Project 6 : Indicators Evaluation

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Abstract

Comparison of different trading indicators and their usages.

Introduction

Computation and explanation of 5 trading indicators

- Commodity Channel Index
- RSI
- Momentum
- Simple Moving Average
- Bollinger Bands Percent

6.1.1 Commodity Channel Index

CCI = (Typical Price - 20-period SMA of TP) / (. 015 x Mean Deviation)

Typical Price (TP) = (Adjusted High + Adjusted Low + Adjusted Close)/3

Typical Price is the average of high, low, and adjusted close prices which offers a more balanced view of stock price and captures the full range of price movements. Commodity Channel Index(CCI) uses TP to measure how far current price deviates from the moving average. When price deviates from the mean positively then the stock is considered overbought, negative deviation means the stock is oversold. Common potential buy signal and sell signal are indicated when CCI is above 100 or below -100 respectively. However using a single indicator may lack context from the full picture. For example, CCI < -100 suggests the stock may be oversold but can be invalidated with conjunction usage of simple moving averages (SMA adjusted prices). If CCI signals oversold but price is still below a long term moving average (SMA90-180) then it can mean the stock is still in a downward trend.

6.1.1 *FIGURE 1*

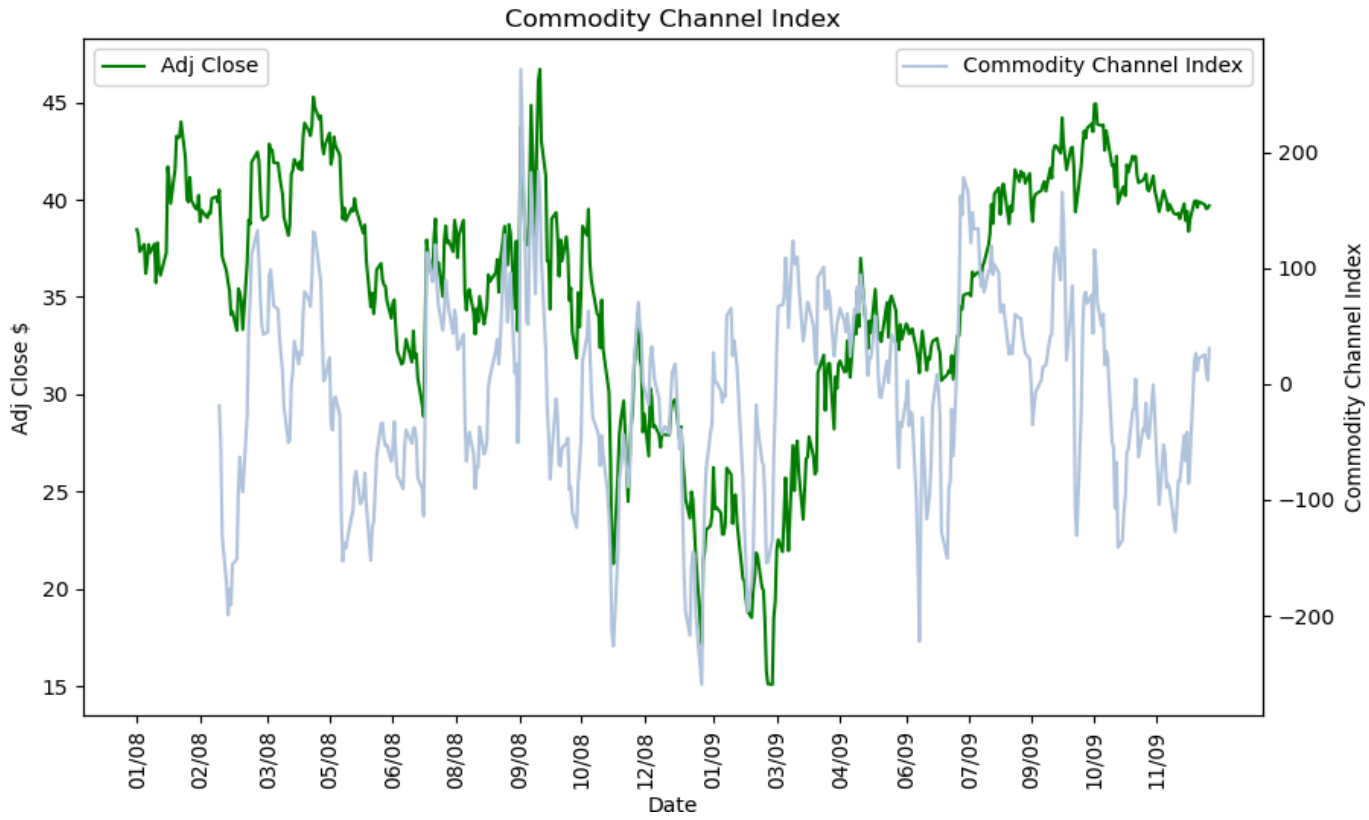

Figure shows 01/08 - 12/09 JPM stock price relative to commodity channel index calculated with 20 day simple moving average.

6.1.2 Momentum

Momentum %= ((Price/Price(during k periods)) - 1) * 100

k=# of days ago

Momentum measures the rate of change in stock price over time. The formula uses current price and previous price to calculate percent change. This simple formula can show when prices are gaining or losing strength over time. For example, if the momentum is consistently and consecutively positive that means the stock is on an upward trend. In addition momentum at -20% or 20% indicates oversold and overbought respectively. Another popular signal used is

when momentum crosses 0, it demonstrates a reversal in trend. Negative going to positive represents upward trend and vice versa.

