Pre-COVID Period Analysis

Data Sourcing Methodology

Data Extraction: Data for the Technology, Financial, Healthcare, and Energy sectors is obtained from Alpha Vantage using the specified API and parameters. The extracted data is subsequently saved in CSV format.

Data Preparation:

The CSV files are loaded into Pandas DataFrames, with relevant date ranges filtered to include data from January 1, 2017, to December 31, 2019, for each sector.

The "timestamp" column is converted to a datetime data type and arranged in ascending order.

Daily percentage changes in returns are calculated based on the closing prices.

Data Integration: The monthly statistics computed for all four sectors are merged into a single data frame.

XLE Market Analysis Report (2017-2020)

XLE Pre-COVID Closing Price and Monthly Returns (2017-2020)
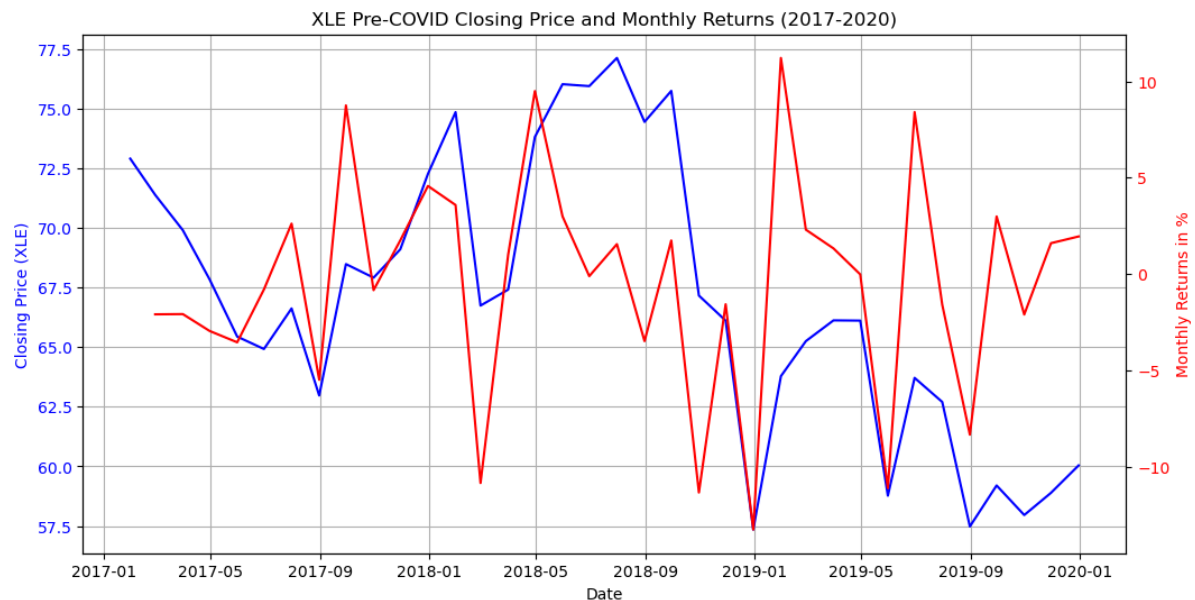
Overall Market Trend

