

# Geo-Political Risks Trend Analysis in MENA Region

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## Introduction

This analysis aims to provide a comprehensive assessment of the geopolitical situation in MENA (Middle East and North Africa) countries for a period of 38 years for a firm interested in investing in renewable energy projects within this region. By conducting a time series analysis, we will examine historical data to gain insights into the geopolitical factors that may impact the feasibility and profitability of such investments.

Renewable energy has gained significant attention globally as a sustainable and environmentally friendly alternative to traditional energy sources. The MENA region offers immense potential for renewable energy projects due to its abundant solar and wind resources. However, investing in this region requires a thorough understanding of the geopolitical landscape, as political stability, government policies, and regional conflicts can significantly influence the success of renewable energy ventures.

To address these concerns, we have collected historical data that includes various geopolitical indicators for MENA countries. The dataset encompasses key variables such as the Geo-Political Risk (GPR), Geo-Political Risk due to Threats (GPRT), Geo-Political Risk due to Actual-act (GPRA), Geo-Political Risk Historical (GPRH), and specific country-level indicators for Egypt (GPRC\_EGY), Israel (GPRC\_ISR), Saudi Arabia (GPRC\_SAU), and Tunisia (GPRC\_TUN), along with their historical data, that is, GPRHC\_EGY, GPRHC\_ISR, GPRHC\_SAU, and GPRHC\_TUN.

The analysis will involve producing plots to help in exploring the trends, patterns, and relationships between these geopolitical factors over time. By analyzing the data, we aim to identify any significant political risk factors that may affect renewable energy investments in MENA countries.

The findings of this analysis will provide informed advice to the investor regarding the feasibility and viability of investing in renewable energy projects within the MENA region. The insights gained from this analysis will enable the investor to make well-informed decisions, considering the geopolitical risks associated with the region, and ultimately determine whether pursuing such projects is worthwhile or not.

```
# Loading the required libraries and the dataset
```

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ----- tidyverse 2.0.0 --
## v dplyr      1.1.2      v readr      2.1.4
## v forcats    1.0.0      v stringr   1.5.0
## v ggplot2    3.4.2      v tibble    3.2.1
## v lubridate  1.9.2      v tidyr     1.3.0
## v purrr      1.0.1
```

```
## -- Conflicts ----- tidyverse_conflicts() --
```

```
## x dplyr::filter() masks stats::filter()
```

```
## x dplyr::lag() masks stats::lag()
```

```
## i Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors
```

```
library(tseries)

## Registered S3 method overwritten by 'quantmod':
##   method      from
##   as.zoo.data.frame zoo

library(forecast)
library(ggplot2)
library(psych)

##
## Attaching package: 'psych'
##
## The following objects are masked from 'package:ggplot2':
##
##   %+%, alpha

nema <- readxl::read_xlsx("mena.xlsx")
```

## Descriptive Analysis

The descriptive analysis of GPR (Geopolitical Risk) involves examining its mean, variance, minimum, and maximum values, providing insights into the average risk level, variability, and extreme risk events, and aiding in understanding the dynamics and potential impact on investments in renewable energy in MENA countries.

```
# Descriptive statistics of the general GPR
describe(nema$GPR)

##      vars    n  mean    sd median trimmed   mad   min    max range skew kurtosis
## X1      1 462 100.71 47.77  90.61   93.87 21.16 39.05 512.53 473.48 4.39    28.07
##      se
## X1 2.22
```

The descriptive statistics for GPR (Geopolitical Risk) in MENA countries reveal valuable insights into the risk landscape across the region. The average GPR level of approximately 100.71 indicates a moderate geopolitical risk presence, while the relatively high standard deviation of 47.77 suggests substantial variability among the countries, indicating a diverse risk environment. The median value of 90.61 suggests that about half of the countries have GPR levels below this point, while the trimmed mean of 93.87, after excluding extreme values, provides a robust measure of central tendency. The minimum GPR value of 39.05 represents the lowest recorded risk, while the maximum value of 512.53 indicates the highest observed risk, showing the presence of extreme events or significant variations in risk levels among the countries. Additionally, the positively skewed distribution (skewness of 4.39) and high kurtosis (28.07) suggest the existence of extreme values and potential outliers. These findings illustrate the complex and diverse geopolitical risk landscape in MENA countries, highlighting the need for careful risk assessment and management for potential investors in renewable energy projects within the region.

## Creating times series objects for each variable

Creating a time series object for each variable is important because it allows us to leverage the powerful time series analysis tools available in R. By converting the variables to a time series object, we gain access to specialized functions and methods tailored specifically for time series data. These tools enable us to handle and manipulate the data in a time-dependent manner, perform advanced analyses, and apply forecasting techniques. Additionally, working with time series objects in R facilitates the identification and extraction of important temporal features, such as trends, seasonality, and autocorrelation, which are vital for understanding the underlying patterns and dynamics of the data. Overall, converting the variables to a time series object is a necessary step that unlocks the full potential of time series analysis in R and enables us to extract meaningful insights from the data.

