Financial Data Analysis Project

Sector-based Investment Insights through Data Analysis

INDEX

Project Overview

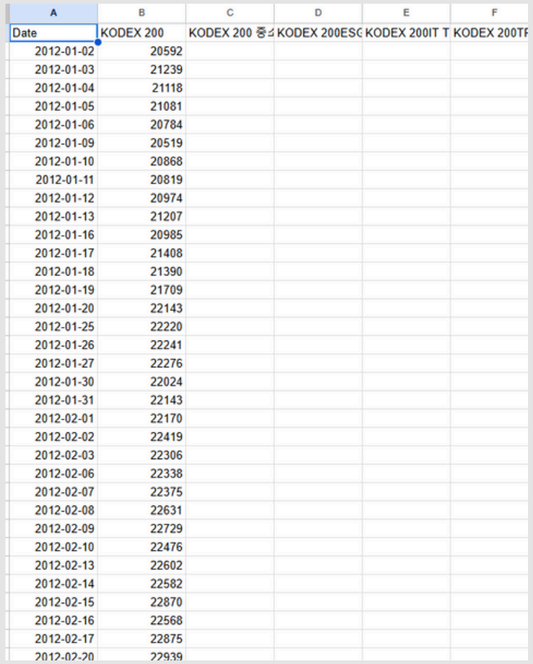
Background:

Interest rate hikes often influence the stock market; this study identifies sector-specific trends and performance.

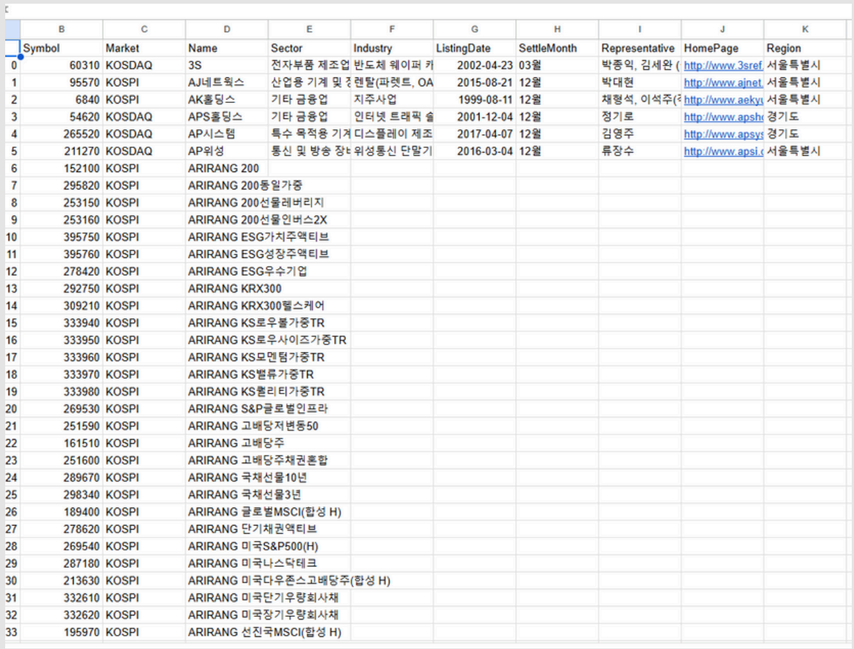
Objective:

Analyze the impact of 10-Year Treasury rates on KODEX ETF sectors!!

