

1. Bollinger Bands®

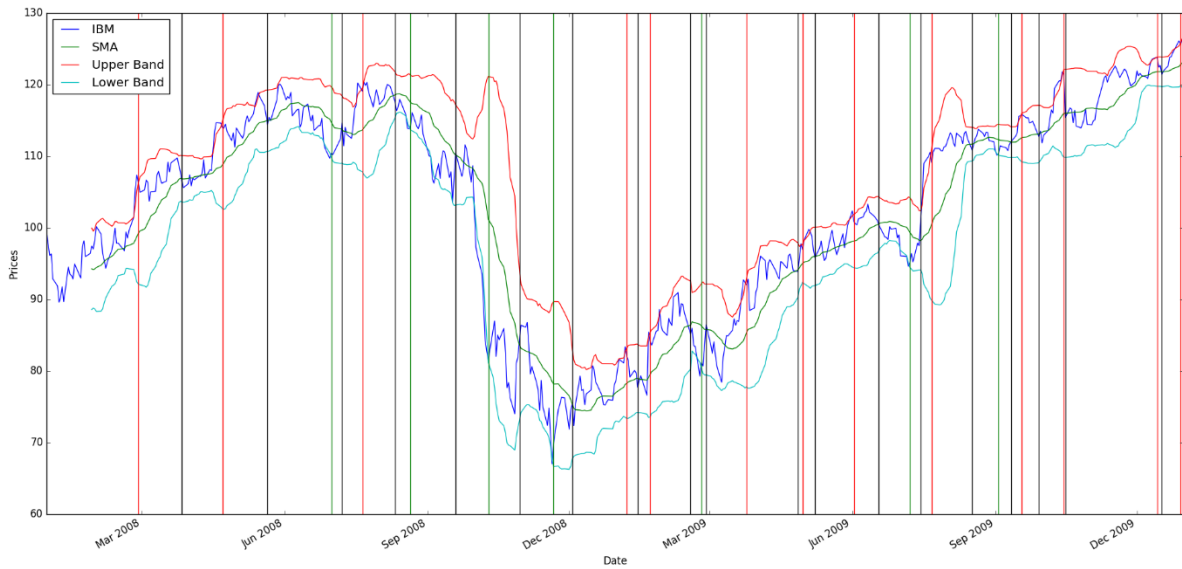


Figure 1: Trading strategy using Bollinger Bands

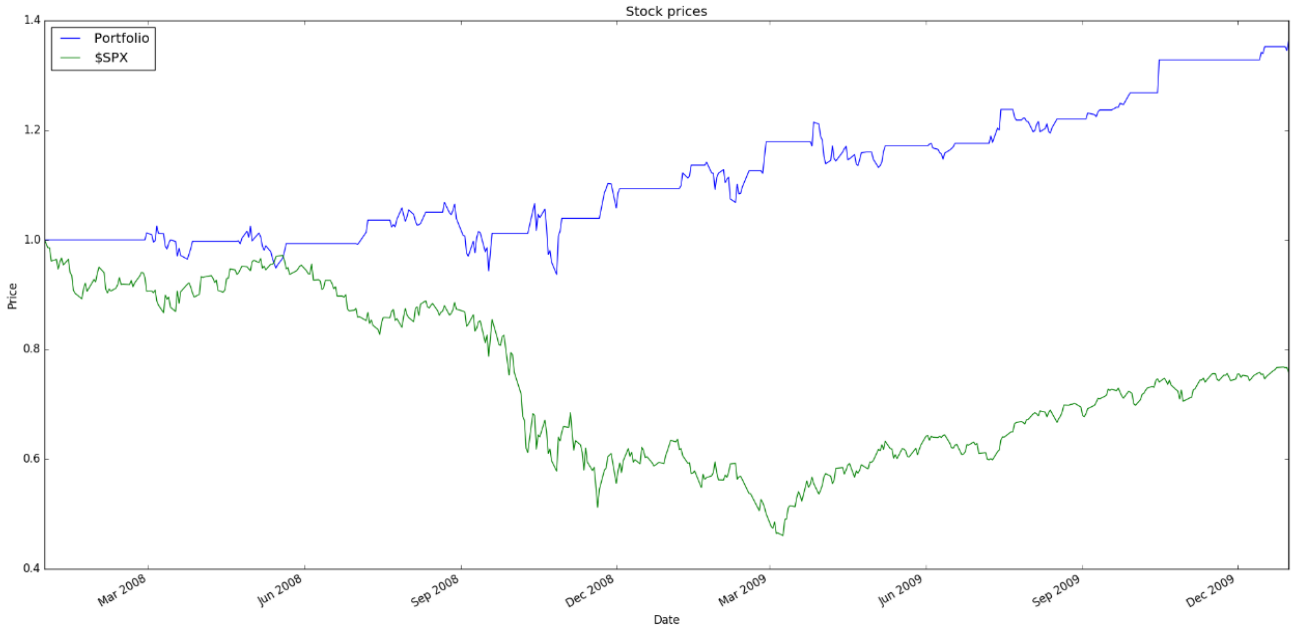


Figure 2: Performance of Bollinger Band trading strategy versus SPX

	Bollinger Band portfolio	\$SPX
Sharpe Ratio	0.97745615082	-0.21996865409
Cumulative return (%)	0.3614	-0.240581328829
Standard Deviation of daily return	0.0108802922269	0.0219524869863
Average Daily Return (%)	0.000669942567631	-0.000304189525556

2. Personal strategy

Explanation of strategy

My strategy built upon the idea of market momentum. If the stock moved in the same direction two days in a row, then that prompted an order. Here are the two cases when there is no outstanding order:

1. If the stock moved down a certain percentage 2 days in a row, that prompts a sell order because the stock is likely to continue moving downward.
2. If the stock moved up a certain percentage 2 days in a row, that prompts a buy order because the stock is likely to continue moving upward.

When an order is active (when we are either in a long or short position), the strategy behaves as follows:

- When in a long position, the desire is to sell the stock if it begins to decrease in price. As such, if the stock price falls for 2 consecutive days by a certain percentage, a sell order is given.
- When in a short position, the desire is to buy back the stock once the stock price increases. Therefore if the stock price increases 2 consecutive days by a certain percentage, a buy order is given.

While delaying the buying and selling means you lose some of the potential gain from making the trade the extra day earlier, it also means that you trade less often and are not likely to simply be reactionary. Smaller changes in price are “evened out” so that trading is only done when there are major changes in the price.

Comparison to Bollinger Bands

I set the percentage changed at 2.5%. Over the specified time period, here are the trades that this strategy performed:

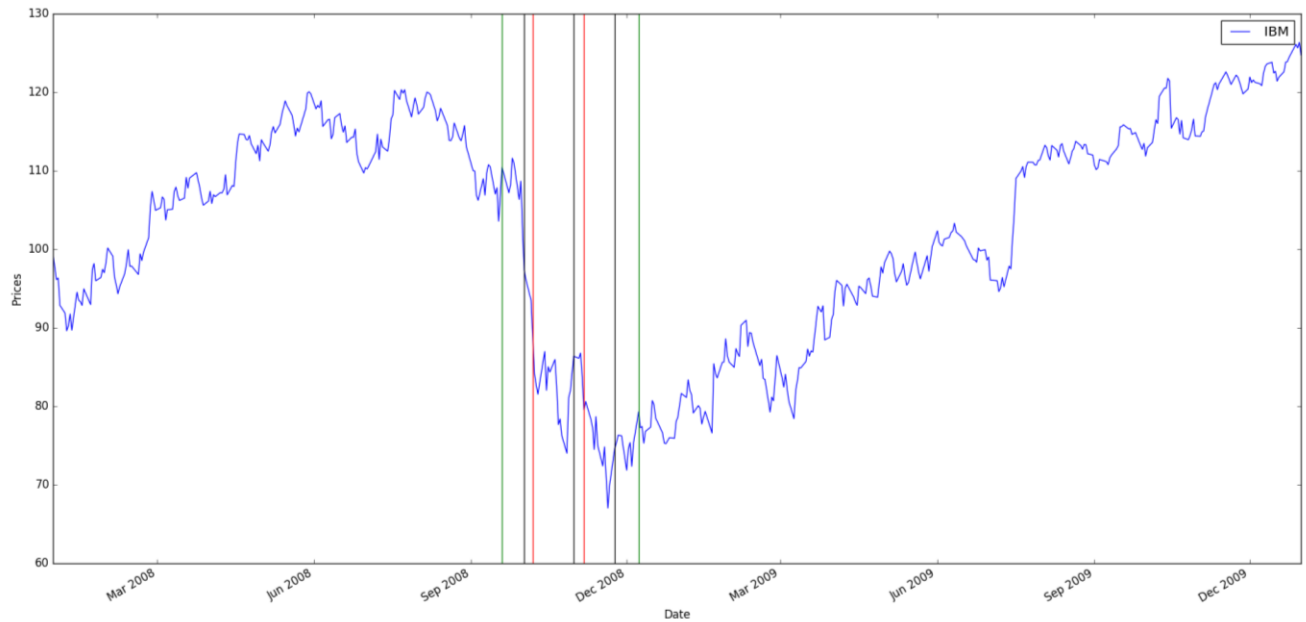


Figure 3: Trades selected by personal strategy

You can see that the trading is mostly performed in the middle where the stock price changed drastically. This is exactly what this strategy was intended to do – only make trades when the price changes significantly.

Here is the performance of this strategy version the general market over the same time period:

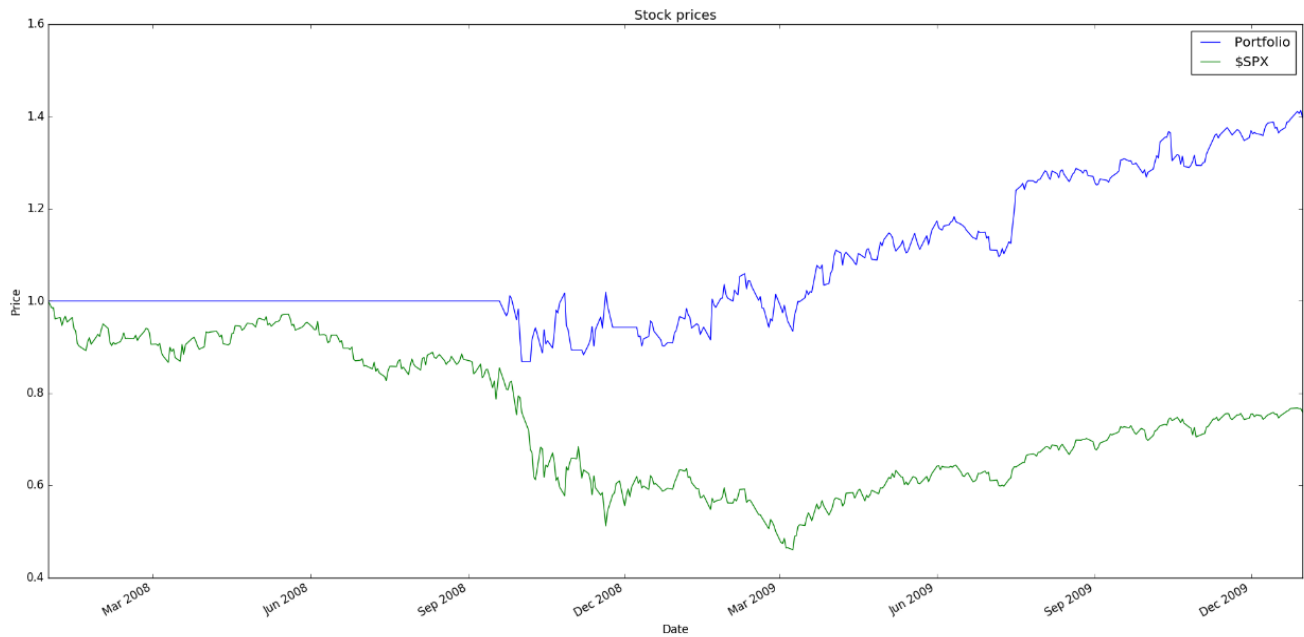


Figure 4: Performance of personal strategy versus the general market

Here are the statistics for this portfolio over the time period above.