6.1.2 *FIGURE 1*

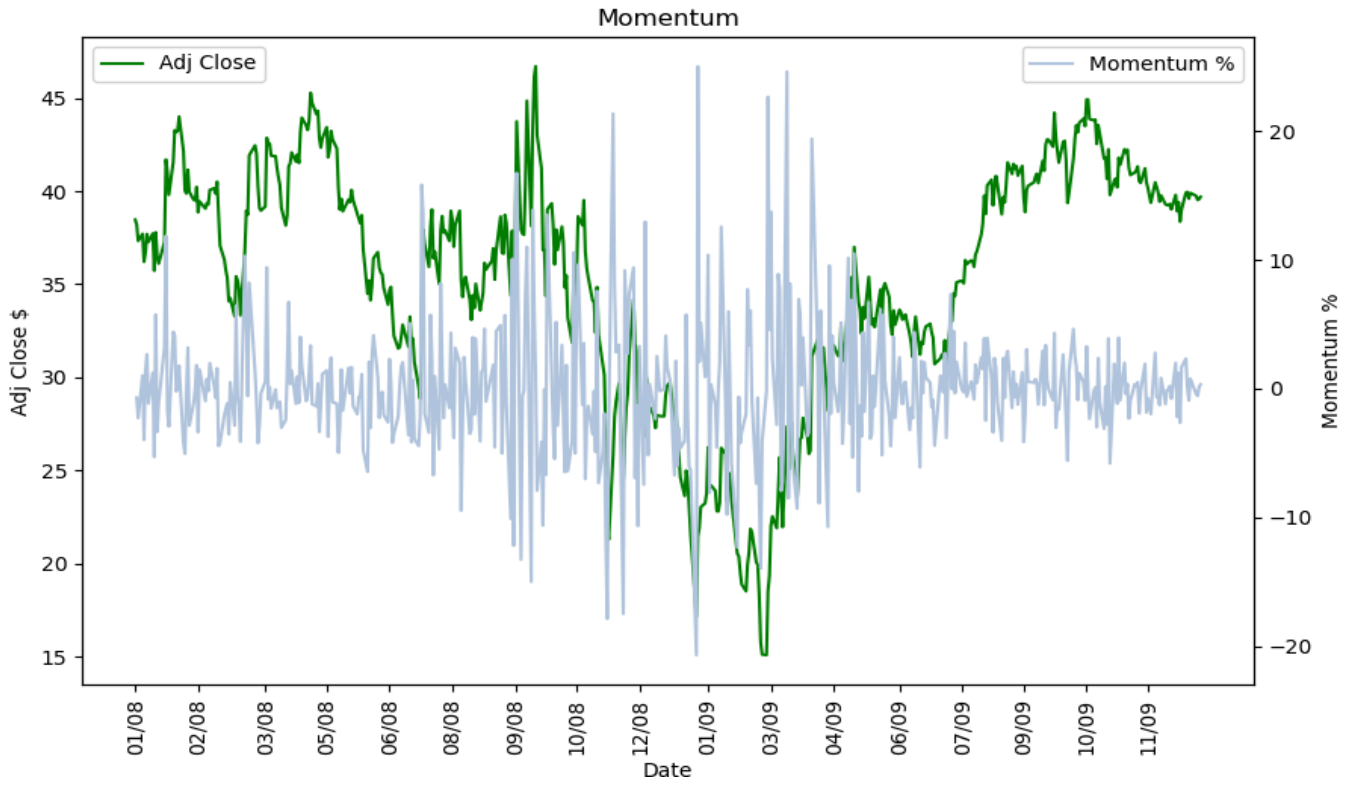

Figure shows 01/08 - 12/09 JPM stock price relative to momentum calculated with k=1 day

6.1.3 20 Day Simple Moving Average

SMA20 = sum or price of k period / k period

The simple moving average smooths out noise and outliers from daily price movements. This can show a more representative and stable line for price analysis. The SMA20 is often used as resistance levels or support levels when price is rising or dropping respectively. The SMA20 is also used as trend confirmation, being above the SMA20 represents a strong trend, below