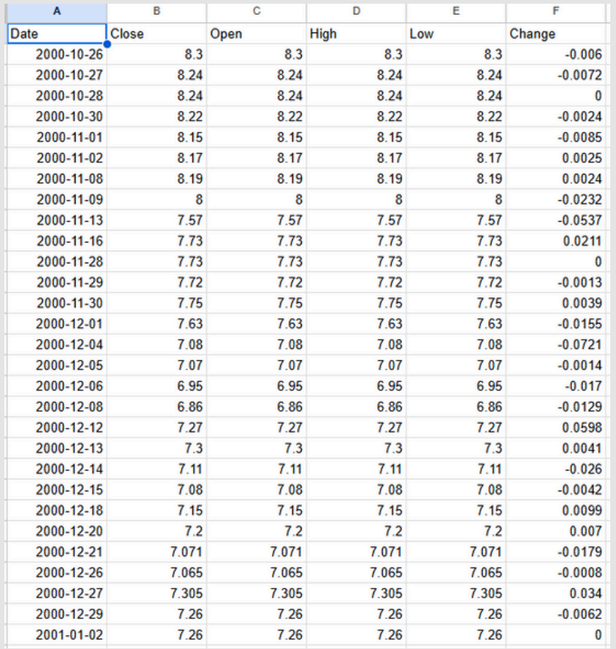
Data Description



Date	KODEX 200	KODEX 200 중소	KODEX 200ESG	KODEX 200IT T	KODEX 200TR
2012-01-02	20592				
2012-01-03	21239				
2012-01-04	21118				
2012-01-05	21081				
2012-01-06	20784				
2012-01-09	20519				
2012-01-10	20868				
2012-01-11	20819				
2012-01-12	20974				
2012-01-13	21207				
2012-01-16	20985				
2012-01-17	21408				
2012-01-18	21390				
2012-01-19	21709				
2012-01-20	22143				
2012-01-25	22220				
2012-01-26	22241				
2012-01-27	22276				
2012-01-30	22024				
2012-01-31	22143				
2012-02-01	22170				
2012-02-02	22419				
2012-02-03	22306				
2012-02-06	22338				
2012-02-07	22375				
2012-02-08	22631				
2012-02-09	22729				
2012-02-10	22476				
2012-02-13	22602				
2012-02-14	22582				
2012-02-15	22870				
2012-02-16	22568				
2012-02-17	22875				
2012-02-20	22939				



	Symbol	Market	Name	Sector	Industry	ListingDate	SettleMonth	Representative	HomePage	Region
0	60310	KOSDAQ	3S	전자부품 제조업	반도체 웨이퍼 카	2002-04-23	03월	박종익, 김세완 (	http://www.3sref.c	서울특별시
1	95570	KOSPI	AJ네트웍스	산업용 기계 및 장	렌탈(파렛트, OA	2015-08-21	12월	박대현	http://www.ajnet.c	서울특별시
2	6840	KOSPI	AK홀딩스	기타 금융업	지주사업	1999-08-11	12월	채형석, 이석주(공	http://www.aekyu	서울특별시
3	54620	KOSDAQ	APS홀딩스	기타 금융업	인터넷 트래픽 솔	2001-12-04	12월	정기로	http://www.apsh	경기도
4	265520	KOSDAQ	AP시스템	특수 목적용 기계	디스플레이 제조	2017-04-07	12월	김영주	http://www.apsys	경기도
5	211270	KOSDAQ	AP위성	통신 및 방송 장비	위성통신 단말기	2016-03-04	12월	류장수	http://www.apsi.c	서울특별시
6	152100	KOSPI	ARIRANG 200							
7	295820	KOSPI	ARIRANG 200동일가중							
8	253150	KOSPI	ARIRANG 200선물레버리지							
9	253160	KOSPI	ARIRANG 200선물인버스2X							
10	395750	KOSPI	ARIRANG ESG가치주액티브							
11	395760	KOSPI	ARIRANG ESG성장주액티브							
12	278420	KOSPI	ARIRANG ESG우수기업							
13	292750	KOSPI	ARIRANG KRX300							
14	309210	KOSPI	ARIRANG KRX300헬스케어							
15	333940	KOSPI	ARIRANG KS로우볼가중TR							
16	333950	KOSPI	ARIRANG KS로우사이즈가중TR							
17	333960	KOSPI	ARIRANG KS모멘텀가중TR							
18	333970	KOSPI	ARIRANG KS벨류가중TR							
19	333980	KOSPI	ARIRANG KS퀄리티가중TR							
20	269530	KOSPI	ARIRANG S&P글로벌인프라							
21	251590	KOSPI	ARIRANG 고배당저변동50							
22	161510	KOSPI	ARIRANG 고배당주							
23	251600	KOSPI	ARIRANG 고배당주채권혼합							
24	289670	KOSPI	ARIRANG 국채선물10년							
25	298340	KOSPI	ARIRANG 국채선물3년							
26	189400	KOSPI	ARIRANG 글로벌MSCI(합성 H)							
27	278620	KOSPI	ARIRANG 단기채권액티브							
28	269540	KOSPI	ARIRANG 미국S&P500(H)							
29	287180	KOSPI	ARIRANG 미국나스닥테크							
30	213630	KOSPI	ARIRANG 미국다우존스고배당주(합성 H)							
31	332610	KOSPI	ARIRANG 미국단기우량회사채							
32	332620	KOSPI	ARIRANG 미국장기우량회사채							
33	195970	KOSPI	ARIRANG 선진국MSCI(합성 H)							



