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The Spillover Effects of Intrastate Conflict on FDI Flows in Countries Neighbouring the Conflict

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Abstract: The purpose of this study is to investigate the spillover effect of intrastate wars on neighbouring nations net FDI inflows by categorising battle deaths into different thresholds and regressing FDI on those thresholds. The research design is based on a two-way fixed effects model with country and time fixed effects. The sample period is from 1970-2019 and the sample consists of all countries in the World. We aim to fill the gap in the literature between FDI and conflict spillovers, by providing insight into their intersection. We find that battle deaths in neighbouring countries, on average, have positive and significant effects on FDI inflows for a given country.

Keywords: Intrastate Conflict, Foreign Direct Investment (FDI), Spillovers

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1 Introduction

With the literature on business in developing and emerging economies vastly increasing in width over the last decade, it is surprising that so little has been done to address the relationships between conflict and foreign investment (Meyer & Peng, 2016). Foreign direct investments, or FDI as it's more commonly known, are an important determinant of economic development. This especially holds true for the global south where the transfer of tech plays a major part in if the country is going to escape poverty (Harrison, 1994, Javorcik et al., 2017). FDI is, for instance, linked to the creation of high-value clusters in an economy (Birkinshaw, 2016). Foreign capital flows then often lead to beneficial externalities through these clusters. Application of intellectual property, new job opportunities and facilitated access to global export & import markets are just a few of the benefits. However, FDI is sensitive to the perceived risk of the target market for investment. Conflict is one of the highest perceived risk factors, whether it be domestic conflict or international. Furthermore, as the world becomes more globalised countries become more interdependent meaning that civil war (and the torrent of negative side effects it brings) in one nation can lead to instability in that nation's neighbours because of how tightly wound economies are.

The links between civil war and FDI have been explored previously, and have been found to be strongly negative. FDI providers tend to decrease their investment or abandon a nation experiencing intrastate conflict immediately after the outbreak of said conflict. This holds true for the secondary and tertiary sectors, which is in line with what would be expected given the relative immobility of capital in the primary sector (Li et al., 2017). Indeed, conflict in one state leading to a reduction in capital inflows is intuitive and backed by

empirical evidence. War, including civil war, increases the risk that investment returns won't be realised because of the uncertainty related to the loss of productive assets, which of course has a negative impact on revenue flows. What hasn't been previously studied however is the impact of civil war on the inflows of foreign capital to its neighbours. There are arguments and indications that FDI could move both ways in countries neighbouring a nation experiencing intrastate conflict. In particular, investors may view conflict from a regional perspective when calculating the perceived risk of investment. This would mean that they not only withdraw from the nation experiencing the intrastate conflict but also from its neighbours, motivating their decision that instability is regional and that their investments may not produce sufficiently certain returns because of said instability. Alternatively, neighbouring countries may benefit from the conflict as investors interested in remaining within the region shift their capital flows from the nation experiencing intrastate conflict to its neighbours, thus boosting their FDI through transfers that would otherwise have gone to the nation experiencing conflict. This paper thus attempts to address the question:

> *What effect does intrastate war have on FDI inflows in countries neighbouring the conflict-afflicted nation?*

We attempt to answer this question by assembling a dataset containing conflict deaths, FDI inflows, and a set of fundamental economic control variables between the years 1970-2019. We do this by matching the economic variables with the battle deaths in neighbouring countries. This data covers the entire world and looks at observations on the country-year level. We run a TWFE

model (a generalised difference-in-difference model) with clustered standard errors to evaluate the effects of conflict on the FDI of neighbouring countries while controlling for other relevant variables. The intent is to isolate the effect of adjacent battle deaths on the FDI of a given country by limiting omitted variable bias and controlling for unobserved heterogeneity, while giving us a broad understanding of their relationship. We also take a closer look at each continent to see if there are differences in different parts of the world. Our results show that for certain levels of conflict, there is a significant and positive relationship between battle deaths and FDI. We also see that there are differences between continents, with Asia and Oceania having the most significant results.

Our findings in this paper relate to two major strands of economic literature, which are those whose intersection we hope to contribute to. We look at the determinants of FDI flows and link them to conflict deaths, and we look at the effects of conflict on economic growth, which is closely linked to FDI. We provide insight into the numerical relationships between casualties and economic effects. Secondly, we provide contributions to the growing literature of conflict economics by providing statistics for how future intrastate conflicts could shape neighbouring countries' economies.

2 Theoretical Background

The literature in the field of both conflict and FDI is extensive. We begin by presenting the study that is most similar to ours and move on to research related to the UCDP dataset and FDI in general.

2.1 Dodging bullets: The Heterogeneous Effect of Political Violence on Greenfield FDI

Of much note to our study is a paper by Witte et al. (2017). This is to date the most similar paper to ours that we can find. In their study, the authors delve into whether political conflict deaths (as defined in the UCDP) have an effect on greenfield FDI[1]. This study is relevant to ours as they have very similar variables on both the X and Y side. They regress FDI on conflict deaths, as well as some company-specific variables such as ROE and number of employees (related to greenfield FDI). They find that a nationwide conflict has a significant effect on greenfield FDI whilst smaller, localised conflicts do not significantly affect FDI, which is consistent with their hypothesis.

2.2 Military Interventions in Civil Wars: Protecting Foreign Direct Investments and the Defence Industry

On the topic of FDI, the majority of research that we've read has FDI as the independent variable. The usage of FDI has frequently been to predict military interventions in conflicts. One such article is the one by Klosek (2020). This study is a recent addition to the literature about specifically civil wars and military intervention. In their study, the author attempts to define through a RE-logit model how the protection of existing FDI as well as the protection of prior arms trade increases the likelihood of a state intervening militarily in a civil war. In this case, both FDI and the relevant UCDP data are on the X side. The results corroborate the hypothesis that existing foreign direct investments and established defence ties increase the probability of engaging in a military intervention, robust to many controls.

[1] Greenfield FDI is a specific type of subsidiary-based FDI where new establishments are created, rather than M&A

2.3 The Impact of Civil War on Foreign Direct Investment Flows to Developing Countries

One study of note that looks at the impact of civil wars on FDI inflows is Li et al. (2017). This study uses an unbalanced panel for 128 developing countries in order to investigate the effect of an intrastate conflict on the different sectors of FDI inflows within the said nation. They use a dummy variable for if a nation is experiencing conflict and a disaggregated dataset for FDI which contains FDI separated into primary, secondary and tertiary sectors. What they find is that there is no significant effect of a civil war on the primary sector (in line with what would be expected, given the immobility of primary sector capital), whilst the secondary and tertiary sectors decrease significantly.

3 Data and Descriptive Statistics

This section presents the data used to compile our final dataset in our study and relevant information about it, followed by some descriptive statistics of our variables of interest.

3.1 Data

The data used in this study comes from the Uppsala Conflict Data Program (henceforth referred to as UCDP) and from The World Bank DataBank (henceforth referred to only as "world bank"). Furthermore, two dataset containing information about which countries neighbour each other, and country-continent pairs are also used to facilitate the regressions.

Our conflict data comes from UCDP, specifically six datasets. Three of them detail the onsets of different times of intrastate conflict and three of them detail death, conflict location, and conflict participants. The macroeconomic

data comes from the World Bank. There are separate datasets for each variable of interest and for approximately every country. We take all the data from 1970 to 2019.

3.1.1 UCDP

The UCDP is a longitudinal database which covers all nations in the world from 1946 and onwards and contains data about conflict deaths, when & where they occurred, and which parties were involved. The data is highly extensive and provides relevant information and definitions for the topics discussed in our thesis. According to the UCDP itself;

> *The Uppsala Conflict Data Program (UCDP) is the world's main provider of data on organi[s]ed violence and the oldest ongoing data collection project for civil war, with a history of almost 40 years. Its definition of armed conflict has become the global standard of how conflicts are systematically defined and studied.*

UCDP also operates and continuously updates its online database (UCDP Conflict Encyclopedia) on armed conflicts and organised violence, in which information on several aspects of armed conflict such as conflict dynamics and conflict resolution is available. This interactive database offers a web-based system for visualising, handling and downloading data, including ready-made datasets on organised violence and peacemaking. This was used to get an understanding of which regions were of particular note when constructing our study

Data on armed conflicts have been published yearly in the Journal of Peace Research since 1993, in the Human Security Reports since 2005, in the SIPRI Yearbook since 1988, and in the report series States in Armed Conflict (1987-

2012).

UCDP themselves have been collecting data since 1989, and the data before that was collected by the Peace Research Institute Oslo (PRIO). UCDP compiles their data yearly and has their own data on all nations in the world from 1989-2021. PRIO compiles their data periodically and has data and best estimates on all nations in the world from 1946-2008. UCDP has combined those two datasets into one, which they present as the definitive conflict death dataset on their website. UCDP is the most comprehensive dataset about conflicts to date, they validate across multiple sources. There will be some instrument errors due to the nature of what is being measured and we use their best estimates in this study.

3.1.2 World Bank DataBank

From the World Bank DataBank we have used a series of datasets from the "World Development Indicators" which contains as the name would suggest a vast set of macroeconomic data. The data that we use in our thesis more specifically is that of FDI, GDP, Inflation, and Resource Rent on a per-country, per-year basis. We have used the data from 1970 onwards, as that is the point from which there exists data on FDI. This leaves us with 266 entities observed over 50 years, the time period 1970-2020. All data is compiled annually.

The datasets are concatenated in the World Development Indicators but they have different sources. The values contained therein are also slightly different, with the number of missing observations differing slightly and for that reason, we are going to treat them as we would four separate datasets.

3.1.2.1 FDI

The first is called Foreign Direct Investment, Net Inflows (Balance of Pay-

ments, Current US$). According to the World Bank;

> *Data on equity flows are based on balance of payments data reported by the International Monetary Fund (IMF). Foreign direct investment (FDI) data are supplemented by the World Bank staff estimates using data from the United Nations Conference on Trade and Development (UNCTAD) and official national sources.*

3.1.2.2 GDP

The second is GDP per capita (Current US$). This data is compiled from the World Bank national accounts data and OECD National Accounts data files.

3.1.2.3 Inflation

The third is Inflation, consumer prices (annual percent). This data is compiled from the IMF and others.

3.1.2.4 Resource Rent

The last is Total natural resources rents (percent of GDP). This data is an estimate made by the world bank and is thus the "weakest" dataset that we use. According to the World Bank;

> *The estimates of natural resources rents are calculated as the difference between the price of a commodity and the average cost of producing it. This is done by estimating the price of units of specific commodities and subtracting estimates of average unit costs of*

extraction or harvesting costs. These unit rents are then multiplied by the physical quantities countries extract or harvest to determine the rents for each commodity as a share of gross domestic product (GDP).

Even though the resource rents dataset is quite imprecise in relation to the other variables that we use, it is still commonly used because it is considered to be sufficient for econometric studies at an aggregate level. We thus find no problem in using it as a control variable for our regression

3.1.3 Geographical Data

This section presents the datasets with geographical data we used to make our regressions possible.

3.1.3.1 Neighbouring Countries

We used a dataset compiled on GitHub that contains information on which countries border each other in order to be able to match countries with their neighbours (Country-borders, 2022).

3.1.3.2 Continental Delineation

We used a dataset from Kaggle that contains country-continent pairs in order to be able to separate our main regression into continent-specific regressions (Gokhale, 2017).

3.2 Descriptive Statistics

This section presents all variables that have been used to conduct our regression.

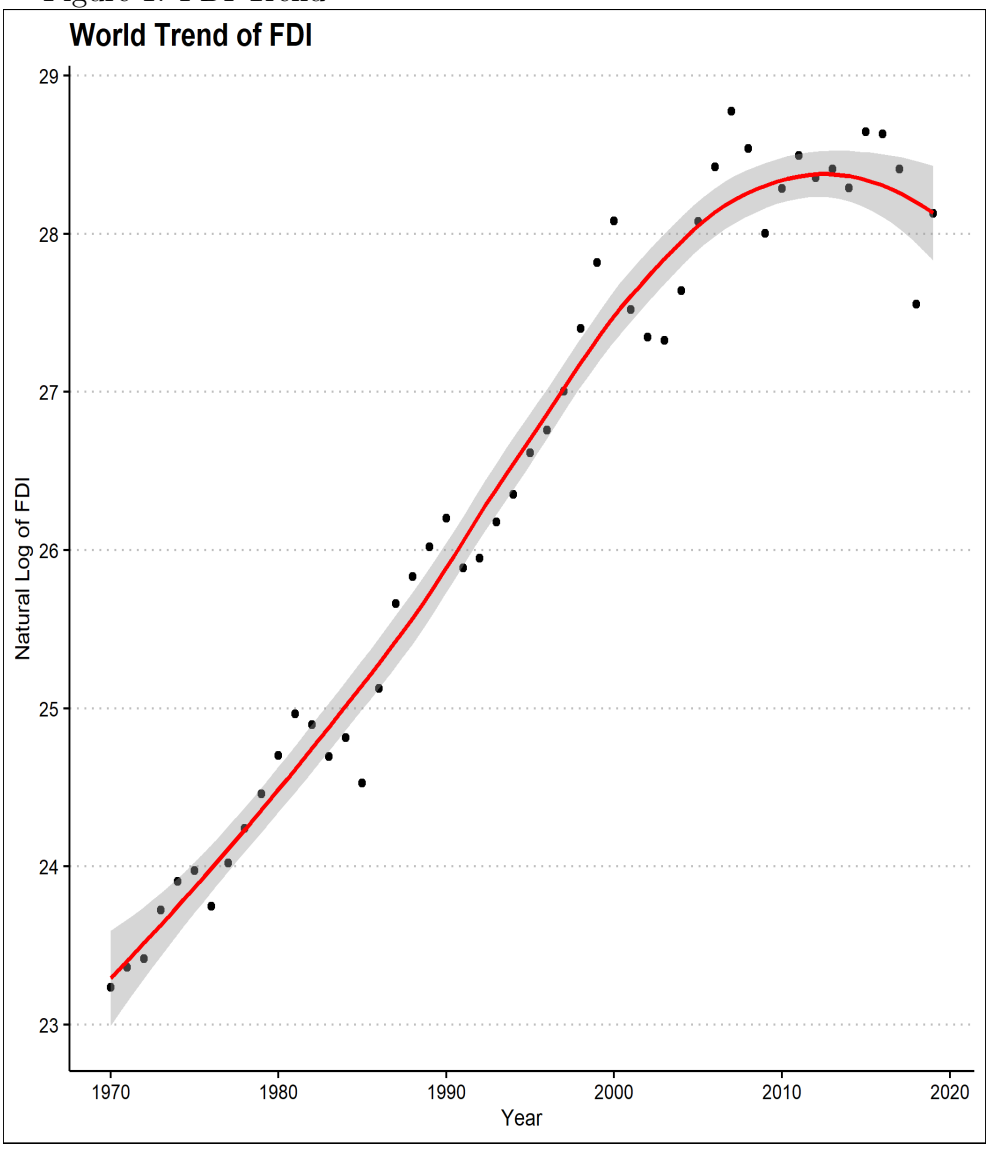
Table 1: Main Variables		
Variable	Data Source	Description
FDI	World Bank Databank	Foreign Direct Investment.
log_FDI	World Bank Databank	Foreign Direct Investment expressed as a natural logarithm.
GDP/capita	World Bank Databank	Gross Domestic Product per Capita.
log_GDP/capita	World Bank Databank	Gross Domestic Product per Capita expressed as a natural logarithm.
Resource Rent	World Bank Databank	Natural resource rent expressed as a percentage of GDP.
Inflation	World Bank Databank	Consumer inflation expressed as a percentage.
Battle Deaths	UCDP Database	The number of deaths in a conflict in a given year where one of the primary participants is the government.
Non-war battle deaths (Q0)	UCDP Database	A dummy variable for if there are between 1 and 999 battle deaths in a country in a given year, beneath the threshold for war.
Quartile 1 war battle deaths (Q1)	UCDP Database	A dummy variable for the first quartile of war level battle deaths (1000-1448 Battle Deaths).
Quartile 2 war battle deaths (Q2)	UCDP Database	A dummy variable for the second quartile of war level battle deaths (1448-2326 Battle Deaths).
Quartile 3 war battle deaths (Q3)	UCDP Database	A dummy variable for the third quartile of war level battle deaths (2326-4724 Battle Deaths).
Quartile 4 war battle deaths (Q4)	UCDP Database	A dummy variable for the fourth quartile of war level battle deaths (4724-81594 Battle Deaths).
Experiencing Conflict	UCDP Database	A dummy variable for if a country is experiencing conflict (has non-war battle deaths).
Experiencing War	UCDP Database	A dummy variable for if a country is experiencing war in a given year.

