Global Stock Data Analysis

1. Project Overview

This project analyzes daily global stock market indicators from 2020 to 2024 to understand market performance trends, volatility behavior, and regional differences across major stock indices.

The objective is to generate data-driven insights that support investment analysis, risk assessment, and market comparison using Python, SQL, and Power BI.

2. Dataset Summary

- Rows- 18270
- Columns- 16
- Time Period: 2020 – 2024
- Markets Covered: S&P 500, NASDAQ Composite, FTSE 100, Nikkei 225, Hang Seng, CAC 40, DAX, KSE 100, SSE Composite
- Key Attributes:
    1. Date and time components (Year, Month, Quarter, Day of Week)
    2. Market indicators (Open, High, Low, Close, Volume)
    3. Performance metric (Daily Change Percent)
    4. Market classification (Region, Market Type)

3. Exploratory Data Analysis using Python

Data preparation and initial analysis were conducted using Python libraries such as pandas, matplotlib, and seaborn.
Key steps included:

- Data Loading - Used pandas to import the dataset.
- Initial Exploration - Used df.info() to check structure and df.describe() for summary statistics.
- Missing Data Handling - Checked for null values.
- Feature engineering
    1. Created year, month, quarter and day_of_week columns from date column.
    2. Created a region column by mapping each Index to its region.
    3. Created a market_type column to divide the Indexes into Developed and Emerging Markets.
- Database Integration - Connected Python script to PostgreSQL and loaded the cleaned DataFrame into the database for SQL analysis.

4. Data Analysis using SQL

1. Top 10 Worst Trading Days Across All Markets - Identified the days with the largest overall negative market movements to highlight major downturn periods.

	date date	index_name character varying (100)	country character varying (50)	daily_change_percent numeric (6,2)	close numeric (12,2)	volume bigint
1	2024-05-03	KSE 100	Pakistan	-44.32	627.90	33419892
2	2023-11-21	NASDAQ Composite	USA	-42.72	649.43	34849542
3	2023-02-07	CAC 40	France	-42.64	630.85	42793210
4	2020-05-24	S&P 500	USA	-42.15	671.16	36221540
5	2023-10-21	CAC 40	France	-42.11	622.95	3828348
6	2021-06-03	Nikkei 225	Japan	-41.54	635.77	29392281
7	2020-02-18	KSE 100	Pakistan	-40.53	722.39	16711072
8	2024-10-20	DAX	Germany	-40.41	650.85	20594302
9	2023-07-27	Nikkei 225	Japan	-38.35	677.97	41940710
10	2020-05-20	DAX	Germany	-34.30	807.23	16799439

2. Markets with Highest Volatility - Analyzed return fluctuations to determine which markets exhibit the highest risk and instability.

	index_name character varying (100)	region character varying (50)	total_days bigint	volatility numeric	avg_return numeric
1	FTSE 100	Europe	1827	4.84	0.04
2	Nikkei 225	Asia	1827	4.81	-0.19
3	KSE 100	Emerging Markets	1827	4.78	0.21
4	Hang Seng	Asia	1827	4.72	0.09
5	NASDAQ Composite	Americas	1827	4.65	0.03
6	SSE Composite	Asia	1827	4.45	-0.01
7	CAC 40	Europe	1827	4.37	0.04
8	S&P 500	Americas	1827	4.34	-0.01
9	DAX	Europe	1827	4.21	0.00
10	Dow Jones	Americas	1827	4.10	-0.15

3. Monthly Performance Patterns - Examined average market returns across months to identify seasonal trends in performance.

	month integer	month_name character varying (15)	markets_analyzed bigint	avg_return numeric	volatility numeric	positive_days bigint	negative_days bigint
1	1	January	10	-0.014	4.43	774	772
2	2	February	10	-0.113	4.82	702	715
3	3	March	10	0.210	4.68	786	759
4	4	April	10	0.206	4.69	790	707
5	5	May	10	-0.019	5.01	775	775
6	6	June	10	0.124	4.73	758	739
7	7	July	10	-0.164	4.41	763	782
8	8	August	10	-0.054	3.92	751	796
9	9	September	10	0.065	4.34	738	760
10	10	October	10	-0.134	4.21	764	782
11	11	November	10	0.097	4.63	753	746
12	12	December	10	-0.127	4.45	735	809