The Energy Select Sector (XLE) showed a clear downward trend from 2017 to early 2020, as seen by the negative slope of the regression line. The closing price declined from approximately 75 in early 2017 to around 60 by 2020, representing a significant deterioration in value over this period.
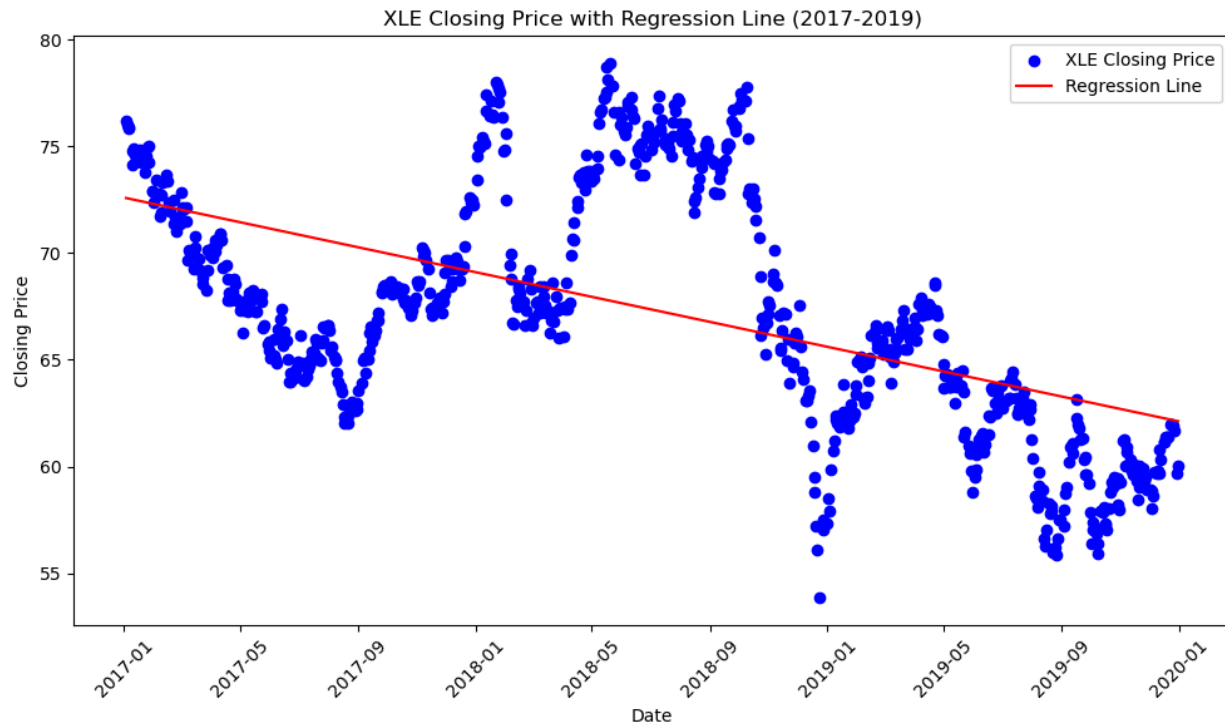
Price Trend:

- The closing price (blue line) shows overall volatility but a general declining trend from around 72 in early 2017 to about 60 by early 2020
- There are several significant peaks and troughs, with the highest price reaching around 77 in mid-2018
- The lowest point appears to be around 57 during this period

Returns Pattern:

- Monthly returns (red line) show high volatility throughout the period
- The largest positive returns appear to move from 60 to a 70
- There are also significant negative returns, dropping to about -10% at certain points

Relationship between Returns and Closing Price:

- There appears to be an inverse relationship at several points - when prices drop sharply, returns often spike up shortly after
- Large negative returns often precede drops in the closing price
- Sharp price increases tend to coincide with or follow positive return spikes
- This pattern suggests some mean reversion in the price movements

XLE Closing Price with Regression Line (2017-2019)

Regression Analysis Insights

1. The negative slope indicates a clear downward trend
2. Significant price deviation from the trend line means very high volatility

Contributing Factors

1. Global oil price fluctuations
2. Increased focus on renewable energy affecting the traditional energy sector
3. Market sentiment shifts regarding fossil fuel investments
4. Global economic growth concerns impacting energy demand
5. Supply-demand imbalances in energy markets

Risk Factors Identified

1. High price volatility
2. Deteriorating trend support levels
3. Inconsistent price recovery patterns
4. Increasing frequency of sharp price declines

XLF Market Analysis Report (2017-2020)

