Gold Case study

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Introduction

This analysis focuses on examining gold price trends and their impact on the finance industry. The goal is to understand historical gold price data, identify trends, and provide insights into key months when gold prices were at their highest and lowest.

Problem Statement

To examine gold prices and note any trends that impact the finance industry. This involves understanding and analyzing historical gold price data, identifying patterns, and providing insights into key months with the highest and lowest gold prices.

Goals / Metrics

- **Note Gold Price Trends:** Analyze historical gold price data to identify trends over a period of at least 3 years.
- **Identify Key Months:** Determine the months when prices were at their highest and lowest.

Deliverables

- Comprehensive analysis report outlining gold price trends.
- Identification of key months with the highest and lowest gold prices.

Data Acquisition

The dataset was acquired from Kaggle

Loading Libraries

```
library(tidyverse)
```

```
## -- Attaching core tidyverse packages ------------------------ tidyverse 2.0.0 --
## v dplyr     1.1.3     v readr     2.1.4
## v forcats   1.0.0     v stringr   1.5.1
## v ggplot2   3.4.3     v tibble    3.2.1
## v lubridate 1.9.3     v tidyr     1.3.0
## v purrr     1.0.2
## -- 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
```

```r
library(ggplot2)
library(dplyr)
library(skimr)
library(knitr)
```

Reading Data

```r
gold_df  <- read_csv('annual_gold_rate.csv')
```

```
## Rows: 43 Columns: 7
## -- Column specification --------------------------------------------------------
## Delimiter: ","
## dbl  (6): USD, EUR, GBP, INR, AED, CNY
## date (1): Date
##
## i Use `spec()` to retrieve the full column specification for this data.
## i Specify the column types or set `show_col_types = FALSE` to quiet this message.
```

Data Cleaning

```r
gold_df1 <- gold_df %>% drop_na()
```

Reshaping Data

```r
long_gold_df0 <- gold_df %>% select(-INR)
long_gold_df1 <- gather(long_gold_df0, key = "Currency", value = "value", -Date)
print(head(long_gold_df1, n = 16))
```

```
## # A tibble: 16 x 3
##    Date       Currency value
##    <date>     <chr>    <dbl>
##  1 1980-12-31 USD       614.
##  2 1981-12-31 USD       459.
##  3 1982-12-31 USD       375.
##  4 1983-12-30 USD       424.
##  5 1984-12-31 USD       361.
##  6 1985-12-31 USD       317.
##  7 1986-12-31 USD       368.
##  8 1987-12-31 USD       446.
##  9 1988-12-30 USD       437.
## 10 1989-12-29 USD       381.
## 11 1990-12-31 USD       384.
## 12 1991-12-31 USD       362.
## 13 1992-12-31 USD       344.
## 14 1993-12-31 USD       360.
## 15 1994-12-30 USD       384.
## 16 1995-12-29 USD       384.
```

Creating A DataFrame for Examining Trends

```r
trend_df <- long_gold_df1 %>% filter(Date >= "2013-01-01")
print(head(trend_df,n = 16))
```

```
## # A tibble: 16 x 3
##    Date       Currency value
##    <date>     <chr>    <dbl>
##  1 2013-12-31 USD      1411.
##  2 2014-12-31 USD      1266.
##  3 2015-12-31 USD      1160.
##  4 2016-12-30 USD      1251.
##  5 2017-12-29 USD      1257.
##  6 2018-12-31 USD      1268.
##  7 2019-12-31 USD      1393.
##  8 2020-12-31 USD      1770.
##  9 2021-12-31 USD      1799.
## 10 2022-12-30 USD      1800.
## 11 2013-12-31 EUR      1064.
## 12 2014-12-31 EUR       953.
## 13 2015-12-31 EUR      1045.
## 14 2016-12-30 EUR      1129.
## 15 2017-12-29 EUR      1114.
## 16 2018-12-31 EUR      1074.
```

Data Summary

The summary of the data from 1978 to 2022:

```
summary_gold_df0  <- gold_df %>% select(-Date)
summary_gold_df1  <- summary(summary_gold_df0)
kable(summary_gold_df1)
```

	USD	EUR	GBP	INR	AED	CNY
	Min. : 271.0	Min. : 253.4	Min. : 172.1	Min. : 3554	Min. : 995.5	Min. : 926.6
	1st Qu.: 362.8	1st Qu.: 311.1	1st Qu.: 222.8	1st Qu.: 7462	1st Qu.:1332.0	1st Qu.: 2259.1
	Median : 436.9	Median : 366.1	Median : 251.1	Median : 13721	Median :1604.0	Median : 3346.4
	Mean : 738.4	Mean : 617.7	Mean : 489.3	Mean : 37253	Mean :2712.5	Mean : 5138.9
	3rd Qu.:1237.7	3rd Qu.: 999.0	3rd Qu.: 780.3	3rd Qu.: 73891	3rd Qu.:4545.9	3rd Qu.: 8300.1
	Max. :1800.1	Max. :1710.4	Max. :1457.9	Max. :141287	Max. :6611.7	Max. :12199.8
	NA	NA	NA	NA	NA	NA's :5

