

# Portfolio Analysis and Suggestions for Jabre Capital

Sponsored by Jabre Capital

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# Outline

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# Jabre Capital's Basic Information

Jabre Capital is an alternative asset management platform founded in 2006. It provides services and products including:

1. Cayman-based collective investment schemes
2. UCITS IV regulated strategies
3. Individually managed accounts

# Jabre Capital's Challenges

The comparasion below clearly illustrates the challenge Jabre Capital faces:

1. As of December 31th 2010, Jabre Capital had portfolio value of \$4,133,365,000
2. A year later, the portfolio value was only \$793,966,000

In one year, the hedge fund's value was down by around 80%, which made it among the 10 worst hedge funds 2011.

## Manager's Puzzle

Mr. Philippee Jabre, the fund manager, has the following puzzles:

1. Mr. Jabre was limited to invest in large numbers of stocks to increase diversification due to the low portfolio value
2. He had difficulties in finding support and resistance lines for call and put of a stock

in 2012 Q2, the return of his S&P's pick was -6.5%, compared to total market gain 0.1%.



Piechart of Stock Selection

# Our task

Our task will be:

1. Develop a software for drawing support and resistance lines
2. Tell Mr. Jabre whether his portfolio is truly diversified or not
  - A large number of different stocks doesn't guarantee diversification,
  - If the stocks are positively related to each other, the risk increases rather than decrease.
3. Help Mr. Jabre narrow down his stock selection without hurting diversification
  - Stock performance are influenced by macro economic factors and individual company status,
  - To narrow down the stock selection, we should pick stocks which can represent macro economic factors,
  - Unfortunately, these factors are mixed together.

# Concepts of Support and Resistance Lines

Support and resistance represent key junctures where the forces of supply and demand meet.

- Support is the price level at which demand is thought to be strong enough to prevent the price from declining further,
- Resistance is the price level at which selling is thought to be strong enough to prevent the price from rising further.

If we can find lines where the price won't go above or below, they are support and resistance lines.

## Algorithm Applied

Thus, my approach is as follows:

- Find points where the derivative is about to change signal,
- Find the maximum and minimum point among the points above,
- Among all the points where the derivative is going to be positive, draw a line which connects minimum point and another point with the smallest absolute value of slope rate,
- Among all the points where the derivative is going to be negative, draw a line which connects maximum point and another point with the smallest absolute value of slope rate.



# Introduction of Principal Component Analysis(PCA)

Principal component analysis (PCA) is a mathematical procedure that converts a set of observations of possibly correlated variables into a set of values of linearly uncorrelated eigenvectors.

It can be conducted in the following steps:

1. Get some data and subtract the mean
2. Calculate the covariance matrix
3. Calculate the eigenvectors and eigenvalues of the covariance matrix
4. Choose components, form a feature vector, and approximately predict data from the data set

It is a powerful method to find patterns in data of high dimension, and compress data to low dimension without losing much information.

## Problem Solving based on PCA

In our approach, we will use the return performance of a stock rather than price performance, as the thing we are interested in is changes in the stock price rather than absolute stock prices.

Thus, to help Jabre Capital with its challenges, our approach will be divided into following steps:

1. Get historical prices of stocks ever on Jabre Capital's list in 2011, and develop historical return ratios accordingly,
2. Divide stocks according to industries they are in, and list important macro economic factors (such as material prices) to a specific industry,
3. Gather historical data of the macro economic factors, and decide whether these factors are favorable to stock performance or not,

## Problem Solving based on PCA

- If macro economic factors are favorable or neutral to a certain industry, apply Principal Component Analysis to find whether there is a specific return pattern in the industry,
  - If there is a certain pattern, elect one stock with highest average return ratio and minimized risk to represent a specific industry,
  - If there is no such pattern, divide stocks in the same industry into subcategories to find whether there is a certain pattern or not, until the number of stocks in this industry decreases by 80% which corresponds to the portfolio value loss.
- If macro economic factors are not favorable to a certain industry, decide whether to exit this industry or not, by referring to authorized third party opinions about the factor's future trends.

The following outputs are expected from this project:

- Software of finding support and resistance line,
- Return of Investment charts and data of all the stocks Jabre Capital invested in 2011,
- Principal component analysis of all the stocks, stocks in each industry, stocks in each subcategory,
- Suggestions about a narrowed portfolio list,
- R package with a complete set of documentations along with some test codes that can be used to reproduce simulation results,
- Technical report and presentations summarizing the work.

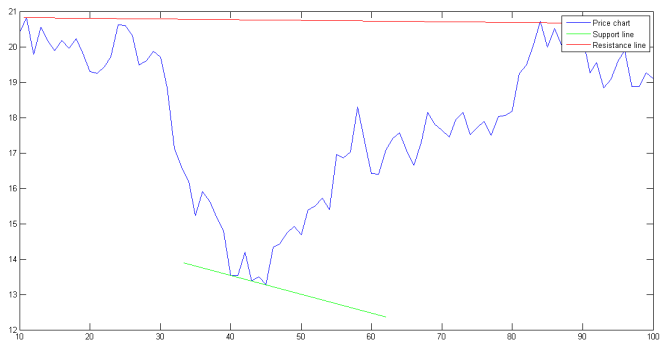
## From Sponsor to Team

In order for our project to be of successful one, we will need:

- Provide lists of stocks Jabre Capital held in 2011, and access to all the price charts and data of these stocks before Oct 26,2012
- Timely responses to inquiries,
- Symposium attendance travel expenses.

## Evaluation of Task 1

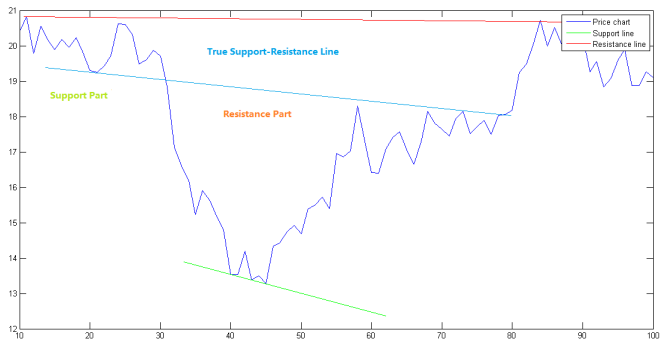
Based on algorithm mentioned, I have developed software for drawing support and resistance lines. Using a sample data, I get the pictures as follows:



Resistance and Support lines drawn by Matlab

# Evaluation of Task 1

It fulfills the goal of the algorithm quite well. However, it is not good enough to draw real support and resistance lines:



Real Resistance and Support lines

## Future Work

- Improve the algorithm of Task 1, making it possible to draw multiple resistance and support lines in a give period, and the lines can be crossed by the price chart
- Apply R to calculate covariance matrix, apply PCA analysis in Task 2&3,
- Optimize the stock selection.