 UHBS excludes the population in the pro-Russian separatist occupied territories of Donbas causing non-randomness

in the demographic composition of the conflict region. In addition, migration is a significant threat to the analysis of this study because people flee the conflict zone to the west and across the border, resulting in a nonrandom sample and self-selection. Furthermore, conflict may be endogenous, indicating unobservable features of individuals and households that influence their migration decision in contrast to the conflict itself. Finally, in the absence of armed conflicts, other factors such as price may influence household expenditure decision. Given these data limitation and selection problem, this study is unable to employ standard DiD technique, as this could bias the results. Hence, the standard DiD model is adjusted by using household distance from the conflict regions to measure the intensity of the conflict on household consumption. Distance is then interacted with the duration of the conflict as an exogenous variable to examine how households in various regions of Ukraine are affected differently by the conflict. This technique removes biases from unobserved heterogeneity that may exist between the treatment and the comparison groups. Additionally, the technique gives valuable insight into how the conflict's impacts on household spending are likely to vary based on the proximity to the epicentre of armed violence. The assumption of parallel trends between treated and control groups is tested to ensure that in the absence of armed conflict, the difference in consumption expenditure between the 'treatment' and 'control' group is constant over time. Since the UHBS survey does not contain data on commodity prices, this study is unable to control for prices in the analysis.

As a first step to investigating the effect of conflict on household, the total household consumption expenditure for the each of the 11 categories of goods and services considered in this study is used as indicator to assess whether differences exist in the consumption levels for households that are closer to the conflict zone compared to households that are further away since the conflict started in 2014. Next, to assess household consumption behaviour and how it allocates

expenditure to various goods when in conflict situation, this study analyses how household budget shares vary as we approach the combat zone. Further, this study estimates the marginal budget share to determine whether differences exist in the marginal expenditure behaviour among households based on proximity to conflict zone. Finally, this study computes the expenditure elasticities to gain insight into how households perceive different categories of goods when exposed to conflict shocks.

#### 2.4.2 Empirical Specification

In order to determine whether the effect of the conflict on household consumption expenditures changes with distance from the conflict zones, this research estimates the modified DiD model specified below:

$$Y_{ijrt} = \beta_0 + \beta_1 C_t + \beta_2 D_r + \beta_3 C_t * D_r + X_{jrt} \delta + \gamma_r + \gamma_t + \varepsilon_{ijrt} \quad (1)$$

where  $Y_{ijrt}$  denotes, in separate models, log total consumption expenditure and budget share in good  $i$  for household  $j$  in region  $r$  at time  $t$ . The years of conflict are captured by the time dummy variable  $C_t$ . The value is 1 if the year is greater than or equal to 2014, and 0 otherwise;  $D_r$  represents the distance from the conflict zone (Donetsk) to the administrative center in region  $r$  and  $X_{jrt}$  is the matrix of household control characteristics discussed in section 2.3. The focus of equation (1) is on the estimates of  $\beta_3$  vector, which indicate the effect of armed conflict on the relevant consumption expenditure and budget share.

Besides the conflict, other factors may influence household's spending and budget share. Ukraine's economic situation started to get worse before the conflict started in 2014 because of a weakening

domestic currency, rising energy costs and the breakup of trade ties with Russia. The Western regions developed a lot more trade with Europe and did not have to deal with the effect of the conflict as much as the Eastern region, which was more focused on trading with Russia. These factors may affect household spending, and not as a direct impact of the conflict, even though the conflict may have made things worse. Therefore, equation (1) includes the -regional fixed effects ( $\gamma_r$ ), to control for the average differences in any observable or unobservable economic factors across regions in Ukraine. Also, given that the study examines the impact of the war across a several years, equation (1) further includes time fixed effects ( $\gamma_t$ ) to account for time-specific economic variables such as commodity prices in Ukraine in each year. where  $\varepsilon_{ijrt}$  is the idiosyncratic error term with mean zero and constant variance which captures the unknown variation in the  $i^{th}$  good and budget share for the  $j^{th}$  household in region  $r$  at time  $t$ .

If exposure to armed conflict shows some effect on the household budget share allocated to specific categories of goods, then equation (1) can be expanded to include total household expenditure thus:

$$Y_{ijrt} = \beta_0 + \beta_1 C_t + \beta_2 D_r + \beta_3 C_t * D_r + \beta_4 \log \exp_{jrt} + X_{jrt} \delta + \gamma_r + \gamma_t + \varepsilon_{ijrt} \quad (2)$$

The functional form expressed in (2) relates budget shares linearly to the logarithm of total household expenditure ( $\exp_{jrt}$ ). To determine if there exist significant variation in households' marginal expenditure behaviour according to their proximity to armed conflict, the log of total expenditure is further interacted with the dummy variable for the time of conflict and the natural log of distance to conflict zone. Thus, equation (2) becomes:

$$Y_{ijrt} = \beta_0 + \beta_1 C_t + \beta_2 D_r + \beta_3 C_t * D_r + \beta_4 \log \exp_j + \beta_5 C_t * D_r * \log \exp_{jrt} + X_{jrt} \delta + \gamma_r + \gamma_t + \varepsilon_{ijrt} \quad (3)$$

The main focus here is on the vector  $\beta_4$  which enables the computation of marginal budget shares and expenditure elasticities according to household proximity to armed conflict. The marginal budget share (*mbs*) for good *i* and household *j* is expressed as follows:

$$mbs_{ijrt} = \frac{\partial c_{ijrt}}{\partial \exp_{jrt}} \quad (4)$$

The partial derivative of the expenditure share with respect to the total consumption expenditure can be estimated from equation (4) thus:

$$\frac{\partial Y_{ijrt}}{\partial \exp_{jrt}} = \frac{\exp_{jrt} \frac{\partial c_{ijrt}}{\partial \exp_{jrt}} - c_{ijrt} \frac{\partial \exp_{jrt}}{\partial \exp_{jrt}}}{\exp_{jrt}^2} = \frac{\beta_4}{\exp_{jrt}} \quad (5)$$

Solving for  $\frac{\partial c_{ijrt}}{\partial \exp_{jrt}}$  in equation (5) we have:

$$mbs_{ijrt} = \beta_4 + \frac{c_{ijrt}}{\exp_{jrt}} = \beta_4 + Y_{ijrt} \quad (6)$$

Equation (6) can be computed after estimating equation (2) and it expresses the marginal budget shares for households before the conflict started. The marginal budget shares for households during the conflict according to distance to the conflict zone is computed after estimating equation (3) and is given as:

$$mbs_{ijrt} = \beta_4 + \beta_5 + Y_{ijrt} \quad (7)$$

According to the definition of elasticity, the expenditure elasticity of good  $i$  for household  $j$  before the conflict can be expressed as:

$$e_{ijrt} = \beta_4 + (\beta_4 + Y_{ijrt}) \frac{1}{Y_{ijrt}} = \frac{\beta_4}{Y_{ijrt}} + 1 \quad (8)$$

The expenditure elasticity for households during the conflict according to distance to the conflict zone is given as:

$$e_{ijrt} = \frac{\beta_4 + \beta_5}{Y_{ijrt}} + 1 \quad (9)$$

One major econometric problem encountered when estimating the effect of armed conflict on household consumption and expenditure share was the presence of significant number of zeros in education expenditure variable. In many household expenditure surveys, the issue of zero expenditure is common which may occur for one of three reasons: non-consumption, inability to afford the good, or lack of frequent purchases. In Ukraine, education is provided free of charge in public schools up to the higher education level, hence most households have no educational expenses. As the DiD model does not resolve the issue of zero expenditure, the inverse hyperbolic



sine (arcsinh) transformation<sup>11</sup> is used to approximate the logarithm of the total household consumption variable to allow retaining zero-valued observations.

## 2.5 Results

### 2.5.1 Do Ukrainian households reduced consumption three years into the Donbas conflict?

Tables 2.4 reports the results of household consumption expenditure for the 11 categories of goods and services considered in the analysis using equation (1). Each regression includes regional and time fixed effects. Robust standard errors clustered at household level are presented in parentheses. Comparing household consumption expenditure before and during the conflict shows substantial increase. That is, since the conflict started, there is higher chance of a ukrainian household to increase expenditure for all the categories of goods and services except for spending on alcohol, tobacco and education. However, the results of the estimates for most goods weaken with household's proximity to Donbas as indicated by the positive and significant coefficient of the interaction term. This implies that, for every one-kilometer distance to the conflict zone, a household has 59 per cent lower chance of spending on food; 198 per cent lower chance of spending on clothing and footwear, 67 per cent lower chance of spending on utility, 160 per cent lower chance of spending on healthcare; 54 per cent lower chance of spending on transport; 67 per cent lower chance of spending on leisure; 93 per cent lower chance of spending on durables; and 77 per cent lower chance of spending on other goods. This result is consistent with the argument that other things being equal, armed violence has a direct impact on food security, incomes, and consumption (Serneels and Verpoorten, 2012; Koren and Bagozzi, 2016; Brück and d'Errico, 2019)

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<sup>11</sup> Inverse hyperbolic sine technique (IHS) transforms is similar to logarithm and it allows retaining zero-valued observations (see Burbidge et al., 1988; MacKinnon and Magee, 1990; Pence, 2006).

On the other hand, estimates show 31 per cent , 8 per cent and 28 per cent higher chances of spending on alcohol and tobacco, education and housing respectively as household moves closer to the conflict zone . The reasons for the increase in household spending those commodities is that when people are confronted with shocks and insecurity, they frequently increase their cigarette smoking and alcohol consumption in order to calm down or relieve stress. Destruction of educational infrastructure, disruption to free government funded school system and loss of teaching personnel might force household to rely on private schools funded out of pocket (Lai and Thyne, 2007; Islam et. al, 2016) . In addition, damage to properties during a battle results in a housing shortage, which leads to significant rent increases (see Shemyakina, 2006; Konstantin et.al., 2019 )

#### 2.5.2 Has consumption pattern changed for households that are experiencing conflict?

One reason why conflict affected households have lower consumption is that they may have to adjust their expenditure behaviour to soothe their needs (Justino, 2011). Using the functional form expressed in equation (2), which includes the log of total annual expenditure as extra covariate, this study investigates how a household allocates its expenditure in times of war. Table 2.5 shows the effects of household proximity to conflict zone on different budget shares.

Looking at the expenditures shares for all the 11 categories of goods analyzed, this study finds that, close proximity to armed conflict significantly affects household spending pattern. Specifically, for every one-kilometer distance to the conflict zone, household budget share allocated to food, clothing and footwear and healthcare services decrease by 4 per cent , 2 per cent and 2 per cent respectively. On the other hand, each kilometer distance to Donbas increases the household buget share for alcohol by 2 per cent , increases expenditure on education by 1 per cent , increases spending on transport by 1 per cent and increases spending on housing by 3 per

cent . No affect of proximity to conflict zone was founds on budget share allocated to utility, leisure, durable and other goods.

Table 2.6 shows the estimated coefficients for the logarithm of household expenditure and its interaction with the time of conflict and the natural log of distance to conflict zone. Results show that, as total annual expenditure increases, households closer to the conflict zone spend less on alcohol and tobacco, clothing and footwear, transport and housing while the budget shares devoted to utility, health, education, leisure and durable significantly increase when annual total expenditure increases for households closer to conflict. The primary objective of this estimate is to assess whether proximity to a war zone has an effect on the household marginal propensity to consume. Using equations (7) and (9) therefore, this study employs the coefficients that correspond to the logarithm of the total expenditures before and during the conflict in equation (3) to compute the marginal budget shares and expenditure elasticities for the 11 commodities examined. The estimates in table 2.7, column (2) reveal that for one US dollar increase in the household's budget, expenditure on food increases by \$0.56 on alcohol and tobacco by \$0.05, on clothing and footwear by \$0.12. Expenditure on transport increase by \$0.07, on housing by \$0.18, and spending on other goods increase by \$0.03. Spending on utility and leisure does not change with increase in household budget while expenditures on health, education, and durable, respectively, decrease by \$0.04, \$0.03, and \$0.01 for one US dollar increase in the household's budget. In general, the closer a households is to conflict zone the more it spends on food, clothing and housing than on other commodities at the margin. Finally, the estimates in column (3) of table 2.7 shows expenditure elasticity of 0.96 for food, 1.53 for alcohol and tobacco, 1.83 for clothing and footwear, -0.12 for utility, -0.93 for health, -5.39 for education, 2.39 for transport, -0.12 for leisure, 1.47 for housing, -0.44 for durables and 1.25 for other goods. This results suggest that households closer to armed

conflict consider food as necessity while commodities such as alcohol, clothing and footwear, transport, housing and other goods are all classified as luxury items. Expenditure elasticities for utility, health, education, leisure and durable goods are negative which implies that an increase in household budget comes with a decrease in spending on those commodities. This is because households regard those items as non-essential during times of war.

## **2.6 Conclusion**

Armed conflict has the potential to destabilize a country's economic structure, and there exist significant gaps in the knowledge of the microeconomic implications of conflict. Focusing on the ongoing conflict in Eastern Ukraine, this research contributes to the discourse in two broad ways. First, this study estimates the effects of armed conflict on household consumption. Using the Ukrainian Household Budget Survey data, this paper adopts household's consumption expenditure for eleven categories of goods and services namely food, alcohol and tobacco, clothing and footwear, utilities, health, education, transport, leisure, housing, durables, and other items as a proxy to measure household consumption in times of conflict. A modified difference-in-difference (DiD) empirical strategy is employed to measure the intensity of the conflict on consumption expenditure according to household distance from conflict regions. Estimation results revealed that households closer to the violence had lower chance of spending on all commodities (with the exception of education) from 2014 to 2016 compare to households that are further away from the conflict zone.

The second contribution of this study to the literature investigates household consumption pattern according to proximity to economic shocks caused by the outbreak of armed conflict. Estimates of the average impact of the conflict on the household budget share allocation for the 11

items analyzed in this study reveal that, household budget share allocated to food, clothing and footwear, and healthcare services decrease with proximity to armed conflict. On the other hand, each kilometer closeness to Donbas increases the household budget share for alcohol, education transport and housing. This study find no effect of household proximity to conflict zone on budget share devoted to utility, leisure, durable and other goods.

Further, this study extends the analysis to estimate the impact of the conflict on household expenditure behaviour at the margin. Results show that most annual expenditure is allocated to food, clothing and housing when a household is near the conflict zone. Finally, estimations of elasticity of demand confirm that in a war situation, households closer to the epicenter of the conflict perceive only food as necessity, whereas spending on goods such as alcohol, clothing and footwear, transportation, and housing is regarded as a luxury. Utility, health, education, leisure, and durable goods all have negative expenditure elasticities, implying that a rise in household budget results in a drop in spending on those commodities. This may be because in times of war, households deem those goods as non-essential.

This research therefore concludes that whenever there is conflict outbreak, some household's consumption expenditure and budget shares are impacted more than others. As one moves from low to high conflict intensity areas, the negative economic consequences of armed violence increase. This analysis also infers that in times of war, household will show preference for goods and services that are essential for survival (such as food and shelter). This implies that some commodities that were considered necessities in peacetime are perceived as luxuries or not needed for survival in times of war.

## **Implications for Policymakers**

Effective conflict resolution policies require accurate understanding of how individuals and households have been affected by violence and the implications for their consumption. The findings of this study show that, in addition to the knowledge of the effects armed conflict on consumption, understanding household expenditure behaviour is critical in formulating economic policies that improves household wellbeing. For example, the change in household budget shares for food commodities due to exposure to armed conflict can be converted to increase in food quantities supplied to reduce starvation and alleviate the suffering of households. International Humanitarian system's response to food crises in regions affected by conflict should be a priority. Measures should be taken to ensure that food assistance reach the most vulnerable such as children, women and the elderly in conflict situations.

