



# Detecting Illegal Arms Trade in South Sudan

*A quantitative analysis of arms trade during embargo*

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Master Thesis in Economics and Business Administration

Major: Business Analytics

NORWEGIAN SCHOOL OF ECONOMICS

This thesis was written as a part of the Master of Science in Economics and Business Administration at NHH. Please note that neither the institution nor the examiners are responsible – through the approval of this thesis – for the theories and methods used, or results and conclusions drawn in this work.

## **Abstract**

This thesis uses an event study methodology to detect potential embargo violations in South Sudan based on chains of reactions by individual stocks. The results show that out of 87 companies included in this study, 10 have potentially been involved in illegal arms trade. All these companies have their headquarters in either the US or China. The thesis also examines whether members of the United Nations Security Council (UNSC) are influenced by the interests of the embargo violating companies headquartered in their country. The results from a sentiment analysis on American and Chinese speeches at the UNSC show that there is no consistent behavior suggesting that countries act in the interests of embargo violating companies. The results also indicate that sentiment analysis alone is inadequate to assess the behavior of member states in the UNSC meetings. This paper therefore also includes a quantitative assessment of alternative motives and strategic factors to provide a more comprehensive understanding of why the UNSC representatives act as they do.

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# 1. Introduction

Since its birth in 2011, South Sudan has experienced constant conflict and unrest. Political disagreements and ethnic disputes developed into a civil war in 2013. The war lasted until 2018 resulting in an estimated death toll exceeding 400 000 and the displacement of nearly 4 million people (CFR, 2021). During the years of conflict, the youngest nation in the world was left fragile, unstable and in economic distress. For many, the only resort was to pick a side and take up arms.

As a response to the ongoing hostilities and peace agreement violations, the United Nations Security Council (UNSC) imposed an arms embargo on South Sudan in 2018 (UN, 2018). The UNSC regarded the situation in South Sudan to be a significant enough threat to peace and security, finding it necessary to prohibit any export of arms into the country. However, from previous experience with embargos, it is known that violations are common due to the large profits that can be derived from embargo breaches (Sprague, 2006; Schroeder & Lamb, 2006). South Sudan is likely no exception (Amnesty International, 2020), providing reason to believe that there have been, and still exist, illegal streams of arms into the country.

This thesis makes use of event study methodology to detect illegal arms trade. Based on the assumption that company insiders and well-informed investors are likely to be aware of illegal trades, the event study methodology looks for consistent abnormal stock reactions that may suggest illicit behavior. The thesis also investigates the power dynamics in the UNSC related to arms trade. Assuming that the UN representatives are aware of the interests of their countries' arms trade companies, it is interesting to evaluate whether the UNSC discussions may have been motivated by the prospects of revenue from arms export. To evaluate the discussions, a sentiment analysis framework has been used to assess the contributions of the different member states in the UNSC meeting records.

The event study framework requires event and stock data to analyze the impact of an event on stock prices. An automated event selection through sentiment analysis versus human selection is discussed. The sentiment analysis shows that important events obtain low scores, and a sole focus on these scores would exclude significant events. This concern underlines the need for human screening in the selection of events. The final selection of events is based on a qualitative assessment of historical information, number of news articles and number of

fatalities related to the events. 13 events that unambiguously increase or decrease hostilities during the embargo have been identified. Arms trade companies have been identified based on their standard industrial classification (SIC) codes or presence in Stockholm International Peace Institute's (SIPRI) top 100 database of arms-producing and military service companies. Daily stock data for these 87 companies has been gathered and used in the event study.

For each company, abnormal returns are computed for the three days surrounding each event. During the embargo, if a company is not involved in arms trade or exporting arms legally to other countries, an event increasing hostilities should either (i) not affect the stock price or (ii) decrease the stock price. The latter is because an event that increases the conflict level is likely to delay the removal of the embargo and thus the restoration of legal trade. If a company is trading illegally, a hostility-increasing event would increase the stock price, as it increases the demand for (illegal) weapons during the embargo.

The findings show patterns aligned with illegal trade for 10 companies. Out of these companies, 6 are headquartered in the US and 4 in China. Compared to the ratio in the data, China is considerably over-represented among the violators. The ratio of companies headquartered in China is 40% among the violators, while it accounts for 6,9% of the input data. Conversely, the ratio of companies headquartered in the US is slightly higher among the violators (60% vs. 41%). The sentiment analysis, used to estimate the UN members' attitudes in the UNSC meetings, shows that China's sentiment score is consistently above the score observed for the US. The difference in sentiment scores for these two countries suggests that China has had a more positive attitude towards the situation in South Sudan than the US throughout the UNSC meetings. Further investigation into two UNSC meetings shows that there is a difference in voting behavior and choice of wording for the two countries, probing further discussion on the motives of the representatives and their respective countries.

The research in this thesis is related to several fields of literature. Firstly, it relates to literature on arms embargo breaches (Control Arms Campaign, 2006; Moore, 2010). Secondly, it is closely related to financial event studies on political events (Guidolin & La Ferrara, 2007; DellaVigna & La Ferrara, 2010; Dube et. al., 2011). Thirdly, it contributes to the literature on the dynamics of the UNSC (O'Neill, 1996; Chaziza, 2014). Lastly, the research conducted is linked to studies incorporating sentiment analysis to assess the content in textual sources (Liu et. al., 2007; Dekalchuk et. al., 2016).

## 2. Literature Review

Illegal arms trade is an extensive topic and diverse research has touched upon different aspects within this area. In many cases, the same actors involved in illegal arms trade are also involved in the legal trade of weapons, often making it challenging to distinguish the culprits from the compliant companies. Although it is difficult to identify embargo breaches, there are scholars who have used an event study approach to detect illegal arms trade. To gain a better insight into the motives of illegal arms trade, the UNSC dialogs provide a starting point to discuss incentives that countries might have. Applications of sentiment analysis used to assess statements also seem appropriate to evaluate the UNSC meetings. This section presents the most relevant literature, discusses how the authors conduct their research, and points out how this thesis contributes to the literature.

This thesis relates to literature on arms embargo violations (Control Arms Campaign, 2006; Moore, 2010). A report published by the Control Arms Campaign (2006) presents concerns over the enforcement and monitoring of UN arms embargoes. The report points towards systematic embargo breaches in several countries, undermining the efficiency of arms embargoes and the UN. In a study conducted by Moore (2010), different factors that lead to arms embargoes are discussed. Moore finds that states are willing to violate embargoes to advance their own strategic interests. In general, the literature on this topic focuses on the limited effectiveness of arms embargoes. This thesis contributes to the topic by focusing on embargo violations in South Sudan. Moreover, the sentiment analysis provides an assessment of the UN member states' attitudes related to embargoes, providing reason to believe that states are willing to violate embargoes to govern their own strategic and financial interests.

The thesis also relates to event studies on political events in areas of conflict (Guidolin & La Ferrara, 2007; Della Vigna & La Ferrara, 2010; Dube et. al., 2011). With a focus on Angola, Guidolin and La Ferrara (2007) study whether increased hostility may be regarded as beneficial for certain companies operating in areas of conflict. DellaVigna and La Ferrara (2010) conduct a comprehensive study on detecting illegal arms trade. They propose an event study method to detect illegal arms trade. They find “positive event returns for companies headquartered in countries with high corruption and low transparency in arms trade” (DellaVigna & La Ferrara, 2010, p. 26), providing reason to believe that companies headquartered in certain countries may be more likely to violate embargos. Lastly, Dube et. al. (2011) study how coups and secret coup authorizations affect asset prices of partially

nationalized companies. This thesis draws inspiration from all three papers for the choice of research topic and design. DellaVigna and La Ferrara's study has been especially helpful in building the methodological framework. This thesis supports the literature by confirming the relevance of the framework as a method to detect potential violations for ongoing embargoes.

This paper also complements literature on the dynamics of the UNSC (O'Neill, 1996; Chaziza, 2014). Existing literature study the structural characteristics of the UNSC and discusses how strategic interests might influence behavior and voting decisions in UNSC meetings. The findings in this thesis suggests that there are evident differences in attitude between the US and China on South Sudan throughout the UNSC meetings.

Lastly, this thesis is related to literature on the application of sentiment analysis (Liu et. al., 2007; Dekalchuk et. al., 2016). Sentiment analysis is often used within a range of disciplines to interpret reviews and opinions. Dekalchuk et. al. (2016) uses sentiment analysis in a political context. They investigate how voting patterns of members in the European Parliament (MEPs) are affected by national interests rather than their affiliation to a transnational political group. Based on MEPs' written questions to the European Commission, the authors find that questions related to Russia are regarded twice as negative in tonality compared to the average question. Furthermore, when looking at Russia-related questions, Dekalchuck et. al. find that there is more variation in modality, indicating that MEPs vote in line with their national affiliation rather than their political group affiliation. This study contributes to the literature on sentiment analysis by applying dictionary-based analysis to a series of political statements. This application shows that sentiment analysis can be used to map out the sentiments of different speakers over time. The results can then be used to discuss relative attitudes on matters of concern and gain insight into how these attitudes change over time. Additionally, this study contributes to the literature on event selection based on sentiment analysis. Findings from the event selection in this thesis suggests that a selection based purely on a sentiment analysis is insufficient in capturing all events that are of importance. Human screening is therefore needed to evaluate individual event importance.

### 3. Conceptual Framework

This section introduces the conceptual framework that underlies the research in this thesis and presents the hypotheses tested in Section 5. First, this section focuses on the event study and discusses the foundation of the first hypothesis. Thereafter, the conceptual framework for the sentiment analysis is presented, providing reasoning for the second hypothesis.

The event study isolates events that change the demand for weapons in South Sudan during the UN arms embargo. In addition to affecting the demand for arms, these events also affect the prospects of an extended embargo. An example could be an unexpected rebel attack against the ruling party. The incident would escalate the conflict level, and thus increase the demand for arms as well as the likelihood of an extension of the embargo. The thesis focuses on the UN arms embargo, and thereby not EU or unilateral embargoes.

The value of a company is based on the sum of current and expected future profits. Arms embargoes impact the value of arms trade companies by raising the cost of exporting arms. Companies with high cost of violating embargoes will abstain from selling arms to country under embargo, while companies with low cost of violation could disregard possible sanctions and continue to export arms under embargo. The existence of an embargo will thereby affect the prospects of payoffs differently across types of companies. While compliant companies might experience a decrease in value, violating companies reaping the benefits of embargo breaches would observe a positive impact on company value. Based on different company attitudes towards sanctions, there is reason to believe that embargo breaches in South Sudan have been present, leading to the first hypothesis:

*H<sub>1</sub>: There is significant evidence consistent with illegal arms export to South Sudan.*

To gain a broader understanding of the motives behind embargo violations, a sentiment analysis is conducted to evaluate the influence of government policies, reflected in the UNSC meeting transcriptions. The event study provides a list of potential embargo violators. Considering these violators, the sentiment analysis of the UN representatives' statements will be used to evaluate whether the interests of companies headquartered in the member states have motivated representatives' attitudes towards imposing an embargo.