3.2.1 Dependent Variable

Our outcome variable (dependent variable) of interest is Foreign Direct Investment (FDI). Foreign Direct Investment is a measure of equity flows, and taking the World Bank definition, is "the sum of equity capital, reinvestment of earnings, and other capital" (World Bank, 2022). More specifically, we are looking at the net inflows of foreign direct investments in a given country in a given year.

FDI has, since the start of our dataset in 1970, seen a strong positive increase. As seen in the graph below, there is a decrease in overall FDI in the 2010s. There are many non-constant determinants of FDI, such as transport costs, size of the host market, agglomeration effects, factor cost, investment climate, trade barriers, and more (Lim, 2001). However, those determinants are beyond the scope of our research question, so the exact causes of the decrease in the 2010s are not investigated in this paper.

Figure 1: FDI Trend



This is a scatterplot of the natural log of global FDI inflows for each year in 1970-2019 in our sample. Data is from the World Bank.

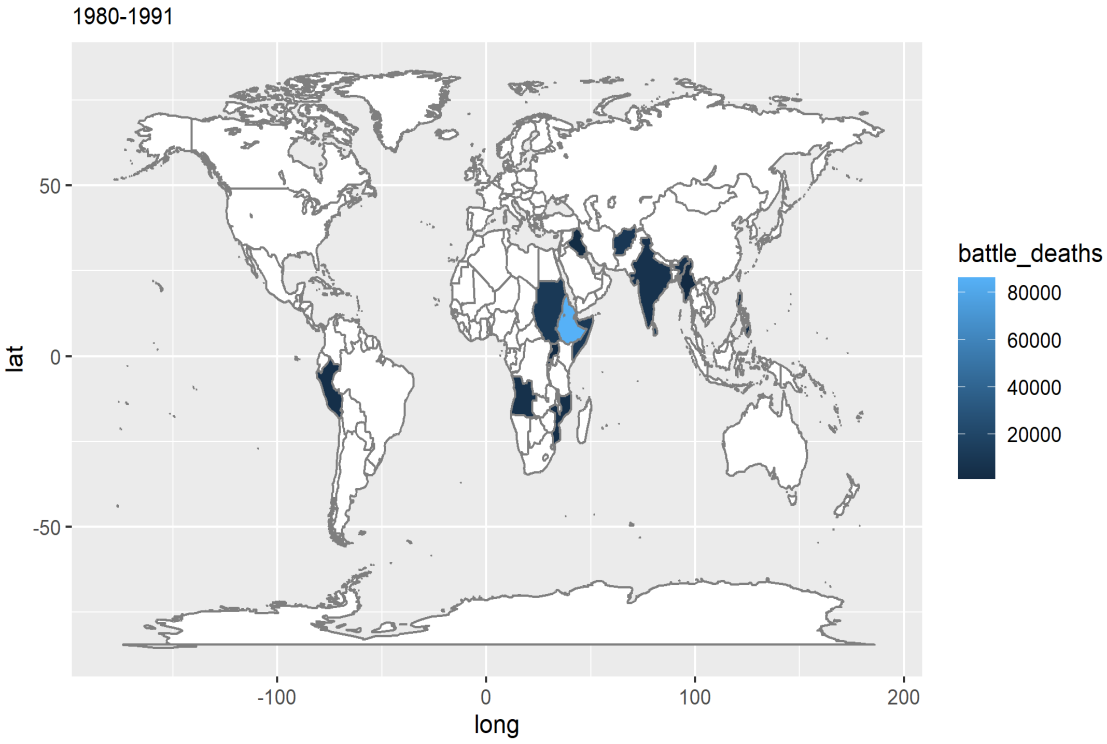
3.2.2 Independent Variables

All of our exogenous variables are derived from battle deaths. Battle deaths are measured by the best estimate of conflict deaths in a given year where one participant is the government in a given country in a given year; they

do not represent the sum total of battle deaths for a conflict over its entire duration. For the purposes of our analysis, looking at the effects on neighbours, this would be the sum of battle deaths of nations surrounding the country of interest. We define Neighbouring non-war Conflict (Q0) as a dummy variable for battle deaths in the surrounding conflicts that do not meet the threshold for the UCDP's definition of war.[2] Subsequently, Q0 takes on the value of 1 for bordering battle deaths between and including 1 to 999 in a given year. Q1-Q4 are our main exogenous variables of interest and are quartiles for battle deaths that meet the threshold for war. Q1 is for battle deaths greater than or equal to 1,000 and less than or equal to 1,448. Q2 is for battle deaths greater than 1,448 and less than or equal to 2,326. Q3 is for battle deaths greater than 2,326 and less than or equal to 4,724. Q4 is for battle deaths greater than 4,724 and less than or equal to 81,594. This allows us to identify if different levels of conflict, which could be looked at as a metric of conflict intensity, have significant impacts on the FDI of countries neighbouring the conflict. We can see where conflict deaths occur on a coarse decade level in the figures below. There seems to be some consistency in where the deaths occur, with the Global South experiencing most of the conflict deaths.

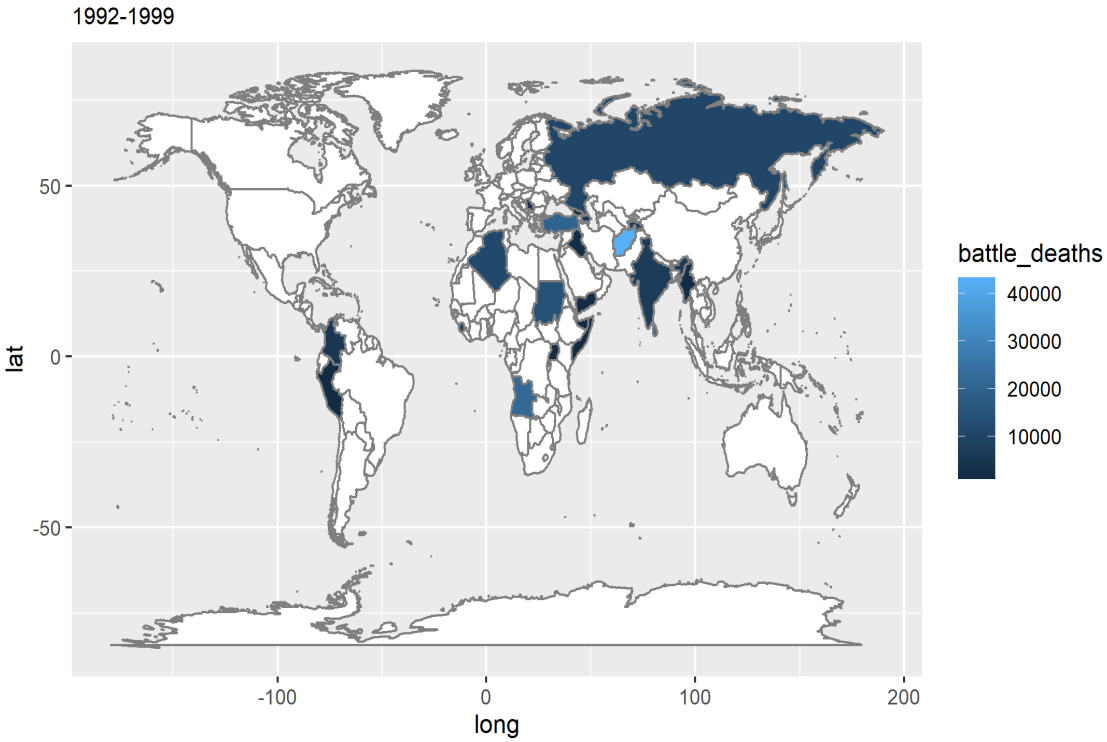
[2] <1000 battle deaths in a given year.

Figure 2: Battle Deaths 1980-1991



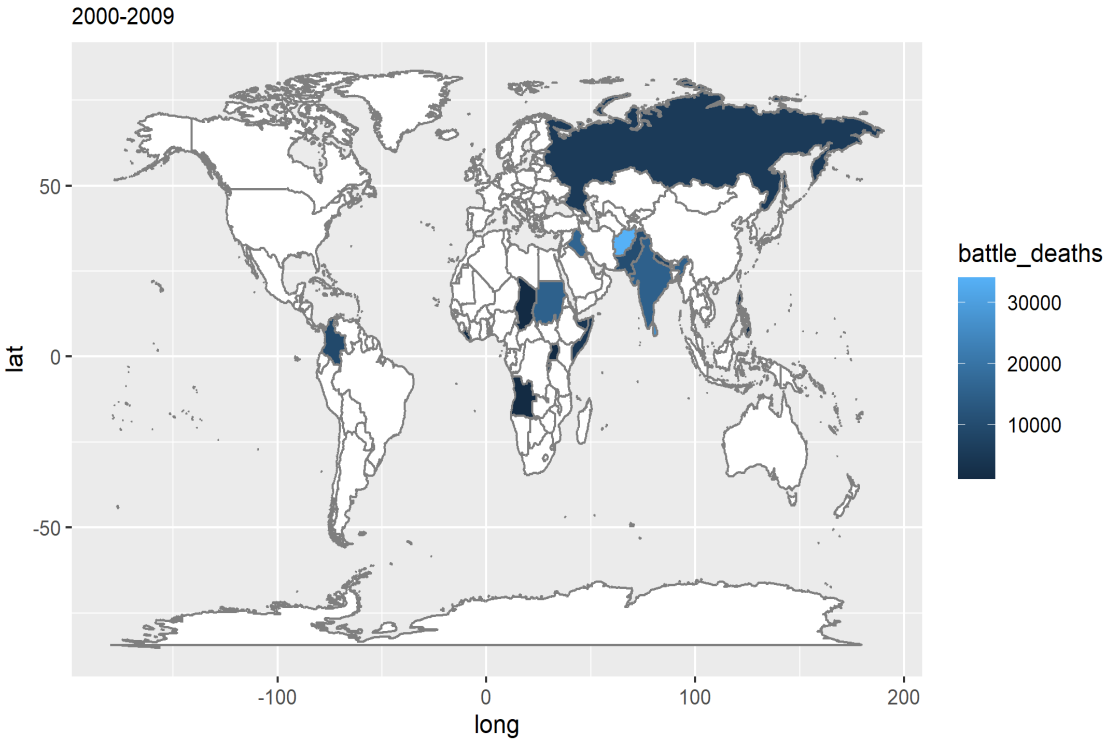
This map displays the aggregate battle deaths for the time period 1980-1991. Data is from the UCDP.

Figure 3: Battle Deaths 1992-1999



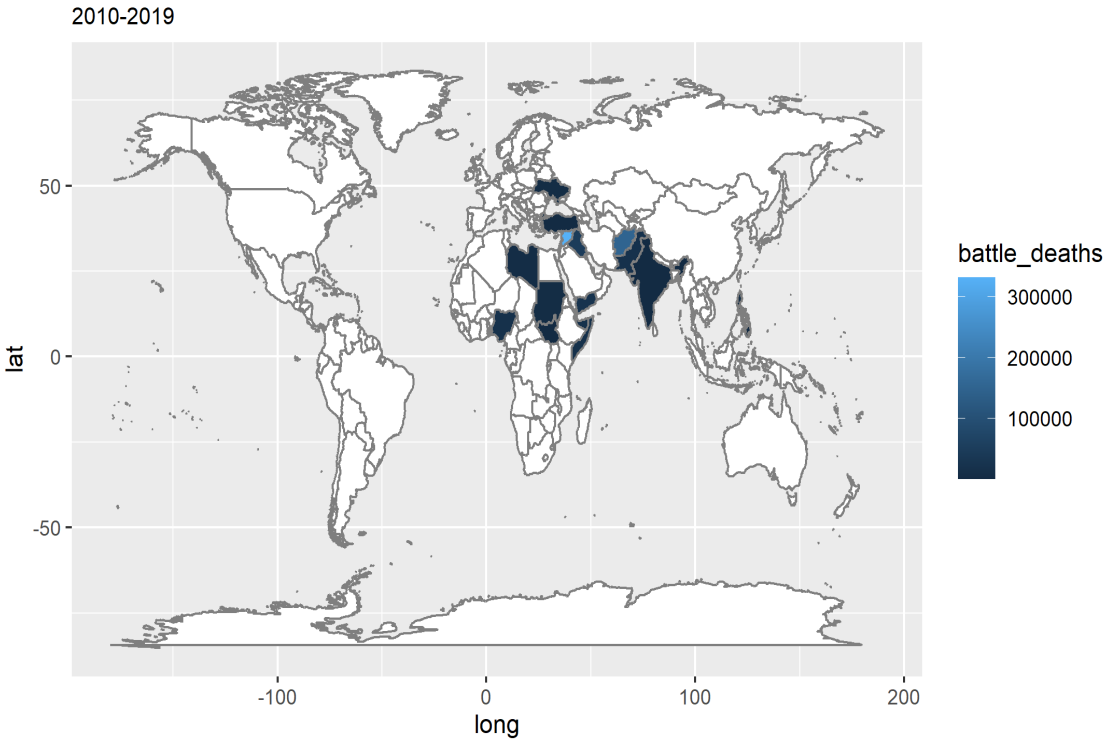
This map displays the aggregate battle deaths for the time period 1992-1999. Data is from the UCDP.

Figure 4: Battle Deaths 2000-2009



This map displays the aggregate battle deaths for the time period 2000-2009. Data is from the UCDP.

Figure 5: Battle Deaths 2010-2019



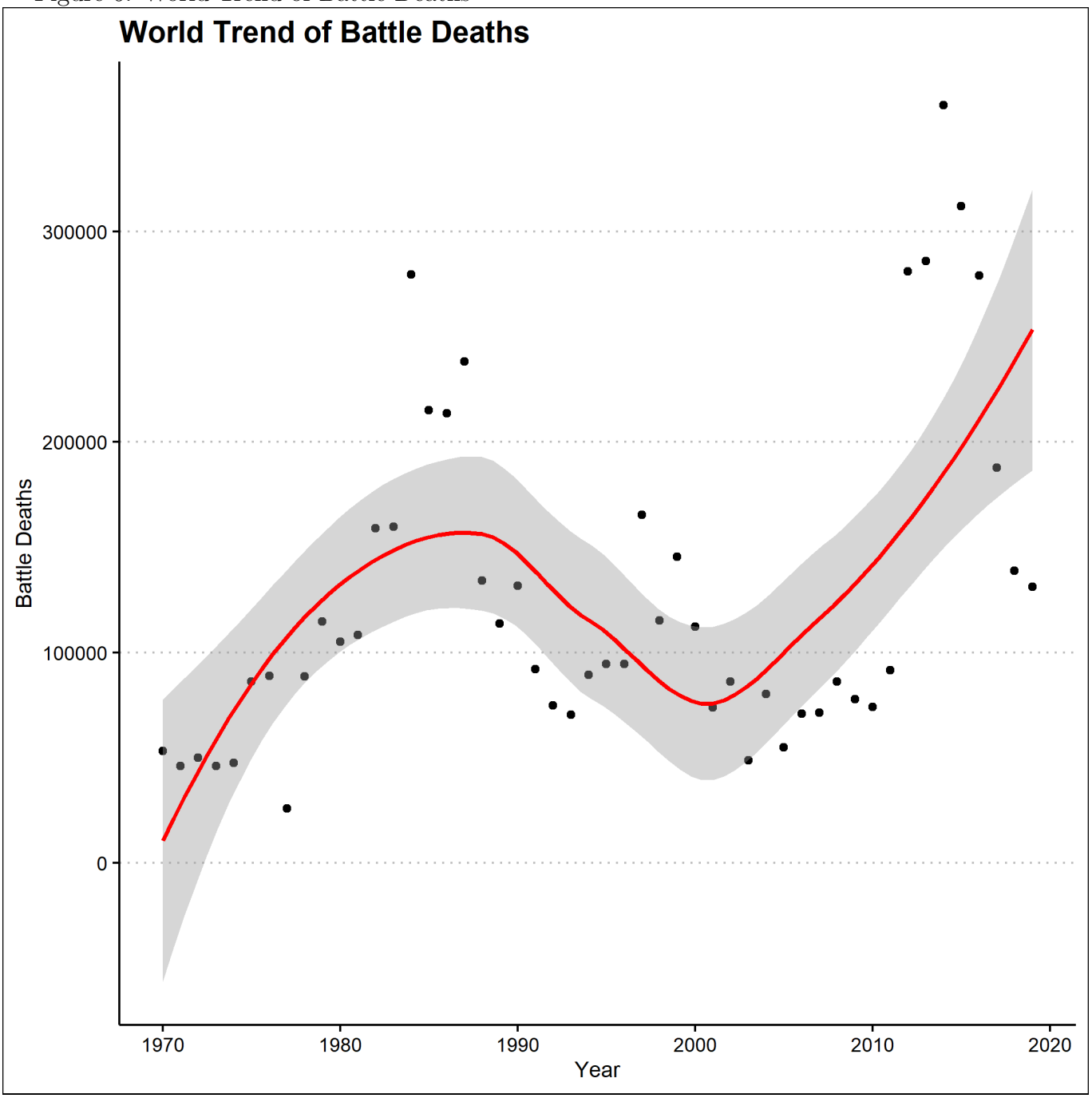
This map displays the aggregate battle deaths for the time period 2010-2019. Data is from the UCDP.

