Bank Financial Project for stock prices Data Analysis and Vizualization

1. In this Project we mainly focus on exploratory data analysis of stock prices.

2. This project is basically made for to use of the libraries like Numpy, Pandas, matplotlib, seaborn,plotly and cufflinks.

3. The data is based on Bank Stocks and see it progressed throughout the financial crisis all the way early to 2016.

In [ ]:
```
# import the needed Libraries
```

In [1]:
```
from pandas_datareader import data, wb
import numpy as np
import pandas as pd
import datetime
import seaborn as sns
%matplotlib inline
```

Dataset

We need to get data using datareader. we will get the stock information for the following banks:

Bank of America

City Group

Goldman Sachs

JPMorgan Chase

Morgan Stanley

Wells Fargo

We need to figure out how to get the stock data from Jan 1st 2006 to Jan 1st 2016 for each of this banks.

So, First we need to set each bank to the seprate dataframe, with the variable name for that bank being its ticker symbol. This will involve a few steps:

1. Use datetime to start and end datetime objects.

2. Figure out the ticker symbol for each bank.

3. Figure out how to use datareader to grab info on the stock.

In [2]:
```
df = pd.read_pickle('all_banks')
```

In [3]:
```
df
```

Out[3]:

Bank Ticker	BAC					C				
Stock Info	Open	High	Low	Close	Volume	Open	High	Low	Close	Vo
Date										
2006-01-03	46.92	47.18	46.15	47.08	16296700	490.00	493.80	481.10	492.90	15
2006-01-04	47.00	47.24	46.45	46.58	17757900	488.60	491.00	483.50	483.80	18
2006-01-05	46.58	46.83	46.32	46.64	14970900	484.40	487.80	484.00	486.20	11
2006-01-06	46.80	46.91	46.35	46.57	12599800	488.80	489.00	482.00	486.20	13
2006-01-09	46.72	46.97	46.36	46.60	15620000	486.00	487.40	483.00	483.90	16
2006-01-10	46.40	46.51	45.88	46.21	15634800	483.00	485.50	480.80	485.40	13
2006-01-11	46.06	46.25	45.75	46.10	14745100	495.80	495.80	485.80	489.80	16
2006-01-12	46.22	46.23	45.71	45.80	10546600	491.00	491.00	488.80	490.30	12
2006-01-13	45.83	46.00	45.68	45.80	10791300	491.00	491.90	487.30	489.20	94
2006-01-17	45.40	45.58	45.00	45.31	14606100	485.10	487.00	482.70	484.30	12
2006-01-18	45.32	45.65	44.92	45.18	10911300	484.30	486.70	481.10	483.80	12
2006-01-19	45.88	45.88	44.85	45.14	14584000	485.60	485.80	477.00	479.40	16
2006-01-20	45.00	45.15	44.17	44.19	25164400	472.10	474.00	456.30	456.90	47
2006-01-23	43.50	44.39	43.49	43.96	23459900	460.00	463.80	457.00	460.00	20
2006-01-24	44.08	44.68	44.04	44.24	13500300	462.90	463.60	459.90	460.10	20
2006-01-25	44.15	44.65	44.15	44.63	15132000	461.40	463.70	460.10	462.30	15
2006-01-26	45.00	45.16	44.67	44.90	18449500	465.50	475.50	464.50	470.10	19

Bank Ticker	BAC					C				
Stock Info	Open	High	Low	Close	Volume	Open	High	Low	Close	Vo
Date										
2006-01-27	44.90	45.11	44.61	44.80	12250800	470.10	473.70	466.00	468.70	14
2006-01-30	44.75	45.35	44.25	44.48	14816000	468.70	469.90	466.60	468.20	10
2006-01-31	44.65	44.73	44.12	44.23	19151000	468.30	470.50	465.50	465.80	18
2006-02-01	44.10	44.24	43.86	43.95	15854800	465.90	467.20	461.10	463.30	18
2006-02-02	43.95	43.97	43.37	43.44	14745300	459.00	461.00	451.00	451.80	23
2006-02-03	43.30	43.55	42.75	43.09	17097100	450.70	456.10	448.10	450.60	16
2006-02-06	43.40	43.65	43.24	43.37	12554600	452.60	456.10	450.90	451.70	11
2006-02-07	43.60	43.87	43.46	43.49	13917200	452.00	453.80	450.00	450.50	12
2006-02-08	43.55	43.72	43.34	43.67	12564600	453.30	455.30	450.70	453.60	10
2006-02-09	43.75	44.05	43.70	43.83	13766200	455.00	461.00	454.30	457.90	13
2006-02-10	43.77	44.02	43.41	43.92	9039000	457.00	460.70	452.50	459.60	12
2006-02-13	43.70	43.96	43.30	43.70	8329500	460.60	462.30	454.10	456.80	11
2006-02-14	43.92	44.49	43.73	44.16	17049500	457.80	462.50	457.10	461.20	15
...	...	...	...	...	...	...	...	...	...	...
2015-11-18	17.43	17.87	17.43	17.84	84683912	53.85	55.02	53.76	54.98	18
2015-11-19	17.78	17.85	17.62	17.69	51517056	54.88	55.30	54.74	55.06	11
2015-11-20	17.81	17.83	17.59	17.65	56108450	55.37	55.37	54.55	54.75	14

Bank Ticker	BAC					C				
Stock Info	Open	High	Low	Close	Volume	Open	High	Low	Close	Vo
Date										
2015-11-23	17.62	17.73	17.46	17.47	50317909	54.67	54.84	54.15	54.28	14
2015-11-24	17.26	17.57	17.25	17.47	57915299	53.81	54.51	53.71	54.18	12
2015-11-25	17.51	17.57	17.41	17.44	34939034	54.29	54.33	53.76	54.08	98
2015-11-27	17.46	17.50	17.33	17.48	22935528	54.06	54.37	53.72	54.21	54
2015-11-30	17.48	17.58	17.42	17.43	59755532	54.34	54.46	53.97	54.09	13
2015-12-01	17.52	17.81	17.48	17.81	74130038	54.40	54.91	54.25	54.88	11
2015-12-02	17.88	17.89	17.55	17.62	76675759	54.99	55.02	54.03	54.14	15
2015-12-03	17.68	17.76	17.25	17.30	95810096	54.42	54.60	53.35	53.51	19
2015-12-04	17.44	17.83	17.38	17.80	103021728	53.66	55.33	53.52	55.09	21
2015-12-07	17.79	17.80	17.44	17.54	81633309	54.77	54.88	53.91	54.40	15
2015-12-08	17.39	17.46	17.13	17.19	84873480	53.84	54.01	53.18	53.39	14
2015-12-09	17.11	17.38	16.87	17.10	82418050	53.05	53.81	52.31	52.81	19
2015-12-10	17.15	17.41	16.96	17.20	68395011	52.89	53.24	52.17	52.65	16
2015-12-11	16.97	17.06	16.64	16.73	91503850	51.94	52.21	50.67	51.11	24
2015-12-14	16.76	16.89	16.50	16.80	120589534	51.14	51.73	50.50	51.10	21
2015-12-15	17.02	17.49	16.99	17.42	99737154	51.85	52.80	51.85	52.52	21
2015-12-16	17.65	17.78	17.23	17.75	171576652	53.04	54.01	52.30	53.90	26

Bank Ticker	BAC					C				
Stock Info	Open	High	Low	Close	Volume	Open	High	Low	Close	Vo
Date										
2015-12-17	17.80	17.83	17.30	17.30	97265726	54.01	54.20	52.71	52.84	17
2015-12-18	17.19	17.26	16.76	16.76	136737824	52.46	52.68	51.16	51.21	25
2015-12-21	16.98	17.03	16.77	16.97	65150270	51.71	51.91	51.08	51.79	16
2015-12-22	17.05	17.11	16.85	17.08	56173502	51.99	52.13	51.39	52.01	13
2015-12-23	17.16	17.34	17.10	17.34	65770672	52.30	52.64	52.08	52.63	14
2015-12-24	17.32	17.38	17.22	17.27	29373415	52.48	52.97	52.45	52.71	46
2015-12-28	17.22	17.23	16.98	17.13	41777497	52.57	52.57	51.96	52.38	87
2015-12-29	17.25	17.35	17.16	17.28	45670376	52.76	53.22	52.74	52.98	10
2015-12-30	17.20	17.24	17.04	17.05	35066378	52.84	52.94	52.25	52.30	87
2015-12-31	17.01	17.07	16.83	16.83	47152968	52.07	52.39	51.75	51.75	11

2517 rows × 30 columns

In [4]:
```
start = datetime.datetime(2006,1,1)
end = datetime.datetime(2016,1,1)
```

In [5]:
```
# Bank of America

BAC = data.DataReader("BAC", 'yahoo', start, end)
```

In [6]:
```
BAC
```

Out[6]:

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-03	47.180000	46.150002	46.919998	47.080002	16296700.0	34.596096
2006-01-04	47.240002	46.450001	47.000000	46.580002	17757900.0	34.228691
2006-01-05	46.830002	46.320000	46.580002	46.639999	14970700.0	34.272778
2006-01-06	46.910000	46.349998	46.799999	46.570000	12599800.0	34.221321
2006-01-09	46.970001	46.360001	46.720001	46.599998	15619400.0	34.243366
2006-01-10	46.509998	45.880001	46.400002	46.209999	15634600.0	33.956776
2006-01-11	46.250000	45.750000	46.060001	46.099998	14742100.0	33.875950
2006-01-12	46.230000	45.709999	46.220001	45.799999	10546600.0	33.655510
2006-01-13	46.000000	45.680000	45.830002	45.799999	10791000.0	33.655510
2006-01-17	45.580002	45.000000	45.400002	45.310001	14605900.0	33.295433
2006-01-18	45.650002	44.919998	45.320000	45.259998	10867000.0	33.258682
2006-01-19	45.880001	44.849998	45.880001	45.139999	14584000.0	33.170521
2006-01-20	45.150002	44.169998	45.000000	44.189999	24950800.0	32.472408
2006-01-23	44.389999	43.490002	43.500000	43.959999	23459500.0	32.303413
2006-01-24	44.680000	44.040001	44.080002	44.240002	13500300.0	32.509151
2006-01-25	44.650002	44.150002	44.150002	44.630001	15132000.0	32.795738
2006-01-26	45.160000	44.669998	45.000000	44.900002	18449100.0	32.994156
2006-01-27	45.110001	44.610001	44.900002	44.799999	12250800.0	32.920662