Companies with low cost of violation benefit from less competition during an embargo due to the exclusion of compliant arms dealers. From a violating company's perspective, the prospect of imposing and extending an embargo is therefore positive. Imposing an embargo could increase the current value of violating companies by reducing competition, while an embargo extension would increase the expected future payoffs. It is therefore in the violating companies' interests that the UNSC imposes an embargo, and once in place, further extends it. The results from the sentiment analysis are used to discuss whether there are any potential links between the representatives' attitudes related to the embargo and company interests. With the assumption that the UN representatives are aware of the interests of companies headquartered in their countries, the second hypothesis follows:

*H<sub>2</sub>: The UN members that headquarter embargo violators are more inclined to advocate for imposing and extending arms embargoes.*

## 4. Background

In 2005, a comprehensive peace agreement between the Khartoum government and the Sudan People's Liberation Army/Movement (SPLA/M) was signed. The agreement was put in place to stop the ongoing conflict in Sudan, and to allow for an independence referendum in South Sudan. Six years later, in 2011, the referendum was held and with a majority vote of nearly 99%, South Sudan declared its independence on the 9<sup>th</sup> of July 2011 (Rolandsen & Daly, 2016).

Upon independence, South Sudan struggled with resolving central issues. Sudan and South Sudan nearly went to war during discussions over the terms of secession, leading to battles between the two nations and a halt in oil production. The disputes continued until early 2013 when an internal struggle in SPLM became evident. The main factions were the supporters of the President, Salva Kiir, followers of the Vice President, Riek Machar, and a group of politicians that had been close to the former leader of SPLM/A, John Garang (Rolandsen & Daly, 2016).

The internal rivalry led to the SPLM being split into two major opposing factions, primarily based on ethnicity. On the one hand, the SPLM leader Salva Kiir from the Dinka tribe continued to act as President of South Sudan. On the other hand, Riek Machar from the Nuer tribe gained support for the establishment of SPLM-in-Opposition. In addition to these two major parties, several smaller factions contributed to complicating the political landscape in South Sudan. In December 2013, the SPLM's party conference outside the capital of Juba broke out into gun violence, resulting in Machar fleeing the country and marking the start of a long-lasting and complex civil war (Idris, 2018).

The following years witnessed several failed peace agreements between the warring parties. In February 2017, a famine was officially declared by the UN in large part due to civil war and economic collapse (Idris, 2018). With little progress being made, the UNSC decided to impose an arms embargo on South Sudan in July 2018 (UN, 2018). Under pressure from the international community, President Kiir signed a power-sharing agreement with Machar and other opposing factions during the following month, marking the end of a five-year-long civil war (UN, 2020). Nevertheless, sudden clashes and widespread violence leaves South Sudan fragile, and in crisis. The UNSC has therefore decided to uphold the embargo until the country is able to transition into a stable state (UN, 2021).

## 5. Data Selection

### 5.1 Companies and Stock Data

Similar to DellaVigna and La Ferrara's (2010) study on detecting illegal arms trade, the selection of arms trade companies in this thesis is based on two independent criteria. The first criterion is that the company is included in the Stockholm International Peace Research Institute's (SIPRI) Top 100 list. The list consists of the 100 largest arms-producing and military service companies based on revenues derived from arms sales (SIPRI, 2018). The second criterion is that the company is listed with a Standard Industrial Classification (SIC) code related to arms trade. A SIC code is used to classify the primary business of a company (SICCODE, 2021) and can thereby be used to select relevant companies for this study. To control for double listings (cases where a company is classified with two SIC codes), data cleaning has been done to ensure that each company only has one stock price per date. The relevant SIC codes linked to arms trade, and related industry descriptions, are presented in Table A1 of the Appendix.

Based on the compiled list of companies from the two sources described above, the CUSIP or ISIN codes are extracted. CUSIP and ISIN are unique codes used to identify securities that are traded on the stock market. While CUSIP codes are limited to North American companies, ISIN codes are used in most parts of the world (ISIN, 2021). These codes are used to retrieve stock data from Compustat with access through Wharton Research Data Services (WRDS). Companies without any of these codes are excluded from the data, implying that the data is limited to companies that are publicly traded on an international stock exchange.

When retrieving the stock data, the date, company name, country of headquarters, CUSIP or ISIN code and daily closing price is included. Country of headquarters is included to match the companies with their respective regional Fama-French factors used in the regression. Stock data dating back to 2017 is regarded to be sufficient for the estimating event returns during the embargo. Lastly, penny stocks, defined as "stocks with price of less than two units in the local currency unit" (DellaVigna & Ferrara, 2010, p. 34) in 90% of the observations, are removed. The final data consists of 87 companies from 20 different countries. The distribution of companies based on country of headquarters is presented in Figure 1.

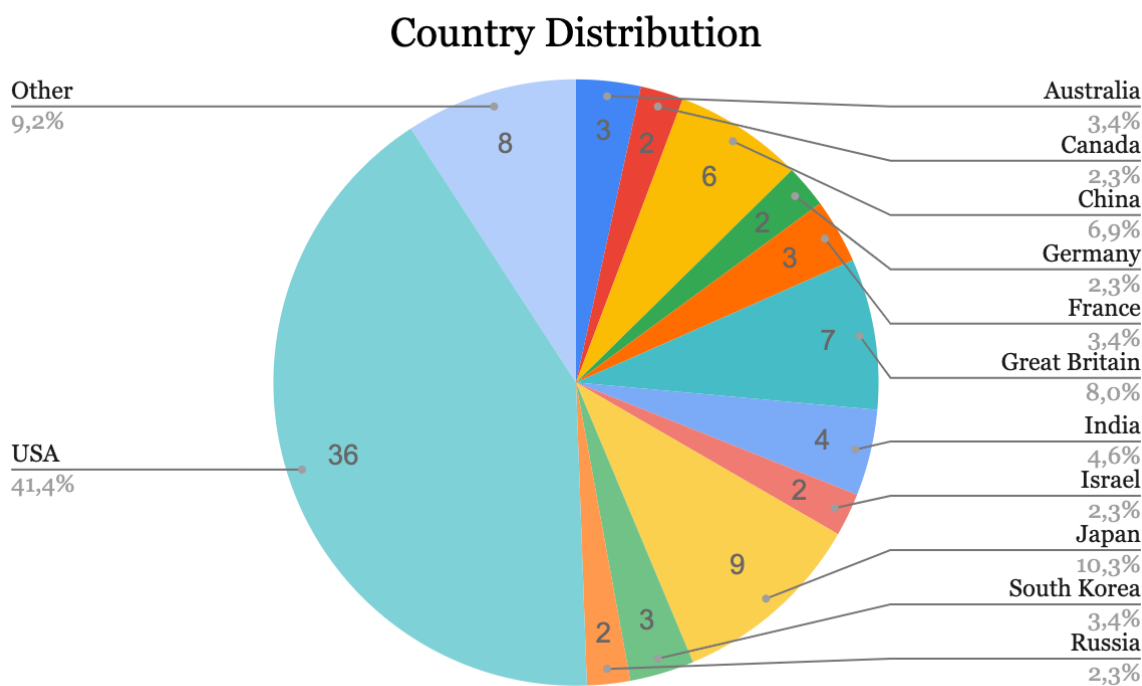


Figure 1

*Notes:* The figure presents a pie-chart of the number of companies per country based on the location of headquarters. All countries with only one company are compiled in “Other”.

## 5.2 Fama-French Factors

The Fama-French factors used in this study are specific to four regions, namely Europe, Japan, Asia Pacific (excluding Japan) and North America. The factors have been retrieved through the Tuck School of Business’ data library (Tuck, 2021). The choice of regional factors for the different companies is based on their country of headquarters. For some of the countries, it has not been straightforward to identify which region is most appropriate. In these cases, the region that is closest related to the country has been chosen. For example, the retrieved company data includes companies from Oman and Peru, however it is not clear which one of the four regions the countries belong to. Asia Pacific factors are therefore used for these companies, as this region seems closest related to the country of headquarters.

## 5.3 Events

In the selection of events, the goal is to assemble a list of important incidents that have significantly impacted the intensity of the conflict in South Sudan. The selected events must therefore have either increased or decreased the conflict level unambiguously, suggesting that each event could have affected the demand for arms. The data has been retrieved from the Armed Conflict Location and Event Data Project (ACLED), providing country specific data

on political violence, protests, and other important events (ACLED, 2021). However, since the data lacks information related to the importance of the events, there has been conducted an assessment based on readings of the history of South Sudan to evaluate event significance as a basis for comparison and event selection. In the detection of illegal arms trade, only events after the embargo was imposed in 2018 have been regarded.

Initially, the selection of events that increase conflict intensity was based on the number of fatalities (more than 50 fatalities), while events that decrease conflict intensity were limited to the ones listed with the sub event type “Agreement” in the database. This selection method managed to capture several severe incidents and key agreements, but it failed to include important events where less than 50 people were killed. The stringent focus on 50 fatalities would leave out crucial events such as the dismissal of the cabinet.

An alternative selection method based on a sentiment analysis was therefore conducted as a basis of comparison. The sentiment analysis ranks the events according to hostility level based on their descriptions in the database. For every event, each word in the description is given a score based on how negative or positive it is regarded as. These scores are then added to rank the events from most to least hostile. However, the events selected based on their sentiment scores did not reflect the actual degree of perceived hostility related to the events as most of the historically important events were left out. To illustrate how a pure sentiment analysis suffers when ranking the relevance of an event, ten events have been listed in Table 1. The first five events are the events included in the final dataset with the lowest sentiment scores, while the last five are the ones from ACLED with the largest absolute sentiment score. The purpose of using absolute scores is to retrieve the events that are regarded as most positive or negative by the sentiment analysis.

Event Note	Avg. Sentiment Score	Fatalities
<b><u>Lowest scoring events – final data</u></b>		
1. President appoints new leaders in the Upper Nile state, with consent from SPLM-IO leader, ending a stand-off between the parties	0.07	0
2. Renewal of the UNMISS	0.06	0
3. Three factions of the SPLM agreed to re-unite, including a smaller branch of the SPLM-IO	0.05	0
4. Kiir and Machar sign the Khartoum Declaration of Agreement	0.02	0
5. Kiir orders release of prisoners of war, in compliance with revitalized peace agreement	0.01	0
<b><u>Highest scoring events - raw data from ACLED</u></b>		
6. Raid attack, killing a prison guard	-0.92	1
7. Return of exiled politicians, reunited with SPLM	-0.82	0
8. Raid attacks killing several people and stealing cattle	-0.77	12
9. Raid attacks killing several	-0.73	7
10. Raids killing 1 and stealing 4500 cattle	-0.72	1

Table 1

*Notes:* List of events from the cleaned dataset used in this thesis and the events in the original data retrieved from ACLED. See Table A3 of the Appendix for the detailed event descriptions.

If the event selection were to be purely based on a sentiment analysis, important events such as the signing of the Khartoum Declaration of Agreement (event 4) would have been left out due to its neutral sentiment score of 0.02. The use of wording in the event description could increase the relevance of an event that otherwise would be irrelevant for the conflict intensity in South Sudan. For instance, in event 6, the killing of a single prison guard may not seem like the most influential event for the hostilities in South Sudan, however it obtains the highest sentiment score. Event 7 however, has a negative sentiment score, when in practice the event seems to have had little or even positive impact on the level of hostilities.

The initial selection method based on fatalities and listings of “Agreement” therefore seemed more reliable as a starting point. To address the issue of missing important events in the database, the event selection was extended to include events based on a qualitative assessment of the events. In the qualitative assessment, events of importance were gathered through various literature on South Sudan and the UNSC reports. To estimate the relative importance of each event, the aim is to evaluate whether the event was important enough to

attract the interest of media and investors. The estimation is done by examining the number of news articles in the LexisNexis database related to the event on the same and next day of the event. The search was done by finding all articles that mention South Sudan during these days and thereafter narrowing the search down to include event-specific details such as location (e.g., “Juba” or “Bentiu”) or involved parties (e.g., “SPLA-IO” or “Yau Yau”). The number of stories was thereby used as a proxy of event importance to evaluate and determine which events to include in the analysis.