4. Developed vs Emerging Markets Performance - Compared returns between developed and emerging markets to evaluate performance differences by market maturity.

	market_type character varying (20)	num_markets bigint	total_observations bigint	avg_daily_return numeric	volatility numeric	worst_day numeric	best_day numeric	avg_volume numeric
1	Emerging	2	3654	0.104	4.62	-44.32	45.69	25403822
2	Developed	8	14616	-0.018	4.51	-42.72	45.44	25659474

5. Quarterly Performance Trends - Assessed market performance across quarters to observe periodic growth and decline patterns.

	quarter integer	region character varying (50)	years_analyzed bigint	avg_return numeric	volatility numeric	total_days bigint	win_rate numeric
1	1	Americas	5	-0.121	4.64	1356	49.3
2	1	Asia	5	0.079	4.45	1356	50.1
3	1	Emerging Markets	5	0.263	5.88	452	50.2
4	1	Europe	5	0.060	4.36	1356	50.7
5	2	Americas	5	-0.008	4.38	1365	51.1
6	2	Asia	5	0.099	5.07	1365	50.4
7	2	Emerging Markets	5	0.290	4.66	455	53.0
8	2	Europe	5	0.153	5.03	1365	51.0
9	3	Americas	5	-0.021	4.27	1380	49.0
10	3	Asia	5	-0.177	4.65	1380	48.9
11	3	Emerging Markets	5	0.145	4.11	460	48.7
12	3	Europe	5	-0.024	3.75	1380	49.1
13	4	Americas	5	-0.016	4.18	1380	48.8
14	4	Asia	5	-0.140	4.46	1380	47.4
15	4	Emerging Markets	5	0.161	4.31	460	47.0
16	4	Europe	5	-0.085	4.68	1380	51.3

6. High Risk Period Detection- Detected dates with exceptionally high overall volatility indicating periods of elevated market risk.

	date date	daily_market_volatility numeric
1	2024-05-03	18.97
2	2024-05-20	16.14
3	2020-11-27	15.32
4	2021-06-15	14.92
5	2020-03-01	14.74
6	2024-05-26	14.69
7	2023-02-20	14.52
8	2021-11-10	14.49
9	2022-03-07	14.44
10	2020-05-08	14.32

7. Day of Week Performance Pattern- Analyzed average returns by day of the week to determine if certain days consistently outperform others.

	day_of_week character varying (15)	avg_return numeric
1	Sunday	0.19
2	Saturday	0.08
3	Monday	0.07
4	Wednesday	0.02
5	Friday	-0.04
6	Tuesday	-0.11
7	Thursday	-0.16

8. Year-over-Year Performance Change - Compared annual market returns to measure growth or decline relative to previous years.

	index_name character varying (100)	year integer	avg_return numeric	yoy_change numeric
1	CAC 40	2020	0.37	[null]
2	CAC 40	2021	-0.17	-0.54
3	CAC 40	2022	0.15	0.32
4	CAC 40	2023	-0.33	-0.48
5	CAC 40	2024	0.16	0.49
6	DAX	2020	-0.22	[null]
7	DAX	2021	0.11	0.33
8	DAX	2022	0.22	0.11
9	DAX	2023	-0.29	-0.51

Total rows: 50 Query complete 00:00:00.075

9. Market Drawdown detection (Biggest Loss streaks) - Identified consecutive periods of negative returns to assess prolonged market downturns