Housing is critical for lowering vulnerability and increasing resilience during crisis. Housing provides security, personal safety, and weather protection, as well as preventing illness and disease. In the event of armed conflict policy makers should implement policies to ensure housing needs of the people exposed to armed conflict are met in the most effective and efficient manner possible. These policies should cover the recovery phase as an urgent response to resettle those who have been displaced from their homes because of violent conflict. The policies should also include the reconstruction or maintenance of houses that have been destroyed during the conflict. Furthermore, the policies should be adaptable for immediate response to vulnerable people in the event of future conflict. Humanitarian organizations can provide cash-based assistance, rental support and building materials to support affected households and regions. If the policies are meticulously set up, they have the potential to reduce the likelihood of repeated conflict (Collier, 2000).

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## Tables

Table 2. 1 Description of the expenditure categories

Category	Description	Mean expenditure	Mean budget share
Food	Rice, bread, pasta, flour, cereal meat, fish, milk, fats & oil, fruits, vegetables, confectionary, other foods, tea & coffee, water & soft drink	1548.21 (1105.66)	0.585
Alcohol & Cigarette	Alcohol , wine , beer, Cigarettes, cigars, and other tobacco products.	99.74 ( 158.10)	0.031
Clothes & footwear	Readymade fabrics and materials for making clothes, clothing and footwear for men, women children up to 14 years,	207.95 (260.40)	0.067
Utilities	Telecommunication, water, sewage, electricity, gas and other fuels	66.73 (184.99)	0.018
Health	Hospital services (e.g., medical, dental), doctor fees, prescription, medical equipment, lab fees etc.	104.50 (224.25)	0.039
Education	Books, uniforms, school supplies, registration fees for preschool, primary education, secondary education and higher education.	18.40 (92.36)	0.005
Transport	Buying and maintenance/repair of a new and/or used car, road, rail and sea transport (except transport for leisure)	121.23 (479.63)	0.03
Leisure	Goods such as audio-visual equipment, photographic and information processing equipment, flowers, pets, newspapers, books and stationery for recreation and cultural activities.	66.73 (184.99)	0.018
Housing	House, house rent, home improvement, land, mortgage repayment	319.87 (337.81)	0.123
Durable	Furniture, household items, household equipment, luxury goods, appliances, vehicles, computer, electronic goods.	85.19 (237.00)	0.026
Other goods	Personal care (e.g., hair dressing), expenditures on life and vehicle insurance, wedding, funerals and other services.	79.77 (129.74)	0.025

N=126, 429; Expenditure is expressed in annual USD (PPP); Standard deviation in parentheses

Table 2.2 Description of Treatment Variable

Variable	Measure	Mean (SD)
Conflict	Years of conflict (2014 to 2016) 1 if year is greater or equal 2014, 0 otherwise	0.193 (0.395)
Distance	Natural log of distance in kilometers from Donetsk to 22 administrative capitals, measured by driving distance	647.771(416.424)
Log of total expenditure	Log of total household expenditure for 11 categories of goods and services	9.790 (0.869)

Number of Observations is 126,429; standard deviation in parentheses.

Table 2.3 Summary statistics of the variables used in the estimations

Variables	Mean (SD)
Household size	2.442 (1.334)
Household Head gender (Female=1)	0.556 (0.497)
Active Age – HH Head ( 15-65 years)	0.666 (0.472)
Years of Schooling (Household Head)	12.233 (2.703)
Proportion of children (0 – 6 years)	0.158 (0.433)
Proportion of children (7 -13 years)	0.238 (0.535)
Proportion of children (14-18 years)	0.122 (0.359)
Agriculture land ownership (yes=1)	0.595 (0.491)
Urban resident (yes=1)	0.373 (0.484)
City resident (yes=1)	0.283 (0.450)
Rural resident (yes=1)	0.344 (0.475)

Number of Observations is 126,429; standard deviation in parentheses.

Table 2.4 Impact of conflict exposure on household consumption expenditure: Modified difference-in-difference estimates

	Food	Alcohol & Cigarette	Clothing & footwear	Utility	Health	Education	Transport	Leisure	Housing	Durable	Other
Conflict	0.458*** (0.008)	-0.0616 (0.035)	0.613*** (0.028)	0.117*** (0.028)	1.434*** (0.030)	-0.0422*** (0.003)	0.579*** (0.035)	0.117*** (0.028)	0.529*** (0.016)	0.681*** (0.023)	1.122*** (0.021)
Ln distance	-0.547*** (0.061)	-1.420*** (0.260)	2.608*** (0.191)	-5.813*** (0.226)	-0.483 (0.247)	-0.318*** (0.037)	-0.845** (0.283)	-5.813*** (0.226)	-1.251*** (0.194)	0.738*** (0.207)	0.277 (0.170)
Conflict *Ln distance	0.592*** (0.056)	-0.311 (0.274)	1.980*** (0.217)	0.668** (0.213)	1.597*** (0.219)	-0.0815*** (0.015)	0.544* (0.264)	0.668** (0.213)	-0.281** (0.100)	0.926*** (0.174)	0.765*** (0.154)
Household size	0.241*** (0.002)	0.664*** (0.007)	0.543*** (0.005)	0.394*** (0.006)	0.377*** (0.006)	0.0436*** (0.001)	0.641*** (0.008)	0.394*** (0.006)	0.278*** (0.003)	0.378*** (0.005)	0.336*** (0.004)
Female head	-0.0298*** (0.003)	-0.691*** (0.013)	-0.105*** (0.009)	0.0170 (0.011)	0.111*** (0.012)	0.0154*** (0.001)	-0.319*** (0.013)	0.0170 (0.011)	0.00247 (0.006)	0.0141 (0.009)	0.0220** (0.008)
Active age (head)	0.0551*** (0.003)	1.157*** (0.016)	1.101*** (0.013)	0.433*** (0.014)	-0.797*** (0.014)	0.0525*** (0.001)	1.179*** (0.017)	0.433*** (0.014)	0.0689*** (0.007)	0.193*** (0.011)	0.642*** (0.010)
Years of education (head)	0.0294*** (0.001)	0.0424*** (0.003)	0.0737*** (0.002)	0.119*** (0.002)	0.0653*** (0.002)	0.00404*** (0.000)	0.122*** (0.003)	0.119*** (0.002)	0.0639*** (0.001)	0.0632*** (0.002)	0.0669*** (0.002)
Children (0-6 years)	-0.154*** (0.004)	-0.518*** (0.018)	-0.325*** (0.010)	0.0284 (0.015)	-0.056*** (0.014)	0.0253*** (0.002)	-0.528*** (0.018)	0.0284 (0.015)	-0.193*** (0.007)	-0.165*** (0.012)	0.0408*** (0.010)
Children (7-13 years)	-0.0954*** (0.003)	-0.499*** (0.015)	-0.129*** (0.008)	0.213*** (0.013)	-0.269*** (0.013)	0.0331*** (0.002)	-0.377*** (0.015)	0.213*** (0.013)	-0.144*** (0.005)	-0.203*** (0.011)	-0.144*** (0.009)
Children (14-18 years)	-0.0618*** (0.004)	-0.308*** (0.019)	0.145*** (0.011)	0.0566*** (0.017)	-0.259*** (0.018)	0.0733*** (0.003)	-0.0510* (0.020)	0.0566*** (0.017)	-0.134*** (0.008)	-0.202*** (0.014)	0.00311 (0.011)
Agricultural land ownership (dummy)	-0.0425*** (0.004)	-0.150*** (0.017)	-0.231*** (0.012)	-0.560*** (0.015)	0.0420** (0.015)	-0.0333*** (0.002)	0.0237 (0.017)	-0.560*** (0.015)	-0.126*** (0.007)	0.0148 (0.012)	-0.208*** (0.010)
Urban (dummy)	0.101*** (0.004)	0.370*** (0.017)	-0.0299* (0.013)	0.621*** (0.016)	0.239*** (0.016)	0.0300*** (0.002)	0.913*** (0.018)	0.621*** (0.016)	0.0977*** (0.008)	0.0613*** (0.013)	0.208*** (0.011)
Rural (dummy)	-0.287*** (0.004)	-0.046** (0.017)	0.0633*** (0.012)	-0.686*** (0.016)	-0.099*** (0.016)	-0.0342*** (0.002)	0.00856 (0.018)	-0.686*** (0.016)	-0.188*** (0.007)	-0.040** (0.012)	-0.293*** (0.011)
Constant	9.997*** (0.404)	10.06*** (1.734)	-16.06*** (1.275)	38.78*** (1.502)	5.193** (1.641)	2.056*** (0.247)	4.408* (1.885)	38.78*** (1.502)	12.27*** (1.295)	-3.615** (1.376)	-0.617 (1.132)
Regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429
R <sup>2</sup>	0.551	0.248	0.373	0.322	0.143	0.181	0.270	0.322	0.250	0.170	0.332

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Robust standard errors clustered at household level in brackets. All models include regional and year fixed effects.

Table 2.5 Impact of armed conflict exposure on household consumption share: modified difference-in-difference estimates

	Food	Alcohol & Cigarette	Clothes & footwear	Utilities	Health	Education	Transport	Leisure	Housing	Durable	Other
Conflict	-0.0173*** (0.002)	-0.000702 (0.001)	-0.00481*** (0.001)	-0.0128*** (0.000)	0.0161*** (0.001)	-0.00814*** (0.000)	-0.00901*** (0.001)	-0.0128*** (0.000)	0.0259*** (0.001)	-0.00957*** (0.001)	0.00411*** (0.000)
Ln distance	0.239*** (0.018)	-0.0127** (0.004)	0.136*** (0.006)	-0.0496*** (0.004)	-0.00680 (0.007)	-0.00845* (0.003)	-0.00493 (0.006)	-0.0496*** (0.004)	-0.206*** (0.010)	0.0246*** (0.005)	0.0241*** (0.004)
Conflict *Ln distance	0.0391* (0.016)	-0.0236*** (0.006)	0.0173** (0.006)	0.00446 (0.003)	0.0152* (0.007)	-0.00809*** (0.001)	-0.0134** (0.005)	0.00446 (0.003)	-0.0306** (0.010)	-0.00353 (0.004)	-0.00421 (0.004)
Log total expenditure	-0.0657*** (0.001)	0.00597*** (0.000)	0.00862*** (0.000)	0.0126*** (0.000)	0.00624*** (0.000)	0.00266*** (0.000)	0.0242*** (0.001)	0.0126*** (0.000)	-0.0330*** (0.001)	0.0152*** (0.000)	0.00793*** (0.000)
Household size	-0.0023*** (0.001)	0.00216*** (0.000)	0.00692*** (0.000)	-0.00232*** (0.000)	-0.00209*** (0.000)	0.00183*** (0.000)	0.0000168 (0.000)	-0.00232*** (0.000)	0.000884** (0.000)	-0.00201*** (0.000)	-0.00282*** (0.000)
Female head	0.0115*** (0.001)	-0.0118*** (0.000)	-0.000598 (0.000)	0.000695*** (0.000)	0.000724* (0.000)	0.000850*** (0.000)	-0.00606*** (0.000)	0.000695*** (0.000)	0.00211*** (0.000)	0.000379 (0.000)	0.00280*** (0.000)
Active age (head)	-0.0585*** (0.001)	0.0149*** (0.000)	0.0274*** (0.000)	0.00181*** (0.000)	-0.0263*** (0.001)	0.00260*** (0.000)	0.0102*** (0.000)	0.00181*** (0.000)	0.00355*** (0.001)	-0.000623* (0.000)	0.00554*** (0.000)
Years of education (head)	-0.0037*** (0.000)	-0.000748*** (0.000)	0.000812*** (0.000)	0.000548*** (0.000)	0.000357*** (0.000)	0.000143*** (0.000)	0.000708*** (0.000)	0.000548*** (0.000)	0.00152*** (0.000)	0.00000149 (0.000)	-0.00018*** (0.000)
Children (0-6 years)	0.00234* (0.001)	-0.00246** (0.000)	-0.00622*** (0.000)	0.00288** (0.000)	0.000229 (0.000)	0.00118*** (0.000)	-0.00264*** (0.000)	0.00288*** (0.000)	-0.00102 (0.001)	0.00365*** (0.000)	0.00916*** (0.000)
Children (7-13 years)	0.00662*** (0.001)	-0.00432*** (0.000)	0.000703 (0.000)	0.00486*** (0.000)	-0.00325*** (0.000)	-0.00284*** (0.000)	-0.00213*** (0.000)	0.00486*** (0.000)	-0.00306*** (0.000)	0.000563 (0.000)	0.000719*** (0.000)
Children (14-18 years)	-0.0113*** (0.001)	-0.00402*** (0.000)	0.0140*** (0.001)	0.00166*** (0.000)	-0.00398*** (0.000)	0.00380*** (0.000)	-0.00118** (0.000)	0.00166*** (0.000)	-0.00641*** (0.001)	-0.00345*** (0.000)	0.00142*** (0.000)
Agricultural land ownership (dummy)	0.0207*** (0.001)	0.000267 (0.000)	-0.00498*** (0.000)	-0.00306*** (0.000)	0.00382*** (0.000)	-0.00133*** (0.000)	0.00528*** (0.000)	-0.00306*** (0.000)	-0.0145*** (0.001)	0.00305*** (0.000)	-0.000439* (0.000)
Urban (dummy)	-0.0130*** (0.001)	0.00197*** (0.000)	-0.00827*** (0.000)	0.00265*** (0.000)	-0.00143*** (0.000)	0.000400* (0.000)	0.00608*** (0.000)	0.00265*** (0.000)	0.00701*** (0.001)	-0.00439*** (0.000)	-0.000173 (0.000)
Rural (dummy)	-0.0501*** (0.001)	0.00575*** (0.000)	0.0169*** (0.000)	0.0000710 (0.000)	0.00850*** (0.001)	-0.000344 (0.000)	0.0107*** (0.000)	0.0000710 (0.000)	0.00266*** (0.001)	0.00866*** (0.000)	0.00149*** (0.000)
Constant	-0.368** (0.119)	0.0629* (0.030)	-0.961*** (0.041)	0.250*** (0.029)	0.0499 (0.047)	0.0386 (0.022)	-0.147*** (0.041)	0.250*** (0.029)	1.731*** (0.070)	-0.258*** (0.031)	-0.199*** (0.024)
Regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429
R <sup>2</sup>	0.228	0.095	0.224	0.105	0.076	0.059	0.135	0.105	0.096	0.054	0.069

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ ; Robust standard errors clustered at household level in brackets. All models include regional and year fixed effects

