



# LUNDS UNIVERSITET

## Ripples of Conflict:

How has the Ukraine-Russia conflict affected economic growth in third party countries?

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## Abstract

This study aims to research the effect the conflict between Russia and Ukraine have had on third party countries' economic growth. Employing an econometric model with inspiration from previous research and Solow's growth model with augmentation to include human capital. The research spans the period from 1993 to 2022. The third party countries are categorized into four different groups based on economic development and geographic location, with a fifth group consisting of all countries in the study. While the conflict did not have a statistically significant impact on the average economic growth across all countries, distinct variations surfaced amongst the groups. Asian and Eurasian countries face the most substantial negative effects, while western European countries, with and without the US, experience a positive impact. Moreover, eastern European countries with low economic development endure larger negative effects from the conflict than eastern European countries with higher economic development and integration with the EU. These findings highlight varying effects and suggest that countries with lower economic development are more susceptible to negative spillover effects on economic growth. Further research is needed once the conflict between Ukraine and Russia is settled to fully understand the effects on economic growth in third party countries.

Keywords: conflict, economic growth, economic development, third party countries,

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## 1. Introduction

The presence of war between countries has been constant throughout history. One of the most recent conflicts is the ongoing war between Russia and Ukraine. Following the tumultuous years marked by the Covid-19 pandemic, the president of the Russian Federation declared war against Ukraine. Moreover, Russia and Ukraine have long had a strained relationship after the former Ukrainian president Viktor Yanukovich was overthrown. In 2014 Russian forces entered Ukrainian territory and annexed the Crimean peninsula. An incident that set the stage for a prolonged period of heightened hostility between the two nations. Subsequently, Ukraine moved politically closer to the EU and NATO. Ukraine's political move closer to EU and NATO caused Russia to relocate soldiers closer to the Ukrainian border in the guise of a military exercise. This would further increase tensions between the two nations. The heightened tension culminated in the outbreak of the war between Ukraine and Russia (Mbah & Wassum, 2022). The US, EU, and more countries implemented heavy sanctions against Russia as a response to Russia's actions (Martin, 2023). When war breaks out an inevitable consequence is the destruction of human capital and infrastructure, two amongst other critical factors for economic growth (Baum & Thesis, 2020). The economic consequences will not stay isolated to the countries directly involved in the conflict, due to spillover effects neighboring countries economies will be affected (Murdoch & Sandler, 2002a). The central research question of this study is whether the conflict between Russia and Ukraine has exclusively caused negative effects on the average economic growth in third party countries.

The economic growth in third party countries can be affected through a number of different channels. Two examples of channels which can affect the economic growth in third party countries are labor and trade. With war the assignment of labor to less-productive roles, such as soldiers, causes a negative effect on the economy. Furthermore, with war there will be an increase of refugees. The effect refugees have on economic growth will depend on the quality of the human capital. Conflict between countries will cause disruptions in trade flows which will have a negative effect on economic growth in third party countries. However, the disruption can cause a switch in trade partners that can have a positive effect on the economic growth (De Groot, 2010).

The aim of this study is to research the effects the Ukraine-Russia conflict has had on third party nations. The study will cover 29 nations<sup>1</sup> which are either among Ukraine and Russias largest trading partners in 2022 (Statista, 2023a, 2023b) or a country bordering either of the two nations. Furthermore, the countries will be divided in four different groups based on their economic development and geographic location. The time frame of the study is between 1993 to 2022. The null hypothesis is that the conflict between Ukraine and Russia has only led to an negative effect on the average economic growth in third party countries. If the regression analysis shows uniformly negative effects on the average economic growth in the groups, the null hypothesis can not be rejected. However, if there exists evidence of positive effects on the average economic growth due to the war when keeping other factors constant the null hypothesis will be rejected.

The countries in the study were divided into four different groups based on geographic location and economic development. The different groups were eastern European countries with low economic development, eastern European countries with higher economic development and higher integration with the EU after the fall of the Berlin wall, western European countries including the US. Due to the relatively greater distance the US has to the conflict in comparison to the other countries in the group two regressions were performed. One with the inclusion of the US and one with the exclusion of the US. Further group divisions in the study are countries in Eurasia and Asia which either border Russia or have a high amount of trade with Russia or Ukraine. The final and fifth group in the study consists of all 29 countries.