Looking at trends in battle deaths across the world in figure 6, we see a roughly cubic trend, with a local maximum in 2014 of 359,919 deaths, and an upward trend toward the end of the timeframe. In figure 7, over the entire time frame, Pakistan neighbours by far the most number of battle deaths (788,711 total battle deaths), with the next closest country China neighbouring 440,911 battle deaths over the same time period. For readability figure 7 cuts off the lowest 2 quartiles of total battle deaths. Table 2 below gives a good summary of the different quartiles of battle deaths (Q0 does not represent a quartile of battle deaths, it represents battle deaths that fall beneath the threshold for war).

Table 2: Battle Death Quartile Statistics				
Group	Country-Year Observations	Min BD	Mean BD	Max BD
Q0	1497	2	266	998
Q1	271	1000	1186	1448
Q2	265	1450	1773	2326
Q3	272	2330	3248	4700
Q4	260	4748	16456	81594

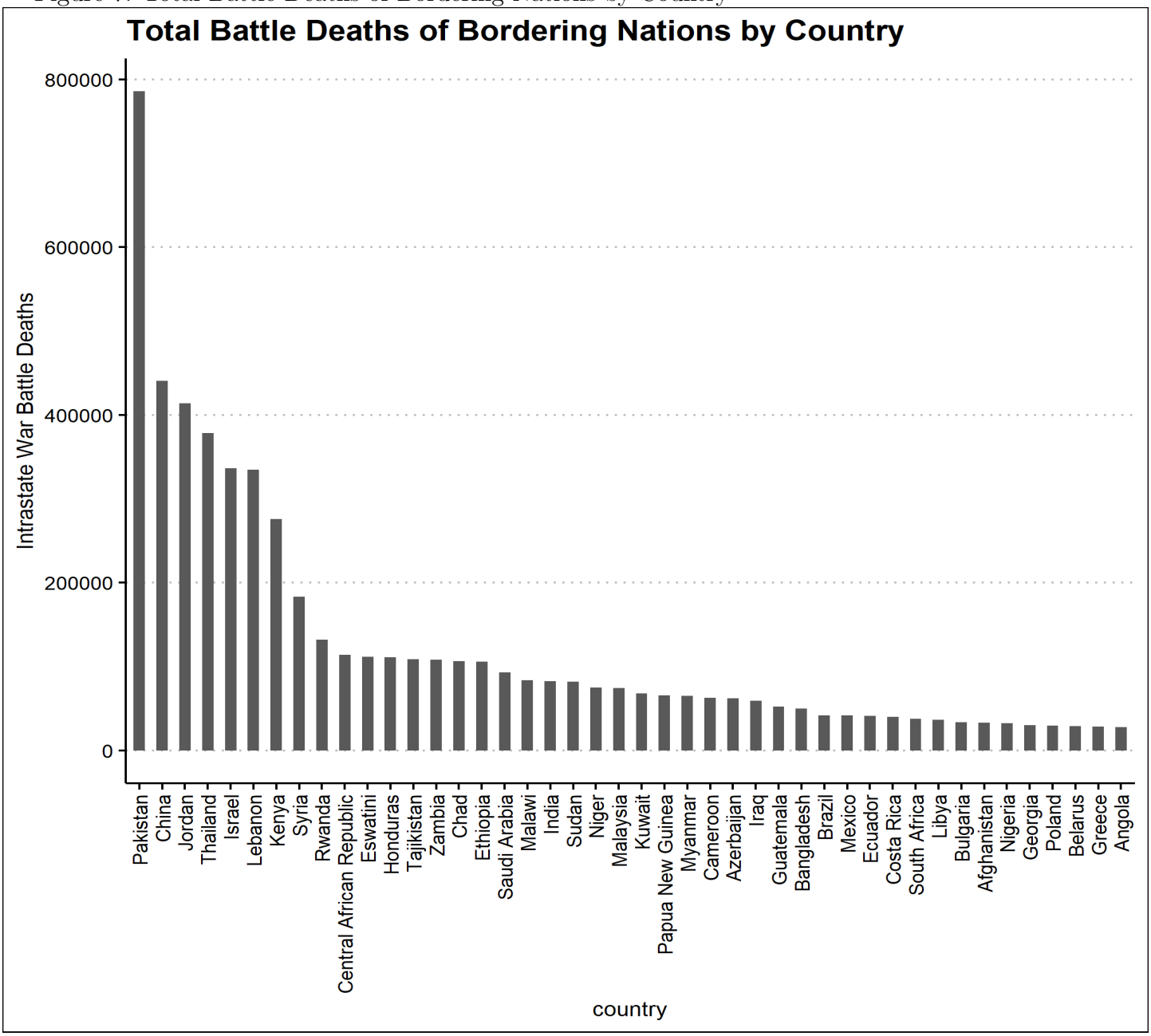
This table outlines a summary of useful statistics for each battle death dummy variable included in the main regression. This includes statistics for battle deaths beneath the threshold to be considered war as defined by the UCDP (battle deaths between and including 1-999). Q1-Q4 represent the quartiles of battle deaths that meet the threshold for war. Data is from the UCDP.

Figure 6: World Trend of Battle Deaths



This is a scatterplot of the total number of battle deaths that occur each year in 1970-2019 in our sample. There is a maximum in 2014, predominantly caused by the Syrian civil war, Iraqi civil war, and the war in Afghanistan. Data is from the UCDP.

Figure 7: Total Battle Deaths of Bordering Nations by Country



This is a bar plot that shows the countries in the top 2 quartiles of the cumulative war deaths that a given country bordered during 1970-2019. Data is from the UCDP.

3.2.3 Control Variables

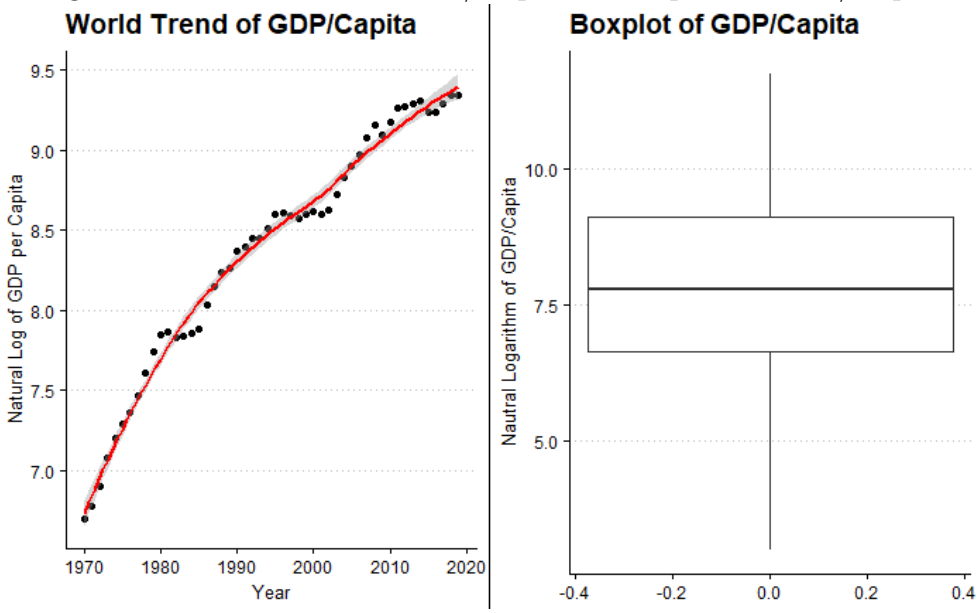
One of our control variables is gross domestic product per capita (GDP/Capita). Gross domestic product as defined by the World Bank as "GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products". It is calculated without making deductions for the depreciation of fabricated assets or for the depletion and degradation of natural resources. We take the data as a per capita measurement, meaning the value of GDP is divided by the country's population in the same year as the GDP measurement. It is also taken in terms of 2021 dollar values. Specifically, we take the natural logarithm of GDP/Capita in our regression. Another control variable we use is consumer inflation. Since we take this data from the World Bank, the relevant definition for inflation is:

> *"Inflation, as measured by the consumer price index, reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspeyres formula is generally used".*

The last control variable we use from the World Bank is resource rent as a percentage of GDP. The World Bank defines this variable as the "Total natural resources rents are the sum of oil rents, natural gas rents, coal rents (hard and soft), mineral rents, and forest rents." For our regression, this is represented as a percentage of GDP.

Looking first at the GDP per capita measure in figure 8, we see a consistent, but concave, upward trend over the time period of our analysis. Reassuringly, we see that there are no outliers with this control variable.

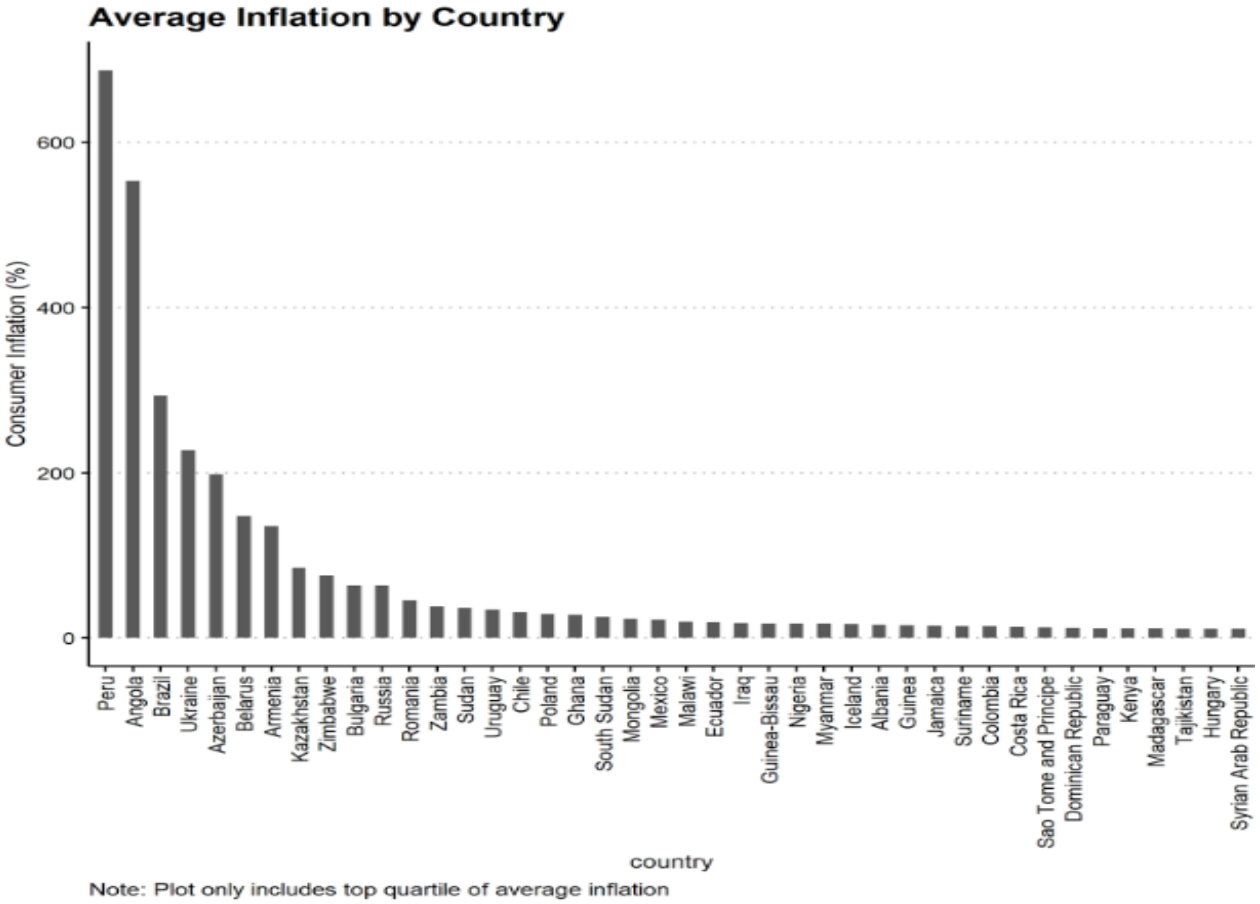
Figure 8: World Trend of GDP/Capita & Boxplot of GDP/Capita



The graph on the left is a scatterplot of the global level of the natural log of GDP/Capita over the time period 1970-2019. The graph on the right shows the distribution of the natural log of GDP/Capita for all country-year observation over the time period 1970-2019. Data is from the World Bank.

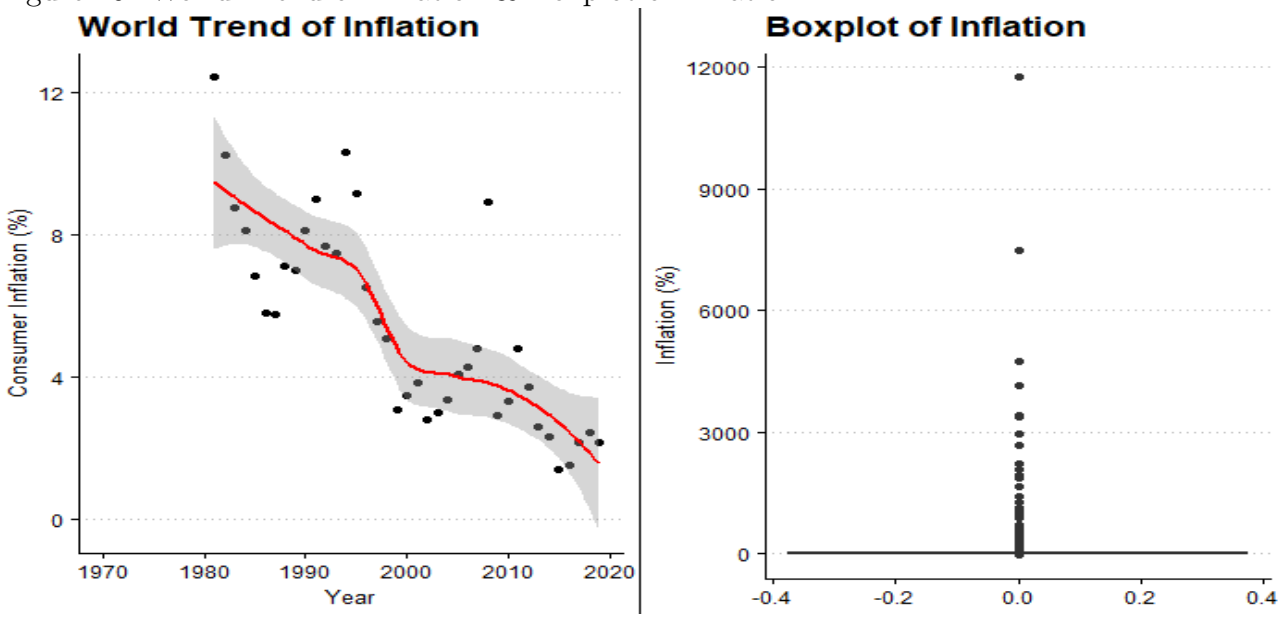
Next, looking at inflation in figures 9 10, we see a consistent downward trend in the timeframe of our analysis. It is worth noting that while the global trend has few extreme values, when looking at inflation at a more granular level, including inflation for all countries in all years where data is available, we see an overwhelming amount of outliers on the upper end of the range. Graphing the average inflation for each country demonstrates that the outliers are concentrated among a few countries, notably Peru (687%), Angola (553%), Brazil (294%), Ukraine (227%), Azerbaijan (198%), Belarus (148%), and Armenia (136%) have average inflation in the 3 digits.

Figure 9: Average Inflation by Country



This is a bar plot of the countries in the top quartile of average inflation experienced in the time period 1970-2019. Data is from the World Bank.