represents a weak trend. SMA20 is often used in conjunction with other SMA with longer periods. For example, when the SMA20 line crosses above the SMA 100 line, that means the recent days have a stronger trend than historical which could signal a shift to an upward trend.

The dynamic change of periods can repurpose the SMA indicator for long term or short term trades.

6.1.3 *FIGURE 1*

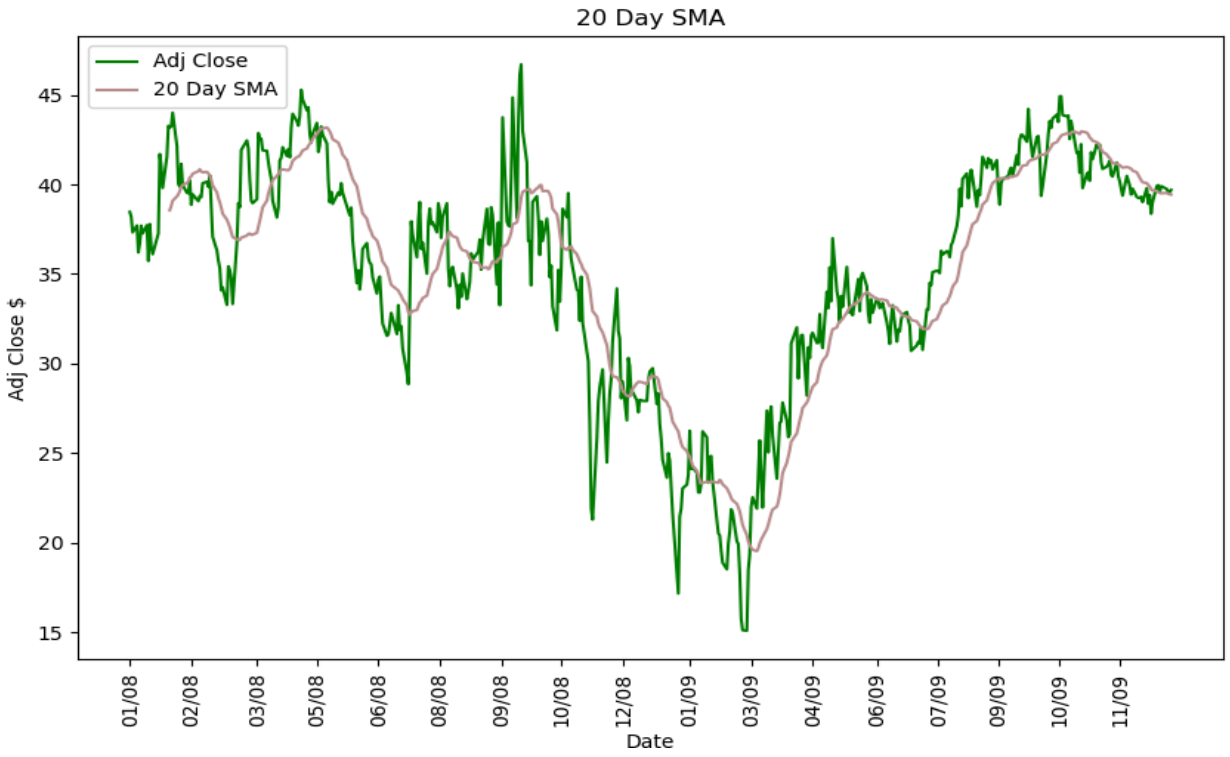

Figure shows 01/08 - 12/09 JPM stock price relative to SMA calculated with k=20 days