To provide context on the topic, previous research on the spillover effect from conflicts on neighboring countries will be presented. Previous research has aimed to observe the effects of civil wars in different regions over a certain time period. However, this study only aims to observe a single conflict, the conflict between Ukraine and Russia, and its consequential effects on economic growth in third party countries. With the conflict being ongoing it would be impossible to adopt the same research method previously used since no long-term effects can be observed. Another factor that hinders the adoption of the same method that was used in previous studies is that only one specific conflict is being analyzed rather than multiple ones. In later parts

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<sup>1</sup> Nations in the study: Bulgaria, Belarus, Hungary, Moldova, Czechia, Lithuania, Poland, Romania, Slovakia, Latvia, Estonia, Austria, Germany, Spain, France, United Kingdom, Italy, Netherlands, Norway, Finland, United States, China, India, Armenia, Kazakhstan, Georgia, Azerbaijan, Mongolia, Turkey

the method and the econometric model used will be presented and explained. Afterwards the findings from the econometric regression will be displayed. Lastly the results from the regression analysis will be compared with previous research to see whether the Ukraine-Russia conflict follows the same pattern regarding spillover effects on third party countries. Furthermore, the research question presented above will be answered and suggestions for future research on the topic will be discussed.

## 2. The spillover effect of conflicts

The literature on the spillover effects of conflicts on economic growth in third party countries is uniform in the aspect that conflicts will have an economic effect beyond the border. However, there is a difference in opinion whether conflict has a positive or negative effect on economic growth in third party countries. The difference has been due to the focus of the studies. The first to study conflict's effect on neighboring countries was Murdoch and Sandler (2002a). The focus of their studies was mainly on the negative effects (Murdoch & Sandler, 2002a, 2002b, 2004). Later studies used a similar method as Murdoch and Sandler but made changes to allow the consideration of other effects. De Groot studied whether the effects were positive or negative (De Groot, 2010). Furthermore, Dunne & Tian researched whether political and economical differences could be used as determinants of the size of the spillover effect caused by conflicts. Rather than only considering the intensity of the conflict and the distance between countries (Dunne & Tian, 2015). This study will focus on the Ukraine - Russia conflict and how it has affected the economic growth in third party countries. The countries have been divided into four separate groups and a fifth group consisting of all the countries in the study. To analyze the effect the conflict has had on the average economic growth in the groups five regressions were conducted with OLS regressions.

### 2.1 Previous research

Previous research on the spillover effect of conflicts has predominantly used the Solow growth model (Solow, 1957), augmented for the inclusion of human capital (Mankiw et. al. 1992) as a base for their models. The first to research the topic were Murdoch and Sandler (2002a, 2002b, 2004). The model was changed to better fit the research with the inclusion of a conflict variable and a distance matrix. Murdoch and Sandler focused mainly on the negative spillover effects on neighboring countries from civil conflict. In two of their studies Murdoch and Sandler included countries from across the globe and their third paper focused on regional differences between Asia, Africa, and Latin America. Furthermore, in the studies Murdoch and Sandler analyzed both short and long-term spillover effects of conflicts on neighboring countries. They analyzed both short and long-term effects by dividing the sample into five 5 year periods and ran separate

regressions for each 5 year period and one with all periods included. In their research Murdoch and Sandler focused mainly on the negative spillover effects of civil conflicts on neighboring countries (Murdoch & Sandler, 2002a, 2002b, 2004). The findings of their research showed evidence of negative short-term effects but that the long-term effects were rather modest. Which supports the notion that the economic impact of civil wars is primarily confined to the short-term (Murdoch & Sandler, 2002a). In further research Murdoch and Sandler found evidence of regional differences in the effect civil wars had on neighboring countries. The study found that countries in Africa have a higher resilience and capacity for growth after a civil war than countries in Asia and Latin America. Furthermore, common for the three regions were that neighboring countries experienced a stronger negative effect than the country where the civil war occurred (Murdoch & Sandler, 2002b) In their final paper Murdoch and Sandler found evidence that the timing, duration, and intensity of the civil war affects the spillover effect on neighboring countries (Murdoch & Sandler, 2004).

Following Murdoch and Sandler further research regarding the spillover effect of conflicts on neighboring countries was conducted by De Groot (2010) with a focus on conflicts in Africa. Similarly to Murdoch and Sandler, De Groot used the Solow growth model as a base for his econometric model. De Groot used different specifications in his model which yielded different results from previous studies. In his study De Groot found that conflicts can have a positive effect on third party countries. However, whether the effects are positive or negative depends on the distance between the country and the conflict. Direct neighbors, bordering countries, experienced a negative effect on economic growth as a consequence of the conflict. Countries that were non-contiguous with the conflicting nation may experience a positive spillover effect, with the effect being larger for countries closer to the conflict, but not bordering. Furthermore, De Groot found that the more violent the conflict was the more reliable the results were (De Groot, 2010).

