Evaluating Financial Crises and Stock Market Trends Using Technical, Market, and Fundamental Indicators

Data Visualization Group Project
Management of Financial Institutions
MGT-6090

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Literature Review

- Market Indicators

- Technical Indicators

- Fundamental Economic Indicators

Dependent Variables

- Farma-French's 2*3 portfolios based on Size and Book-to-Market
  - SMALL LoBM
  - ME1 BM2
  - SMALL HiBM
  - BIG LoBM
  - ME2 BM2

	Median ME	
70th BE/ME percentile	Small Value	Big Value
30th BE/ME percentile	Small Neutral	Big Neutral
	Small Growth	Big Growth

- Farma-French's 5 portfolios based on sectors
  - Consumer
  - Manufacturing
  - High technology
  - Health care
  - Others
- Overall Market: SPY index

Three Types of Indicators

- Market Indicators:
  - CBOE VIX
  - CBOE Equity Put-Call Ratios
- Technical indicators (all based on the overall market index SPY):
  - MA (5, 10, 50, 100, 200 days from SPY)
  - Relative Strength Index (below 30 is oversold, above 70 is overbought)
  - Bollinger Band (lower band, 20 day MA, upper band)
- Fundamental indicators
  - Unemployment rate
  - CPI growth rate
 - PPI growth rate
  - San Francisco Tech growth rate

Preliminary Findings: General Trend from 1990 to 2020

Cumulative Returns from 1990 to 2020

Growth/Value Big/Small — BIG HiBM — ME1 BM2 — SMALL HiBM — BIG LoBM — ME2 BM2 — SMALL LoBM

Cumulative Returns from 1990 to 2020

Five Major Sectors — Cnsmr — HiTec — Hlth — Manuf — Other

Key Observations:

- Small value stocks tend to do very well in the long run
- Growth stocks tend to generate less returns than value stocks
- Small growth stocks do not do very well
- The healthcare sector generated most returns
- The consumer sector experienced less maximum downfalls and volatilities
- The manufacturing sector did not generate much profits in more recent years

Visualizing the Dot-com Bubble and the Market Crash of 2000-2001
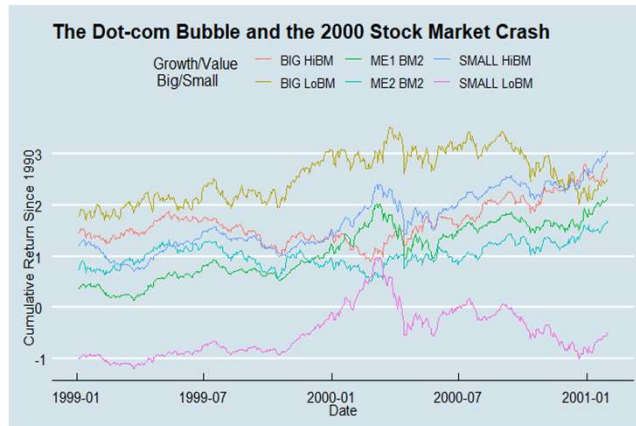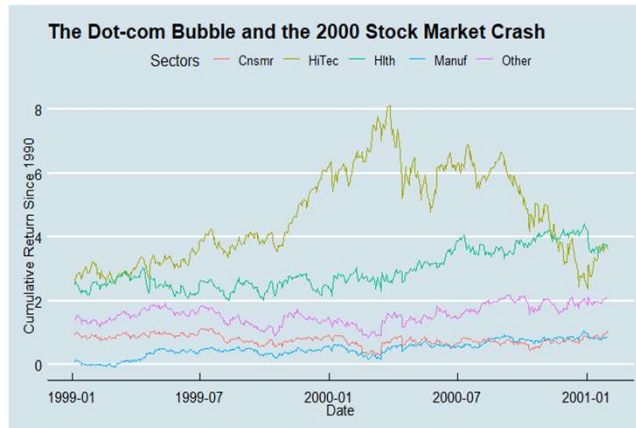
Key Observations:

- The high technology sector experienced the most increase before the bubble popped
- Other sectors did not experience too much downfall during this market crash
- But even if the technology sector had decreased, their values are still quite close to when the bubble started
- Small-cap growth stocks experienced the most volatilities during the same time
- They were not able to jump back very soon as compared with other stocks
- Big-cap growth stock instead seem to do quite well in the meanwhile
- Both big-cap and small-cap values stocks performed better than others during the crisis

Visualizing the Dot-com Bubble and the Market Crash of 2000-2001

The Dot-Com Bubble and the 2000 Stock Market Crash
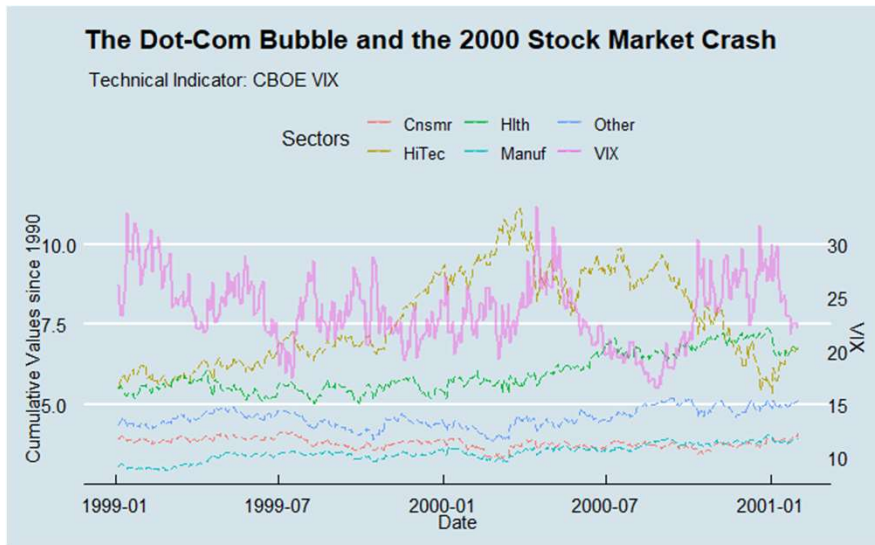
Key Findings:

- Highest volatilities one year before the market crashed
- Lowest volatilities soon before the market reached the peak and crashed later
- Relatively higher volatilities when the market reached its bottom