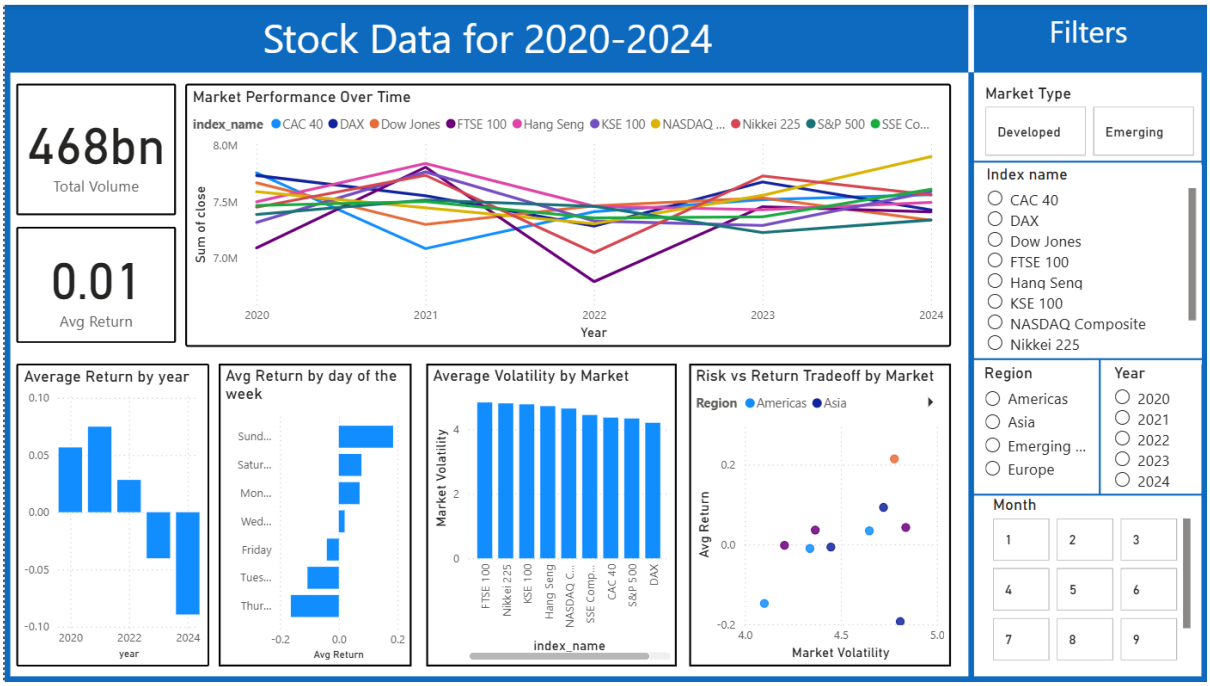
	index_name character varying (100)	worst_drawdown_streak bigint
1	Nikkei 225	14
2	KSE 100	13
3	S&P 500	12
4	Dow Jones	12
5	DAX	10
6	SSE Composite	9
7	FTSE 100	9
8	Hang Seng	9
9	NASDAQ Composite	9
10	CAC 40	9

10. Identifying Consistently High Performing Markets - Determined markets that repeatedly ranked among top performers over multiple years.

	index_name character varying (100)	times_in_top_3 bigint
1	KSE 100	3
2	DAX	2
3	FTSE 100	2
4	CAC 40	2
5	NASDAQ Composite	2
6	S&P 500	2
7	Hang Seng	2

5. Dashboard in Power BI

Finally, built an interactive dashboard in Power BI to present insights visually.



6. Key Insights

Based on the analysis:

- Market performance varied significantly across years, with strong growth in early years followed by downturns in recent periods
- Certain markets consistently showed higher volatility, indicating greater risk exposure
- Developed markets generally demonstrated more stability compared to emerging markets
- Regional analysis showed performance differences across Americas, Europe, and Asia
- Day-of-week trends revealed specific days with higher average returns

- Risk vs Return analysis highlighted that higher volatility did not always guarantee higher returns

7. Business Recommendations

Based on the findings, the following recommendations can be made:

- Portfolio Diversification – Allocate investments across regions and markets to balance risk and return
- Risk Management – Monitor high-volatility markets closely during uncertain periods
- Market Timing Strategies – Leverage seasonal and day-of-week trends for short-term investment decisions
- Focus on Stable Markets – Long-term investors may prioritize markets with lower volatility and consistent growth
- Regional Investment Planning – Adjust investment exposure based on regional performance trends