MSA 8389 Directed Reading

Industry Trajectory Analysis

Submitted by

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Abstract

Predicting trends and movements within a given industry sector can be an incredibly difficult, time consuming and potentially fruitless endeavor. The goal of the research conducted over this semester is to show the potential to use data analysis and eventually machine learning techniques to protect changes within a given industry. Python was used to pull information from the Wharton database the most connected companies were determined using graphing methods. Once the companies were selected a set of variables were compiled to represent how well a company was doing. The variables were standardized and PCA reduction was used to reduce the variables to two principle components. Once the graphs were completed, companies were grouped by sector to establish if any similarities existed between sectors. Several sectors had graphes with similar changes in trajectory. Upon looking at the events surronding changes it trajectory it was discovered that each change in trajectory on the graph corresponded to a major event affecting the company. Each of the companies narrtives have been examined to be the basis for moving from a descriptive model to the ultimate goal of predictive model of industry forces.

Contents

1 Indstrusy Research **1**
- 1.1 Introduction . . . 1
- 1.2 Process . . . 1

2 Narratives **3**
- 2.1 Hardware . . . 4
  - 2.1.1 Lowe's Companies Inc . . . 5
  - 2.1.2 Home Depot Inc . . . 6
  - 2.1.3 Sherwin-Williams Co . . . 8
- 2.2 Retail . . . 9
  - 2.2.1 WalMart Inc . . . 10
  - 2.2.2 Sears Holdings Corp . . . 11
  - 2.2.3 Target Corp . . . 12
- 2.3 Oil . . . 13
  - 2.3.1 Exxon Mobil Corp . . . 14
  - 2.3.2 Royal Dutch Shell PLC . . . 15
  - 2.3.3 Chevron Corp . . . 16
- 2.4 Automotive . . . 17
  - 2.4.1 Chrysler Corp . . . 18
  - 2.4.2 Ford Motor Co . . . 19
  - 2.4.3 General Motors Co . . . 20
- 2.5 Computers . . . 21
  - 2.5.1 HP Inc . . . 22
  - 2.5.2 Compaq Inc . . . 23
  - 2.5.3 International Business Machines Corp . . . 24
- 2.6 Telecommunications . . . 25
  - 2.6.1 Motorola Solutions Inc . . . 26
  - 2.6.2 Verizon Communications Inc . . . 27
  - 2.6.3 AT&T Inc . . . 28
- 2.7 Conglomerate . . . 29
  - 2.7.1 Newell Brands Inc . . . 30

2.7.2 General Electric Co 31
2.7.3 Berkshire Hathaway 32

3 Conclusion **33**

References **34**

Chapter 1

Indstrusy Research

1.1 Introduction

The research began by looking at the supply chain database created by Wharton. This database contained a list of companies and who they supplied to organized by year using the unique identifier gvkey. Using the gvkeys of the supplier as the source and the gvkeys of customers as destinations a directed graph was created to determine the most connected companies for each year. Throughout the years several companies appeared over and over.

1.2 Process

This small group of regularly highly connected companies became the base group for our research. Twenty-seven companies were divided into nine sectors: Automotive, Retail, Oil, Computers, Hardware, Telecommunication and Conglomerates. Several variables were selected to represent how well the companies were doing. Some of the variables included were total assets, net income, total sales and stock holder equity.

Once the variables were compiled, they were standardized and a PCA reduction was performed. This allowed all twenty-seven companies to be compared side by side. Trends were noticed immediately regarding General Motors and Ford Motor Company. Once the selected companies were divided into smaller graphs, still using the original standardization and PCA from the large graph, more trends were noticed.

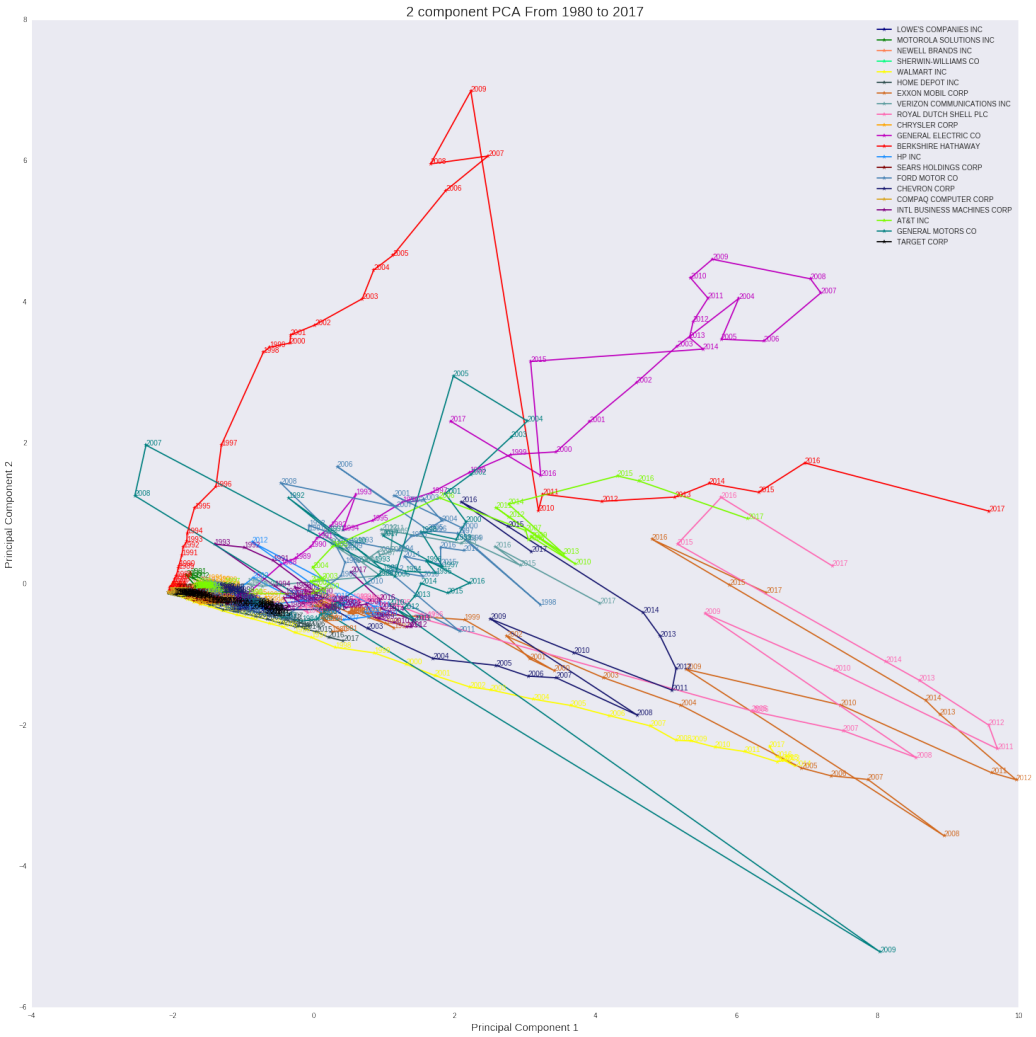
One of the most striking trends within in an industry was the similarities between Home Depot and Lowe's. The graphs had similar trajectories and then both changed trajectories in the same direction around the same time and then once again changed back to the original direction at the same time. Both changes in direction coincide with the begin and end of the house market crash. The oil industry has a whole has a lot of similar trajectories in the graphs for each of the companies, most noticeably between Exxon and Shell.

As research began into the history of each of the companies and the events transpiring during each of the changes in trajectory one major theme occurred over and over. Nearly every change in a company's trajectory coincided with a major event for the company. From the housing market crash in the hardware industry to AT&T being bought by what was at the time a spin off company to the oil industry reacting to the changes in oil prices in the mid 2000's.

The discovery of the changes in graph trajectories has led to an increased emphasis on telling the story of each company. The following sections of this paper are narratives of the major changes in each company's graph and how those changes are representative of major events affect each company.