Table 2.6

Estimates of Budget Share Equations with Interaction Terms

	Food	Alcohol & Cigarette	Clothes & footwear	Utility	Health	Education	Transport	Leisure	Housing	Durable	Other
Conflict	-0.0172*** (0.002)	-0.000742 (0.001)	-0.0049*** (0.001)	-0.0127*** (0.000)	0.0162*** (0.001)	-0.0081*** (0.000)	-0.0091*** (0.001)	-0.0127*** (0.000)	0.0258*** (0.001)	-0.0095*** (0.001)	0.0041*** (0.000)
Ln distance	0.239*** (0.018)	-0.0127** (0.004)	0.136*** (0.006)	-0.0497*** (0.004)	-0.00718 (0.007)	-0.00860** (0.003)	-0.00472 (0.006)	-0.0497*** (0.004)	-0.206*** (0.010)	0.0244*** (0.005)	0.0241*** (0.004)
Conflict*Ln distance	0.235 (0.167)	-0.156* (0.061)	-0.427*** (0.058)	0.164*** (0.033)	0.623*** (0.082)	0.255*** (0.013)	-0.349*** (0.065)	0.164*** (0.033)	-0.494*** (0.110)	0.297*** (0.040)	-0.0556 (0.040)
Log total expenditure	-0.0655*** (0.001)	0.00582*** (0.000)	0.00821*** (0.000)	0.0127*** (0.000)	0.00684*** (0.000)	0.00291*** (0.000)	0.0239*** (0.001)	0.0127*** (0.000)	-0.0335*** (0.001)	0.0155*** (0.000)	0.00788*** (0.000)
Conflict*Ln distance*Log total expenditure	-0.0244 (0.021)	0.0165* (0.007)	0.0554*** (0.007)	-0.0199*** (0.004)	-0.0758*** (0.010)	-0.0328*** (0.002)	0.0418*** (0.008)	-0.0199*** (0.004)	0.0577*** (0.013)	-0.0374*** (0.005)	0.00640 (0.005)
Observations	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429
R <sup>2</sup>	0.228	0.095	0.224	0.105	0.077	0.059	0.136	0.105	0.096	0.054	0.069

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  Standard errors in parentheses impact on total consumption



Table 2.7 Marginal Budget Shares and Expenditure Elasticities for household exposed to conflict

	Marginal budget share	Elasticity
Food	0.56	0.96
Alcohol	0.05	1.53
Clothing	0.12	1.83
Utility	0.00	-0.12
Health	-0.04	-0.93
Education	-0.03	-5.39
Transport	0.07	2.39
Leisure	0.00	-0.12
Housing	0.18	1.47
Durable	-0.01	-0.44
Other	0.03	1.25

Table 2.8 Household consumption share per year of conflict

	Food	Alcohol & Cigarette	Clothes & footwear	Utilities	Health	Education	Transport	Leisure	Housing	Durables	Others
2014	-0.0392*** (0.003)	0.0144*** (0.001)	0.0160*** (0.001)	-0.0116*** (0.001)	-0.0153*** (0.001)	-0.0069*** (0.000)	-0.00154 (0.001)	-0.0116*** (0.001)	0.0124*** (0.002)	-0.00914*** (0.001)	0.00721*** (0.001)
2015	-0.00578* (0.002)	0.00202* (0.001)	-0.0053*** (0.001)	-0.0126*** (0.000)	0.00700*** (0.001)	-0.0078*** (0.000)	-0.0077*** (0.001)	-0.0126*** (0.000)	0.0175*** (0.001)	-0.00832*** (0.001)	0.00449*** (0.001)
2016	-0.0205*** (0.002)	-0.00132 (0.001)	-0.0042*** (0.001)	-0.0125*** (0.000)	0.0163*** (0.001)	-0.0080*** (0.000)	-0.0087*** (0.001)	-0.0125*** (0.000)	0.0270*** (0.002)	-0.00884*** (0.001)	0.00421*** (0.001)
Ln_distance	0.239*** (0.018)	-0.0127** (0.004)	0.136*** (0.006)	-0.0496*** (0.004)	-0.00679 (0.007)	-0.00845* (0.003)	-0.00493 (0.006)	-0.0496*** (0.004)	-0.206*** (0.010)	0.0246*** (0.005)	0.0241*** (0.004)
Log total expenditure	-0.0657*** (0.001)	0.00597*** (0.000)	0.00863*** (0.000)	0.0126*** (0.000)	0.00624*** (0.000)	0.00266*** (0.000)	0.0242*** (0.001)	0.0126*** (0.000)	-0.0330*** (0.001)	0.0152*** (0.000)	0.00793*** (0.000)
2014*Ln_distance*Log total expenditure	-0.00675 (0.003)	-0.00372* (0.002)	0.00770*** (0.001)	0.000655 (0.001)	-0.000462 (0.002)	-0.0012*** (0.000)	-0.00187 (0.001)	0.000655 (0.001)	0.00147 (0.002)	0.00103 (0.001)	-0.000491 (0.001)
2015*Ln_distance*Log total expenditure	0.00126 (0.003)	-0.00393** (0.001)	0.00198 (0.001)	0.000880 (0.000)	0.00212 (0.001)	-0.0012*** (0.000)	0.000445 (0.001)	0.000880 (0.000)	-0.00201 (0.002)	0.0000355 (0.001)	-0.0000502 (0.001)
2016*Ln_distance*Log total expenditure	0.0142*** (0.003)	-0.00111 (0.001)	0.000374 (0.001)	-0.000284 (0.000)	0.00122 (0.002)	-0.0015*** (0.000)	-0.0025* (0.001)	-0.000284 (0.000)	-0.0071*** (0.002)	-0.0026*** (0.001)	-0.0008 (0.001)
Regions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429	126429
R <sup>2</sup>	0.228	0.095	0.224	0.105	0.076	0.059	0.135	0.105	0.096	0.054	0.069

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$  Standard errors in parentheses impact on total consumption

## Chapter 3

### Analysis of household resilience in armed conflict situation

#### 3.1 Introduction

Violent conflict threatens the lives and livelihoods of people globally making individuals to live in conditions of terror and extreme insecurity (World Bank, 2011). When armed conflict breaks out, people's resilience, defined as their capacity to thrive and "bounce back" from potential shocks is often impacted. For example, facilities such as water supply networks, sewage systems, electricity infrastructure, and medical institutions, are frequently attacked, seized, or destroyed during armed confrontations. In addition, armed conflict may reduce food availability and access by disrupting agricultural production and food market system leading to increased food prices and reduced disposable income (Teodosijević, 2003; Bundervoet, 2006; Verpoorten 2009; FAO et al., 2017; Martin-Shields and Stojetz 2018). As a result, understanding resilience is critical in the discipline of economics as it demonstrates how a system may maintain its optimal performance after suffering losses due to stresses or shocks.

The study of resilience at microeconomic level can be used to explain how spatial exclusion of individual and households from production and consumption opportunities affects the stability of income generation and welfare promoting outcomes overtime. A wide range of studies have, used employment and diversity of household labour, income sources and stability, asset concentration, and access to credit, production and consumption elasticities, among other attributes to investigate access to welfare opportunities in the event of crises (see Keil et al., 2008; Alinovi et al., 2009; World Bank, 2010; Goulden et al., 2013; Le Dang et al., 2014). Evidence reported

in these studies is not sufficient to demonstrate positive or negative relationship between socio-economic characteristics of households and their ability to mitigate economic shocks or stresses. More work is required to answer the question on how people are able to thrive in the face of violent conflict, and recover from resulting shocks. Thus, the objective of the study is to analyze the impact of shocks on household resilience capacity by answering the following questions: What is the effect of the armed conflict in Eastern Ukraine on household's resilience capacity? Which resilience measures are most affected?

To achieve the objective above this study draws on the Household Budget Survey data collected from households in Ukraine before and during the conflict that started in 2014. Specifically, this paper analyses the case of Donbas<sup>12</sup> (Donetsk and Lugansk regions), an economic region in Eastern Ukraine, and examines the capacity of local residents to cope with possible economic consequences of the conflict three years after it started. As a first step, the Principal Component Analysis (PCA) is employed to construct the indicators of household resilience from observed variables. Next, a modified difference-in-difference (DiD) empirical strategy is used to estimate the effect of the conflict on each the resilience indicator. Further, the study estimates the effect of the conflict on the observed variables that form the components of the resilience indicators to show how household coping strategies have been affected in contexts of the violent conflict in Eastern Ukraine.

Results of the study indicate that, the conflict in Eastern Ukraine has a negative impact on the indices of household resilience. Specifically, access to basic services, adaptive capacity, assets, social safety network, and access to food have all declined for households closer to the fighting in

Donbas. The study highlights household vulnerability in conflict situations and provides evidence that proximity to conflict zone adversely influences household capacities to cope with risks. More generally, the findings of this study include evidence-based results that are critical for developing economic resources and strategies to respond to crises, such as humanitarian aid to conflict victims and assistance to countries transitioning from war to permanent peace. This study also offers a framework (in political context) for establishing peacebuilding and conflict prevention mechanisms.

The rest of this paper is organized as follows: Section 3.2 explores the literature on the link between armed conflict and resilience at household level; Section 3.3 and Section 3.4 discuss the case of the conflict in Ukraine and the dataset used, respectively. Section 3.5 presents the empirical strategy adopted in this analysis, while the results of the study are presented in Section 3.6 and Section 3.7 concludes.

### **3.2 Armed Conflict and Resilience – A Literature Review**

Resilience is the ability of people, households, communities, countries, and systems to mitigate, adapt to and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth (USAID, 2012). Conflict is often regarded as a shock or a stressor which limits human livelihood activities. Increased intensity of armed conflict can lead to the occurrence of maladaptive coping strategies, which can cause total breakdown of household resilience (FAO, 2020). The degree of distress or resilience displayed by conflict-affected individuals and households is primarily influenced by the way he violence affects their livelihoods in different time periods and stages. In the same vein, the strategies adopted by households in response to economic risks and shocks in peaceful regions may differ from those adopted in

contexts of conflict and violence. Therefore, household capacity to deal with exposure to shocks can be illustrated by how armed conflict may weaken resilience and exacerbate insecurity.

Violent conflicts are characterised by their destruction of strategies available to households for survival (de Waal 1997, Justino 2011). While people's possessions improve their income level and serve as collateral that can enhance access to credit markets, the destruction of productive assets has a strong impact on the ability households to maintain their livelihoods or recover afterwards in times of stress (Justino, 2011). Given that armed conflicts are human-made shocks, household's assets which are known to be critical in building resilience in the face of shocks are more likely to be targeted during the outbreak of conflicts (Lautze and Raven-Roberts, 2006). Productive assets such as agricultural lands and tools, as well as financial assets such money and livestock are often raided, looted or deliberately destroyed in order to strip people of their livelihoods during conflicts (Bundervoet and Verwimp 2005, Ibáñez and Moya 2006, Shemyakina 2011, Verpoorten 2009). Thus, any hinderance to people's access to their resources has a significant effect on their capacity to maintain their livelihoods during the periods of hardship or recover when the crises are over (Justino and Verwimp 2012, Verpoorten 2009).

Access to basic services often serves as an underlying factor that drives household livelihood in conflict situation. Violent conflicts destroy schools, hospitals, roads, water supply networks and other public infrastructure making people's access to these essential services either disrupted or completely cut off (World Bank, 2017). Insecurity responses by residents may also restrict their access to certain basic services. For example, fear of insecurity usually leads people to cluster their settlements closer together which in turn increases the distance to essentials supplies such as water and health services (Mykhnenko, 2020). In some conflict situations, residents of rural areas migrate to urban centres in order to access basic services. Therefore, a comprehensive

insight into the role that disruptions to people's access to basic services play in worsening household vulnerabilities is essential to better understand any discourse of resilience in conflict situation.

The latent abilities of individuals or households to navigate inevitable change and harness the necessary action for the purpose of improving or protecting well-being is important during conflict situation (Adger et al. 2005). Such ability which is referred to as 'adaptive capacity' involves creating strategies that enable people to anticipate and respond to change, and recover from or minimize the consequences of such change (Adger and Vincent 2005). Such adaptive strategies include engaging in formal and informal education, vocation or trade, using personal or group savings schemes, and having more than one income earner in a household. Suffice to say that the adaptive capacity of individuals or household can be constrained by armed conflict. For example, conflict may alter the structure of a family and thus limiting the ability of household members to undertake education and employment.

Social network is a key determinant of how people protect themselves during crisis. The effects of armed conflict on livelihoods can be mitigated through social support and protection for livelihood due to the capacity of those networks to mobilise resources. Individuals use resources acquired from their social networks to keep themselves alive and survive in conflict, as well as to recover when crises are over (Justino, 2011). For instance, social safety nets can be reinforced through remittances from family and friends to help people in the areas of their greatest needs. However, frequently armed conflicts hamper transfer of funds to conflict affected areas and may profoundly undermine household strategies for resilience. According to the World Bank (2005), the disruptions caused to the activities of financial institutions during conflict put constraints on transfer of money from family member to loved ones in conflict regions. Consequently, households

who depend largely on their social networks for support are especially vulnerable during conflict. In addition, households that rely on social assistance are found to be vulnerable as they may be unable to access state assistance while foreign support can be extremely limited or unavailable when needed (Keen et al., 2009)

Though many have been through sometimes decades of violence, the nature and magnitude of the impact of armed conflict on individuals and households are largely determined by the way in which different people respond and adapt (or not) to violence-induced shocks (Nordstrom 1997) and the nature of the conflict. In the case of Ukraine, therefore, it is important to understand the nature of conflict in order to analyze how the resilience of households is affected.

### **3.3 Armed conflict situation in Ukraine**

Millions of people have suffered the complex consequences of the on-going armed conflict in Eastern Ukraine. Despite numerous ‘ceasefire agreements’<sup>13</sup>, civilians are regularly exposed to active hostilities, particularly in Donetsk and Lughansk regions where the conflict is concentrated. Basic services are inaccessible due to continuous risks of exposure to dangerous landmines and explosives (Mykhnenko, 2020). Educational institutions are either destroyed or occupied by militias as a stronghold for launching attacks at the enemies. This has negatively affected the education pathway of thousands of children and the wellbeing of teachers (Costello et al., 2018; Coll-Seck et al., 2019; Unicef, 2020). Water supply systems are often damaged leading to frequent water shortages, high cost of repairs and water treatment. According to Ukraine - Complex

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<sup>13</sup> On 5 September 2014, after comprehensive talks in Minsk, Belarus, under the auspices of the Organization for Security and Co-operation in Europe (OSCE), the Russian Federation, the Donetsk People's Republic (DPR) and the People's Republic of Luhansk (LPR) signed a ceasefire agreement to end the conflict in Donbas. The agreement failed to bring an end to the fighting and was then followed by a new measure on 12 February 2015 called Minsk II. This initiative also failed to stop the fighting.



Emergency Fact Sheet (2017), water supply networks were disrupted about 90 times by the violence in 2016, affecting access to clean water by millions of people. Households lack access to healthcare services due to the damage caused to health facilities particularly in areas closest to the contact line <sup>14</sup> while Women and the elderly are disproportionately affected by the conflict and they account for more than half of population who are vulnerable (Ukraine Humanitarian Needs Overview, 2019 ). Worse still, the elderly with chronic health conditions are unable to obtain the medicines needed for them to stay alive (Osiichuk and Shepotylo, 2018; UNHCR Ukraine, 2020).

Economic activities in the once industrial regions in Eastern Ukraine have been severely impacted by the conflict, which adversely impaired people's living standards and well-being. According to (Osiichuk and Shepotylo, 2018), unemployment is higher in the conflict-affected regions compared to the rest of the country. Mine contamination has significantly curtailed access to rural farmland while vulnerable people are constantly being compelled to cut expenditure on food, health care, or rely on friends and family to meet their basic needs (FAO, 2020; UNHCR, 2020). Individuals without sources of income have their resources stretched to a breaking point while households may resort to selling their valuable possessions or skipping necessary expenditures, such as medicine to survive. Over 20% of the limited income of conflict affected people in Eastern Ukraine is spent on heating to stay alive during winter (FAO, 2020).