Moreover, De Groot presented four different channels through which conflict can affect economic growth in third party countries. The different channels were capital, labor, conflict spillover, and trade. The first channel through which conflict can affect third party countries is capital, primarily through the destruction of the capital stock. Even if the negative effect of the



destruction of capital stock mainly affects the conflicting countries it can spread to bordering countries. Further ways conflict can affect economic growth in third party countries through capital is the signal conflict gives to potential investors. Countries in the close proximity of the conflict might suffer from investors' risk aversion. There are few industries that benefit from war and if investors perceive that the conflict can spillover into bordering countries the amount of foreign direct investments might decrease. This would negatively affect the closest countries economic growth. The second channel is through labor. When a conflict breaks out, countries in close proximity might assign more labor to less productive positions, for instance increasing soldiers guarding the border. Furthermore, civilians escaping the conflict will seek refuge in surrounding countries. The closest countries will see the most people seeking refuge. The effect refugees have on economic growth depends on the quality of their labor. Highly skilled refugees will likely have a positive effect on economic growth while low skilled refugees will likely have a negative effect. Furthermore, highly skilled refugees are more likely to seek refuge in countries further away. This indicates that neighboring countries are more likely to suffer negative effects while non-contingent countries are more likely to benefit from refugees. The third channel is the potential spillover of the conflict. The fear that a conflict might spread into other countries is something that bordering countries naturally suffer more from. Generally non-contingent countries are unlikely to experience any effects from the potential spillover of the conflict. The final channel in which conflict can affect third party countries is through trade. The break out of a conflict will disrupt trade. Countries bordering the conflicting nations are more likely to suffer negative consequences due to relatively more trade than non-contingent countries. Moreover, non-contingent countries can experience positive effects on economic growth due to the trade disruption. The trade disruption would give the non-contingent countries an opportunity to change trading partners and the new partners might be more effective in their production (De Groot, 2010).

The research performed by Dunne and Tian (2015), similarly to De Groot, focused on Africa. The aim of their research was to determine whether political and economical differences affected the size of the spillover effect caused by conflicts. The findings of their research showed that by including political and economical differences the estimates of the negative spillover effects decreased. These results suggest that by only considering geographical proximity the effects of

conflict on third party countries economic growth might be overestimated. Regarding Dunne and Tian's findings on conflict spillover effect on neighboring countries their results showed consistency with earlier research. With immediate neighbors experiencing negative effects on economic growth due to conflicts. However, Dunne and Tian did not find any evidence that conflicts have a statistically significant effect on non-contingent countries (Dunne & Tian, 2015). This differs from the results in De Groot's (2010) research.

Previous research on conflict spillover effects on third party countries have found evidence of both positive and negative effects. The negative effects seem to be predominantly prominent in countries bordering the conflicting nation. Previous studies do not have consensus regarding the non-contingent countries. De Groot found that non-contingent countries are affected positively by the spillover effect from conflicts and the closer to the conflict the greater the positive effects are, granted that the country does not border the conflict (De Groot, 2010). Further research from Dunne and Tian indicated that conflict spillover effects had no statistically significant effect on non-contingent countries (Dunne & Tian, 2015).

The null hypothesis states that the conflict between Ukraine and Russia have had exclusively negative effects on the average economic growth in third party countries. Since the countries are divided in different groups it is enough that one group indicates non-negative effects to reject the null hypothesis. With consideration of previous research it can be predicted that the conflict between Ukraine and Russia will have an effect on economic growth in third party countries. The consensus of previous research is that bordering countries will experience a negative effect. It can be expected that the groups containing bordering countries will be affected negatively by the conflict. Regarding how conflicts will affect economic growth in non-contingent countries there is a divided opinion. The only group that consists of exclusively non-contingent countries is the group with western European countries including the US. Furthermore, the EU and the US implemented sanctions against Russia in 2014 during the annexation of the Crimean peninsula (Martin, 2023). The sanctions caused the EU's GDP per capita to decrease by an estimated -0.3% in 2014 and -0.4% in 2015 (Szczepanski, 2015). The EU and the US implemented new sanctions in 2022 (Martin, 2023). The new sanctions caused oil and energy prices on the worldmarket to increase. Furthermore, Ukraine is one of the largest exporters of cereal to the EU.

The destruction of Ukrainian production facilities has caused an increase in the price of agricultural goods (Mbah & Wassum, 2022). The observable data indicates that the average economic growth in western Europe and the US would be negatively affected by the conflict. However, De Groot concluded in his research that the economic growth in non-contingent countries is positively affected by conflicts (De Groot, 2010). With the findings from De Groot's research it is plausible to expect that the western European group including the US will be positively affected. If one group indicates non-negative effects on the average economic growth from the conflict between Ukraine and Russia it would be sufficient evidence to reject the null hypothesis.