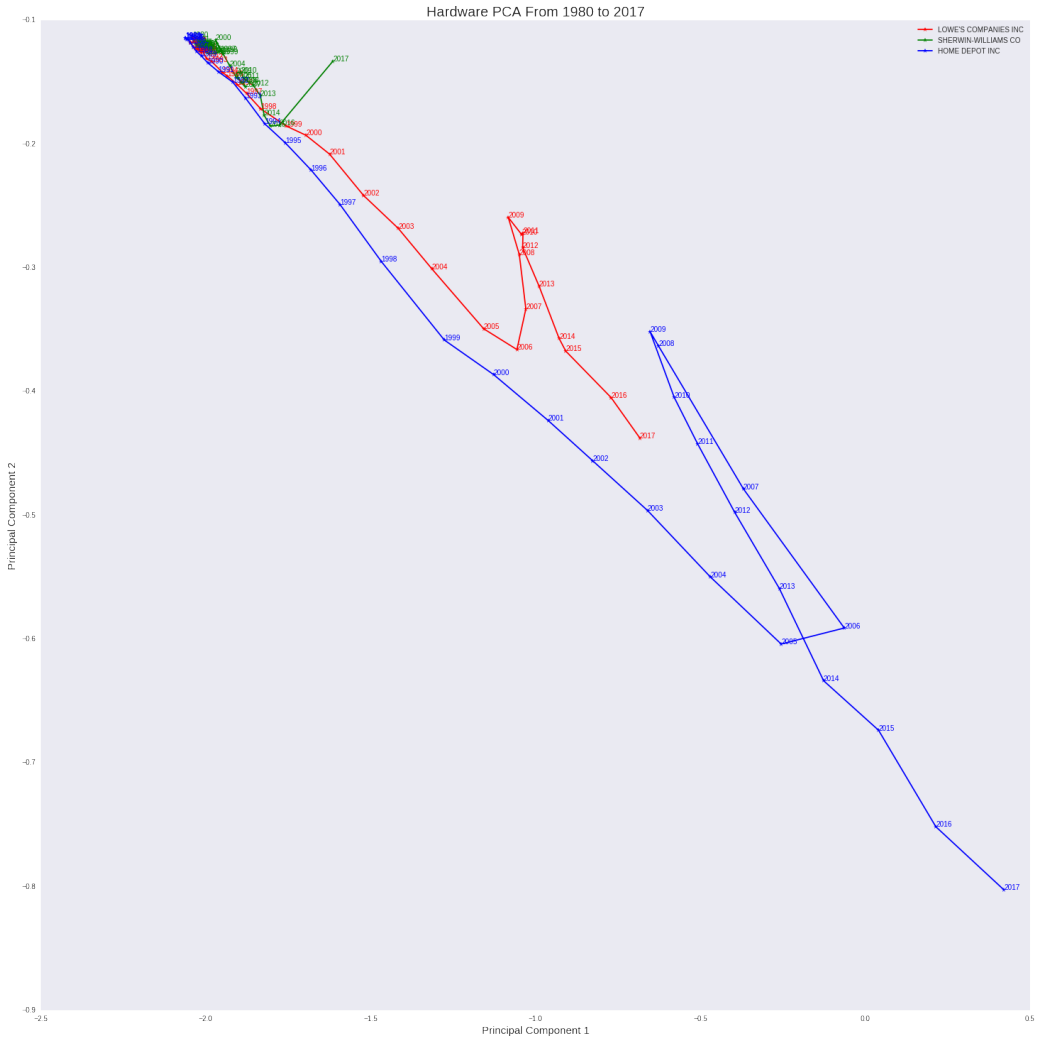
Chapter 2

Narratives

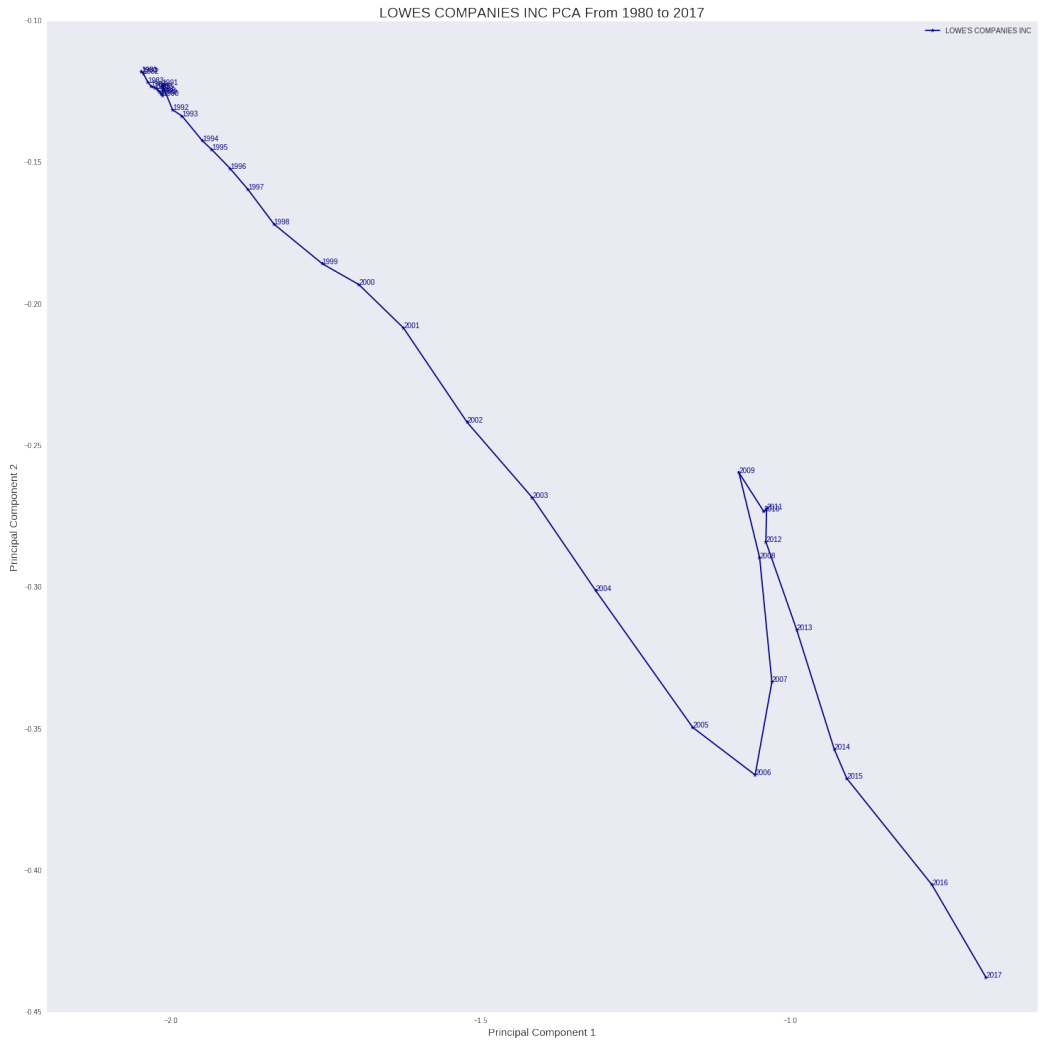


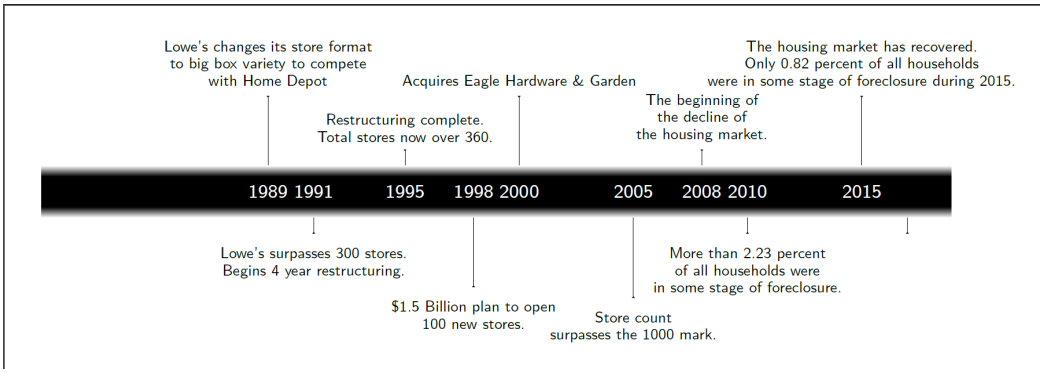
Several trends can be seen int the main graph such as Shell and Exxon or Lowes and Home Depot. Each of these indivisual graphes will be broken down more throughout this section.