People's ability to access social entitlements and pensions remains constrained due to insecurity and logistical challenges. Humanitarian response to people in need, particularly in NGCA is either unpredictable or inadequate to meet the volume of critical needs (UHNO, 2019;

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<sup>14</sup> The 'contact line' has been the scene of active hostilities, killing more than 3,000 civilians and severely injuring nearly 9,000 since 2014. In contrast to 2017, crossing the "contact line" through official checkpoints rose by 15%, with an average of 1.1 million crossings per month, of which over half were made by elderly people over 60 years of age.

OCHA, 2020). Aid supplies are often irregular and livelihood opportunities are eroding. An estimated 5.2 million people require humanitarian assistance as the harsh winter weather in Ukraine further exacerbate the deteriorating living conditions (OCHA, 2020). Insufficient funding contributes to delays, interruptions and even stoppage of critical humanitarian activities in Eastern Ukraine. Since the outbreak of the conflict Donbas, more than 3,000 people have been killed and about 9,000 wounded (Global Humanitarian Overview, 2020).

### **3.4 Data and variables of interest**

This paper employs the Ukrainian Household Budget Survey (UHBS) from 2003-2016. The UHBS is a national survey with the objective of collecting important information on the distribution of income and consumption expenditure for the purpose of examining living conditions of individuals and private households. The UHBS is comprised mainly of two groups of data: the household variables and household members' variables. Variables at the household level provide information about the households as they relate to, income, household consumption expenditure for specific goods and service items as a proportion of total expenditure and household consumption in quantities over a given reference period. The UHBS also captures the demographic characteristics of the households such as household size and composition Number of workers, age, gender, education level and employment status of the head of household, degree of urbanization, and region of residence. In addition, the UHBS captures data on the presence of essential household facilities such as water, sewage, and heating systems, ownership and types of assets, income from productive assets, and social assistance received by households.

Armed conflict intensity and household level of exposure to the violence is measured using regional distance to the conflict zone. The importance of this variable is that it allows the study to compare the level of household exposure to the conflict within specific distance ranges from Donbas. It also infers that, the closer a region is located to Donbas, the more likely the households are exposed to the conflict. The Google map is used to construct the distance (measured in kilometers) from the conflict zone to the administrative center of each region in Ukraine. The average distance of other regions from the conflict zone is 647 kilometers.

The size of the household and the number of children are used as determinants of household resilience particularly to food (in)security. Studies reveal that food insecurity increases with an increase in the number of family members and vice versa. Beside this, inadequacy of essential goods and services as well as food insecurity is exacerbated by the presence of children of various ages in households (Haile et al., 2005; Felker-Kantor and Wood, 2012). The mean number of household size and number of children observed in data set is 2.4 and 0.46 respectively. By controlling for female-headed households, the study tries to capture the role of women in household food security. According to Ibnouf (2011), women, play a critical role in household food security since they are primarily responsible for home budgets, expenditure planning and food preparation. Controlling for this variable captures the role of gender in mitigating economic risk in the face of conflict shocks. In the sample, more than half of the households (56 per cent) is headed by women. According to the literature, a household may experience shocks that will lower its resilience capability. For example, a household head may lose his job and become unable to continue to feed his or her family. Also, a sick family members may need medical care which would mean extra expenditure that will limit a family's ability to purchase food (Béné, 2020; Ansah, Gardebreek and Ihle, 2020). Therefore the study includes 'market shock' and 'household

shock' variables to control whether any of member of a household experienced job loss or illness before or during the conflict. The more of these shocks a household is exposed to, the less resilient it would be. Only 1 per cent of the sampled households experienced market shocks while 53 per cent experienced household shocks. Finally, the study controlled for household residence to account for whether a household is in an urban, town or rural setting. This is to capture any differences in infrastructure, public services such as electricity and safe drinking water, access to health and education, purchasing power, and other factors that may exist among households in different settlements within a region. Urban households account for 37 percent of the sampled households, while towns account for 28 percent and rural areas for 34 percent. Table 3.1 presents the descriptive statistics of variables of interest in the dataset.

### **3.4.1 Methodological approach for measuring household resilience**

As a first step, the Principal Component Analysis (PCA) is employed to construct the indicators of resilience. PCA is a data reduction technique used to re-express multivariate data with fewer dimensions. The purpose of this strategy is to reorient the data so that a large number of original variables can be summarised by a small number of "components" that capture as much information (variation) as possible from the original variables. PCA is also effective for identifying associations between variables. This study thus performed a PCA on 14 observed variables (discussed in section 3.4.1.1) and used the first five components as household's resilience indicators in the regression analysis. The original variables were chosen based on the review of the literature, availability of data, and conceptual framework for this study. As shown in Tables (A1)-(A4), only those components with Eigen values greater than one are considered as indicators of household resilience and are renamed based on variable loadings above 0.3 or below -0.3 as

Access to Basic Services (ABS), Adaptive capacity (AC), Food Access (FA), Assets (AST), and Social Safety Network (SSN).

#### 3.4.1.1 Access to Basic Services (ABS)

Access to Basic Services is a key factor for improving people's livelihood and for enhancing household's resilience in conflict situation. The following observed variables are used to explain ABS according to the weight of their loading:

- Availability of water supplies (dummy) - Shortage of water services during or after armed conflict can paralyze household resilience and may displace a population and cause the death of crops and livestock (WB, 2016).
- Access to sewage system (dummy) - Poor household sanitation is having a devastating effect. For example, women and girls living in areas of conflict may be at even greater risks when they lack safe and private household sanitation facilities (Human Rights Watch in 2013).
- Availability of heating system (dummy) - The absence of heating system particularly during severe winter, as the ones observed in Ukraine may lead to complete breakdown of people's ability to resist shocks, causing cold related illnesses such as flu ( UNHCR,2015).

#### 3.4.1.2 Adaptive Capacity (AC)

The adaptive capacity demonstrates the ability of a household to cope with and adapt to a certain shock, allowing the household to continue to perform its main functions. AC, in other words, represents the capacity of households to absorb shocks. Having more coping mechanisms, for instance, means having a better chance of reducing food insecurity after, say, losing a job. The

buffer effect on household main functions is a trait of adaptability. AC is explained using the following variable loadings:

- Active head (dummy)- These are household heads who form part of Ukraine labour force aged between 15 and 65 years
- Number of workers (count from 0 to 6) -This indicates the number of working members in a household aged 16 years or over. Armed conflict often inhibits access of household members to employment and income due to, for example, the death or recruitment of young males (Justino , 2011). The impact of this on the ability of households to mitigate shocks or adversity can be dramatic as households may experience reductions in food security and access to essential household goods following the loss of earnings capacity.
- Years of education of household head (continuous) - Individual's ability to recover quickly from shocks is influenced in part by learning and cognition, particularly the capability to process, evaluate, and respond to risks (Walker, 2021).

#### 3.4.1.3 Food Access (FA)

To determine the causal effect of a change in household resilience to food security because of armed conflict, the monthly per capita food expenditure and the household dietary diversity score (HDDS) strongly measure Food Access indicator. These variables are directly observable and they measure household food intake and diet diversity in the achievement of household resilience to shocks. The variables of the household FA indicator are expressed as:

- Food expenditure - This is expressed in monthly per capita terms using the exchange rate of Ukrainian hryvnia to US dollars in 2014. This indicator captures the monetary aspect

of food security and directly reflects a household's access to food (Pangaribowo et al., 2013).

- Household Dietary Diversity Score (HDDS): This is the sum of the number of different foods consumed by a household over a specified period of time. Following the literature (see Swindale and Bilinsky, 2006; Hoddinott and Yohannes, 2002), this study construct the HDDS indicator using carefully selected variety of food groups based on their relevance in providing daily nutrient requirements in household diet. The set of food groups considered in computing the score are: cereals, tubers, vegetables, fruits, meat, egg, fish, milk, oil, sugar and miscellaneous.

#### 3.4.1.4 Assets (AST)

Assets availability in conflict situations is an important coping mechanism. The assets considered in this analysis include the following:

- Land ownership (acre) per capita - Studies have established that land ownership is linked to household resilience and food (in) security (Manlosa et al. 2019; Olte et al. 2019; Carter et al. 2006; Turner et al. 2003; Olson 1999). Further, more and more land accumulation suggests more resources are available to households to be resilient to food-insecurity in times of crises (Stephens et al., 2012)
- Agricultural equipment (dummy variable) - Ownership of various agricultural assets such as tractors, ploughs and harvesters can help increase household resilience to potential shocks. However, armed conflicts have been found to decrease food availability by

adversely affecting agricultural production through the destruction of agricultural tools and equipment (NOC 2017; Pack et al. 2014; Chamarbagwala and Morán 2011).

- Rental Property – This includes income on productive assets such as lands and private houses per month using the exchange rate of Ukrainian hryvnia to US dollars in 2014.

#### 3.4.1.5 Social Safety Nets (SSN)

Social safety nets are an important factor in mitigating economic shocks. Many households depend on assistance received from friends and relatives, as well as international agencies and charities, all of which support the capacity of population to mitigate crises. Social safety nets should therefore be considered as an important indicator in the estimation of household resilience. The variables used to generate the SSN indicator are:

- Assistance in kind - This reflects the monetary value of per capita assistance in the form of goods or services received by households as gifts. They include food and beverages, drinking water, medical treatment, medicine, clothing, housing, farm inputs etc. During armed conflicts, many families, neighbors, friends and relatives cooperate in contributing food to each other. Some local charitable organisations also provide food and other essential donations to families in need (WB, 2010).
- Assistance in cash - This is per capita cash assistance received from relatives, neighbours, friends, international organisations, charities and NGOs. Assistance received in cash increases the ability of households to withstand shocks, as well as helps in recovery after the crisis is over.
- Other assistance - Monetary value of other assistance received from government institutions, or humanitarian organizations, relatives, neighbors and friends .



### 3.5 Empirical Strategy

To investigate whether the effect of the conflict on household resilience changes with distance from the conflict zones, this research employed a modified DiD empirical strategy. As explained in detail in chapter 2 (section 2.4.1), the conflict was non-random as it was localized in Eastern Ukraine and the UHBS data does not include the population of the NGCA which are territories of Donetsk and Lugansk regions occupied by Russian backed separatist (see Figure 1.1). Also, the likelihood of out-migration of the population fleeing the conflict and sample selection problem prevent the use of the conflict zones (Donbas) as a treatment in the traditional DiD model. To overcome these problems, this study uses distance from the administrative capital of each region in Ukraine to Donetsk (conflict zone) to capture conflict intensity and degree of household exposure to the conflict (Osiichuk and Shepotylo, 2018). Next distance as the "treatment" is interacted with the time of the conflict (2014-2016) to examine how households from different regions of Ukraine are impacted by the conflict. This technique addresses the unbalanced nature of the UHBS data set and allows the pre and post analysis of the impact of the conflict in Donbas. The modified DiD model is specified thus:

$$Y_{irt} = \beta_0 + \beta_1 C_t + \beta_2 D_r + \beta_3 C_t * D_r + X_{rt} \delta + \gamma_r + \gamma_t + \varepsilon_{irt} \quad (1)$$

$Y_{irt}$  represents, in separate models, ABS, AC, FA, AST or SSN the for household  $i$  in region  $r$  at time  $t$ . The years of conflict are captured by the time dummy variable  $C_t$ . The value is 1 if the year is greater than or equal to 2014, and 0 otherwise;  $D_r$  represents the distance from the conflict zone (Donetsk) to the administrative center in region  $r$  and  $X_{irt}$  is the matrix of household control characteristics discussed in section 3.4 including dummies for whether any of the family members

experienced market shocks (job loss) and household shocks (sick household member) during the period of analysis. The focus of equation (1) is on the estimates of  $\beta_3$  vector, which indicates whether proximity to conflict zone influences the impact of armed conflict on household resilience indicators or not.  $\gamma_r$  is the regional fixed effect that captures unobservable fixed regional characteristics that may influence the outcome variable, while  $\gamma_t$  is the year fixed effects that capture any variation in time-specific economic variables such as commodity prices over time which is not attributed to the explanatory variables.  $\varepsilon_{irt}$  is the idiosyncratic error terms. To further explore the factors that drive the possible impact of the Donbas conflict on household resilience, all the observed variables employed to estimate the resilience indicators are used as outcomes of interest in additional regression models.

### **3.6 Results**

This section presents the results of the effects of armed conflict exposure on household resilience in Ukraine. Results of the PCA used for estimating the indicators of resilience are shown in Tables A1 - A4. The components considered for each indicator are only those with Eigen value above one and explain at least 60 per cent of the variance of the original variables. Table 3.2 reports the coefficients for the estimates of resilience indicators (ABS, AC, FA, AST, and SSN) from equation (1). Further analyses reveal the effect of armed conflict on the components of each indicator. All regression estimates include regional and time fixed effects. Robust standard errors clustered at household level are presented in parenthesis.

#### **3.6.1 Access to Basic Services**

Analysis of equation (1) indicates that ABS for household closer to the armed conflict in Donbas is negatively impacted. As shown in Table 3.2, column (1), there is 54 per cent higher chance of

a household in Ukraine having increased ABS from the time when the conflict started. However, the chance is weaker for a household that lives closer to Donbas as indicated by the positive and significant coefficient of the interaction term. The effect is mainly driven by shortage of water supply and decline in access to sewage facilities as shown in Table 3.3. Since the conflict started in 2014, there has been more than 300 incidents of damage to water pipelines and sewage facilities due to the conflict (UNICEF, 2019). Results also indicates increase in access to heating. Reports by IOM (2019) reveals that resident of the GCA spent a large chunk of their limited income on heating to stay alive during the winter season.

### 3.6.2 Adaptive Capacity

Table 3.2 column (2) reveals that exposure to conflict reduces household adaptive capacity. That is, while there is about 3 per cent higher chance of a Ukrainian household to adjust or cope with the economic changes since the Donbas conflict started, the probability declines for household closer to Donetsk as indicated by the positive and significant coefficient of the interaction term. This outcome is presumably driven by the consequences of the conflict on the labour market as indicated by the significant coefficients of number of workers in a household (see Table 3.4, column (2)). As documented by the World Bank (2016), conflict has been found to drastically reduce market activities and thus significantly affects local economies. Thus, the 3 per cent decrease in the number of household working members may be as a result of a decline in local employment opportunities as a consequence of physical destruction of productive assets (ILO, 2015).

### 3.6.3 Food Access (FA)

Ukrainian household shows 78 per cent higher chance of increasing FA during the conflict but at a decreasing rate for households closer Donbas . That is for each kilometer distance to the conflict zone, a household has 4 per cent lower chance of having access to food. Specifically, Table 3.5 column (1) reveals that households closer to the conflict zone would cut budget on food as indicated by the positive and significant interaction term. This agrees with literature that the ability of households to acquire sufficient quality and quantity of food to meet all members' nutritional requirements for productive lives is negatively impacted by the onset of armed conflict (Saaka and Osman, 2013). In addition, the variety of food groups consumed declines for households exposed to armed conflict (Abdullah et al., 2019).

### 3.6.4 Assets

Column (3) of Table 3.2 shows substantial decrease in household assets during the first 3 years of the armed conflict in Donbas. The trend increases with household proximity to the conflict zone. That is, household one kilometer closer to Donbas has 3 per cent higher chance of increasing assets during the conflict. This effect is mainly driven by the 3 per cent increase in property rent received by household closer to the conflict zone as indicated in Table 3.5, column (3). This result is counterintuitive but may be because of price increase or high demand for housing and land for farming by the population displaced from the NGCA.