### 3. Empirical Analysis

To test how the Ukraine-Russia conflict has affected third party countries' economic growth an econometric study was conducted. The study consists of data from 29 countries over the period between 1993 to 2022. The countries were selected from Ukraine and Russia's largest trading partners (Statista, 2023a, 2023b) and the countries bordering those two nations. The study will research how the number of fatalities in the conflict in relation to the distance between the country and the conflict have affected economic growth (GDP per capita growth [annual %]) in third party countries. Due to no country-specific variation in the main explanatory variable, fatalities, time series regressions were conducted instead of fixed effects panel data regressions. Therefore the country-specific effects were omitted in the analysis. However, to still capture regional differences the countries were divided into four groups based on geographical location and economic development. A fifth group, consisting of all selected countries, was included to analyze the effects on an aggregate level. The groups were created by taking the mean of every variable for each year. The use of mean values to divide the groups was to account for missing values in the data for some countries and to simplify the regional comparison of the effect the conflict has had on the average economic growth.

#### 3.1 Method

The econometric model used is a further development of the model used in previous research. The base model used in previous research was the Solow growth model (Solow, 1957) with augmentation for human capital (Mankiw et. al. 1992). The model had to be adjusted in order to fit the research question. Since the conflict between Ukraine and Russia is still ongoing it is not possible to analyze the long-term effects on third party countries. Furthermore, some variables had to be changed due to lack of available data. In the regression model (equation [1]) GDP per capita growth measured in annual percentage was used as the dependent variable. The main explanatory variable was the number of fatalities in the conflict. However, to incorporate distance in the model the explanatory variable used in the regression was fatalities per km. The model uses five control variables to isolate and measure the effect of the main explanatory variable by accounting for other factors that can affect GDP per capita growth. The control variables used were gross fixed capital formation, expected years in school, exchange rate

towards USD, inflation rate, and an index of Economic Freedom. The control variables were selected with inspiration from Solow's growth model (Solow, 1957) with augmentation for human capital (Mankiw et. al. 1992) and in accordance with previous research. The Solow growth model uses investments and education level as control variables. Due to lack of data availability the variables had to be changed to gross fixed capital formation and expected years in school. In Dunne and Tian's study it was established that economical and political differences impact the spillover effect of conflicts (Dunne & Tian, 2015). Therefore, an index of economic freedom was used. The data for the economic freedom index was gathered from the Heritage foundation (Heritage Foundation, 2023). The use of Inflation and exchange rate towards USD as control variables was motivated by previous research. The previous research established the existence of a relationship between inflation (Gylfasson & Herbertsson, 2001) and exchange rates (Olofsson, 2019) with economic growth through regression analysis. The model used is depicted in Equation 1.

$$Gr_{i,t} = \beta_{i,1} + \beta_{i,2}F_{i,t} + \beta_{i,3}GCF_{i,t} + \beta_{i,4}ER_{i,t} + \beta_{i,5}I_{i,t} + \beta_{i,6}EF_{i,t} + \beta_{i,7}YrS_{i,t} + \varepsilon_{i,t} \quad (1)$$

In equation 1 the variables are depicted by different characters. Gr denotes the dependent variable GDP per capita growth. The letter F depicts the main explanatory variable fatalities per km. Furthermore, GCF, ER, I, EF, YrS depicts the variables gross fixed capital formation, exchange rate towards the USD, inflation, economic freedom index, and expected years in school. For further clarification, Table 4.1 showcases which characters in the model represent which variable. The error terms are represented by epsilon and the subscript t represents different time periods between 1993-2022 with t=1 representing values from 1993. The subscript i represents the different groups with i = 1, ..., 5. Furthermore there are no lagged variables in the model since the conflict is ongoing and only short-term effects can be analyzed. Long-term effects will only be possible to analyze after the conflict settles and some time has passed. With the exclusion of lagged variables the model prioritizes capturing short-term effects.

**Table 3.1: Description of character in the model**

Variable	Character in the model
GDP per capita growth (annual %)	Gr
Fatalities per Km	F
Gross fixed capital formation	GCF
Exchange rate	ER
Inflation	I
Economic freedom index	EF
Expected years in school	YrS

The aim of the regression is to get estimations of the effect that the Ukraine-Russia war has had on the average economic growth in third party countries. The models were estimated using OLS regressions and to ensure that the econometric model used did not have any traces of heteroskedasticity and autocorrelation, two tests were performed. The tests performed were White's-test for heteroskedasticity and Bruesch-Godfreys test for autocorrelation. Moreover, in case of any evidence indicating either of the two, robust standard errors were used in the regression. To ensure that the model was not overfitted a limited number of control variables was used.