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-30	45.349998	44.250000	44.750000	44.480000	14812100.0	32.685516
2006-01-31	44.730000	44.119999	44.650002	44.230000	19151000.0	32.501823
2006-02-01	44.240002	43.860001	44.099998	43.950001	15854700.0	32.296047
2006-02-02	43.970001	43.369999	43.950001	43.439999	14745100.0	31.921293
2006-02-03	43.549999	42.919998	43.299999	43.090000	17097000.0	31.664091
2006-02-06	43.650002	43.240002	43.400002	43.369999	12554600.0	31.869852
2006-02-07	43.869999	43.459999	43.599998	43.490002	13914200.0	31.958019
2006-02-08	43.720001	43.340000	43.549999	43.669998	11101600.0	32.090298
2006-02-09	44.049999	43.700001	43.750000	43.830002	13766200.0	32.207878
2006-02-10	44.020000	43.410000	43.770000	43.919998	9038900.0	32.274017
2006-02-13	43.959999	43.299999	43.700001	43.700001	8329500.0	32.112350
2006-02-14	44.490002	43.730000	43.919998	44.160000	17049200.0	32.450375
...	...	...	...	...	...	...
2015-11-18	17.870001	17.430000	17.430000	17.840000	85708300.0	16.122965
2015-11-19	17.850000	17.620001	17.780001	17.690001	51829700.0	15.987406
2015-11-20	17.830000	17.590000	17.809999	17.650000	56288300.0	15.951259
2015-11-23	17.730000	17.459999	17.620001	17.469999	50362900.0	15.788581
2015-11-24	17.570000	17.250000	17.260000	17.469999	58724200.0	15.788581
2015-11-25	17.570000	17.410000	17.510000	17.440001	34939000.0	15.761465

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-11-27	17.500000	17.330000	17.459999	17.480000	22937500.0	15.797613
2015-11-30	17.580000	17.420000	17.480000	17.430000	61893700.0	15.752430
2015-12-01	17.809999	17.480000	17.520000	17.809999	74351800.0	16.095861
2015-12-02	17.889999	17.549999	17.879999	17.620001	76919000.0	15.968972
2015-12-03	17.770000	17.250000	17.680000	17.299999	95810100.0	15.678960
2015-12-04	17.830000	17.379999	17.440001	17.799999	103021700.0	16.132109
2015-12-07	17.799999	17.440001	17.790001	17.540001	81633300.0	15.896472
2015-12-08	17.459999	17.129999	17.389999	17.190001	84873500.0	15.579268
2015-12-09	17.379999	16.870001	17.110001	17.100000	82418100.0	15.497697
2015-12-10	17.410000	16.959999	17.150000	17.200001	68395000.0	15.588333
2015-12-11	17.059999	16.639999	16.969999	16.730000	91503900.0	15.162370
2015-12-14	16.889999	16.500000	16.760000	16.799999	121121200.0	15.225810
2015-12-15	17.490000	16.990000	17.020000	17.420000	99737200.0	15.787718
2015-12-16	17.780001	17.230000	17.650000	17.750000	171576700.0	16.086796
2015-12-17	17.830000	17.299999	17.799999	17.299999	97265700.0	15.678960
2015-12-18	17.270000	16.760000	17.190001	16.760000	136737800.0	15.189559
2015-12-21	17.030001	16.770000	16.980000	16.969999	65150300.0	15.379878
2015-12-22	17.110001	16.850000	17.049999	17.080000	56173500.0	15.479576

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-12-23	17.340000	17.100000	17.160000	17.340000	65770700.0	15.715212
2015-12-24	17.379999	17.219999	17.320000	17.270000	29369400.0	15.651771
2015-12-28	17.230000	16.980000	17.219999	17.129999	41777500.0	15.524892
2015-12-29	17.350000	17.160000	17.250000	17.280001	45670400.0	15.660836
2015-12-30	17.240000	17.040001	17.200001	17.049999	35066400.0	15.452384
2015-12-31	17.070000	16.830000	17.010000	16.830000	47153000.0	15.252998

2517 rows × 6 columns

In [7]:
```
#City Group
C = data.DataReader("C", 'yahoo', start,end)
```

In [8]:
```
C
```

Out[8]:

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-03	493.799988	481.100006	490.000000	492.899994	1537600.0	376.3034(
2006-01-04	491.000000	483.500000	488.600006	483.799988	1870960.0	369.3559(
2006-01-05	487.799988	484.000000	484.399994	486.200012	1143160.0	371.1883(
2006-01-06	489.000000	482.000000	488.799988	486.200012	1370210.0	371.1883(
2006-01-09	487.399994	483.000000	486.000000	483.899994	1680740.0	369.4323(
2006-01-10	485.500000	480.799988	483.000000	485.399994	1365890.0	370.5774(
2006-01-11	495.799988	485.799988	495.799988	489.799988	1684340.0	373.9366(
2006-01-12	491.000000	488.799988	491.000000	490.299988	1230010.0	374.3183(
2006-01-13	491.899994	487.299988	491.000000	489.200012	940880.0	373.4786(
2006-01-17	487.000000	482.700012	485.100006	484.299988	1237740.0	369.7376(
2006-01-18	486.700012	481.100006	484.299988	483.600006	1215070.0	369.2033(
2006-01-19	485.799988	477.000000	485.600006	479.399994	1696500.0	365.9968(
2006-01-20	474.000000	456.299988	472.100006	456.899994	4777680.0	348.8192(
2006-01-23	463.799988	457.000000	460.000000	460.000000	2024410.0	351.1860(
2006-01-24	463.600006	459.899994	462.899994	460.100006	2083740.0	351.2623(
2006-01-25	463.700012	460.100006	461.399994	462.299988	1591940.0	352.9418(
2006-01-26	475.500000	464.500000	465.500000	470.100006	1988560.0	358.8968(
2006-01-27	473.700012	466.000000	470.100006	468.700012	1412760.0	357.8279(

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-30	469.899994	466.600006	468.700012	468.200012	1057630.0	357.44625
2006-01-31	470.500000	465.500000	468.299988	465.799988	1887080.0	355.61392
2006-02-01	467.200012	461.100006	465.899994	463.299988	1845250.0	353.70532
2006-02-02	461.000000	451.000000	459.000000	451.799988	2325420.0	348.61261
2006-02-03	456.100006	448.100006	450.700012	450.600006	1663510.0	347.68673
2006-02-06	453.200012	450.899994	452.600006	451.700012	1147420.0	348.53549
2006-02-07	453.799988	450.000000	450.899994	450.500000	1207470.0	347.60949
2006-02-08	455.299988	450.700012	453.299988	453.600006	1051350.0	350.00149
2006-02-09	461.000000	454.299988	455.000000	457.899994	1357740.0	353.31936
2006-02-10	460.700012	452.500000	457.000000	459.600006	1272030.0	354.63125
2006-02-13	462.299988	454.100006	460.600006	456.799988	1158300.0	352.47079
2006-02-14	462.500000	457.100006	457.799988	461.200012	1518040.0	355.86572
...	...	...	...	...	...	...
2015-11-18	55.029999	53.759998	53.849998	54.980000	19100300.0	48.682915
2015-11-19	55.299999	54.740002	54.880001	55.060001	11997500.0	48.753757
2015-11-20	55.369999	54.549999	55.369999	54.750000	14896000.0	48.479263
2015-11-23	54.840000	54.150002	54.669998	54.279999	14547100.0	48.063087
2015-11-24	54.509998	53.709999	53.810001	54.180000	12950900.0	47.974537
2015-11-25	54.330002	53.759998	54.290001	54.080002	9859400.0	47.886002

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-11-27	54.369999	53.720001	54.060001	54.209999	5483300.0	48.001106
2015-11-30	54.459999	53.970001	54.340000	54.090000	14603100.0	47.894859
2015-12-01	54.910000	54.250000	54.400002	54.880001	11856000.0	48.594372
2015-12-02	55.020000	54.029999	54.990002	54.139999	15288800.0	47.939117
2015-12-03	54.599998	53.349998	54.419998	53.509998	19750000.0	47.381287
2015-12-04	55.330002	53.520000	53.660000	55.090000	21464100.0	48.780315
2015-12-07	54.880001	53.910000	54.770000	54.400002	15077300.0	48.169346
2015-12-08	54.009998	53.180000	53.840000	53.389999	14785500.0	47.275028
2015-12-09	53.810001	52.310001	53.049999	52.810001	19903700.0	46.761452
2015-12-10	53.240002	52.169998	52.889999	52.650002	16333800.0	46.619774
2015-12-11	52.209999	50.669998	51.939999	51.110001	24093500.0	45.256153
2015-12-14	51.730000	50.500000	51.139999	51.099998	21586800.0	45.247303
2015-12-15	52.799999	51.849998	51.849998	52.520000	21642300.0	46.504669
2015-12-16	54.009998	52.299999	53.040001	53.900002	26044800.0	47.726612
2015-12-17	54.200001	52.709999	54.009998	52.840000	17179600.0	46.788025
2015-12-18	52.680000	51.160000	52.459999	51.209999	25509600.0	45.344711
2015-12-21	51.910000	51.080002	51.709999	51.790001	16929000.0	45.858276
2015-12-22	52.130001	51.389999	51.990002	52.009998	13241300.0	46.053082