Date	Close	Open	High	Low	Change
2000-10-26	8.3	8.3	8.3	8.3	-0.006
2000-10-27	8.24	8.24	8.24	8.24	-0.0072
2000-10-28	8.24	8.24	8.24	8.24	0
2000-10-30	8.22	8.22	8.22	8.22	-0.0024
2000-11-01	8.15	8.15	8.15	8.15	-0.0085
2000-11-02	8.17	8.17	8.17	8.17	0.0025
2000-11-08	8.19	8.19	8.19	8.19	0.0024
2000-11-09	8	8	8	8	-0.0232
2000-11-13	7.57	7.57	7.57	7.57	-0.0537
2000-11-16	7.73	7.73	7.73	7.73	0.0211
2000-11-28	7.73	7.73	7.73	7.73	0
2000-11-29	7.72	7.72	7.72	7.72	-0.0013
2000-11-30	7.75	7.75	7.75	7.75	0.0039
2000-12-01	7.63	7.63	7.63	7.63	-0.0155
2000-12-04	7.08	7.08	7.08	7.08	-0.0721
2000-12-05	7.07	7.07	7.07	7.07	-0.0014
2000-12-06	6.95	6.95	6.95	6.95	-0.017
2000-12-08	6.86	6.86	6.86	6.86	-0.0129
2000-12-12	7.27	7.27	7.27	7.27	0.0598
2000-12-13	7.3	7.3	7.3	7.3	0.0041
2000-12-14	7.11	7.11	7.11	7.11	-0.026
2000-12-15	7.08	7.08	7.08	7.08	-0.0042
2000-12-18	7.15	7.15	7.15	7.15	0.0099
2000-12-20	7.2	7.2	7.2	7.2	0.007
2000-12-21	7.071	7.071	7.071	7.071	-0.0179
2000-12-26	7.065	7.065	7.065	7.065	-0.0008
2000-12-27	7.305	7.305	7.305	7.305	0.034
2000-12-29	7.26	7.26	7.26	7.26	-0.0062
2001-01-02	7.26	7.26	7.26	7.26	0

KODEX_ETF: KODEX Sector Closing Price Data

- Contains daily closing prices of various KODEX ETFs.

