Project Proposal:

Volatility in Oil Prices Due to Geopolitical Incidents

Sraavika Vaddadi

Introduction:

Crude oil is one of the world's most important commodities. It plays a role in shaping everything from global trade and national security decisions, to impacting our everyday individual expenses. This makes crude oil highly sensitive to changes in the geopolitical landscape such as wars or international threats. Through this project, I aim to understand just how sensitive WTI and Brent crude oil prices are to international political conflicts and to observe those trends over time.

Data:

There are three datasets I will be utilizing for this project:

1. EIA Petroleum Spot Prices:

   The EIA, which stands for the Energy Information Administration, is an agency within the Department of Energy, which keeps track of the global supply and demand of numerous energy sources and their future forecasts. The EIA has an open-source API that I will be utilizing to get data on crude oil prices for my project. There are two main global benchmarks for oil pricing – WTI or West Texas Intermediate priced in Cushing, Oklahoma or the Brent Crude priced on North Sea production. Analyzing both benchmarks provides insight on how conflicts influence pricing in both of these major markets.

   This dataset starts from 1986 and is updated daily. In total, there are 914 rows excluding the header and 12 columns, but only 5 are relevant to my project.

2. Geopolitical Risk Index:

   The Geopolitical Risk Index was developed by two Federal Reserve Board economists - Dario Caldara and Matteo Iacoviello. Their methodology is to measure the proportion of newspaper articles covering geopolitical tensions to the monthly total articles of several major newspapers. The index also classifies these articles into eight categories based on certain word usage. Categories include War Threats, Peace Threats, Military Buildups, Nuclear Threats, Terror Threats, Beginning of War, Escalation of War, and Terror Acts (Caldara, Dario and Matteo Iacoviello (2022)).

   In total, there are 113 columns and 1498 rows including the header row in the GPR dataset. However, within this large dataset, there are three sub-indices: the Recent GPR index that starts in 1985 and measures the number of monthly articles by 10 newspapers, the Historical Index which uses 3 newspapers and starts in the 1900s, and a country specific index. For my project, I will be utilizing the Recent GPR index, which includes articles from the Chicago Tribune, the Daily Telegraph, the Financial Times, The Globe and Mail, The Guardian, the Los Angeles Times, The New York Times, USA Today, The Wall Street Journal, and The Washington Post (Caldara, Dario and Matteo Iacoviello (2022)).

3. International Crisis Behavior:

   This is a dataset developed by Patrick James and Kyle Beardsley, who have been keeping track of various international conflicts and wars from 1919 through 2019. This dataset allows us to understand the specific crisis that was occurring and the intensity of it. Intensity is measured on a scale of 1-4 where 1 indicates no violence and 4 is a full-scale war (Brecher, Michael, et al. (2023)).

   There are 95 columns in this dataset and 497 rows including the header. However, there are only 4 columns that are relevant to my project.

All three datasets will be merged based on the date column. I will also need to create a calculated column called volatility that will understand the difference between last month's price compared to the current month and also add another column for percent change. Both of these calculations will help quantify the effects of geopolitical incidents. Additionally, to identify which crisis might be the leading influencer of the GPR index, I am incorporating the violence intensity column from the ICB dataset. This will help narrow down the causes of volatility in crude oil prices even if there were several international conflicts occurring in a specific year. Although there is no data for crisis names from 2019 onwards, I will still continue analyzing the relationship between GPR and crude oil prices as that is the main question of my project.

Data Dictionary

Column	Type	Source	Description
Date	Date	All	The month and year for pricing, GPR, and crisis data
Product Name	Text	EIA	The type of petroleum – WTI or Brent
Series Description	Text	EIA	Pricing description
Value	Numeric	EIA	Price of oil
Unit	Text	EIA	Unit of measurement
GPR	Numeric	GPR	The measure of geopolitical risk
Recent GPR Threats	Numeric	GPR	The measure of geopolitical threats
Recent GPR Acts	Numeric	GPR	The measure of geopolitical threats that escalated into acts
Share of articles Cat. 1	Numeric	GPR	Frequency of articles on War Threats
Share of articles Cat.2	Numeric	GPR	Frequency of articles on Peace Threats
Share of articles Cat. 3	Numeric	GPR	Frequency of articles on Military Buildups
Share of articles Cat. 4	Numeric	GPR	Frequency of articles on Nuclear Threats
Share of articles Cat. 5	Numeric	GPR	Frequency of articles on Terror Threats
Share of articles Cat. 6	Numeric	GPR	Frequency of articles on Beginning of War
Share of articles Cat. 7	Numeric	GPR	Frequency of articles on Escalation of War
Share of articles Cat. 8	Numeric	GPR	Frequency of articles on Terror Acts
Percent of Recent GPR Articles	Numeric	GPR	Proportion of total articles that are categorized in the GPR index
Number of articles (10)	Numeric	GPR	Total number of articles published by the 10 major newspapers
Crisis Name	Text	ICB	Name of the international crisis
Violence Intensity	Numeric	ICB	Intensity of the crisis on a 1-4 scale

Proposed Analysis:

The main motive of my project is to understand and analyze the effects of geopolitical tensions and conflicts on crude oil prices. My research questions include:

1. What is the correlation between geopolitical risk and crude oil prices?
2. How does this risk vary between Brent crude and WTI crude prices?
3. Which specific international incident has had the highest impact on WTI and Brent pricing?
4. What types of events have a greater effect on crude volatility based on the GPR index categories?
5. What GPR index categories have occurred most frequently?
6. What has been the overall crude oil pricing trends for WTI and Brent?

Works Cited:

Caldara, Dario and Matteo Iacoviello (2022). "Measuring Geopolitical Risk," International Finance Discussion Papers 1222r1. Washington: Board of Governors of the Federal Reserve System, https://doi.org/10.17016/IFDP.2022.1222r1.

Brecher, Michael, Jonathan Wilkenfeld, Kyle Beardsley, Patrick James and David Quinn (2023). *International Crisis Behavior Data Codebook, Version 15.* http://sites.duke.edu/icbdata/data-collections/

Data Sources:

https://www.eia.gov/opendata/browser/petroleum/pri

https://www.matteoiacoviello.com/gpr.htm

https://sites.duke.edu/icbdata/data-collections/