Lastly, the model used in this thesis requires that there are no overlapping events in the event window of 21 days. Where events are overlapping, the events that have been regarded as less important are excluded from the dataset. This exclusion has been done to prevent any unexpected removal of more influential events. The final data consists of 13 independent events, ranging from 2018 to 2021, where 4 of the 13 events are regarded as hostile. A complete list of the selected events during embargo is presented in Table A1 of the Appendix.

#### **5.4 UNSC Meeting Reports**

For the sentiment analysis on the UNSC discussions, meeting reports published by Security Council Reports (SCR, 2021) have been examined. The UNSC meeting reports provide a detailed record of the proceedings of a meeting including transcriptions of contributions by individual Security Council members. The meeting reports are therefore suitable for the sentiment analysis as they allow differentiation between speakers and relate the contributions to the respective countries. Although there are other types of UN documents such as presidential statements and letters available, the UNSC meeting reports seemed to replicate the discussions and individual opinions of member states most accurately.

The sentiment analysis requires the input data to be in a textual format. All meeting reports, available in pdf-format, dating back to 2011 when South Sudan became an independent country are retrieved. Out of the 57 meeting reports on South Sudan during the past 10 years, 26 of them are not formatted with standard text, often consisting of scanned pages, making it challenging to retrieve sentences and data for the sentiment analysis. These faulty reports are therefore excluded from the analysis. An overview of the documents show that missing text is mostly the case for reports published before 2016. Since the analysis is concerned with the discussions leading up to and during the embargo, the absence of reports prior to 2016 is not regarded as a problem. The final data consists of 31 pdf-documents, one for each meeting report included in the analysis.

Summary statistics for the five permanent members in the UNSC are shown in Table 2.

During these meetings, the US has been the country that on average has spoken the most with 874 words, while China has spoken the least with 545 words. Furthermore, China and the US are the two countries with the highest and lowest sentiment scores, respectively.

<b>Country</b>	<b>Avg. Score</b>	<b>Min. Score</b>	<b>Max. Score</b>	<b>Avg. No. of Words</b>	<b>Min. Words</b>	<b>Max. Words</b>	<b>Avg. SD</b>	<b>Min. SD</b>	<b>Max. SD</b>	<b>No. of Entities</b>
China	0.24	0.13	0.36	545	41	983	0.27	0.11	0.36	23
France	0.18	0.04	0.29	673	73	1638	0.29	0.16	0.35	20
Russia	0.16	0	0.25	586	84	1004	0.25	0.16	0.3	20
UK	0.12	-0.06	0.24	762	299	1039	0.3	0.25	0.36	20
USA	0.08	-0.12	0.2	874	83	2131	0.29	0.11	0.34	23

Table 2

*Notes:* Summary statistics on the UNSC meeting transcripts for the five permanent members in the Security Council.

Additionally, the use of different dictionaries results in sentiment scores different from the original dictionary. The sentiment scores are however similar, with the US appearing more neutral in its tone than China. A table with summary statistics of the results from the three dictionaries can be found in Table A4 of the Appendix.



## 6. Methodology

This section presents the methodology used to test the two hypotheses. It provides clarification of key terms as well as a description of the research design used throughout this study. First, the event study framework used to detect companies involved in illegal arms trade is explained. Thereafter, a description of the sentiment analysis used to study potential connections between the UNSC members' behavior and the interests of arms companies is presented.

### 6.1 Event Study

The event study methodology is widely used to measure stock price reaction to an announcement or event (Binder, 1998). This thesis makes use of the methodology to study how stock prices respond to events that either increase or decrease conflict intensity. Individual event studies for each company-event pair are conducted to detect any patterns of illegal company behavior.

According to  $H_1$ , it is expected that significant events result in an increase or decrease in the stock price of the affected company on the days of the event. To test the hypothesis, the event study methodology considers the cumulative abnormal return (CAR) around the days of the event. CAR reflects investors' views on future cash flows due to expected changes in the demand for arms. Since the events included in this study are publicly announced in news articles, it is expected that any stock price reactions are absorbed during a short time span after the events take place. The event study methodology follows MacKinlay's (1997) framework with a regression controlling for three Fama-French factors (excess stock exchange returns, SMB and HML).

The Fama-French three-factor model is used as a benchmark with the estimation equation

$$E(R_{i,t}) = R_{f,t} + \hat{\beta}_i(R_{m,t} - R_{f,t}) + \hat{S}_iSMB_t + \hat{H}_iHML_t$$

Equation 1

*Notes:* The Fama-French three-factor model equation for estimating expected returns.

where  $E(R_{i,t})$  is the expected return of company  $i$  on day  $t$ . The Fama-French three-factor model is an extension of the Capital Asset Pricing Model (CAPM). While CAPM estimates expected return ( $E(R_{i,t})$ ) as the risk-free rate of return ( $R_{f,t}$ ) plus the market risk premium

$(R_{m,t} - R_{f,t})$  times the risk of the stock ( $\hat{\beta}_i$ ), the Fama-French three-factor model also includes two additional risk factors. These risk factors are size (small minus big, SMB) and value (high minus low, HML), also called book-to-market ratio. The reason for including these factors is that Fama and French (1993) found that small firms tend to outperform big ones, and similarly that high book-to-market firms tend to outperform firms with low book-to-market firms. The coefficients  $\hat{\beta}_i$ ,  $\hat{S}_i$  and  $\hat{H}_i$  are estimated by linear regression and are measures of sensitivity or correlation of the stock to changes in the general market. The normal returns are estimated based on a pre-event window of 120 days and an event window of 21 days.

Abnormal returns are computed by subtracting normal returns from the actual observed returns. The benchmark specification estimates a 3-day return, starting on the day before the event and the abnormal returns are therefore aggregated to get the 3-day CAR. For every company-event pair, the CAR is then regressed on an indicator for the respective event. The t-values are extracted from the regression to determine statistically significant company-event reactions.

For every company-event pair during the embargo, the null hypothesis is tested. The null states that the event has not had an impact on the CAR, meaning that the CAR is zero. By performing a two-tailed t-test on each company-event pair, the null is rejected based on a 5% significance level. In cases where the null has not been rejected, there is no reason to believe that the observed company has been involved in illegal arms trade. Similarly, compliant behavior is consistent with negative (positive) CARs in cases where events increase (decrease) the hostility level. This behavior is because these events would likely delay (haste) the lifting of the embargo and subsequently delay (haste) future legal arms trade. However, if the null has been rejected based on a positive (negative) CAR related to an event that increases (decreases) hostility level, it is believed that the company has been involved in illegal arms trade.

On the one hand, events that increase hostilities will result in that embargo violating companies benefit from both increased demand for arms and probability of an embargo extension. On the other hand, non-compliant companies are harmed by hostility-reducing events. Events that decrease the conflict level and increase the likelihood of the embargo being lifted would imply less demand for arms and increased competition from compliant companies.

To detect companies that violate the embargo, separate regressions are conducted for each company-event pair. When combining the event data with company data, 1058 such pairs for the embargo period are found. These pairs are analyzed to find cases where a company has a significant reaction aligned with behavior which may suggest an embargo violation, hereafter referred to as an *illegal reaction*. Moreover, chains of these illegal reactions are identified. When detecting illegal chains of illegal reactions, three illegal reactions are required to consider a company as an embargo violator. The purpose of looking for chains is to find multiple significant reactions consistent with illegal arms trade for a single company. While a single illegal reaction could be due to a coincidence or false positive, a chain will to a larger extent indicate that a company has been involved in illicit arms trade.

## **6.2 Sentiment Analysis**

Sentiment analysis aims to extract subjective information from text by applying text analysis techniques and natural language processing (Hussein, 2018). Also known as opinion mining, sentiment analysis enables the user to gather data on emotions, polarity, and opinions in a text. In the case of the UNSC meeting reports, the use of sentiment analysis enables an analysis of how the different members and their respective countries express themselves verbally at the Security Council.

### **6.2.1 Sentimentr**

There are several different types of sentiment analyses, and their uses differ on what type of sentiment should be processed, e.g., emotions. In this thesis however, a context polarity-based approach with the *sentimentr* package in R is used, as opposed to other also widely used packages such as *syuzhet* or *Rsentiment*. The *sentimentr* package calculates text polarity sentiment on a sentence level and allows the user to access dictionaries from other packages (Ricker, 2021).

### **6.2.2 Dictionaries**

There are different dictionaries that can be used in sentiment analysis, all containing different types of words and different scoring systems. For this analysis, the default dictionary in the package is chosen, which consists of the *syuzhet* dictionary made by Jockers (2020) and weighted valence shifters. The dictionary contains 11709 words, with most of the words

being of a negative sentiment. The words have an associated sentiment value ranging from 1 (positive) to -2 (negative), where 0 is regarded as a neutral word. These values are used to calculate the average sentiment score for a sentence or a group of sentences. In this thesis, an average sentiment score ranging between -0.05 and 0.05 is regarded as a neutral sentiment. Other dictionaries such as *afinn* and *bing* contain fewer and different words than the default dictionary. *afinn* computes a sentiment value between [5, -5] and includes words from colloquial language, and the dictionary is often used for analysis of twitter posts. *bing* is closely related to the *syuzhet* dictionary containing similar types of words. However, it either classifies a word as -1 (negative) or 1 (positive), and it contains only half the number of words as the *syuzhet* dictionary. Using the default dictionary in the *sentimentr* package, the results will have continuous sentiment scores spanning from [-2,1] per speaker for each meeting.

### 6.2.3 Valence Shifters

The inclusion of valence shifters is what differentiates *sentimentr* from other dictionaries. A valence shifter is a word that reverses, increases, or decreases the impact of a polarized word, known as negators, amplifiers and deamplifiers respectively. To illustrate the difference between the dictionaries, *bing* and *sentimentr* will be compared. With the use of *bing*, sentences like “The agreement is great for South Sudan” and “The agreement is not great for South Sudan” would be regarded as equal, given a positive score of 1 (due to the use of “great”), since *bing* consider negators improperly. *Sentimentr* on the other hand, creates an observation window of the four preceding words and the two words after the polarity word in focus looking for valence shifters (Naldi, 2019). In this example, the word “not” would reverse the sentiment and yield a negative sentiment value, therefore indicating a totally different sentiment in the sentence than what *bing* does.

There are more sophisticated ways to analyze sentiments, such as with the use of machine learning or other AI powered text mining techniques. However, for the purpose of this thesis, a dictionary-based sentiment analysis will be sufficient to gain insights into the dynamics of the meetings. Additionally, several comparative studies show that *sentimentr* is preferable when using dictionary-based methods, since it balances speed and accuracy, with the increased accuracy coming from the inclusion of valence shifters (Kawate & Patil, 2017; Naldi, 2019).

## 7. Results

In this section results from the event study and sentiment analysis are presented. The event study is used to estimate whether events that increase or decrease conflict intensity affect stock returns of arms companies during the embargo. With the use of this framework,  $H_1$  is tested against the null hypothesis stating that there is no evidence consistent with illegal arms exports to South Sudan. With regards to the sentiment analysis,  $H_2$  is tested against the null hypothesis stating that there is no evidence suggesting that a country headquartering embargo violators is more inclined to advocate for an embargo and an extension when imposed.

### 7.1 Event Study

The results show that out of the 1058 company-event pairs, 102 of them reveal illegal reactions. Moreover, the findings present 10 chains of illegal reactions where one companies had five reactions, one had four reactions and eight had three reactions. Subsequently, 10 of the 87 companies included in the data are classified as embargo violators. Based on the detected illegal chains, the null hypothesis stating that there is no significant evidence consistent with illegal arms exports to South Sudan is rejected. The chains of illegal reactions are presented in Table 3 alongside their respective companies and location of headquarters.