```
# creating time series object for every variable

GPR <- ts(nema$GPR, start = c(1985, 1), frequency = 12)
GPRT <- ts(nema$GPRT, start = c(1985, 1), frequency = 12)
GPRA <- ts(nema$GPRA, start = c(1985, 1), frequency = 12)
GPRH <- ts(nema$GPRH, start = c(1985, 1), frequency = 12)
GPRC_EGY <- ts(nema$GPRC_EGY, start = c(1985, 1), frequency = 12)
GPRC_ISR <- ts(nema$GPRC_ISR, start = c(1985, 1), frequency = 12)
GPRC_SAU <- ts(nema$GPRC_SAU, start = c(1985, 1), frequency = 12)
GPRC_TUN <- ts(nema$GPRC_TUN, start = c(1985, 1), frequency = 12)
GPRHC_EGY <- ts(nema$GPRHC_EGY, start = c(1985, 1), frequency = 12)
GPRHC_ISR <- ts(nema$GPRHC_ISR, start = c(1985, 1), frequency = 12)
GPRHC_SAU <- ts(nema$GPRHC_SAU, start = c(1985, 1), frequency = 12)
GPRHC_TUN <- ts(nema$GPRHC_TUN, start = c(1985, 1), frequency = 12)
```

## Visualization of Trends

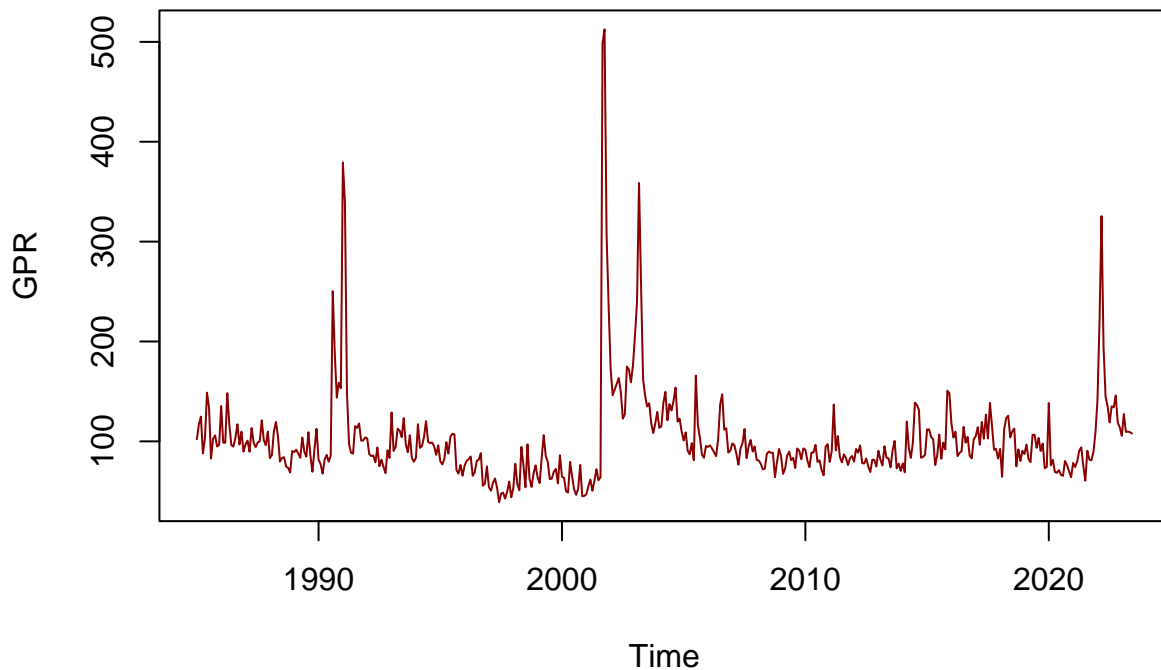
### General Geo-Political Risk Trend in MENA countries

The graph shows that the geopolitical risk (GPR) in MENA countries has been increasing over time. The GPR is a measure of the risk of political instability or conflict in a country. A higher GPR indicates a higher risk of these events.