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-12-23	52.639999	52.080002	52.299999	52.630001	14950200.0	46.602066
2015-12-24	52.970001	52.450001	52.480000	52.709999	4671200.0	46.672905
2015-12-28	52.570000	51.959999	52.570000	52.380001	8761700.0	46.380703
2015-12-29	53.220001	52.740002	52.759998	52.980000	10155100.0	46.911987
2015-12-30	52.939999	52.250000	52.840000	52.299999	8763300.0	46.309872
2015-12-31	52.389999	51.750000	52.070000	51.750000	11281800.0	45.822861

2517 rows × 6 columns

In [9]:
```
# Goldman Sachs
GS  = data.DataReader("GS", 'yahoo', start,end)
```

In [10]:
```
GS
```

Out[10]:

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-03	129.440002	124.230003	126.699997	128.869995	6188700.0	105.687309
2006-01-04	128.910004	126.379997	127.349998	127.089996	4861600.0	104.227493
2006-01-05	127.320000	125.610001	126.000000	127.040001	3717400.0	104.186478
2006-01-06	129.250000	127.290001	127.290001	128.839996	4319600.0	105.662666
2006-01-09	130.619995	128.000000	128.500000	130.389999	4723500.0	106.933891
2006-01-10	132.949997	130.020004	130.050003	132.029999	5536800.0	108.278831
2006-01-11	133.800003	131.419998	131.449997	131.970001	4671400.0	108.229630
2006-01-12	133.210007	131.380005	131.399994	132.250000	3725500.0	108.459259
2006-01-13	133.660004	131.899994	132.020004	133.259995	2894900.0	109.287575
2006-01-17	133.130005	130.589996	131.000000	132.589996	3621600.0	108.738068
2006-01-18	132.679993	131.009995	131.059998	132.369995	4302700.0	108.557678
2006-01-19	134.820007	132.710007	132.720001	133.820007	5010700.0	109.746826
2006-01-20	134.059998	131.250000	132.850006	131.440002	5679900.0	107.996712
2006-01-23	134.179993	131.639999	131.639999	132.869995	3847900.0	109.171700
2006-01-24	134.089996	132.339996	132.630005	133.000000	3758000.0	109.278488
2006-01-25	134.039993	132.460007	133.649994	133.559998	3740500.0	109.738647
2006-01-26	138.360001	133.009995	133.009995	137.399994	4808200.0	112.893692
2006-01-27	139.750000	137.100006	137.929993	138.940002	3687900.0	114.159042

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-30	140.639999	138.710007	139.550003	139.869995	3168600.0	114.923157
2006-01-31	141.860001	138.449997	139.729996	141.250000	4906200.0	116.057083
2006-02-01	142.949997	140.429993	141.399994	141.710007	3635900.0	116.434990
2006-02-02	143.770004	141.399994	142.270004	142.520004	3711000.0	117.100555
2006-02-03	143.119995	140.699997	141.550003	142.740005	4178900.0	117.281296
2006-02-06	144.100006	141.600006	142.610001	142.820007	3849300.0	117.347054
2006-02-07	143.309998	139.479996	142.350006	139.479996	5207700.0	114.602745
2006-02-08	141.929993	139.320007	140.100006	141.139999	4481400.0	115.966652
2006-02-09	142.850006	140.490005	141.139999	140.850006	3059500.0	115.728424
2006-02-10	141.850006	137.800003	140.669998	140.809998	4433100.0	115.695541
2006-02-13	141.800003	139.149994	139.649994	139.649994	2155200.0	114.742439
2006-02-14	142.320007	138.770004	141.199997	141.779999	3003100.0	116.492508
...	...	...	...	...	...	...
2015-11-18	194.050003	191.009995	191.050003	193.660004	2509200.0	177.125275
2015-11-19	194.210007	191.669998	193.820007	193.029999	1835800.0	176.549057
2015-11-20	193.490005	191.110001	193.000000	191.470001	2932100.0	175.122223
2015-11-23	191.490005	188.520004	191.300003	189.190002	2671700.0	173.036926
2015-11-24	189.800003	186.559998	188.020004	188.669998	2679400.0	172.561279
2015-11-25	189.770004	188.149994	188.990005	189.149994	1495600.0	173.000351

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-11-27	191.190002	188.850006	189.160004	190.470001	1092700.0	174.207657
2015-11-30	191.080002	189.240005	190.500000	190.020004	3415000.0	174.391205
2015-12-01	193.149994	190.009995	191.220001	193.070007	4140900.0	177.190353
2015-12-02	193.839996	189.800003	193.300003	190.259995	1817200.0	174.611435
2015-12-03	191.649994	184.729996	190.660004	185.199997	3599000.0	169.967590
2015-12-04	190.619995	184.750000	185.610001	189.990005	3517200.0	174.363708
2015-12-07	190.119995	185.000000	190.000000	185.490005	3499900.0	170.233765
2015-12-08	184.470001	181.839996	183.919998	182.919998	2663800.0	167.875153
2015-12-09	184.850006	179.830002	182.020004	180.710007	3907500.0	165.846924
2015-12-10	183.929993	180.309998	180.990005	182.110001	2212300.0	167.131775
2015-12-11	180.149994	175.470001	179.679993	176.559998	3750100.0	162.038239
2015-12-14	178.630005	172.899994	176.669998	176.399994	5102400.0	161.891403
2015-12-15	183.279999	178.850006	178.979996	182.009995	3398700.0	167.039963
2015-12-16	186.880005	181.679993	184.009995	186.210007	3191700.0	170.894562
2015-12-17	187.889999	182.610001	186.880005	182.610001	2807900.0	167.590637
2015-12-18	181.899994	175.389999	181.199997	175.490005	6740800.0	161.056259
2015-12-21	178.149994	175.830002	177.500000	177.750000	2472900.0	163.130341
2015-12-22	180.690002	177.050003	178.899994	180.050003	2312800.0	165.241226

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-12-23	183.000000	180.460007	180.699997	182.949997	2367900.0	167.902679
2015-12-24	183.169998	182.020004	182.270004	182.470001	1107600.0	167.462173
2015-12-28	181.929993	179.839996	181.770004	181.619995	1723300.0	166.682083
2015-12-29	184.179993	182.500000	182.820007	183.529999	1848900.0	168.434937
2015-12-30	183.529999	181.839996	183.279999	182.009995	1514300.0	167.039963
2015-12-31	182.889999	180.029999	181.160004	180.229996	1773900.0	165.406387

2517 rows × 6 columns

In [11]:
```
# JP Morgan
JPM = data.DataReader("JPM", 'yahoo', start,end)
```

In [12]:
```
JPM
```

Out[12]:

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-03	40.360001	39.299999	39.830002	40.189999	12838600.0	26.974699
2006-01-04	40.139999	39.419998	39.779999	39.619999	13491500.0	26.818987
2006-01-05	39.810001	39.500000	39.610001	39.740002	8109400.0	26.900234
2006-01-06	40.240002	39.549999	39.919998	40.020000	7966900.0	27.089762
2006-01-09	40.720001	39.880001	39.880001	40.669998	16575200.0	27.529747
2006-01-10	40.750000	40.070000	40.500000	40.730000	16614800.0	27.570374
2006-01-11	40.869999	40.610001	40.730000	40.700001	12332300.0	27.550074
2006-01-12	40.419998	39.900002	40.250000	39.950001	12230000.0	27.042387
2006-01-13	40.029999	39.650002	39.779999	39.919998	10961200.0	27.022076
2006-01-17	39.820000	39.410000	39.480000	39.709999	9941100.0	26.879927
2006-01-18	39.709999	38.950001	39.110001	39.279999	17813100.0	26.588852
2006-01-19	39.470001	38.799999	39.340000	39.060001	12091800.0	26.439939
2006-01-20	38.820000	37.880001	38.810001	38.049999	20902400.0	25.756266
2006-01-23	38.700001	37.970001	38.139999	38.270000	13172300.0	25.905180
2006-01-24	38.529999	38.090000	38.270000	38.110001	9781500.0	25.796881
2006-01-25	38.680000	38.060001	38.160000	38.480000	14248700.0	26.047340
2006-01-26	39.810001	38.709999	38.709999	39.590000	16187900.0	26.798698
2006-01-27	40.040001	39.169998	39.250000	39.750000	12929400.0	26.906992

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-30	39.970001	39.419998	39.520000	39.849998	8701700.0	26.974691
2006-01-31	40.189999	39.740002	40.029999	39.750000	15582100.0	26.906992
2006-02-01	40.220001	39.669998	39.880001	39.880001	11429800.0	26.994999
2006-02-02	40.160000	39.590000	39.880001	39.990002	10309100.0	27.069462
2006-02-03	40.099998	39.400002	39.450001	39.529999	10440700.0	26.758081
2006-02-06	39.599998	39.310001	39.400002	39.439999	6591800.0	26.697157
2006-02-07	39.599998	39.049999	39.200001	39.259998	8590500.0	26.575315
2006-02-08	39.619999	39.250000	39.279999	39.599998	10065200.0	26.805464
2006-02-09	40.029999	39.439999	39.529999	39.770000	8496300.0	26.920542
2006-02-10	39.980000	39.290001	39.619999	39.919998	8790500.0	27.022076
2006-02-13	40.310001	39.610001	39.770000	39.770000	7791600.0	26.920542
2006-02-14	40.330002	39.650002	39.660000	40.099998	12904100.0	27.143917
...	...	...	...	...	...	...
2015-11-18	67.550003	66.370003	66.480003	67.449997	12911400.0	58.178867
2015-11-19	67.820000	67.040001	67.580002	67.660004	12839500.0	58.360001
2015-11-20	68.110001	67.379997	67.989998	67.540001	11209600.0	58.256516
2015-11-23	67.580002	66.779999	67.309998	66.879997	11339000.0	57.687214
2015-11-24	67.139999	66.040001	66.169998	66.779999	10910000.0	57.600960
2015-11-25	67.120003	66.550003	66.930000	66.860001	7772000.0	57.669960