	My portfolio	\$SPX
Sharpe Ratio	0.835425219517	-0.21996865409
Cumulative return (%)	0.3976	-0.240581328829
Standard Deviation of daily return	0.0146198167736	0.0219524869863
Average Daily Return (%)	0.000769394789444	-0.000304189525556

This performance is very similar to the Bollinger Bands strategy. While greater risk (lower Sharpe Ratio) is carried, a higher cumulative return is achieved, showing that there is a balance between risk and reward.

Test on out of sample period

The behavior of the market was different over the second time period (December 31, 2009 to December 31, 2011). Running the trading strategy above with the same percentage change to trigger a trade (2.5%) resulted in very poor performance. There were few significant shifts in the value of the value of the stock on 2 sequential days. However, there were general trends of the price to go up. This made this trading strategy perform quite poorly over this time period. Setting the percent changed value too high caused too few trades to be made, so a smaller value had to be used. Here is a plot showing the trades that were made with a percent changed value of 0.1%:

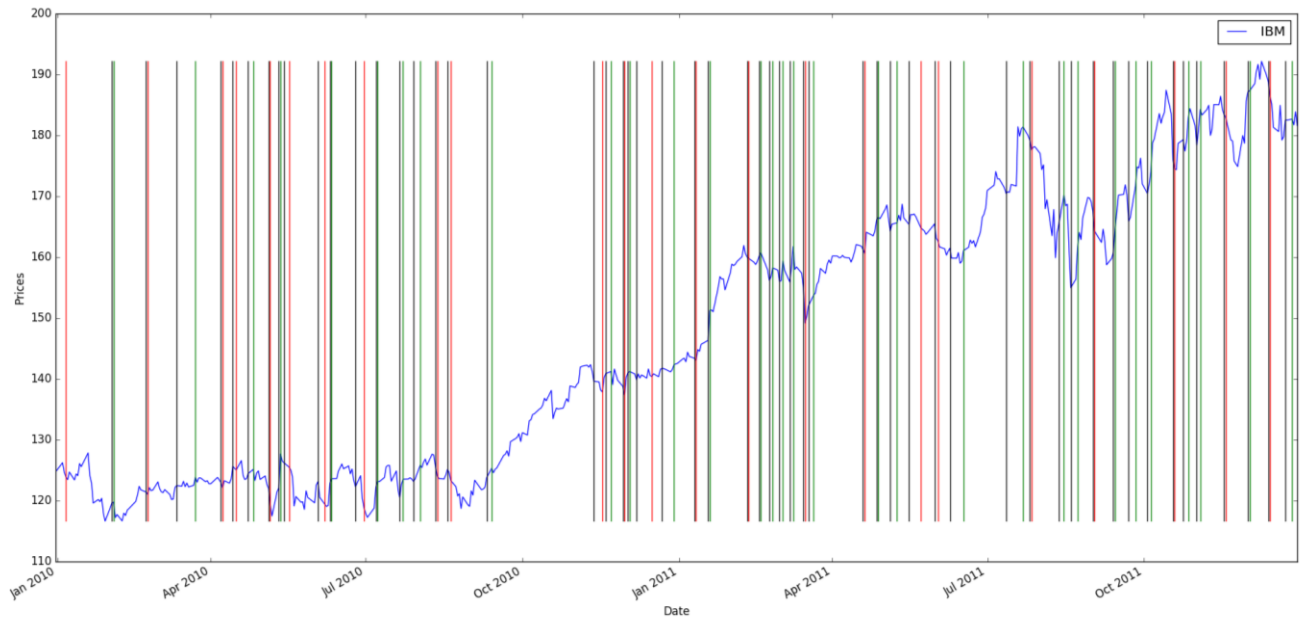


Figure 5: Orders placed during Dec. 31, 2009 to Dec. 31, 2011 with a threshold percent changed value of 0.1%

This is how this strategy performed during the time period as compared to the general market:

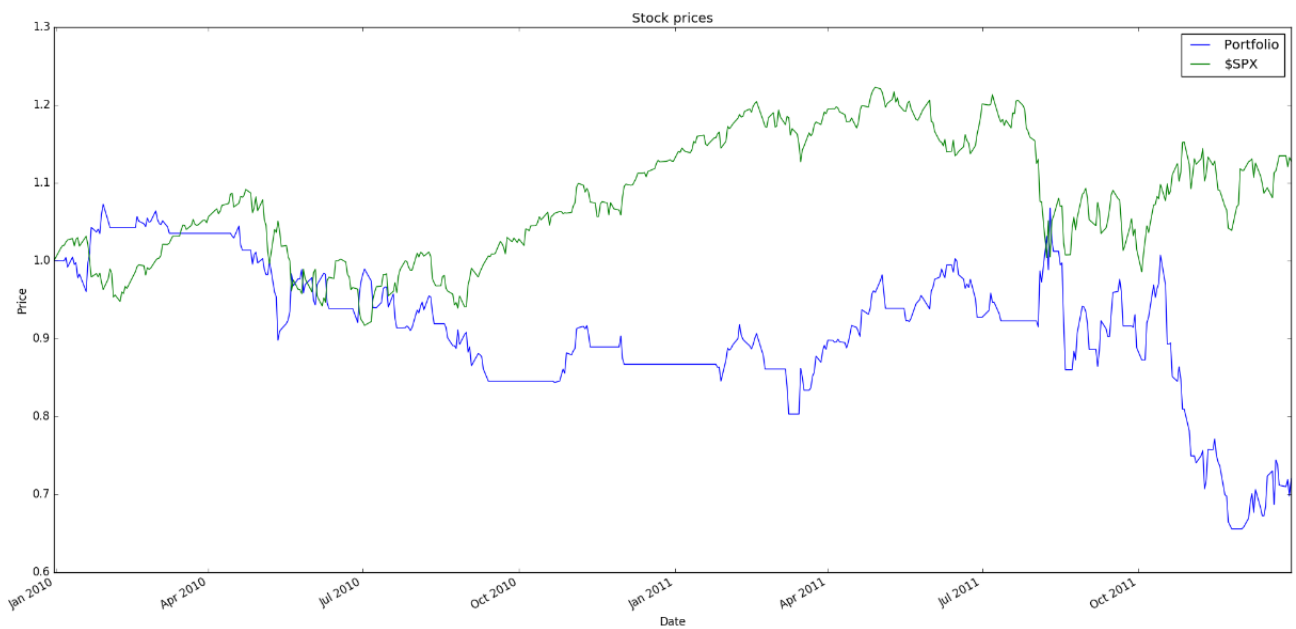


Figure 6: Performance of trading strategy from Dec. 31, 2009 to Dec. 31, 2011

	My portfolio	\$SPX
Sharpe Ratio	-0.419347780311	0.393165319464
Cumulative return (%)	-0.2796	0.127791229486
Standard Deviation of daily return	0.0182994556112	0.0131086008359
Average Daily Return (%)	-0.00048340623571	0.000324661859049

As you can see, the performance is significantly worse than it was over the earlier time period (2008-2009). This reveals a couple underlying deficiencies in this trading strategy:

1. While the market does have momentum it is not necessarily the case that the momentum is in daily increments. Momentum might exist across weeks, months, or even years. While there can be momentum across days, it does not necessarily make the best trading strategy.
2. When we are in a certain position, we expect momentum to carry us to a more favorable position. Then, when the momentum shifts, we expect the momentum to behave in a similar way in order to find a good exit point. This is not always the case. For example, in Figure 5 you can see several points where this did not work. In one of them we enter a short position, assuming that the market will continue its downward trend. When the market increases in value we will buy back the stock to make our profits. However in this case the market does a slow creep, so by the time we come across a day where the market has increased the past 2 days, the price is significantly higher than where the stock was sold. The stock was bought back at a loss.

Perhaps a better strategy would be to only make an order when the stock price moves significantly (i.e., a certain percentage change 2 days in a row), but then to exit that position before the price leads to a loss. This combines the ideas of market momentum while protecting the trader from significant losses.

As can be clearly seen, refining the strategy over a single time period is not ideal. In this case the strategy performed well over one time period and poorly over a different time period, even though the time periods were adjacent. Thus such a practice does not make for the strongest of trading strategies. The market behavior can be significantly different during various time periods. In the extreme case, I would image that the stock market during the “Roaring Twenties” warranted a different trading strategy than during the Great Depression simple because the market was vastly different in these two time periods (that also happened to be adjacent).