2.1 Hardware

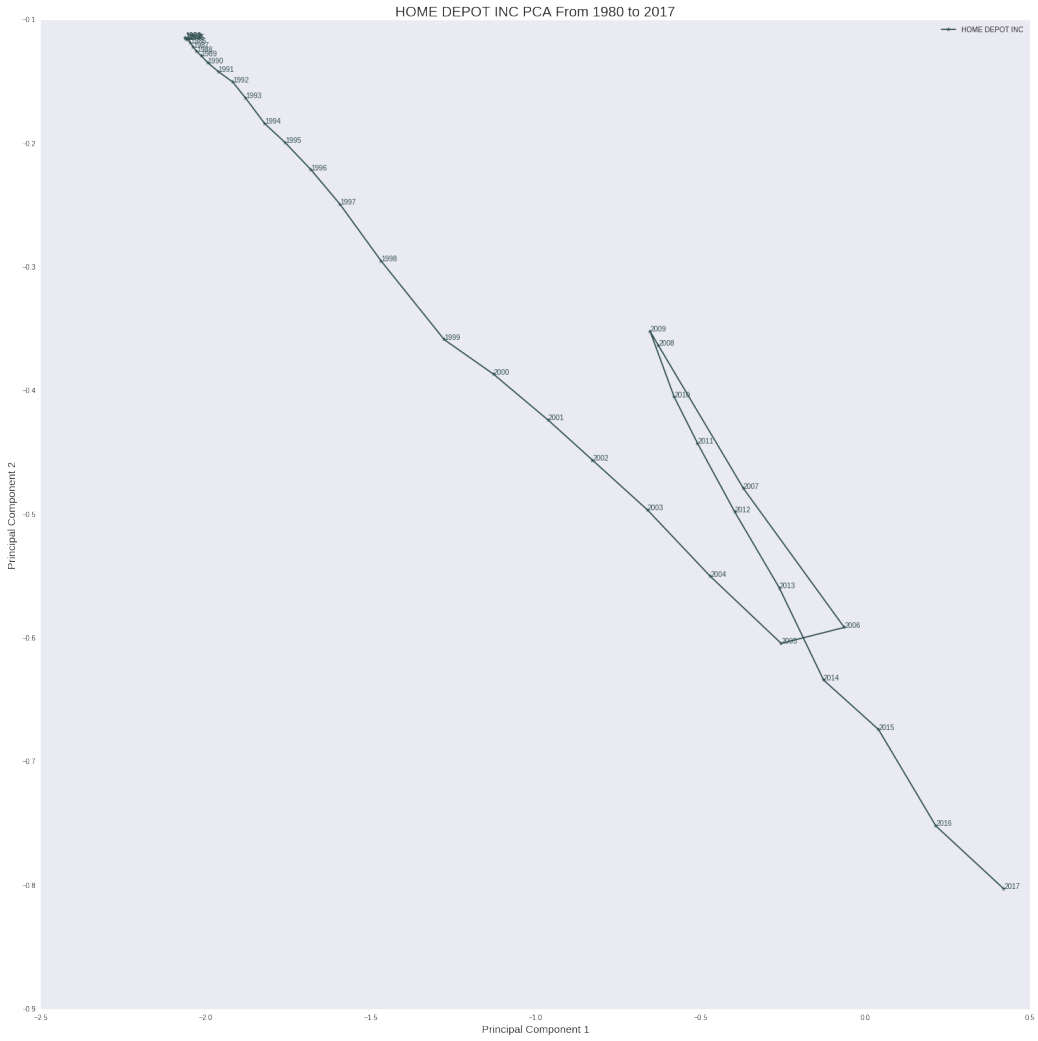


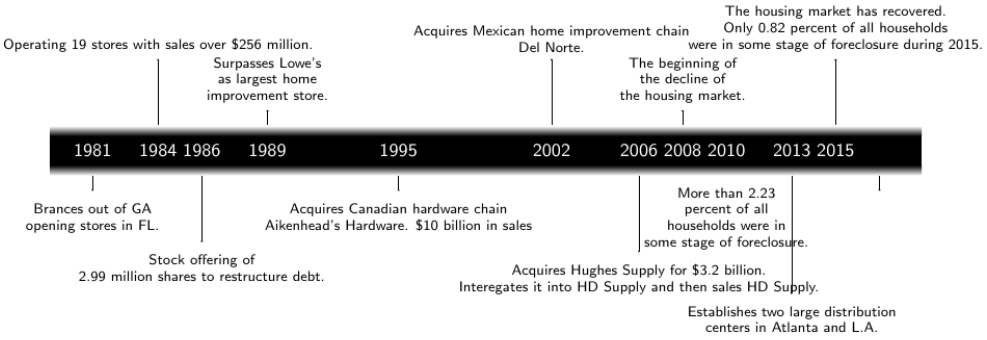
2.1.1 Lowe's Companies Inc



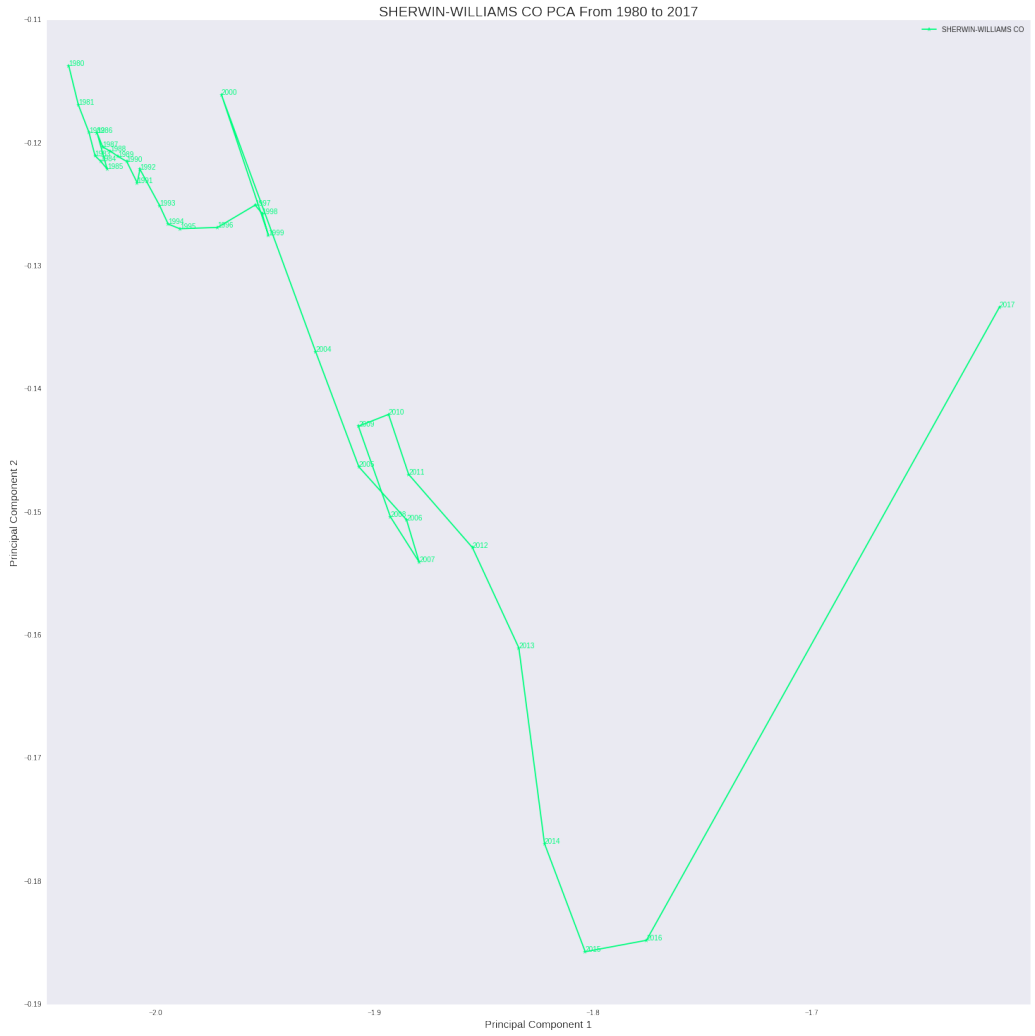


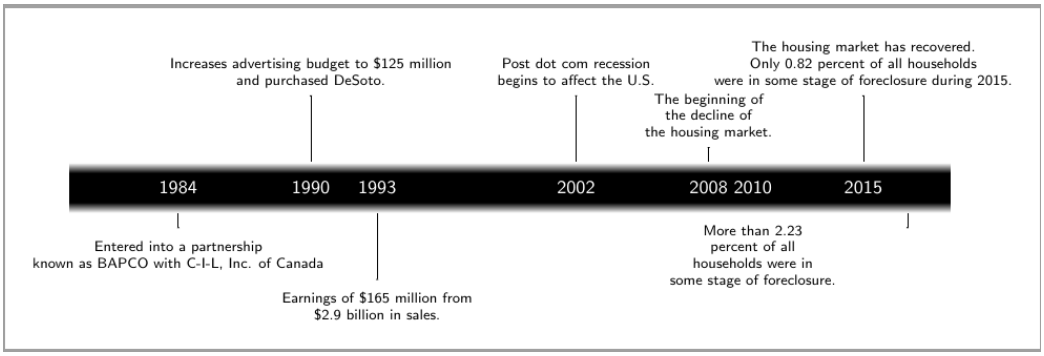
2.1.2 Home Depot Inc



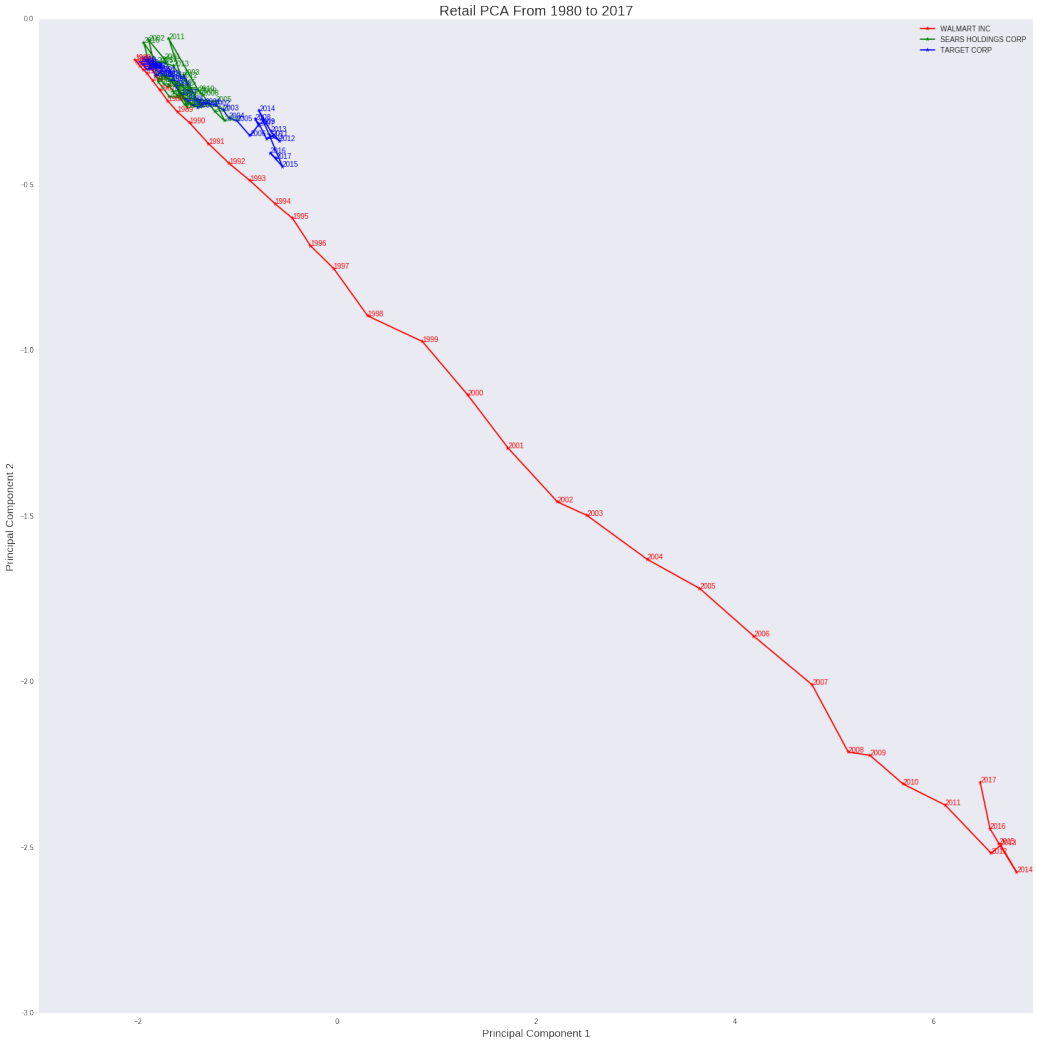

Operating 19 stores with sales over $256 million.
Surpasses Lowe's as largest home improvement store.
Acquires Mexican home improvement chain Del Norte.
The beginning of the decline of the housing market.
The housing market has recovered. Only 0.82 percent of all households were in some stage of foreclosure during 2015.
1981
1984
1986
1989
1995
2002
2006
2008
2010
2013
2015
Brances out of GA opening stores in FL.
Stock offering of 2.99 million shares to restructure debt.
Acquires Canadian hardware chain Aikenhead's Hardware. $10 billion in sales
Acquires Hughes Supply for $3.2 billion. Interegates it into HD Supply and then sales HD Supply.
More than 2.23 percent of all households were in some stage of foreclosure.
Establishes two large distribution centers in Atlanta and L.A.

2.1.3 Sherwin-Williams Co

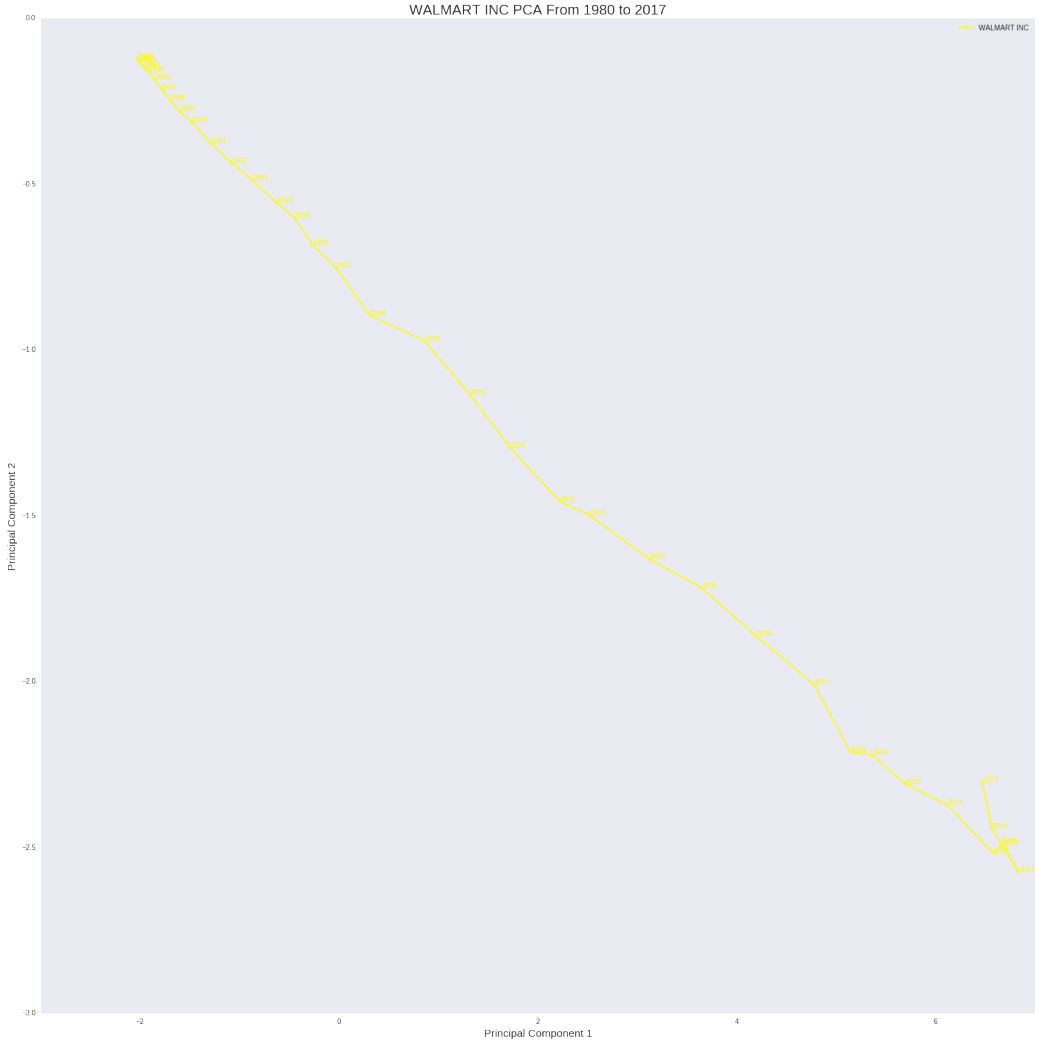




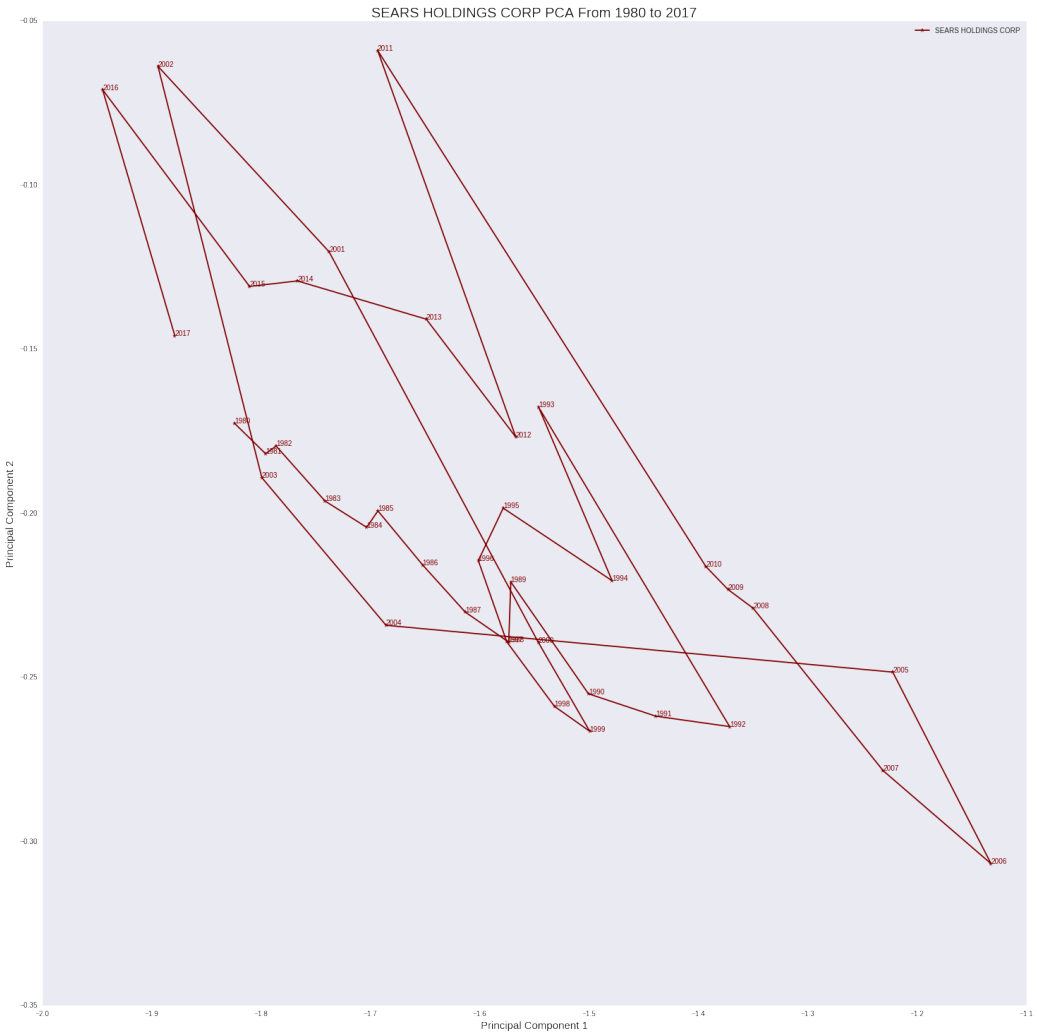
2.2 Retail


Retail PCA From 1980 to 2017
WALMART INC
SEARS HOLDINGS CORP
TARGET CORP
Principal Component 2
Principal Component 1
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-2
0
2
4
6