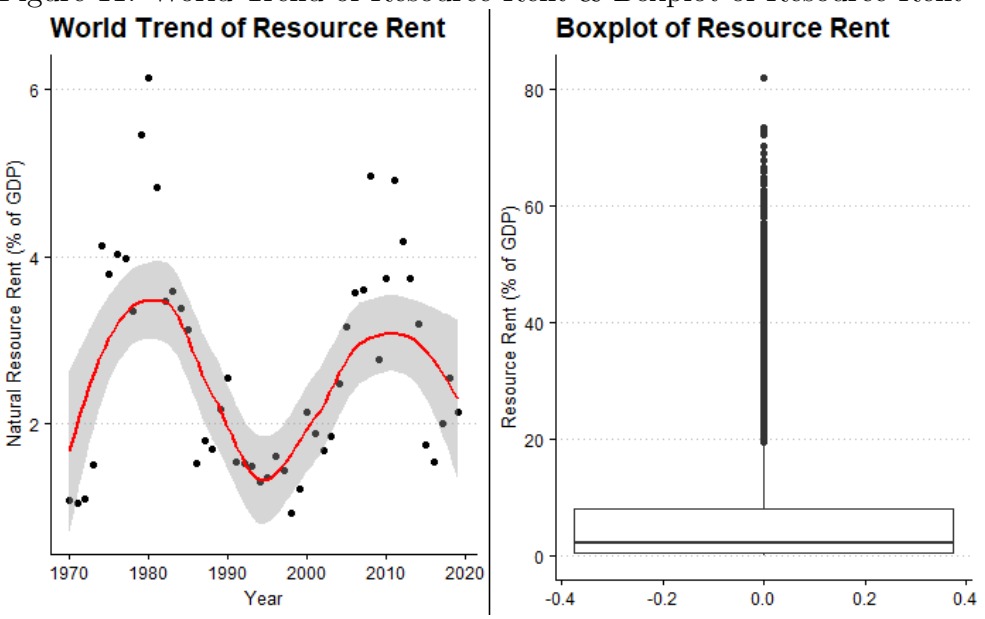
Figure 10: World Trend of Inflation & Boxplot of Inflation



The graph on the left is a scatterplot of the global average consumer inflation each year over the time period 1970-2019. The graph on the right shows the distribution of consumer inflation for all country-year observation over the time period 1970-2019. There are a significant number of outliers on the upper end of the distribution. Data is from the World Bank.

Examining resource rent, there is an interesting trend with an approximate form of a quartic function. Similar to consumer inflation, we also see a significant number of outliers on the upper end of the range for the variable.

Figure 11: World Trend of Resource Rent & Boxplot of Resource Rent



The graph on the left is a scatterplot of the global average resource rent (expressed as a percentage of GDP) each year over the time period 1970-2019. The graph on the right shows the distribution of resource rent for all country-year observation over the time period 1970-2019. There are a significant number of outliers on the upper end of the distribution. Data is from the World Bank.

Our final control variables are dummy variables labelled "conflict" and "war". These variables control for the countries experiencing a conflict in a given year (battle deaths less than or equal to 999 in a given year for conflicts, exceeding 999 battle deaths in a given year for war), with 1 being if a country is experiencing intrastate war in a given year. Below are summaries of the control variables.

Table 3: Control Variable Summary Statistics						
Variable	Observations	N/A	Mean	StD	Min	Max
Log_FDI	9486	1538	9.19	9.83	3	12.15
Log_GDP/C	9486	2518	7.95	2.86	6.91	27.32
Inflation	9486	3049	22.98	223.58	−18.11	11749.64
Resource Rent	9486	1592	6.93	11.19	0	87.58

Table 3 displays summary statistics of some of the control variables. Data is from the World Bank.

Table 4: Control Variable Summary Statistics, Cont'd			
Variable	Observations	Equal to 1	Equal to 0
Experiencing Conflict	5592	739	4853
Experiencing War	5592	242	5350

Table 4 displays summary statistics of some of the control variables. Data is from the World Bank.

4 Method

This section presents our model and how it was derived.

4.1 Theoretical Framework

The endogenous variable (left-hand-side variable) of interest is the natural logarithm of FDI. We take the natural logarithm to linearise the relationship between FDI and the right-hand-side variables. The endogenous variables on the right-hand side of our regression are resource rent (as a percent of GDP)

and consumer inflation. Inflation and resource rent have been identified as important variables for FDI models. Additionally, inflation has been used in an investigation of FDI and economic growth in Nigeria (Umeora & Chinweobo, 2013). The relationship between FDI and resource rent has also been thoroughly examined. Furthermore, natural resources have previously been used to predict FDI inflows (Asiedu & Lien, 2011). As mentioned, these two variables have a well-established background in being used to investigate FDI, which is why we include them in our study. We also have control variables for if a country is at war or experiencing conflict beneath the war threshold, which are assumed to have a reasonable level of endogeneity. A country experiencing conflict internally represents a hostile environment to FDI, so by including these two controls, we construct the omitted group to be countries not experiencing or bordering conflict, isolating the effect that neighbouring conflict has on FDI.

However, we include this to make our regression better at identifying the effects of conflict on neighbouring countries against countries that aren't bordering or experiencing conflict. We have drawn from a well-established body of research that has examined the interaction of conflict and FDI when choosing our variables. One study looked at subnational regions in China and FDI inflows from Japan through an analysis of the impact of historical conflict on FDI location and performance, which is similar to what we are trying to approximate but examines it at a national scale (Gao et al., 2018). Previous studies also looked at FDI in post-conflict countries to examine the relationship between dyadic (two-sided) conflict and bilateral FDI flows (Garriga & Phillips, 2013, Li & Vashchilko, 2010). In the context of our analysis, we account for conflict through quartiles of yearly battle deaths by creating unique dummy variables, as well as a variable for conflict data that does not meet the threshold for war. This allows us to measure the effectiveness of the scale of

the conflict, measured through the number of deaths. In doing this, we can examine if investment into nations bordering conflict responds differently to the presence of a conflict in the region or if the effect is driven by the scale of the conflict. This gives us insight into the sensitivity of FDI and a better understanding of when intrastate war has significant regional destabilisation effects. It is complicated to determine if these variables are exogenous or endogenous, as many factors contribute to the onset of a conflict.

We use a two-way fixed effect model (generalised difference-in-difference model) to estimate the coefficients of interest. Using a two-way fixed effect model is a well-established practice in economics (de Chaisemartin & D'Haultfœuille, 2022, Imai & Kim, 2020). Additionally, since there are a large number of variables that affect FDI, variables which can be unique to each country, entity-fixed effects at the country level allow us to control for time-invariant heterogeneity. The data covers a timeframe of 50 years and many variables can change significantly over that length of time. So by controlling for entity-invariant heterogeneity, we can control for these changes over time. Furthermore, we use a linear model, also common in econometric models, to make the interpretation and relationship between variables more coarse. This means that GDP/capita and FDI are taken as natural logarithms. Since there is a chance that the errors of our regression may be correlated within clusters at the county level, we take clustered standard errors at that level (Abadie et al., 2022).

4.1.1 Research Question

We are interested in answering the following questions:

> What effect does intrastate conflict have on the FDI of neighbouring countries?

Does the effect of intrastate conflict on the FDI of neighbouring countries change depending on where the conflicts take place?

We test the null hypothesis that intrastate conflict has no significant effect on the FDI of neighbouring countries. For the second question, we test the null hypothesis that intrastate conflict has no significant effect on the FDI of neighbouring countries for each continent and then compare the results.

4.1.2 Identifying the Analytical Sample

The conflict data, which includes data for the variables: Q0-Q4, experiencing conflict (conflict), and experiencing war (war), comes from the UCDP. In our analytical sample we look at Type 3 and Type 4 intrastate conflicts. As defined by the UCDP, these are intrastate conflicts where one primary actor is the government and one primary actor is a rebel group. Furthermore, Type 3 and 4 conflicts include non-internationalised intrastate conflicts (no foreign intervention, Type 3), and internationalised conflicts (foreign intervention takes place, Type 4). Since we are taking observations at a country-year level, each conflict data point does not represent the entire conflict, but relevant information about the conflict for that year (i.e. total battle deaths in that year for that conflict). For example, if we look at Afghanistan from 2001-2005, the country experienced conflict (battle deaths greater than zero) continuously, but only 2001 and 2005 had battle deaths exceeding 999 in a year. This means that for 2002-2004, while battle deaths did occur, those years are identified as conflicts, not reaching the threshold for war. Since we are looking at the effect of these conflicts on the neighbouring countries, we summed all of the conflict data that fits in the above definition for all nations bordering each country for each year.

There are also non-state intrastate conflicts in the data taken from UCDP. These conflicts are defined as, "*[...]the use of armed force between two organ-*

ised armed groups, neither of which is the government of a state[...]". Since these conflicts can spill over many borders, despite being defined as intrastate, it is difficult to assess the location where the conflicts took place. Therefore, non-state intrastate conflicts are excluded from our analytical sample. Additionally, we exclude the years 2020-2021 due to the potential effects of the coronavirus on our data. This is because these years are not generalisable, and it is best practice to exclude them from long-term econometric studies.

For the conflict data, this leaves us with 9,384 country-year observations across 184 countries. This includes 125 countries that at some point in time bordered a conflict with at least 1 battle-related death in a given year. The number of countries that internally experienced at least 1 battle-related death in the time frame 1970-2019 is 115, 53 of which experienced both war and conflict years at some point, 2 that experienced only war years at some point, and 60 that experienced just conflict years at some point.

The data on our other variables: FDI, GDP/capita, consumer inflation, and resource rent, come from several World Bank datasets. Since we are looking at data on the level of country-year, all data points are totals (i.e. for FDI) or averages (i.e. for GDP/capita) for each country in each year. We transform FDI into the natural log of FDI, and repeat the processes for GDP/capita. However, since consumer inflation and resource rent are given as percentages, no transformations are taken for that data.

The FDI data had 9,486 entity-year observations, of which 2,518 are N/As. The GDP/capita data has 9,486 entity-year observations, of which 1,538 are N/As. The consumer inflation data has 9,486 entity-year observations, of which 3,049 are N/As, predominantly toward the start of the timeframe of 1970-2019. The resource rent data has 9,486 entity-year observations, of which 1,592 are N/As. All of the World Bank data covers 266 entities. These entities include countries as well as larger regions and other methods of categorization

such as income levels. For the purposes of our analysis, we filter so that only the countries remain, leaving the World Bank data with 186 countries.

We then merged the World Bank and UCDP data. Since not all of the datasets used ISO codes, and given the inconsistent namings of countries, we had to manually change mismatched names between the datasets on several occasions. Once merged, and filtering out any country-year observations with missing data, there are 5,432 country-year observations for our final analytical sample.

4.1.3 Econometric Models

To address our first question, we have the following regression:

$$FDI_{it} = \beta_0 + \beta_1 Q0_{it} + \beta_2 Q1_{it} + \beta_3 Q2_{it} + \beta_4 Q3_{it} + \beta_5 Q4_{it} + \beta_6 Conflict_{it} + \beta_7 War_{it} + \beta_8 GDP/Capita_{it} + \beta_9 Inflation_{it} + \beta_{10} ResourceRent_{it} + \beta_{11} Country_i + \beta_{12} Year_t + \epsilon_{it}$$

4.2 Assumptions

In this section we present the assumptions required for our model to recover a causal effect.

4.2.1 Common Trends Assumption

The common trends assumption/parallel trends is an assumption for DiD and two-way fixed effects (TWFE). It assumes that prior to an exogenous event that affects our treatment group, both the treatment and control groups have the same trend for the outcome variable (in our analysis, this is the natural logarithm of FDI) and that if the treatment did not occur, the trend for the treatment group would not change. In the context of our analysis, the treatment is the presence of battle deaths in neighbouring countries. There

are other sub-assumptions, like for instance the absence of other heterogenous, uncontrollable shocks; for example, an embargo that was set to take effect even before the civil war started.

4.2.2 Linear Additive Effects

Linear additive effects is an assumption that has been found to be crucial when dealing with TWFE models. This is important when a model uses multiple regressors, as an additional predictor variable can impact the relationship between a previous regressor and the prediction. The linear additive assumption then assumes that the impact is additive, which has to hold in order for causality to be determined.

4.2.3 Functional Form Assumption

The model we've estimated is linear, however, that is simply an assumption that we've made. There could be the possibility that the relationship between intrastate conflict in one nation has a scaling effect depending on the severity of the spillovers to FDI in the neighbours. We have to look into this further, as it is by no means clear that the relationship is linear. From what we've looked at, however, no papers have as of yet made arguments for the form being anything other than linear. This, however, will be elaborated on later.

4.3 Potential Biases

4.3.1 Thresholds for Action

FDI flows may not be sensitive to conflict if the returns on an investment are sufficiently high to counteract the negative effect of the increased risk associated with conflict. This includes neighbouring nations as well as those that have conflict present. There is no clear direction that this could bias the estimate, as conflicts by their nature are heterogeneous and thus the reasoning

behind the timing of corporate and governmental decisions to move capital out of a nation into its neighbours or alternatively reduce general investment into the region is unclear. Previous research (Witte et al., 2017, Li et al., 2017) has mainly theorised, and not so much conducted research, on the possibility of companies in particular maintaining their assets within a nation during times of conflict.

We identified the following three potential sources of bias in our analysis:

1. To what extent and beneath what threshold of combat deaths do FDI providers simply move their capital *within* the nation experiencing conflict (as can be seen in Witte et al.) implying that tier of combat deaths has no spillover effect on FDI?

2. To what extent and past what threshold of combat deaths do FDI providers move their capital out of the country experiencing intrastate conflict and into the country's neighbours because of the direct danger to their financial investment implying a net positive spillover effect on FDI (what can be referred to as "the capital flight hypothesis")?

3. To what extent and past what threshold of combat deaths do FDI providers move their capital out of the *region* as a whole. Corporations may choose to do this because they view it as unprofitable to maintain "temporary" capital stocks in neighbouring countries in hopes of a swift end to the conflict and the possibility of returning to "business as usual". Furthermore, both corporations and governments may choose to do this because they view instability in one country to have the risk of spilling over into its neighbours, and as such, they may view their investments to be at risk of being directly affected negatively by staying in the region. Both of these arguments imply a net negative spillover effect on FDI.

Are we able to integrate these potential thresholds into our regressions in

order to disentangle their causal effect? The answer to that question, for now, is no. The heterogeneity between countries and conflicts means that these thresholds likely differ significantly between all observed countries in the study, and it is not what this study attempts to answer.

The research here is severely lacking and consequently, it is difficult to draw any well-informed conclusions that would allow for the control of this potential bias. This is elaborated upon further in the discussion of our results.[3]

4.3.2 Lagged Effect

A sensible assumption to make is that the effect of warfare on FDI is not immediate. FDI investment decisions and the accumulation of FDI in a country for any given investment are processes that can take years to occur. Governments making long-term plans for investments and development of a region, or corporations purchasing new brick and mortar abroad are just two examples. Furthermore, considering that we are studying the effect of intrastate conflict on neighbouring countries, the effect could possibly be delayed even further because of the additional separation between conflict and the investor. Therefore, we suspect that the immediate time period effect that we are studying in our regression may be a point of bias, or a misspecification.

Depending on the assumption, the lagged effect could bias the results of the regression both ways:

1. FDI decreases in neighbouring countries during warfare → the lag would slow that decrease, and provide us with higher results than the candid effect.

2. FDI increases in neighbouring countries during warfare → the lag would slow that increase, and provide us with lower results than the candid

[3]This is abstracted from previous research, most importantly Witte et al., *"Dodging bullets: The heterogeneous effect of political violence on greenfield FDI"*

effect.

Both of these problems present serious issues because they both draw the coefficient of battle deaths on FDI towards zero, which is something that hampers our ability to conduct causal inference.

4.3.3 Impact of Expectations

Investors' expectations of conflict in a given region could affect their response to conflicts that do take place. If an investor is expecting that a region will experience conflict, and invest anyway, they might be less likely to withdraw or stop investing in a country if its neighbour is experiencing conflict. This also might indicate a selection bias in conflict-prone regions for FDI that is less sensitive to instability. Likewise, if an investor is not expecting conflict in a region, and conflict does occur, since they did not price-in the conflict when making their investment decision, they could respond more strongly to the conflict. Depending on the assumption, this could bias the estimate in two ways:

1. Investors expecting conflict in a region would be less sensitive to the occurrence of conflict as it is already metaphorically "priced-in" to their investment decisions, implying that our results, lacking controls for this potential bias, would underestimate the magnitude of the effect of battle deaths on FDI in these regions.

2. Investors *not* expecting conflict in a region would be more sensitive to the occurrence of conflict as it is not "priced-in" their investment decisions, implying that our results, lacking controls for this potential bias, would overestimate the magnitude of the effect of battle deaths on FDI in these regions. This could be due to the shock effect of warfare, unprepared investors may be ready to make rash decisions after the outbreak of conflict

and thus "overreact" to occurrent battle deaths.