### 3.2 Data and Descriptive Statistics

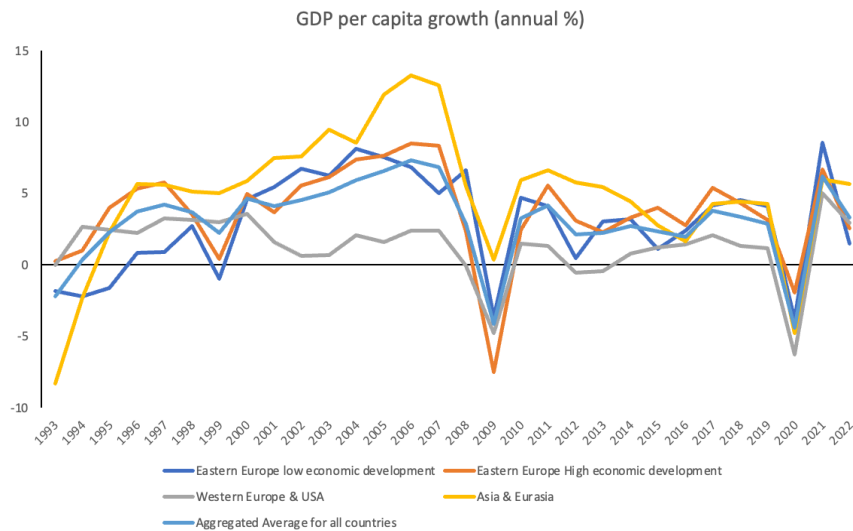
The data was compiled from a set of 29 countries covering the period from 1993 to 2022. The countries were selected based on the amount of trade with Russia or Ukraine, along with the nations bordering either of these two countries. Table 3.2 provides an overview of the countries selected along with their respective groups.

**Table 3.2: Countries in the study and which group they belong to**

Eastern Europe low economic development	Eastern Europe higher economic development and integration	Western Europe with USA	Asian and Eurasian countries bordering Russia or a significant trade partner
Bulgaria	Czechia	Austria	China
Belarus	Lithuania	Germany	India
Hungary	Poland	Spain	Armenia
Moldova	Romania	France	Kazakhstan
	Slovakia	United Kingdom	Georgia
	Latvia	Italy	Azerbaijan
	Estonia	Netherlands	Mongolia
		Norway	Turkey
		Finland	
		United States	

The data for the dependent variable, GDP per capita growth, was collected from the World Bank database (World Bank, 2023a). Moreover, since the dependent variable is GDP per capita growth, i.e. changes in GDP per capita, the control variables have to be measured in annual change. This was solved by transforming the data for the variables into annual percentage change. Due to most eastern european countries being part of the Soviet Union until after the cold war (Sierp, 2015) the data availability in those countries is limited to after 1995. Since at least 30 observations are needed for the central limit theorem to be applicable to the regression estimates linear extrapolation was used. The countries where linear extrapolation was used were Lithuania, Latvia, Estonia, Moldova, and Belarus due to no data regarding GDP per capita growth being available prior to 1995. In Graph 3.1 the development of the average GDP per capita growth for the different groups in the period of 1993-2022 can be observed.

**Graph 3.1: GDP per capita growth (annual %) between 1993-2022**



The independent variable, fatalities per km, was created through dividing the number of fatalities with the distance between the east Ukrainian city Kharkiv and the respective countries' capital. The distances were measured with the use of Google Earth (Alphabet Inc., 2023) and the data for the number of fatalities was gathered from the Uppsala university UCDP conflict database (Shawn, Petterson & Öberg, 2023). The UCDP conflict dataset provides three different estimations for the number of fatalities, best, low, and high, for this paper the best estimation was used. The number of fatalities in a war acts as an indicator of the intensity level of a war (UCDP, 2023). Graph 3.2 showcases a time series graph over the development of the best estimation of annual number of fatalities in the conflict between Ukraine and Russia.