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-11-27	67.330002	66.639999	67.000000	67.169998	4052500.0	57.937366
2015-11-30	67.519997	66.680000	67.279999	66.680000	15147500.0	57.514713
2015-12-01	67.830002	66.989998	67.339996	67.610001	12708800.0	58.316883
2015-12-02	67.879997	66.480003	67.830002	66.660004	13440900.0	57.497444
2015-12-03	67.029999	65.580002	66.830002	65.800003	14626900.0	56.755676
2015-12-04	68.000000	66.029999	66.099998	67.889999	17786000.0	58.558399
2015-12-07	67.750000	66.400002	67.660004	67.000000	11686000.0	57.790718
2015-12-08	66.959999	65.699997	66.250000	65.959999	13084500.0	56.893658
2015-12-09	66.580002	65.040001	65.610001	65.459999	16770200.0	56.462410
2015-12-10	66.500000	65.080002	65.540001	65.610001	12839000.0	56.591782
2015-12-11	65.160004	63.509998	64.800003	64.070000	17889300.0	55.263454
2015-12-14	64.760002	63.599998	64.230003	64.269997	17638200.0	55.435966
2015-12-15	66.650002	65.070000	65.070000	66.099998	18126600.0	57.014423
2015-12-16	67.739998	65.910004	66.910004	67.529999	21720000.0	58.247868
2015-12-17	68.000000	66.080002	67.900002	66.279999	18122100.0	57.169693
2015-12-18	65.970001	64.400002	65.970001	64.400002	23819600.0	55.548096
2015-12-21	65.559998	64.830002	65.019997	65.540001	18869300.0	56.531403
2015-12-22	66.000000	64.980003	65.919998	65.680000	12149500.0	56.652161

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-12-23	66.849998	66.050003	66.120003	66.730003	12524500.0	57.557827
2015-12-24	66.889999	66.320000	66.620003	66.599998	4468200.0	57.445694
2015-12-28	66.449997	65.709999	66.290001	66.379997	6610600.0	57.255939
2015-12-29	67.300003	66.739998	66.839996	67.070000	9820800.0	57.851109
2015-12-30	67.050003	66.449997	67.040001	66.589996	7190700.0	57.437080
2015-12-31	66.779999	66.000000	66.190002	66.029999	14654300.0	56.954060

2517 rows × 6 columns

In [13]:
```
# Morgan Stanley
MS = data.DataReader("MS", 'yahoo', start,end)
```

In [14]:
```
MS
```

Out[14]:

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-03	58.490002	56.740002	57.169998	58.310001	5377000.0	36.786667
2006-01-04	59.279999	58.349998	58.700001	58.349998	7977800.0	36.811905
2006-01-05	58.590000	58.020000	58.549999	58.509998	5778000.0	36.912865
2006-01-06	58.849998	58.049999	58.770000	58.570000	6889800.0	36.950710
2006-01-09	59.290001	58.619999	58.630001	59.189999	4144500.0	37.341850
2006-01-10	59.220001	58.580002	58.849998	59.220001	4713600.0	37.360771
2006-01-11	59.880001	58.840000	59.150002	59.570000	5837900.0	37.753712
2006-01-12	59.779999	59.270000	59.630001	59.470001	3817700.0	37.690361
2006-01-13	59.669998	59.060001	59.570000	59.380001	3430900.0	37.633316
2006-01-17	59.459999	58.680000	59.450001	58.810001	2624700.0	37.272053
2006-01-18	58.900002	58.049999	58.549999	58.450001	2903000.0	37.043888
2006-01-19	59.980000	58.709999	58.750000	59.349998	3813000.0	37.614288
2006-01-20	59.549999	57.410000	59.299999	57.849998	5445900.0	36.663620
2006-01-23	58.689999	57.700001	57.700001	58.480000	3767000.0	37.062904
2006-01-24	59.450001	58.619999	58.820000	58.689999	3813600.0	37.195988
2006-01-25	59.419998	58.549999	59.000000	59.169998	4011700.0	37.500198
2006-01-26	60.500000	59.490002	60.490002	59.970001	5790400.0	38.007229
2006-01-27	61.000000	59.790001	60.000000	60.779999	3700100.0	38.520565

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-30	61.849998	60.639999	61.450001	60.669998	4246600.0	38.450867
2006-01-31	61.910000	60.490002	60.500000	61.450001	5178400.0	38.945213
2006-02-01	61.959999	60.889999	61.099998	61.830002	3496000.0	39.186028
2006-02-02	62.139999	60.849998	61.650002	61.270000	3469800.0	38.831131
2006-02-03	62.150002	60.360001	60.599998	61.439999	3891600.0	38.938873
2006-02-06	61.910000	61.230000	61.259998	61.730000	2629500.0	39.122654
2006-02-07	61.540001	60.270000	61.349998	60.529999	3811300.0	38.362125
2006-02-08	61.360001	60.799999	61.150002	61.270000	2718000.0	38.831131
2006-02-09	61.900002	61.099998	61.270000	61.180000	2714000.0	38.774097
2006-02-10	61.139999	59.410000	61.000000	60.310001	4483600.0	38.222706
2006-02-13	60.580002	59.389999	60.200001	59.810001	4104900.0	37.905819
2006-02-14	60.459999	59.209999	59.810001	60.070000	3715100.0	38.070610
...	...	...	...	...	...	...
2015-11-18	34.310001	33.610001	33.689999	34.250000	10396200.0	30.111458
2015-11-19	34.439999	33.950001	34.279999	34.169998	8947800.0	30.041119
2015-11-20	34.529999	33.779999	34.330002	33.910000	8624100.0	29.812527
2015-11-23	34.139999	33.570000	33.919998	33.639999	7963000.0	29.575161
2015-11-24	33.779999	33.180000	33.270000	33.590000	7954500.0	29.531204
2015-11-25	33.750000	33.439999	33.619999	33.610001	6210000.0	29.548784

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-11-27	33.919998	33.480000	33.630001	33.779999	3014600.0	29.698242
2015-11-30	34.529999	33.700001	33.810001	34.299999	17416300.0	30.155409
2015-12-01	35.349998	34.599998	34.599998	35.270000	18594200.0	31.008202
2015-12-02	35.400002	34.720001	35.360001	34.889999	10996500.0	30.674122
2015-12-03	35.220001	34.290001	35.049999	34.450001	15021200.0	30.287285
2015-12-04	35.580002	34.410000	34.660000	35.320000	13205400.0	31.052156
2015-12-07	35.310001	34.419998	35.279999	34.680000	8389200.0	30.489498
2015-12-08	34.349998	33.840000	34.230000	34.060001	10613400.0	29.944403
2015-12-09	34.310001	33.090000	33.799999	33.369999	13211200.0	29.337786
2015-12-10	33.900002	33.279999	33.500000	33.419998	10674500.0	29.381737
2015-12-11	33.049999	31.930000	32.810001	32.080002	16133000.0	28.203665
2015-12-14	32.520000	31.389999	32.130001	31.879999	14990100.0	28.027826
2015-12-15	33.080002	32.560001	32.639999	32.840000	13708800.0	28.871828
2015-12-16	33.770000	32.680000	33.169998	33.610001	13682900.0	29.548784
2015-12-17	33.849998	32.360001	33.830002	32.380001	15959800.0	28.467409
2015-12-18	32.250000	31.250000	32.130001	31.290001	19331700.0	27.509121
2015-12-21	31.799999	31.190001	31.620001	31.680000	10920100.0	27.851999
2015-12-22	32.380001	31.610001	31.959999	32.220001	11468400.0	28.326748

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-12-23	32.730000	32.279999	32.470001	32.599998	6807100.0	28.660824
2015-12-24	32.709999	32.439999	32.570000	32.480000	2798200.0	28.555326
2015-12-28	32.360001	31.950001	32.360001	32.169998	5420300.0	28.282784
2015-12-29	32.700001	32.330002	32.439999	32.549999	6388200.0	28.616871
2015-12-30	32.650002	32.200001	32.500000	32.230000	5057200.0	28.335531
2015-12-31	32.299999	31.770000	31.910000	31.809999	8154300.0	27.966284

2517 rows × 6 columns

In [15]:
```
# Wells Fargo
WFC = data.DataReader("WFC", 'yahoo', start,end)
```

In [16]:
```
WFC
```

Out[16]:

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-03	31.975000	31.195000	31.600000	31.900000	11016400.0	20.723480
2006-01-04	31.820000	31.365000	31.799999	31.530001	10870000.0	20.483118
2006-01-05	31.555000	31.309999	31.500000	31.495001	10158000.0	20.460379
2006-01-06	31.775000	31.385000	31.580000	31.680000	8403800.0	20.580564
2006-01-09	31.825001	31.555000	31.674999	31.674999	5619600.0	20.577309
2006-01-10	31.684999	31.445000	31.549999	31.650000	7157800.0	20.561069
2006-01-11	31.895000	31.575001	31.650000	31.815001	8047000.0	20.668261
2006-01-12	31.790001	31.430000	31.705000	31.445000	10763600.0	20.427893
2006-01-13	31.795000	31.510000	31.549999	31.625000	6365600.0	20.544836
2006-01-17	31.575001	31.200001	31.459999	31.299999	10690400.0	20.333696
2006-01-18	31.844999	31.299999	31.305000	31.799999	10780800.0	20.658518
2006-01-19	31.820000	31.270000	31.805000	31.305000	8713400.0	20.336946
2006-01-20	31.309999	30.750000	31.309999	30.750000	18166000.0	19.976393
2006-01-23	30.969999	30.750000	30.754999	30.805000	7047400.0	20.012131
2006-01-24	30.975000	30.660000	30.825001	30.795000	8232000.0	20.005634
2006-01-25	31.065001	30.730000	30.834999	31.000000	8580800.0	20.138809
2006-01-26	31.500000	31.184999	31.240000	31.285000	8598000.0	20.323956
2006-01-27	31.600000	31.035000	31.285000	31.350000	7640000.0	20.366179