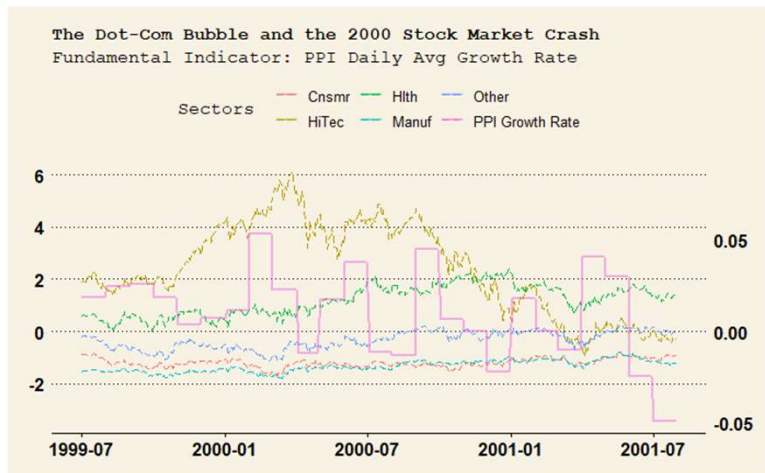# Visualizing the Dot-com Bubble and the Market Crash of 2000-2001
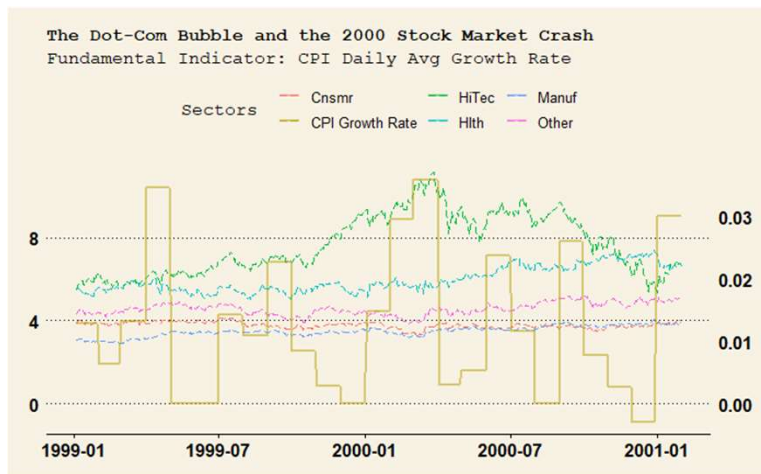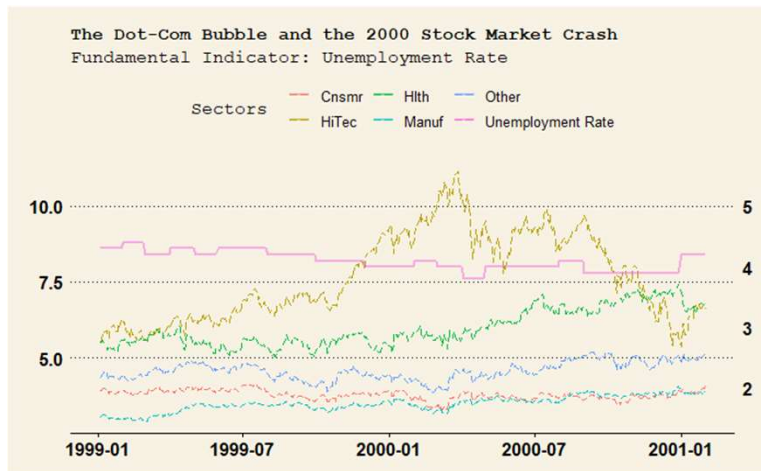
Key findings:

- Unemployment rate did not experience too much oscillation during the Dot-com Bubble market crash
- CPI growth rates experienced normal seasonal changes