**Graph 3.2: The number of estimated fatalities in the conflict between Ukraine and Russia**



Prior to the start of the conflict there were no fatalities. Following the start of the conflict there were two major incidents, the annexation of the Crimean peninsula in 2014 and the Russian invasion in 2022. The incidents can be observed in Graph 4.2 with the increase in fatalities in 2014 and the larger increase in 2022. Given that a significant portion of the fatalities in the conflict occurred in 2022, the regressions predominantly focus on that particular year. In 2014 the countries in eastern Europe, Asia, and Eurasia experienced a decline in their average GDP per capita growth. The decline for Asian and Eurasian countries started prior to 2014 and the decline for the eastern European countries happened contemporary with the increase of fatalities in the conflict between Ukraine and Russia in 2014. The western European countries and the US had an increase in the average GDP per capita growth in 2014 and on an aggregate level, all countries had a slight decline. Common for all the groups in the study is the decline of GDP per capita growth after 2021. However, the size of the decline differs slightly between the groups. The eastern European countries had the largest declines in average GDP per capita growth. Though the western European countries including the US had a decline in the average GDP per capita growth in 2021 it was smaller than the decline for the eastern European countries. Moreover, the decrease in average GDP per capita growth for all the countries in the study was relatively small in 2021.

The control variables were selected to cover different factors that can affect the GDP per capita growth in accordance with previous research. The exchange rate towards the international dollar and inflation rate was selected to cover external and internal economic factors. The index of economic freedom was selected to cover political and other economical factors. Expected years in school and gross capital formation were selected to cover human capital respectively investments. Since the dependent variable is measured in percentual change a necessary transformation was to change them to percentual change as well. Similar to the dependent variable a few countries did not have data available dating further back than 1995. Therefore, the mean value was used when creating the groups to cover the missing data points.

The data for the control variables were gathered from different sources. The data for inflation rate, exchange rate towards USD, and gross fixed capital formation was sourced from the World Bank database (World Bank, 2023b, 2023c, 2023d). Furthermore, to fill out some of the missing data points in gross fixed capital formation data from FRED was used (FRED, 2023). Expected years in school were gathered from the UNs human development reports (UNDP, 2023). In Tables 3.1, 3.2, 3.3, 3.4, and 3.5 the descriptive statistics for the control variables can be observed.

**Table 3.1: Descriptive statistics for eastern European countries with low economic development**

	Gross fixed capital formation	Expected Years in School	Inflation Rate	Exchange rate	Economic Freedom Index
Mean	9.7	0.2	-80.8	25.0	56.1
Standard Deviation	17.4	0.2	560.0	50.9	6.2
Min	-22.5	-0.1	-90.7	-7.1	43.4
Max	35.8	0.1	179.9	241.2	65.2

**Table 3.2: Descriptive statistics for eastern European countries with higher economic development and integration with EU**

	Gross fixed capital formation	Expected Years in School	Inflation Rate	Exchange rate	Economic Freedom Index
Mean	9.3	0.2	-4.9	7.4	65.1
Standard Deviation	14.6	0.2	176.8	14.6	5.4
Min	-34.4	-0.1	-509.2	-13.8	53.3
Max	40.7	1.1	480.5	47.8	71.5

**Table 3.3: Descriptive statistics for western European countries including the US**

	Gross fixed capital formation	Expected Years in School	Inflation Rate	Exchange rate	Economic Freedom Index
Mean	3.6	0.1	9.7	-0.8	70.0
Standard Deviation	8.6	0.1	61.8	12.5	1.9
Min	-15.6	-0.1	-104.4	-55.2	66.2
Max	19.4	0.6	190.9	17.4	73.3

**Table 3.4: Descriptive statistics for Asian and Eurasian countries**

	Gross fixed capital formation	Expected Years in School	Inflation Rate	Exchange rate	Economic Freedom Index
Mean	21.8	0.2	14.9	31.5	57.3
Standard Deviation	31.6	0.1	69.1	123.2	7.2
Min	-21.7	-0.2	-117.1	-6.4	40.4
Max	142.5	0.5	194.6	671.0	66.8

**Table 3.5: Descriptive Statistics for all the selected countries**

	Gross fixed capital formation	Expected Years in School	Inflation Rate	Exchange rate	Economic Freedom Index
Mean	10.6	0.1	13.2	11.5	63.9
Standard Deviation	12.4	0.1	68.8	33.2	4.4
Min	-376.2	0.0	-391.6	-8.0	53.7
Max	33.8	0.7	196.3	173.8	69.7

### 3.3 Results

Table 4.6 depicts the estimated effect fatalities per km has on the average economic growth for the five groups. The second, Table 4.7, shows the results of the estimated effects of the conflict between Ukraine and Russia on the average economic growth in the western European countries with and without the US. When the groups are analyzed independently, a statistical significant relationship emerges between GDP per capita growth and fatalities per km at varying significance levels. The eastern European groups show that fatalities per km has a statistically significant effect on GDP per capita growth with a significance level of 10%. The countries in western Europe and the US show a statistical significant effect with a significance level of 1%. The estimated effect for Asian and Eurasian countries holds a statistical significance at the 1% level. Conversely, aggregated level regression, encompassing all selected countries, does not indicate any statistically significant effect. Of the groups that show statistically significant effects western Europe, with and without the US, differentiate from the other groups by estimating a positive relation between GDP per capita growth and fatalities per km.