5 Results

5.1 Description of Results

The results from our main regression are presented in Table 5. For all regressions, clustered standard errors, clustered at the country level, are used. Starting with a simple OLS which does not take into account year or country fixed effects, and omits any controls, the variables for conflict not in the threshold of war and the second quartile of battle deaths are significant. The coefficient for Q2 is negative while Q4 is positive. The lack of controls means that the results are likely to suffer from omitted variable bias. Additionally, excluding fixed effects means the results suffer from unobserved heterogeneity, both across entities and across time. In the next column (column 2), the variables for experiencing conflict and experiencing war within a given country in a given year are included. This makes the regression more appropriate for comparing the effects of a country bordering battle deaths against a country not bordering battle deaths while still including countries that experienced conflict in our data. Column 2 also introduces fixed effects for year and country. The intended effect is to account for time-invariant but entity-variant unobserved heterogeneity with country fixed effects and entity-invariant but time variant unobserved heterogeneity with year fixed effects. The results change, with only Q4 in the regression remaining significant at $\alpha = 0.1$. This means that Q0, and Q2 become insignificant with the introduction of additional controls and a TWFE model. Adding the variable "log_gdp_cap" in the next column has the biggest positive effect on the R2 value. Q1 and Q4 become significant at $\alpha = 0.05$, Q2 becomes significant at $\alpha = 0.10$ and the control variable "Natural log of GDP/Capita" is significant at $\alpha = 0.01$. Column 4 introduces consumer

inflation as a control which is significant at $\alpha = 0.01$. For this column, Q2 is significant at $\alpha = 0.10$. Column 5 adds the last control variable, resource rent. Q1 and Q4 remain significant at the same level as the previous column, and Q2 remains significant at $\alpha = 0.05$. Q3 is insignificant across all regressions. Of the significant variables, consumer inflation is the only variable with an estimator that is negative. The low R2 value for all regressions is not a concern, as FDI has many determinants beyond the scope of this analysis and is in line with similar literature.

Table 5: Effect of Battle Deaths on FDI

	Dependent variable:				
	Natural Log of FDI (OLS)	Natural Log of FDI (TWFE)			
	(1)	(2)	(3)	(4)	(5)
Neighbouring non-war Conflict (Q0)	0.869***	-0.003	0.027	0.024	0.023
	(0.090)	(0.138)	(0.143)	(0.143)	(0.143)
Quartile 1 War Battle Deaths (Q1)	0.018	0.224	0.294**	0.300**	0.301**
	(0.180)	(0.149)	(0.149)	(0.149)	(0.149)
Quartile 2 War Battle Deaths (Q2)	-0.421**	0.198	0.247*	0.250*	0.259*
	(0.181)	(0.139)	(0.140)	(0.140)	(0.139)
Quartile 3 War Battle Deaths (Q3)	-0.243	0.100	0.241	0.245	0.249
	(0.179)	(0.212)	(0.200)	(0.198)	(0.199)
Quartile 4 War Battle Deaths (Q4)	0.566***	0.348*	0.432**	0.433**	0.433**
	(0.183)	(0.195)	(0.187)	(0.187)	(0.186)
Experiencing Conflict (Conflict)		0.029	0.069	0.066	0.059
		(0.127)	(0.107)	(0.106)	(0.103)
Experiencing War (War)		-0.211	-0.079	-0.065	-0.072
		(0.207)	(0.191)	(0.187)	(0.187)
Natural Log of GDP/Capita			0.893***	0.883***	0.890***
			(0.118)	(0.115)	(0.115)
Consumer Inflation				-0.0003***	-0.0003***
				(0.0001)	(0.0001)
Resource Rent					0.009
					(0.011)
Country Fixed Effects	No	Yes	Yes	Yes	Yes
Time Fixed Effects	No	Yes	Yes	Yes	Yes
Observations	5432	5432	5432	5432	5432
R-Squared	0.232	0.004	0.061	0.063	0.064

Note: The table reports the outputs for a naive OLS regression with no controls, as well as regressions with TWFE and an increasing number of control variables. *p<0.1; **p<0.05; ***p<0.01

Further regressions are run with the full econometric model (all variables and with TWFE) for each continent. Clustered standard errors, clustered at the country level, are used here as well. The results are displayed in Table 6 below. Looking at the continent of Asia, this subset of the larger sample contains 1293 country-year observations. The variable for the first and fourth quartile of war-level battle deaths is significant at $\alpha = 0.01$. Quartile 2 is significant at $\alpha = 0.05$, along with the control variable "Natural Log of GDP/Capita" being significant at $\alpha = 0.1$. Unlike in the main regression, where the whole world was used in the sample, consumer inflation is not significant. In the results for Europe, the Natural Log of GDP/Capita is the only significant variable, with a significance at $\alpha = 0.01$. The results for Africa are similar, but with the addition of the variables for consumer inflation and experiencing war significant at $\alpha = 0.05$. The coefficients for consumer inflation and for experiencing conflict are negative. For the Americas, only the control variables for the natural log of GDP/capita and consumer inflation are significant, with significance at $\alpha = 0.01$. Oceania has a sample size much smaller than the other continents, with 373 observations. Additionally, the coefficients for the variables Q1, Q2, and experiencing war are not reported because there are no country-year observations with data-points that return a 1 for those dummy variables. The coefficients for Q0, Q3, and experiencing conflict are positive and significant at $\alpha = 0.05$. Q4, natural log of GDP/capita, and resource rent are also positive and are significant at $\alpha = 0.01$.

Table 6: Effect of Battle Deaths on FDI

	Dependent variable:				
	Natural Log of FDI				
	Asia	Europe	Africa	Americas	Oceania
	(1)	(2)	(3)	(4)	(5)
Neighbouring non-war Conflict (Q0)	0.470**	0.019	-0.282	0.071	0.475**
	(0.185)	(0.245)	(0.282)	(0.235)	(0.184)
Quartile 1 War Battle Deaths (Q1)	0.864***	-0.089	-0.049	0.182	
	(0.242)	(0.265)	(0.253)	(0.294)	
Quartile 2 War Battle Deaths (Q2)	0.496**	-0.315	-0.030	-0.033	
	(0.243)	(0.407)	(0.213)	(0.298)	
Quartile 3 War Battle Deaths (Q3)	0.483	0.046	-0.132	-0.058	0.950**
	(0.402)	(0.236)	(0.298)	(0.365)	(0.409)
Quartile 4 War Battle Deaths (Q4)	0.763***	0.412	0.176	-0.065	2.232***
	(0.284)	(0.376)	(0.258)	(0.224)	(0.265)
Experiencing Conflict (Conflict)	-0.018	-0.102	-0.214	-0.017	0.315**
	(0.137)	(0.199)	(0.158)	(0.272)	(0.148)
Experiencing War (War)	0.096	-0.390	-0.671**	-0.017	
	(0.194)	(0.273)	(0.302)	(0.219)	
Natural Log of GDP/Capita	0.482*	0.901***	0.520***	0.935***	1.392***
	(0.251)	(0.187)	(0.196)	(0.253)	(0.406)
Consumer Inflation	-0.001	-0.0004*	-0.0002**	-0.0002***	0.032
	(0.001)	(0.0002)	(0.0001)	(0.0001)	(0.021)
Resource Rent	0.016	-0.028	0.018	0.001	0.069***
	(0.013)	(0.035)	(0.016)	(0.016)	(0.014)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1293	1256	1633	1158	373

Note: The table reports the outputs for continent specific regressions with the same variables as the main regression from Table 5. *p<0.1; **p<0.05; ***p<0.01

5.2 Robustness Checks

5.2.1 Testing if Fixed Effect is Preferable to Random Effect

To determine if fixed effect(s) are preferable to random effect(s), a Hausman test is utilised. This test takes H_0 = unique errors are not correlated with regressors and H_1= unique errors are correlated with regressors. If H_0 is rejected, it provides evidence that random effect(s) is not preferable to fixed effect. When we run this test, the resulting p-value is 2e-16, so we reject the null hypothesis. This result indicates that using a fixed effect model is appropriate.

5.2.2 Testing for Time-Fixed Effects and Entity-Fixed Effects

Testing for time fixed effects is important in determining the robustness of our results. Since we use time fixed effects in our main regression, it is important to check to see if the time variable, "year" for our regression, is significant in relation to the natural logarithm of FDI. We can run an F test with H_0 = time has no significant effect on FDI and H_1= time has a significant effect on FDI. The result of this F test was a p-value $<$ 2e-16, so we reject the null hypothesis. This result indicates that time fixed effects are appropriate.

Additionally, it is important to see if there are individual (entity) effects on our regression. Similar to testing for time fixed effects, we run an F test with H_0 = entity (country) has no significant effect on FDI and H_1= entity (country) has a significant effect on FDI, where entity is defined by country. The result of this F test was a p-value $<$ 2e-16. We reject the null and find that entity-fixed effects are appropriate

Lastly, we want to check if using both entity and time fixed effects together is significant against using neither. While there is already evidence of this from the previous two tests, for robustness we check this regardless. Running an F test for two-way fixed effects, the result is a p-value $<$ 2e-16. This means the null hypothesis is rejected and indicates that there is a significant effect.

5.2.3 Testing for Serial Correlation

Serial correlation, or more specifically auto-correlation, describes when a variable correlates with itself over time. In other words, when a variable correlates with lagged instances of itself. If serial correlation exists in the data and is ignored, the estimate of the standard error is biased. In an OLS, serial correlation creates an effect through the effective degrees of freedom of the statistic's null distribution (Kiebel et al., 2007). To check for serial correlation, we use a Breusch-Godfrey test for serial correlation. The null hypothesis is H_0 = no serial correlation, and the alternative hypothesis is H_1 = serial correlation. After running the test, the outcome was a p-value $<$ 2e-16, so we reject the null hypothesis.

6 Discussion

6.1 Interpretation of Results

The results are surprising and have interesting implications for further studies and understanding the impact of intrastate conflict on regional well-being and stability. The interpretation of our regression results focuses on the main regression with full controls and two-way fixed effects as well as the regressions for each continent. Looking first at the main regression including the whole world, there are interesting implications for all the significant battle death quartile coefficients (Quartiles 1, 2, and 4) being positive. The results are compared against a group defined as experiencing no conflict or war in a given year nor bordering conflict in the same year. We can see that, ceteris paribus, being in: the first quartile of battle deaths increases FDI in expectation by 30.1%, the second quartile of battle deaths increases FDI in expectation by 25.9%, and the fourth quartile of battle deaths increases FDI in expectation by 43.3%. There appear to be larger effects from being in the lowest and highest quartiles for battle deaths. Additionally, low-level conflicts, ones that fall beneath the threshold for war (1-999 battle deaths in a year), do not seem to cause any significant impact on FDI. This might imply that FDI

requires a certain threshold of instability before it responds. But then this raises questions about why the third quartile of battle deaths is not significant. It could be due to higher variance of country-year observations in that quartile since the coefficient for Q3 is similar to that of Q2. Since there is a lot of literature on the negative impact of conflict on macroeconomic variables such as FDI, these positive coefficients raise interesting questions and ideas. One theory is that we have previously mentioned is that the countries experiencing intrastate war undergo capital flight to the neighbouring countries. This would mean that neighbouring an intrastate conflict has a significant positive impact on FDI. It could be that only conflicts that span multiple nations, or interstate conflicts, cause FDI to decrease over a region.

Examining the natural logarithm of GDP/Capita, the contextual result is that every percentage increase in GDP/Capita increases the natural logarithm of FDI by 0.89%. There is evidence that an increase in GDP/Capita can signal to inventors that the purchasing power of the citizens in a given country is increasing, making the country more attractive to investors (Callen, 2008). This indicates that our results are consistent with the literature, at least for the relationship between FDI and GDP/capita. Lastly, every percentage point increase in inflation represents a 0.003% decrease in FDI; it is important to note that inflation is taken from year 0 (0 C.E). This relationship works in the opposite direction of GDP/capita, with higher inflation decreasing the purchasing power of consumers, and making the currency conversion less favourable for potential investors.

Since we had interesting results from our main analysis, there is merit in looking at if there are differences depending on where in the world the conflicts are taking place. When we ran regressions for each continent, we saw that for the variables that account for neighbouring conflict (Q0-Q4), only Asia and Oceania retained significant results. Similar to the results from the main regression, when looking at Asia, only the first, second, and fourth quartiles are significant. However, in these results the coefficients are larger, with the effects of significant conflict variables ranging from an increase in FDI (in expectation) of 47% for Q0 to 86.4% for Q1. While the analysis does not look into why

this is the case, it does reinforce the notion that FDI does not respond only to the level of the conflicts surrounding a nation. Given the relatively small sample size for Oceania (there are only 11 countries in the sample with 373 country-year observations), the results are harder to interpret in comparison to other continents. Nonetheless, we see a huge impact on FDI, with the highest quartile of battle deaths increasing FDI on average by 223.2%. Since there are only 10 country-year observations that fall under Q4, and they all occur for one country (Papua New Guinea), this large effect could have been a response to a conflict with very unique characteristics. However, this is speculative since our analysis does not look into the characteristics of the conflicts that occur because it is beyond the scope of what we are attempting to answer. Oceania is also the only continent where experiencing conflict has a significant impact. The result is a positive coefficient, which is contrary to literature and further indicates that there are some other, or several other, effects that impact FDI which we are not accounting for. Africa is also interesting in that it is the only continent where being a country experiencing war in a given year has a significant impact. The coefficient for this variable is negative, with an average impact of a reduction of FDI of 67.1%. The sign of the coefficient for this variable is in line with the literature. Why Africa is the only continent where this variable is significant raises questions, and the overall differences between continents warrant further investigation.

6.2 Limitations & Extensions

6.2.1 Functional Form Issues

When we started analysing the questions posed in this study, we expected deaths to lead to a reduction of FDI moving to neighbouring countries as companies/governments withdraw from the region as a whole. However, as we've discussed with the potential biases in our regression, it is hard to determine when that occurs in favour of capital flight from say, Rwanda to Uganda, where FDI providers maintain their presence in the region in hopes of being able to return to the country that is experiencing conflict or alternatively seek

different investment opportunities in the region. What could happen is that the region gets pushed across an arbitrary "threshold" of deaths, as mentioned previously, where FDI providers no longer see the risk-to-return ratio as sufficient for them to incur the extra costs of storing and maintaining capital in the region in the short run, which causes them to move away. Therefore, we believe that an interesting proposal for future research is to explore the possibility of the linear model being the incorrect assumption for these types of analyses.

If FDI regressed on combat deaths was not linear, and instead expressed a quadratic equation, this could be consistent with the results that we see. We have seen, for instance, that for the fifth regression the coefficient starts at a 30.1% increase, then dips to a 25.9% increase, then decreases further to a 24.9% increase (however this number is insignificant) and lastly increases to a 43.3% increase, which follows an approximate quadratic form. However, that is a completely different econometric study to the one we have conducted and as such, it is a topic for additional research.

6.2.2 Sector-Based FDI Flight

As previous research has shown, a country that goes through an intrastate conflict observes a significant decrease in its FDI numbers for the secondary and tertiary sectors (Li et al., 2017). As we've seen positive and significant changes to the neighbouring countries' FDI numbers when the country in question is experiencing intrastate conflict, a point of interest could be testing the capital flight theory that we mentioned in our potential biases. If it is that their disaggregated FDI numbers are consistent with the previous study, it implies that the increase in FDI is accounted for by an increase of investments into the secondary and tertiary sectors of an economy, then that would suggest the possibility that the capital that is no longer going to the country afflicted by intrastate conflict is being kept in the region. However, a more thorough investigation needs to be conducted before any conclusions can be drawn from that hypothesis.

6.2.3 Additional Extensions

Looking ahead, a simple extension would be to look at the long-term effects of bordering intrastate conflicts. Additionally, using a broader scope for the conflicts we use and looking at the time series of some entities with outlier data could be interesting. Another simple extension would be to subset the data on a more granular level than continents (i.e. sub-regions such as Central Asia, East Asia, etc.), and evaluate both how these regions differ and why the differences may exist; or to examine if there is a movement of FDI within the countries bordering conflict away from the borders. Furthermore, we want to investigate if there are other dependent variables that might be of interest to our current regression. There are interesting questions to be asked about how attention bias of conflicts might play a role (i.e. reporting by news agencies and on social media of conflicts). Additionally, more granular investigations could. There are many different questions and paths of research that can be taken from the results of our analysis, and those listed do not represent an exhaustive list.