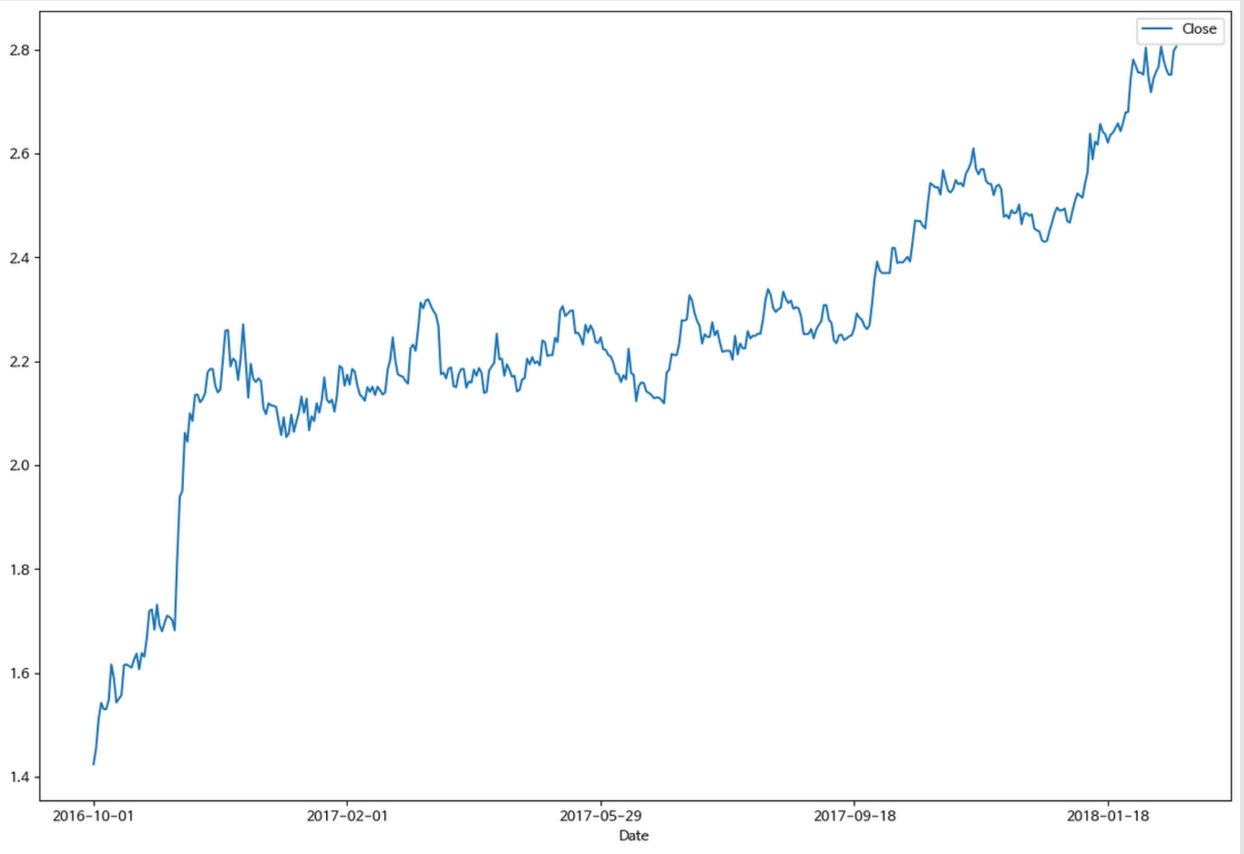
KRX: ETF Names and Sector Information

- Includes ETF names, associated sectors, and additional metadata.

10Y Rate: 10-Year Treasury Bond Yield

- Historical 10-year bond yield data for market trend analysis.

Data Description



Analysis Period: October 1, 2016 – February 20, 2018

- The selected period highlights a significant increase in interest rates, as depicted in the graph above. This trend is essential for analyzing its impact on various financial sectors

Analysis Process

1. Data Preprocessing

- Unnecessary Data Filtering: Removed sectors not matching the analysis period.
- Period Selection: Filtered data for the required analysis period (Oct 1, 2016 ~ Feb 20, 2018)
- Data Transformation: Aligned KODEX ETF and 10Y Rate data to the same period and format.
- Return Calculation: Calculated volatility and returns to analyze trends in sectoral changes.

```
# 날짜 기간과 맞지 않는 섹터를 제거하기 위한 리스트
drop_list = ['KODEX 게임산업', 'KODEX 고배당', 'KODEX IT', 'KODEX 필수소비재', 'KODEX 헬스케어', 'KODEX 경기소비

# drop_list에 포함된 섹터를 데이터프레임에서 제거
kodex_sector_df = kodex_sector_df.drop(drop_list, axis=1)

# 수정된 데이터프레임 확인
print("제거 후 섹터 데이터프레임:")
kodex_sector_df
```

```
# 같은 날짜로 Sample 기간으로 만들었지만, 행의 갯수가 다르다

# 국고채 데이터프레임의 인덱스 중 KODEX 섹터 데이터프레임의 인덱스와 일치하는 항목 찾기
reindex_sample = df_10Y_rate_close_sample.index.isin(kodex_sector_df_sample.index)

# reindex_sample 결과 확인 (Boolean Series로 반환됨)
reindex_sample

# 국고채 데이터프레임에서 인덱스를 다시 설정하여 KODEX 섹터 데이터프레임과 일치시키기
df_10Y_rate_close_resample = df_10Y_rate_close_sample[reindex_sample]

# 다시 샘플링된 국고채 데이터프레임의 Shape 확인
df_10Y_rate_close_resample.shape
```

```
(340, 1)
```

```
print("인덱스 일치 여부:")
print(df_10Y_rate_close_resample.index.equals(kodex_sector_df_sample.index))
```

```
# pd.concat으로 두 개의 DataFrame을 합치는 방법 (행의 개수가 다름)
df1 = pd.concat([df_10Y_rate_close_sample, kodex_sector_df_sample], axis=1, join='inner')

# 병합된 데이터프레임 확인
df1
```

Analysis Process

2.Background of Return Calculation

- Limitation of Absolute Comparison: Significant differences in absolute values across KODEX initial sector data made direct comparison difficult.