The summary of the data from 2013 to 2022.

```
summary_gold_df2  <- gold_df %>% filter(Date >= "2013-01-01")
summary_gold_df3  <- summary_gold_df2 %>% select(-Date)
summary_gold_df4  <- summary(summary_gold_df3)
kable(summary_gold_df4)
```

	USD	EUR	GBP	INR	AED	CNY
	Min. :1160	Min. : 952.9	Min. : 758.9	Min. : 74313	Min. :4261	Min. : 7285
	1st Qu.:1259	1st Qu.:1066.1	1st Qu.: 909.5	1st Qu.: 81951	1st Qu.:4626	1st Qu.: 8325
	Median :1331	Median :1121.7	Median : 962.9	Median : 85329	Median :4887	Median : 8586
	Mean :1438	Mean :1240.4	Mean :1052.1	Mean : 98986	Mean :5280	Mean : 9448
	3rd Qu.:1680	3rd Qu.:1451.7	3rd Qu.:1253.8	3rd Qu.:122925	3rd Qu.:6171	3rd Qu.:11110
	Max. :1800	Max. :1710.4	Max. :1457.9	Max. :141287	Max. :6612	Max. :12200

Identifying Max Values

```
max_values <- long_gold_df1 %>%
   group_by(Currency) %>%
   filter(value == max(value))
```

Identifying Max Values (Past 10 yrs)

```
max_values_trend <- trend_df %>%
   group_by(Currency) %>%
   filter(value == max(value))
```

Identifying Min Values

```
min_values <- long_gold_df1 %>%
   group_by(Currency) %>%
   filter(value == min(value))
```

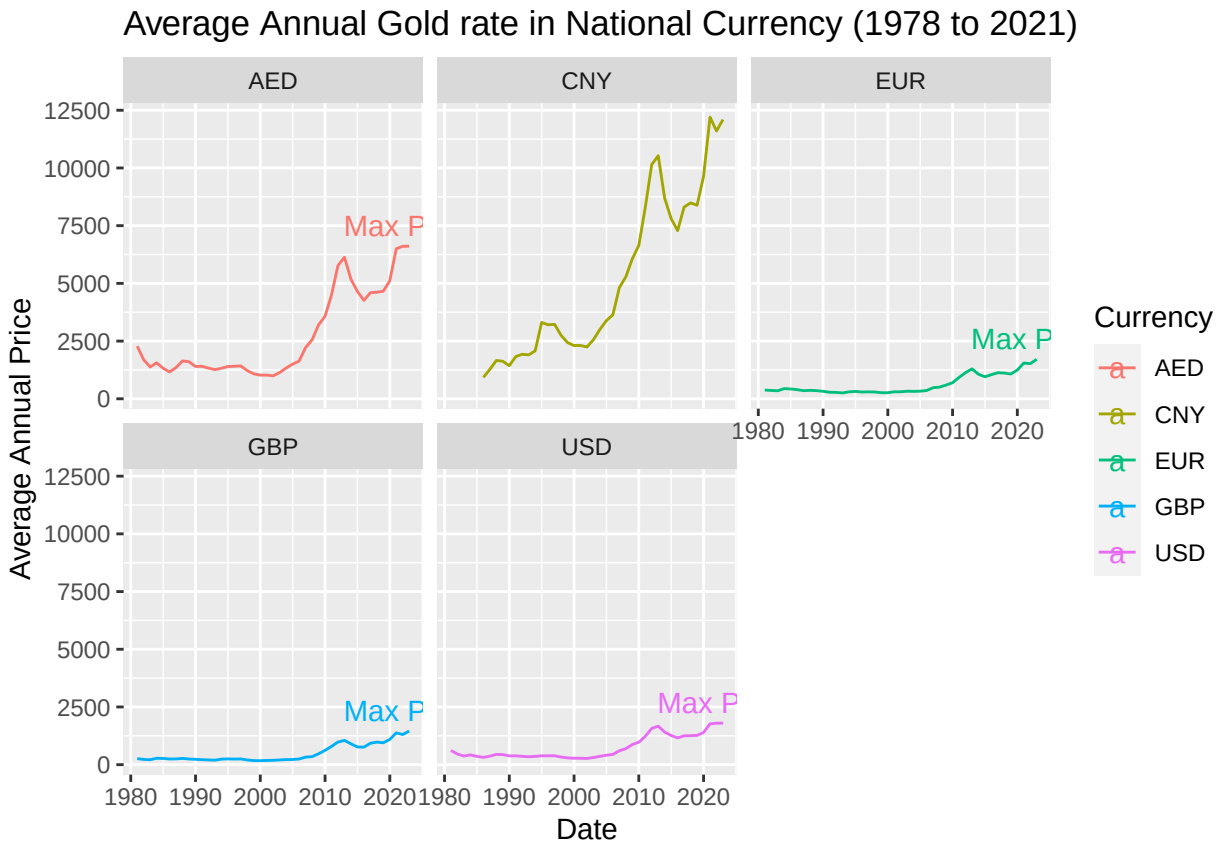
Identifying Min Values (Past 10 yrs)

```
min_values_trend <- trend_df %>%
   group_by(Currency) %>%
   filter(value == min(value))
```

