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Finance Data Project

In this data project we will focus on exploratory data analysis of stock prices.

We'll focus on bank stocks and see how they progressed throughout the financial crisis all the way to early 2016.

The Imports

```
from pandas_datareader import data, wb
import pandas as pd
import numpy as np
import datetime
%matplotlib inline

start = datetime.datetime(2006, 1, 1)
end = datetime.datetime(2016, 1, 1)

# Bank of America
BAC = data.DataReader("BAC", 'google', start, end)

# CitiGroup
C = data.DataReader("C", 'google', start, end)

# Goldman Sachs
GS = data.DataReader("GS", 'google', start, end)

# JPMorgan Chase
JPM = data.DataReader("JPM", 'google', start, end)

# Morgan Stanley
MS = data.DataReader("MS", 'google', start, end)

# Wells Fargo
WFC = data.DataReader("WFC", 'google', start, end)

# Could also do this for a Panel Object
df = data.DataReader(['BAC', 'C', 'GS', 'JPM', 'MS', 'WFC'],'google',
start, end)

tickers = ['BAC', 'C', 'GS', 'JPM', 'MS', 'WFC']

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

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

```
bank_stocks.head()

Bank Ticker    BAC                                        C
\
Stock Info    Open   High    Low  Close    Volume   Open   High    Low
Close
Date

2006-01-03   46.92  47.18  46.15  47.08  16296700  490.0  493.8  481.1
492.9
2006-01-04   47.00  47.24  46.45  46.58  17757900  488.6  491.0  483.5
483.8
2006-01-05   46.58  46.83  46.32  46.64  14970900  484.4  487.8  484.0
486.2
2006-01-06   46.80  46.91  46.35  46.57  12599800  488.8  489.0  482.0
486.2
2006-01-09   46.72  46.97  46.36  46.60  15620000  486.0  487.4  483.0
483.9

Bank Ticker              ...        MS
WFC  \
Stock Info    Volume    ...      Open   High    Low  Close   Volume
Open
Date                    ...

2006-01-03   1537660    ...     57.17  58.49  56.74  58.31  5377000
31.60
2006-01-04   1871020    ...     58.70  59.28  58.35  58.35  7977800
31.80
2006-01-05   1143160    ...     58.55  58.59  58.02  58.51  5778000
31.50
2006-01-06   1370250    ...     58.77  58.85  58.05  58.57  6889800
31.58
2006-01-09   1680740    ...     58.63  59.29  58.62  59.19  4144500
31.68

Bank Ticker
Stock Info    High    Low  Close    Volume
Date
2006-01-03   31.98  31.20  31.90  11016400
2006-01-04   31.82  31.36  31.53  10871000
2006-01-05   31.56  31.31  31.50  10158000
2006-01-06   31.78  31.38  31.68   8403800
2006-01-09   31.82  31.56  31.68   5619600

[5 rows x 30 columns]
```

EDA

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