	High	Low	Open	Close	Volume	Adj Close
Date						
2006-01-30	31.365000	31.150000	31.350000	31.235001	5756400.0	20.291475
2006-01-31	31.295000	31.105000	31.125000	31.180000	11763400.0	20.255749
2006-02-01	30.985001	30.750000	30.950001	30.920000	8224200.0	20.255741
2006-02-02	30.895000	30.600000	30.825001	30.650000	9830600.0	20.078863
2006-02-03	30.719999	30.309999	30.424999	30.520000	7532400.0	19.993706
2006-02-06	30.600000	30.334999	30.424999	30.525000	7290000.0	19.996979
2006-02-07	30.680000	30.450001	30.500000	30.565001	8095000.0	20.023176
2006-02-08	30.725000	30.395000	30.500000	30.665001	5924400.0	20.088686
2006-02-09	30.815001	30.504999	30.605000	30.615000	7052600.0	20.055931
2006-02-10	30.969999	30.570000	30.635000	30.865000	6501200.0	20.219709
2006-02-13	30.875000	30.600000	30.775000	30.825001	5401400.0	20.193506
2006-02-14	31.584999	30.889999	30.950001	31.325001	8263600.0	20.521057
...	...	...	...	...	...	...
2015-11-18	55.770000	54.970001	55.060001	55.669998	16612600.0	47.099842
2015-11-19	56.070000	55.459999	55.770000	55.970001	12167600.0	47.353668
2015-11-20	56.259998	55.720001	56.259998	55.820000	16264100.0	47.226749
2015-11-23	56.040001	55.560001	55.900002	55.599998	9638100.0	47.040619
2015-11-24	55.480000	54.889999	55.139999	55.279999	14156500.0	46.769901
2015-11-25	55.520000	55.099998	55.459999	55.220001	10034400.0	46.719120

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-11-27	55.470001	54.980000	55.340000	55.389999	4914000.0	46.862957
2015-11-30	55.689999	55.099998	55.459999	55.099998	15998900.0	46.617596
2015-12-01	55.770000	55.270000	55.509998	55.709999	15543400.0	47.133686
2015-12-02	55.799999	55.000000	55.799999	55.080002	12779900.0	46.600677
2015-12-03	55.220001	54.029999	55.130001	54.200001	15410100.0	45.856152
2015-12-04	55.880001	54.310001	54.480000	55.669998	19647700.0	47.099842
2015-12-07	55.560001	55.020000	55.450001	55.419998	17991600.0	46.888336
2015-12-08	55.209999	54.279999	54.980000	54.400002	19949500.0	46.025356
2015-12-09	54.939999	53.709999	54.119999	54.119999	18499600.0	45.788464
2015-12-10	54.990002	53.880001	54.250000	54.340000	14075300.0	45.974606
2015-12-11	53.939999	52.990002	53.450001	53.310001	17815700.0	45.103168
2015-12-14	53.570000	52.750000	53.320000	53.200001	22055100.0	45.010098
2015-12-15	55.119999	53.810001	53.830002	54.910000	19056700.0	46.456852
2015-12-16	56.040001	54.820000	55.209999	55.849998	21086800.0	47.252140
2015-12-17	56.240002	55.470001	56.110001	55.470001	18800500.0	46.930641
2015-12-18	55.150002	53.790001	55.000000	53.790001	31468600.0	45.509266
2015-12-21	54.540001	53.549999	54.299999	54.020000	12993400.0	45.703857
2015-12-22	54.500000	53.700001	54.360001	54.340000	10318100.0	45.974606

	High	Low	Open	Close	Volume	Adj Close
Date						
2015-12-23	55.060001	54.459999	54.599998	55.040001	13033600.0	46.566833
2015-12-24	55.090000	54.709999	54.970001	54.820000	4999400.0	46.380711
2015-12-28	54.779999	54.169998	54.549999	54.680000	8288800.0	46.262257
2015-12-29	55.349998	54.990002	55.110001	55.290001	7894900.0	46.778351
2015-12-30	55.310001	54.790001	55.270000	54.889999	8016900.0	46.439926
2015-12-31	54.950001	54.220001	54.509998	54.360001	10929800.0	45.991516

2517 rows × 6 columns

Create a list of the ticker symbols (as strings) in alphabetical order. call list as tickers

In [17]:
```
tickers = ['BAC', 'C', 'GS', 'JPM', 'MS', 'WFC']
```

Use pd.concat to concatenate the bank dataframes together to a single data frame called bank_stocks. Set the keys argument equal to the tickers list. Also pay attention to what axis you concatenate on.

In [18]:
```
bank_stocks = pd.concat([BAC,C,GS,JPM,MS,WFC],axis=1,keys=tickers)
```

In [19]:
```
bank_stocks.head()
```

Out[19]:

	BAC						C
	High	Low	Open	Close	Volume	Adj Close	Hig
Date							
2006-01-03	47.180000	46.150002	46.919998	47.080002	16296700.0	34.596096	493
2006-01-04	47.240002	46.450001	47.000000	46.580002	17757900.0	34.228691	491
2006-01-05	46.830002	46.320000	46.580002	46.639999	14970700.0	34.272778	487
2006-01-06	46.910000	46.349998	46.799999	46.570000	12599800.0	34.221321	489
2006-01-09	46.970001	46.360001	46.720001	46.599998	15619400.0	34.243366	487

5 rows × 36 columns

Set the column name levels:

In [20]:
```
bank_stocks.columns.names = ['Bank Ticker', 'Stock Info']
```

In [21]:
```
# Check head of the bank_stocks dataframe.

bank_stocks.head()
```

Out[21]:

Bank Ticker	BAC						C
Stock Info	High	Low	Open	Close	Volume	Adj Close	Hig
Date							
2006-01-03	47.180000	46.150002	46.919998	47.080002	16296700.0	34.596096	49
2006-01-04	47.240002	46.450001	47.000000	46.580002	17757900.0	34.228691	49
2006-01-05	46.830002	46.320000	46.580002	46.639999	14970700.0	34.272778	48
2006-01-06	46.910000	46.349998	46.799999	46.570000	12599800.0	34.221321	48
2006-01-09	46.970001	46.360001	46.720001	46.599998	15619400.0	34.243366	48

5 rows × 36 columns

Check Some Exploratory Data Analysis

What as the max Close price for each bank's stock throughout the time period?

In [22]:
```
#for tick in tickers:
    #print(tick,bank_stocks[tick]['Close'].max())

bank_stocks.xs(key='Close', axis=1, level='Stock Info').max()
```

Out[22]:
```
Bank Ticker
BAC     54.900002
C      564.099976
GS     247.919998
JPM     70.080002
MS      89.300003
WFC     58.520000
dtype: float64
```

Create a new empty DataFrame called returns. This dataframe will contain the returns for each bank's stock.

In [23]:
```
returns = pd.DataFrame()
```

We can use pandas pct_change() method on the Close column to create a column representing this return value. Create a for loop that goes and for each Bank Stock Ticker creates this returns column and sets it as a column in the returns DataFrame.

In [32]:
```
for tick in tickers:
    returns[tick+ 'Returns'] = bank_stocks[tick]['Close'].pct_change()
```

In [33]:
```
returns.head()
```

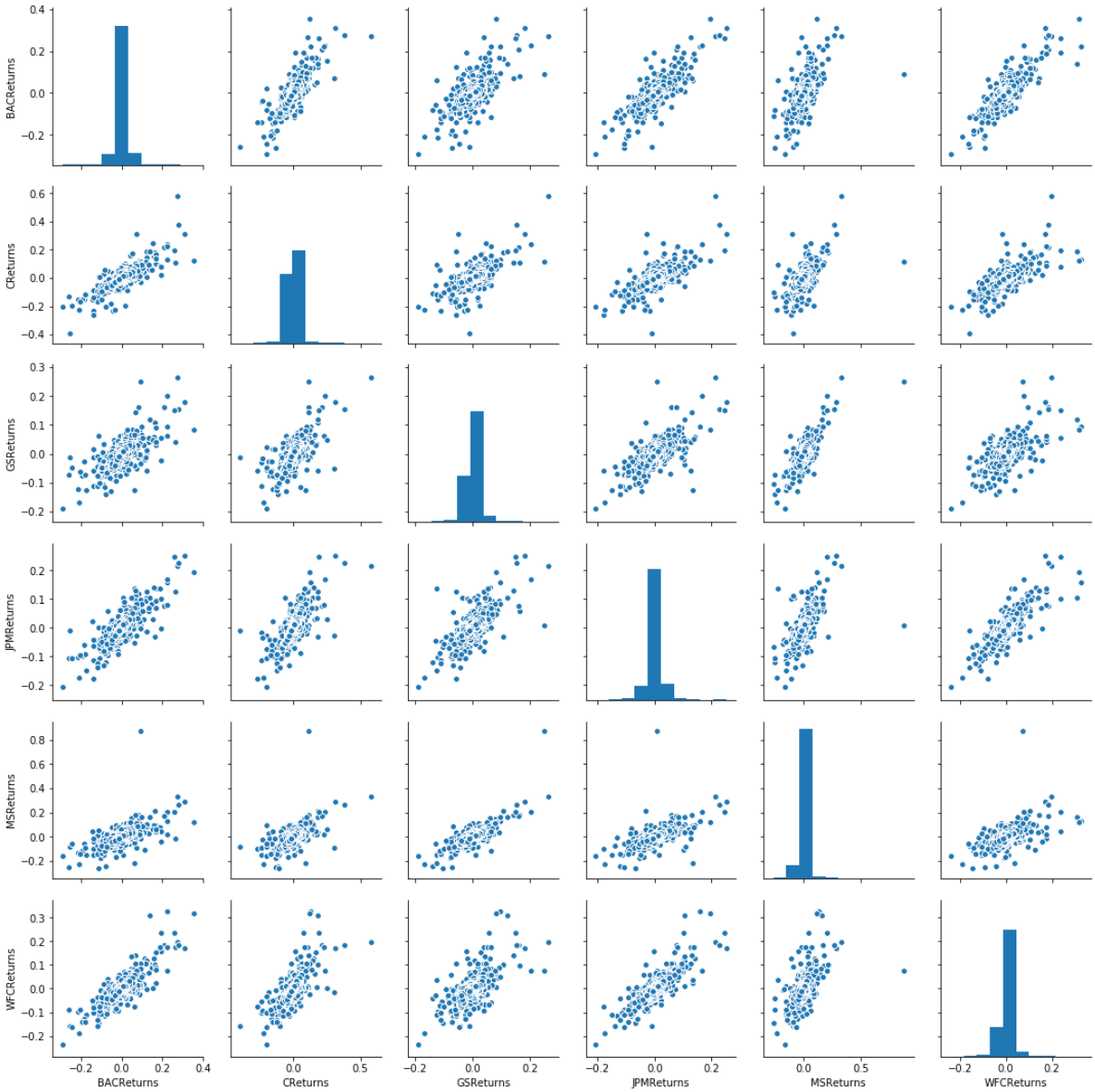
Out[33]:

	BACReturns	CReturns	GSReturns	JPMReturns	MSReturns	WFCRetu
Date						
2006-01-03	NaN	NaN	NaN	NaN	NaN	NaN
2006-01-04	-0.010620	-0.018462	-0.013812	-0.014183	0.000686	-0.011599
2006-01-05	0.001288	0.004961	-0.000393	0.003029	0.002742	-0.001110
2006-01-06	-0.001501	0.000000	0.014169	0.007046	0.001025	0.005874
2006-01-09	0.000644	-0.004731	0.012030	0.016242	0.010586	-0.000158

Create a Pairplot using seaborn of the return dataframe. What Stocks stands for you?