Company	Country	Reactions
HUNAN NANLING IND EXPLOSIVE	CHINA	5
FLUOR CORP	USA	4
ANHUI JIANGNAN CHEMICAL IND	CHINA	3
GENERAL DYNAMICS CORP	USA	3
HUAIBEI MINING HOLDINGS CO	CHINA	3
HUNTINGTON INGALLS IND INC	USA	3
LOCKHEED MARTIN CORP	USA	3
MANTECH INTL CORP	USA	3
SHANXI TOND CHEMICAL CO LTD	CHINA	3
TRANSDIGM GROUP INC	USA	3

Table 3

*Notes:* List of companies with more than three detected illegal reactions. The table includes countries of headquarters and number of reactions for the respective companies.

Interestingly, the results show that all the violating companies have their headquarters in either China or the US. Out of these 10 companies, 4 are headquartered in China and 6 in the

US. Figure 1 from Section 5.1 shows that the company data used in this study includes 6 companies headquartered in China and 36 in the US. The ratio of American companies in the data is 41%, while among the violators it is 60%. Similarly, the ratio of Chinese companies in the data is 6.9%, while 40% of the violators are headquartered in China. Companies with headquarters in the US and especially China are thereby overrepresented among the violators in comparison to the respective ratios in the data. Due to the overall frequency of headquarters in China and the US, the following findings related to arms violators are largely based on companies headquartered in these two countries.

To evaluate the consistency of the arms violators' behavior, the following examines how the CARs for these companies compare to the "counterfactual" constituted by the CARs for companies without any observed illegal reactions. Figure 2 illustrates the average (equal-weighted) CAR on days with events that increase or decrease the hostility level during the embargo. The x-axis denotes the event dates while the y-axis refers to the subsequent 3-day average CAR. The tick marks on the x-axis with associated "-" symbols are hostile events, while the rest are regarded as non-hostile (associated with "+" symbols). The plot includes two graphs, where the red solid line represents companies that were found to be violators (presented in Table 3), while the blue dashed line represents companies with no observed illegal reactions (law-abiders) from the event study.

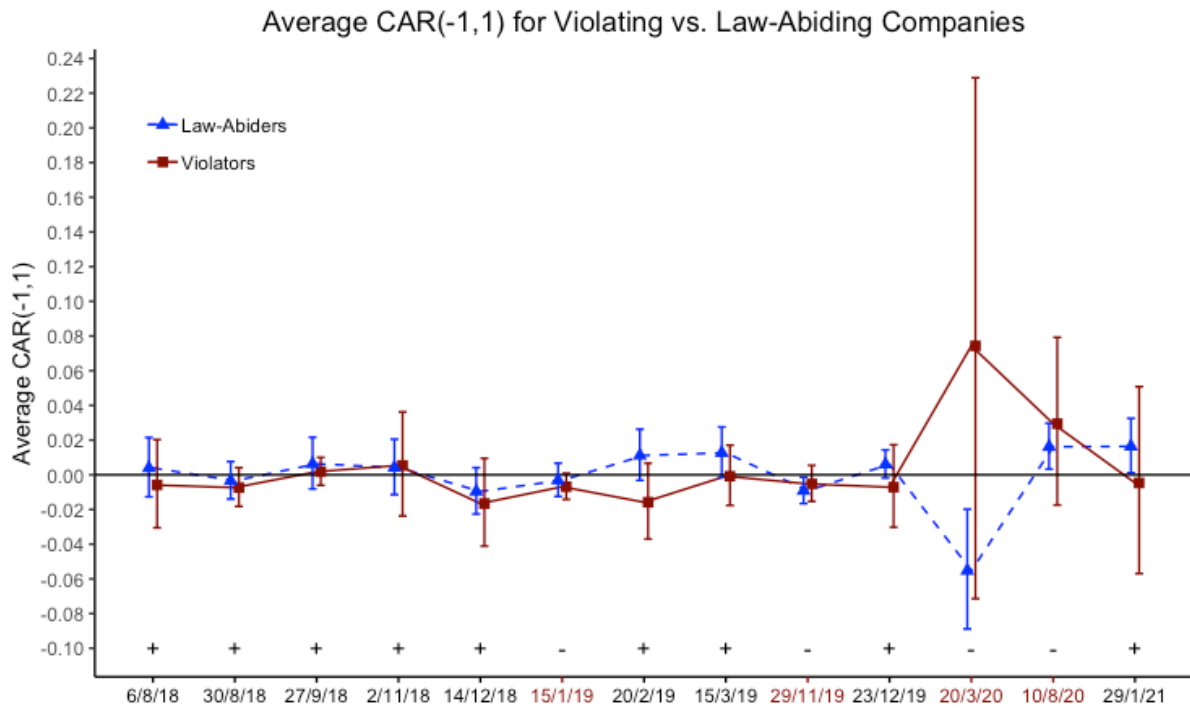


Figure 2

*Notes:* The figure displays average CAR(-1,1) separately for each event. The figure presents the returns separately for companies detected as violators (listed in Table 3) and companies with no observed illegal reactions. 95% confidence bars are included for each group of companies. The events are unexpected significant occurrences impacting hostilities in South Sudan during the embargo. The events are listed in Table A2 of the Appendix. The sign of the tick marks indicates the expected hostility effect of an event. Events regarded as non-hostile are noted with a “+” symbols, while events regarded as hostile are noted with “-” symbols.

For 10 out of 13 events, the companies labelled as violators experience CARs in accordance with illegal behavior. In 7 out of 9 events that diminish hostilities, the average CAR is negative for the violators. This reaction indicates that the violating companies are negatively affected by events that decrease the demand for weapons and increase the likelihood of the embargo being lifted. For 2 out of 4 events that increase hostilities, the average CAR is positive. The ambiguous behavior related to the hostility-increasing events makes it difficult to confirm that the violators benefit from events that both increase the demand for arms and decreases the likelihood of the embargo being lifted in the foreseeable future.

For the companies labelled as law-abiders, the results are different. For 7 out of 9 events that decrease hostilities, the average CAR for the law-abiding companies is positive, while for 3 out of 4 events that increase hostilities, the average CAR is negative. These findings suggest that the law-abiders are positively affected by events that increase the likelihood of the embargo being lifted, while they are negatively affected by events that decrease the likelihood of the embargo being lifted.

Based on 95% confidence intervals, only 3 out of 26 observed CARs in Figure 2 are statistically significant. Since most of the confidence intervals are not exclusively above or below zero, there is no statistical evidence of consistent patterns for either violating or compliant companies. Figure A1 and A2 in the Appendix show the average CARs for all American and Chinese companies and the American and Chinese violators, respectively. The plots are similar to the one in Figure 2, indicating that there is no consistent behavior for either group. Nevertheless, all three figures seem to depict a trend as described above.

For the violators, the insignificant results are likely due to that the companies only have illegal reactions for a certain number of events, the reactions on the remaining events will therefore reduce the absolute average CAR per event when grouping all violators. For the compliant companies, none of the individual company reactions on the events have been significant although the plots may suggest that most of the reactions are ambiguous.

## **7.2 Sentiment Analysis**

The sentiment analysis is conducted to find potential links between the dialogs in UNSC and the violators detected in the event study. The event study showed that nearly all the violators were headquartered in either China or the US. It is therefore interesting to investigate the development of statements from these two members to inspect whether their opinions related to the arms embargo could be motivated by the interests of arms companies headquartered in the member countries.

Figure 3 illustrates the sentiment score over time for China and the US. The x-axis represents the timeline of the UNSC meetings, while the y-axis denotes the average sentiment score. For each report, the average sentiment score is calculated per country to get an estimate of the individual country's tone during the meetings. The two graphs show that China's sentiment score is consistently above the US's, suggesting that China has a more positive tone than the US during all the meetings in the analysis. Moreover, it is notable that the two graphs follow the same pattern, indicating that though the intensity of the tone might differ, the sentiment in their speeches move in the same direction. However, there is no statistically significant difference between the sentiment scores of the two countries. Figure A3 of the Appendix presents separate plots of the sentiment scores for American and Chinese representatives with 95% confidence intervals.



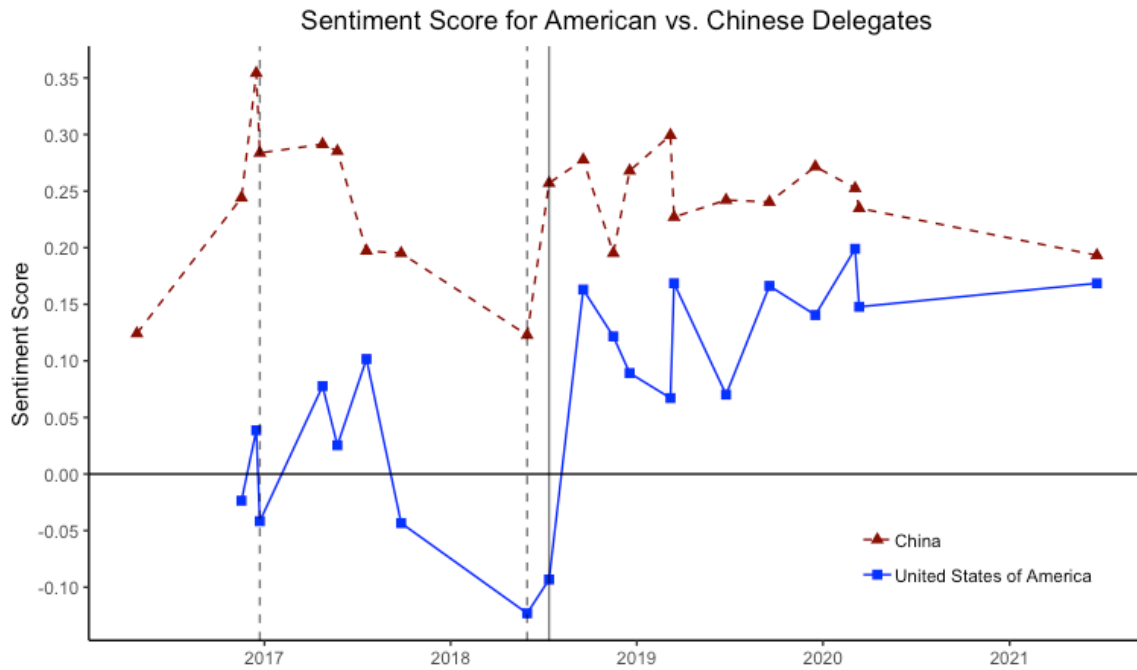


Figure 3

*Notes:* The figure displays the average sentiment scores for each UNSC meeting. The figure presents the sentiment scores for separately for China and the US. The two vertically dashed lines mark the two dates where the two countries' sentiment scores diverge the most. The solid vertical line marks the date when the embargo was imposed. Note that the first observation is missing for the US, this is because it did not contribute in this UNSC meeting since the purpose of the meeting was for external consultants to deliver speeches. China acted as the President in this meeting, and therefore spoke in between the consultants' speeches.

The null hypothesis of  $H_2$  states that there is no evidence suggesting that a country headquartering embargo violators is more inclined to advocate for an embargo and its extension when imposed. To decide whether the null can be rejected, the meeting reports are inspected to qualitatively evaluate if the member countries' attitude towards imposing an arms embargo was positive or not. From Figure 3, there are two dates where the US and China differ greatly in their sentiment scores, the 23<sup>rd</sup> of December 2016 and 31<sup>st</sup> of May 2018. It is therefore appropriate to investigate the meeting reports for these two dates to explain the differences.