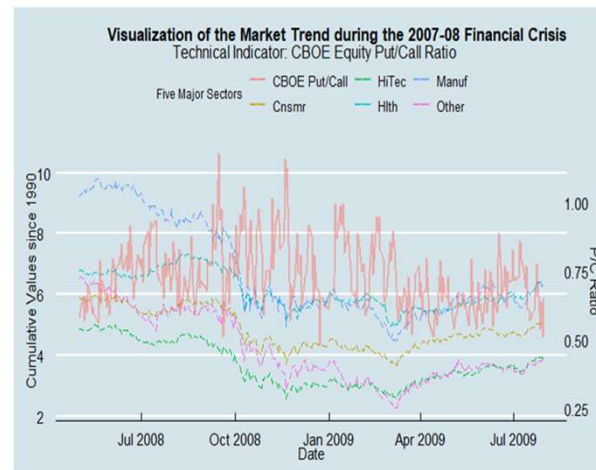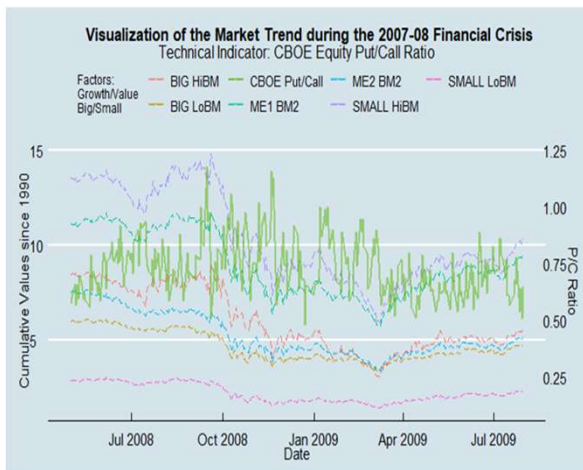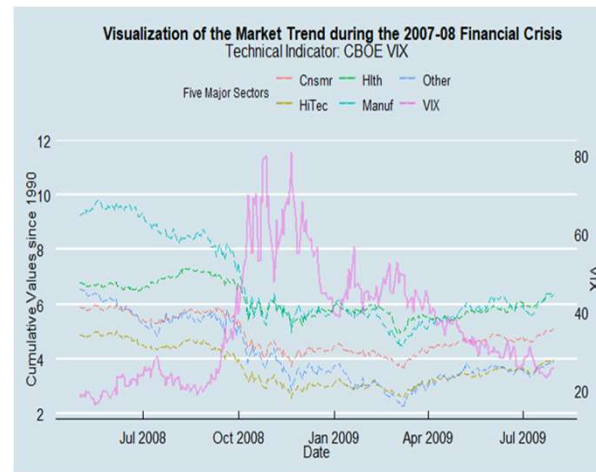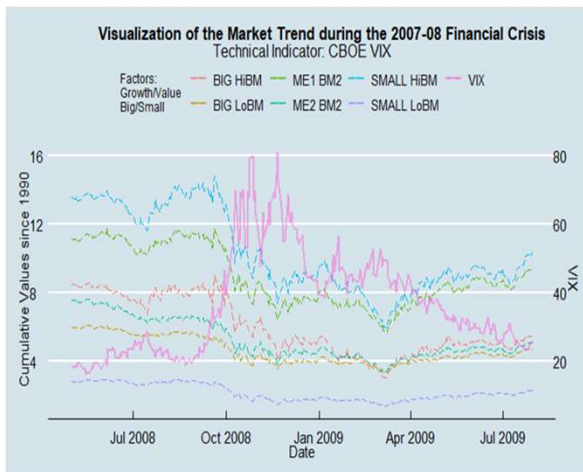# Visualizing the Dot-com Bubble and the Market Crash of 2000-2001

Key findings:

- PPI growth rates slightly decreased during the same period
- The San Francisco Tech Index growth rates are quite synchronized with the high technology sector of the market

Visualizing the Market Trend During the 2007-08 Financial Crisis

Key Findings:

- The manufacturing sector still experiencing another peak until the mid-2008 while other sectors started going down after reaching the peak since October 2007
- The volatility index remained low soon before the market started to plunge
- The volatility index reached two peaks, after the second of which the market started recovering
- Put/call ratios experienced more ups and downs than VIX during the same time
- Higher put-call ratio when the market did not reach the bottom