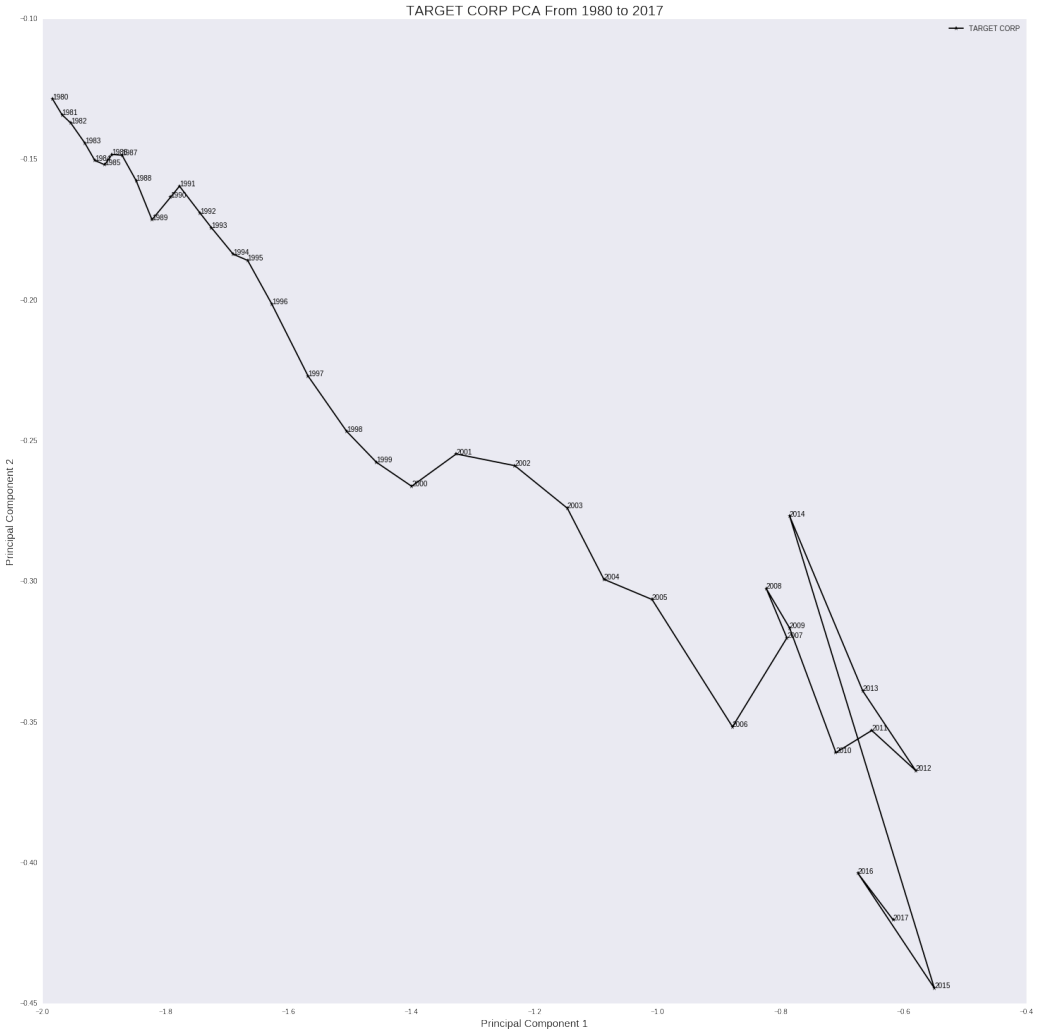
2.2.1 WalMart Inc



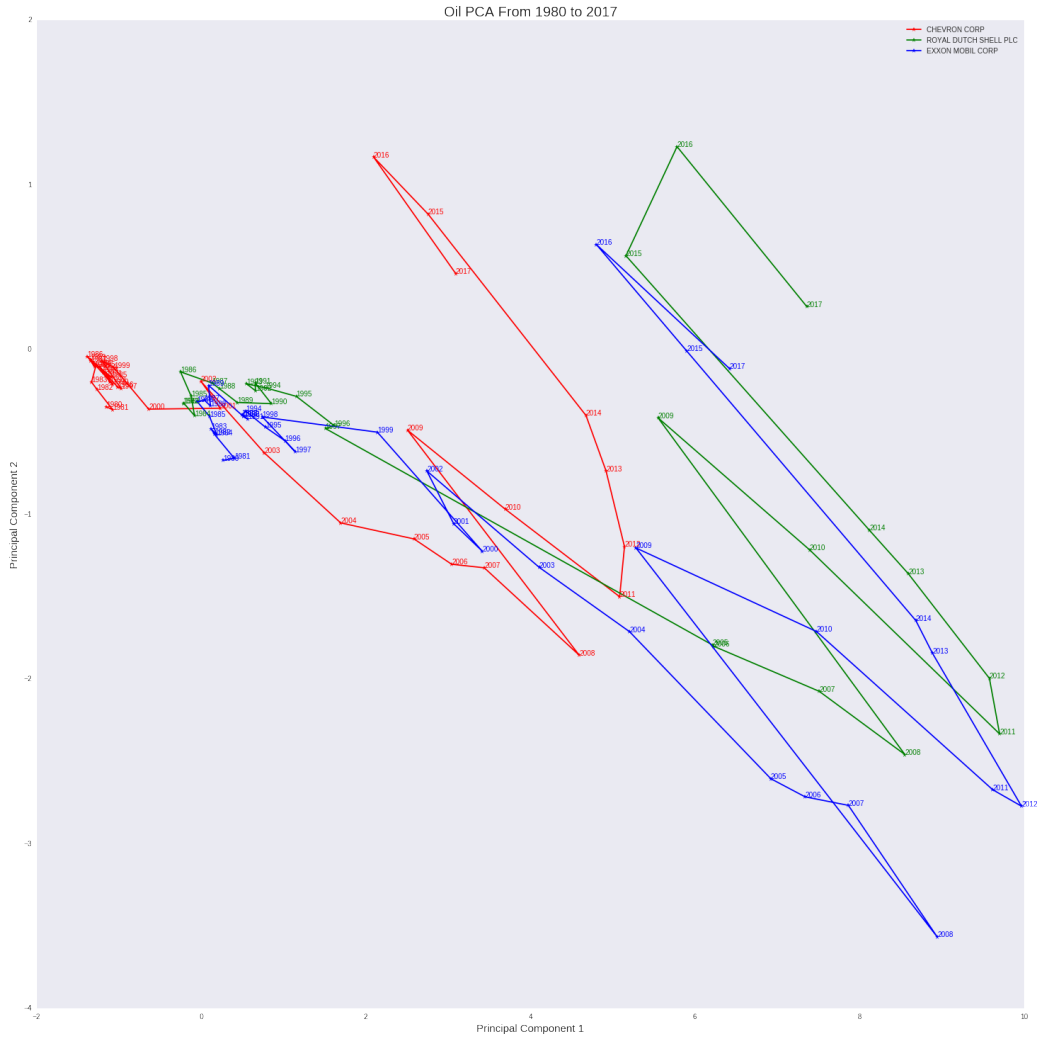
2.2.2 Sears Holdings Corp



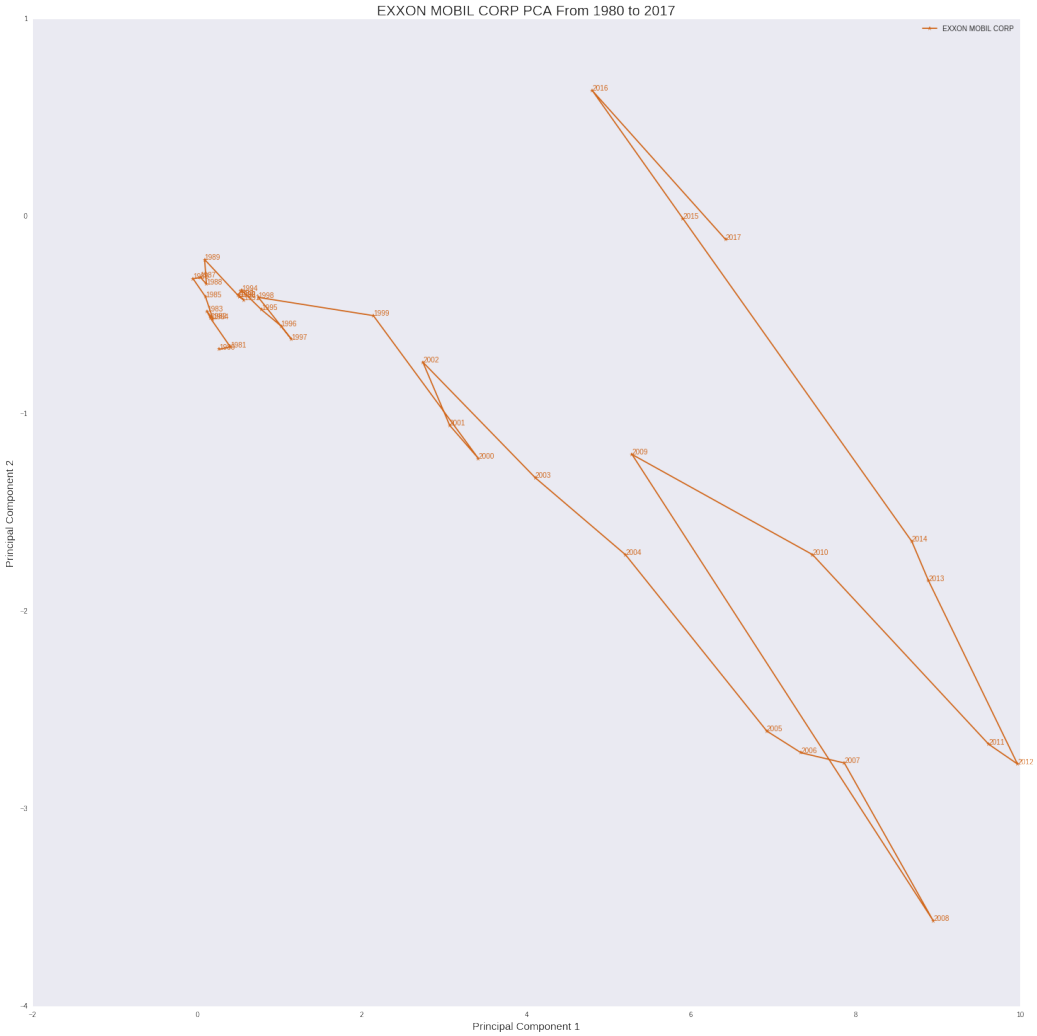
2.2.3 Target Corp



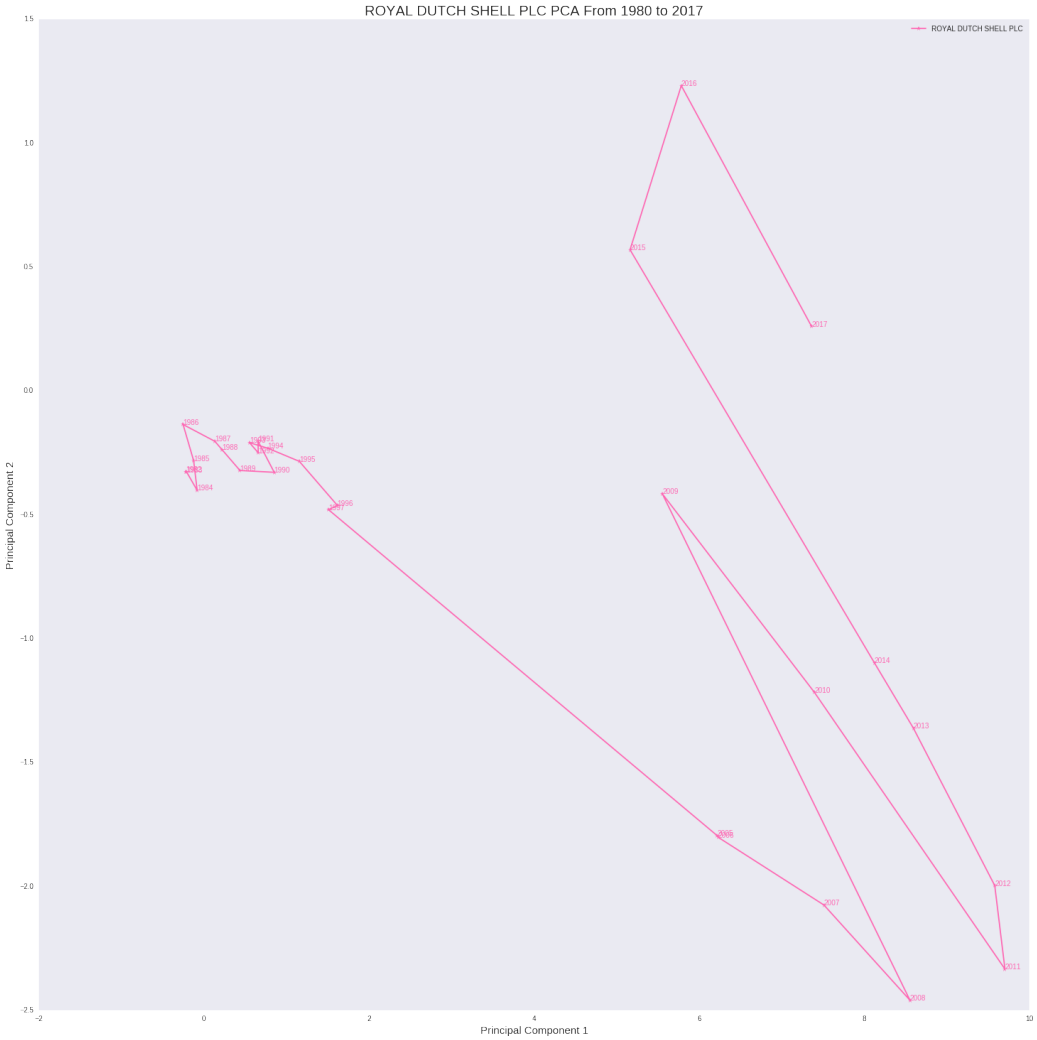
2.3 Oil


Oil PCA From 1980 to 2017
CHEVRON CORP
ROYAL DUTCH SHELL PLC
EXXON MOBIL CORP
Principal Component 2
Principal Component 1