```
# plotting GPR in MENA region

plot(GPR, main = "General GPR in MENA Region", col = "darkred")
```

## General GPR in MENA Region



The graph shows that the GPR in MENA countries was high in 1990 - 1991. This was due to the Gulf War. The invasion of Kuwait by Iraq in August 1990 led to a large-scale military conflict known as the Gulf War. A coalition of countries, led by the United States, intervened to liberate Kuwait, resulting in significant geopolitical tensions in the region. In 2001- ongoing, there was a war on terror. The terrorist attacks of September 11, 2001, in the United States led to the global “War on Terror,” with a strong focus on combating terrorism in the MENA region. This has led to military interventions and conflicts in countries like Afghanistan, Iraq, and later, Syria and Libya. The relatively high GPR recorded between 2020 - 2023 would be as a result of COVID-19 Pandemic and “Geopolitical competition” as countries such as the United States, Russia, and China, were involved in geopolitical competition in the region, supporting different factions and interests.

The GPR has declined slightly since 2011, but it remains at a high level. This suggests that the MENA region is still a volatile region, and there is a significant risk of political instability or conflict.

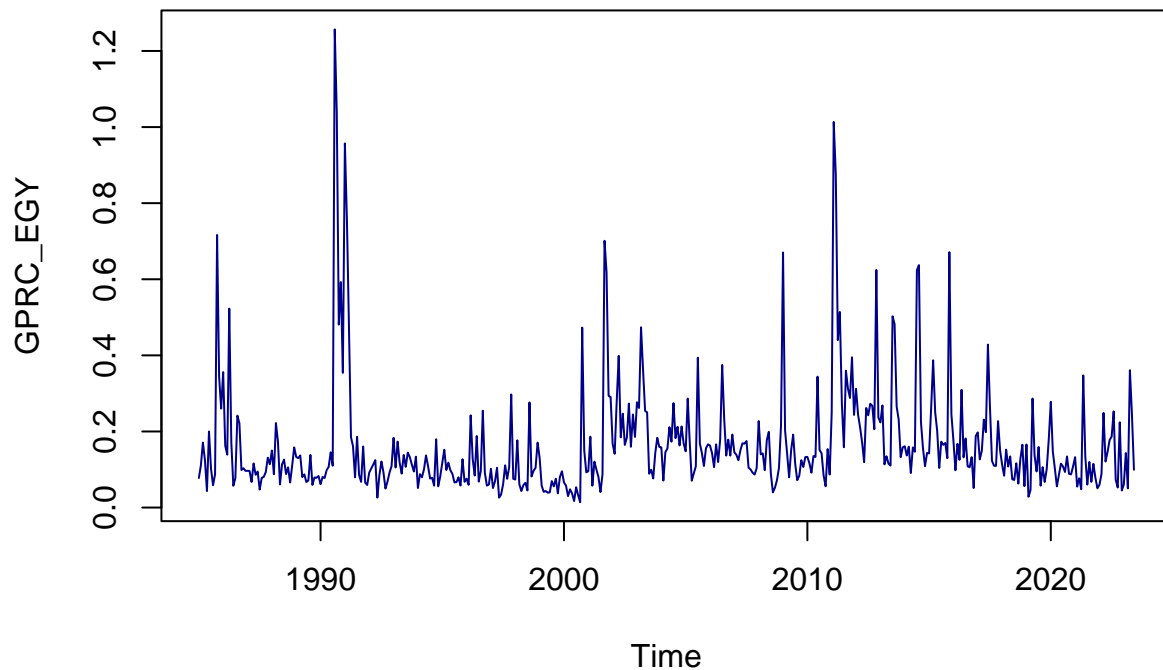
### Geo-Political Risk Trend in Egypt

The analysis of Egypt’s geopolitical risk assesses political stability, economic risk, and regional dynamics, examining events such as the Gulf War, the Arab Spring, and the Sinai insurgency to understand the country’s overall risk profile for investors

