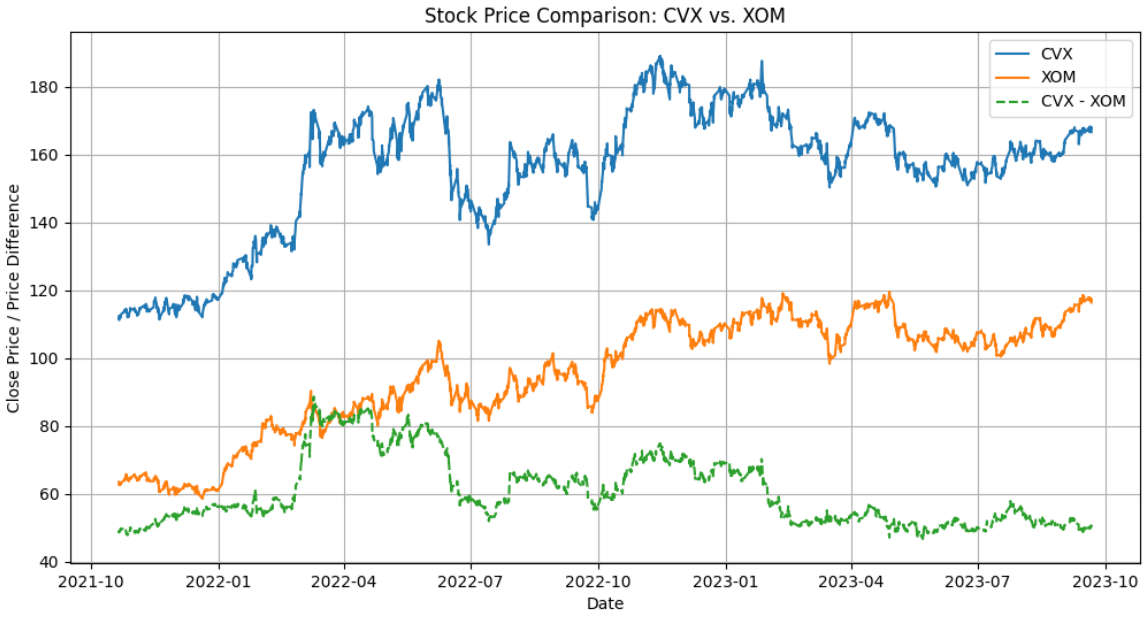
Strategic RSI Threshold Selection for Improved Stock Trading: A Case Study on CVX

Conducted by Ivan Xiong

Company and Industry Introduction

Although the petroleum industry is volatile due to geopolitical economic conditions, there are consistencies within the market itself. Across all major oil corporations, stock price trends closely resemble one another. Therefore, if we were to devise a trading strategy within this industry, it will be applicable to all oil companies. For example, the chart below shows the stock comparison of CVX (Chevron) vs XOM (Exxon Mobil):



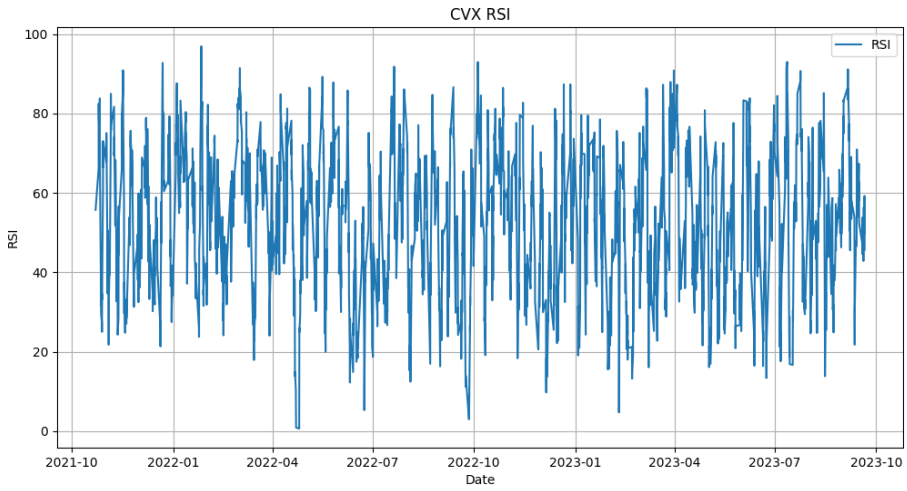
Between October 21, 2021 and September 21, 2023, CVX and XOM prices show similar trends, which is essential to my analysis below.