### 3.6.5 Social Safety Network

Estimates in Table 3.2 reveals 32 per cent decrease in SSN for Ukrainians during the conflict but the effect increases for households closer to the conflict zone . This implies for every one kilometer

closer to the conflict, a household has 3 per cent higher chance to depend on SSN. As shown in Table 3.7, columns (2)-(3), cash assistance and other assistance significant decrease by 5 per cent and 8 per cent respectively according to households proximity to the conflict. This results illustrate the impact of the Donbas conflict on household's social connections. A plausible reason for this phenomenon is that people's ability to socialize, access humanitarian services and social entitlements remains constrained due to insecurity and logistical challenges. For instance, crossing the 'contact line' poses immense obstacles for people seeking to get in touch with family members to get supplies to meet their basic needs. In addition, assistance from family member through cash transfers may have been hampered due to the disruption of financial institution that serve as intermediary for remittances while humanitarian support for conflict-affected people is either erratic or insufficient to meet the volume of critical needs (OCHA, 2019 ).

### **3.7 Conclusions**

Resilience is the capacity of individuals and groups to withstand, adapt, and recover from a wide range of adverse events in a way that decreases their long-term uncertainty and promotes future development. The vulnerability of households and their resilience to shocks depends on the degree of risk to which they are exposed. Most shocks are unpredictable and thus measuring how individuals or households respond to them might prove challenging. This paper explores how responses to economic shocks affect people's livelihood and provides evidence of how household resilience is shaped by armed conflict. Analysis of the Ukrainian household budget Survey before and during the conflict that started in 2014 validates the conceptual framework employed to measure resilience in this study.

The research finds evidence of a link between armed conflict and resilience, and it sufficiently explains how proximity to conflict zone affects a household's ability to mitigate economic shocks. Specifically, the indicators of household resilience: access to basic services, adaptive capacity, assets, social safety network and access to food decline due to the conflict in Donbas. This study provides more evidence that the closeness of a household to armed conflict has a substantial impact on the components of resilience indicators. Frequently, essential infrastructures such as water, sewage, and heating systems are destroyed and hence unavailable for residential usage. In addition, households experience unemployment, the loss of assets such as houses and lands, and consequently rely on social assistance to sustain their livelihoods during and after conflicts.

Finally, the results of this study suggest that, in the context of armed conflict, the resilience of households is proportional to their degree of exposure to the conflict. This gives useful information regarding a household's proximity to armed violence, indicating that a household's resilience capacity is less likely to be damaged by armed conflict if it resides further away from the conflict zone.

## Policy Intervention

The findings of this study indicate the key priority areas for policy interventions designed to mitigate the effects of conflict and to improve the resilience and livelihood of conflict-affected individuals and households. In the event of armed conflict policymakers should implement strategies that lead to resilient recovery and address setbacks caused by armed conflict, offer opportunities and strengthen capacities to deal with future risks and bounce back quickly. International donors should support the reconstruction or maintenance of private assets (e.g., houses, farmland, and businesses) and public amenities such as schools, water supplies, sewage systems, electricity, and heating systems among others that have been destroyed during the conflict. Furthermore, government economic policies should be adaptable for immediate response to vulnerable people in the event of future conflict. Humanitarian organizations can provide cash-based assistance, rental support and building materials to support affected households and regions. If the policies are meticulously set up, they have the potential to reduce the likelihood of repeated conflict (Collier, 2004).

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## Tables

Table 3.1

### Descriptive Statistics

<b>Variables</b>	<b>Mean</b>	<b>Std. Dev.</b>
<b>Explanatory</b>		
Conflict	0.13	0.33
Distance (km)	647.77	416.47
<b>Controls</b>		
Household size	2.44	1.34
Number of children	0.46	0.50
Female household head	0.56	0.47
Market shock	0.01	0.08
Household shock	0.53	0.50
Urban	0.37	0.48
Town	0.28	0.45
Rural	0.34	0.48

Number of observation=126,569

Table 3.2 Impact of conflict exposure on household resilience indicators

	(1) ABS	(2) AC	(3) FA	(4) AST	(5) SSN
Conflict	0.541*** (0.021)	0.266*** (0.018)	0.784*** (0.019)	-0.496*** (0.019)	-0.323*** (0.021)
Ln_Distance	-4.339*** (0.134)	-0.390** (0.122)	1.312*** (0.124)	-1.010*** (0.101)	2.714*** (0.109)
Conflict*Ln Distance	0.0168*** (0.002)	0.00717*** (0.002)	0.0382*** (0.002)	-0.0346*** (0.002)	-0.0333*** (0.003)
Household size	0.192*** (0.004)	-0.607*** (0.004)	-0.133*** (0.003)	0.141*** (0.003)	-0.0106*** (0.003)
Female head	-0.0733*** (0.007)	0.145*** (0.006)	-0.0254*** (0.006)	-0.103*** (0.006)	-0.0754*** (0.006)
Share of children	0.0208*** (0.006)	-0.0564*** (0.006)	0.239*** (0.005)	-0.296*** (0.005)	-0.0627*** (0.005)
Market shocks	0.220*** (0.039)	-0.552*** (0.038)	0.370*** (0.028)	-0.178*** (0.027)	0.00951 (0.031)
Household shocks	-0.0374 (0.022)	0.249*** (0.018)	0.0514** (0.017)	-0.0993*** (0.014)	-0.159*** (0.015)
Urban	0.985*** (0.010)	0.157*** (0.008)	-0.0990*** (0.008)	0.0284*** (0.006)	-0.169*** (0.007)
Rural	-1.868*** (0.011)	-0.201*** (0.007)	0.183*** (0.008)	0.113*** (0.008)	-0.0145 (0.008)
Region	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes
Observations	126569	126569	126569	126569	126569
R <sup>2</sup>	0.553	0.482	0.132	0.144	0.128

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes regional and year fixed effects. Robust standard errors clustered at household level in parentheses

Table 3.3 Impact of conflict exposure on ABS components

	(1) Water Availability	(2) Sewage Availability	(3) Heating Availability
Conflict	0.157*** (0.007)	0.172*** (0.007)	0.103*** (0.007)
Ln_Distance	-0.755*** (0.039)	-0.860*** (0.039)	2.091*** (0.039)
Conflict*Ln_Distance	0.00258*** (0.001)	0.00343*** (0.001)	-0.00518*** (0.001)
Region	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	126569	126569	126569
R <sup>2</sup>	0.423	0.426	0.465

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes individual controls, regional and year fixed effects. Robust standard errors clustered at household level in parentheses. Controls include gender of household head, household size, share of children, market shocks, household shocks and type of settlement-urban or rural.

Table 3.4 Impact of conflict exposure on AC components

	(1) Active head	(2) Number of workers	(3) Years of education head
Conflict	0.0445 (0.007)	-0.0331** (0.013)	0.0981*** (0.007)
Ln_Distance	-0.1339*** (0.049)	-0.692*** (0.086)	-0.0349 (0.039)
Conflict*Ln_Distance	0.0019*** (0.001)	0.00706*** (0.001)	0.000630 (0.001)
Region	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	126569	126569	126569
$R^2$	0.242	0.423	0.076

\* $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Regression includes individual controls, regional and year fixed effects. Robust standard errors clustered at household level in parentheses. Controls include gender of household head, household size, share of children, market shocks, household shocks and type of settlement (urban or rural).

Table 3.5 Impact of conflict exposure on FA components

	(1) Food Expenditure	(2) HDDS
Conflict	0.478*** (0.009)	-0.612*** (0.030)
Ln_Distance	-0.662*** (0.061)	2.928*** (0.208)
Conflict*Ln_Distance	0.00299*** (0.001)	0.00278 (0.003)
Region	Yes	Yes
Year	Yes	Yes
Observations	126569	126569
$R^2$	0.536	0.275

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$ . Regression includes individual controls, regional and year fixed effects. Robust standard errors clustered at household level in parentheses. Controls include gender of household head, household size, share of children, market shocks, household shocks and type of settlement (urban or rural).

Table 3.6

Impact of conflict exposure on AST components

	(1)	(2)	(3)
	Land (ha)	Agricultural Tools	Rental Property
Conflict	-0.0510*** (0.004)	-0.0117* (0.005)	0.488*** (0.038)
Ln_Distance	0.158*** (0.029)	0.360*** (0.021)	0.583** (0.224)
Conflict*Ln_Distance	-0.000930 (0.001)	-0.00127 (0.001)	0.0254*** (0.003)
Region	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	126569	126569	126569
R <sup>2</sup>	0.102	0.020	0.271

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes individual controls, regional and year fixed effects. Robust standard errors clustered at household level in parentheses. Controls include gender of household head, household size, share of children, market shocks, household shocks and type of settlement (urban or rural).

Table 3. 7

Impact of conflict exposure on SSN components

	(1)	(2)	(3)
	Food Assistance	Cash Assistance	Other Assistance
Conflict	0.514*** (0.053)	1.408*** (0.061)	1.022*** (0.025)
Ln_Distance	7.931*** (0.352)	1.879*** (0.464)	-1.662*** (0.057)
Conflict*Ln_Distance	-0.00653 (0.005)	0.0531*** (0.006)	0.0841*** (0.004)
Region	Yes	Yes	Yes
Year	Yes	Yes	Yes
Observations	126569	126569	126569
R <sup>2</sup>	0.088	0.095	0.424

\* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes individual controls, regional and year fixed effects. Robust standard errors clustered at household level in parentheses. Controls include gender of household head, household size, share of children, market shocks, household shocks and type of settlement (urban or rural).

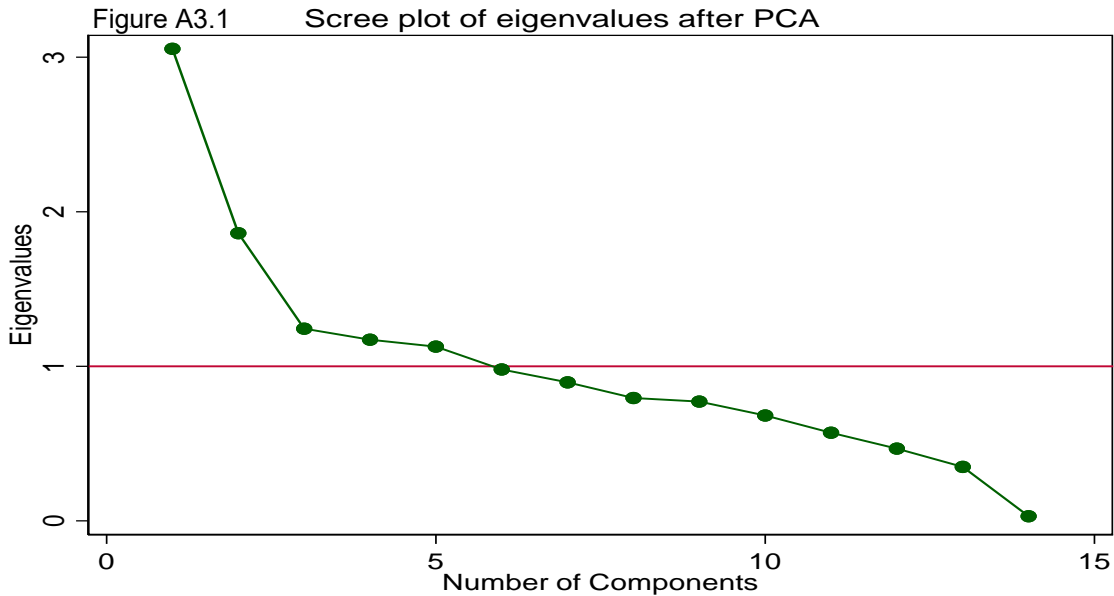
## Appendix

### Principal Component Analysis

Table A3.1 Principal components, eigenvalues, and proportion of variance explained.

Component	Eigenvalue	Difference between Eigenvalue	Proportion variance explained	Cumulative Proportion variance explained
Comp1	3.05	1.19	0.22	0.22
Comp2	1.86	0.62	0.13	0.35
Comp3	1.24	0.07	0.09	0.44
Comp4	1.17	0.04	0.08	0.52
Comp5	1.13	0.15	0.08	0.60
Comp6	0.98	0.08	0.07	0.67
Comp7	0.90	0.10	0.06	0.74
Comp8	0.79	0.02	0.06	0.80
Comp9	0.77	0.09	0.06	0.85
Comp10	0.68	0.11	0.05	0.90
Comp11	0.57	0.10	0.04	0.94
Comp12	0.47	0.12	0.03	0.97
Comp13	0.35	0.32	0.02	1.00
Comp14	0.03	.	0.00	1.00

Notes: The number of components equals the total number of variables (14) and all components explain the full variation in the data (1.00). The top 5 components have eigenvalues greater than 1 and explain 60% of variation.



Notes: The first five factors have eigenvalues greater than 1. (This means that the component explains as much of the variation as the original variables).

Table A3.2 Principal Component Loadings

Variable	Component 1	Component 2	Component 3	Component 4	Component 5	Unexplained
Food expenditure	0.1404	0.0071	0.6647	0.0056	0.0283	0.2125
HDDS	-0.115	-0.0958	0.6982	0.0077	0.0162	0.194
Water availability	0.5614	0.0233	0.0018	0.0264	0.0157	0.1431
Toilet availability	0.5646	0.0232	0.0011	0.0244	0.0173	0.1326
Heating availability	0.4451	-0.0239	0.0073	-0.0259	-0.0451	0.4604
Land (ha)	-0.0386	0.1137	0.0627	0.662	-0.0423	0.4219
Agricultural tools	-0.2115	0.1331	0.0654	-0.5852	0.0164	0.5263
Property Rent	-0.2029	-0.0111	-0.0148	0.4614	0.0569	0.5245
Active age	-0.0265	0.6498	-0.0082	0.0037	0.0966	0.3115
Number of workers	0.108	0.4265	0.136	0.0672	-0.0034	0.6113
Years of education	0.0378	0.5691	-0.1788	-0.0046	-0.0261	0.3539
Food assistance	-0.1286	0.0856	0.0015	-0.0112	0.613	0.51
Cash assistance	0.0773	0.0568	0.0731	-0.0336	0.6523	0.4463
Other assistance	0.1125	-0.1717	-0.1132	0.0233	0.4304	0.693

Notes: The component loadings represent the correlation between the components and original variable. This study concentrates on loadings above 0.3 or below -0.3.

Table A3.3 Component rotation

Variable	Component 1 ABS	Component 2 AC	Component 3 FA	Component 4 AST	Component 5 SSN	Unexplained
Food expenditure			0.6647			0.2125
HDDS			0.6982			0.194
Water availability	0.5614					0.1431
Toilet availability	0.5646					0.1326
Heating availability	0.4451					0.4604
Land (ha)				0.6620		0.4218
Agricultural tools				-0.5852		0.5264
Property Rent				0.4614		0.5245
Active age		0.6498				0.6113
Years of education		0.4265				0.3538
Number of workers		0.5691				0.3115
Food assistance					0.6130	0.5100
Cash assistance					0.6523	0.4464
Other assistance					0.4304	0.6929

Notes: Principal components with loadings above 0.3 or below -0.3 are only shown. Components are re-named based on the variable loadings.