When analyzing the estimated effects we need to establish whether they are economically significant or not. Since the regressions were conducted on mean values for each year, the analysis is limited to the average impact fatalities per km has on economic growth for each group. For instance, the results suggest that, while keeping all other variables constant, a one unit increase in fatalities per km corresponds to a decrease of 0.1288 percentage units in the average GDP per capita growth in eastern European countries with low economic development. With this

in consideration the results from the regressions can be deemed economically significant. Since fatalities per km was created by dividing the number of conflict related fatalities by the distance between the respective country's capital and the city Kharkiv, the only way to alter the variable is through changes in fatalities since distances are constant.

**Table 3.6: Result from regressions with explanatory variable Fatalities/Km**

Dependent Variable: GDP per capita growth (annual %)	Eastern Europe low economic development	Eastern Europe higher economic development and integration	Western Europe with USA	Asian and Eurasian countries bordering Russia or a significant trade partner	Aggregate level for all countries in the study
1. Fatalities per Km	-0.1288* (0.066)	-0.0783* (0.058)	0.1207*** (0.001)	-0.1728*** (0.007)	0.0344 (0.618)
2. Economy Freedom Index	0.2795** (0.032)	0.2901** (0.016)	-0.6825** (0.011)	-0.6183 (0.548)	-0.1456 (0.301)
3. Gross fixed capital formation	0.1053*** (0.002)	0.2182*** (0.000)	0.1630** (0.011)	-0.0045*** (0.004)	0.0168*** (0.004)
4. Expected years in School	6.6114* (0.079)	3.1650 (0.202)	-1.146 (0.359)	19.4175*** (0.004)	4.3725 (0.419)
5. Exchange rate	-0.0092 (0.134)	0.0694* (0.075)	0.0287 (0.424)	-0.0043 (0.206)	-0.0310*** (0.002)
6. Inflation rate	-0.0004 (0.147)	-0.005 (0.713)	0.0*** (0.007)	0.0001 (0.301)	0.0 (0.750)
Number of observations	30	30	30	30	30
$R^2$	0.5642	0.7154	0.4855	0.6236	0.3299
White-test	F=29.93 P=0.3309	F=25.73 P=0.5337	F=25.88 P=0.2570	F=29.78 P=0.3241	F=28.30 P=0.2941
Breusch-Godfrey test	F=0.396 P=0.5293	F=0.061 P=0.8053	F=1.450 P=0.2285	F=0.2150 P=0.6432	F=0.036 P=0.8487

(\*\*\*): Significance level of 1%; (\*\*): Significance level of 5%; (\*) Significance level of 10%

In Table 3.6 it can be observed that the conflict between Ukraine and Russia has a larger negative effect on the average economic growth in eastern European countries with low economic development than in eastern European countries with higher economic development and higher integration with the EU. The results indicate that countries with lower economic development

will be more sustainable to negative spillover effects. The group that had the largest negative effect from the conflict on the group's average economic growth was the Asian and Eurasian countries. This further solidifies the suggestion that the economic development of a country is a determinant of how susceptible a country is to negative spillover effects from conflicts. With the Asian and Eurasian countries having on average the greatest distance from the conflict but are on average being affected the most negatively. Furthermore, the only group that indicates a positive statistically significant value is the western European countries including the US. Despite the relatively greater distance the US has to the conflict compared to the western European countries in the group the estimated coefficient remains positive even with the exclusion of the US. With the removal of the US from the group the estimated coefficient for fatalities per km does only slightly decrease and the significance level of 1% remains. The results in Table 4.7 indicate that the inclusion of the USA in the group does not distort the results.

**Table 3.7: Comparison with group 3 included USA and excluded**

Dependent Variable: GDP per capita growth (annual %)	Western Europe including the US	Western Europe excluding the US
1. Fatalities per Km	0.1207*** (0.001)	0.1168*** (0.001)
2. Economy Freedom Index	-0.6825** (0.011)	-0.6131** (0.025)
3. Gross fixed capital formation	0.1630** (0.011)	0.1495** (0.016)
4. Expected years in School	-1.146 (0.359)	-0.7999 (0.472)
5. Exchange rate	0.0287 (0.424)	0.0266 (0.419)
6. Inflation rate	0.0*** (0.007)	0.0** (0.015)
Number of observations	30	30
$R^2$	0.4855	0.4620
White-test	F=25.88 P=0.2570	F=25.14 P=0.2410
Breusch-Godfrey test	F=1.450 P=0.2285	F=1.393 P=0.2379

(\*\*\*): Significance level of 1%; (\*\*): Significance level of 5%; (\*) Significance level of 10%

An important note when analyzing the result from the regressions is that no country specific effects can be identified. Since time series regressions were conducted instead of fixed effects panel data regressions due to there being no country-specific variation in the main explanatory variable. Furthermore, the results only depict the average effect the Ukraine-Russia war has had on the average economic growth in the different groups, emphasizing general trends rather than country-specific effects.