### 7.2.2 23<sup>rd</sup> of December 2016

The first event of interest is a meeting that was held for voting on the first instance of implementing an arms embargo and targeted sanctions on South Sudan. The draft resolution was ultimately not adopted due to 8 out of 15 countries abstaining from voting. While China abstained from voting, the US voted in favor for an arms embargo. It is also notable that the draft resolution had been proposed by the United States.

Examining the meeting transcripts of the US and China in detail explains why the sentiment scores diverge. First, the US representative's speech length was five times longer than China's (1937 vs. 386 words). The contribution from the US representative focused mainly on the disappointment in lack of action from countries abstaining from voting on the embargo. The speech listed reasons for why the embargo should have been imposed due to insufficient compliance from the South Sudanese government to prior UNSC demands. On several occasions, the US representative stated that "history is going to be a very hard judge of their decision", referring to the opposing countries' lack of action towards sanctioning the South Sudanese government. From the findings of the sentiment analysis, the US yielded a neutral sentiment score of -0.04. However, China spoke in more positive and hopeful terms regarding the situation, resulting in a positive sentiment score of 0.28. The use of words such as "peace", "stability" and "implementation" to refer to earlier resolutions and agreements, may indicate that China wants to allow South Sudan to regain peace and stability by itself.

### **7.2.3 31<sup>st</sup> of May 2018**

The second meeting with a prominent divergence in the sentiment score of the two countries was the 31<sup>st</sup> of May 2018. This was the last meeting before the arms embargo was imposed on the 13<sup>th</sup> of July 2018. The purpose of the meeting was to vote on a draft resolution proposed by the US. The US proposed a renewal of existing panels responsible for sanctioning South Sudan, as well as subjecting certain prominent leaders in South Sudan to targeted sanctions such as asset freezes and travel bans (UN Security Council, 2018). The draft resolution was adopted, notably with the US in favor and China abstaining from voting. Similar to the meeting on the 23<sup>rd</sup> of December 2016, the US focused on ongoing atrocities in South Sudan, and how immediate intervention by the international community was required. This wording resulted in a slightly negative sentiment score of -0.12. However, China continued to emphasize the fact that peace processes in South Sudan were ongoing and reiterated that further sanctions would undermine the processes. China did not mention any of the ongoing violence, famine, or displacements of people in the country. The results from the sentiment analysis shows a slightly positive sentiment score of 0.12.

Overall, based on the insights from the two meetings described above, the null hypothesis cannot be rejected. Even though the US acted in a way that is expected of a country that serves the interests of violating companies, China has not. Inconsistent behavior from the two countries therefore makes a rejection of the null hypothesis not possible.

## **8. Discussion**

In this section, the results presented in the previous in this thesis are discussed in a broader context of economic and geopolitical interests. The focus will mainly be on the findings from the sentiment analysis, where insights from the meeting reports will be used to explain the divergence in behavior of the US and China. Firstly, the expectations and findings are briefly evaluated. Secondly, the main part of the discussion aims to justify the observed behavior of the US and China in the UNSC meetings. Thirdly, an evaluation of the discussed reasons is conducted to assess whether the US and China are likely to have acted in the interests of illegal arms exporters headquartered in their countries. Lastly, the limitations of this paper are discussed with a focus on the underlying assumptions of the thesis.

### **8.1 Expectations and Findings**

The expectations in this thesis are aligned with the two hypotheses: (i) that there exists illegal arms export to South Sudan and (ii) that countries headquartering embargo violators are in favor of imposing and maintaining an embargo. The event study shows that there is significant evidence suggesting that American and Chinese companies have violated the embargo. The findings from the sentiment analysis show that China has a more positive tone than the US throughout the meetings and that the two countries disagree on the matter of imposing an embargo. As the detected violators are from either China or the US, the expectation would therefore be that both these countries would advocate for an embargo. However, the observed differences from the sentiment analysis does not provide consistent evidence of this expectation, thus contradicting the expected behavior of countries that headquarter embargo violators. The following part of this section will discuss potential reasons that can explain the differences in observed behavior for the US and China. The discussions focus on economic and strategic factors as two important drivers for the two countries' motivation to behave in a certain manner.

### **8.2 Economic Factors**

#### **8.2.1 Chinese Investments in The Petroleum Industry**

In terms of financial investments, China dominates the oils reserves in South Sudan. Even before South Sudan's independence, China controlled a large portion of the oil sector in Sudan (Bodetti, 2019). While South Sudan has long been perceived as a risky business

venture for many countries, China entered the market swiftly after the secession in 2011 with the state-owned China National Petroleum Corporation (CNPC). In 2018, prior to embargo, CNCP also signed a lucrative deal with the South Sudanese Petroleum and Mining Ministry, providing Chinese benefactors with prospects of exceptional profits (Paraskova, 2018). Thus, China continues to extract and purchase most of South Sudan's oil, but it has come at a cost due to the challenging circumstances halting oil production and putting Chinese workers security at risk.

China's investments in several areas of conflict may suggest that it is more willing to take the risk of operating in challenging environments as opposed to many North American and European countries. The demand for transparency and ethical focus forces many Western countries to abstain from trading with questionable governments. However, this absence of investors leaves China in a favourable position to extract resources and engage in trade agreements without much competition. It may then be argued that China benefits from a certain degree of conflict in the countries it invests in, as this would provide China with free rein for its business ambitions. For instance, before South Sudan's independence, China supported an unstable Sudan to secure the flow of oil. This was after Chevron was forced to stop its operations in Sudan due to the US ban on involvement by American companies in the oil sector. China used its veto to protect the Sudanese regime from sanctions and provided Sudan with arms to secure the oil installations (Moro, 2012), indicating that China had incentives to maintain the status quo. The same reasoning is applicable for arguing the case of China's positive attitude in the UNSC meetings on South Sudan and the abstention from voting on an embargo. Introducing sanctions and arms embargoes is found to shift the balance of power (Spatz, 2019). A shift in power is arguably unfavourable for China as it currently reaping the benefits of an untapped market with few foreign investors (Large, 2016).

### **8.2.2 The US's Prospects of Illegal Arms Revenue**

One could argue that a country with a large portion of illegal weapon export would have incentives to facilitate for illegal arms trade. Facilitating for illegal arms trade implies that a country tries to push for an embargo and ensures that it is kept in place. One way to facilitate for illegal arms trade could be through the country's influence in the UNSC. As a permanent member of the UNSC, the US has a significant impact on the outcomes. In the case of South Sudan, the US is also the penholder, meaning that it leads the negotiation and drafting of

resolution on all matters of South Sudan (SCR, 2021). The penholder role provides the US with increased leverage to influence the outcomes of the UNSC discussions in a favorable manner. Based on the US's role in the UNSC, it seems evident that it is in a prominent position to stress the importance of implementing and extending an embargo.

The sentiment analysis shows that the US's behavior is aligned with what is expected of a country serving the interests of violating companies. Relative to other countries, the US has a more negative tone in the UNSC meetings, both before and during the embargo. The summary statistics from the meeting reports, presented in Section 5.4, show that the US average, minimum and maximum sentiment scores are the lowest among the permanent members. The meeting reports also show that the American voting patterns reflect the US's view of the immediate need for sanctions and an embargo. The US's eager to impose an embargo, and consistent use of a relatively negative tone in the meetings, may indicate that there are potential financial gains at stake.

It might seem questionable that the US's motivation to push through an embargo is related to violating it. However, evidence shows that companies headquartered in the US have previously breached an embargo that the US voted in favor of. In a specific incidence of illegal arms trade to South Africa during the apartheid, it was discovered that long-term violations were made possible by government institutions' negligence or purposeful evasion of US policies. Even after the violations were uncovered, lack of reprisals resulted in continued arms shipments to South Africa (Paretzky, 1987). There is also evidence suggesting that US companies have exported weapons to South Sudan's neighbor, Uganda, where the weapons in turn have ended up in South Sudan (CAR, 2018). Although this was prior to the embargo, it is likely that Uganda will continue to be an entry path for weapons to South Sudan. With ties to Uganda, the US has an opportunity to use South Sudan's neighbor as an intermediary to channel arms to South Sudan and make it challenging to identify and prosecute the embargo breaches. With its history on embargo violations and easy access to intermediaries, there is reason to believe that it is possible that the US advocates for an embargo based on the prospects of financial gains.

However, the US ban on arms transfer prior to the UN embargo might be contradictory to the suggested motives of financial gain from illegal arms trade. In early 2018, six months before the UN embargo was imposed on South Sudan, the US banned the export of weapons and defense services to South Sudan (Wroughton, 2018). The US's own prohibition on arms

exports could arguably undermine the purpose of pushing through an international arms embargo to obtain less competition for violating companies headquartered in the US. The US restriction targeted at American arms dealers, while other states are permitted to export weapons to South Sudan, may suggest that revenue from arms export to South Sudan is not the primary interest of the US. Nevertheless, it is notable that while the arms ban restricts legal trade, companies that trade illegally could still disregard any national restrictions.

## **8.3 Strategic Factors**

### **8.3.1 China's Non-Interference Policy**

China's principle of non-interference has long been an important aspect of its foreign policy (Zheng, 2016). This principle could be one of the reasons for why China has had a relative positive tone throughout the UNSC meetings on South Sudan. The idea of non-interference supports the concept of absolute sovereignty that opposes interference in the internal affairs and politics of other states (Zheng, 2016). China has firmly expressed that an act of coercion and isolation, such as an arms embargo, is counterproductive in gaining cooperation of targeted countries (Ren, 2014). However, as an emerging global power and a permanent member of the UNSC, China cannot avoid taking part in discussions regarding international sanctions. China's entry in political discussions has proven to be the case for several matters in Africa, where the conflict in South Sudan is one example.

From the UNSC meeting reports on South Sudan, it is evident that potential sanctions have been a frequent topic. Considering China's view on promoting political negotiations and coordination as opposed to coercive measures (Ren, 2014), it can be argued that it is favourable for China to speak positively about the situation in South Sudan to avoid the potential implementations of sanctions. The reports also show that China supported regional bodies such as the Intergovernmental Authority on Development and the African Union to resolve the conflict in South Sudan, rather than imposing international sanctions. By avoiding implementing sanctions, China can comply with its responsibility to mediate conflict, while at the same time protect its principle of non-interference.

### **8.3.2 American Interests: Terrorism, Stability and Global Power**

The US's strategic interests in gaining peace in South Sudan could be one explanation to why the US upholds a serious tone in the UNSC meetings and stresses the importance of an embargo. Since South Sudan's independence, the US has worked to bridge divides between

communities through peace mediations and substantial financial aid. Addressing the challenges of South Sudan in the UNSC meetings is a step towards coordinating international efforts to put an end to the ongoing conflict. However, it may be naïve to believe that the US's sole motivation for promoting peace in South Sudan is purely altruistic. To gain a better understanding of why the US is consistently addressing the challenges in South Sudan, three strategic concerns have been identified: countering terrorism, creating stability for US development agencies, and regaining global power balance.

First, South Sudan is in a region with an increase of terrorist activities, and countering terrorism has since 2001 been an integral part of the US foreign policy. With international terrorist groups operating in neighboring countries such as Kenya, Uganda, and the Democratic Republic of Congo (Shinn, 2003; Isoke, 2015), South Sudan is vulnerable to terrorists looking to expand their territory. Additionally, continued internal conflict and fragmentation along ethnic lines could lay the foundation for the rise of local extremist groups to gain power. The bombings of the US embassies in Tanzania and Kenya in 1998 and the Sudanese governments active support of Al-Qaeda in the early 1990s are among several examples of terrorist threats to the US (Ploch, 2010). Increased instability in South Sudan therefore contributes to the risk of terrorism, undermining the American efforts to combat terror in the region.