7 Conclusion

There exists an extensive literature on topics relating to FDI and conflict, including national analyses on the impact of conflict on FDI. We present a novel examination of the cross-section of conflict and FDI by examining the regional effects of conflict and analysing the impact of intrastate war on the FDI of neighbouring countries. Furthermore, we see if the scale of the conflict plays a role in determining FDI. We also examine if there are differences in the relationship between conflict and FDI depending on geographical region by examining each continent separately. Our data covers almost every country in the world over a 50-year period from 1970 to 2019, and uses a two-way fixed effect model with country-level clustered standard errors to establish a causal relationship. While there does not seem to be a significant difference between the different levels of conflict, the results of our main regression indicate that there is a significant and positive relationship between intrastate war and the

FDI of neighbouring conflicts. So despite our initial theory that intrastate war would have regional destabilisation effects, measured through FDI, it seems that intrastate war is good for the FDI of neighbouring countries. This result raises many interesting questions, such as if intrastate war results in capital flight to neighbouring countries, that warrant further research. Additionally, except for the third quartile of battle deaths, our econometric model and results are robust across many tests. When examining each continent separately, we see different results for each continent. Asia and Oceania demonstrate the strongest relationships between FDI and conflict, which remains positive. Africa is the only continent where a country experiencing war itself is shown to be significant. Many of these differences invite further investigation beyond the scope of our analysis. One limitation of the analysis is that it does not address potential functional form issues, which could bias our regressions. Overall, our analysis is an introductory investigation into the relationship between macro-economic trends and their relationship to regional instability, and is not capable of identifying the differences between variables and geographical areas. It follows that there is room for numerous extensions, including but not limited to adding additional controls and investigating sector-based FDI flight.

8 Sources

Abadie, A., Athey, S., Imbens, G.W., Wooldridge, J. (2022) "When Should you Adjust Standard Errors for Clustering," The Quarterly Journal of Economics 148(1), pp. 1-35.

Asiedu, E., & Lien, D. (2011). "Democracy, foreign direct investment and natural resources." Journal of International Economics, 84(1), 99–111. https://doi.org/10.1016/j.jinteco.2010.12.001

Birkinshaw, J. (2016) "Upgrading of industry clusters and foreign investment," International Studies of Management & Organization, 30(2), pp. 93–113. Available at: https://doi.org/10.1080/00208825.2000.11656789.

de Chaisemartin, C. and D'Haultfœuille, X. (2022) "Two-way fixed effects and differences-in-differences with heterogeneous treatment effects: A

survey," The Econometrics Journal [Preprint]. Available at: https://doi.org/10.1093/ectj/utac017.

Callen, T. (2008). "Back to Basics. What Is Gross Domestic Product? Finance & Development." Available at: http://www.imf.org/external/pubs/ft/fandd/2008/12/pdf/basics.pdf.

Gao, G.Y., Wang, D.T. and Che, Y. (2018) "Impact of historical conflict on FDI location and performance: Japanese investment in China," Journal of International Business Studies, 49(8), pp. 1060–1080. Available at: https://doi.org/10.1057/s41267-016-0048-6.

Garriga, A.C. and Phillips, B.J. (2013) "Foreign aid as a signal to investors," Journal of Conflict Resolution, 58(2), pp. 280–306. Available at: https://doi.org/10.1177/0022002712467937.

Gokhale, C. (2017) "Country to Continent," Kaggle.

Harrison, Ann. (1994) "The role of multinationals in economic development: the benefits of FDI." The Columbia Journal of World Business 29.4 pp. 6-11.

Imai, K. and Kim, I.S. (2020) "On the use of two-way fixed effects regression models for causal inference with panel data," Political Analysis, 29(3), pp. 405–415. Available at: https://doi.org/10.1017/pan.2020.33.

Javorcik, B.S., Lo Turco, A. and Maggioni, D. (2017) "New and improved: Does FDI boost production complexity in host countries?," The Economic Journal, 128(614), pp. 2507–2537. Available at: https://doi.org/10.1111/ecoj.12530.

Kiebel, S.J. Kherif, A.P. and Holmes, C. (2007) "The General Linear Model," Statistical Parametric Mapping, pp. 101–125. Available at: https://doi.org/10.1016/b978-012372560-8/50008-5.

Klosek, K.C. (2020) "Military interventions in civil wars: Protecting foreign direct investments and the Defence Industry," Civil Wars, 22(1), pp. 87–113. Available at: https://doi.org/10.1080/13698249.2020.1724726.

Li, C., Murshed, S.M. and Tanna, S. (2017) "The impact of Civil War on foreign direct investment flows to developing countries," The Journal of International Trade & Economic Development, 26(4), pp. 488–507.

Available at: https://doi.org/10.1080/09638199.2016.1270347.

Li, Q. and Vashchilko, T. (2010) "Dyadic military conflict, security alliances, and bilateral FDI flows," Journal of International Business Studies, 41(5), pp. 765–782. Available at: https://doi.org/10.1057/jibs.2009.91.

Lim, E.-G. (2001) "Determinants of, and the relation between, Foreign Direct Investment and growth: A summary of the recent literature," IMF Working Papers, 01(175), pp. 1–28. Available at: https://doi.org/10.5089/9781451858754.001.

Meyer, K. E., & Peng, M. W. (2016). Theoretical foundations of emerging economy business research. Journal of International Business Studies, 47(1), 3-22.

Umeora, C.E. (2013) "Effects of foreign direct investment (FDI) on economic growth in Nigeria," SSRN Electronic Journal [Preprint]. Available at: https://doi.org/10.2139/ssrn.2285329.

Witte, C.T., Burger, M.J., Ianchovichina, E.I., Pennings, E. (2017) "Dodging bullets: The heterogeneous effect of political violence on Greenfield FDI," Journal of International Business Studies, 48(7), pp. 862–892. Available at: https://doi.org/10.1057/s41267-017-0079-7.

9 Appendix

9.1 Tables

9.1.1 Table 1

Table 1: Main Variables		
Variable	Data Source	Description
FDI	World Bank Databank	Foreign Direct Investment.
log_FDI	World Bank Databank	Foreign Direct Investment expressed as a natural logarithm.
GDP/capita	World Bank Databank	Gross Domestic Product per Capita.
log_GDP/capita	World Bank Databank	Gross Domestic Product per Capita expressed as a natural logarithm.
Resource Rent	World Bank Databank	Natural resource rent expressed as a percentage of GDP.
Inflation	World Bank Databank	Consumer inflation expressed as a percentage.
Battle Deaths	UCDP Database	The number of deaths in a conflict in a given year where one of the primary participants is the government.
Non-war battle deaths (Q0)	UCDP Database	A dummy variable for if there are between 1 and 999 battle deaths in a country in a given year, beneath the threshold for war.
Quartile 1 war battle deaths (Q1)	UCDP Database	A dummy variable for the first quartile of war level battle deaths (1000-1448 Battle Deaths).
Quartile 2 war battle deaths (Q2)	UCDP Database	A dummy variable for the second quartile of war level battle deaths (1448-2326 Battle Deaths).
Quartile 3 war battle deaths (Q3)	UCDP Database	A dummy variable for the third quartile of war level battle deaths (2326-4724 Battle Deaths).
Quartile 4 war battle deaths (Q4)	UCDP Database	A dummy variable for the fourth quartile of war level battle deaths (4724-81594 Battle Deaths).
Experiencing Conflict	UCDP Database	A dummy variable for if a country is experiencing conflict (has non-war battle deaths).
Experiencing War	UCDP Database	A dummy variable for if a country is experiencing war in a given year.

9.1.2 Table 2

Table 2: Battle Death Quartile Statistics				
Group	Country-Year Observations	Min BD	Mean BD	Max BD
Q0	1497	2	266	998
Q1	271	1000	1186	1448
Q2	265	1450	1773	2326
Q3	272	2330	3248	4700
Q4	260	4748	16456	81594

This table outlines a summary of useful statistics for each battle death dummy variable included in the main regression. This includes statistics for battle deaths beneath the threshold to be considered war as defined by the UCDP (battle deaths between and including 1-999). Q1-Q4 represent the quartiles of battle deaths that meet the threshold for war. Data is from the UCDP.

9.1.3 Table 3

Table 3: Control Variable Summary Statistics						
Variable	Observations	N/A	Mean	StD	Min	Max
Log_FDI	9486	1538	9.19	9.83	3	12.15
Log_GDP/C	9486	2518	7.95	2.86	6.91	27.32
Inflation	9486	3049	22.98	223.58	−18.11	11749.64
Resource Rent	9486	1592	6.93	11.19	0	87.58

Table 3 displays summary statistics of some of the control variables. Data is from the World Bank.

9.1.4 Table 4

Table 4: Control Variable Summary Statistics, Cont'd			
Variable	Observations	Equal to 1	Equal to 0
Experiencing Conflict	5592	739	4853
Experiencing War	5592	242	5350

Table 4 displays summary statistics of some of the control variables. Data is from the World Bank.

9.1.5 Table 5

Table 5: Effect of Battle Deaths on FDI

	Dependent variable:				
	Natural Log of FDI (OLS)	Natural Log of FDI (TWFE)			
	(1)	(2)	(3)	(4)	(5)
Neighbouring non-war Conflict (Q0)	0.869***	-0.003	0.027	0.024	0.023
	(0.090)	(0.138)	(0.143)	(0.143)	(0.143)
Quartile 1 War Battle Deaths (Q1)	0.018	0.224	0.294**	0.300**	0.301**
	(0.180)	(0.149)	(0.149)	(0.149)	(0.149)
Quartile 2 War Battle Deaths (Q2)	-0.421**	0.198	0.247*	0.250*	0.259*
	(0.181)	(0.139)	(0.140)	(0.140)	(0.139)
Quartile 3 War Battle Deaths (Q3)	-0.243	0.100	0.241	0.245	0.249
	(0.179)	(0.212)	(0.200)	(0.198)	(0.199)
Quartile 4 War Battle Deaths (Q4)	0.566***	0.348*	0.432**	0.433**	0.433**
	(0.183)	(0.195)	(0.187)	(0.187)	(0.186)
Experiencing Conflict (Conflict)		0.029	0.069	0.066	0.059
		(0.127)	(0.107)	(0.106)	(0.103)
Experiencing War (War)		-0.211	-0.079	-0.065	-0.072
		(0.207)	(0.191)	(0.187)	(0.187)
Natural Log of GDP/Capita			0.893***	0.883***	0.890***
			(0.118)	(0.115)	(0.115)
Consumer Inflation				-0.0003***	-0.0003***
				(0.0001)	(0.0001)
Resource Rent					0.009
					(0.011)
Country Fixed Effects	No	Yes	Yes	Yes	Yes
Time Fixed Effects	No	Yes	Yes	Yes	Yes
Observations	5432	5432	5432	5432	5432
R-Squared	0.232	0.004	0.061	0.063	0.064
Note:	The table reports the outputs for a naive OLS regression with no controls, as well as regressions with TWFE and an increasing number of control variables. *p<0.1; **p<0.05; ***p<0.01				

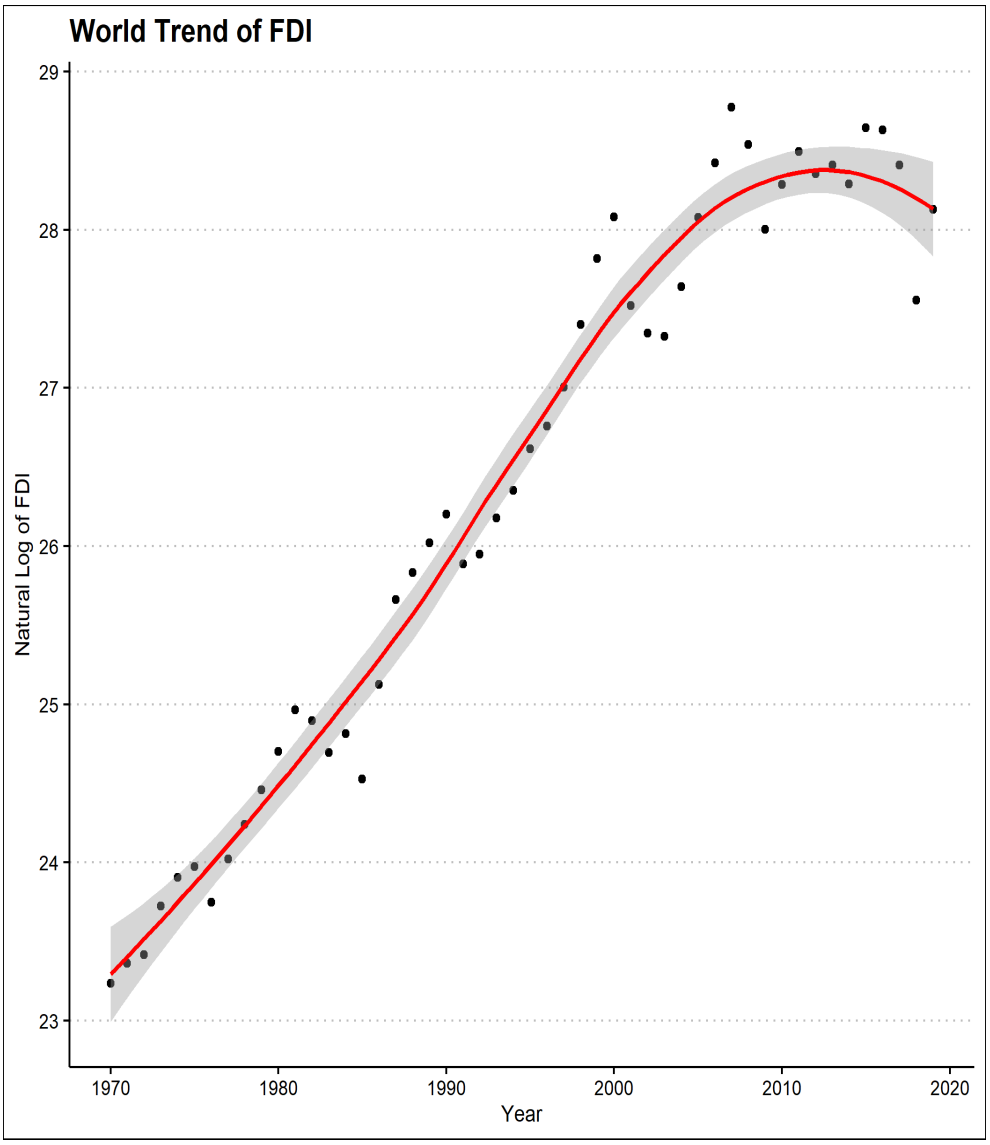
9.1.6 Table 6

Table 6: Effect of Battle Deaths on FDI

	Dependent variable:				
	Natural Log of FDI				
	Asia	Europe	Africa	Americas	Oceania
	(1)	(2)	(3)	(4)	(5)
Neighbouring non-war Conflict (Q0)	0.470**	0.019	-0.282	0.071	0.475**
	(0.185)	(0.245)	(0.282)	(0.235)	(0.184)
Quartile 1 War Battle Deaths (Q1)	0.864***	-0.089	-0.049	0.182	
	(0.242)	(0.265)	(0.253)	(0.294)	
Quartile 2 War Battle Deaths (Q2)	0.496**	-0.315	-0.030	-0.033	
	(0.243)	(0.407)	(0.213)	(0.298)	
Quartile 3 War Battle Deaths (Q3)	0.483	0.046	-0.132	-0.058	0.950**
	(0.402)	(0.236)	(0.298)	(0.365)	(0.409)
Quartile 4 War Battle Deaths (Q4)	0.763***	0.412	0.176	-0.065	2.232***
	(0.284)	(0.376)	(0.258)	(0.224)	(0.265)
Experiencing Conflict (Conflict)	-0.018	-0.102	-0.214	-0.017	0.315**
	(0.137)	(0.199)	(0.158)	(0.272)	(0.148)
Experiencing War (War)	0.096	-0.390	-0.671**	-0.017	
	(0.194)	(0.273)	(0.302)	(0.219)	
Natural Log of GDP/Capita	0.482*	0.901***	0.520***	0.935***	1.392***
	(0.251)	(0.187)	(0.196)	(0.253)	(0.406)
Consumer Inflation	-0.001	-0.0004*	-0.0002**	-0.0002***	0.032
	(0.001)	(0.0002)	(0.0001)	(0.0001)	(0.021)
Resource Rent	0.016	-0.028	0.018	0.001	0.069***
	(0.013)	(0.035)	(0.016)	(0.016)	(0.014)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes	Yes
Observations	1293	1256	1633	1158	373
Note:	The table reports the outputs for continent specific regressions with the same variables as the main regression from Table 5. *p<0.1; **p<0.05; ***p<0.01				