```
Bank Ticker
BAC     54.90
C      564.10
GS     247.92
JPM     70.08
MS      89.30
WFC     58.52
dtype: float64
```

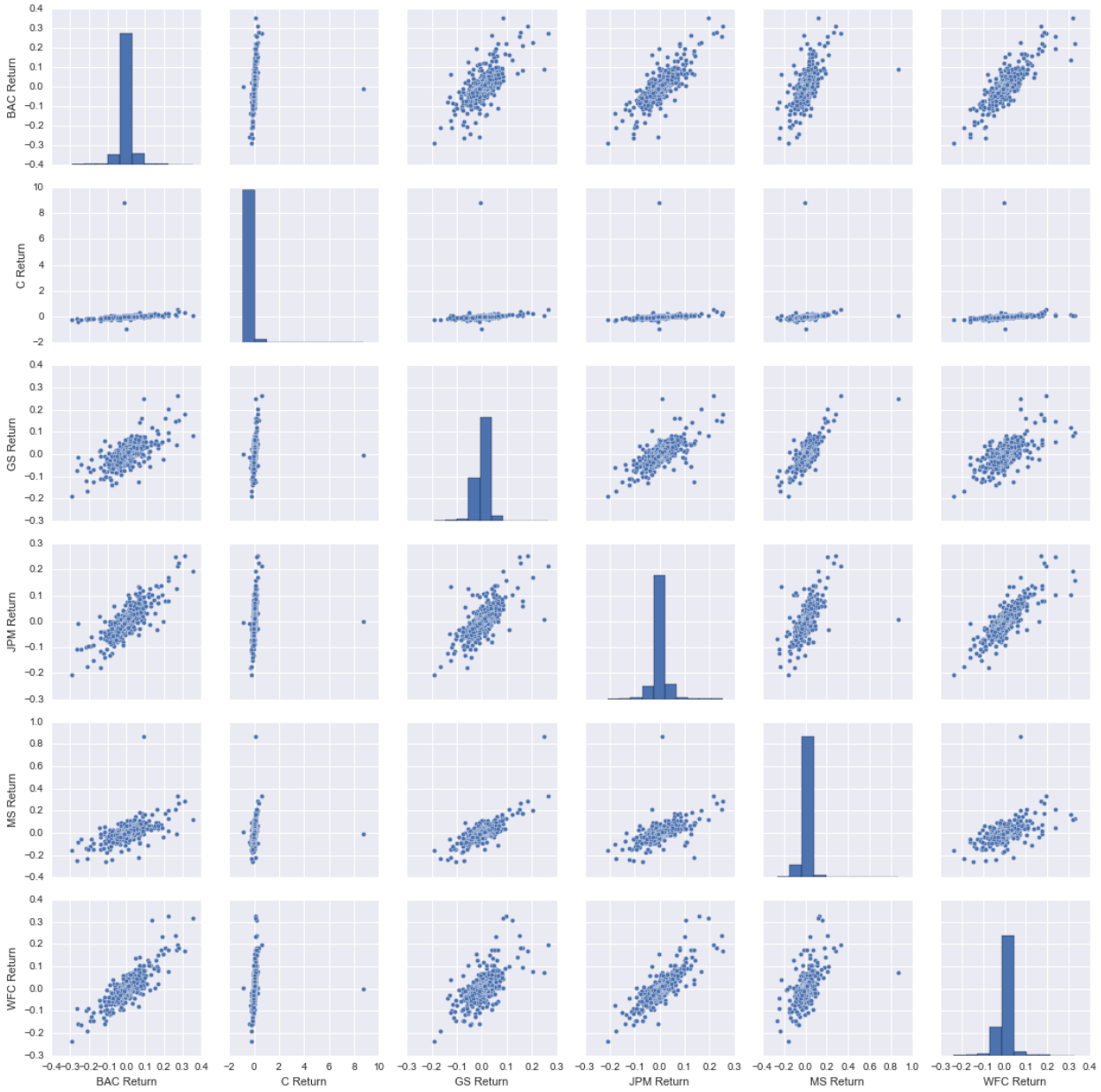
```
returns = pd.DataFrame()
```

```
for tick in tickers:
    returns[tick+' Return'] = bank_stocks[tick]['Close'].pct_change()
returns.head()
```

Date	BAC Return	C Return	GS Return	JPM Return	MS Return	WFC Return
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	-0.000951
2006-01-06	-0.001501	0.000000	0.014169	0.007046	0.001025	0.005714
2006-01-09	0.000644	-0.004731	0.012030	0.016242	0.010586	0.000000

```
#returns[1:]
import seaborn as sns
sns.pairplot(returns[1:])
```

```
<seaborn.axisgrid.PairGrid at 0x113fb4da0>
```




```
returns.idxmin()
```

```
BAC Return   2009-01-20
C Return     2011-05-06
GS Return    2009-01-20
JPM Return   2009-01-20
MS Return    2008-10-09
WFC Return   2009-01-20
dtype: datetime64[ns]
```

Citigroup had a stock split.