```
# plotting GPR for Egypt
```

```
plot(GPRC_EGY, main = "Geo-Political Risk Trend in Egypt", col = "darkblue")
```

## Geo-Political Risk Trend in Egypt



Between 1990 and 2015, Egypt experienced several political events that contributed to high geopolitical risk in the country during three distinct time periods:

In examining the graphs, The Gulf War (1990-1991) significantly impacted Egypt's geopolitical risk. In response to Iraq's invasion of Kuwait, Egypt joined a coalition of countries led by the United States to liberate Kuwait and counter Iraq's aggression. Egypt's involvement in the war and its strategic position in the Arab world increased its exposure to regional tensions and geopolitical instability. The 9/11 terrorist attacks in the United States in 2001 had far-reaching consequences globally, including in Egypt. The attacks led to a shift in U.S. foreign policy, and Egypt faced increased scrutiny in terms of its political and security landscape. The period from 2009 to 2015 saw significant domestic political changes and regional turmoil, which heightened geopolitical risks in Egypt all these explains the high geopolitical risk examined by the graph for Egypt. In January 2011, widespread protests and demonstrations erupted across Egypt, leading to the ousting of President Hosni Mubarak after nearly 30 years in power. The Egyptian Revolution and its aftermath marked a period of political uncertainty and instability, impacting investor confidence and economic activities in the country.

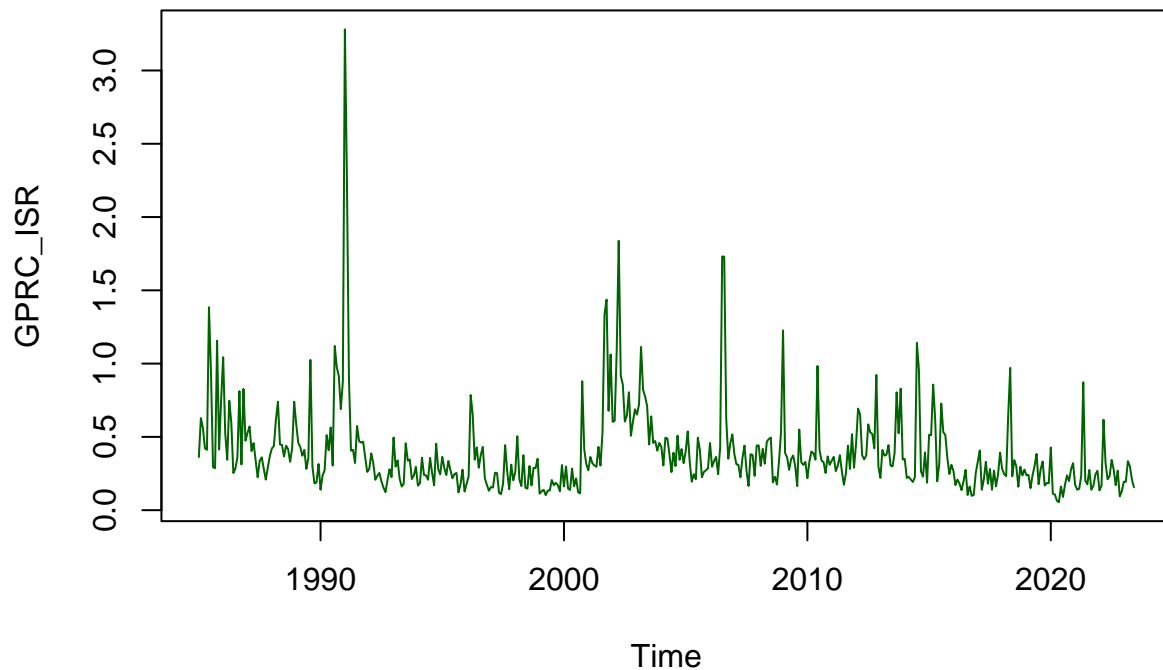
## Geo-Political Risk Trend in Israel

The time trend plot of Israel's geopolitical risk reveals fluctuations in political stability, economic risks, and regional tensions

```
# plotting GPR for Israel
```

```
plot(GPCR_ISR, main = "Geo-Political Risk Trend in Israel", col = "darkgreen")
```

## Geo-Political Risk Trend in Israel



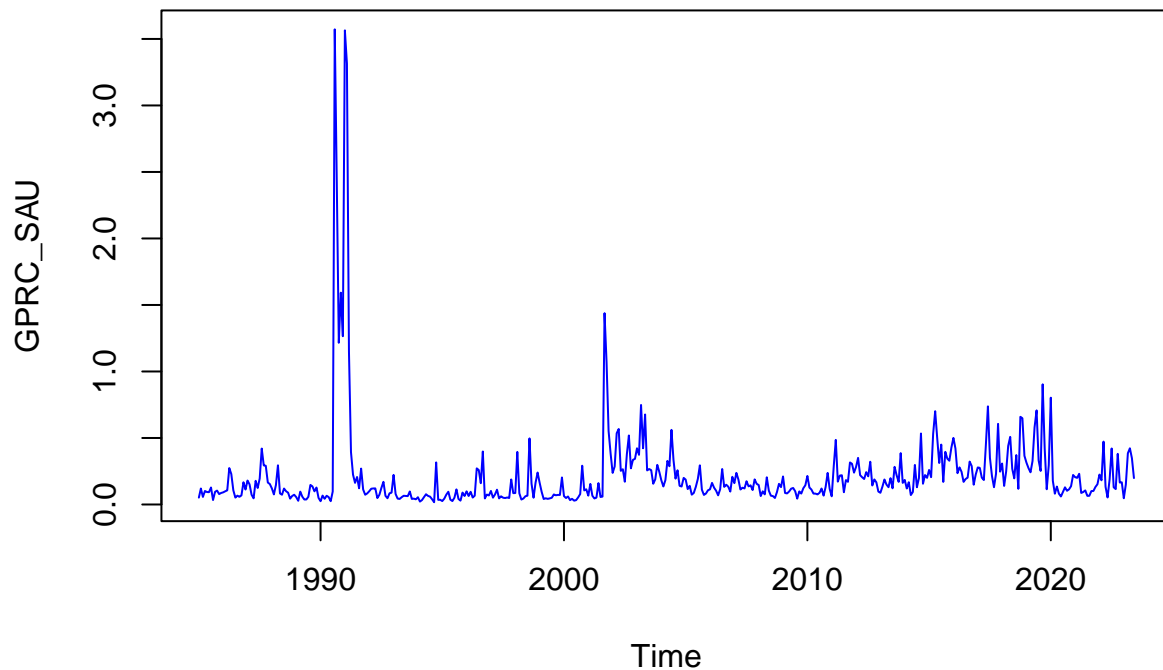
The Gulf War (1990-1991) heightened geopolitical risk in the region, as Iraq launched missiles at Israel in response to its involvement in the coalition against Iraq's invasion of Kuwait. Israel's restraint in not retaliating significantly impacted the geopolitical landscape. In 2006, Israel faced a significant geopolitical risk during the Second Lebanon War, a conflict with Hezbollah in Lebanon. The war led to heightened regional tensions and impacted investor confidence in the area. The Israel's geopolitical risk is also influenced by ongoing conflicts, including the Israeli-Palestinian conflict and regional tensions with Iran and other actors. These conflicts, coupled with security concerns, contributes to her elevated risk profile.

## Geo-Political Risk Trend in Saudi Arabia

The time trend plot of Saudi Arabia's geopolitical risk showcases fluctuations in political stability, economic factors, and regional dynamics