Table A3.4 Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy

Variable	kmo
Food expenditure	0.5826
HDDS	0.528
Water availability	0.6355
Toilet availability	0.6333
Heating availability	0.9064
Land (ha)	0.6501
Agricultural tools	0.5454
Property Rent	0.8441
Active age	0.6563
Years of education	0.8858
Number of workers	0.6847
Food assistance	0.5607
Cash assistance	0.6293
Other assistance	0.4399
Overall	0.6659

The values are more than 0.5 so overall the variables have much in common to warrant PCA.

## Chapter 4

### The health impact of armed conflict

#### 4.1 Introduction

Armed conflicts often have devastating effects on different aspects of human lives. Beyond physical death, violent conflict has a considerable impact on health, educational infrastructure and agricultural production (O'hare, and Southall 2007; Cervantes-Duarte and Fernández-Cano, 2016; Baumann and Kuemmerle 2016). The long-term impacts of conflicts often lead to the displacement of the population, unemployment and a decline in nation's economic growth (Serneels and Verpoorten, 2015). However, the direct impact of armed conflict on population is often investigated when the conflict is over and the extent of a war's impact on people's health, while the conflict is still ongoing, is less well researched. This research seeks to overcome this gap by using existing data to explore whether or not health outcomes in Ukraine are impacted three years into the conflict in Donbas. Ukraine has experienced political tension with Russia since the collapse of the Soviet Union in 1991. The tension has degenerated into armed conflict during the past seven years. This triggered a devastative wave of violence and killings throughout the Eastern part of the country, resulting in a detrimental effect on the residents. Thus, the intensity of the conflict in Donbas<sup>15</sup> provides a quasi-natural experiment to examine a possible causality between health outcomes and armed conflict on the population of a country.

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<sup>15</sup> Donbas is an industrial region in Eastern Ukraine, specifically Donetsk and Lugansk regions. Donbas is known for production of metal, coal, and machine-building industries which are key contributors to the economy of Ukraine.

The objective of this paper is to investigate the impacts of armed conflict on Ukrainians in addition to what has been previously researched in literature. First, it is argued that the occurrence of armed conflicts initiates the spread of diseases and thus dramatically deteriorates individual health status as people become sicker (see Murray, 2002; Garry and Checchi, 2019). Second, people die during armed conflicts, not just from starvation or bullets wounds, but also from chronic conditions such as asthma, cancer, or heart disease (Levy and Sidel, 2016). Third, research suggest that armed conflicts affect individuals by causing barriers to healthcare services (Devkota and van Teijlingen, 2010). Thus, this study explores channels through which the conflict in Eastern Ukraine affect the people's health by using three key health indicators: self-evaluated health status, diagnosed chronic diseases and access to healthcare during the conflict. The paper employ data from the Ukrainian Household Budget Survey (UHBS, 2003-2016)<sup>16</sup> to analyse the health consequences of the Donbas conflict. A difference-in-difference identification strategy is employed to exploit the variation in the impact of the conflict on the population health across the regions of the country.

This paper contributes to literature by making improvements to the methodology employed in previous study. First, it improves the data set used in existing literature that examined the health consequences of armed conflicts in Ukraine (see Osiichuk and Shepotylo, 2018). The data employed in the study contains a short pre-conflict sample resulting in fewer observations and inadequate testing of the parallel trends assumption. A significant problem with this is that comparing the changes in outcomes over time between the treated and control groups may be biased. This research addresses this issue by adding more data points before the conflict started to test parallel trend assumption.

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<sup>16</sup> The UHBS is a national survey focusing on households' expenditure on goods and services. The UHBS also gives information on the living conditions of individuals in Ukraine(EUROSTAT,2010)

Second, this paper improves the model. The existing empirical literature applied the natural log to estimate individual's distance from the conflict zone. However, this approach is problematic in that it excludes the population who are within the conflict regions represented by zero kilometers, possibly leading to biased results. In this paper, the Inverse Hyperbolic Sine (IHS) technique is adopted to transform the square of individual distance from the conflict zones (see Burbidge et al., 1988; MacKinnon and Magee, 1990; Layton, 2001; Pence, 2006). Thus, the model adopted is able to retain the population in the conflict regions which are valued by zero kilometres. The empirical analysis based on this improved data set and method gives a more accurate assessment of the health effects of armed conflict on the population. Since the conflict occurred in the Donbas, this paper focuses on the population in the government-controlled areas (GCA)<sup>17</sup> of Donetsk and Lugansk oblasts who are the most affected as the treatment group and the rest of the regions as the control group.

Results indicate contrasting effects of armed conflict on the population health. First, there is evidence of significant deterioration in the health status of the population due to armed conflict. The effect is stronger for the people who live closer to the conflict regions. On the contrary, access to healthcare service improves during the period of armed conflict. This study finds no effect of the conflict on chronic disease diagnosis. Due to data limitation, the estimation results from this research only provide a representation of the overall effect of armed conflict on the health of Ukrainians in the period from 2014 to 2016 although the conflict is still ongoing. Nonetheless, the outcome of this study has the potential of providing information for understanding population-based risk factors present during the outbreak of armed conflict. This information can help

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<sup>17</sup> The conflict in Eastern Ukraine divided Donbas into government-controlled areas (GCA) and non-government controlled areas (NGCA). Ukrainian government controls the GCA, while the pro-Russian separatists control the NGCA. The majority of people in need are located in the NGCA of Luhansk and Donetsk, many of whom are elderly and more vulnerable (OCHA,2018).

policymakers and practitioners to initiate intervention measures to mitigate the health impacts of violent conflicts and to find cost-effective mechanisms for the provision of health services and the reallocation of health resources in such a way as to optimize the gains from health spending.

The rest of the paper is organised as follows. The next section reviews literature on conflicts with reference to its implications for health, while section 4.3 describes the data. Section 4.4 explains the empirical framework and econometric methods employed in this study. The results are presented and interpreted in Section 4.5, while the study concludes in Section 4.6.

## **4.2 Consequences of Armed Conflicts – A Literature Review**

There is a wealth of literature on the adverse effects of armed conflict on the population. Aside from the destruction caused to physical infrastructure, armed conflict is found to be a major cause of poor macroeconomic policy such as high inflation, distorted foreign exchange markets, large budget deficits and reduction in domestic investment (Alesina and Tabellini 1990; Imai and Weinstein, 2000). In addition, violent conflicts impose substantial impacts on the national economy by reducing GDP per capita (Collier, 1999).

Micro-level analyses show that armed conflict has considerable impacts on educational infrastructure as it contributes to the destruction of schools and other learning infrastructure (Raqib and Cooper, 2018). Armed conflict also affects financial well-being and contributes to loss of livelihoods through unemployment and loss of income (Osiichuk and Shepotylo, 2018). Recent social-economic analyses of the impact of armed conflicts indicate that people are predisposed to poverty due to hunger and other hardships during violent crisis (Rindebaek, 2017; Havari and Peracchi, 2017).

The recent academic interest in health consequences of war is informed by established causality between adverse health effects and conflict. For example, pneumonia caused the death of 600,000 soldiers in the course of the American civil war (Connolly and Heymann, 2002). In the recent past, similar casualties have been reported in the Democratic Republic of Congo (DRC), Somalia, Afghanistan and other conflict-prone countries (Connolly and Heymann, 2002). A survey of armed conflict in Kosovo indicates that at least 80 per cent of healthcare facilities were damaged in the conflict – a factor that elevated the risk of disease outbreaks among citizens (Haar and Rubenstein, 2012).

Research evidence shows that women, children, and elderly citizens are most vulnerable to poor physical health and mental health distresses due to armed conflict (Akresh et al., 2012; Brittain, 2003; Jansen, 2006; Minoiu and Shemyakina, 2014). According to Adam et al. (2003), armed conflicts lead to the emergence and escalation of epidemic diseases such as dysentery, typhoid, cholera, pneumonia, measles, and tuberculosis due to malnutrition, lack of clean water, crowding, poor sanitary conditions and general lack of hygiene in displacement camps.

Previous studies have described the consequences of the escalation of the conflict in Donbas. The UNHCR (2017) reported that the risk of death and disease is most pronounced in Lugansk and Donetsk where more than one million persons have been affected by fighting between the rebels and government forces. Coupe and Obrizan (2016) find that armed conflict in Eastern Ukraine adversely affected the level of happiness of the population in the conflict zone. Conversely, Osiichuk and Shepotylo (2018) examine the conflict in Eastern Ukraine based on the distance to the conflict zone and find no evidence that the conflict negatively affect Ukrainians' health.

According to Adam et al. (2003), armed conflict has a comparable pattern on health in different geographic regions and the after-effects of civil wars persist long after the conflict has ceased as evidenced by the longer disability-modified life years (DALY).

The present study assumes that the armed conflict in Ukraine would have a substantial and unmediated effect on health due to the prevalence of diseases in conflict-prone areas. Therefore, this research seeks to answer the following question: i) what is the effect of the armed conflict in Eastern Ukraine on the population health; ii) which health outcomes are most affected?

### **4.3 Data**

The Ukrainian Household Budget Survey (UHBS) from 2003-2016 is used to estimate the models specified in this empirical analysis. The UHBS is a repeated cross-section that captures the composition of the population in all the regions in Ukraine. It is a detailed nationally representative survey that includes comprehensive information on individual and household characteristics. Specifically, the UHBS provides information on the household demographic and socioeconomic characteristics such as age, sex, income, size, degree of urbanization, and region. It also contains information on a subjective measure of health indicators based on individual respondent's self-reported physical and mental health status, as well as information on morbidity, access to healthcare facilities and household expenditure on health care. This paper employs this data set to provide detailed information on the trends of the carefully selected measured health indicators before and after the conflict started in Eastern Ukraine and to capture the impact and the intensity of the Donbas conflict on the population.

Beginning in 2014, the UHBS excludes data on Crimea and the self-proclaimed Donetsk and Lugansk republics. The fighting happened in the Donbas and the contact line in the conflict regions divides Donbas into Government-Controlled Areas (GCA) and non-Government Controlled Areas (NGCA). GCA is controlled by Ukrainian government forces while the NGCA is controlled by Russian backed separatist. Whilst Donbas population has been excluded in previous study (see Osiichuk and Shipotylo, 2018), this study assumes that the population in the conflict affected regions have direct experience with the conflict and are the most affected. Hence, they should be included in the analysis so that the results reported in this study can appropriately reflect the impact of the conflict on the entire population.

Table 4.1 shows a description of the outcome and treatment variables. To assess the effect of the conflict on the population, this study employs respondents' objective and subjective measures of health. Previous studies find that subjective health indicators are valid measures for monitoring population health and they can be used to assess the impact of conflict on population (Miilunpalo et al., 1997; McEniry et al., 2019). Thus, individual self-report of health status is included as a subjective measure of the population health. It indicates the stated level of wellness and illness of individual respondents. As objective measure, this paper evaluates chronic disease which is commonly used to measure the impact of conflict on health (see Osiichuk and Shepolyte, 2018; Jawad et al., 2019). It indicates whether an individual has been diagnosed with a chronic disease during the conflict or not. Rytter et al. (2006) argue that restrictions and delays in access to hospital services during armed conflicts influence the severity of the population's medical conditions. Therefore, respondents' indication as to whether they were able to receive medical care when needed is used as a proxy to measure access to healthcare service. The conflict in Eastern Ukraine started in 2014; hence, the treatment period for this analysis is from 2014 to 2016.



Table 4.2 presents summary statistics for the outcome and control variables in the UHBS samples. Given that, men and women suffer from different types of diseases at different ages, the study includes ‘gender and age’ variables to control for the variation in individual health status due to gender and age differences. Differences in income might be linked to variation in health status. Thus, this study includes ‘real income’, which is the household total income less taxes and deflated by the consumer price index. Individual’s level of education is included as a variable to control for differences in education levels that may influence respondent’s decision about their health. People who are employed are thought to have greater control over their health and, as a result, may be healthier than those who are jobless. The employment status of individuals is therefore included in this study. The study also takes into account household size, as it is thought that the number of family members has an impact on health and wellbeing. Finally, cohort (dummy) is included to control for the difference that may exist between the young and older respondents. Residents below 50 years are regarded as ‘young cohorts’ and people above 50 years are considered as ‘old cohorts’.

#### **4.4 Empirical Methodology**

We analyze the impact of armed conflict on health outcomes in Eastern Ukraine employing the difference-in-difference (DiD) empirical strategy. The DiD approach uses a balanced randomized sample with common trends to mitigate biases from unobserved heterogeneity that could result from permanent differences between the control and the treatment groups in the post-intervention period. The 2014 to 2016 UHBS excludes the population in the pro-Russian separatist occupied territories of Donbas and it is assumed there was out-migration of the mobile population who fled from the conflict causing a variation in the demographic composition of the GCA. Therefore, the

standard DiD model is modified by using individual distance from the conflict regions to measure the intensity of the conflict on the population health. This technique addresses the unbalanced nature of the data and removes the bias that may exist between the treatment and the comparison groups.

Methodologically, this paper improves on the statistical models used in the existing literature and differs from previous study in two ways. Beginning in 2014, the UHBS excludes data on Crimea and the self-proclaimed Donetsk and Lugansk republics. Since the fighting happened in the Donbas and the contact line in the conflict regions divides Donbas into Government-Controlled Areas (GCA) and non-Government Controlled Areas (NGCA). GCA is controlled by Ukrainian government forces while the NGCA is controlled by Russian backed separatist. Whilst Donbas population was excluded in previous study (see Osiichuk and Shipotylo, 2018), this study assumes that the population in the conflict regions have direct experience with the conflict and are the most affected. Hence, they should be included in the analysis so that the results reported in this study can appropriately reflect the impact of the conflict on the households of the entire population. Thus, the proposed DiD model is capable of retaining the population in the combat zones valued at zero kilometres. Second, this study includes ‘health status’ and ‘access to healthcare’ in addition to ‘chronic disease’ used in existing studies (e.g., Osiichuk and Shepolyte, 2018) as measures of health outcome of the conflict. In doing so, the analysis is able to capture relevant information that the previous literature ignores.

In the absence of armed conflicts, other factors may influence an individual’s self-evaluation of health status. A person with poor health in the current year is likely to experience poor health in the next year (Buddelmeyer and Cai 2009). That is, an individual’s poor health status during armed conflict may be traceable to the bad health they had suffered before the conflict

started. Therefore, the study used a parallel trend analysis to compare the health status of individuals before and during the conflict. The analysis also includes the year fixed effects that capture any variation in individual health status over time, which is not attributed to the explanatory variables.

#### 4.4.1 Model Specification

To investigate whether changes in distance from the conflict regions affect the degree of the impact of the conflict on the population health, this paper estimates the modified DiD model specified below:

$$H_{irt} = \beta_0 + \beta_1 Conflict_t + \beta_2 (dist\_Donbas)_r^2 + \beta_3 Conflict_t * (dist\_Donbas)_r^2 + X_{irt}\delta + \gamma_r + \gamma_t + v_{irt} \quad (2)$$

Where the outcome variable  $H_{irt}$  represents selected health indicators of interest (see table 4.1, section 4.3) for individual  $i$  at time  $t$ . The health status measure equals 1 if an individual reported good health in the past 12 months and is 0 otherwise. For chronic disease, it is equal to 1 if an individual reported having been diagnosed with a chronic disease in the past 12 months and is 0 otherwise. To measure access to healthcare, the analysis focuses on only individuals who needed and sought medical treatment in the past twelve months. Individuals who did not seek medical care when needed are excluded leading to a smaller sample size for access to healthcare variable. Thus,  $H_{irt}$  equals 1 if an individual had access to medical treatment and 0 otherwise.  $Conflict_t$  is a time dummy variable capturing the years of conflict. It has a value of 1 if year equals or is greater than 2014 and 0 otherwise.  $(dist\_Donbas)_r^2$  represents the square of the distance from Donetsk to the

central city in region  $r$ .  $X_{irt}$  captures individual-specific variables influencing the outcome variables such as gender, age,  $(age)^2$ , level of education, marital status, employment status,  $\ln(\text{real income})$ , household size, settlement type - whether urban, town or rural area residents at time  $t$ .