Visualizing the Market Trend During the 2007-08 Financial Crisis: Fundamentals: Unemployment
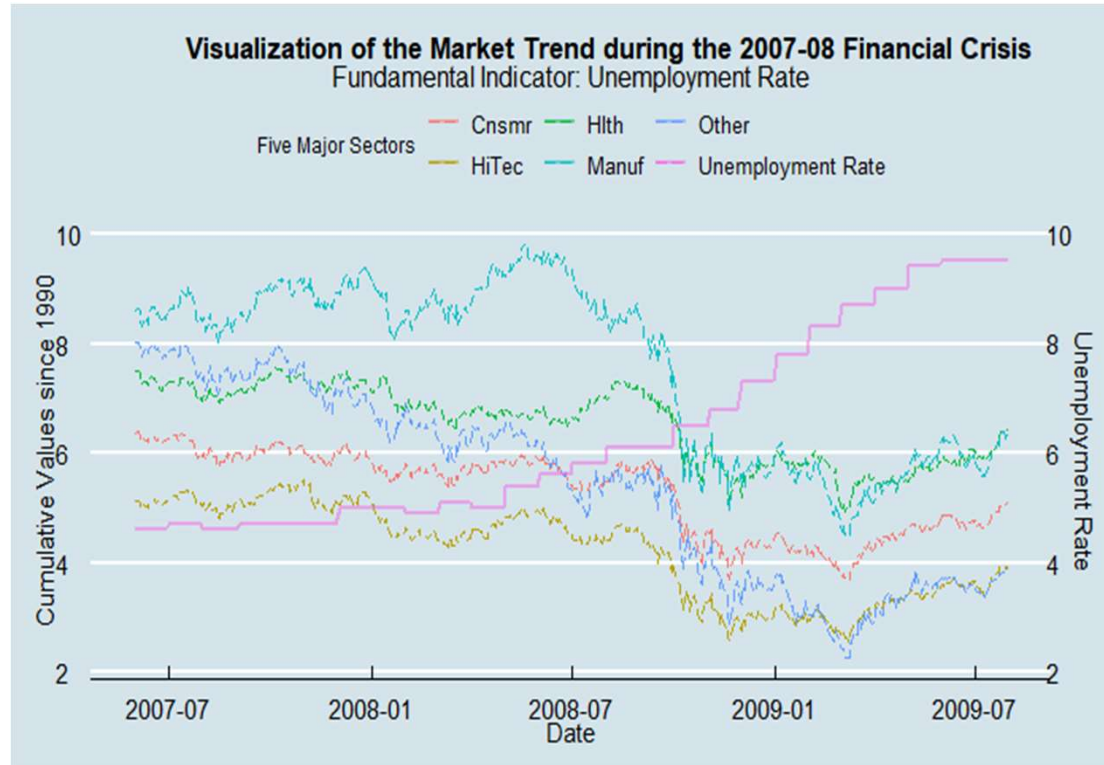
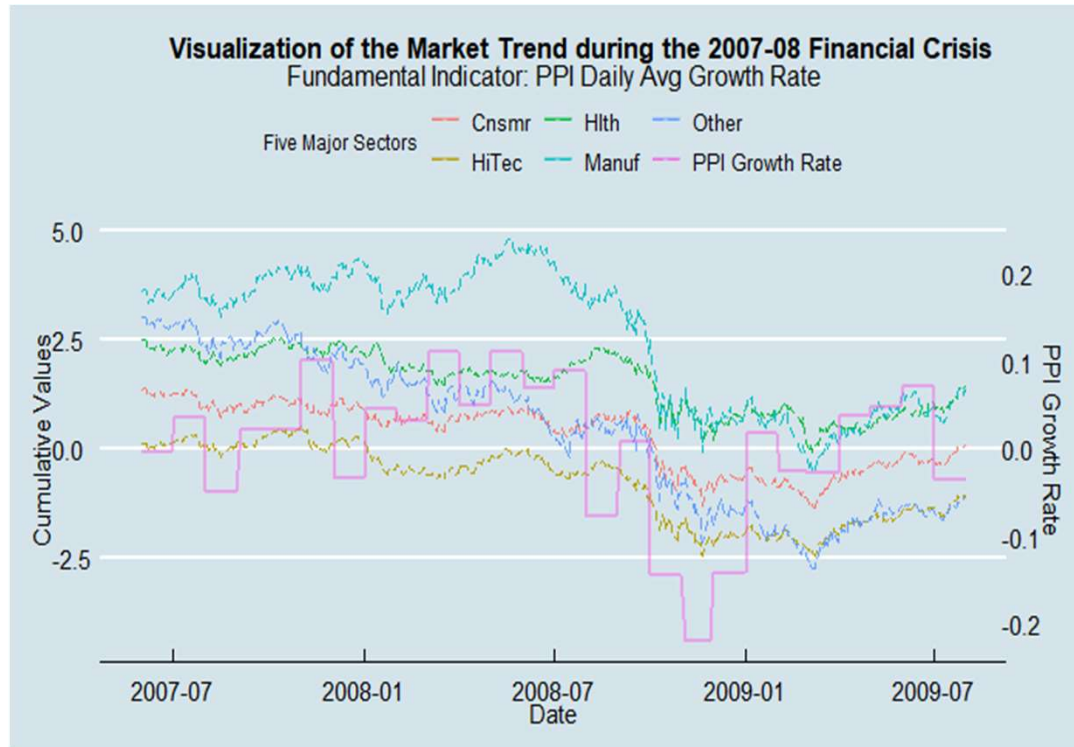Key Findings:

- Unemployment rates already steadily decreasing starting in late 2007 and early 2008, several months, and continued to increase during the crisis
- Employment rates continued to increase after the market hit the bottom in March 2009 and took a long time to recover

Visualizing the Market Trend During the 2007-08 Financial Crisis: Fundamentals: PPI Growth Rate

Visualization of the Market Trend during the 2007-08 Financial Crisis
Fundamental Indicator: PPI Daily Avg Growth Rate

Key Findings:

- PPI growth rates were not significantly affected in the early time of the crisis
- PPI growth rates only started declining until the financial crisis had almost ended
- PPI growth rates were able to rebound back before the market found its bottom several months after

Visualizing the Market Trend During the 2007-08 Financial Crisis

Visualization of the Market Trend during the 2007-08 Financial Crisis
Fundamental Indicator: CPI Daily Avg Growth Rate
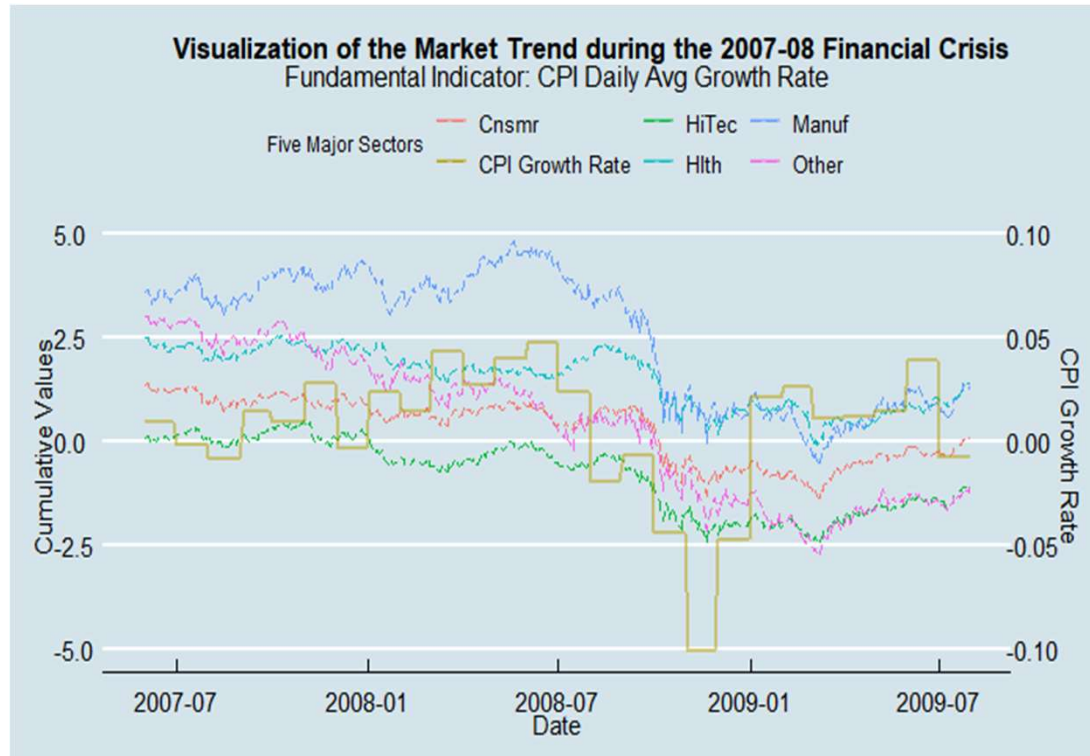
Key Findings:

- CPI growth rates experienced certain lags to decrease after the market
- CPI growth rates decreased quickly during the middle of the crisis
- CPI growth rates found the bottom 2 months before the market reached its bottom