```
# plotting GPR for SA
plot(GPCR_SAU, main = "Geo-Politica Risk Trend in Saudi Arabia", col = "blue")
```

## Geo-Politica Risk Trend in Saudi Arabia



The graph highlights high geopolitical risk in Saudi Arabia during the following key events:

1. During the Gulf War (1990-1991), Saudi Arabia faced significant geopolitical risk as Iraq's invasion of Kuwait threatened regional stability. The country's proximity to the conflict and potential risks to its oil infrastructure heightened concerns for investors.
2. In 2003, the U.S.-led invasion of Iraq impacted Saudi Arabia's geopolitical risk due to its regional implications and potential security concerns.

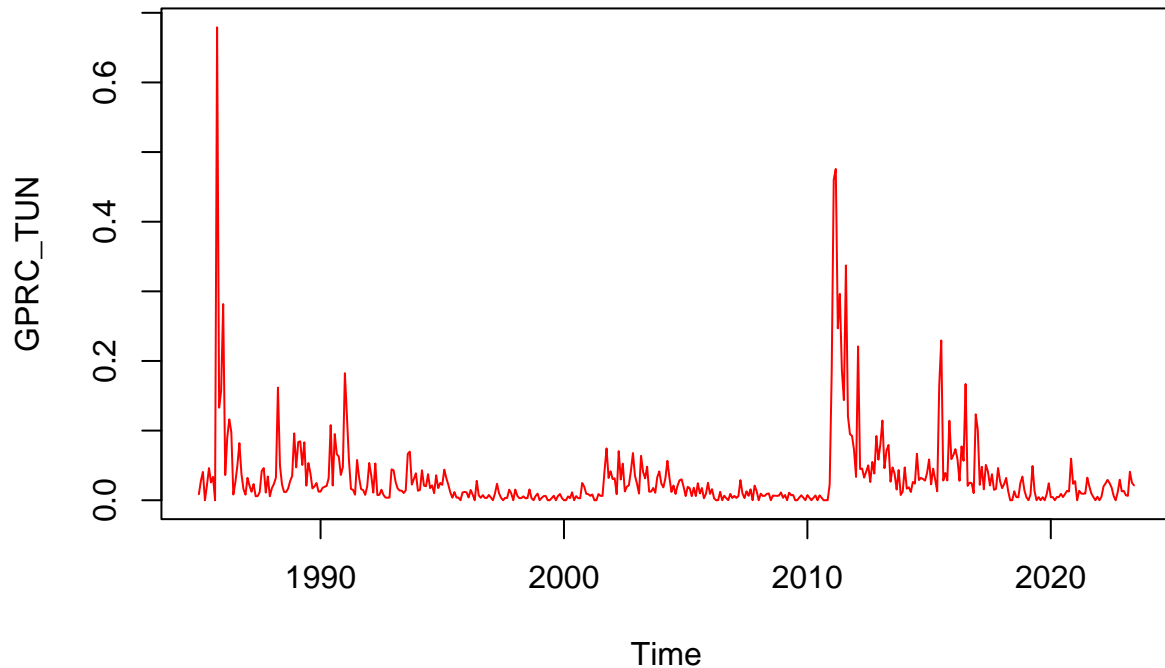
However, Saudi Arabia's geopolitical risk has been relatively lower compared to some other countries in the MENA region this is because, Saudi government has maintained a relatively stable political environment, which is appealing to investors seeking long-term opportunities. Additionally, As a major player in the Gulf Cooperation Council (GCC) and the wider MENA region, Saudi Arabia has sought to foster diplomatic relations, which can positively influence its geopolitical risk profile.

## Geo-Political Risk Trend in Tunisia

Tunisia's geopolitical risk time trend graphic depicts variations in political stability, economic considerations, and regional dynamics.

