

Solution Design: Mini Project 4

How Do Markets React to Republicans and Democrats?

Version 1.0

Project Instructions:

1. Create a csv file with a list of all presidents, their parties from 1920 onwards
2. Using Pandas load the .csv file into a Pandas dataframe.
3. Download data from an appropriate financial website such as Google Finance, Yahoo Finance, Quandl, CityFALCON, or another similar source.
4. Calculate yearly returns for both the downloaded indices from 1920 onwards
5. Segregate returns in terms of Presidency - i.e. stock market returns during Democratic and Republican years
6. Calculate measures of central tendency (mean return, median return, variance of returns) for each of the two groups.
7. Represent the findings through suitable comparative graphical studies

Python Libraries Used:

The following libraries are used and can be installed using pip, e.g. "pip install pandas"

pandas 0.22.0 - see <https://pandas.pydata.org/pandas-docs/stable/> for more information.

Urllib3 1.22 - see <https://urllib3.readthedocs.io/en/latest/> for more information.

fix_yahoo_finance - see <https://pypi.org/project/fix-yahoo-finance/#description>

BeautifulSoup from bs4 - see <https://www.crummy.com/software/BeautifulSoup/bs4/doc/>

Code Classes and Methods:

I created a Market object(class) that implements the following methods. The `__init__()` method is the class constructor where all the necessary variable were declared and intialized either as an empty string or empty list and or empty pandas DataFrame.

1, `get_dow_data(self)`

This method retrieve the DJIA index from yahoo finance using the `fix_yahoo_finance` library with `yf.pdr_override()`. The download index time series is returned as a pandas DataFrame

2, `get_snp500_data(self)`

This method retrieve the S&P 500 index from yahoo finance using the `fix_yahoo_finance` library with `yf.pdr_override()`. The download index time series is returned as a pandas DataFrame

3, `calc_daily_returns(self, pandas.DataFrame dataset)`

This method reads the Adj Close column of the pandas DataFrame to calculate daily returns over the period of time the downloaded data spread through. The calculated daily return is then returned as a list.

4, `get_years(self, pandas.DataFrame dataset)`

In other to be able to map returns to presidency the year of the traded was decided and this method reads in the downloaded DataFrame after resetting the index using pandas DataFrame `reset_index()` method to make the Date column of the DataFrame available to be accessed as a column also assigning a sequential column with a zero base index as the DataFrame frame index. This method also returns a list.

5, `do_yearly_returns(self, pandas.DataFrame dataset)`

This method receives the pandas DataFrame with the daily returns and year columns now added to it to calculates yearly returns that is returned as a list

6, `get_party(self, pandas.DataFrame dataset, string lookup)`

The method take as input DataFrame made from csv by reading the presidents csv file with pandas and a string lookup the name of a political party to returns a list of dictionary containing the party name and the year for which the party was in power.

7, `split_returns_by_presidency(self, pandas.DataFrame rets, pandas.DataFrame presidency)`

The method takes two pandas DataFrame as input, the list of yearly returns loaded into pandas DataFrame and the dictionary of presidency also loaded into pandas DataFrame, the presidency DataFrame is that of a political party at a time and the method returns the dictionary of yearly returns for the presidency of the political party queried for.

Solution Steps

Step 1:

I wrote a utility python script to scrap the list of presidents, their period of presidency and their political party from wikipedia page http://en.wikipedia.org/wiki/List_of_Presidents_of_the_United_States using the following library urllib3, bs4 from where the BeautifulSoup module was imported and used and pandas which enabled me to load the list of dictionary I generated into a pandas DataFrame from where I wrote it into excel using `pandas.DataFrame.to_excel()` function and converted the excel file into a csv file after removing some data and columns not needed.

Step 2:

I then loaded the csv into pandas DataFrame using the `pandas.read_csv()` method

Step 3:

I then headed on to yahoo finance to download the DOW JONES INDUSTRIAL AVERAGE index and the S&P 500 index using `fix_yahoo_finance` from within my code specifying `startdate` as 1920 and end date as today.

Step 4:

Using the `do_yearly_returns()` method I wrote then calculated the yearly returns. Before this I had to calculate daily returns using `calc_daily_returns()` method

Step 5:

I then segregated the yearly returns by presidency of the two main political party under consideration using the `split_returns_by_presidency()` method. I had to prepare the various input that this method will use to accomplish the purpose of the segregation process this is where the `get_party()` and `get_year()` methods comes in handy.

Step 6:

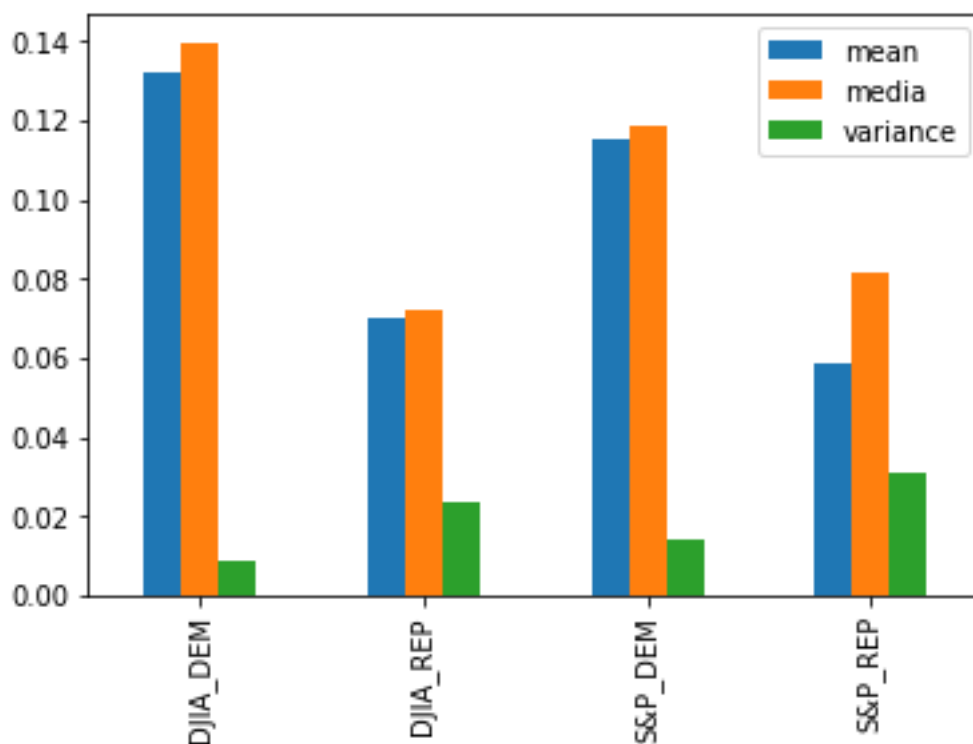
Now I have the datasets I need to calculate the measures of central tendency viz-a-viz mean return, median return, variance of returns for each of the two groups i.e. presidency by political party. I used the built-in method of the pandas DataFrame to find the measures. `pandas.DataFrame.mean()` from **mean**, `pandas.DataFrame.median()` for **median** and `pandas.DataFrame.var()` for variance.

Step 7:

I decided to use barchart for easy comparism of the measures of central tendencies calculated. So I made up a pandas DataFrame from them here is the DataFrame:

```
Variance: 0.03081363017671629
      mean  media  variance
DJIA_DEM  0.132094  0.139812  0.008909
DJIA_REP   0.070095  0.071948  0.023531
S&P_DEM   0.115611  0.118406  0.013918
S&P_REP   0.058862  0.081627  0.030814
```

calling the `pandas.DataFrame.plot.bar()` function on the DataFrame displayed above gives the bar-chart below:



Using DEM - Democrats and REP - Republicans it could be observed from the bar-chart that yearly returns are higher during Democrats presidency than during Republicans presidency. The variance of the population during Republicans presidency is also higher than that of Democrats showing that during the presidency of Republicans the market is more volatile than that of the Democrats. The same showed pattern is noticed for both indexes under consideration and thus can be generalized to be the entire market reaction for both Republicans and Democrats

Tables:

```
Dow Jones During Democratics
=====
      returns  year
0    0.129935  1993
1    0.026449  1994
2    0.291429  1995
3    0.226749  1996
4    0.222698  1997
5    0.161815  1998
6    0.237701  1999
7   -0.030042  2000
8    0.172250  2009
9    0.102646  2010
10   0.067858  2011
11   0.062219  2012
12   0.216784  2013
13   0.086577  2014
14  -0.011247  2015
15   0.149689  2016
=====

Mean:    0.13209429159974323

Median:   0.13981197679800306

Variance: 0.008908996310214854
```

```
S&P 500 During Democratics
=====
      returns  year
0    0.215093  1950
1    0.140543  1951
2    0.113206  1952
3    0.222499  1961
4   -0.103703  1962
5    0.183266  1963
6    0.117900  1964
7    0.095296  1965
8   -0.130632  1966
9    0.186028  1967
10   0.081481  1968
11  -0.113774  1977
12   0.031907  1978
13   0.115544  1979
14   0.263174  1980
15   0.072641  1993
16  -0.008515  1994
17   0.297047  1995
18   0.183772  1996
19   0.291764  1997
20   0.252341  1998
21   0.195589  1999
22  -0.072741  2000
23   0.216227  2009
24   0.120520  2010
25   0.015751  2011
26   0.118406  2012
27   0.240127  2013
28   0.123207  2014
29   0.005018  2015
30   0.114950  2016
=====

Mean:  0.11561061921147454

Median:  0.11840559700141137

Variance:  0.013917932637644894
```

```
Dow Jones During Republicans
=====
      returns  year
0    0.183954  1985
1    0.221284  1986
2    0.069757  1987
3    0.089159  1988
4    0.260001  1989
5   -0.051724  1990
6    0.204495  1991
7    0.045126  1992
8   -0.038074  2001
9   -0.156254  2002
10   0.207618  2003
11   0.041069  2004
12   0.004165  2005
13   0.143652  2006
14   0.071948  2007
15  -0.324608  2008
16   0.220037  2017
=====

Mean:    0.07009452191250096

Median:   0.07194819496171954

Variance: 0.023531227203181248
```



```
S&P 500 During Republicans
=====
      returns   year
0    -0.062838   1953
1     0.370754   1954
2     0.224837   1955
3     0.040523   1956
4    -0.135963   1957
5     0.318236   1958
6     0.081627   1959
7    -0.025130   1960
8    -0.116268   1969
9     0.002261   1970
10    0.118513   1971
11    0.152552   1972
12   -0.187099   1973
13   -0.330016   1974
14    0.261880   1975
15    0.173549   1976
16   -0.097568   1981
17    0.152750   1982
18    0.184588   1983
19    0.027396   1984
20    0.250175   1985
21    0.155343   1986
22    0.057410   1987
23    0.095762   1988
24    0.258345   1989
25   -0.072896   1990
26    0.255268   1991
27    0.047975   1992
28   -0.088908   2001
29   -0.238119   2002
30    0.215521   2003
31    0.095356   2004
32    0.042956   2005
33    0.116267   2006
34    0.048602   2007
35   -0.387021   2008
36    0.171271   2017
=====

Mean:    0.058861903820286984
Median:  0.0816269083472667
```