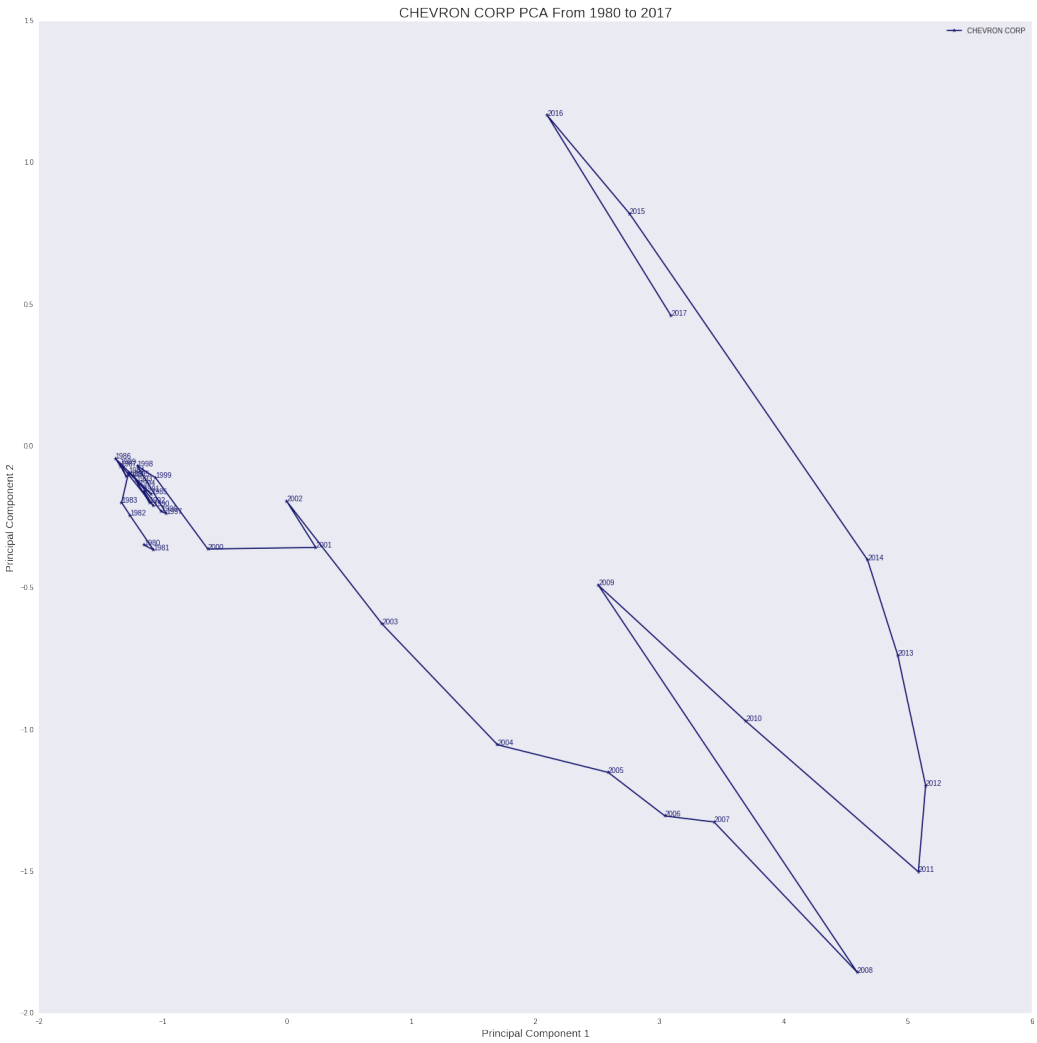
2.3.1 Exxon Mobil Corp



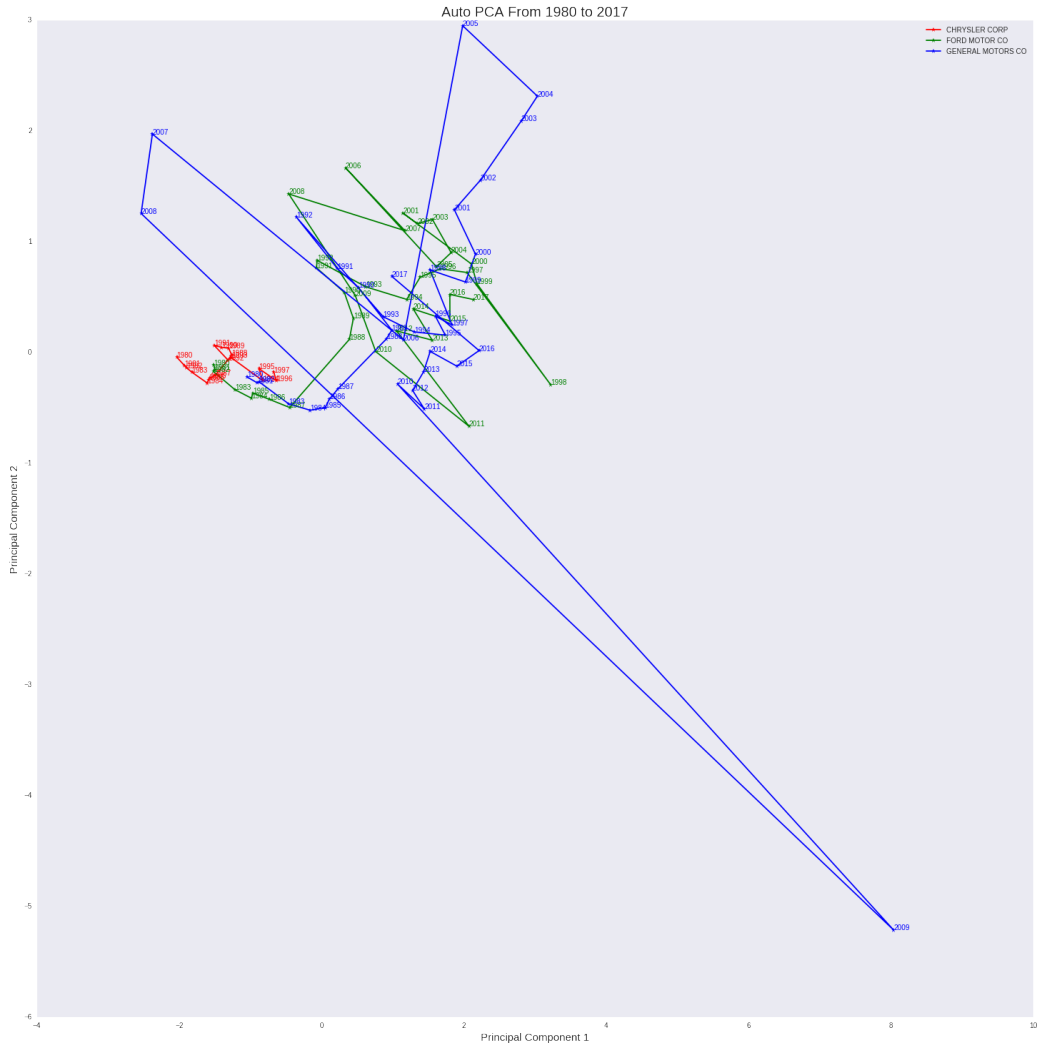
2.3.2 Royal Dutch Shell PLC



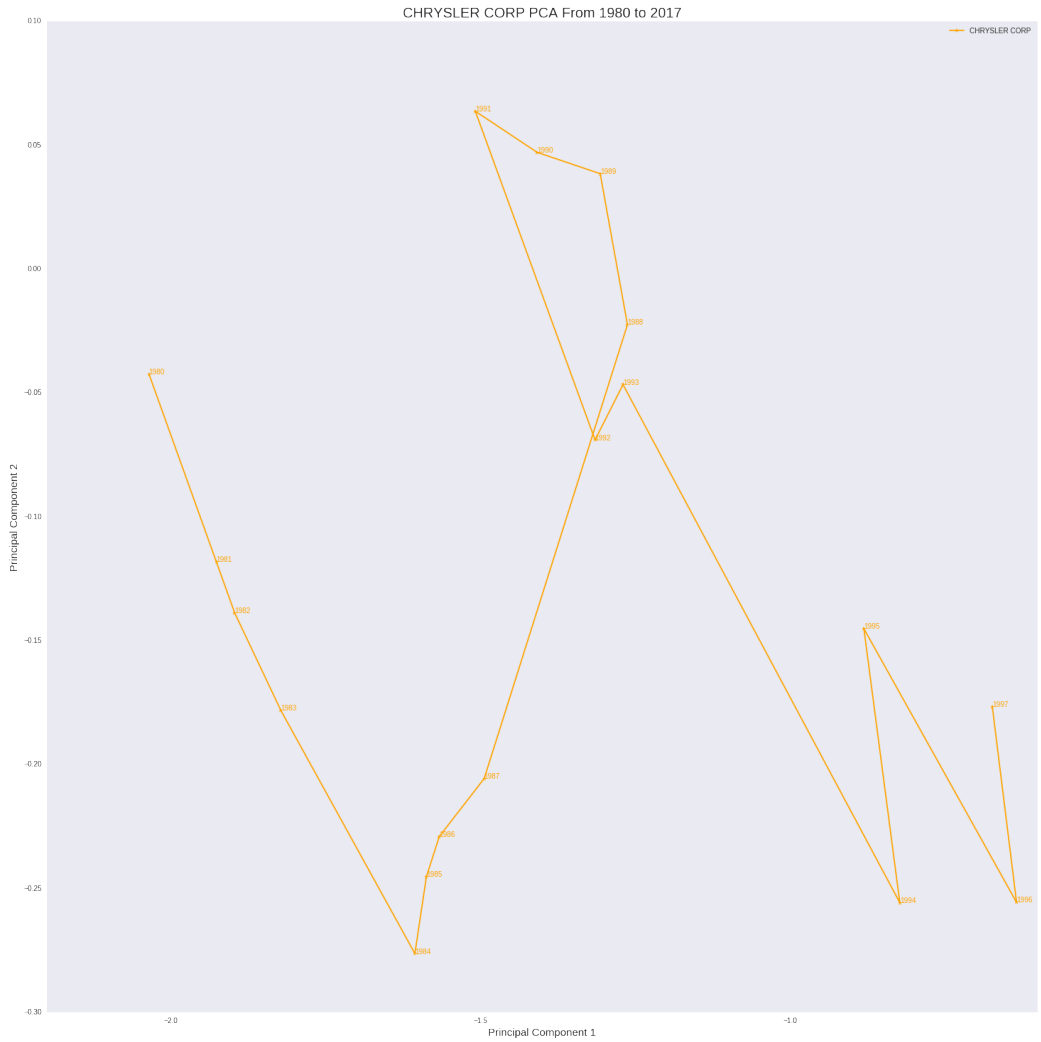
2.3.3 Chevron Corp



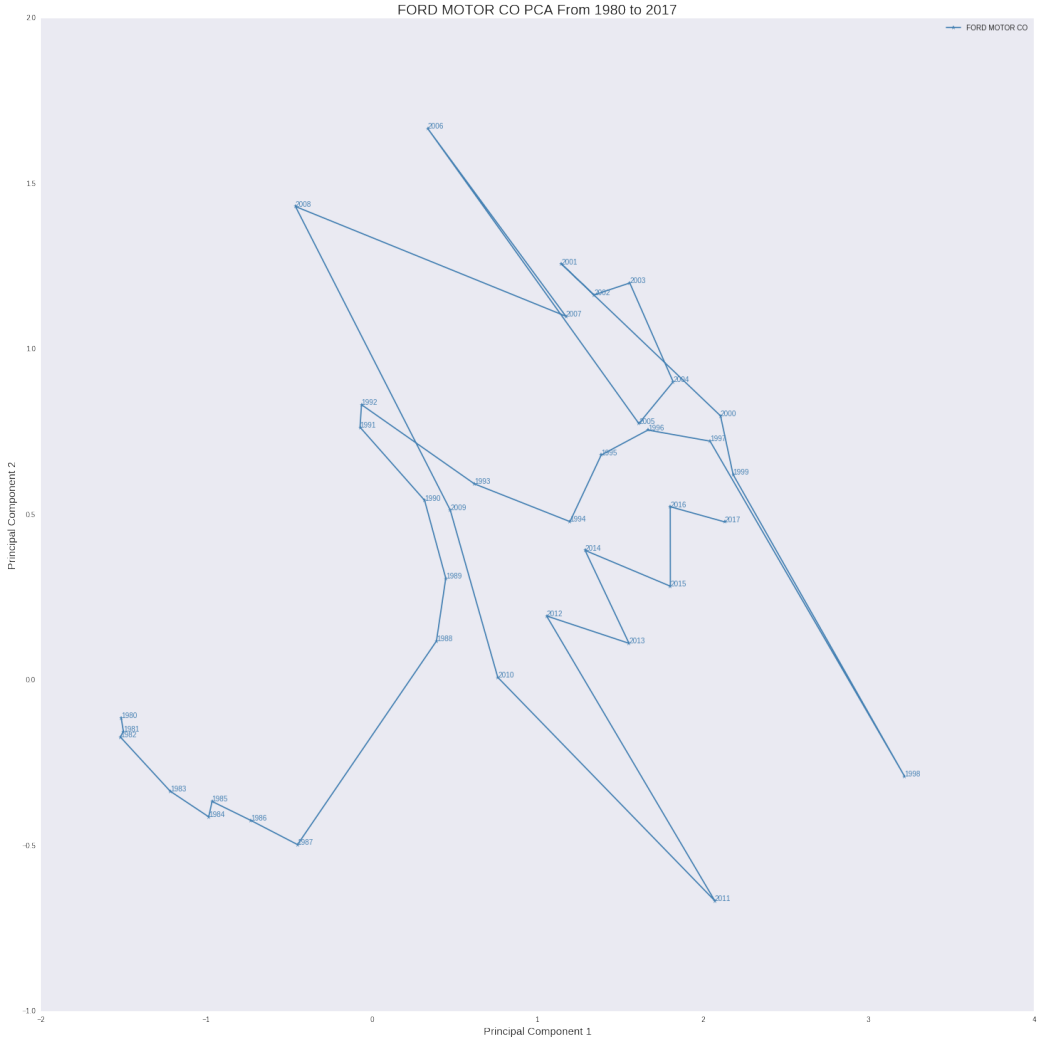
2.4 Automotive



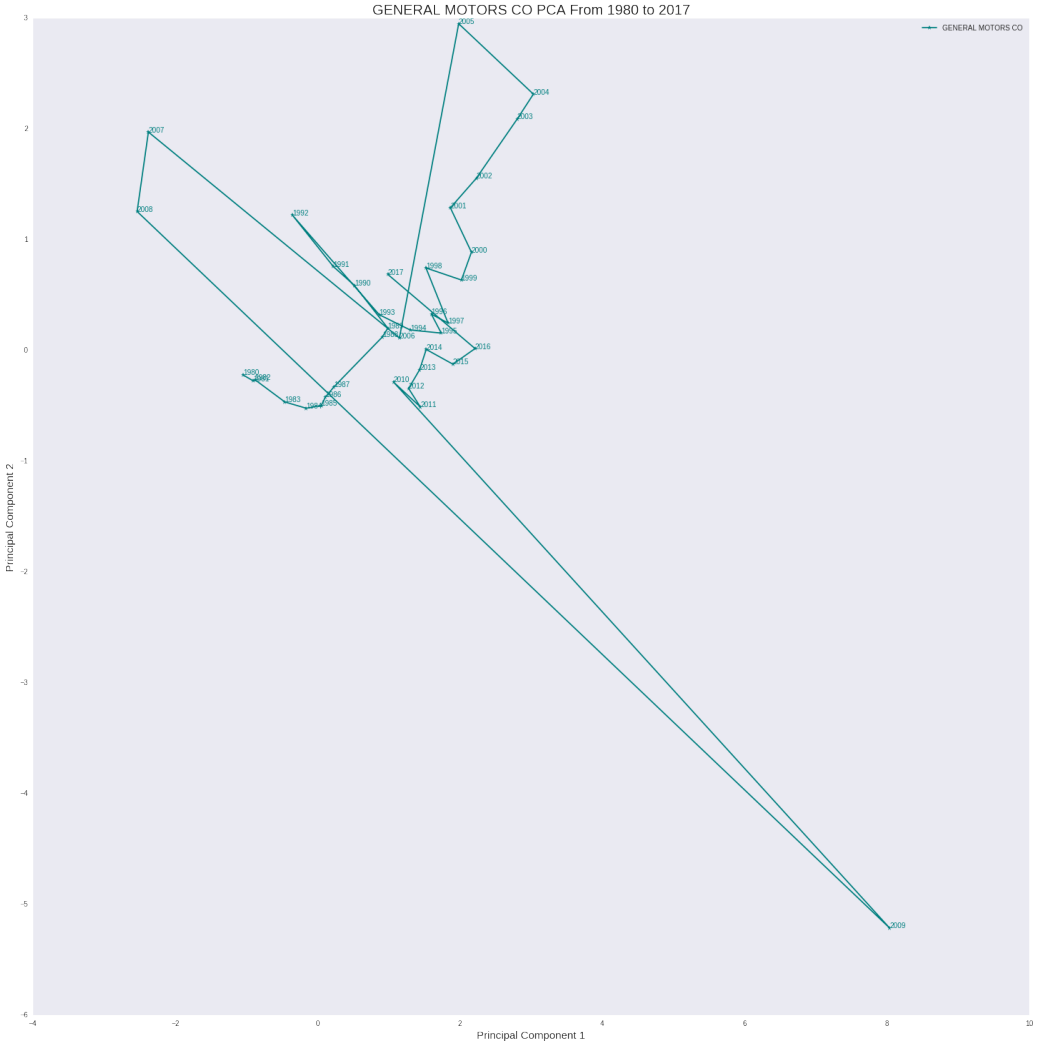
2.4.1 Chrysler Corp



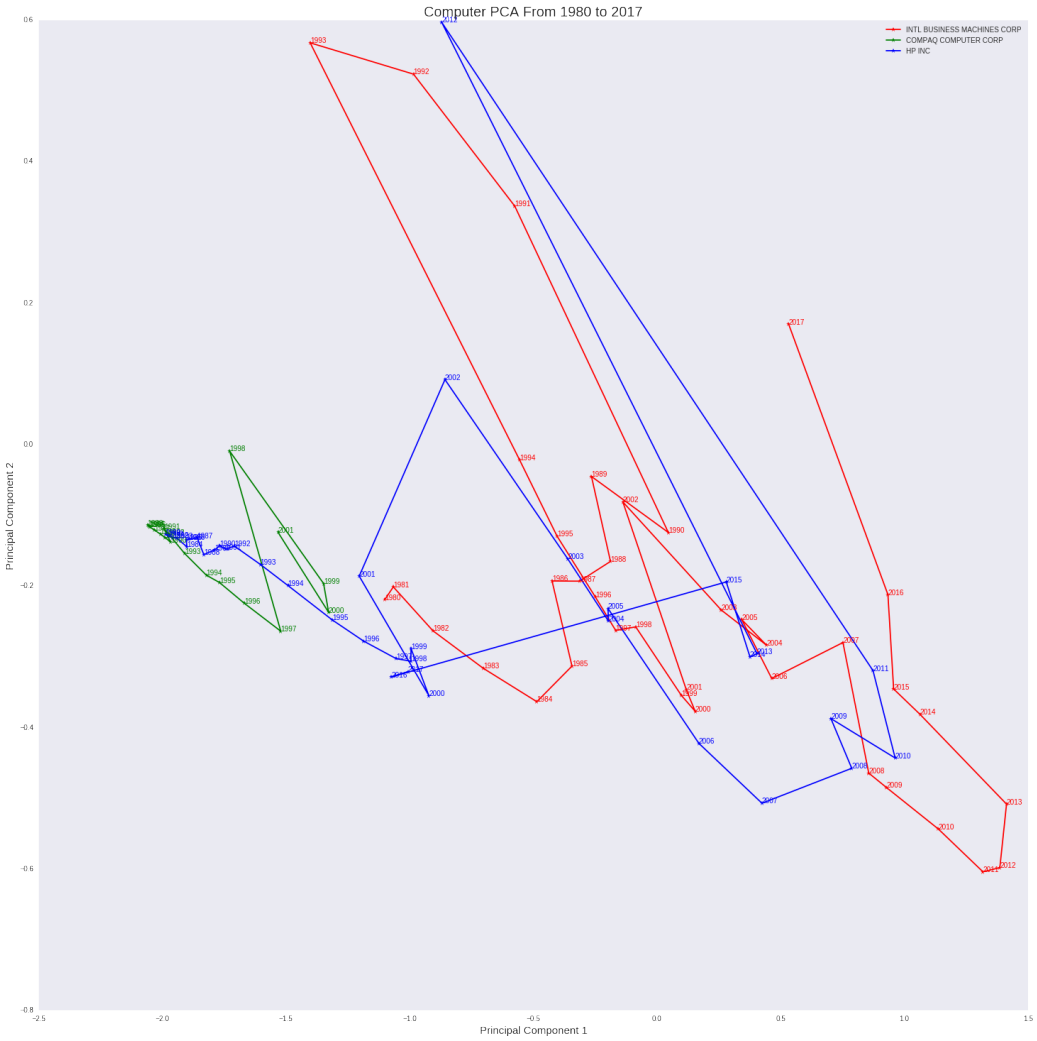
2.4.2 Ford Motor Co



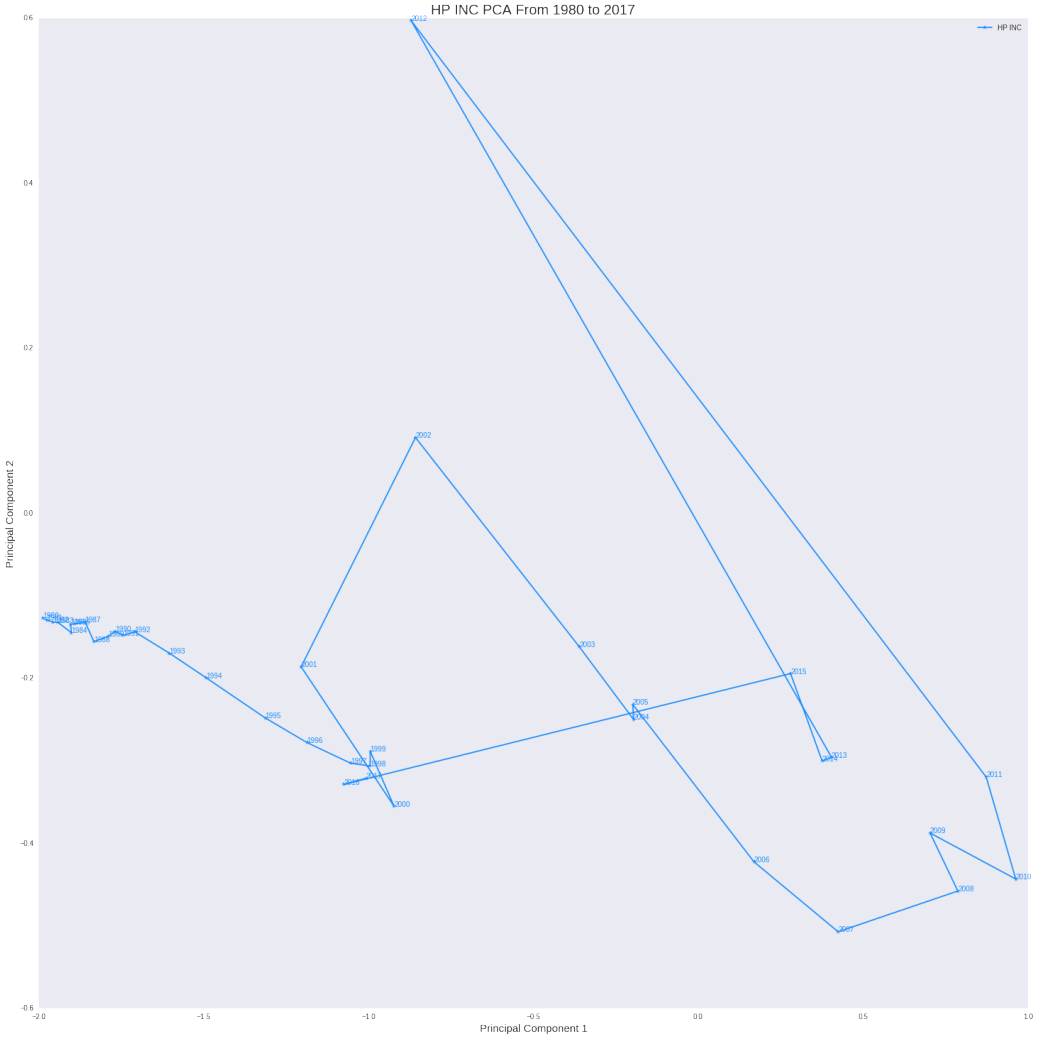