In [34]:
```
sns.pairplot(returns[1:])
```

Out[34]:
```
<seaborn.axisgrid.PairGrid at 0x2d57ea6fa90>
```



Using this returns DataFrame, figure out on what dates each bank stock had the best and worst single day returns. you should notice that 4 of the share the same day for the worst drop, did anything significant happen that day?

In [30]:
```
returns.idxmin()
```

Out[30]:
```
BACReturns   2009-01-20
CReturns     2009-02-27
GSReturns    2009-01-20
JPMReturns   2009-01-20
MSReturns    2008-10-09
WFCReturns   2009-01-20
dtype: datetime64[ns]
```

In [31]:
```
returns.idxmax()
```

Out[31]:
```
BACReturns   2009-04-09
CReturns     2008-11-24
GSReturns    2008-11-24
JPMReturns   2009-01-21
MSReturns    2008-10-13
WFCReturns   2008-07-16
dtype: datetime64[ns]
```

To find out standard deviation of the returns, Which stock would you classify as the riskiest over the entire time period? which would you classify as the riskiest for the year 2015?

In [29]:
```
returns.std()
```

Out[29]:
```
BACReturns    0.036647
CReturns      0.038672
GSReturns     0.025390
JPMReturns    0.027667
MSReturns     0.037819
WFCReturns    0.030238
dtype: float64
```

In [35]:
```
returns.head()
```

Out[35]:

	BACReturns	CReturns	GSReturns	JPMReturns	MSReturns	WFCRetu
Date						
2006-01-03	NaN	NaN	NaN	NaN	NaN	NaN
2006-01-04	-0.010620	-0.018462	-0.013812	-0.014183	0.000686	-0.01159
2006-01-05	0.001288	0.004961	-0.000393	0.003029	0.002742	-0.00111
2006-01-06	-0.001501	0.000000	0.014169	0.007046	0.001025	0.005874
2006-01-09	0.000644	-0.004731	0.012030	0.016242	0.010586	-0.00015

In [43]:
```
returns.loc['2015-01-01': '2015-12-31'].std()
```

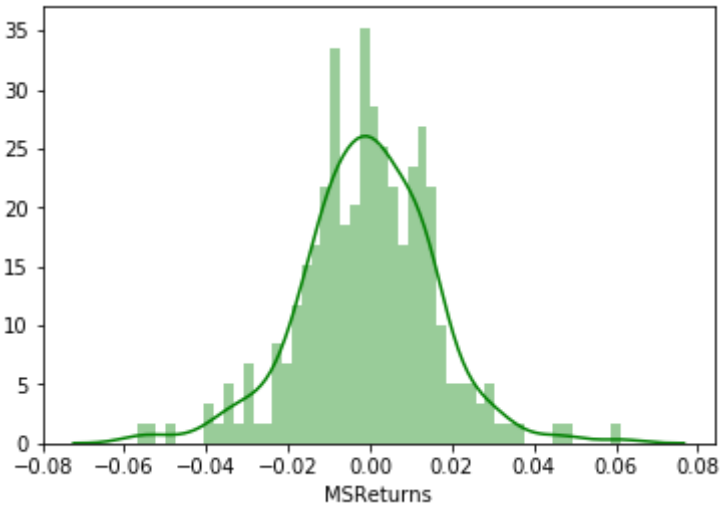
Out[43]:
```
BACReturns    0.016163
CReturns      0.015289
GSReturns     0.014046
JPMReturns    0.014017
MSReturns     0.016249
WFCReturns    0.012591
dtype: float64
```

Create a distplot using seaborn of the 2015 returns for Morgan Stanley

In [47]:
```
sns.distplot(returns.loc['2015-01-01':'2015-12-31']['MSReturns'],color
='green', bins = 50)
```

```
C:\Users\lenovo\Anaconda3\lib\site-packages\matplotlib\axes\_axes.py:6
462: UserWarning: The 'normed' kwarg is deprecated, and has been repla
ced by the 'density' kwarg.
  warnings.warn("The 'normed' kwarg is deprecated, and has been "
```

Out[47]: <matplotlib.axes._subplots.AxesSubplot at 0x2d57f7fed68>

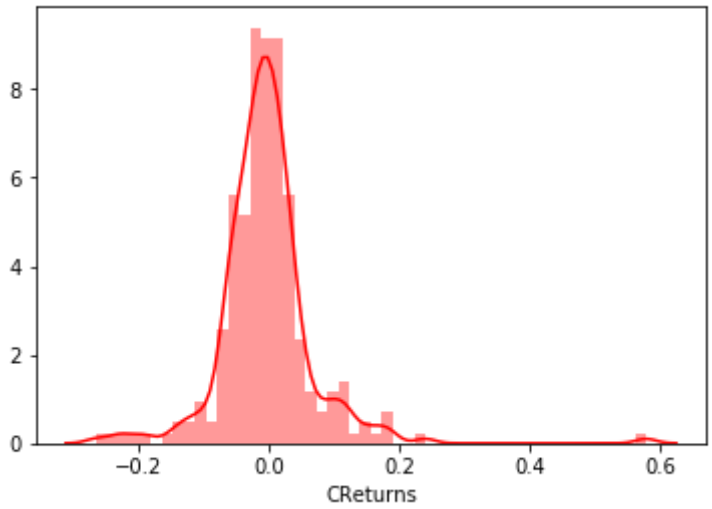


Create a distplot using seaborn of the 2008 returns for the CitiGroup

In [48]:
```
sns.distplot(returns.loc['2008-01-01':'2008-12-31']['CReturns'],color
= 'red', bins=50)
```

```
C:\Users\lenovo\Anaconda3\lib\site-packages\matplotlib\axes\_axes.py:6
462: UserWarning: The 'normed' kwarg is deprecated, and has been repla
ced by the 'density' kwarg.
  warnings.warn("The 'normed' kwarg is deprecated, and has been "
```

Out[48]: <matplotlib.axes._subplots.AxesSubplot at 0x2d5010c6320>



Visualization

This project will focus on visualizations. libraries to try to recreate the described plots below, seaborn, matplotlib, plotly and cufflinks.

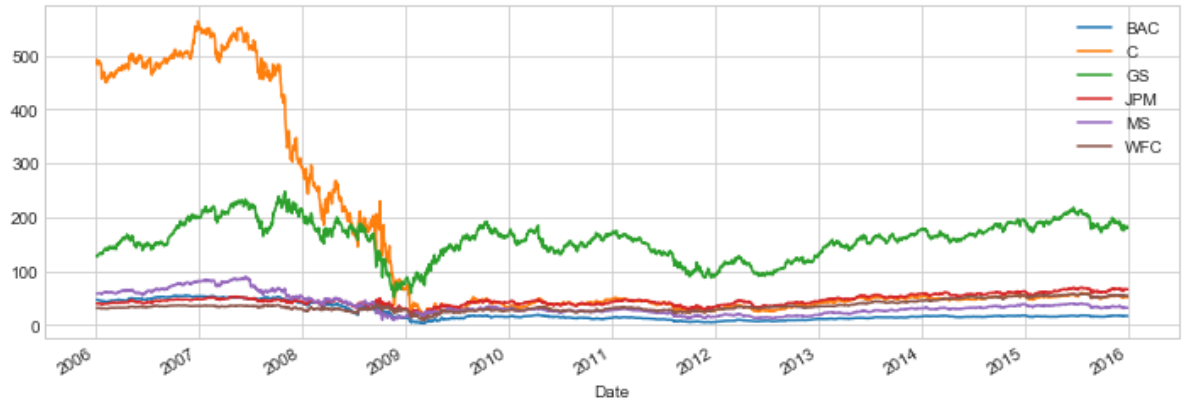
In [49]:
```
# Libraries to import
```

In [56]:
```
import matplotlib.pyplot as plt
import seaborn as sns
sns.set_style('whitegrid')
%matplotlib inline

import plotly
import cufflinks as cf
cf.go_offline()
```

Create a line plot showing Close price for each bank for the entire index of time.