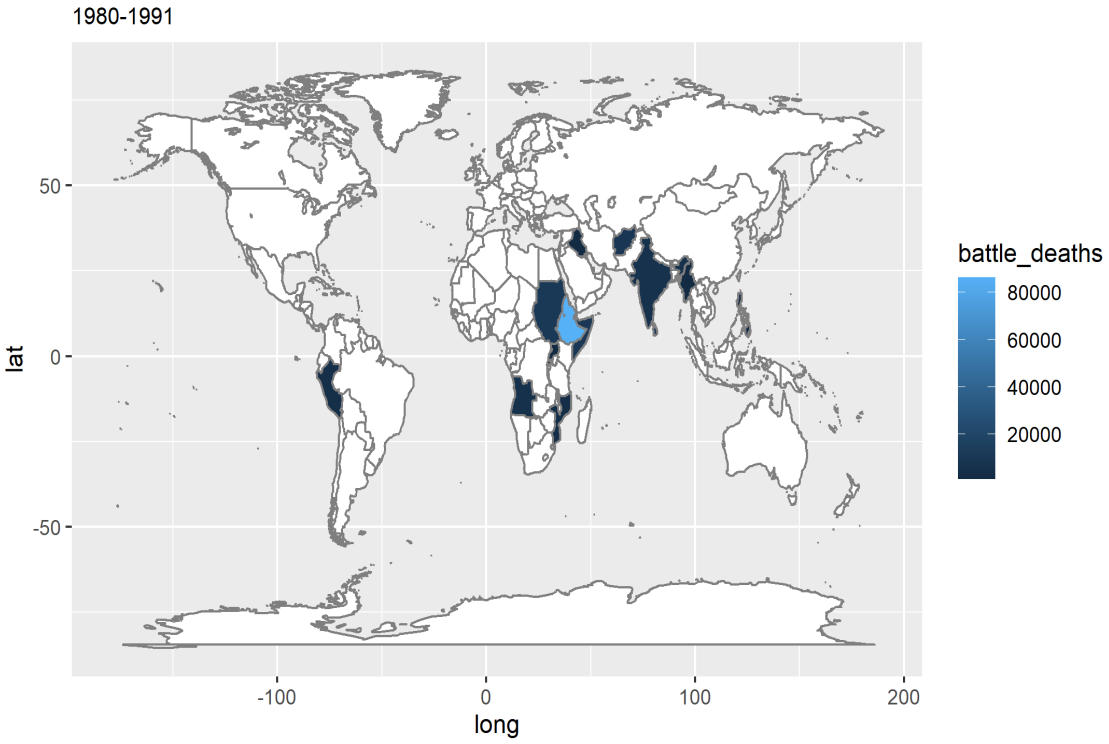
9.2 Figures

9.2.1 Figure 1: FDI Trend



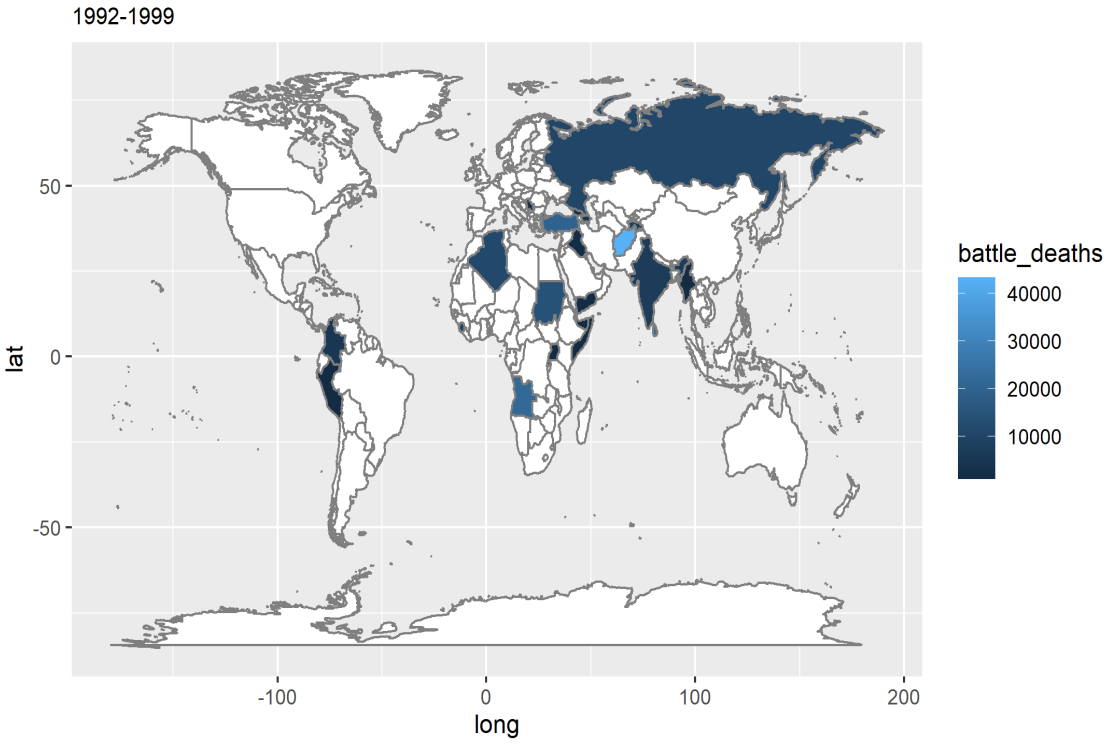
This is a scatterplot of the natural log of global FDI inflows for each year in 1970-2019 in our sample. Data is from the World Bank.

9.2.2 Figure 2: Battle Deaths 1980-1991



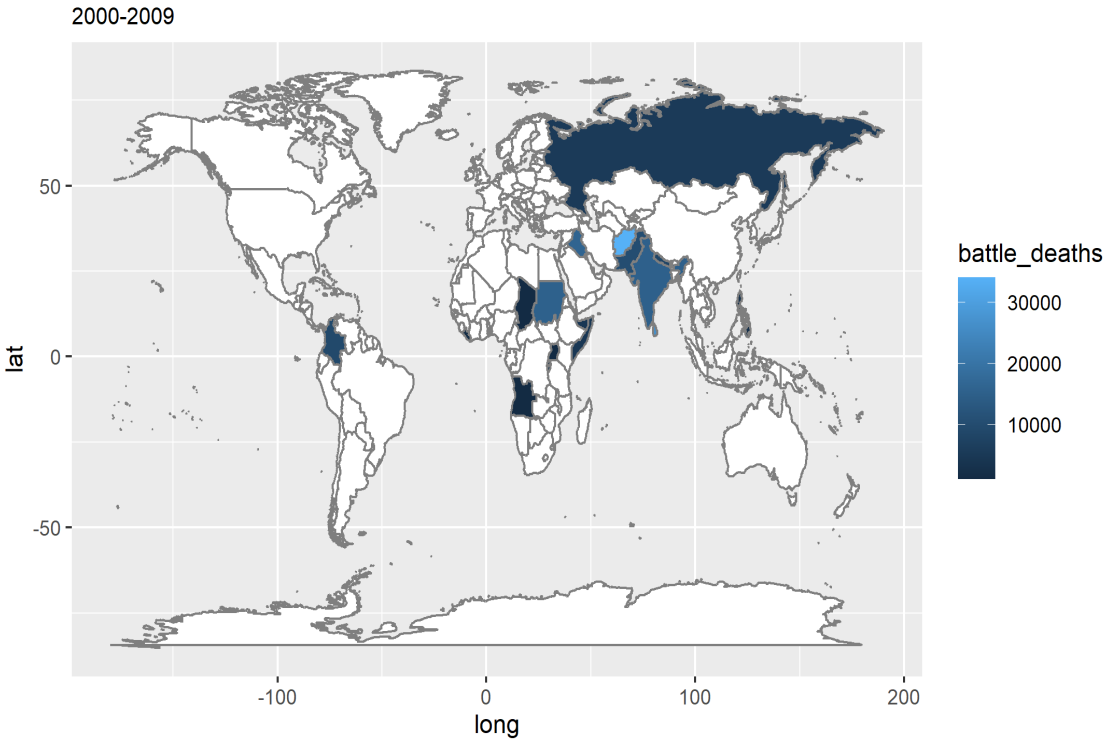
This map displays the aggregate battle deaths for the time period 1980-1991. Data is from the UCDP.

9.2.3 Figure 3: Battle Deaths 1992-1999



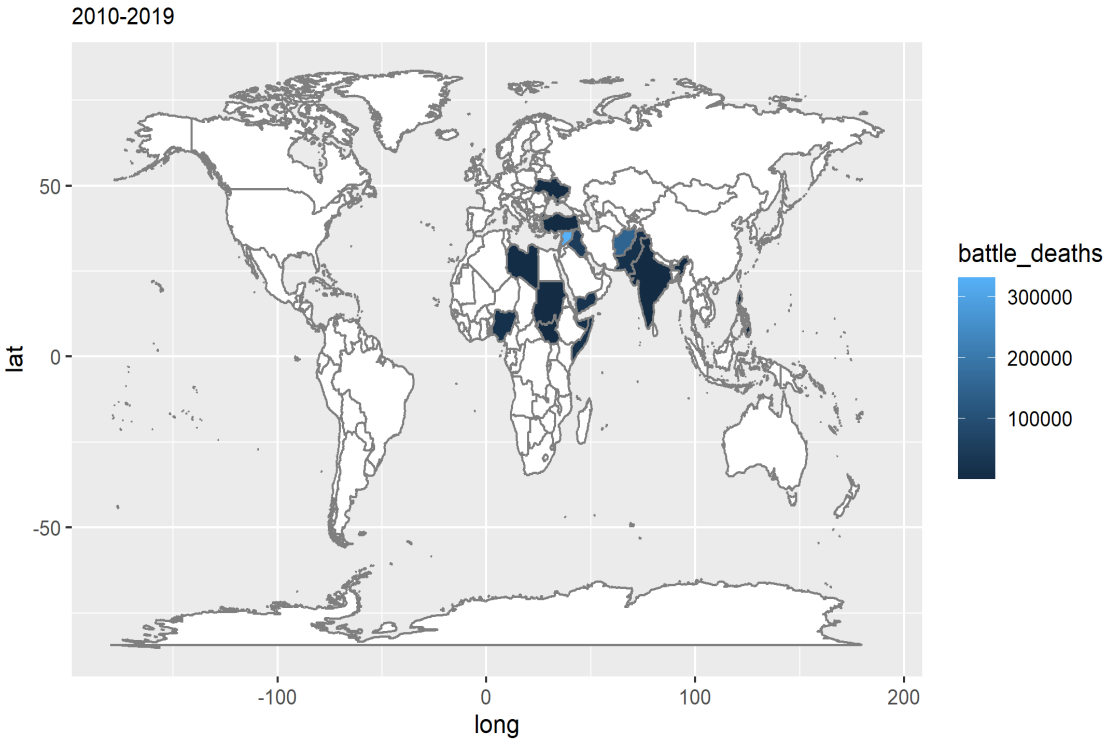
This map displays the aggregate battle deaths for the time period 1992-1999. Data is from the UCDP.

9.2.4 Figure 4: Battle Deaths 2000-2009



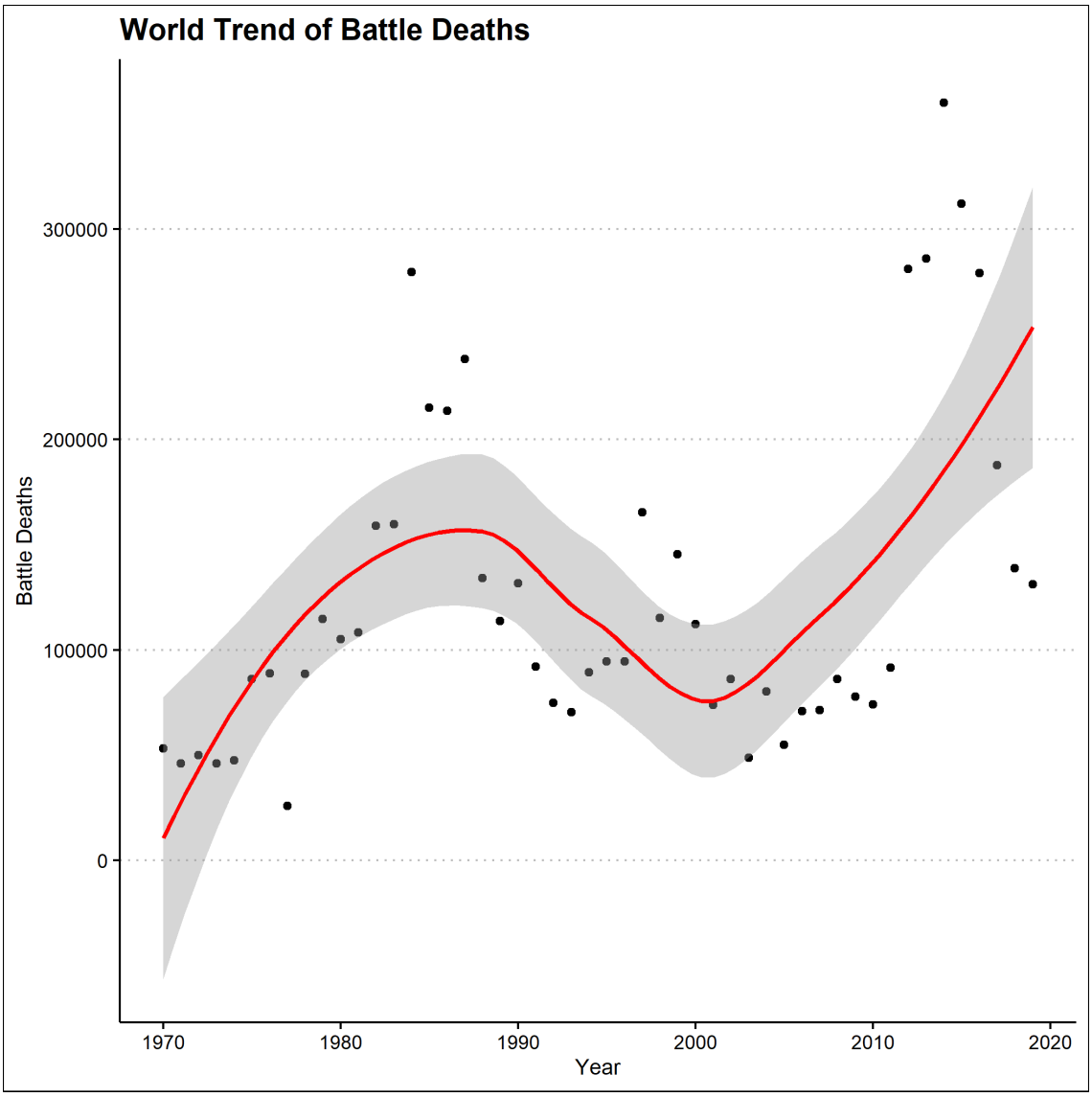
This map displays the aggregate battle deaths for the time period 2000-2009. Data is from the UCDP.

9.2.5 Figure 5: Battle Deaths 2010-2019



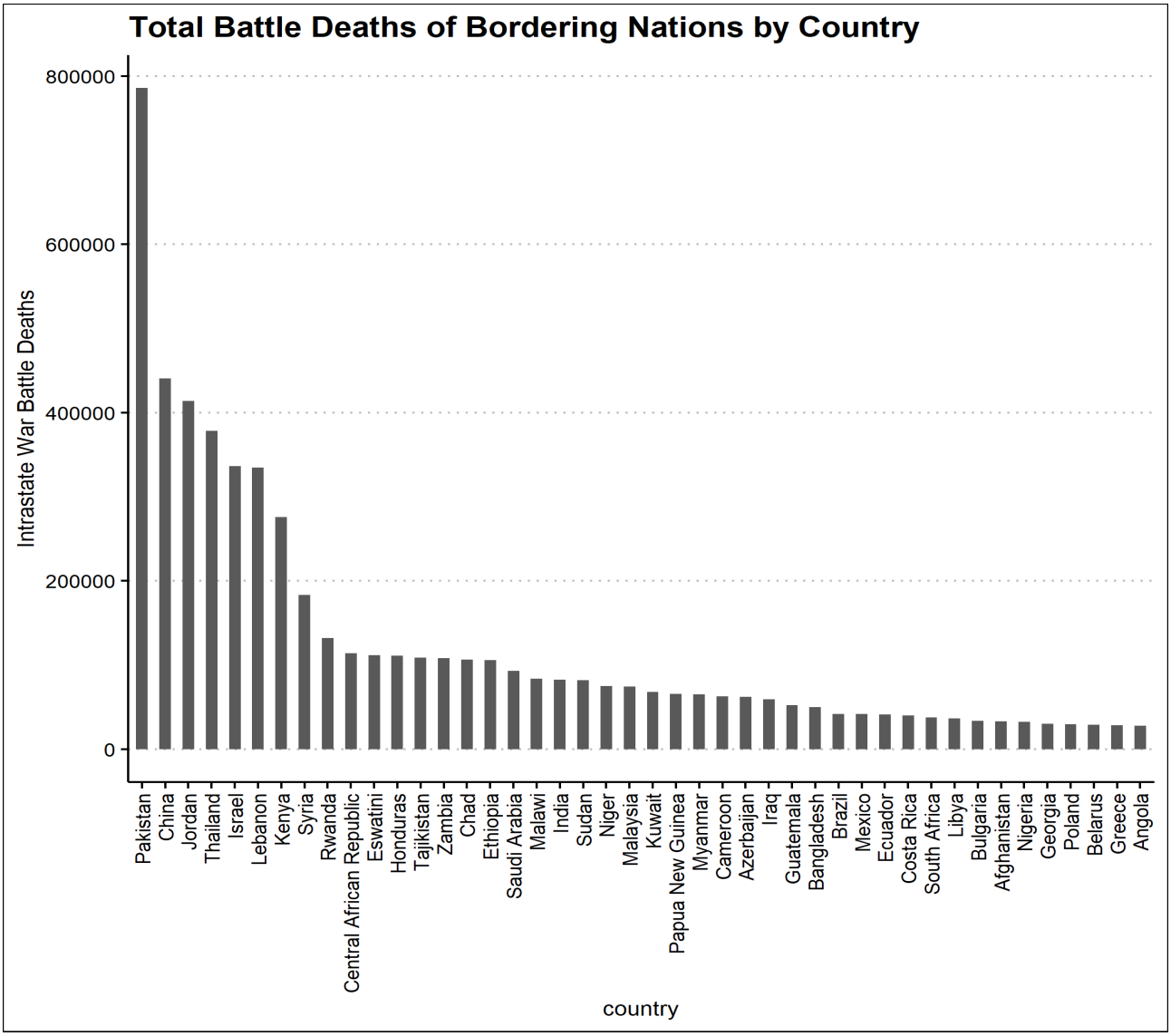
This map displays the aggregate battle deaths for the time period 2010-2019. Data is from the UCDP.