2.4.3 General Motors Co



2.5 Computers



2.5.1 HP Inc


HP INC PCA From 1980 to 2017
HP INC
Principal Component 2
Principal Component 1
0.6
0.4
0.2
0.0
-0.2
-0.4
-0.6
-2.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
2012
2002
2003
2015
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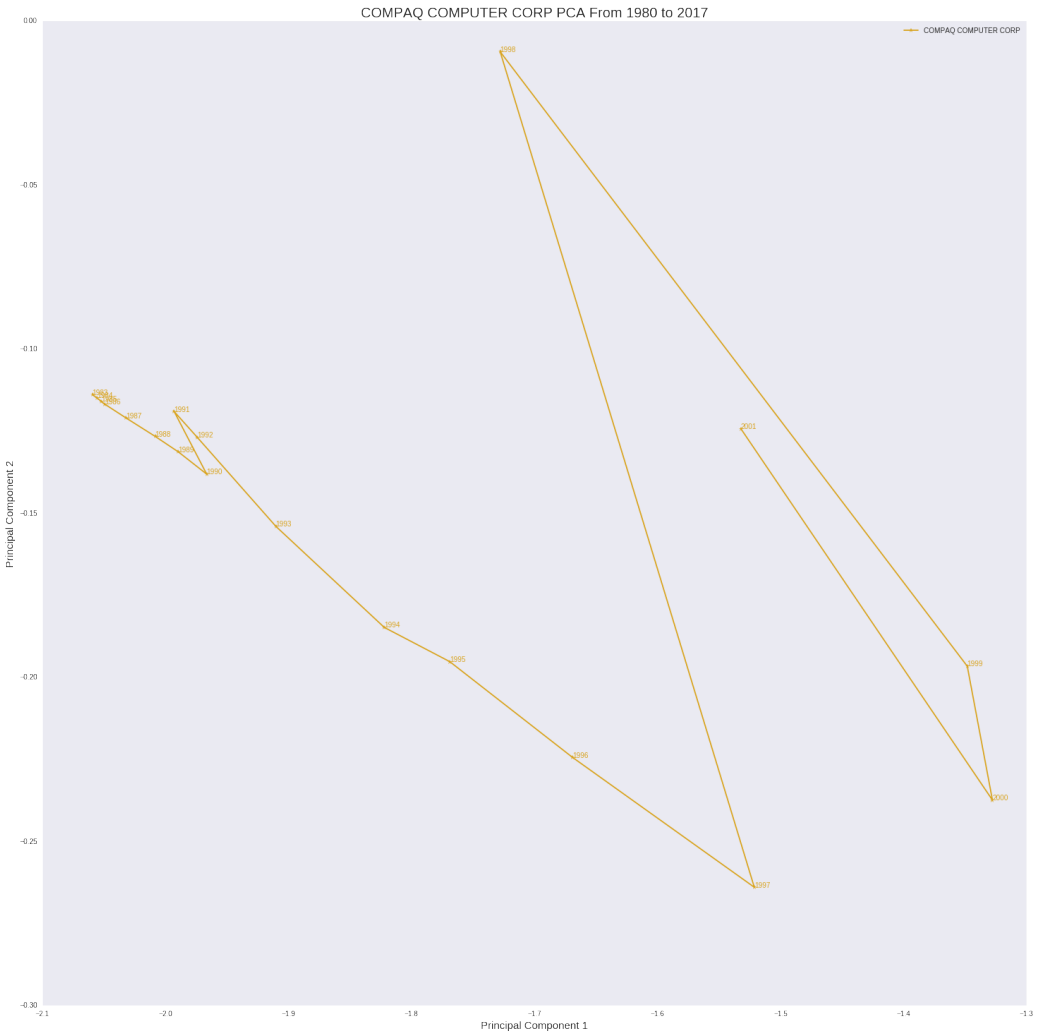
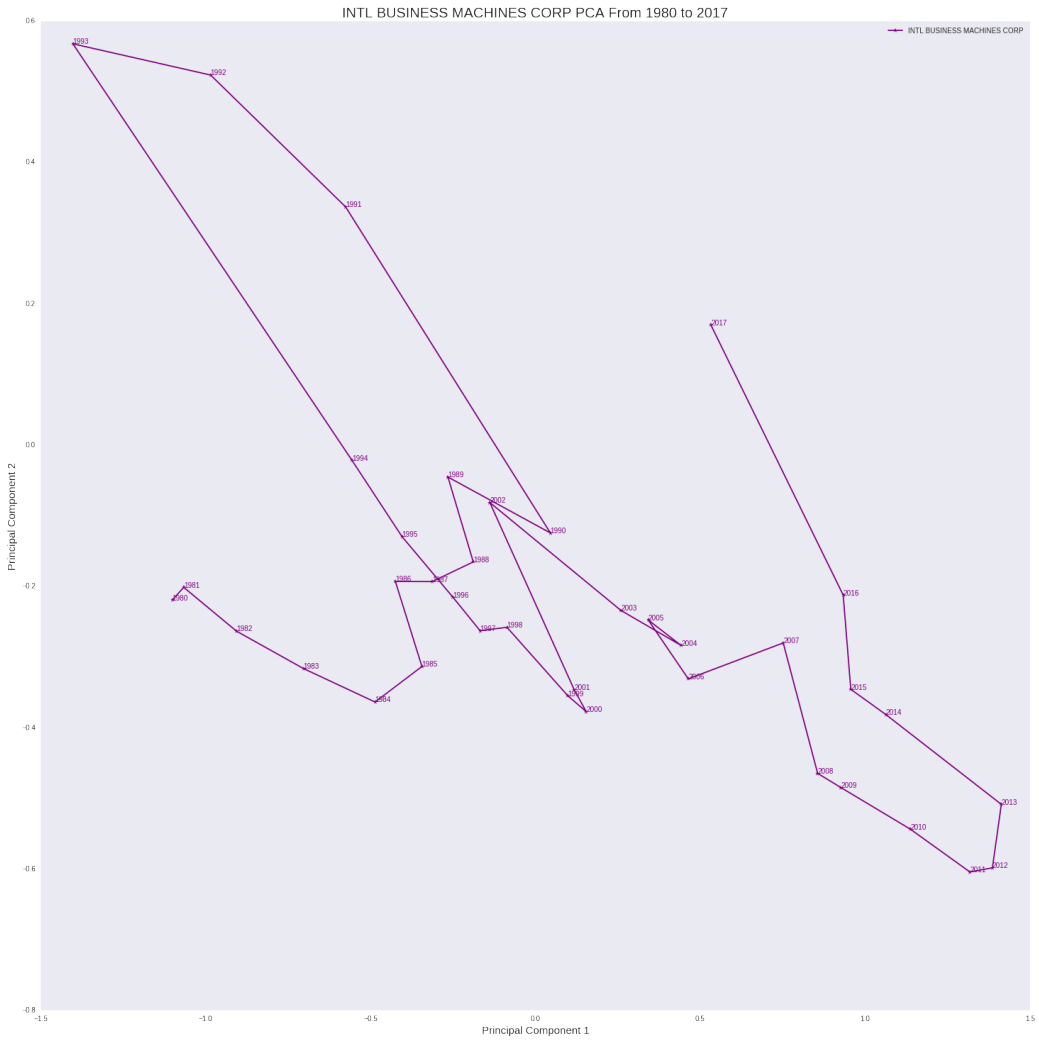
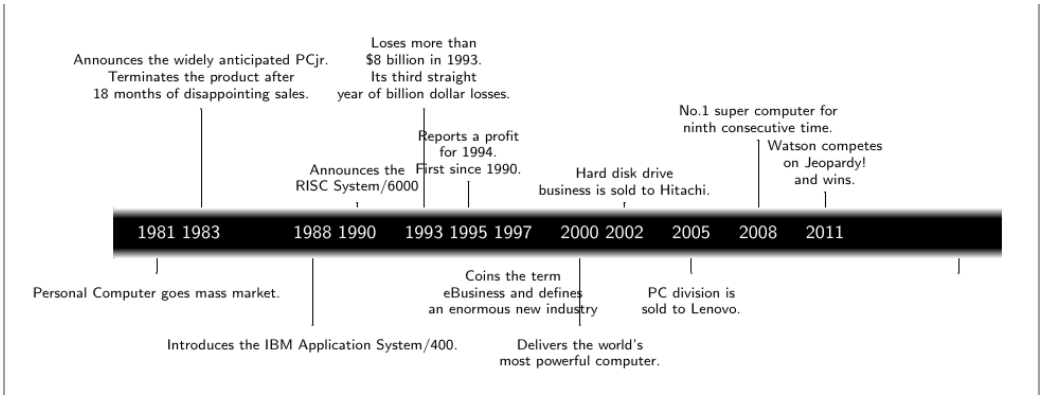
2.5.2 Compaq Inc