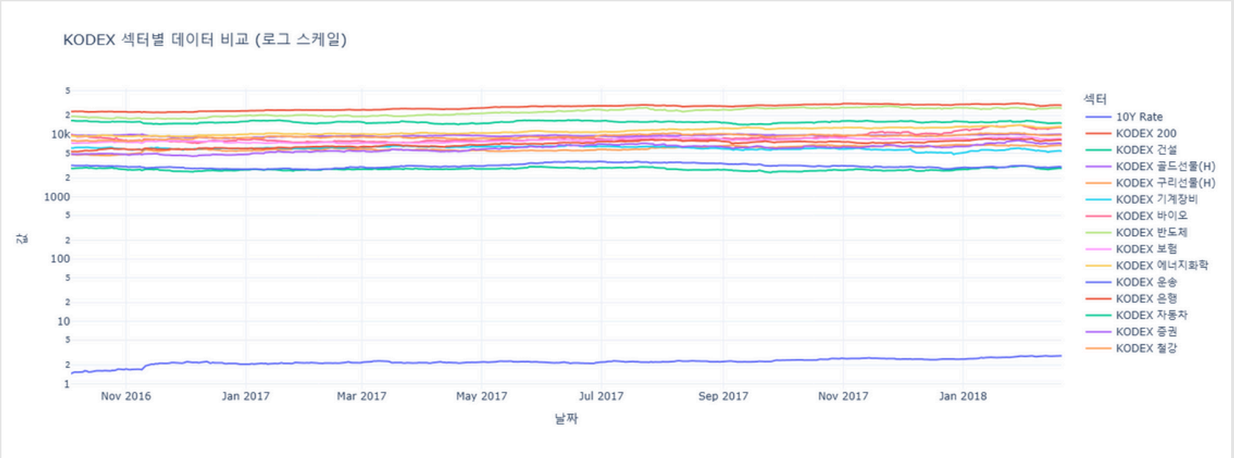
- Introduction of Returns: Set the first data point as the baseline value and converted sector changes into relative ratios to enable comparison.

- Objective: To visually identify sectoral changes and extract insights from the data.

df

Date	10Y Rate	KODEX 200	KODEX 건설	KODEX 골드선물(H)	KODEX 구리선물(H)	KODEX 기계장비	KODEX 바이오	KODEX 반도체	KODEX 보험	KODEX 에너지화학	KODEX 운송	KODEX 은행	KODEX 자동차	KODEX 증권	KODEX 철강
2016-10-04	1.455	23289	2845	10025	4770	6055	9802.0	19328	7325	9433	3185	5319	16658	4840	8011
2016-10-05	1.511	23276	2832	9725	4730	6026	9627.0	19472	7200	9437	3175	5290	16668	4810	7904
2016-10-06	1.542	23436	2859	9705	4730	6142	9522.0	19386	7235	9352	3155	5319	16440	4794	7914
2016-10-07	1.530	23364	2874	9595	4675	6167	9143.0	19284	7217	9330	3155	5286	16389	4794	7790
2016-10-10	1.548	23402	2894	9685	4730	6182	9223.0	18959	7307	9398	3150	5410	16403	4832	7892
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
2018-02-12	2.806	28732	2765	9885	6405	5365	12392.0	25928	8496	12820	2973	8011	15281	7231	9678
2018-02-13	2.780	28954	2726	9910	6480	5185	12117.0	25938	8413	12839	2924	7993	15028	7066	9612
2018-02-14	2.763	29332	2765	9955	6560	5312	12492.0	26445	8399	12900	2958	7973	15084	7074	9664
2018-02-19	2.798	29482	2874	10070	6695	5463	12971.0	26685	8575	13281	3037	8188	15290	7231	9749
2018-02-20	2.806	29144	2850	10000	6630	5375	12771.0	26230	8399	13183	2988	8137	15099	7079	9729

340 rows × 15 columns



Analysis Process

Return Calculation

```
# 기준 값을 첫 번째 행(df.iloc[0
df_set = df / df.iloc[0] * 100
```