RSI-Based Strategy

Profitable trades can be calculated by using the relative strength index (RSI) for each stock. A stock is considered oversold when the RSI is below 30 and overbought when the RSI is above 70. Thus, we can consider times when the RSI is below 30 as a good point to purchase a stock.

$$\text{RSI} = 100 - \left(\frac{100}{1 + \frac{\text{average gain}}{\text{average loss}}} \right)$$

The RSI is calculated at each data point (hourly within a 2-year time frame). To visualize dips and climbs of the RSI, see example of the RSI of CVX:

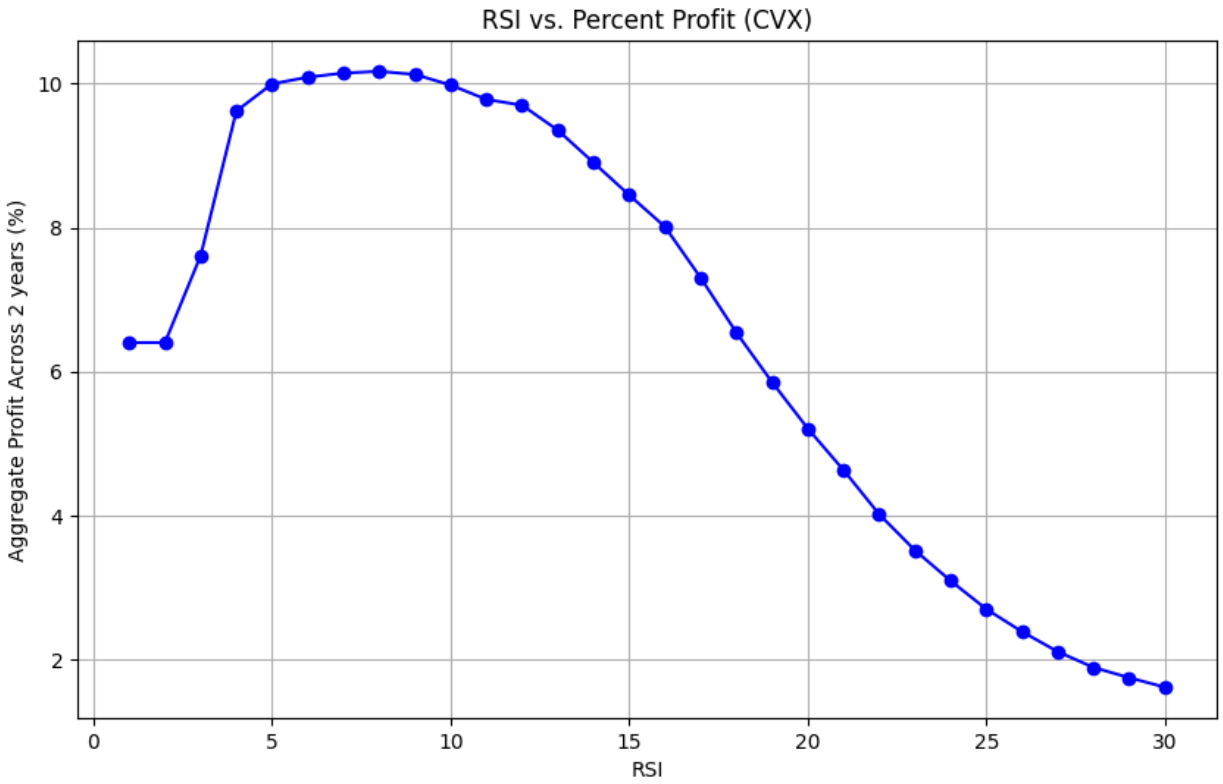


Automating RSI calculation allows for efficient and concise data collection to apply our algorithm accordingly. Because there is a limited RSI selection (1-100), we can use a naive brute force algorithm to calculate potential profits within a designated time frame. We ideally only care about RSI indices where the stock is oversold, so for general applications, RSI 1-30 will suffice. Thus, we can run the algorithm 30 times, for each RSI 1-30 and calculate the profits for each RSI value.

Times of low RSI may signal an impending shift where the stock is more likely to experience a rebound upwards. As a result, points of low RSI are seen as a point of interest, which I chose as dates to buy the stock. By picking a RSI threshold r, we can buy stocks for each data point below that threshold. We can then sell d days later, allowing sufficient time for the stock to recover.

Experimental Data and Results

For experimental purposes, I picked $d = 28$ days as my timeframe for analysis, because 28 days is adequate time for a stock to recover from low RSI. The chart below depicts the percent profit of CVX stocks using different RSI values with a fixed 28-day interval (2 year time frame):



As seen in the graph above, the most profitable RSI is $r = 8$. I took this value to base my future trades on. Using $r = 8$ and $d = 28$, the algorithm returned a 10.17% gain with an initial investment of $14765.74 and return of $16437.51 ($1671.77 profit) across 97 trades within the designated time frame.

Takeaways

Within time frame limitations, the algorithm can be profitable for certain stocks and applicable to other stocks in the same industry. Although the RSI and time frame are fixed for the algorithm, they can be dynamic to further maximize profits. For my demonstration above, they are held constant to isolate RSI as the basis for the trading strategy. Throughout my case study, some limitations I encountered were the restrictions of Yahoo Finance (data maximum of 2 years with 1 hour intervals). This resulted in the algorithm being unprofitable for certain stocks, such as SPY (SPDR S&P 500 ETF Trust). However, this algorithm may be experimentally profitable for such stocks given a larger time frame (10 + years) due to minimized volatility. As a result, buying at points of low RSI can optimize long-term returns. This case study demonstrates potential for profitable algorithms with RSI-based trading strategies.

Further implementation ideas: Dynamic time frames, perhaps using high RSI as a time to sell, Machine learning model to predict RSI threshold, Risk management