XLF Pre-COVID Closing Price and Monthly Returns (2017-2019)
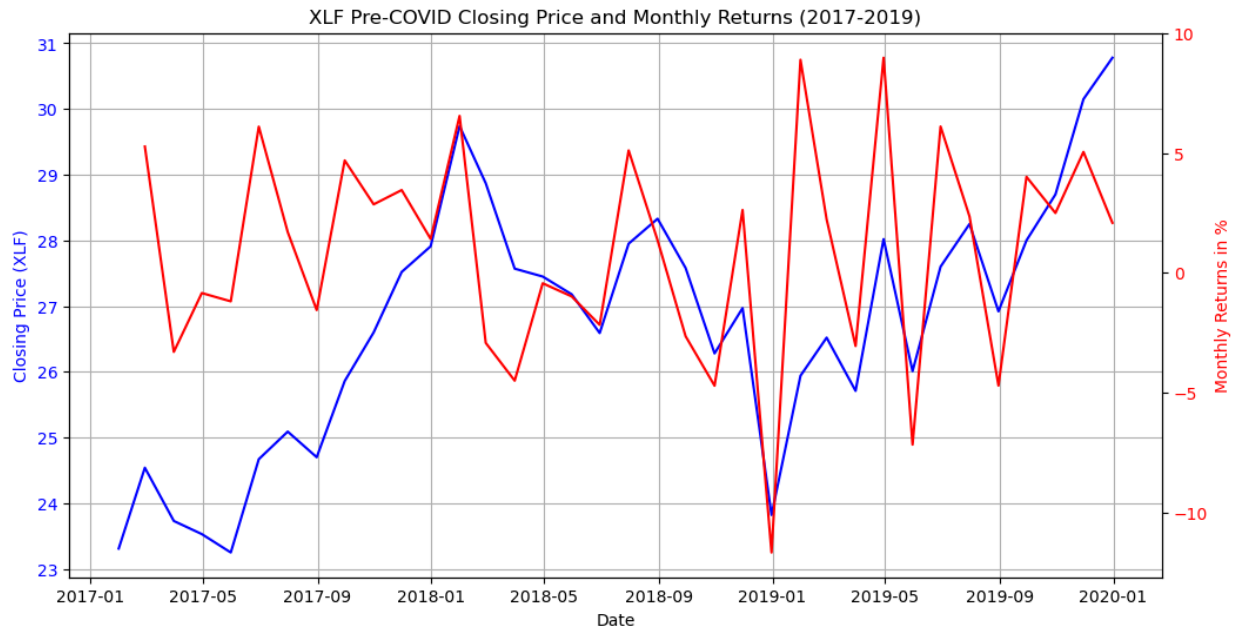
Overall Market Trend:

- The market shows an overall upward trend from 2017 to early 2020
- Starting around 23 in early 2017 and reaching approximately 31 by 2020
- This represents roughly a 35% increase over the period

Price Trend:

- The price movement shows several distinct phases:
    - The initial consolidation period (2017) goes up to 23-25 level
    - Strong upward trend through 2018 reaching around 29-30
    - Increased volatility in 2019 with price swings between 26-31
    - Final upward momentum into early 2020

Returns Pattern:

- Monthly returns (red line) show significant volatility
- Notable spikes:
    - Several peaks of 30 to 31 returns
    - A major negative return of around 22 in early 2019

Relationship between Returns and Closing Price:

1. Momentum Patterns:
   - Strong positive returns often precede sustained price increases
   - Large negative returns typically lead to short-term price corrections
2. Volatility Relationship:
   - Periods of high price volatility correspond to larger swings in monthly returns
   - The most volatile period appears to be 2019, with both large price movements and return swings
3. Price Level Impact:
   - Higher price levels (above 28) tend to see more volatile returns
   - Lower price levels (23-25 range) show more stable return patterns