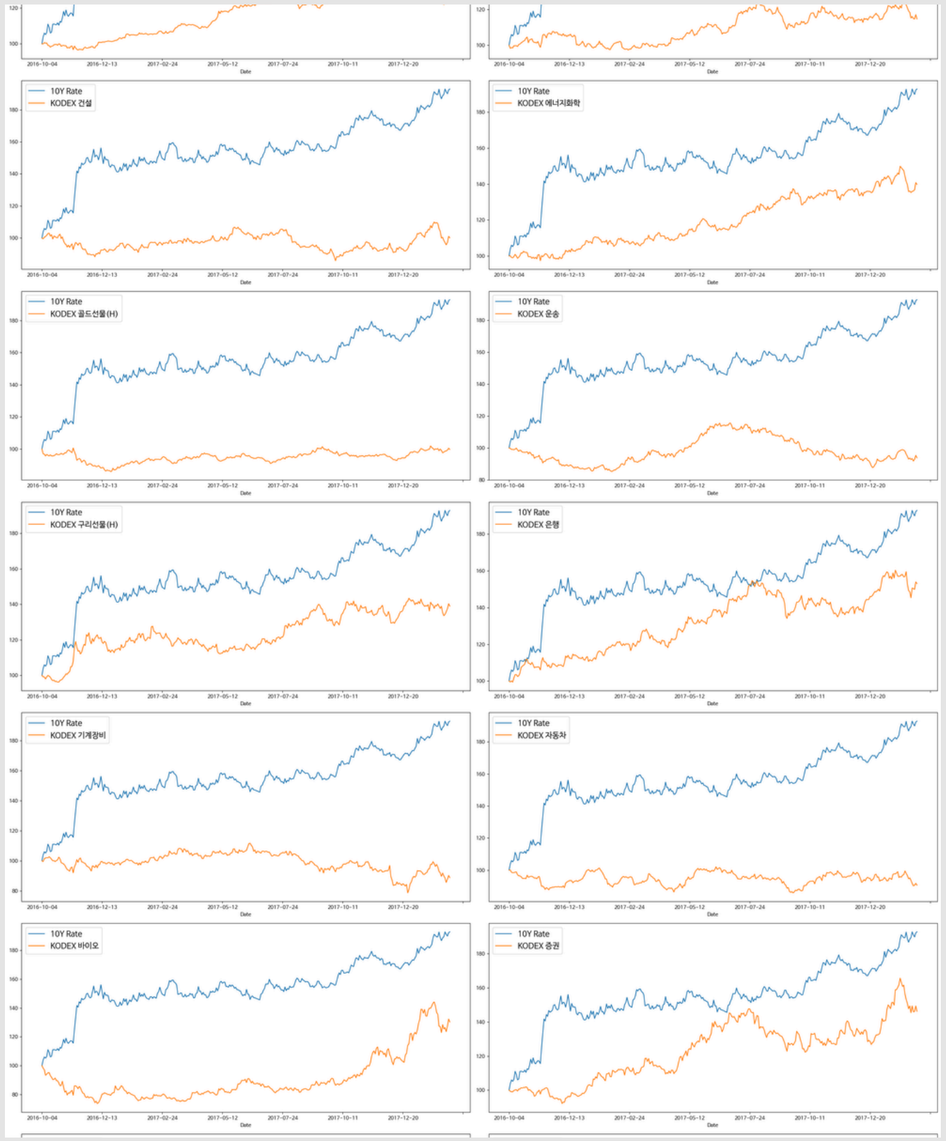
Set the first row's value as the baseline to calculate all subsequent values as a ratio relative to the baseline.

Visualize the calculated results through a graph for better understanding.