6.1.4 Stochastic Oscillator

%K = (current adjusted close - adjusted lowest low over k periods)

/ (highest high over k periods - lowest low over k periods) * 100

Stochastic Oscillator measures the current closing price relative to recent adjusted high and adjusted low price ranges. It provides a percentage value of the range period (typically 20 days) which can be used for short - midterm analysis. When the %K line falls below 20 it indicates that its oversold, above 80 means overbought. %K line is normally used in conjunction with %D line. %D line is a SMA of the %K line, and we can determine reversal of trends when %K crosses the %D line. Crossing upwards means upward trend and vice versa.

6.1.4 *FIGURE 1*

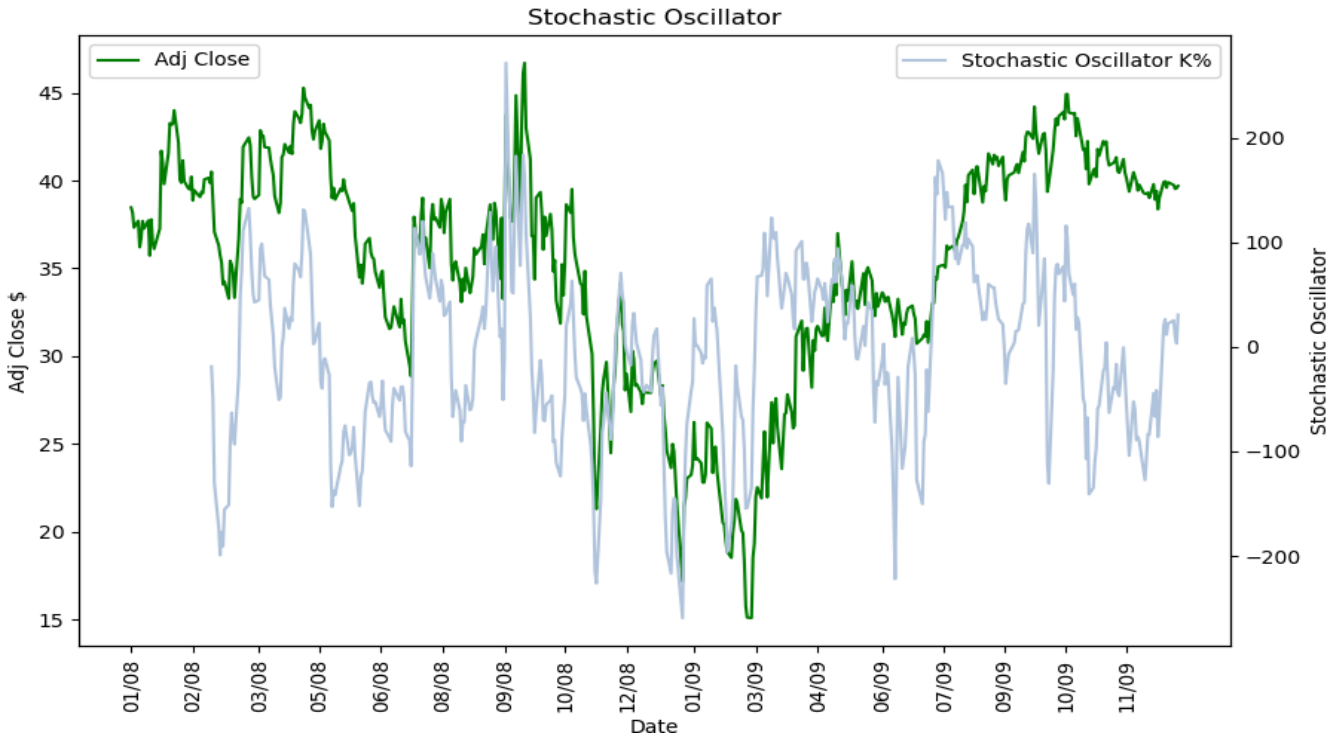

Figure shows 01/08 - 12/09 JPM stock price relative to Stochastic Oscillator, k = 20 days