XLF Closing Price with Regression Line (2017-2019)
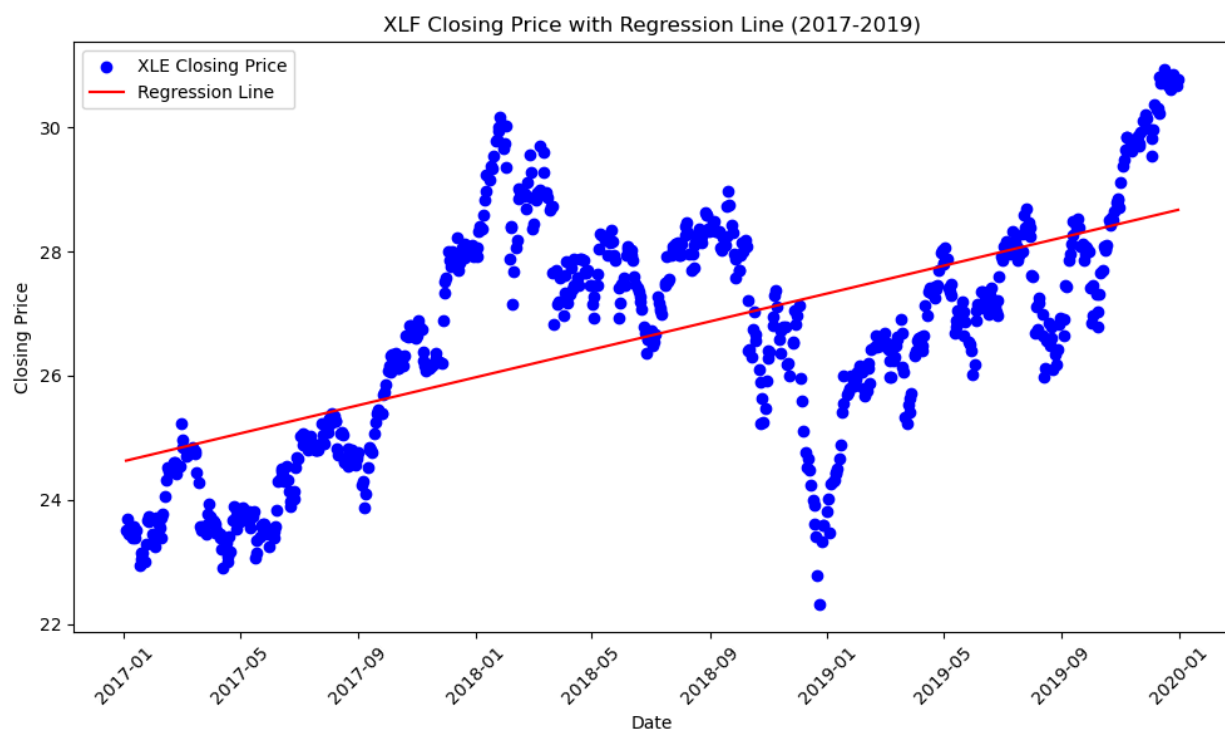
Regression Analysis Insights:

1. Positive Trend:
   - The regression line shows a clear upward slope from 2017 to 2019
   - Starting around 24 and ending near 28, indicating a trend increase
   - The slope appears consistently positive throughout the period

2. Price Distribution:
   - Significant price volatility around the regression line
   - Most data points cluster within ±2 points of the regression line

Contributing Factors:

1. Market Structure:
- Strong upward momentum from 2017-2018
- Higher price levels achieved and maintained in 2018-2019
- Increased volatility but maintaining the upward trend

2. Price Behavior:
- Prices often return to the regression line
- Larger deviations occur at higher price levels
- More frequent price clusters above the regression line than below

Risk Factors Identified:

1. Volatility Patterns:
- Increased volatility at higher price levels
- Major price swings in 2019 (dropping to 22-23 range)
- Greater dispersion from the regression line in later periods

2. Market Stability:
- Multiple periods of rapid price changes
- Several sharp corrections followed by quick recoveries
- There is a higher risk of significant deviations from the trend at elevated prices

3. Trading Implications:
- Mean reversion opportunities during extreme deviations
- Increased risk management needed during high-volatility periods
- Trend following strategies supported by positive regression slope

XLV Market Analysis Report (2017-2020)