Second, South Sudan has the potential to forge commercial links through utilizing its rich natural resources, creating a more stable environment for US development agencies. By exploiting its natural resources such as oil, gold and copper (Ladu et. al., 2019), South Sudan has the potential to develop its economy and strengthen the trade network with other countries in the region. A transition into a stable economy could have spillover effects on unstable neighboring countries through commercial links and extensive trade. The development of a diverse South Sudanese industry and infrastructure can thereby provide the US with a more favourable environment to administer foreign aid and development assistance in an otherwise volatile region.

Third, the geopolitical competition in the region is intensifying as notably Russia and China are expanding their economic and military presence in Africa. This thesis has already touched upon China's involvement in South Sudan. Many other countries in the Africa have developed similar bonds to China, becoming increasingly dependant on the diplomatic and economic ties with China. Alike China, Russia is reaching out to African countries through investemnt,

trade and military assistance (Russia-Africa Summit, 2019). From the US's perspective, Chinese and Russian influence in Africa may impose a threat to democratic values and human rights. The actions of the US in countries such as South Sudan, in need of external assistance to combat national challenges, could contribute to counter the presence of China and Russia in Africa to restore balance in the global power order. With the current situation in South Sudan, American official investments are scarce, but regaining peace and stability could open South Sudan's doors to American investors. With a stable South Sudan, the US can eventually challenge China's position in South Sudan.

#### **8.4 Concluding Remarks on the Discussion**

There seems to be a lack of consistent evidence supporting the expectation that the UN countries headquartering embargo violator are more inclined to advocate for imposing and extending an arms embargo. While China has had a positive tone throughout the meetings and abstained from voting on an embargo, the opposite seems to be the case for the US. Despite the lack of consistent behaviour from the two countries, the findings may indicate that only the US acts in the interests of violating companies, but China does not. The following will evaluate the alternative motives discussed above to provide explanation to the observed behaviour from the sentiment analysis.

When considering China, it is evident that it has both economic and strategic stakes in South Sudan. Large investments in the oil sector and an inherent focus non-intervention have likely influenced China's tone in the UNSC. At the same time, the event study suggests that Chinese companies seem to thrive of profits from illegal arms trade. Given the assumption that UN representatives are aware of the interests of their arms producers, the sentiment analysis seems to indicate that the Chinese representatives do not act in the interests of the illegal arms dealers headquartered in China. China's attitude in the UNSC meetings could therefore suggest that it considers the investments in the petroleum industry and principle of non-interference as more important than potential profits from illegal arms trade.

In the case of the US, findings from the sentiment analysis may indicate that the country is facilitating illegal arms trade through their behavior in the UNSC. Evidence on previous embargo breaches by American companies suggest that the US is aware of the profits that can be derived from weapon exports to countries under embargo. Nevertheless, the US's long-term efforts to build peace and its unilateral ban arms export may suggest that there are other



aspects that are of a higher concern than losing out on illegal arms trade. It seems more likely that American strategic interests in South Sudan, and the greater region of Sub-Saharan Africa, is of a higher priority. It therefore seems reasonable to argue that combating terrorism, creating stable circumstances for development agencies, and strengthening their global presence serve as more accurate factors to explain why the US pushed through an embargo and upholds a serious tone in the UNSC. Through being a key mediator in the peace process of South Sudan, the US can strengthen its position in the country in addition to serving US interests spanning beyond the border of South Sudan.

## **8.5 Limitations**

The research in this study is based on several assumptions that are worth reflecting upon as they could impose potential limitations. In addition to addressing general limitations, the following will assess these assumptions and discuss how the results in this study may vary based on potentially false assumptions.

Firstly, the selection of companies for the event study is based on publicly available stock data. In certain countries, a large degree of the weapon industry is controlled by the government. For instance, most defense companies in Russia are under the control of the state-run conglomerate, Rostec (Bowen, 2021). Similarly, the largest Chinese weapon exporters are integrated into the state-owned arms industry (SIPRI, 2020). Since government-owned companies are usually not listed on any stock exchange, the data for the event study excludes several significant weapons exporters. The number of arms companies from countries such as Russia and China are therefore lower in the input data than it is in reality. The lack of companies from these countries could impose two problems when interpreting the findings from the event study. First, neglecting to account for major arms exporters could result in the exclusion of several companies involved in arms trade. Second, the ratio of detected violators may be biased towards countries with a larger number of private companies operating in the weapons sector. Although it is not possible to conduct an event study without available stock data, it is important to consider these caveats when interpreting the findings.

Secondly, the event study assumes that well-informed investors are aware of illegal trades. Without well-informed investors, there would be no evidence of CARs related to expected embargo violations. It is therefore possible that the detected illegal reactions are actually due

to either coincidences or mis-informed investors reacting to what they believe is legal trade. Nevertheless, evidence on stocks in the arms industry is a more reliable source of information compared to information on imports and exports of arms based on weak reporting obligations (DellaVigna & La Ferrara, 2010). Moreover, the results show illegal chains for 10 different companies, and it seems unlikely that all these chains are caused by coincidences or mis-informed investors.

Thirdly, it is difficult to determine whether observed stock price changes are caused by the observed events or by what is happening in South Sudan's neighboring countries. Although the sale of weapons to intermediates is regarded as an embargo violation (UN, 2015), regional instabilities and the South Sudanese conflict's impact beyond its borders could have impacted the demand for weapons in neighboring countries. Reported cross-border raids in Uganda and Ethiopia and security issues related to refugees from South Sudan (Biryabarema, 2017) show how South Sudan's conflict has a direct impact on its neighbors. Although difficult to control for events outside of South Sudan, reactions to external events (e.g., in Uganda or Ethiopia) could lead to false positives among the detected illegal reactions. Moreover, if companies are continuously supplying weapons elsewhere it will positively impact the overall stock performance, making it difficult to detect actual embargo violations (false negatives).

Lastly, the interpretation of sentiment analysis results is based on the premise that UN delegates are aware of the interests of illegal arms dealers headquartered in their country. If this premise proves false, the sentiment analysis of the UNSC meetings provides insufficient information on the link between an illegal arms dealer and its country of headquarter. However, from the discussions in Section 8.2 and 8.3 it is evident that countries have a variety of interests related to embargoes. Thus, drawing conclusions on whether countries act in favor of illegal arms traders solely based on their tones in the UNSC has proven to be an inadequate approach to a complex task.

## 9. Robustness Checks

In this section, robustness checks are conducted to assess whether the results hold under different conditions. Firstly, alternative event windows are tested, and the results are examined to see whether the same reactions are present. Secondly, other lengths of days over which CAR is calculated are checked to see how this impacts the illegal chains. Lastly, alternative dictionaries are used to evaluate the consistency of the sentiment scores.

### 9.1 Alternative Event Windows

Larger event windows increase the likelihood of confounding events occurring (McWilliams & Siegel, 1997). In the context of the event study, the idea of confounding events refers to presence of additional events in the event window that make it difficult to isolate the actual impact of the event in focus. Due to confounding events, the calculation of abnormal returns may be unreliable and could result in false classifications. A false negative classification of an illegal reaction can occur when a confounding event affects the stock price in the same direction as the event of interest, which in turn leads to a smaller estimated correlation between CAR and the event. False positives can arise when a confounding event causes the estimated correlation between CAR and the event in focus to be shifted in opposite directions. Table 4 presents the results based on 15 and 11-day event windows.

Company	Country	Reactions		
		n = 21	n = 15	n = 11
HUNAN NANLING IND EXPLOSIVE	CHINA	5	6	5
FLUOR CORP	USA	4	3	3
ANHUI JIANGNAN CHEMICAL IND	CHINA	3	6	4
GENERAL DYNAMICS CORP	USA	3	4	4
HUAIBEI MINING HOLDINGS CO	CHINA	3	2	2
HUNTINGTON INGALLS IND INC	USA	3	2	3
LOCKHEED MARTIN CORP	USA	3	3	2
MANTECH INTL CORP	USA	3	2	2
SHANXI TOND CHEMICAL CO LTD	CHINA	3	3	3
TRANSDIGM GROUP INC	USA	3	2	1

Table 4

*Notes:* The table displays the chains of illegal reactions for alternative event windows. In addition to the initial event window of 21 days, 15 and 11 days are tested.

Reducing the event window to 15 days results in that four of the countries are no longer regarded as violators under the condition of minimum three illegal reactions. The list of violators now consists of three companies from each China and the US. Furthermore, decreasing the event window by four additional day results in that six of the companies are still regarded as violators compared to in the initial event window, with three companies from each country. Five of the six companies are regarded as violators in both tests, with China being the country of headquarters for three of them.

The tests indicate that the results are somewhat affected by the choice of event window length and should therefore be interpreted with caution. Nevertheless, the tests also show that most companies are still headquartered in either China or the US confirming the relevance of focusing the sentiment analysis on these two countries.

## **9.2 Alternative Lengths for Calculating CARs**

Alternative model specifications are tested to check whether the number of days over which the CAR is calculated affects the results. The initial selection of  $CAR(-1,1)$  includes the day before and after the event. The day before the event is included to account for uncertainty related to the starting point of the events as well as potential information leakage of coming events. Conversely, only one day after the event is included since it is expected that news of the events travels fast and that the impact on stocks therefore is absorbed shortly after the events take place. To test the validity of these choices, the model has been rerun with  $CAR(0,1)$  and  $CAR(0,3)$ . The results are presented in Table 5.

Company	Country	CAR(-1,1)	CAR(0,1)	CAR(0,3)
HUNAN NANLING IND EXPLOSIVE	CHINA	5	2	6
FLUOR CORP	USA	4	2	3
ANHUI JIANGNAN CHEMICAL IND	CHINA	3	3	4
GENERAL DYNAMICS CORP	USA	3	2	3
HUAIBEI MINING HOLDINGS CO	CHINA	3	2	3
HUNTINGTON INGALLS IND INC	USA	3	4	4
LOCKHEED MARTIN CORP	USA	3	3	3
MANTECH INTL CORP	USA	3	2	2
SHANXI TOND CHEMICAL CO LTD	CHINA	3	2	4
TRANSDIGM GROUP INC	USA	3	2	3

Table 5

*Notes:* The table displays the chains of illegal reactions for alternative numbers of days over which the CAR is calculated. In addition to the initial CAR(-1,1), CAR(0,1) and CAR(0,3) are tested.

For CAR(0,1), only 3 of the 10 companies are still regarded as violators. The overall decrease in reactions indicate that there could be confounding events in the days over which CAR(-1,1) is calculated or that the starting-points of events are uncertain. For CAR(0,3), only one company is no longer regarded as a violator, but the significant difference in number of violators between CAR(0,1) and CAR(0,3) indicates that there may be confounding events happening after day t+1 or that it takes more than one day for the stock to incorporate any effects of an event in South Sudan, in contrary to what is expected by efficient markets. Generally, the choice of days over which CAR is calculated seems to impact the number of illegal reactions detected. However, the choice of CAR(-1,1) seems more accurate as including additional days after the event may increase the likelihood of incorporating effects that are not caused by the event of interest. Moreover, challenging circumstances in South Sudan and thus a potential lack of reporting incidents immediately emphasizes the importance of including at least the day before an event.