The main coefficients of interest is the  $\beta_3$ , which show whether being close to the conflict region increases the impact of the conflict on individual's health or not.  $\sigma_r$  is the regional fixed effect that captures unobservable fixed regional characteristics that may influence the outcome variable, while  $\sigma_t$  is the year fixed effects that capture any variation in individual health status over time which is not attributed to the explanatory variables.  $\varepsilon_{irt}$  is the idiosyncratic error terms.

## 4.5 Results

To measure the impact of conflict on health, this study estimates equation (2) for the sample that includes the population in the GCA of Donbas. Table 4.3 reports the results for self-reports of individual health status, chronic disease and access to health care as the dependent variables with a variety of demographic and socio-economic variables such as gender, age and  $(age)^2$ , age cohorts, marital status,  $\ln(\text{income})$ , education and employment status included as explanatory variables. All regressions include regional and time fixed effects with robust standard errors clustered at the household level.

For the estimation that evaluates the impact of the conflict on self-reported health status, results indicate that individual health status deteriorated during the time of conflict in comparison to pre-conflict periods. As shown in column 1 of table 4.3, there is 8 per cent chance of a person having a poor feeling of health status from the time when the conflict started. The effect is greater for people who live closer to Donbas as indicated by the positive and significant coefficient of the

interaction term. This is consistent with the assumption in this paper that the closer an individual is to the conflict zone the stronger the effect is. It is imperative to mention that before the conflict started, the areas that are closer to Donbas were better off in terms of self-report of health status as indicated by the negative coefficient of the square of the distance from Donbas.

The estimates in column 2 of table 4.3 indicate that the effects of the armed conflict on chronic disease are not statistically significant. These findings are similar to previous studies (see Osiichuk and Shepolyte, 2018) who did not find the effect of the conflict in Donbas on chronic disease. Therefore, this study supports the argument that it takes time for chronic diseases to develop and the effect of the conflict in Donbas on chronic diseases is what might be investigated post conflict. However, in order to understand the reasons why this research finds an effect of the conflict on self-reported health status and not on diagnosed chronic disease, it is important to investigate whether people have access to healthcare services to be diagnosed or not? Thus, this study estimates the effect of the conflict on access to healthcare.

The results in column 3 of table 4.3 indicate that individuals closer to the conflict regions are more likely to have access to healthcare. That is, for every one-kilometer distance to the conflict, individuals have 10 per cent higher chance of receiving health care services. Therefore, the negative and significant interaction term suggests that the Donbas conflict aided individual's access to healthcare service. This result is counterintuitive. The plausible reason for this outcome is that more international humanitarian assistance and government resources were diverted towards providing healthcare service in the conflict areas rather than the rest of the regions in Ukraine. Consequently, as funding and support are diverted to the east, the rest of the country benefited less from resource allocation. On the other hand, it may be the case that due to outmigration of people, there is less demand for healthcare services as fewer people mean more access to resources.

Further analyses in table 4.4 suggest that individuals started feeling deterioration of their health status from the second year of the conflict (2015) and the negative effect continues into the third year as indicated by the positive and significant interaction terms. However, access to healthcare mainly increased for individuals in the town and in the city particularly in the third year of the conflict. The effect is stronger for individuals closer to the conflict regions as indicated by the negative and significant coefficients of the interaction terms (see tables 4 and 5). Results in table 4.6 show that the older cohorts have 6 per cent higher chance of having poor health status during the armed conflict and the effect depends on proximity to the conflict region as indicated by the positive and significant coefficients of the interaction term. Females and males have 7 per cent and 9 per cent higher chances of having poor health during the time of conflict respectively and the intensity increases for those closer to Donbas.

Table 4.7 reports the effect of the conflict on health for different age groups. Health status for all age groups significantly deteriorated during the conflict. Children between ages 0-15 years were the most affected perhaps due to their high vulnerability to infectious diseases during conflicts. The conflict also hit hard on the health of the population of working age; particularly those within the 26-55 age group and the effect is stronger with distance to conflict. The 16-25 group are the least affected, possibly due to their non-exposure to previous shocks such as the Chernobyl disaster<sup>18</sup> and the ability to endure the adverse effect of armed conflicts. Similarly, the health of individuals above 56 years is less affected. This may be due to the high medical attention given to the older population during conflicts as indicated by the positive and significant coefficient for access to healthcare service by age group above 65 years during the conflict. The

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<sup>18</sup> The Chernobyl disaster was a nuclear accident that occurred on 26 April 1986, at the nuclear reactor in the Chernobyl Nuclear Power Plant, near the city of Pripyat in the north of the Ukrainian (Burgherr and Hirschberg, 2008)

effect of the conflict on access to healthcare for all other age groups was, however, less pronounced and did not depend on proximity. The effect of the conflict on chronic diseases was mostly not significant for all age groups except the older generation above 56 years and did not depend on the distance to conflict.

#### **4.6 Conclusions**

This paper made three important contributions to existing literature on the effects of armed conflict on population health status. First, this study finds evidence that armed conflict has a negative impact on people's health. In particular, individual's self-reported health status shows significant deterioration due to violent conflict. The effect is stronger for the population closer to the conflict. Further analyses reveal that an individual's feeling of illness started in the second year of the conflict and it is more significant for the population living in towns. More specifically, older cohorts and females who are closer to the conflict have poorer feeling of their health status than their counterparts who are further away from the conflict. This research did not find any effect of the conflict on chronic disease regardless of the method employed. Thus, the assumption that armed conflict increasingly worsens people's chronic health conditions in Ukraine is rejected.

Second, this study finds that access to healthcare service improved during the period of the conflict. That is, the closer an individual is to the conflict the more access to healthcare service they have. The probable justification for this outcome is that most the government resources as well as humanitarian assistance may have been diverted towards providing healthcare service in the conflict affected areas rather than to the peaceful regions in Ukraine. It may also be the case that the people's flight from the conflict, resulted to less demand for healthcare services in Donbas.

Finally, this paper improves the estimation by applying a more appropriate statistical model to the analysis of armed conflict influence on health outcomes. The study argues that the exclusion of the population in the conflict zone in the model results in incorrect conclusions. The employment of inverse hyperbolic sine technique to transform the square of individual distance from the conflict zones lends support to this study's arguments about accounting for the people in the conflict zone and more accurately fit the structure of the data used in this and previous analyses.

### **Policy Implications**

As part of a larger research that explores the microeconomic consequences of armed conflict on individuals and households, this study investigates how the ongoing conflict in Eastern Ukraine has affected the people's health. Following the literature, this study used three health indicators as building blocks for the analysis. These three health indicators are: 1) self-reported health status 2) access to healthcare service, and 3) diagnosed chronic disease. The paper relied on data from the Ukrainian Household Budget Survey (UHBS, 2003-2016) to analyze the impact of the conflict on the population health in Ukraine. The findings provide evidence that self-reported health status for individuals significantly deteriorates when exposed to violent conflict. In contrast, people's access to healthcare service improves during the period of conflict. The effect is stronger for the population closer to the conflict zone for both outcomes.

The outcome of this study has the potential of providing information for understanding population-based risk factors present during the outbreak of armed conflict. This information can help policymakers and practitioners to initiate intervention measures to mitigate the health impacts of violent conflicts and to find cost-effective mechanisms for the provision of health services and the reallocation of health resources in such a way as to optimize the gains from health spending. Multilateral agencies such as the World Health Organization (WHO) need to see the conflict and



post-conflict period as a window of opportunity to undertake wide-ranging reforms of the health sector.

Donors should fund rebuilding efforts taking into account what factors need to be considered to build back better and affordable health system projects in conflict affected regions. Such reforms should seek to improve the quality and accessibility of health care; increase the effectiveness and efficiency of the health system; and improve population health. National governments should be put under pressure from multilateral agencies, such as the World Bank and the World Health Organisation (WHO), to undertake ambitious and wide-ranging health system reform measures that has the potential to improve people's quality of life.

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## Tables

Table 4. 1	Variable Description	
Variable	Measure	Value
<b>A. Health indicators</b>		
Chronic disease	Do you have a chronic disease (6 months or more)	1 if yes, 0 otherwise
Good health status	How do you rate your current health status	1 if good, 0 otherwise
Access to healthcare	Did you seek and find healthcare services in the last 12 months?	1 if yes, 0 otherwise
<b>B. Treatment Variable</b>		
Conflict years	Years of conflict (2014 to 2016)	1 if year is greater or equal 2014, 0 otherwise
(Distance) <sup>2</sup>	The inverse hyperbolic sine of kilometers squared from Donetsk to 22 administrative capitals, measured by driving distance	Greater than or equal to 0 from conflict regions (Donetsk and Lugansk)
Conflict regions	Regions of conflict in Ukraine	1 if region is Donetsk or Lugansk, 0 otherwise

Table 4. 2 Descriptive Statistics

Variable	Observation	Mean
<b>Dependent</b>		
Good health status	152342	0.79
Chronic disease	112009	0.33
Access to healthcare	132438	0.11
<b>Explanatory</b>		
Conflict year	152342	0.33
Conflict region	152342	0.11
<b>Controls</b>		
Female	152342	0.52
Married	152342	0.57
Household size	152342	3.30
Employed	138002	0.77
Income (\$10,000)	152338	0.16
Higher education	151497	0.43
City residents	152342	0.34
Town residents	152342	0.28
Rural residents	152342	0.38
Cohort (old/young)	152342	0.39

Table 4.3 Impact of armed conflict on of health indicators

	(1) Good health status	(2) Chronic disease	(3) Access to healthcare
Conflict years	-0.081*** (0.015)	0.058*** (0.011)	0.012 (0.010)
(Distance) <sup>2</sup>	-0.248*** (0.049)	0.313*** (0.037)	-0.106*** (0.028)
Conflict year*(Distance) <sup>2</sup>	0.003** (0.001)	0.000 (0.001)	-0.003*** (0.001)
Observations	99640	101005	75102
R <sup>2</sup>	0.035	0.214	0.032

Robust standard errors clustered at household level in parentheses; \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes individual controls, regional and year fixed effects. Distance is transformed using inverse hyperbolic sine transformation technique in (1). Controls include: gender, age, (age)<sup>2</sup>, marital status, household size, level of education, employment status, ln(real income), age-cohorts (older or younger generations) and type of settlement (urban, town or rural).

Table 4.4 Impact of conflict on of health indicators in by year of conflict

	(1) 2014	(2) 2015	(3) 2016
<b>Health status</b>			
Conflict year	0.053 (0.030)	-0.089*** (0.020)	-0.079*** (0.020)
(Distance) <sup>2</sup>	-0.239*** (0.049)	-0.246*** (0.049)	-0.243*** (0.049)
Conflict year* (Distance) <sup>2</sup>	-0.003+ (0.002)	0.005** (0.001)	0.004* (0.002)
Observations	99640	99640	99640
R <sup>2</sup>	0.034	0.034	0.034
<b>Chronic disease</b>			
Conflict year	0.500*** (0.029)	-0.050*** (0.014)	0.068*** (0.015)
(Distance) <sup>2</sup>	0.322*** (0.037)	0.320*** (0.037)	0.320*** (0.037)
Conflict year* (Distance) <sup>2</sup>	-0.004** (0.001)	0.004*** (0.001)	-0.002 (0.001)
Observations	101005	101005	101005
R <sup>2</sup>	0.212	0.209	0.210
<b>Access to Healthcare</b>			
Conflict year	0.101*** (0.024)	-0.011 (0.012)	0.041** (0.013)
(Distance) <sup>2</sup>	-0.114*** (0.028)	-0.112*** (0.028)	-0.112*** (0.028)
Conflict year* (Distance) <sup>2</sup>	-0.002 (0.001)	-0.001 (0.001)	-0.003*** (0.001)
Observations	75102	75102	75102
CONTROLS	Yes	Yes	YEs
R <sup>2</sup>	0.030	0.031	0.030

Robust standard errors clustered at household level in parentheses; \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes individual controls, regional and year fixed effects. Distance is transformed using inverse hyperbolic sine transformation technique. Controls include: gender, age, (age)<sup>2</sup>, marital status, household size, level of education, employment status, ln\_(real income), age-cohorts (older or younger generations) and type of settlement (urban, town or rural).



Table 4.5 Impact of conflict on health indicators by area of settlement

	(1) City	(2) Town	(3) Rural
<b>Health status</b>			
Conflict year	-0.068** (0.024)	-0.140*** (0.025)	0.001 (0.031)
(Distance) <sup>2</sup>	-0.476*** (0.085)	-0.702*** (0.212)	-0.982*** (0.191)
Conflict year* (Distance) <sup>2</sup>	0.002 (0.002)	0.008*** (0.002)	-0.001 (0.002)
Observations	34554	27775	37311
R <sup>2</sup>	0.056	0.042	0.033
<b>Chronic disease</b>			
Conflict year	0.154*** (0.019)	0.061** (0.021)	0.113*** (0.024)
(Distance) <sup>2</sup>	0.195** (0.065)	1.370*** (0.183)	0.448** (0.147)
Conflict year* (Distance) <sup>2</sup>	-0.002 <sup>+</sup> (0.001)	0.002 (0.001)	0.001 (0.002)
Observations	34391	28136	38478
R <sup>2</sup>	0.166	0.154	0.161
<b>Access to healthcare</b>			
Conflict year	0.008 (0.014)	0.052** (0.018)	-0.004 (0.020)
(Distance) <sup>2</sup>	-0.088* (0.042)	-0.280* (0.139)	-0.442** (0.134)
Conflict year* (Distance) <sup>2</sup>	-0.002* (0.001)	-0.006*** (0.001)	-0.002 (0.001)
Observations	28336	20820	25946
R <sup>2</sup>	0.027	0.039	0.031

Robust standard errors clustered at household level in parentheses; \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes individual controls, regional and year fixed effects. Distance is transformed using inverse hyperbolic sine transformation technique. Controls include: gender, age, (age)<sup>2</sup>, marital status, household size, level of education, employment status, ln(real income), age-cohorts (older or younger generations) and type of settlement (urban, town or rural).