```
# plotting GPR for Tunisia
plot(GPRC_TUN, main = "Geo-Politica Risk Trend in Tunisia", col = "red")
```

## Geo-Politica Risk Trend in Tunisia



From the graph, high geopolitical risk in Tunisia was observed during the following key events:

1. During the Gulf War (1990-1991), Tunisia faced elevated geopolitical risk due to its proximity to the conflict in neighboring Libya and regional tensions. The war's repercussions had implications for the stability of North Africa
2. The Arab Spring uprisings that started in Tunisia in late 2010 and led to the ousting of President Zine El Abidine Ben Ali in January 2011 significantly impacted the country's geopolitical risk. The revolution and its aftermath brought about a period of political uncertainty and social unrest.

Nevertheless, Tunisia's geopolitical risk has also been relatively lower compared to some other countries in the MENA region. Factors that have contributed to this are:

**Political Transition:** Despite the challenges following the Arab Spring, Tunisia has made progress in its political transition, establishing democratic institutions and holding multiple elections. This contributes to greater political stability compared to some neighboring countries.

**Economic Reforms:** Tunisia has pursued economic reforms and received support from international organizations to strengthen its economy and address socio-economic issues, contributing to a more stable investment climate.

**Security Measures:** Tunisia has taken measures to address security challenges, particularly regarding the threat of terrorism, which has contributed to maintaining a relatively secure environment.



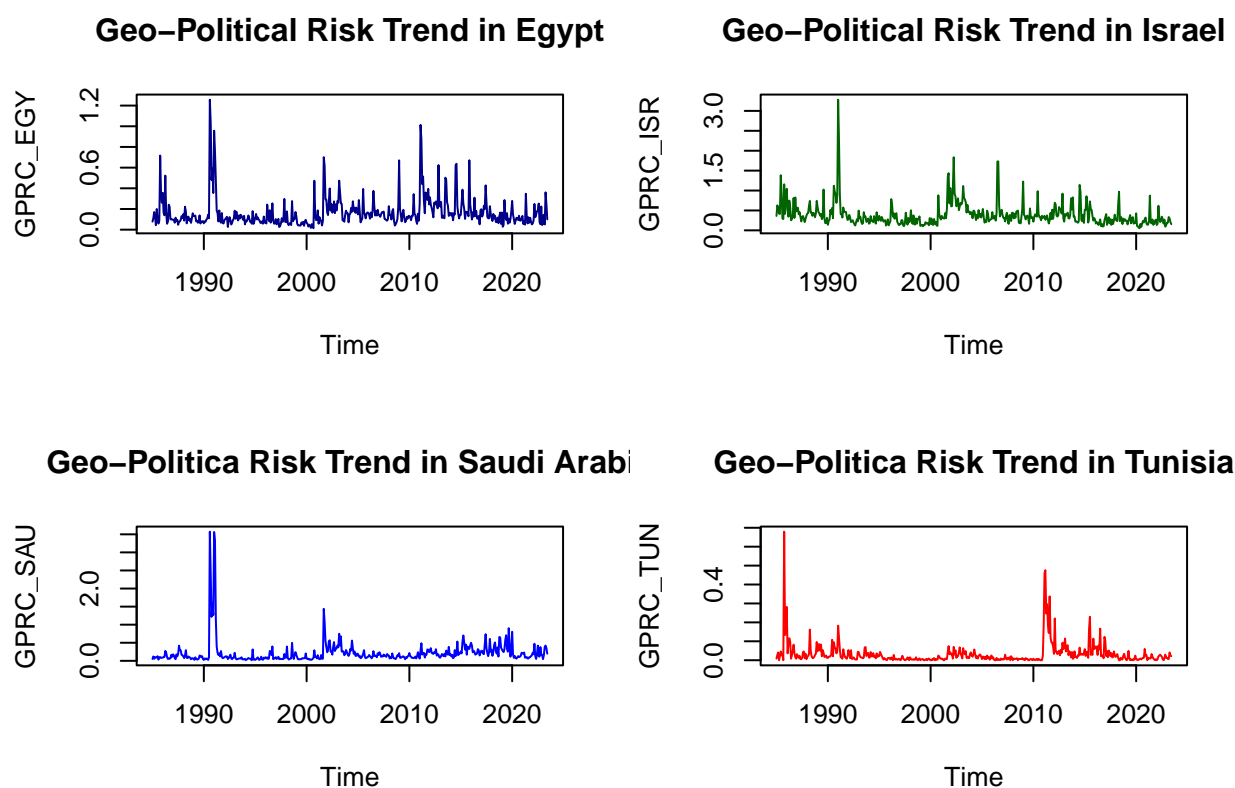
### Trend comparison of the four MENA countries.

The following visualization comprises four time series plots, each representing the geopolitical risk trends in Egypt, Israel, Saudi Arabia, and Tunisia. These plots provide a comprehensive overview of how geopolitical risk has evolved in each country over a period of thirty eight years (38), offering valuable insights for investors seeking to analyze and compare investment risks in the MENA region. By examining the fluctuations in political stability and economic risk over time, alongside the timeline of significant geopolitical events, investors can gain a deeper understanding of the complexities and challenges associated with investing in these countries.