XLV Pre-COVID Closing Price and Monthly Returns (2017-2019)
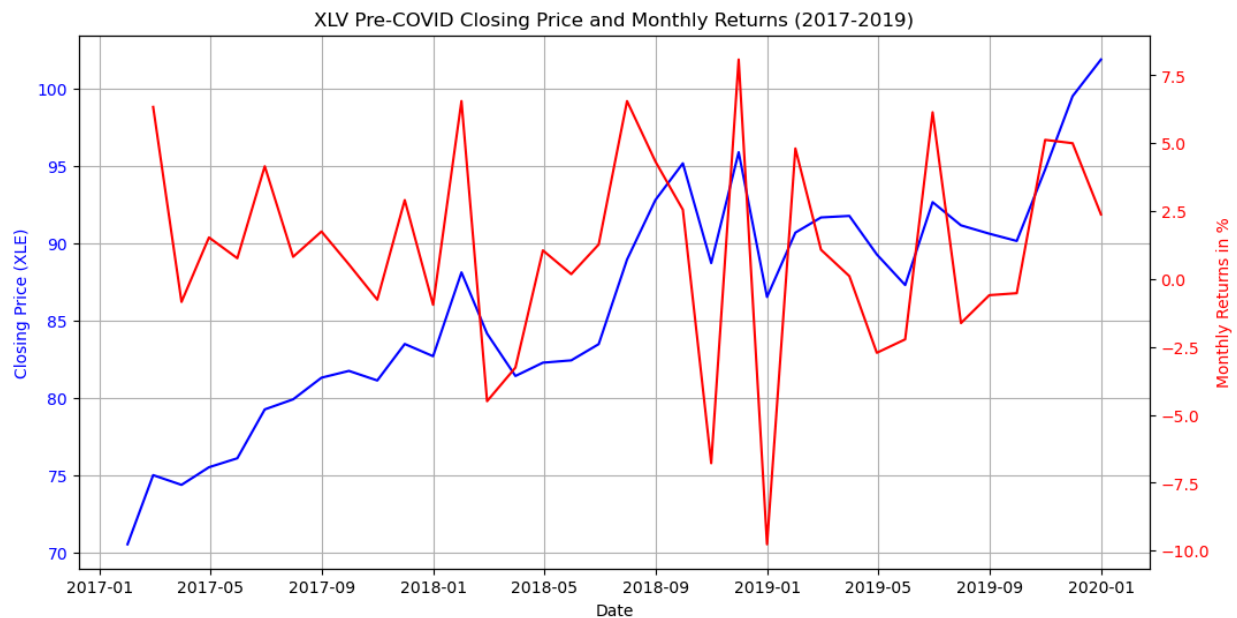
Overall Market Trend:

- A strong bullish trend from 2017 to early 2020
- The price moved from around 70 to over 100, representing roughly a 43% increase
- Consistent upward momentum

Price Trend:

1. Phases:
- Initial rapid rise from 70 to 80 (early-mid 2017)
- A steady climb from 80 to 90 (2017-2018)
- More volatile movement between 85-95 (2018-2019)
- Final push above 100 (late 2019-early 2020)

2. Support Levels:
- Strong support around 85-86 level
- Multiple bounces from 90 level in 2019

Returns Pattern:

1. Volatility Characteristics:
- Monthly returns typically range between -5% and +7.5%
- Largest negative return around -10% in late 2018

- Several notable positive spikes above 5%

2. Return Distribution:
- More frequent positive returns than negative
- Largest volatility clusters in late 2018 and early 2019
- Generally smaller return swings in later periods

Relationship between Returns and Closing Price:

1. Correlation Patterns:
- Large negative returns often followed by price corrections
- Strong positive returns typically lead to sustained price increases
- Higher price levels (above 90) show more return volatility

2. Market Dynamics:
- Quick recovery after major drawdowns
- Price momentum tends to build after positive return periods
- More stable returns during trending periods versus consolidation phases