Table 4.6 Impact of conflict on health indicators by cohorts and gender

	(1) Old cohort	(2) Young cohort	(3) Female	(4) Male
<b>Health status</b>				
Conflict year	-0.059** (0.018)	-0.091*** (0.026)	-0.075*** (0.016)	-0.088*** (0.017)
(Distance) <sup>2</sup>	-0.198** (0.063)	-0.306*** (0.075)	-0.254*** (0.051)	-0.242*** (0.054)
Conflict year* (Distance) <sup>2</sup>	0.003* (0.001)	0.003+ (0.002)	0.002* (0.001)	0.004*** (0.001)
Observations	56274	43366	51932	47708
R <sup>2</sup>	0.018	0.027	0.035	0.037
<b>Chronic disease</b>				
Conflict year	0.161*** (0.016)	0.034* (0.017)	0.044** (0.014)	0.073*** (0.015)
(Distance) <sup>2</sup>	0.321*** (0.052)	0.304*** (0.055)	0.364*** (0.045)	0.256*** (0.046)
Conflict year* (Distance) <sup>2</sup>	-0.001 (0.001)	0.000 (0.001)	-0.000 (0.001)	0.000 (0.001)
Observations	61976	39029	52751	48254
R <sup>2</sup>	0.152	0.047	0.224	0.196
<b>Access to healthcare</b>				
Conflict year	0.045** (0.014)	-0.022 (0.014)	0.006 (0.012)	0.020 (0.014)
(Distance) <sup>2</sup>	-0.115** (0.042)	-0.098** (0.036)	-0.054 (0.0370)	-0.171*** (0.039)
Conflict year* (Distance) <sup>2</sup>	-0.004*** (0.001)	-0.001 (0.001)	-0.003*** (0.001)	-0.004*** (0.001)
Observations	45165	29937	41751	33351
R <sup>2</sup>	0.029	0.025	0.026	0.047

Robust standard errors clustered at household level in parentheses; \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001.

Regression includes individual controls, regional and year fixed effects. Distance is transformed using inverse hyperbolic sine transformation technique. Controls include: gender, age, (age)<sup>2</sup>, marital status, household size, level of education, employment status, ln\_(real income), age-cohorts (older or younger generations) and type of settlement (urban, town or rural).

Table 4. 7 Impact of conflict on of health indicators by Age group

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Age	Age	Age	Age	Age	Age	Age
	0-15	16-25	26-35	36-45	46-55	56-65	Above 65
<b>Good health status</b>							
Conflict year	-0.206***	-0.096*	-0.151***	-0.130***	-0.113***	-0.058*	-0.053*
	(0.039)	(0.041)	(0.035)	(0.032)	(0.029)	(0.027)	(0.023)
Conflict year* (Distance) <sup>2</sup>	0.009**	0.004	0.006*	0.006*	0.005**	0.003+	0.001
	(0.003)	(0.003)	(0.003)	(0.0020)	(0.002)	(0.002)	(0.002)
Observations	9616	11008	12713	13961	15016	12229	25382
R <sup>2</sup>	0.038	0.026	0.036	0.029	0.019	0.017	0.046
<b>Chronic disease</b>							
Conflict year	-0.028	0.006	-0.038	-0.005	0.012	0.065*	0.115***
	(0.025)	(0.029)	(0.025)	(0.028)	(0.031)	(0.032)	(0.025)
Conflict year* (Distance) <sup>2</sup>	0.001	-0.001	0.001	-0.002	0.001	0.003	0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	10745	11934	12741	14411	15009	11389	25385
R <sup>2</sup>	0.016	0.020	0.030	0.038	0.049	0.068	0.239
<b>Access to health care</b>							
Conflict year	0.003	0.005	-0.029	0.022	-0.004	0.003	0.067**
	(0.022)	(0.028)	(0.025)	(0.025)	(0.027)	(0.027)	(0.024)
Conflict year* (Distance) <sup>2</sup>	-0.003*	-0.003	-0.002	-0.004*	-0.003+	-0.003	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Observations	9556	9118	8612	10065	10786	8236	19154
R <sup>2</sup>	0.023	0.054	0.034	0.022	0.024	0.021	0.036

Robust standard errors clustered at household level in parentheses; \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Regression includes individual controls, regional and year fixed effects. Distance is transformed using inverse hyperbolic sine transformation technique. Controls include: gender, age, (age)<sup>2</sup>, marital status, household size, level of education, employment status, ln(real income), age-cohorts (older or younger generations) and type of settlement (urban, town or rural).

## APPENDIX

### A. Previous Studies

The study most relevant to this paper is the empirical examination the consequences of armed conflict on financial well-being and health by Osiichuk and Shepolyto (2018). They investigate the contemporaneous effect of the Russian-Ukrainian hybrid war on financial well-being and health of civilian population. The researchers combine microdata from Ukrainian Household Budget Survey (UHBS) and Russian Longitudinal Monitoring Survey (RLMS) from 2003-2016. This study focuses on diagnosed chronic diseases as the variables introduced to capture the health effects of armed conflict. Osiichuk and Shepolyto claim the effect of the conflict on chronic diseases in Ukraine was found only in the third year of the conflict. This empirical evidence is examined more closely.

First, Osiichuk and Shepolyto (2018) is replicated using the model with *natural log of distance* from the conflict region on the sample that exclude Donetsk and Luhansk regions (from 2012-2016). The results in table A.1, column 1 is similar to Osiichuk and Shepolyto (2018). That is, there is no significant impact of the conflict on chronic disease. Further, the same measure is applied to ‘health status’ and ‘access to healthcare’ as outcome variables. As shown in columns 2 and 3, there is no statistically significant effects of the conflict in Donbas for both measures. Next, Osiichuk and Shepolyto (2018) is replicated with large sample size (2003-2016). As in the first replication, the results show no significant effect of the conflict on all measures of health for the whole period of the conflict (see table A.2). These imply that the armed conflicts are not associated with the onset of chronic disease, deterioration of the feeling of health status and deprivation of access to healthcare services for individuals

A careful scrutiny of the approach adopted by the researchers reveals that their analysis excludes the population in the conflict regions. With the assumption that the population in the conflict regions have first-hand experience of the conflict and are most affected, they should be included in the analysis. Therefore, an improved econometric framework (2) is applied to the number of observation similar to Osiichuk and Shepolyto (2018) but for the sample that includes population of Donbas. The results in table A.3 are comparable to the previous estimates. There is no statistically significant effects of the conflict in Donbas on all measures of health for the whole period of the conflict. Finally, a large number of observations for the sample that includes the population of Donbas is used in the estimation of the improved econometric framework (2). The results are presented in table 4.3.

Although Osiichuk and Shepolyto is successfully replicated, this analysis offers a slightly different interpretation of the results. Contrary to the researchers' results that the effect of the conflict on chronic diseases in Ukraine was found only in the third year of the conflict, this study find the effect of the conflict on chronic diseases in the first year (see table 4.4). It is worth mentioning that the result was reversed in the second year and the size of the impact seems much smaller than what the researchers reported in the third year.

Table A4.1 Replication of Osiichuk and Shepotylo (2018) with additional indicators

	(1) Chronic disease	(2) Good health status	(3) Access to healthcare
Conflict years	0.084 (0.056)	-0.076 (0.077)	0.064 (0.040)
Ln_(distance to Donetsk)	0.683*** (0.090)	-0.670*** (0.125)	-0.229*** (0.067)
Interaction term	-0.005 (0.008)	0.007 (0.012)	-0.011 <sup>+</sup> (0.006)
Constant	-4.316*** (0.602)	5.280*** (0.833)	1.656*** (0.445)
Observations	57765	56582	44164
$R^2$	0.234	0.041	0.032

Robust standard errors clustered at household level; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Regression includes individual controls, regional and year fixed effects. Controls are gender, age, (age)<sup>2</sup>, married, household size, higher education, employed, income, age-cohorts (older or younger generations) and type of settlement (urban, town or rural).

Table A4.2 Replication of Osiichuk and Shepotylo (2018) with large sample data

	(1) Chronic disease	(2) Good health status	(3) Access to healthcare
Conflict years	0.051 (0.042)	-0.075 (0.056)	0.021 (0.030)
Ln_(distance to Donetsk)	0.622*** (0.075)	-0.505*** (0.098)	-0.214*** (0.056)
Interaction term	0.001 (0.006)	0.006 (0.008)	-0.008 <sup>+</sup> (0.005)
Constant	-3.925*** (0.499)	4.176*** (0.653)	1.596*** (0.373)
Observations	90605	89543	67289
$R^2$	0.215	0.035	0.033

Robust standard errors clustered at household level; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Regression includes individual controls, regional and year fixed effects.

Controls: gender, age, (age)<sup>2</sup>, married, household size, higher education, employed, income, age-cohorts (older or younger generations) and type of settlement (urban, town or rural).

Table A4. 3 Impact of armed conflict on health indicators (small sample)

	(1) Chronic disease	(2) Good health status	(3) Access to healthcare
Conflict years	0.051 (0.044)	-0.077 (0.059)	0.024 (0.032)
(Distance) <sup>2</sup>	0.311*** (0.037)	-0.253*** (0.049)	-0.107*** (0.028)
Conflict year* (Distance) <sup>2</sup>	0.001 (0.003)	0.003 (0.004)	-0.004 <sup>+</sup> (0.002)
Constant	-4.141*** (0.525)	4.351*** (0.687)	1.671*** (0.393)
Observations	90605	89543	67289
<i>R</i> <sup>2</sup>	0.215	0.035	0.033

Robust standard errors clustered at household level; \*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

Regression includes individual controls, regional and year fixed effects.

Controls: gender, age, (age)<sup>2</sup>, married, household size, higher education, employed, income, age-cohorts (older or younger generations) and type of settlement (urban, town or rural).

## Chapter 5

### Conclusion

#### 5.1 Summary

This thesis sets out to examine the relationship between violent conflict and socio-economic outcomes using Ukraine as a case study. In my analysis, I rely on data from the Ukrainian Household Budget Survey. I find evidence of significant link between conflict and microeconomic indicators. Using a modified difference-in-difference (DiD) empirical strategy which uses household distance from the conflict regions as a measure of conflict intensity and level of household exposure to economic shocks, I estimate the effects of armed conflict on household consumption and budget share. I adopt household consumption expenditures for eleven categories of goods and services: food, alcohol and tobacco, clothing and footwear, utilities, health, education, transportation, leisure, housing, durables, and other items as a proxy for measuring household consumption in times of conflict. I find evidence that households exposed to armed conflict consumed less of all commodities (excluding education) than those who were not. The magnitude of the impact varies according to a household's proximity to high conflict intensity zones in Eastern Ukraine.

In addition, relating household budget shares to the logarithm of total household expenditure reveals how households allocate expenditure to different goods during conflict and predicts household expenditure behaviour at the margin. Specifically, household budget share allocated to food, clothing and footwear, and healthcare services decrease with proximity to armed conflict. On the other hand, household closer to conflict zone increases budget share for alcohol, education, transport and housing. There is no effect of household proximity to conflict zone on



budget share devoted to utility, leisure, durable and other goods. Marginal estimates show that most of the household's annual expenditure is allocated to food and housing. Finally, estimates of demand elasticities confirm that in a war situation, households consider only food and shelter to be necessities, while spending on other goods is considered a luxury.

To further understand how conflict may influence the capacity of households to cope with adverse shocks; this paper explores the relationship between household resilience and armed conflict. I construct household resilience indicators from multiple observed variables using the Principal Component Analysis and use a modified difference-in-difference (DiD) to evaluate how the resilience of households is affected by proximity to conflict zone. I find evidence that because of the conflict in Donbas, access to basic services, assets, adaptive capacity, and social safety networks have decreased according to depending on closeness to conflict zone

Having gained some understanding of the negative effects of armed conflict at the household level from my data, I turned to individual level data to estimate the health consequences of armed conflict on individuals. I argue that the occurrence of armed conflicts triggers the spread of diseases, causing individual health to deteriorate. Thus, I explore channels through which the conflict affects the people's health. I focus on three key health indicators: self-evaluated health status, diagnosed chronic diseases and access to healthcare during the conflict. I employ a modified difference-in-difference (DiD) identification strategy in which I used individual distance from the conflict regions to measure the intensity of the conflict on the population health. In contrast to previous research, I include the population in conflict zones in my model. I argue that excluding the population in the conflict zone from the model leads to incorrect inferences. I find evidence that armed conflict is harmful to people's health. Individuals' self-reported health status, in particular, deteriorated significantly as a result of violent conflict. The impact is greater for those

living in close proximity to the conflict. Further investigation reveals that an individual's feeling of illness began in the second year of the conflict, and it is more significant for the town residents. More precisely, older cohorts and females who live closer to the conflict have lower perception of their health than their counterparts who live further away from the conflict. I find no effect of the conflict on chronic disease.

## **5.2 Policy Implications**

Effective conflict resolution policies require accurate understanding of how individuals and households have been affected by violence and the implications for their wellbeing. The findings of this study suggests that, in addition to the knowledge of the effects armed conflict on household consumption behaviour, understanding how people's health and their capacity to cope with adverse shocks is impacted by violence is critical for formulating economic policies that improves household livelihood. For example, the change in household budget shares for food commodities due to exposure to armed conflict can be converted to increase in food quantities supplied to reduce starvation and alleviate the suffering of households. International Humanitarian system's response to food crises in regions affected by conflict should be a priority. Measures should be taken to ensure that food assistance reach the most vulnerable such as children, women and the elderly in conflict situations.

Housing is critical for lowering vulnerability and increasing resilience during crisis. Housing provides security, personal safety, and weather protection, as well as preventing illness and disease. In the event of armed conflict policy makers should implement policies to ensure housing needs of the people exposed to armed conflict are met in the most effective and efficient manner possible. These policies should cover the recovery phase as an urgent response to resettle

those who have been displaced from their homes because of violent conflict. The policies should also promote interventions and strategies that lead to resilient recovery and addresses setbacks caused by armed conflict, offers opportunities and strengthens capacities to deal with future risks and bounce back quickly. International donors should support the reconstruction or maintenance of private assets (e.g., houses, farmland, and businesses) and public amenities such as schools, water supplies, sewage systems, electricity, and heating systems among others that have been destroyed during the conflict. Furthermore, the policies should be adaptable for immediate response to vulnerable people in the event of future conflict. Humanitarian organizations can provide cash-based assistance, rental support and building materials to support affected households and regions. If the policies are meticulously set up, they have the potential to reduce the likelihood of repeated conflict (Collier, 2004).

Finally, post-conflict health reconstruction should be among the top priorities for donor agencies to meet immediate health needs of the population affected by conflict. For instance, health reform measures that are tailored to increasing local capacity should be introduced by all stakeholders, including international donors and governments. Depending on the magnitude and the complexity of the devastation, the health system should be developed to function effectively across a long timeline. The ultimate goal should be to restore the health-care system to its pre-conflict operational capacity (The World Bank, 1998; Waters et al., 2007; Rutherford and Saleh, 2019).

### **5.3 Limitations of the Study and Implications for Future Research**

Before applying the findings of this research to future study, it is important to point out the limitations to the inferences that can be drawn from it. First, the data used in this study do not represent the total population of Ukraine because the data collected for the conflict-affected regions only include households located in the Government Controlled Areas (GCA) and excludes households located in the Non-government Controlled Areas (NGCA). Hence, the results may not accurately reflect the impact of the conflict on the consumption behaviour of the overall population. For future research, it is expected that the UHBS may need to collect data for the NGCA population to allow for generalization of the results on household consumption behaviour due to the conflict.

Second, with the UHBS, the information on the prices for nonfood consumption is not available. As a result, it is impossible to conduct a complete household demand analysis with the data. More information is expected to be included in the data to allow for a more comprehensive analysis in the future. Third, while the results of this analysis reflect household's economic situation when the conflict is still ongoing, it is unknown whether the reported household's situation will change as the war progresses or when it ends. Hence, a detailed post-conflict micro-economic analysis of individuals and households is one research direction to pursue in the future.

Finally, assessing the impact of the conflict on the microeconomic variables of surrounding countries can be a very useful research area. The findings will throw light on what we can learn about the conflict's second-round effects. In conclusion, the results of this study should not be interpreted to apply to all conflict exposed households in Ukraine. Despite these limitations, the findings of this study are thought to be valuable to policymakers. The research also adds to the methodologies for estimating household spending behaviour in times of conflict.

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