### 9.3 Alternative Dictionaries

To check the robustness of the default dictionary in the *sentimentr* package, sentiment analyses are conducted with two different dictionaries: *nrc* and the original dictionary from Liu & Hu (2004). Although the speeches in the UNSC meetings consist of more political words and phrasings than most sentiment dictionaries include, the applications of various dictionaries may solidify the results from a sentiment analysis with the *sentimentr* package. Figure 4 presents the results of the sentiment analysis with the alternative dictionaries.

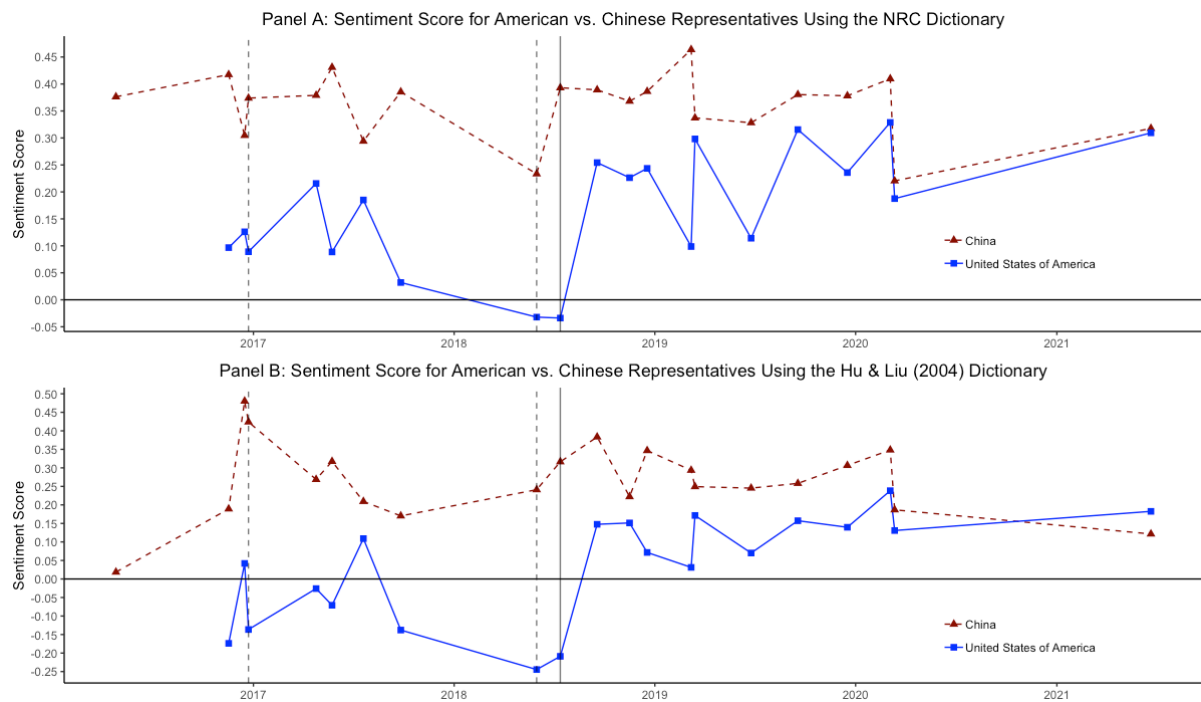


Figure 4

*Notes:* Panel A and panel B display the average sentiment scores for each UNSC meeting, presented separately for China and the US. Panel A displays the average sentiment scores based on the NRC dictionary, while Panel B is based on the Hu & Liu (2004) dictionary.

As Figure 4 shows, the differences in sentiment scores still follow the same patterns as the default dictionary. The average sentiment score for China is slightly higher in both tests. The increase in sentiment score for China is likely due to the non-inclusion of valence shifters and the implications of not identifying negators such as “not”. The Hu & Liu dictionary yields lower average sentiment scores. The tests show that China, on average, had a more positive tone in the UNSC meetings than the US, similar to the results from using the default dictionary. Summary statistics for the alternative dictionaries are presented in Table A4 of the Appendix. Overall, the findings seem to be robust to alternative dictionaries.

## 10. Conclusion

Since its birth in 2011, South Sudan has been struggling with conflict and war, fuelled by the stream of arms into the country. The UNSC's ambitions to promote stability and end the long-lasting conflict resulted in the imposition of an arms embargo on South Sudan in 2018. Nevertheless, prior knowledge on arms embargoes has showed that certain companies disregard potential sanctions due to the expected gains from illegal arms trade. The goal of this paper was to detect potential embargo breaches and broaden the understanding of countries' role related to illegal arms trade.

First, this thesis has examined whether there have been illegal arms exports to South Sudan. The use of an event study methodology shows that there is significant evidence of consistent embargo violations for 10 of the companies included in this study. All the companies labelled as violators have their headquarters in either the US or China.

Second, the thesis examined whether countries are inclined to promote embargoes at the UNSC, in favor of the violating companies that are headquartered in the countries. Based on the sentiment analysis, and an evaluation of the meeting reports, there has been no consistent evidence of countries' behavior suggesting that they support violating companies' interests. While China's behavior in the UNSC stands in contrary to what would be expected from a country in favor of an embargo, the US's behavior is more aligned with that of a country supporting an embargo.

Although the results may suggest that the US has acted in the interests of embargo violators while China has not, alternative motives have likely influenced both countries' behavior in the UNSC meetings. China's positive tone and disapproval of an embargo is arguable grounded in its non-interference principle and desire to secure petroleum investments in South Sudan. Likewise, the US's negative crisis rhetoric is likely due to strategic interests in South Sudan and the greater region. With the assumption of countries being aware of the interests their companies, it seems likely that the alternative motives proposed have been more important than the potential gains from illegal arms trade in influencing their behaviors in the UNSC discussions.

The results from the event study are tested for alternative model specifications of event windows and days over which the CAR is calculated, while the findings from the sentiment

analysis are tested with different dictionaries. The robustness checks for the event study show that different model specifications affect the results, underlining the importance of evaluating how and why the choice of specifications impact the results. The results from the sentiment analysis are robust across different dictionaries.

The findings from the event study complements DellaVigna and La Ferrara's research on illegal arms trade and supports the evidence of embargo violations in South Sudan (Amnesty International, 2020). Further research on the effects of intermediaries, used to channel arms illegally, could provide a better understanding of the dynamics of illicit arms trade.

Moreover, further empirical research based on other methods than sentiment analysis is needed to uncover the factors that determine national governments' motives to facilitate for illegal arms trade.



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## Appendix

**Table A1 – List of SIC Codes Related to Arms Trade**

<b>SIC code</b>	<b>Industry description</b>
2892	Explosives
3482	Small Arms Ammunition
3483	Ammunition, Except for Small Arms
3484	Small Arms
3489	Ordnance and Accessories
3761	Guided Missiles and Space Vehicles
3764	Guided Missile and Space Vehicle Propulsion Units and Propulsion Unit Parts
3769	Guided Missile Space Vehicle Parts and Auxiliary Equipment
3795	Tank and Tank Components

Table A1

*Notes:* The table displays a list of the SIC codes used to retrieve arms trade companies. The industry descriptions related to the respective SIC codes are included.

**Table A2 – Selection of Significant Events During the Embargo**

Date	Event	Hostility Effect	No. of Articles
6/8/18	First version of Khartoum Declaration of Agreement signed	↓	175
30/8/18	Final version of Khartoum Declaration of Agreement signed	↓	32
27/9/18	Release of prisoners and military forces adhere to ceasefire	↓	15
2/11/18	Prominent SPLA-IO detainees released	↓	16
14/12/18	Clan agreement to end violence	↓	4
15/1/19	Raid attacks	↑	1
20/2/19	Three factions of SPLM agree to unite	↓	31
15/3/19	Renewal of the UNMISS	↓	18
29/11/19	Clan clashes	↑	10
23/12/19	Sudan and South Sudan reach agreement on access to oil pipelines	↓	12
20/3/20	Raid clashes	↑	24
10/8/20	Clashes	↑	20
29/1/21	Internal SPLM agreement	↓	4

Table A2

*Notes:* The table displays significant events during the embargo alongside the respective dates. The table includes the expected effect of the events on hostilities in South Sudan. A downward-facing blue arrow indicates that the event is expected to reduce hostilities, while an upward-facing red arrow indicates that the event is expected to increase hostilities. The number of news articles related each event is also included, this is total number of news articles on the day of the event and the following day. These numbers are retrieved from a search of the events in LexisNexis.

**Table A3 – List of Events Based on Sentiment Score**

<b>List of Events with Sentiment Scores</b>			
<b>Date</b>	<b>Avg. Score</b>	<b>Description</b>	<b>Fatalities</b>
29/1/2021	0.07	Agreement: On 29 January 2021, President Salva Kiir appointed the Shiluk politician Budhok Ayang Kur as governor of Upper Nile State, presumably with the consent of the SPLM-IO leader. The appointments ends a stand-off which followed from the President’s refusal to appoint the IO’s controversial nominee, General Johnson Olony. In the days before the appointment, the President also replaced the governor of Warrap state with Aleu Ayieny Eleu (a former Minister of the Interior) without stating a reason, and announced the appointments of several deputy governors.	0
15/3/2019	0.06	Renewal of the UNMISS	0
20/2/2019	0.05	On Feb 20th: three factions of the SPLM political party agreed to (re)unite. These comprise the SPLM itself (ruling party), the Former Detainees, and Taban Deng’s faction of the SPLM-IO. Note that this does not include the larger SPLM-IO headed by Riek Machar.	0
6/8/2018	0.02	Agreement: On August 5th: President Salva Kiir and Dr Riek Machar signed the Khartoum Declaration of Agreement on the behalf of the government and SPLM-IO, respectively. A number of smaller rebellions, as the SPLM-FDs, refused to sign the agreement.	0
27/9/2018	0.01	27 September. President Kiir ordered the release of prisoners of war and detainees, in compliance with the revitalized peace agreement. He also called on military forces to adhere to the ceasefire.	0
25/8/2019	-0.92	On August 25th, the raiders (suspected of coming from the disputed Fangak state) attacked an unspecified location in Duk Pagak county (Jonglei state, coordinates for Pagak used at prec2), killing a prison guard in the cattle rade (coded as VAC/attack, with actor 2 as civilians and AssocActor2 Prison Guards).	1
29/1/2019	-0.82	On January 29th, Deng Alor announced that the SPLM-FDs (high-ranking politicians who have spent much of the war in exile following their arrest in late 2013) was reuniting with the SPLM party, following a meeting with President Salva Kiir.	0
11/3/2019	-0.77	On March 10th and 11th raiders (suspected of coming from the disputed Northern and Southern Liech states, and coded as such) attacked unspecified location in Akop county (Warrap state), killing 12 and wounding 11 (fatalities spread across two months), and stealing 190 head of cattle.	6
30/5/2020	-0.73	On 30 June 2020, suspected Murle raiders attacked Maar in Twic East county (Jonglei state), killing 7 (victims presumed to be Twic East Dinka), amid intense retaliatory raiding in southern Jonglei.	7
3/4/2021	-0.72	On 3 April 2021, unknown raiders attacked Kajethar cattle camp near Pieri (Uror county, Jonglei state), killing one person (victim presumed to be from the Gun section of the Lou Nuer) and allegedly stealing 4,500 head of cattle.	1

**Table A3**

*Notes:* The table displays the list of events with their respective dates, sentiment scores, event description and number of fatalities. The first five observations are the events with the most neutral sentiment score from the final data used in this thesis. The last five events are the events with the highest absolute sentiment score among all the events retrieved from ACLED.