XLV Closing Price with Regression Line (2017-2019)
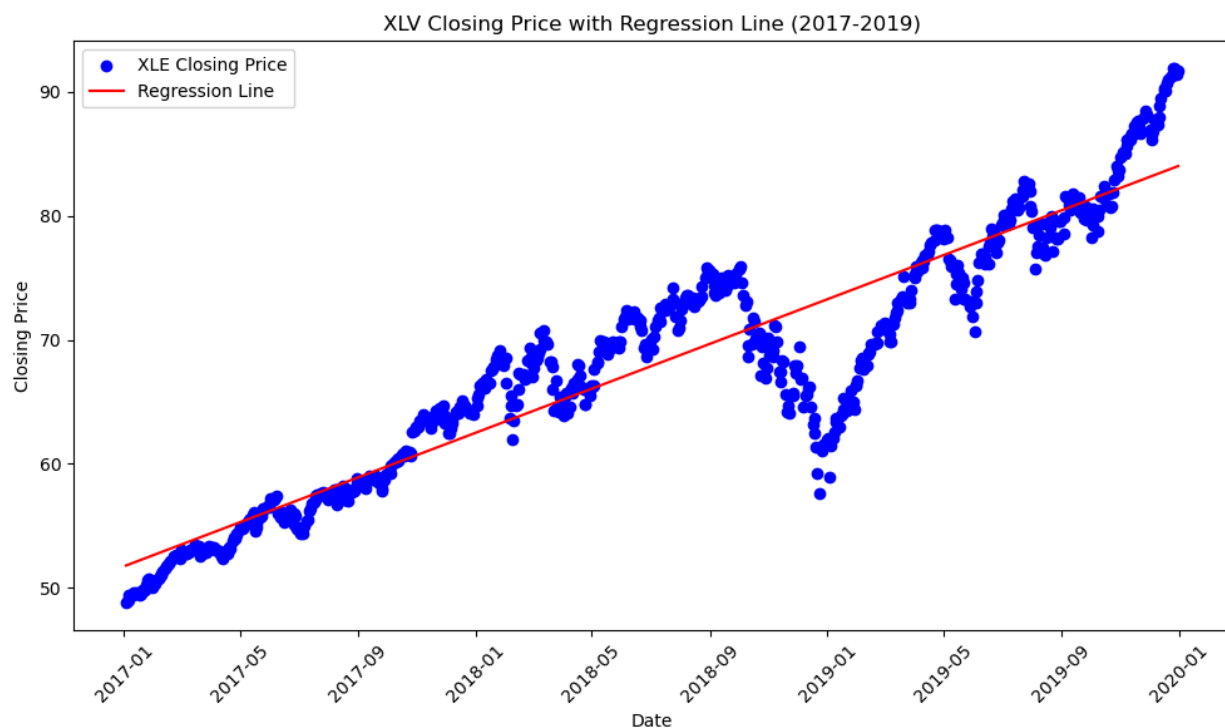
## Regression Analysis Insights:

1. Overall Trend:
- There's a clear positive upward trend as shown by the red regression line

- The average growth appears to be steady, with the price rising from around $50 in early 2017 to about $85 by late 2019

2. Notable Patterns:

- Strong upward momentum from 2017 to mid-2018
- A significant dip occurred in late 2018 (around Q4), dropping from ~$75 to ~$60
- Quick recovery in early 2019 followed by continued growth to new highs around $90
- The regression line is upward-sloping, indicating a positive long-term trend
- This suggests the healthcare sector showed consistent appreciation from 2017-2019
- Actual prices (blue dots) frequently oscillate above and below the regression line
- Most price movements eventually return to the regression line, indicating it serves as a reasonable mean value
- The regression line helps identify whether current prices are potentially overvalued (above line) or undervalued (below the line)
- The slope of the line gives us the average rate of price appreciation expected by the market during this period