## 4. Discussion

The regression results, estimating the effect fatalities per km has on the average economic growth across the five groups supports the rejection of the null hypothesis. A statistically significant positive effect was observed for western Europe, with and without the US. Despite the negative estimated effects for eastern European and Asia-Eurasia groups, the rejection of the null hypothesis requires merely one group to indicate non-negative effects. The regressions results align with the anticipated outcomes. Groups consisting of countries bordering Ukraine or Russia experienced a negative effect from the conflict. Conversely, the group with only non-contingent countries, western Europe and the US, experienced positive effects. The results are not consistent with the studies performed by Murdoch and Sandler (2002a, 2002b, 2004). However, the focus of these studies were on the negative effects on the spillover effects from conflicts on neighboring countries. Though the results do not match with Murdoch and Sandler's results they do align with the results De Groot (2010) found in his study. De Groot used a slightly different model in his study, compared to Murdoch and Sandler, which allowed for positive spillover effects to be recognized.

Conflicts can affect economic growth in third party countries through multiple channels. One channel through which conflicts can affect economic growth in third party countries is the disruption of trade. When trade is disrupted due to conflicts, countries in the close proximity of the nations directly involved are more likely to suffer negative consequences. Countries that are further away are more likely to find new trade partners and the rerouting of trade can have a positive effect on economic growth (De Groot, 2010). The rerouting of trade can explain why the eastern European countries suffer negative spillover effects on economic growth while western European countries are positively affected. Further channels through which conflicts can affect economic growth in third party countries are immigration and fear of conflict spillover. When a conflict breaks out the refugees that possess high quality labor are more likely to seek refuge further away from the conflict. While refugees possessing low quality labor are more likely to seek refuge in bordering countries (De Groot, 2010). Therefore, another explanatory reason for the results in the study could be that Ukrainians fleeing the country with high quality labor are



moving to western European countries. This would positively affect the economic growth in western Europe. While the Ukrainians possessing low quality labor are seeking refuge in eastern Europe which have a negative impact on economic growth. Furthermore, the fear of a possible spillover of the conflict are more likely to affect countries in the close proximity of the conflict. Nations that fear that the conflict will spread to their territory are more likely to increase labor placement in non-productive sectors, for instance soldiers guarding the border. (De Groot, 2010). Since Russia is the instigator of the war in Ukraine, countries that share a border with Russia probably have a greater fear of possible invasions in the future than countries further away. Moreover, since most of the countries sharing a border with Russia are in eastern Europe, Eurasia and Asia the relatively greater fear of future invasions would affect these countries more than the non-contingent countries in western Europe and the US. The fact that the western European countries and the US are non-contingent is another possible explanation for the results. This aligns with results from previous research where secondary neighbors had less negative effects from the conflicts. Moreover, even though the conflict between Russia and Ukraine has caused disruptions in the global production chains. Especially in agricultural products, oil and energy the western European countries' close relation to other large producers such as the US could allow them to shift their import demand. Furthermore, the outbreak of the full scale war between the two countries has allowed the western countries to export weapons to Ukraine.

The results from the regressions on the two groups that contained countries from eastern Europe suggests that countries with a lower economic development are more susceptible to negative spillover effects. The group consisting of eastern European countries with low economic development faced larger negative effects than the other eastern European group. The results are further supported by the estimated effect the conflict has had on the average economic growth of countries in Asia and Eurasia, which experienced the largest negative effect. The finding that economic development is a determinant in countries susceptibility of negative spillover effects from conflicts further supports the findings from Dunna and Tian's research. Which established that more than distance is a determinant of how third party countries will be affected by the spillover effect from conflicts (Dunne & Tian, 2015).

The rejection of the null hypothesis enables the conclusion that, thus far, has the conflict between Ukraine and Russia not solely caused negative effects on the average economic growth in third party countries. However, with the conflict being ongoing it is not possible to evaluate the full and long-term effects on economic growth. To understand the full-scale effect of the conflict, future research could replicate a similar study on the conflict once it has finished and some years have passed. Investigating the long term effects of the Ukraine-Russia conflict on the economic growth in third party countries remains an issue for future researchers to address.

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