**Table A4 – Summary Statistics with Alternative Dictionaries**

Country	Main Dictionary			NRC Dictionary			Hu & Liu Dictionary		
	Avg. Score	Min. Score	Max. Score	Avg. Score	Min. Score	Max. Score	Avg. Score	Min. Score	Max. Score
China	0.24	0.13	0.36	0.36	0.22	0.47	0.27	0.18	0.52
USA	0.08	-0.12	0.2	0.17	-0.03	0.32	0.04	-0.24	0.23
France	0.18	0.04	0.29	0.27	0.11	0.36	0.15	-0.02	0.34
Russia	0.16	0	0.25	0.3	0.08	0.43	0.16	-0.11	0.26
UK	0.12	-0.06	0.24	0.22	-0.14	0.4	0.11	-0.09	0.29

Table A4

*Notes:* The table displays summary statistics for the five permanent members in the UNSC for sentiment analyses with three different dictionaries, namely the default dictionary in the sentimetr package, the NRC dictionary, and the Hu & Liu (2004) dictionary.

**Figure A1 – Average CAR(-1,1) for All American and Chinese Companies**

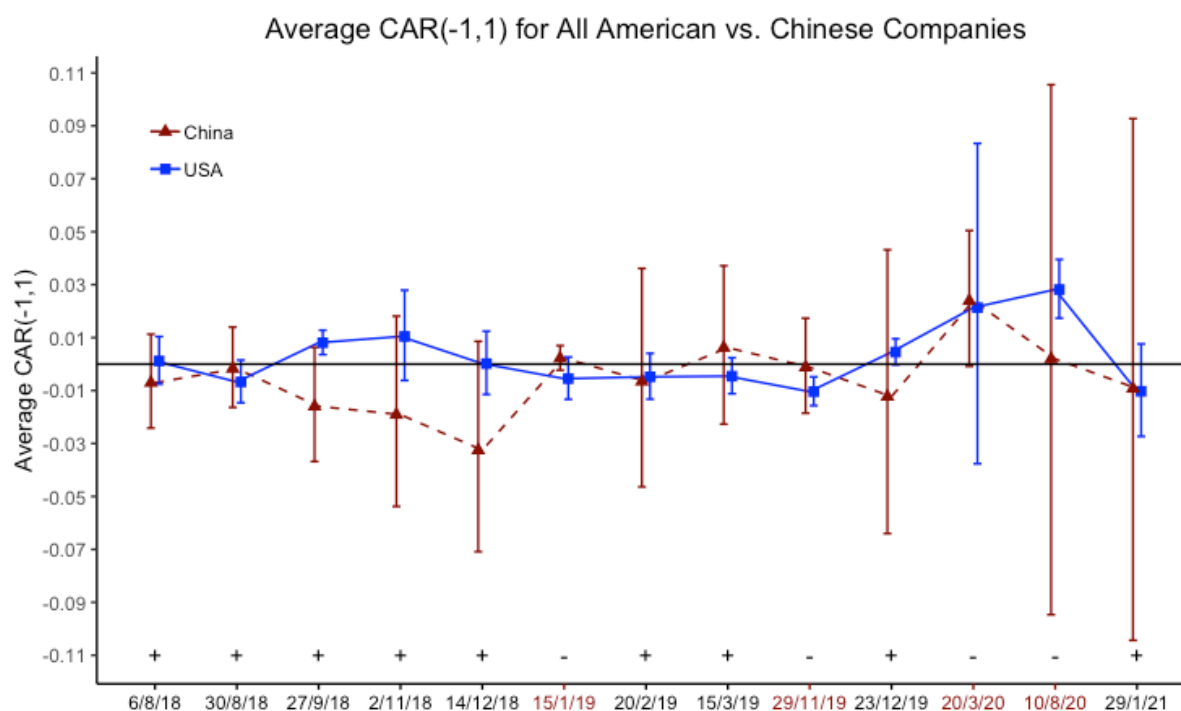


Figure A1

*Notes:* The figure displays average CAR(-1,1) separately for each event. The figure presents the returns separately for American and Chinese companies. 95% confidence bars are included each for group of companies. The events are unexpected significant occurrences impacting hostilities in South Sudan during the embargo. The events are listed in Table A2 of the Appendix. The sign of the tick marks indicates the expected hostility effect of an event. Events regarded as non-hostile are noted with a “+” symbols, while events regarded as hostile are noted with “-” symbols.

**Figure A2 – Average CAR(-1,1) for American and Chinese Violators**

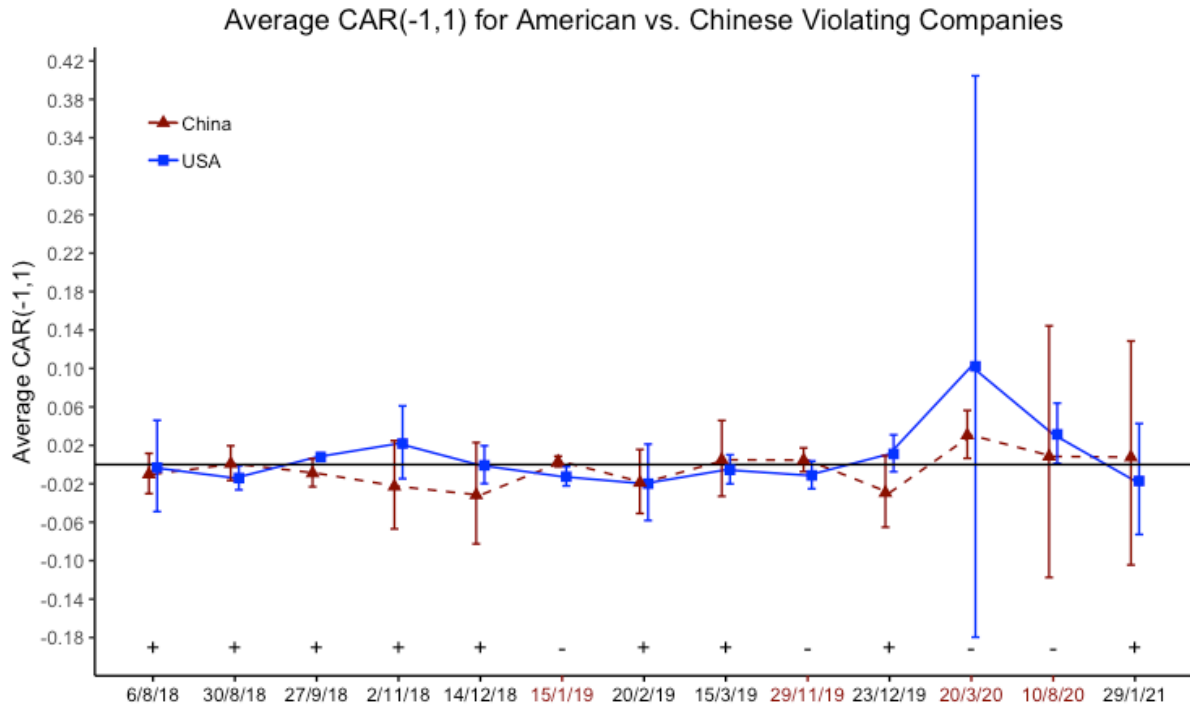


Figure A2

*Notes:* The figure displays average CAR(-1,1) separately for each event. The figure presents the returns separately for American and Chinese violating companies. 95% confidence bars are included each for group of companies. The events are unexpected significant occurrences impacting hostilities in South Sudan during the embargo. The events are listed in Table A2 of the Appendix. The sign of the tick marks indicates the expected hostility effect of an event. Events regarded as non-hostile are noted with a “+” symbols, while events regarded as hostile are noted with “-” symbols.



**Figure A3 – Sentiment Scores for Chinese and American Representatives with CIs**

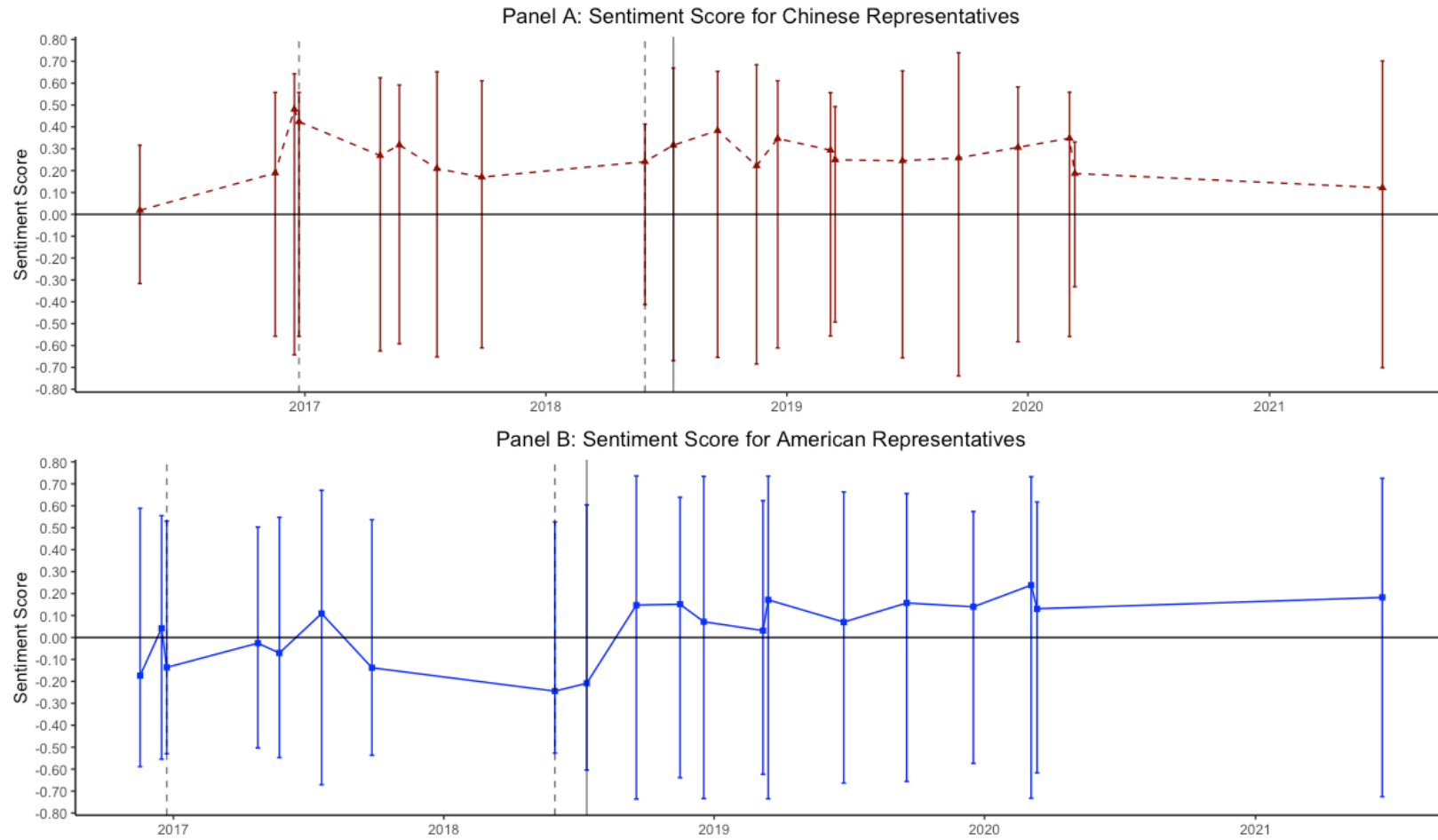


Figure A3

Notes: Panel A and panel B display the average sentiment scores for each UNSC meeting with 95% confidence bars. Panel A displays the sentiment scores for Chinese representatives, while panel B displays the scores for American representatives. None of the sentiment scores are significantly different from a neutral score of 0.