6.1.5 Bollinger Bands Percent

Lower Band = (SMA - 2 standard deviation)

Upper Band = (SMA - 2 standard deviation)

Middle Band = (SMA)

%Bollinger Band = (price - Lower Band) / (Upper Band - Lower Band) * 100

SMA = simple moving average over k period

Bollinger Bands is usually plotted as SMA with two bands represented by 2 standard deviations away. This provides a unique visual representation of overbought and oversold conditions by the ends of the bands. Price touching or exceeding the upper band represents overbought, falling below lower bands represents oversold. In addition the bands also capture market volatility, when the upper and lower bands are wide it means the recent k period is very volatile. If the bands are tight that means volatility is low. Using the bollinger bands % is an easy way to calculate where the price is within the bands. %B = 100% (Upper Band), %B=50% (Middle Band), %B=0 (Lower Band). Bollinger Bands is used in conjunction with RSI (Relative Strength Index). Combining both strategy can help confirm oversold and overbought conditions which ultimately strengths buy and sell signals.

6.1.5 ***FIGURE 1***

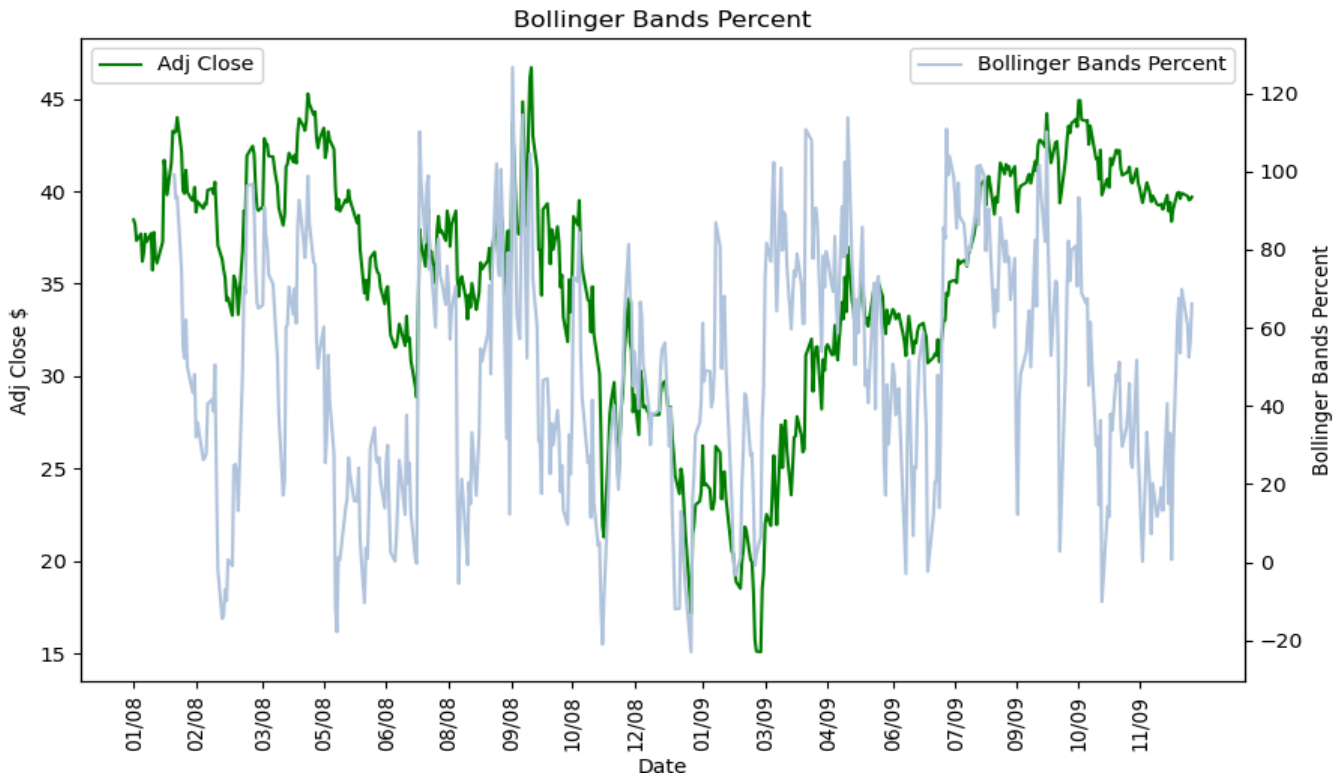

Figure shows 01/08 - 12/09 JPM stock price relative to Bollinger Bands Percent

6.1.6 Theoretically Optimal Strategy

Using the constraints given

- Can see into the future
- 1000 shares trade only, max 1000 shares long or 1000 shares short
- $100,000 starting cash

The most optimal strategy is to look forward one day and base buy/sell decisions on tomorrow's price movement. This strategy will benefit from maximum gain and maximum loss momentum.