```
# plotting the GPR for four countries in MENA region
```

```
par(mfrow = c(2, 2))
```

```
plot(GPRC_EGY, main = "Geo-Political Risk Trend in Egypt", col = "darkblue")
plot(GPRC_ISR, main = "Geo-Political Risk Trend in Israel", col = "darkgreen")
plot(GPRC_SAU, main = "Geo-Politica Risk Trend in Saudi Arabia", col = "blue")
plot(GPRC_TUN, main = "Geo-Politica Risk Trend in Tunisia", col = "red")
```



Based on the comparison of geopolitical risk trends in the four MENA countries – Egypt, Israel, Saudi Arabia, and Tunisia – Saudi Arabia and Tunisia emerge as potential favorable investment destinations for the renewable energy firm.

Saudi Arabia's relatively low geopolitical risk, stable political environment, ongoing economic reforms, and significant regional influence make it an attractive option for renewable energy investment. The country's commitment to diversifying its economy through Vision 2030 indicates a long-term vision for sustainable growth and energy development. Additionally, Saudi Arabia's vast renewable energy potential, especially in

solar and wind, offers promising investment opportunities. However, the firm might approach investments in Saudi Arabia with a cautious eye on the potential impact of regional tensions, as Saudi Arabia has been involved in conflicts with neighboring countries.

Tunisia also presents a favorable investment climate due to its improving political stability, progress in democratic reforms, and ongoing economic development efforts. Despite experiencing upheaval during the Arab Spring, Tunisia has made strides in establishing democratic institutions, and its political transition is generally viewed as positive compared to some other MENA countries. For the renewable energy firm, Tunisia's relatively lower geopolitical risk and growing interest in renewable energy projects present a favorable opportunity. However, the firm should remain mindful of economic challenges and potential security risks, as Tunisia faces regional security threats and economic vulnerabilities.

While Egypt and Israel offer their unique investment potential, they come with higher geopolitical risks. Egypt's historical political unrest and regional tensions with neighboring countries may pose challenges and uncertainties for the renewable energy firm's investment plans. Similarly, while Israel boasts technological advancements and innovation in the renewable energy sector, its long-standing conflict with the Palestinians and regional adversaries introduces geopolitical complexities that may influence investment decisions. The firm might need to consider potential spillover effects and the perception of regional instability before committing significant investments in Egypt and Israel. Ultimately, the decision on where to invest should be based on a comprehensive risk analysis, taking into account specific project opportunities, regulatory environments, and the geopolitical landscape in each country.

## Forecasting Geo-Political Risks in the four countries in a period of ten years

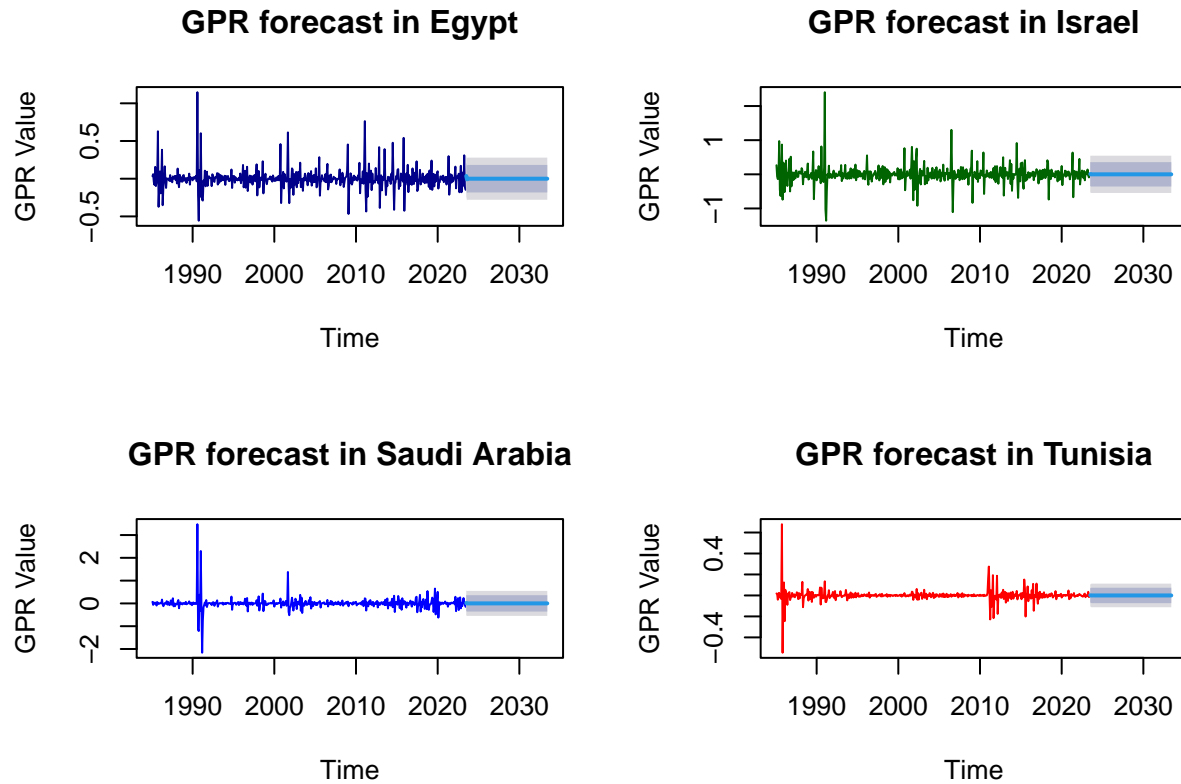
Forecasting the geopolitical risk for Egypt, Israel, Saudi Arabia, and Tunisia over the next ten years is a crucial endeavor for investors and decision-makers in the MENA region. By employing advanced analytical models and considering historical geopolitical trends, this comprehensive analysis aims to project the potential fluctuations in political stability, economic risks, and regional dynamics that could impact each country's risk profile. The forecasted geopolitical risk will enable stakeholders to make informed investment decisions, assess opportunities and challenges, and implement robust risk management strategies to navigate the evolving geopolitical landscape in these four MENA nations.