Visualization

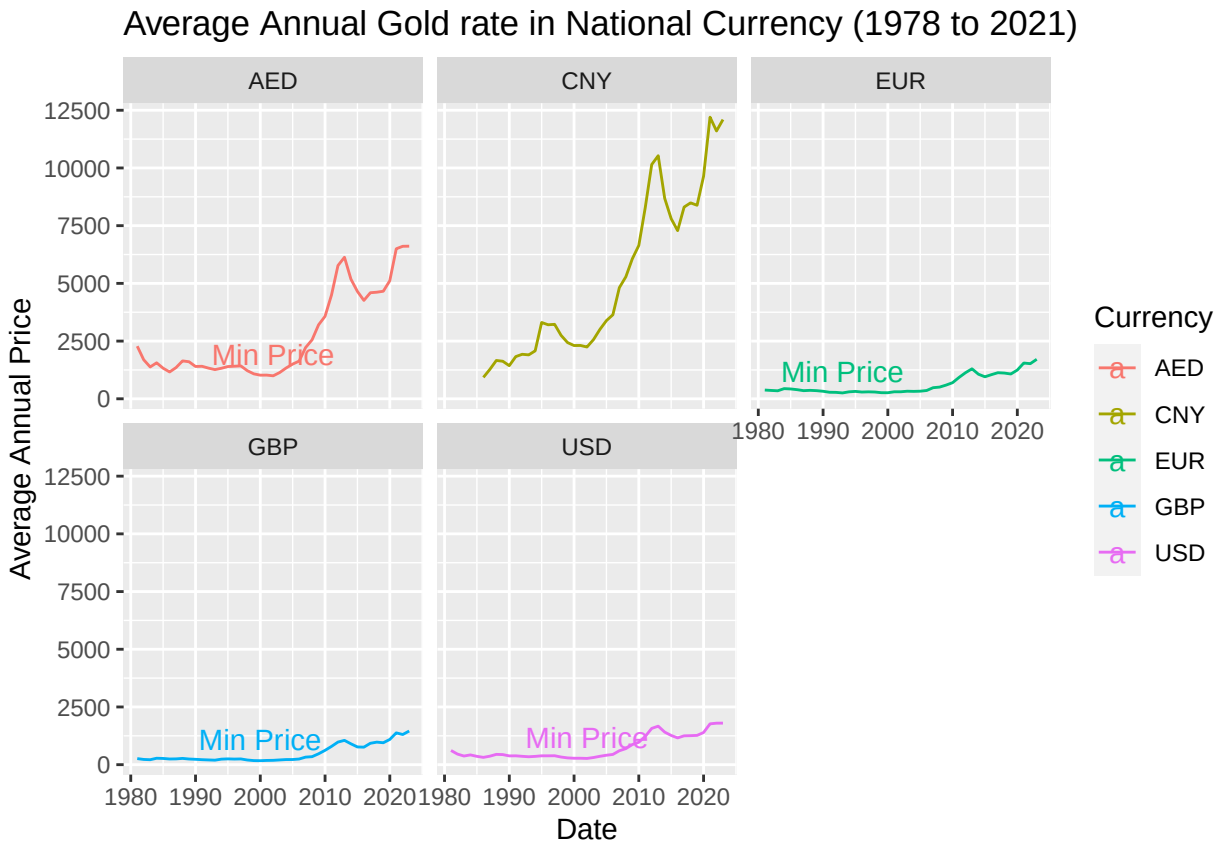
```
ggplot(data = long_gold_df1, aes(x = Date, y = value, color = Currency)) +
  geom_line() +
  geom_text(data = max_values, aes(x = Date, y = value, label = 'Max Price'), vjust = -0.5) +
  facet_wrap(~Currency) +
  labs(title = "Average Annual Gold rate in National Currency (1978 to 2021)", x = "Date", y = "Average
```

```
## Warning: Removed 5 rows containing missing values (`geom_line()`).
```




```
ggplot(data = long_gold_df1, aes(x = Date, y = value, color = Currency)) +
  geom_line() +
  geom_text(data = min_values, aes(x = Date, y = value, label = 'Min Price'), vjust = -0.5) +
  facet_wrap(~Currency) +
  labs(title = "Average Annual Gold rate in National Currency (1978 to 2021)", x = "Date", y = "Average
```

```
## Warning: Removed 5 rows containing missing values (`geom_line()`).
```