Pseudo-code for strategy:

Loop for every JPM trading day:

-> If price goes up tomorrow

->check holdings and change position to 1000 shares long if not already

-> if price goes down tomorrow

->check holdings and change position to 1000 shares short if not already

This strategy is the measurement of Beta since profit is dependent on the volatility.

6.1.6 *FIGURE 1*

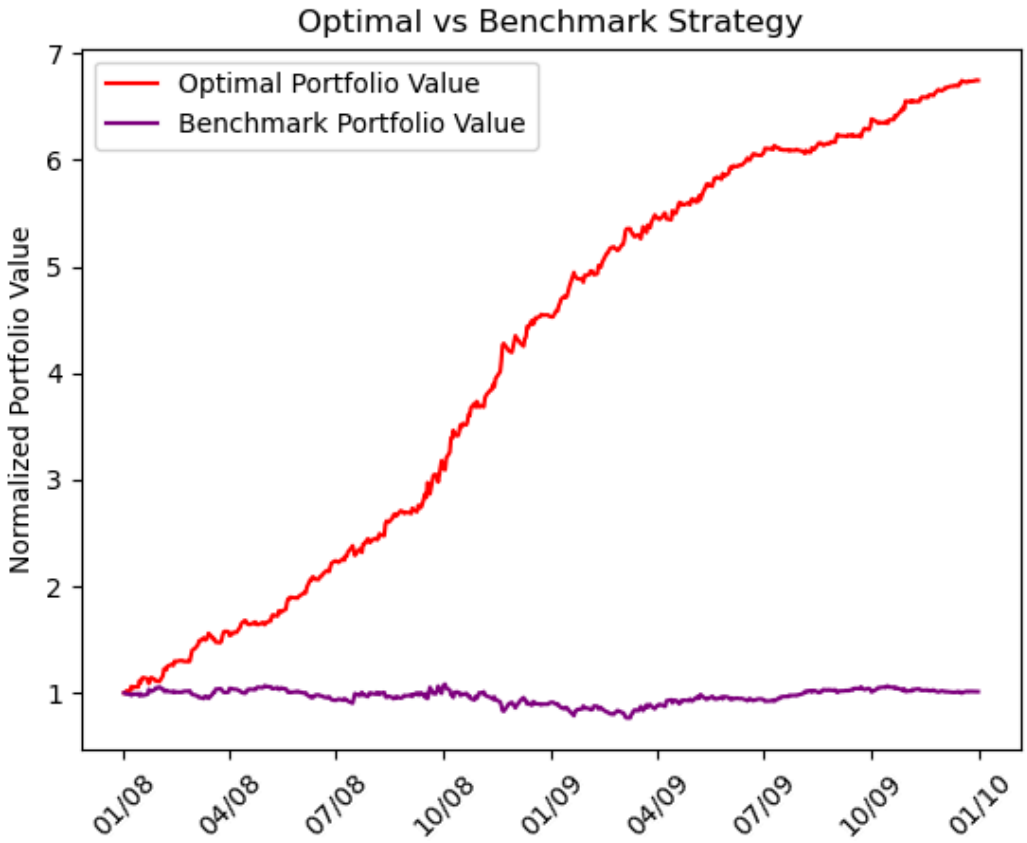

Figure shows 01/08 - 12/09 JPM benchmark and optimal portfolio value normalized

6.1.6 *FIGURE 2*

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Strategy	Cumulative Return	Standard Deviation Daily Returns	Average Daily Returns
Optimal Portfolio	5.7474	0.011945	0.003865
Benchmark Portfolio	0.0123	0.017004	0.000168

Figure shows 01/08 - 12/09 JPM benchmark and optimal portfolio value (Cumulative Return, Standard Deviation Daily Returns, Average Daily Returns)