Comparison Study of all Sectors

Comparison of ETF Prices (XLE, XLV, XLF, XLK) - 2017 to 2019
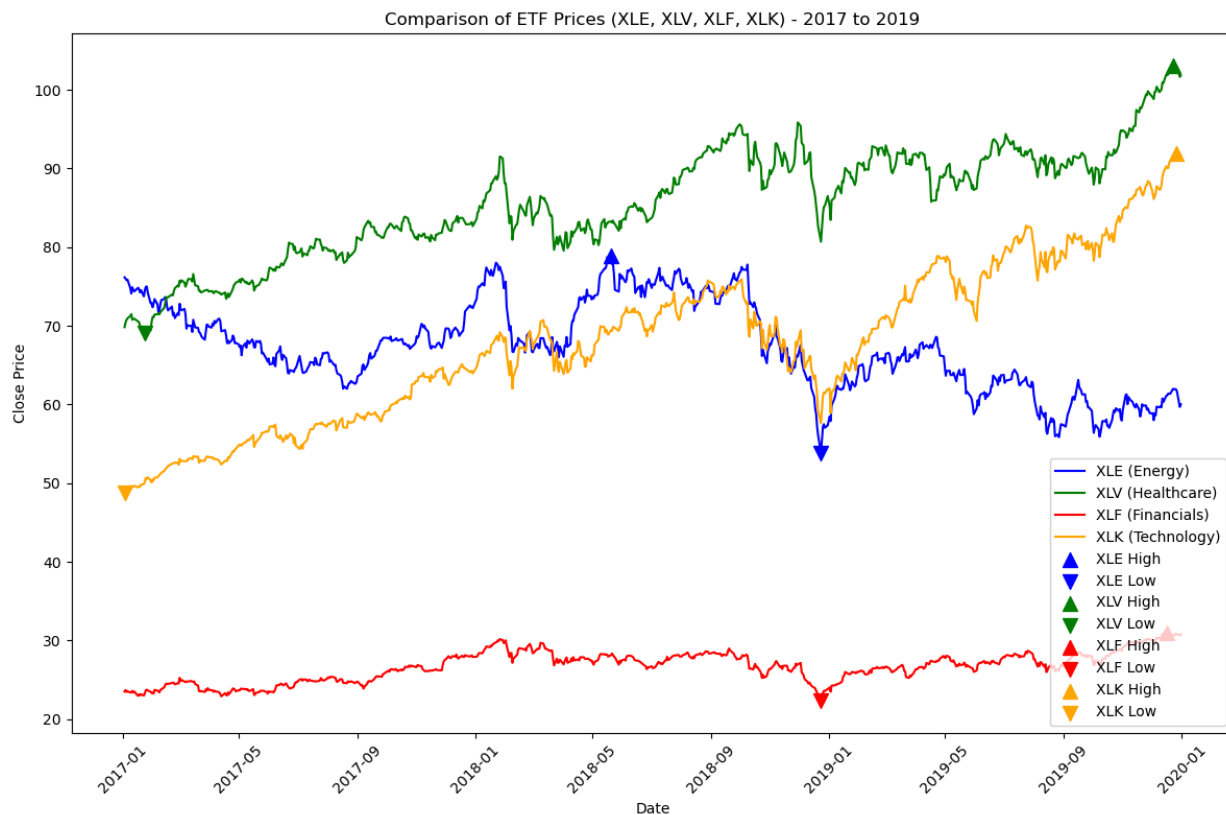
Best Performing Sector:

- XLV (Healthcare) performed the best, rising from ~70 to >100 points
- Healthcare showed the most consistent upward trend with less volatility
- Healthcare showed the most independence from market swings
- Main reasons for healthcare's success:
1. The ageing population driving increased healthcare spending
2. Innovation in medical technologies and treatments
3. Defensive nature of healthcare stocks (people need healthcare regardless of economic conditions)

Worst Performing Sector:

XLF (Financials) showed the poorest performance Why:

- Remained relatively flat between 22-30 (Red)
- Challenged by low interest rate environment
- Regulatory pressures
- Banking sector uncertainties
- Most sensitive to economic policy changes

Key World Events to look into :
Highs and Lows Causes:

1. Major Dip (Late 2018):
- US-China trade war escalation
- Federal Reserve rate hike concerns
- Global growth slowdown fears
- Oil price volatility (especially impacting XLE)

Summary Statistics and Analysis of Sectors during Covid:

Healthcare (XLV) showed the strongest performance:

- Highest mean (85.71)
- Highest median (86.29)
- A very close mean/median indicates the symmetric distribution
- Moderate standard deviation (7.05)
- Moderate variance (49.73)
- Good balance of return vs. risk

Technology (XLK) & Energy (XLE) had similar averages:

- XLK mean: 67.89
- XLE mean: 67.35
- Both sectors traded in similar price ranges despite different characteristics
  XLK
- Highest standard deviation (10.02)
- Highest variance (100.37)
- Most volatile sector, indicating the highest risk

  XLE

- Medium standard deviation (5.62)
- Medium variance (31.55)
- More stable than technology but less than financials

Financials (XLF) had the lowest values:

- Mean: 26.65
- Median: 26.84
- Consistent but much lower price range
- Lowest standard deviation (1.89)
- Lowest variance (3.57)
- Most stable but also lowest returns

These statistics suggest Healthcare was the most attractive sector pre-COVID, offering the highest returns with manageable risk levels, while Technology offered growth potential but with higher volatility.