In [57]:
```
for tick in tickers:
    bank_stocks[tick]['Close'].plot(label=tick,figsize=(12,4))
plt.legend()
```

Out[57]: <matplotlib.legend.Legend at 0x2d50341af60>



In [59]:
```
bank_stocks.xs(key='Close', axis=1,level='Stock Info')
```

Out[59]:

Bank Ticker	BAC	C	GS	JPM	MS	WFC
Date						
2006-01-03	47.080002	492.899994	128.869995	40.189999	58.310001	31.900000
2006-01-04	46.580002	483.799988	127.089996	39.619999	58.349998	31.530001
2006-01-05	46.639999	486.200012	127.040001	39.740002	58.509998	31.495001
2006-01-06	46.570000	486.200012	128.839996	40.020000	58.570000	31.680000
2006-01-09	46.599998	483.899994	130.389999	40.669998	59.189999	31.674999
2006-01-10	46.209999	485.399994	132.029999	40.730000	59.220001	31.650000
2006-01-11	46.099998	489.799988	131.970001	40.700001	59.570000	31.815001
2006-01-12	45.799999	490.299988	132.250000	39.950001	59.470001	31.445000
2006-01-13	45.799999	489.200012	133.259995	39.919998	59.380001	31.625000
2006-01-17	45.310001	484.299988	132.589996	39.709999	58.810001	31.299999
2006-01-18	45.259998	483.600006	132.369995	39.279999	58.450001	31.799999
2006-01-19	45.139999	479.399994	133.820007	39.060001	59.349998	31.305000
2006-01-20	44.189999	456.899994	131.440002	38.049999	57.849998	30.750000
2006-01-23	43.959999	460.000000	132.869995	38.270000	58.480000	30.805000
2006-01-24	44.240002	460.100006	133.000000	38.110001	58.689999	30.795000
2006-01-25	44.630001	462.299988	133.559998	38.480000	59.169998	31.000000
2006-01-26	44.900002	470.100006	137.399994	39.590000	59.970001	31.285000
2006-01-27	44.799999	468.700012	138.940002	39.750000	60.779999	31.350000

Bank Ticker	BAC	C	GS	JPM	MS	WFC
Date						
2006-01-30	44.480000	468.200012	139.869995	39.849998	60.669998	31.235001
2006-01-31	44.230000	465.799988	141.250000	39.750000	61.450001	31.180000
2006-02-01	43.950001	463.299988	141.710007	39.880001	61.830002	30.920000
2006-02-02	43.439999	451.799988	142.520004	39.990002	61.270000	30.650000
2006-02-03	43.090000	450.600006	142.740005	39.529999	61.439999	30.520000
2006-02-06	43.369999	451.700012	142.820007	39.439999	61.730000	30.525000
2006-02-07	43.490002	450.500000	139.479996	39.259998	60.529999	30.565001
2006-02-08	43.669998	453.600006	141.139999	39.599998	61.270000	30.665001
2006-02-09	43.830002	457.899994	140.850006	39.770000	61.180000	30.615000
2006-02-10	43.919998	459.600006	140.809998	39.919998	60.310001	30.865000
2006-02-13	43.700001	456.799988	139.649994	39.770000	59.810001	30.825001
2006-02-14	44.160000	461.200012	141.779999	40.099998	60.070000	31.325001
...	...	...	...	...	...	...
2015-11-18	17.840000	54.980000	193.660004	67.449997	34.250000	55.669998
2015-11-19	17.690001	55.060001	193.029999	67.660004	34.169998	55.970001
2015-11-20	17.650000	54.750000	191.470001	67.540001	33.910000	55.820000
2015-11-23	17.469999	54.279999	189.190002	66.879997	33.639999	55.599998
2015-11-24	17.469999	54.180000	188.669998	66.779999	33.590000	55.279999

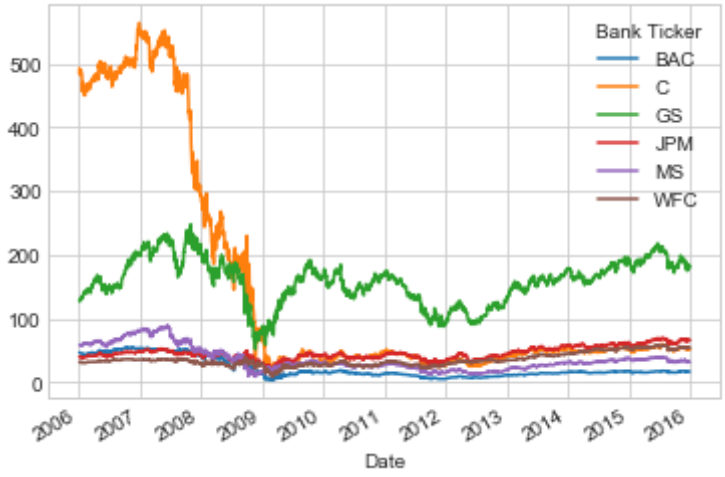
Bank Ticker	BAC	C	GS	JPM	MS	WFC
Date						
2015-11-25	17.440001	54.080002	189.149994	66.860001	33.610001	55.220001
2015-11-27	17.480000	54.209999	190.470001	67.169998	33.779999	55.389999
2015-11-30	17.430000	54.090000	190.020004	66.680000	34.299999	55.099998
2015-12-01	17.809999	54.880001	193.070007	67.610001	35.270000	55.709999
2015-12-02	17.620001	54.139999	190.259995	66.660004	34.889999	55.080002
2015-12-03	17.299999	53.509998	185.199997	65.800003	34.450001	54.200001
2015-12-04	17.799999	55.090000	189.990005	67.889999	35.320000	55.669998
2015-12-07	17.540001	54.400002	185.490005	67.000000	34.680000	55.419998
2015-12-08	17.190001	53.389999	182.919998	65.959999	34.060001	54.400002
2015-12-09	17.100000	52.810001	180.710007	65.459999	33.369999	54.119999
2015-12-10	17.200001	52.650002	182.110001	65.610001	33.419998	54.340000
2015-12-11	16.730000	51.110001	176.559998	64.070000	32.080002	53.310001
2015-12-14	16.799999	51.099998	176.399994	64.269997	31.879999	53.200001
2015-12-15	17.420000	52.520000	182.009995	66.099998	32.840000	54.910000
2015-12-16	17.750000	53.900002	186.210007	67.529999	33.610001	55.849998
2015-12-17	17.299999	52.840000	182.610001	66.279999	32.380001	55.470001
2015-12-18	16.760000	51.209999	175.490005	64.400002	31.290001	53.790001
2015-12-21	16.969999	51.790001	177.750000	65.540001	31.680000	54.020000

Bank Ticker	BAC	C	GS	JPM	MS	WFC
Date						
2015-12-22	17.080000	52.009998	180.050003	65.680000	32.220001	54.340000
2015-12-23	17.340000	52.630001	182.949997	66.730003	32.599998	55.040001
2015-12-24	17.270000	52.709999	182.470001	66.599998	32.480000	54.820000
2015-12-28	17.129999	52.380001	181.619995	66.379997	32.169998	54.680000
2015-12-29	17.280001	52.980000	183.529999	67.070000	32.549999	55.290001
2015-12-30	17.049999	52.299999	182.009995	66.589996	32.230000	54.889999
2015-12-31	16.830000	51.750000	180.229996	66.029999	31.809999	54.360001

2517 rows × 6 columns

In [60]:
```
# Instead of for loop we can do it using cross section with one line

bank_stocks.xs(key='Close', axis=1,level='Stock Info').plot()
```

Out[60]: <matplotlib.axes._subplots.AxesSubplot at 0x2d50345da20>



In [62]:
```
# Finally using plotly to use the same line but in the end to call .iplot()

bank_stocks.xs(key='Close', axis=1,level='Stock Info').iplot()
```

Moving Averages

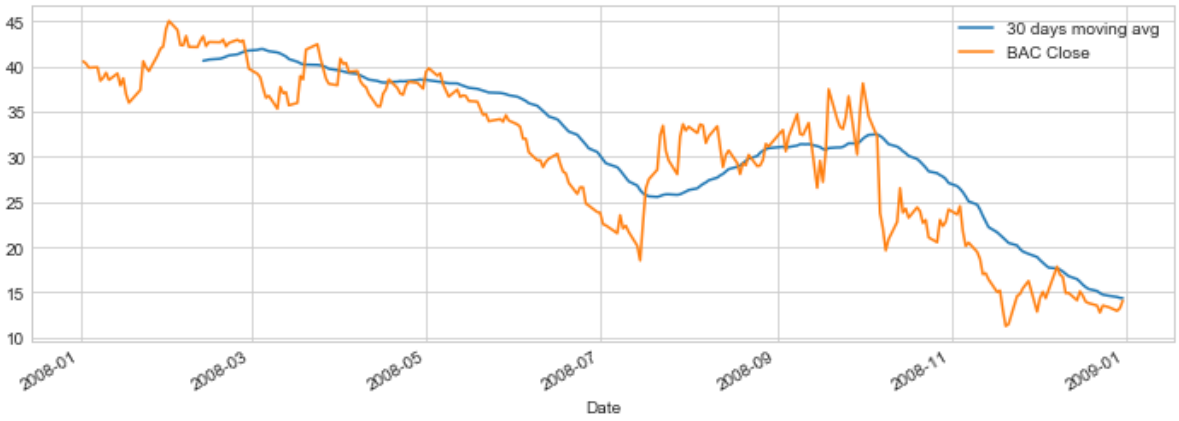
Lets analyze the moving averages for these stocks in the year 2008

Plot the rolling 30 days average agaianst the close price for Bank's of Americas stocks for the year 2008.