9.2.6 Figure 6: World Trend of Battle Deaths



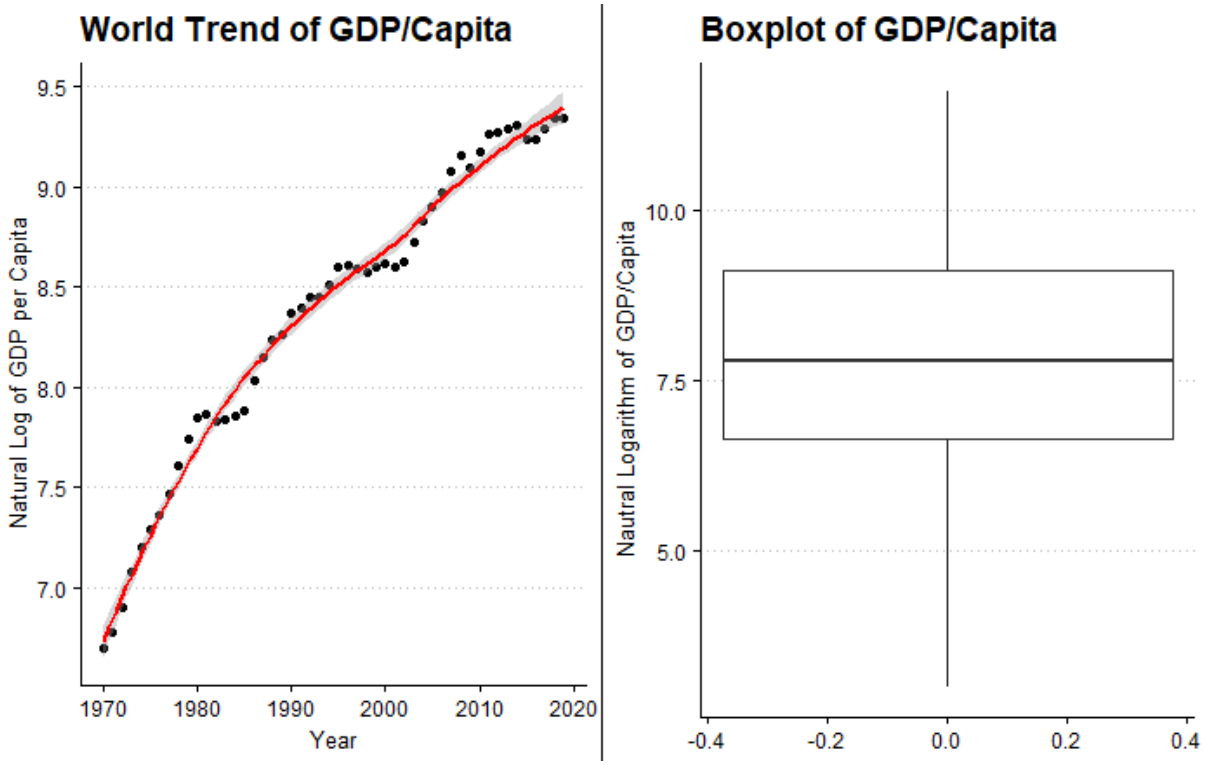
This is a bar plot that shows the countries in the top 2 quartiles of the cumulative war deaths that a given country bordered during 1970-2019. Data is from the UCDP.

9.2.7 Figure 7: Total Battle Deaths of Bordering Nations by Country



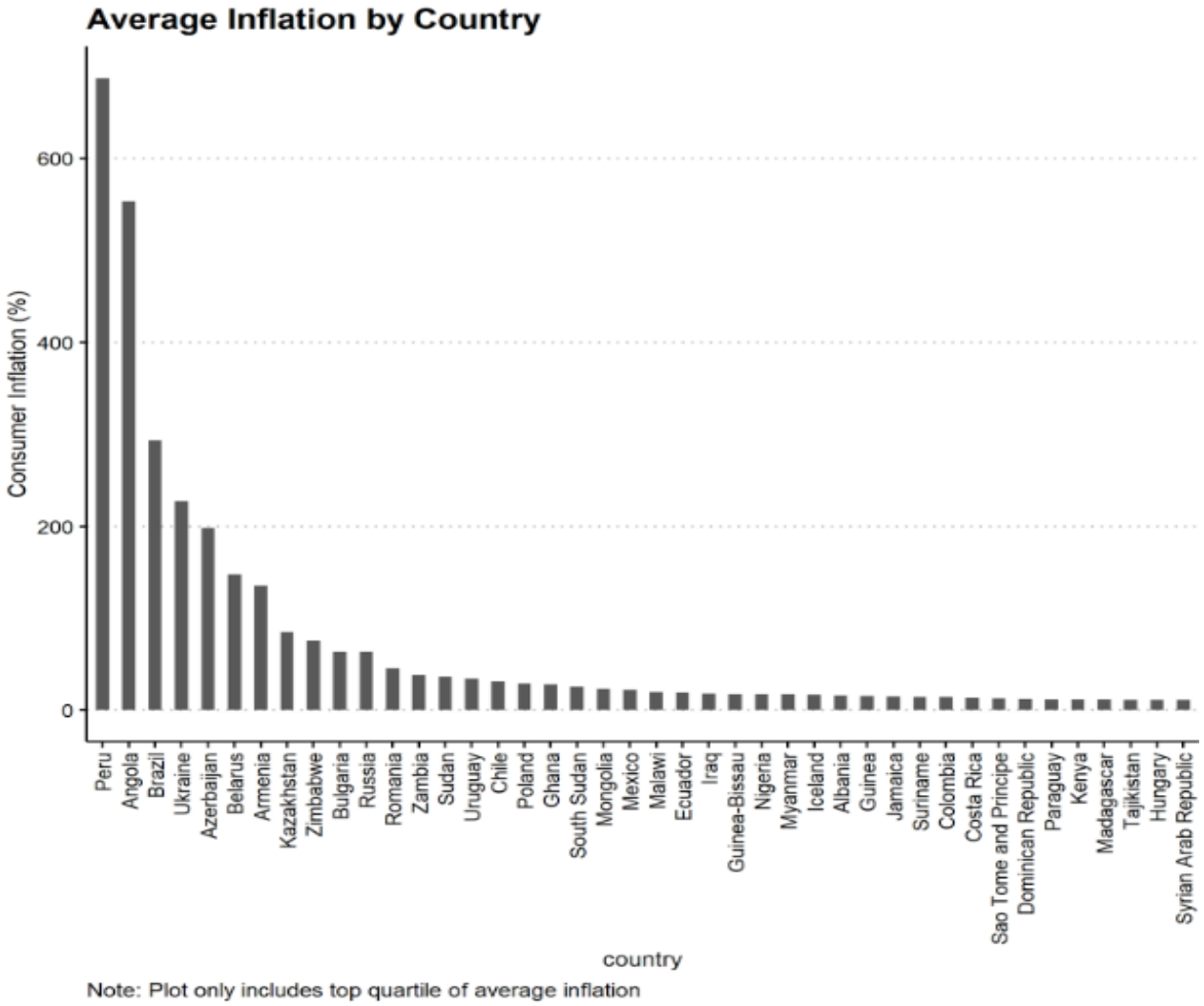
This is a scatterplot of the total number of battle deaths that occur each year in 1970-2019 in our sample. There is a maximum in 2014, predominantly caused by the Syrian civil war, Iraqi civil war, and the war in Afghanistan. Data is from the UCDP.

9.2.8 Figure 8: World Trend of GDP/Capita & Boxplot of GDP/Capita



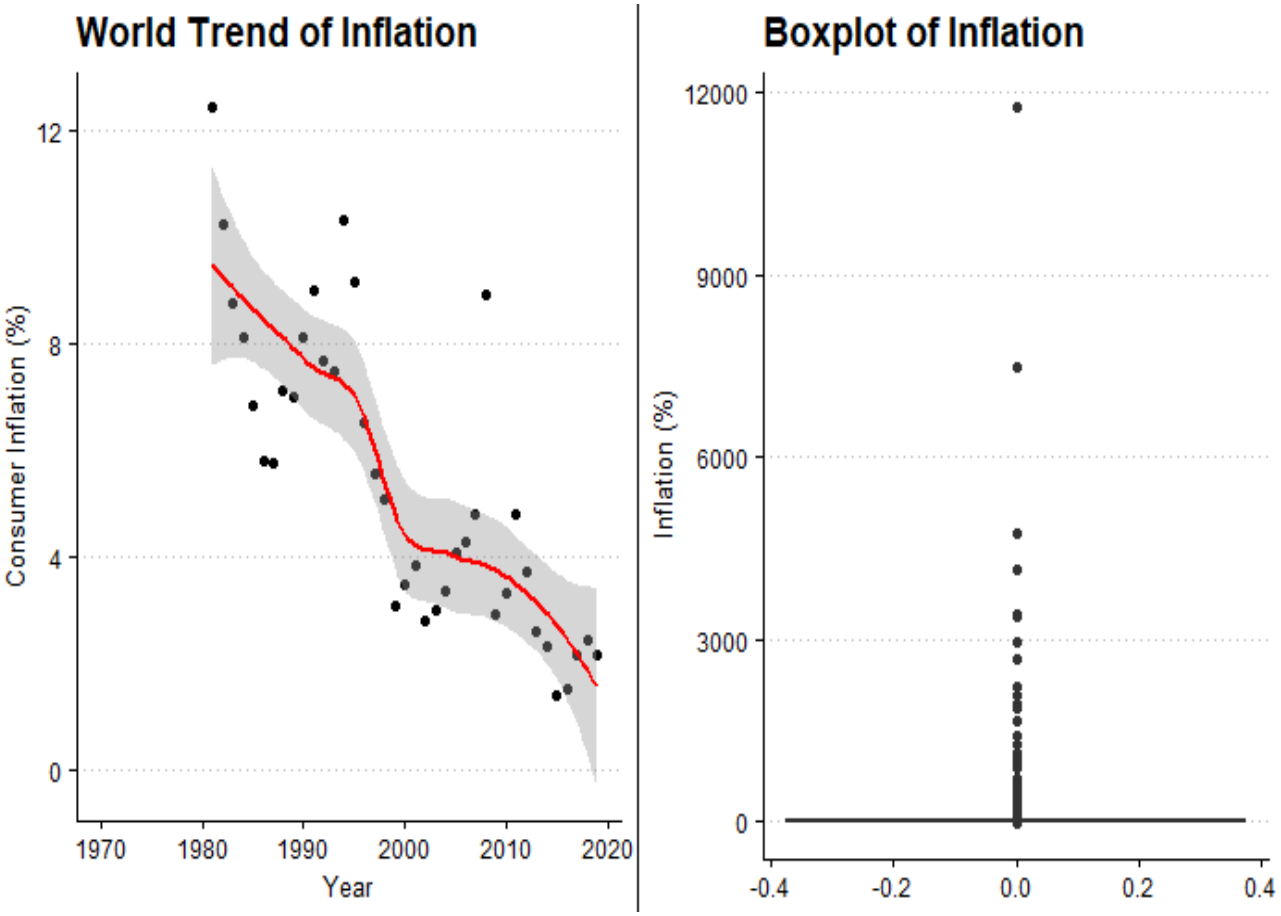
The graph on the left is a scatterplot of the global level of the natural log of GDP/Capita over the time period 1970-2019. The graph on the right shows the distribution of the natural log of GDP/Capita for all country-year observation over the time period 1970-2019. Data is from the World Bank.

9.2.9 Figure 9: Average Inflation by Country



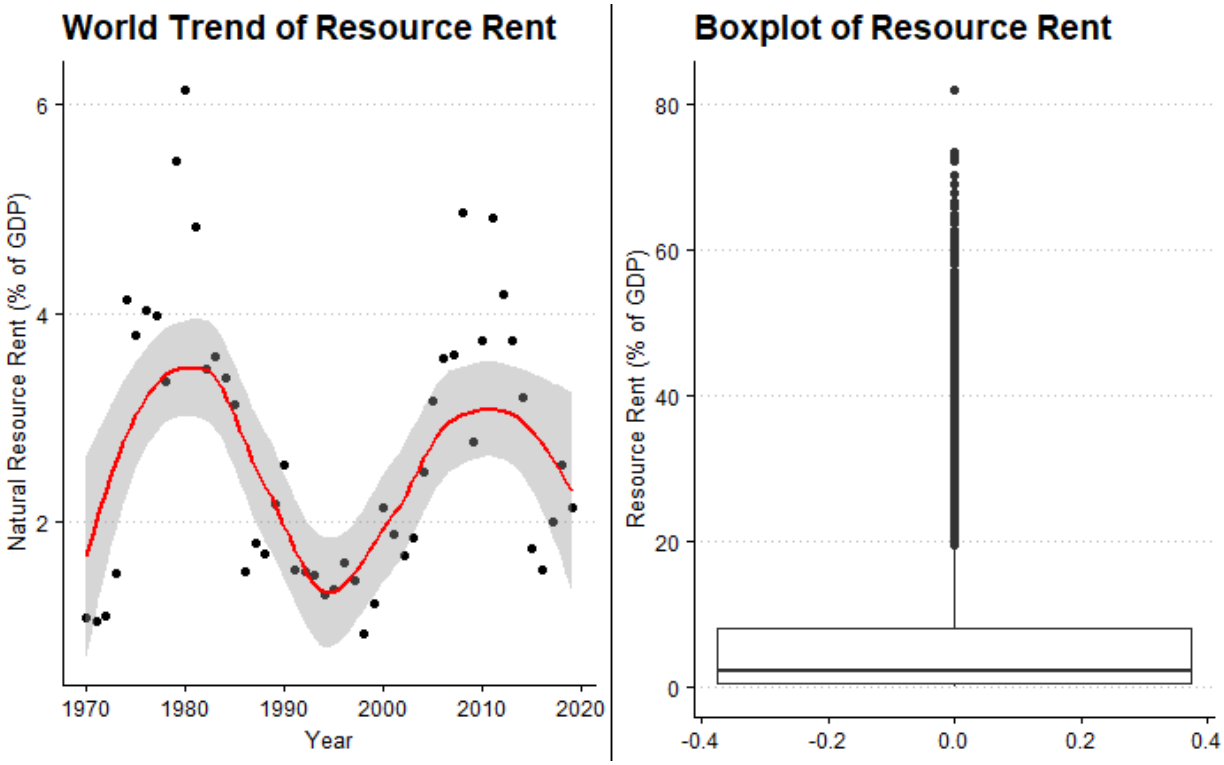
This is a bar plot of the countries in the top quartile of average inflation experienced in the time period 1970-2019. Data is from the World Bank.

9.2.10 Figure 10: World Trend of Inflation & Boxplot of Inflation



The graph on the left is a scatterplot of the global average consumer inflation each year over the time period 1970-2019. The graph on the right shows the distribution of consumer inflation for all country-year observation over the time period 1970-2019. There are a significant number of outliers on the upper end of the distribution. Data is from the World Bank.

9.2.11 Figure 11: World Trend of Resource Rent & Boxplot of Resource Rent



The graph on the left is a scatterplot of the global average resource rent (expressed as a percentage of GDP) each year over the time period 1970-2019. The graph on the right shows the distribution of resource rent for all country-year observation over the time period 1970-2019. There are a significant number of outliers on the upper end of the distribution. Data is from the World Bank.