Visualizing the Market Trend During the 2007-08 Financial Crisis
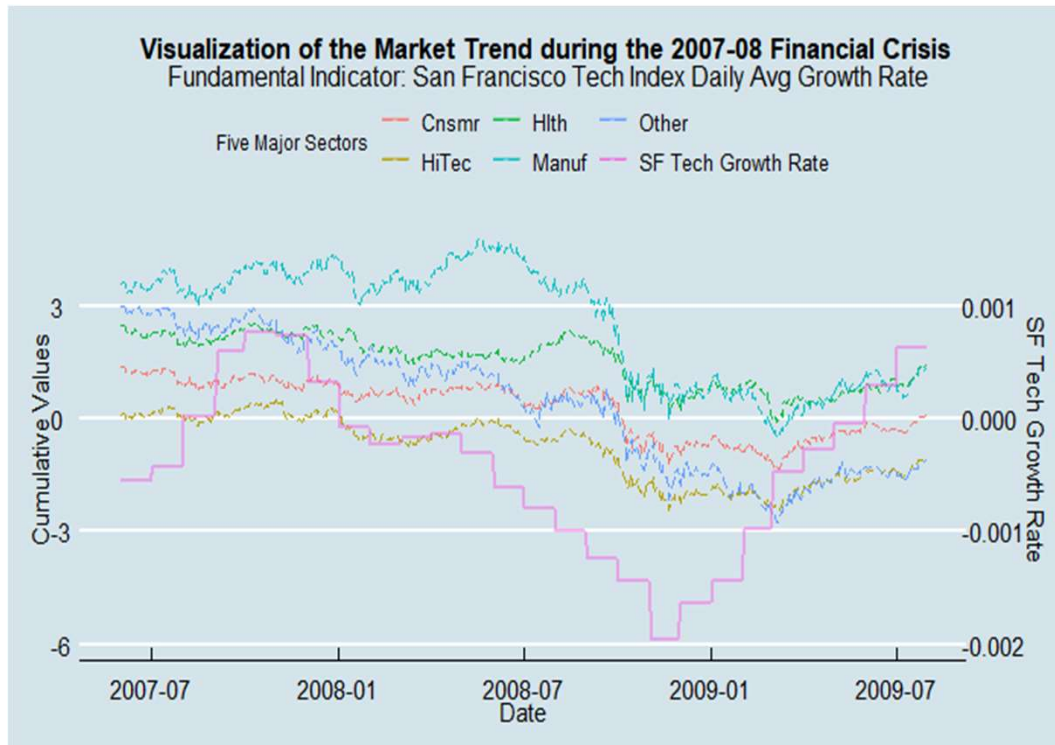
Key Findings:

- San Francisco Tech Index growth rate was pretty responsive to the financial crisis and the market trend
- It reached its bottom several months before the market reached the bottom
- It was able to jump back very rapidly

Summary of Findings from Visualizing the 2007-08 Financial Crisis

Visualization of the Market Trend during the 2007-08 Financial Crisis
Fundamental Indicator: Unemployment Rate

Visualization of the Market Trend during the 2007-08 Financial Crisis
Fundamental Indicator: CPI Daily Avg Growth Rate

Visualization of the Market Trend during the 2007-08 Financial Crisis
Fundamental Indicator: PPI Daily Avg Growth Rate

Visualization of the Market Trend during the 2007-08 Financial Crisis
Fundamental Indicator: San Francisco Tech Index Daily Avg Growth Rate

Summary:

- Unemployment rates slightly increased before the financial crisis and market crash and took significant time to recover
- CPI growth rate was only affected during the very acute time of the crisis and was able to jump back before the market reached the bottom
- PPI growth rate was similar to CPI growth rate in that it was less affected in the beginning and was able to jump back very quickly
- The capital-intensive SF Tech Index growth rates experienced sharp declines in the beginning of the crisis and continued to plunge with the market
- SF Tech Index growth rates reached the bottom 4 months before the market

Prediction Results

	Logistic	KNN
Consumer	0.67	0.53
Manufacturing	0.69	0.52
High Tech Industry	0.68	0.6
Healthcare	0.65	0.56
Other	0.72	0.6

Prediction Results

Predictions on Training Data