In [65]:
```
plt.figure(figsize = (12,4))
BAC['Close'].ix['2008-01-01':'2009-01-01'].rolling(window=30).mean().p
lot(label='30 days moving avg')
BAC['Close'].ix['2008-01-01':'2009-01-01'].plot(label= 'BAC Close')
plt.legend()
```

```
C:\Users\lenovo\Anaconda3\lib\site-packages\ipykernel_launcher.py:2: D
eprecationWarning:


.ix is deprecated. Please use
.loc for label based indexing or
.iloc for positional indexing

See the documentation here:
http://pandas.pydata.org/pandas-docs/stable/indexing.html#ix-indexer-i
s-deprecated

C:\Users\lenovo\Anaconda3\lib\site-packages\ipykernel_launcher.py:3: D
eprecationWarning:


.ix is deprecated. Please use
.loc for label based indexing or
.iloc for positional indexing

See the documentation here:
http://pandas.pydata.org/pandas-docs/stable/indexing.html#ix-indexer-i
s-deprecated
```

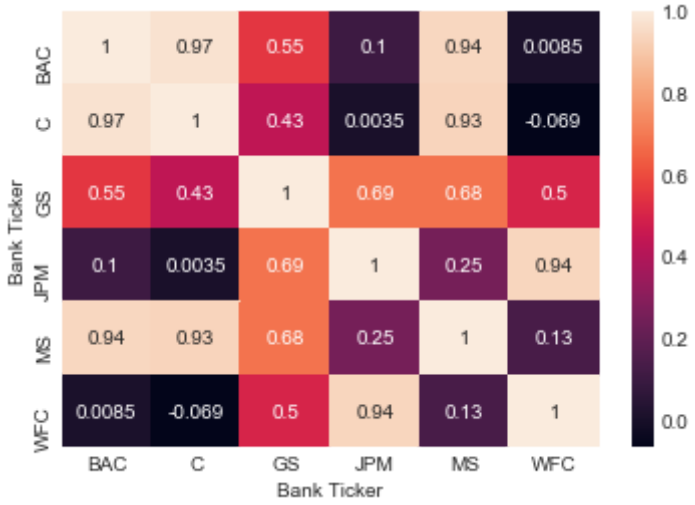
Out[65]:
```
<matplotlib.legend.Legend at 0x2d503b47400>
```



Create a heatmap of the correlation between the stocks Close price.

In [69]:
```
sns.heatmap(bank_stocks.xs(key='Close',axis=1, level='Stock Info').cor
r(),annot=True)
```

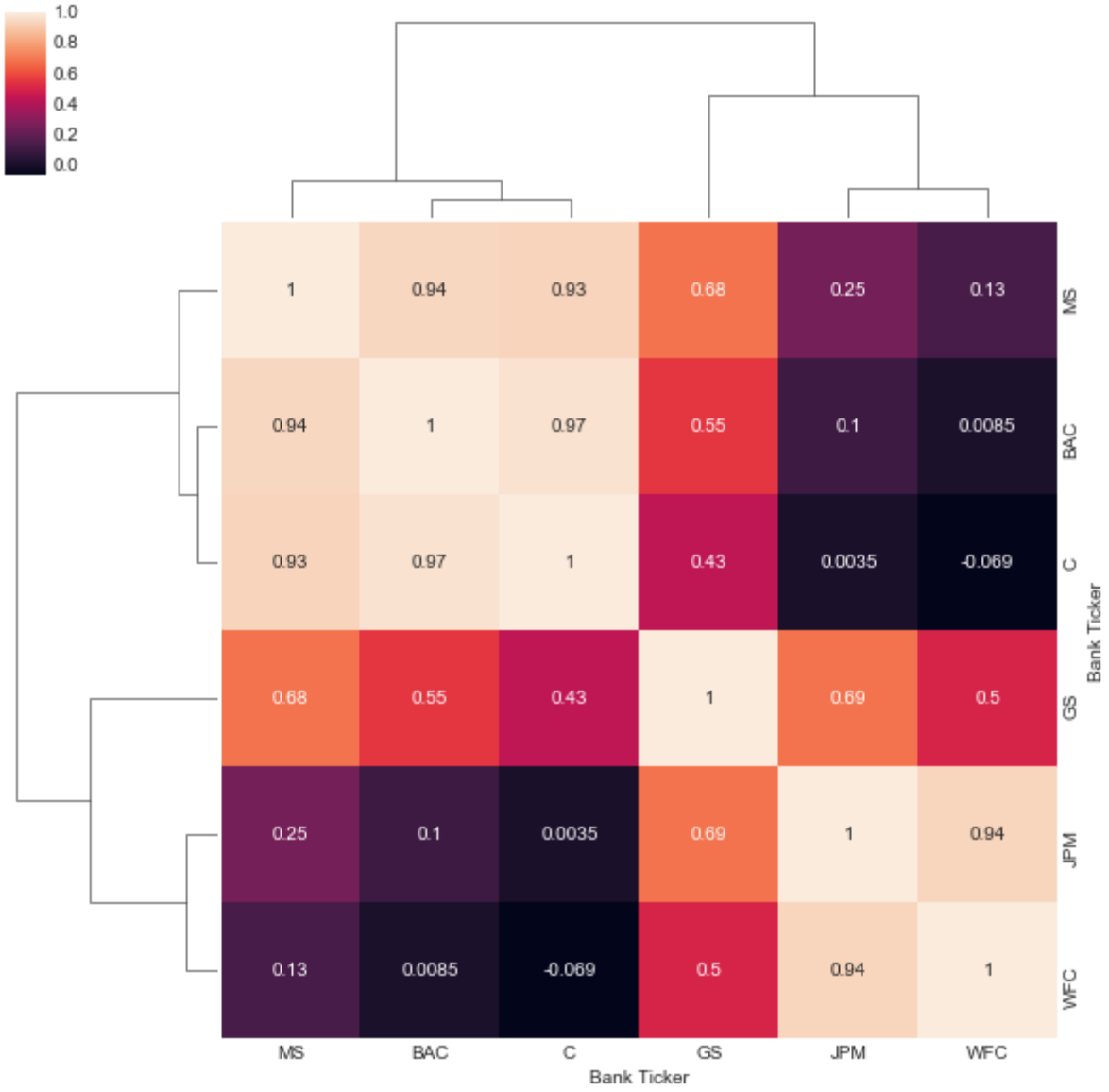
Out[69]: <matplotlib.axes._subplots.AxesSubplot at 0x2d5053ceb70>



Use Seaborn's clustermap to cluster the correlations together:

In [70]:
```
sns.clustermap(bank_stocks.xs(key='Close',axis=1, level='Stock Info').
corr(),annot=True)
```

Out[70]: <seaborn.matrix.ClusterGrid at 0x2d5034490f0>



In this part of the project we are going to create we will rely on the cufflinks to library to create some Technical Analysis plots.

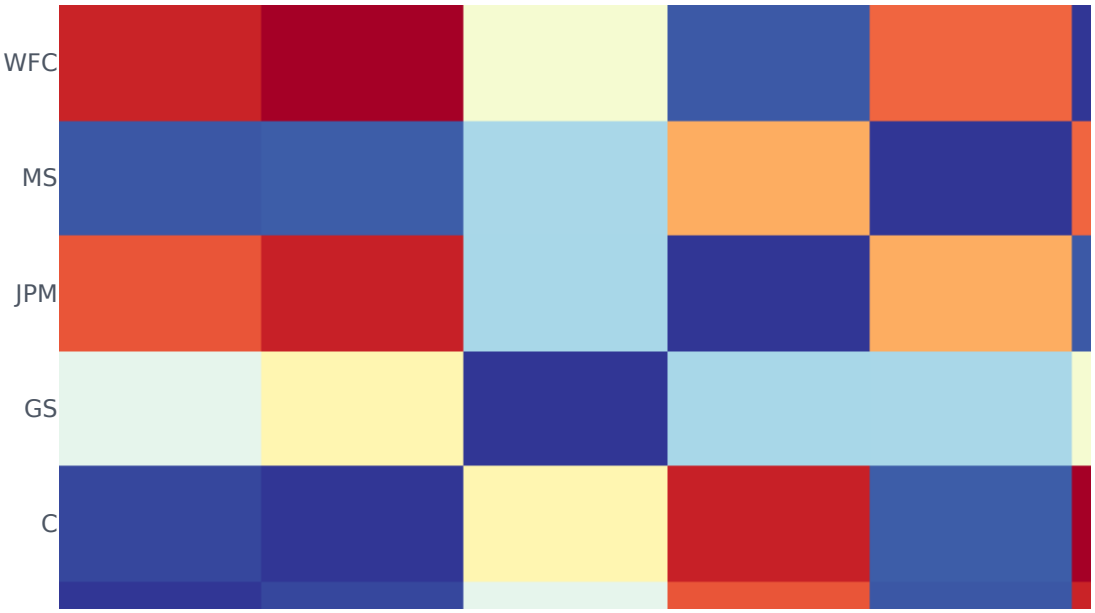
In [73]:
```
close_corr = bank_stocks.xs(key='Close',axis=1, level='Stock Info').co
rr()
```

In [74]:
```
close_corr
```

Out[74]:

Bank Ticker	BAC	C	GS	JPM	MS	WFC
Bank Ticker						
BAC	1.000000	0.971516	0.550898	0.103874	0.944218	0.008542
C	0.971516	1.000000	0.434123	0.003515	0.933609	-0.068536
GS	0.550898	0.434123	1.000000	0.685286	0.683792	0.499897
JPM	0.103874	0.003515	0.685286	1.000000	0.250427	0.940269
MS	0.944218	0.933609	0.683792	0.250427	1.000000	0.131835
WFC	0.008542	-0.068536	0.499897	0.940269	0.131835	1.000000

In [76]:
```
close_corr.iplot(kind='heatmap',colorscale='rdylbu')
```



Use .iplot(kind='candle') to create a candle plot of Bank's of America's stock from Jan 1st 2015 to 1st Jan 2016.

In [78]:
```
bac15 = BAC[['Open','High', 'Low', 'Close']].ix['2015-01-01':'2016-01-01']
bac15.iplot(kind = 'candle')
```

```
C:\Users\lenovo\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: DeprecationWarning:


.ix is deprecated. Please use
.loc for label based indexing or
.iloc for positional indexing

See the documentation here:
http://pandas.pydata.org/pandas-docs/stable/indexing.html#ix-indexer-is-deprecated
```

Use .ta_plot(kind='sme') to create a simple moving Averages plot of Morgan Stanley for the year 2015.

In [80]:
```
MS['Close'].ix['2015-01-01':'2016-01-01'].ta_plot(study='sma', periods
= [13,21,55])
```

```
C:\Users\lenovo\Anaconda3\lib\site-packages\ipykernel_launcher.py:1: D
eprecationWarning:


.ix is deprecated. Please use
.loc for label based indexing or
.iloc for positional indexing

See the documentation here:
http://pandas.pydata.org/pandas-docs/stable/indexing.html#ix-indexer-i
s-deprecated
```