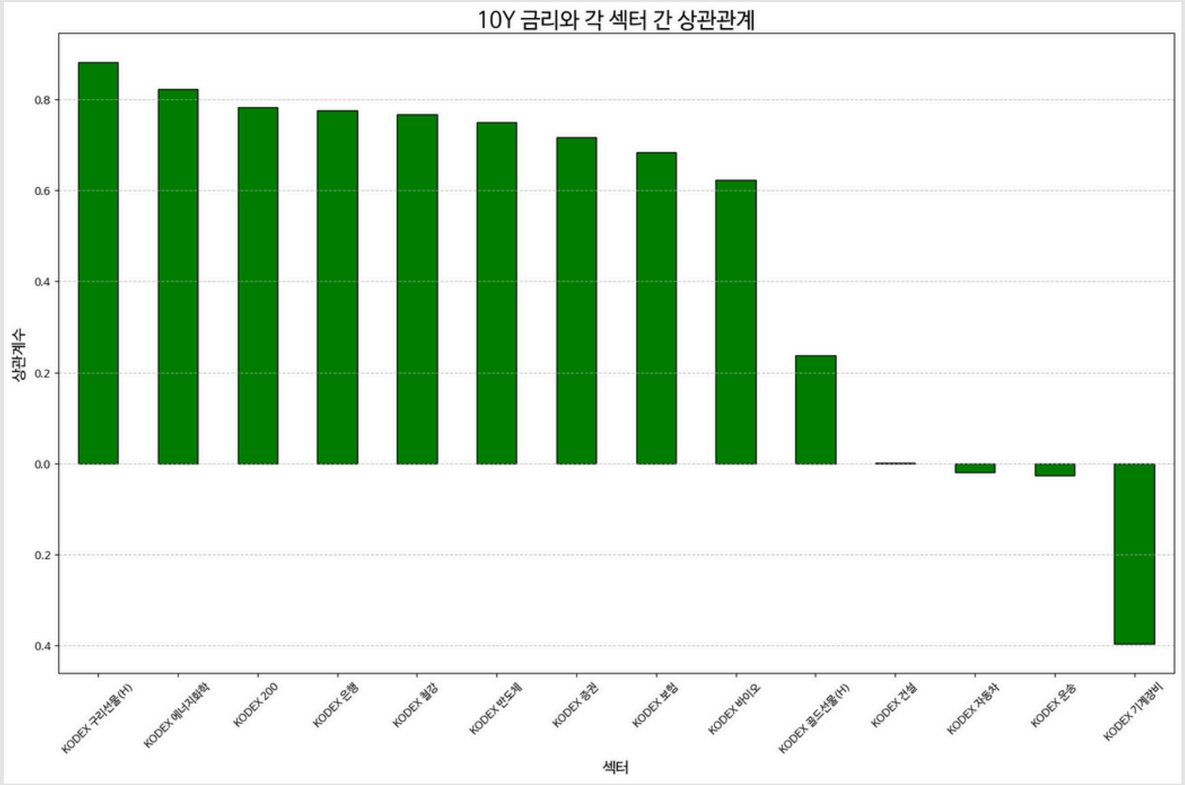
Analysis Process: Comparison of 10Y Rate Sensitivity by Sector

1. Interest Rate Changes Do Not Equally Impact All Sectors
   - Sensitivity varies across sectors.

2. Sector Sensitivity Derived Through 10Y Rate Comparison
   - Results show that certain sectors are not sensitive to interest rate changes.
   - Conversely, some sectors demonstrate high sensitivity.



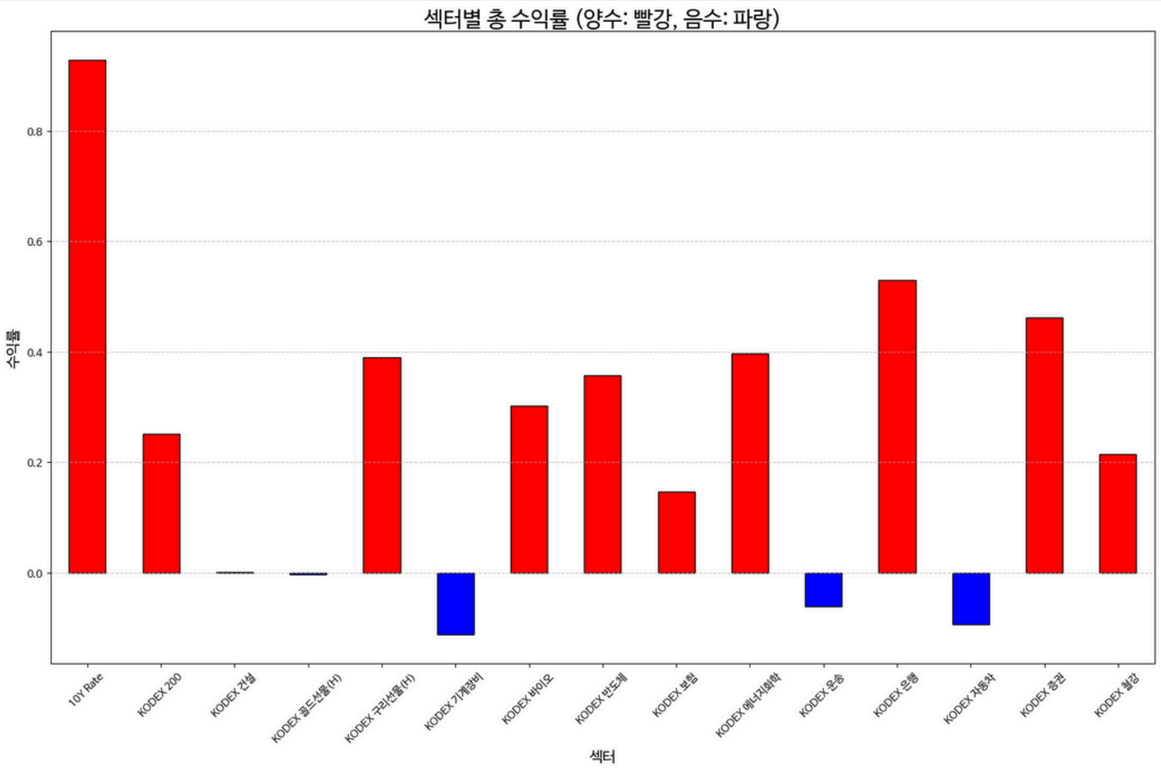
Analysis Process: Correlation Between 10Y Rate and Sectors