Print Max & Min Values

```
print(max_values)
```

```
## # A tibble: 4 x 3
## # Groups:   Currency [4]
##   Date       Currency value
##   <date>     <chr>    <dbl>
## 1 2022-12-30 USD      1800.
## 2 2022-12-30 EUR      1710.
## 3 2022-12-30 GBP      1458.
## 4 2022-12-30 AED      6612.
```

```
print(min_values)
```

```
## # A tibble: 4 x 3
## # Groups:   Currency [4]
##   Date       Currency value
##   <date>     <chr>    <dbl>
## 1 2001-12-31 USD       271.
## 2 1992-12-31 EUR       253.
## 3 1999-12-31 GBP       172.
## 4 2001-12-31 AED       996.
```

Print Max & Min Prices in the past 10 years.

```
print(max_values_trend)
```

```
## # A tibble: 5 x 3
## # Groups:   Currency [5]
##   Date       Currency  value
##   <date>     <chr>     <dbl>
## 1 2022-12-30 USD       1800.
## 2 2022-12-30 EUR       1710.
## 3 2022-12-30 GBP       1458.
## 4 2022-12-30 AED       6612.
## 5 2020-12-31 CNY      12200.
```

```
print(min_values_trend)
```

```
## # A tibble: 5 x 3
## # Groups:   Currency [5]
##   Date       Currency value
##   <date>     <chr>    <dbl>
## 1 2015-12-31 USD      1160.
## 2 2014-12-31 EUR       953.
## 3 2015-12-31 GBP       759.
## 4 2015-12-31 AED      4261.
## 5 2015-12-31 CNY      7285.
```

Conclusion

The analysis of historical gold price trends from 1978 to 2021 and the past ten years reveals intriguing patterns across various currencies. Notably:

General Trend For the Time Period (1978 - 2022):

- **USD (United States Dollar):** The highest gold price was recorded on December 30, 2022, reaching $1800, while the lowest was observed on December 31, 2001, at $271.
- **EUR (Euro):** Similarly, the highest gold price occurred on December 30, 2022, amounting to $1710, with the lowest registered on December 31, 1992, at $253.
- **GBP (British Pound):** Peaking on December 30, 2022, at $1458, the lowest gold price for GBP was noted on December 31, 1999, at $172.
- **AED (United Arab Emirates Dirham):** Reflecting a peak on December 30, 2022, at $6612, the lowest gold price was documented on December 31, 2001, at $996.

Trend for the Past Ten Years: Analyzing the past ten years (2013-2022) shows a continuation of these trends:

- **USD, EUR, GBP, AED:** All experienced their highest gold prices in December 2022, indicating a consistent pattern across different currencies.
- **CNY (Chinese Yuan):** The trend in CNY also follows suit, reaching its zenith in December 2022.

Lowest Prices in the Past 10 Years:

- **USD:** The lowest gold price in the past ten years was observed on December 31, 2015, at $1160.
- **EUR:** Similarly, the lowest gold price for EUR during this period occurred on December 31, 2014, at $953.
- **GBP:** For GBP, the lowest gold price in the past ten years was noted on December 31, 2015, at $759.
- **AED:** The lowest gold price in the past ten years for AED was recorded on December 31, 2015, at $4261.

- **CNY:** Finally, the lowest gold price for CNY during this period was observed on December 31, 2015, at $7285.

Recommendations:

Based on historical trends and recent findings, certain considerations for investors emerge:

1. **Best Months to Buy Gold:**
   - Historically, December and January have seen lower gold prices, presenting potential entry points for buyers.
2. **Best Months to Sell Gold:**
   - August and September, on average, have witnessed higher gold prices, making them potential periods for profit-taking.
3. **Recent High Prices in December 2022:**
   - Stakeholders may consider December 2022 as a favorable time for selling gold, especially if prices have experienced significant increases leading up to this period.
4. **Low Prices in 2015:**
   - For buyers, the historical lows in 2015 (particularly for USD, EUR, GBP, AED, and CNY) might be considered as potential buying opportunities. However, it's essential to analyze current market conditions.
5. **Trend Analysis for the Past 10 Years:**
   - Despite December showing both high and low prices, it remains a notable month for potential volatility, providing opportunities for both buyers and sellers.

It's crucial to approach these recommendations with an awareness of current market conditions and individual financial goals. Adaptation of strategies and consideration of external factors such as global economic conditions and geopolitical events is paramount for informed decision-making.