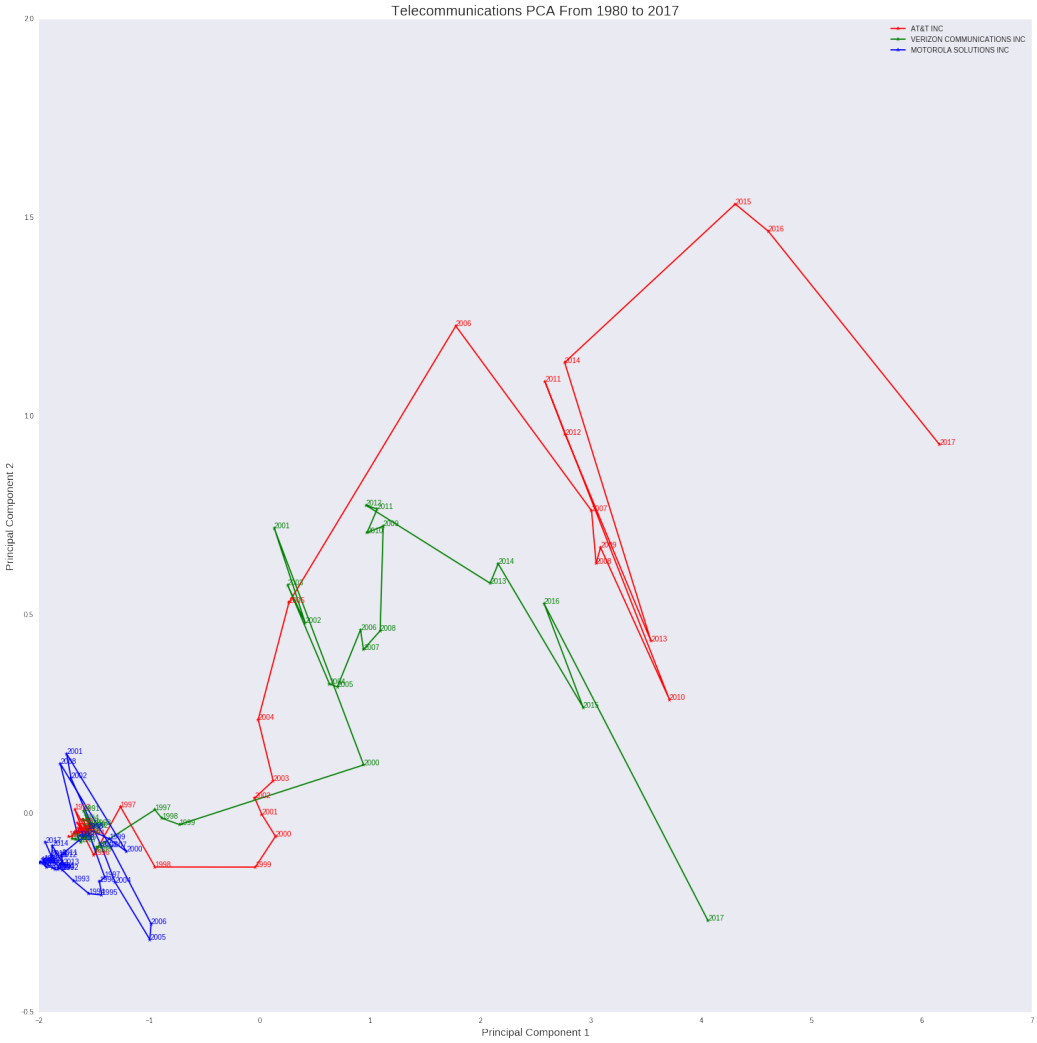


2.5.3 International Business Machines Corp

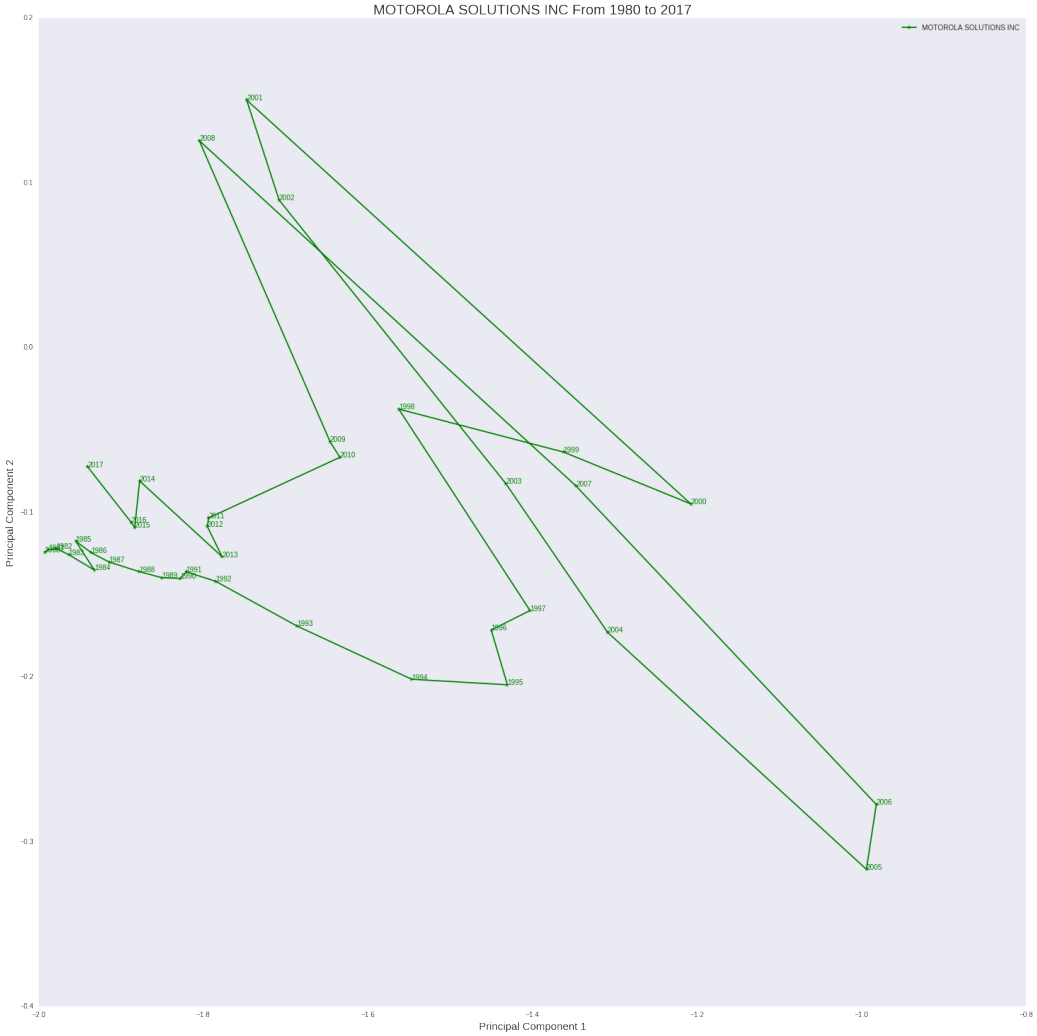




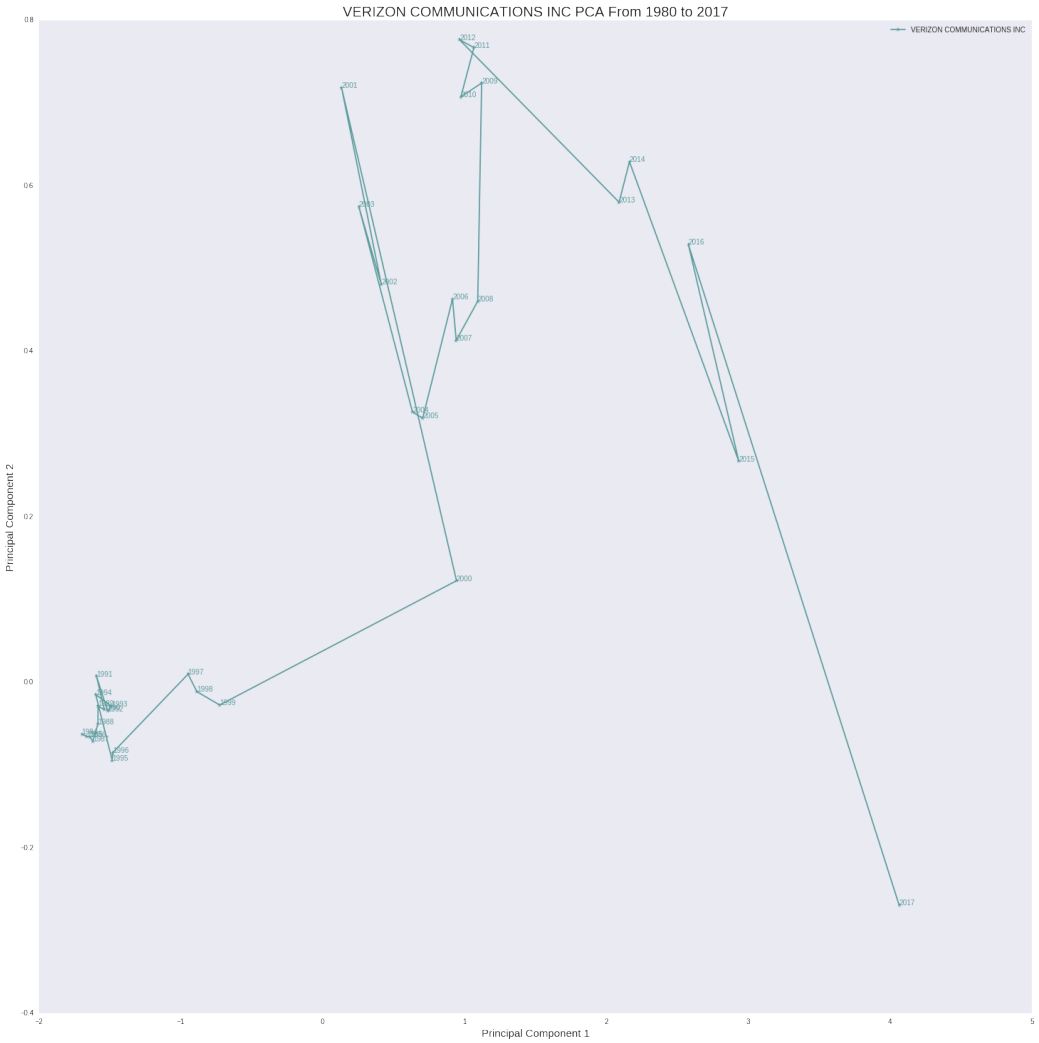
2.6 Telecommunications



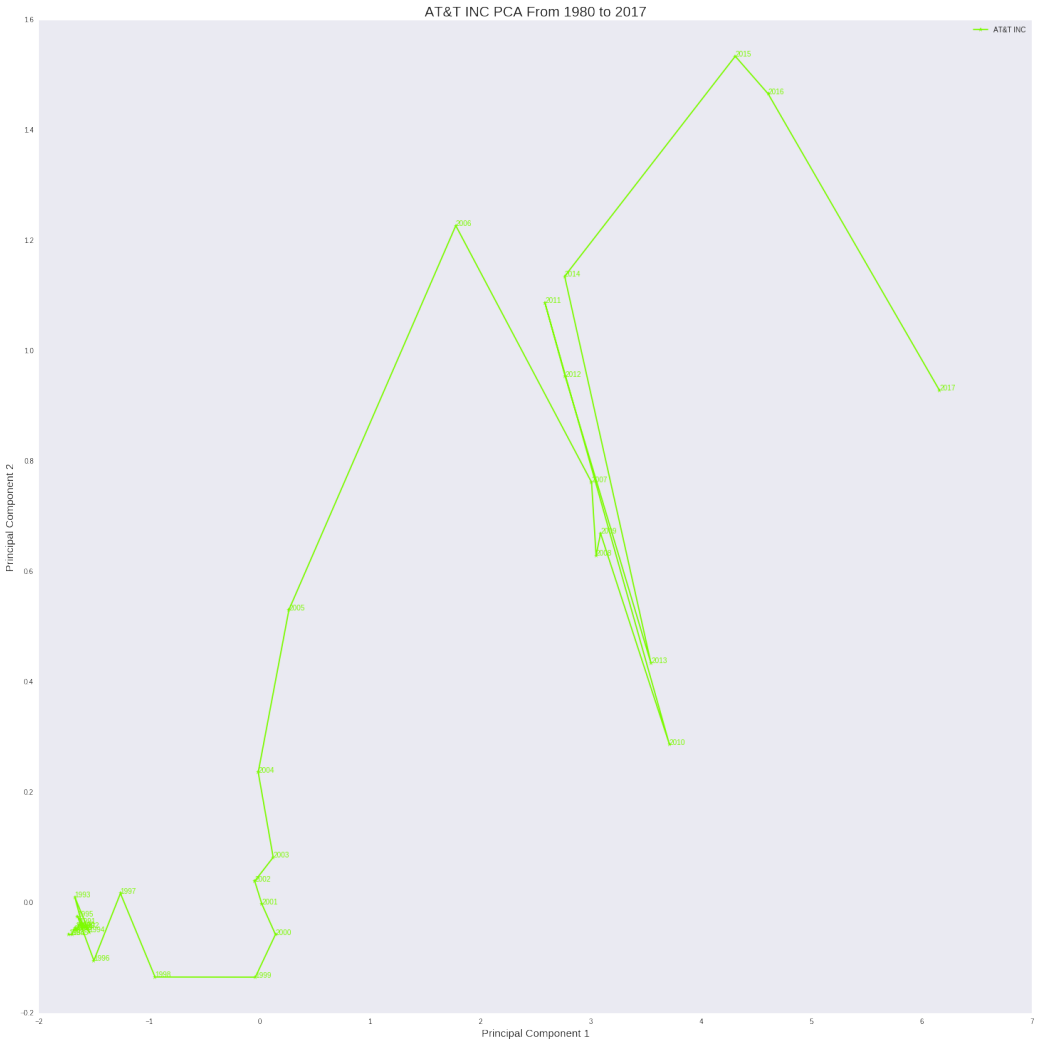
2.6.1 Motorola Solutions Inc



2.6.2 Verizon Communications Inc



2.6.3 AT&T Inc


AT&T INC PCA From 1980 to 2017
AT&T INC
Principal Component 2
Principal Component 1
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
-0.2
-2
-1
0
1
2
3
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2016
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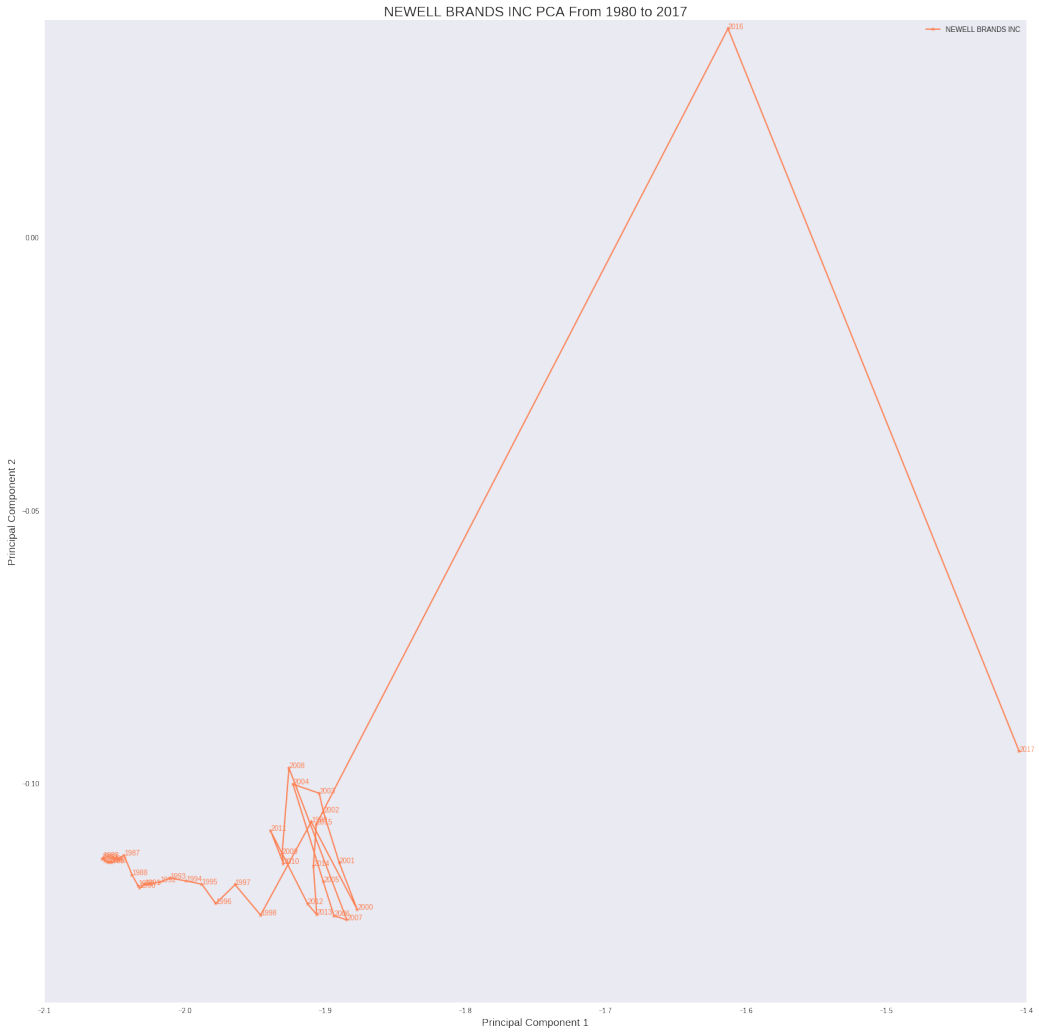
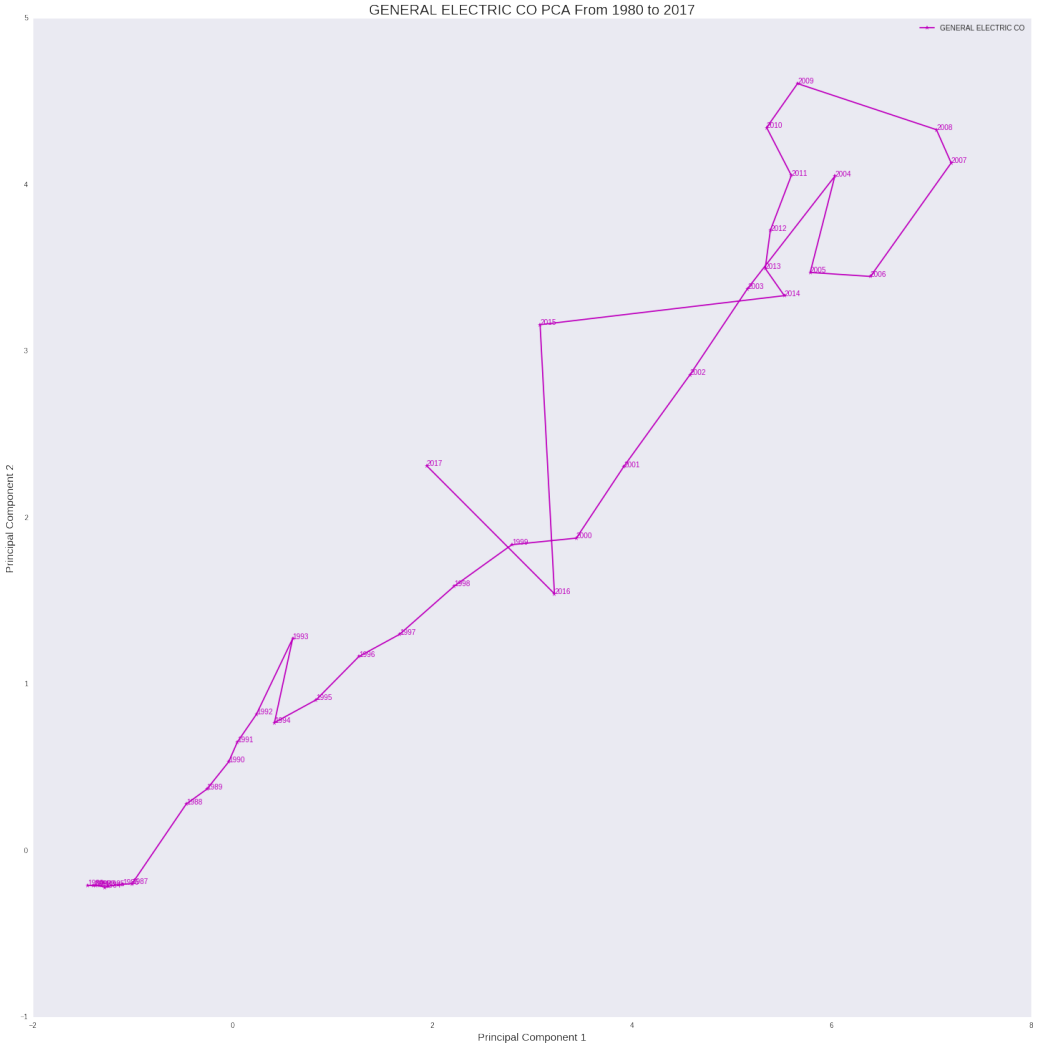
2.7 Conglomerate

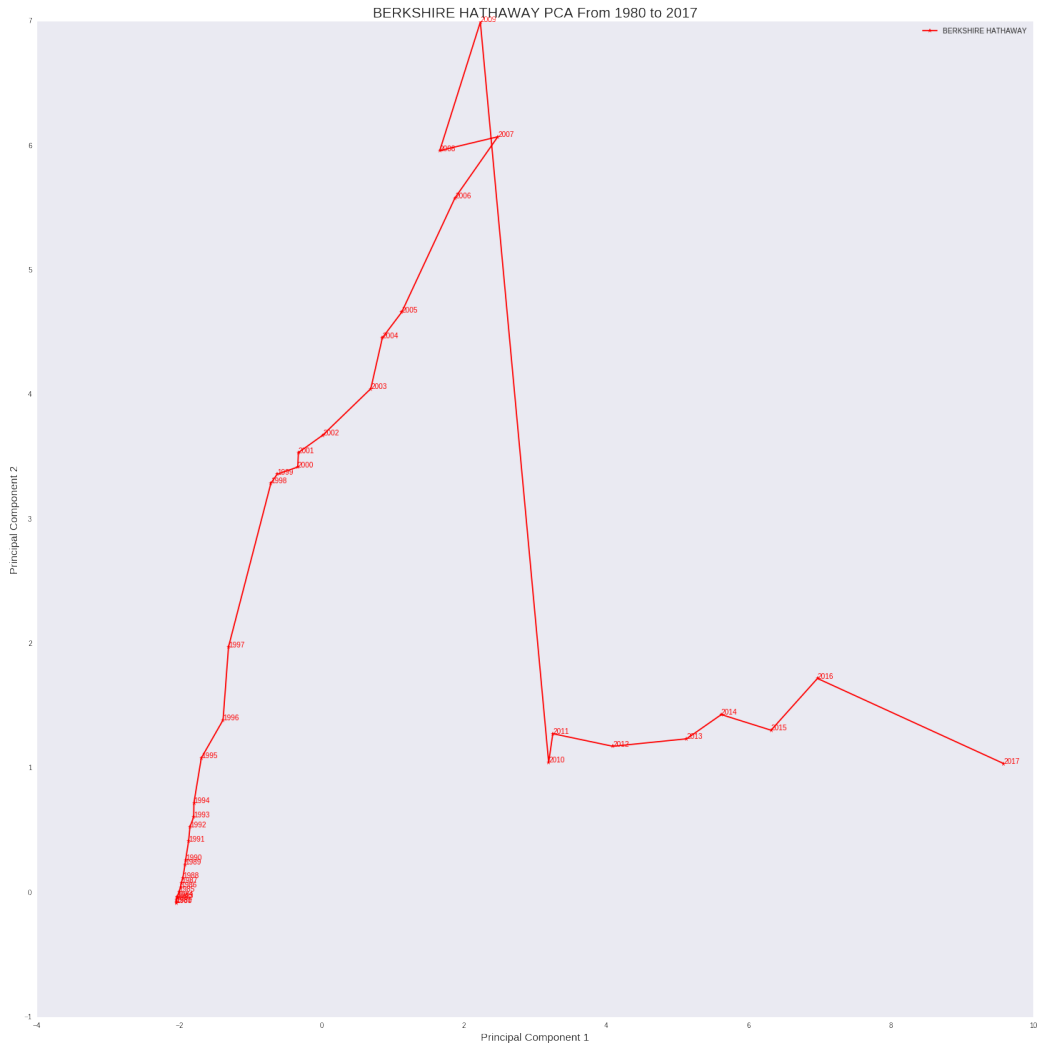
2.7.1 Newell Brands Inc



2.7.2 General Electric Co



2.7.3 Berkshire Hathaway



Chapter 3

Conclusion

From the beginning of this project, the intent has been to understand how plausible it would be to determine if there are predictable market forces acting within a given industry. The continued recurrence of the same highly connected companies implies the market forces that govern these few companies in turn govern their respective industries. Through the PCA reduction of several variables the graphs constructed have given great insight into how these forces can sway even the largest companies over the years. From the housing market affecting the hardware industry, to near identical movements within the oil industry and to delayed tough near mirroring moves in the automotive industry.

These various phenomena within each graph can all be attributed to a major event affect each company. From an acquisition that went well or poorly to an unexpected and expensive recall each change in trajectory has a tangible meaning. These finding give credit to the next phase of this research.

The next goal for this research into industry force is to move from a descriptive model to a predictive one. The scope of the study will eventually be expanded to include more companies to build a predictive model. Ideally the model, given a change in trajectory, will be able to predict what the next points in the graph will be. With enough predictions of companies in a given industry it may be possible to determine in what direction an industry and its respective companies will be moving.

References

[1] ¡Name of the reference here¿, `<urlhere>`

[2] ¡Name of the reference here¿, `<urlhere>`