Correlation Analysis:

- Sectors with High Correlation to Interest Rates:
  - KODEX Copper (H), KODEX Energy Chemistry
- Sectors with Low Correlation to Interest Rates:
  - KODEX Automobile, KODEX Transportation
- Implication:
  - Sectors highly sensitive to interest rate changes are likely to experience greater impacts during interest rate hikes.

Analysis Process: 10Y Rate and Sector Returns



Method of Return Calculation:

- Formula: (Final Value - Initial Value) / Initial Value
- Based on the 10Y Rate and sector data, the total return for each sector is calculated.

Results & Insights:

- Top Performing Sectors:
  - KODEX Bank, KODEX Securities: Over +40% increase
  - KODEX Energy Chemistry, KODEX Copper: Approximately +30% increase
- Underperforming Sectors:
  - KODEX Automobile, KODEX Machinery: Declined -10%
  -

Key Insights:

- Sectors show varying sensitivity to interest rate changes.
- Interest Rate Increases: Financial and energy-related sectors perform well.
- Declining Sectors: Sectors like transportation (e.g., KODEX Transportation) tend to move inversely to interest rate changes.

Results

Sectors with High Returns During Interest Rate Hikes:

- KODEX Energy Chemistry: Increased global demand and rising chemical product prices.
- KODEX Bank/Securities: Higher loan interest rates and increased financial transactions.

Sectors with Low Returns During Interest Rate Hikes:

- KODEX Automobile/Machinery: Demand contraction due to reduced consumer and investment spending.

	0
10Y Rate	0.928522
KODEX 은행	0.529799
KODEX 증권	0.462603
KODEX 에너지화학	0.397541
KODEX 구리선물(H)	0.389937
KODEX 반도체	0.357099
KODEX 바이오	0.302897
KODEX 200	0.251406
KODEX 철강	0.214455
KODEX 보험	0.146621
KODEX 건설	0.001757
KODEX 골드선물(H)	-0.002494
KODEX 운송	-0.061852
KODEX 자동차	-0.093589
KODEX 기계장비	-0.112304

Total Return

Practical Implications:

- Interest Rate Hikes: Focus on financial and raw material-oriented investment strategies.
- Consumer Sector: Implement risk management strategies during economic tightening.

Conclusion

Project Achievements:

- This project analyzed and visualized the relationship between interest rate fluctuations and KODEX sector performance, deriving data-driven insights.
- The focus was on data analysis and visualization; however, further in-depth analysis and predictions are required.

Future Directions:

- Expansion of Data Scope: Include various economic indicators, real-time data, and additional sector data to broaden the scope of analysis.
- Machine Learning Integration: Develop models to predict sector returns based on interest rate fluctuations, enhancing accuracy and decision-making capabilities.
- Advanced Visualization: Utilize interactive visualization tools to improve understanding and deliver real-time analysis results.

Thank you!!