```
# Removing the trend
GPRC._EGY <- diff(GPRC_EGY)
GPRC._ISR <- diff(GPRC_ISR)
GPRC._SAU <- diff(GPRC_SAU)
GPRC._TUN <- diff(GPRC_TUN)

# fitting arima model
model_GPRC._EGY <- arima(GPRC._EGY, order = c(1,1,1))
model_GPRC._ISR <- arima(GPRC._ISR, order = c(1,1,1))
model_GPRC._SAU <- arima(GPRC._SAU, order = c(1,1,1))
model_GPRC._TUN <- arima(GPRC._TUN, order = c(1,1,1))
par(mfrow = c(2, 2))

# plotting forecast
plot(forecast(model_GPRC._EGY, h = 120),
     main = "GPR forecast in Egypt",
     col = "darkblue", xlab = "Time", ylab = "GPR Value")
plot(forecast(model_GPRC._ISR, h = 120),
     main = "GPR forecast in Israel",
     col = "darkgreen", xlab = "Time", ylab = "GPR Value")
plot(forecast(model_GPRC._SAU, h = 120),
     main = "GPR forecast in Saudi Arabia",
```

```
col = "blue", xlab = "Time", ylab = "GPR Value")
plot(forecast(model_GPRC._TUN, h= 120),
     main = "GPR forecast in Tunisia",
     col = "red", xlab = "Time", ylab = "GPR Value")
```



## Discussion

### Egypt

The wider confidence band for Egypt's geopolitical risk forecast indicates a higher level of uncertainty surrounding the predicted values. This suggests that the political stability, economic risks, and regional dynamics in Egypt are subject to more significant fluctuations over the next ten years, making it a less predictable investment environment.

### Israel

With a moderately wider confidence band compared to Saudi Arabia and Tunisia, Israel's geopolitical risk forecast still exhibits a notable level of uncertainty. This indicates that while the country may experience more stable conditions compared to Egypt, there are factors contributing to potential variability in its risk profile.

## **Saudi Arabia**

The narrower confidence band for Saudi Arabia’s geopolitical risk forecast implies a higher level of confidence and precision in the predicted values. This suggests a more stable political and economic environment over the next ten years, making it a relatively predictable and potentially attractive investment destination.

## **Tunisia**

With the most narrow confidence band among the four countries, Tunisia’s geopolitical risk forecast indicates a higher level of confidence in the predicted values. This suggests a relatively stable and predictable investment climate, with a lower degree of uncertainty compared to the other three countries.

## **Investment Recommendation**

Based on the analysis of the geopolitical risk forecasts, the renewable energy firm may find Saudi Arabia to be the best-suited country for its investment in the MENA region. The narrower confidence band for Saudi Arabia’s geopolitical risk forecast indicates a higher level of confidence and predictability over the next ten years, providing a more stable environment for long-term investment in renewable energy projects.

While Tunisia also shows a relatively narrow confidence band, Saudi Arabia’s larger market size and significant efforts in diversifying its economy through Vision 2030 make it a more attractive destination for renewable energy investment. Additionally, Saudi Arabia’s strategic regional influence and lower geopolitical risks compared to Egypt and Israel provide a more favorable risk-reward balance for the firm’s investment objectives.

However, the firm should remain vigilant about the potential regional spillover effects and evolving geopolitical situations across the MENA region. Conducting a detailed risk analysis specific to renewable energy projects and understanding the regulatory landscape in Saudi Arabia will be crucial in ensuring a successful investment.

## **Conclusion**

In conclusion, Saudi Arabia emerges as the most promising choice for the renewable energy firm’s investment in the MENA region, given its relatively stable geopolitical risk profile and significant economic reforms. By making informed decisions and mitigating potential risks, the firm can capitalize on the country’s growing renewable energy sector and contribute to its sustainable development goals.