```
returns.idxmax()
```

```
BAC Return   2009-04-09
C Return     2011-05-09
GS Return    2008-11-24
JPM Return   2009-01-21
MS Return    2008-10-13
WFC Return   2008-07-16
dtype: datetime64[ns]
```

```
returns.std() # Citigroup riskiest
```

```
BAC Return    0.036650
C Return      0.179969
GS Return     0.025346
JPM Return    0.027656
MS Return     0.037820
WFC Return    0.030233
dtype: float64
```

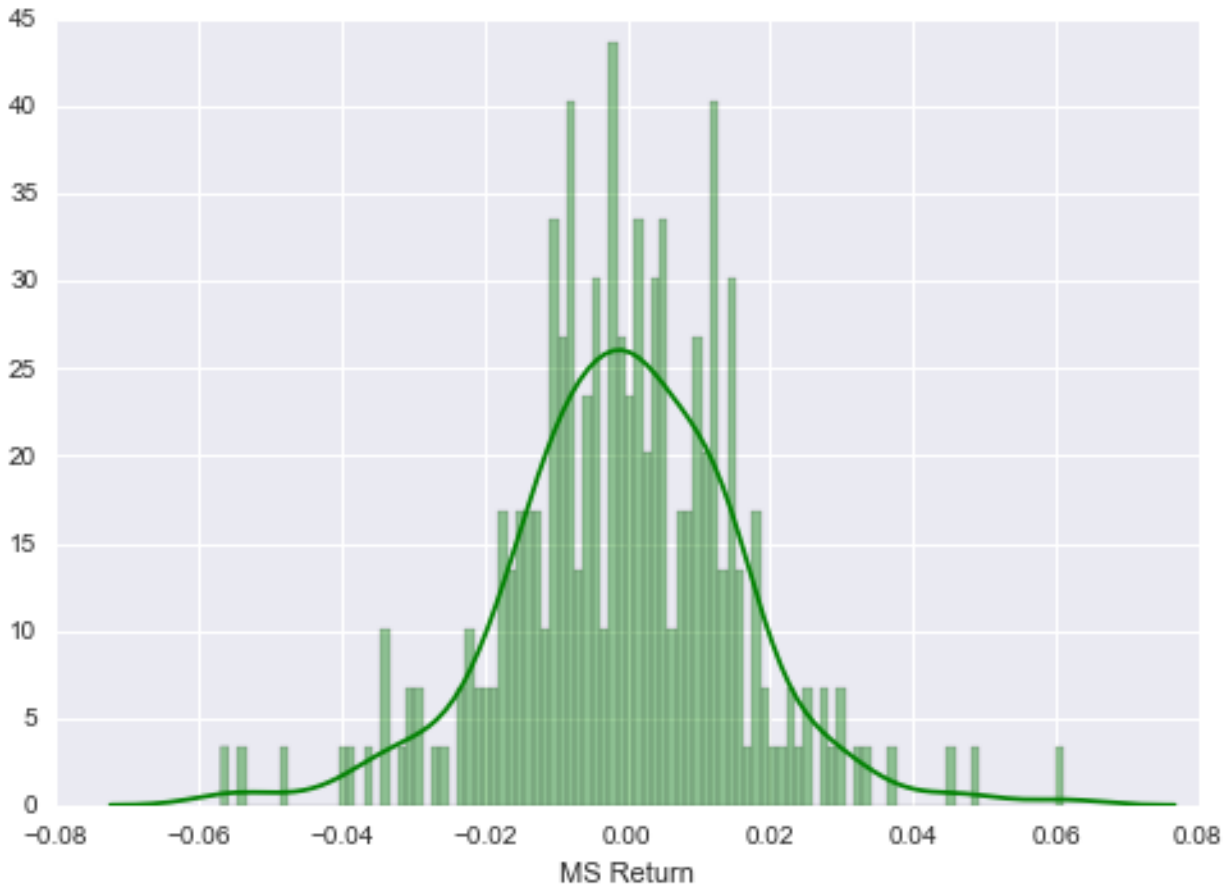
```
returns.ix['2015-01-01':'2015-12-31'].std() # Very similar risk
profiles, but Morgan Stanley or BofA
```

```
BAC Return    0.016163
C Return      0.015289
GS Return     0.014046
JPM Return    0.014017
MS Return     0.016249
WFC Return    0.012591
dtype: float64
```

```
sns.distplot(returns.ix['2015-01-01':'2015-12-31']['MS
Return'],color='green',bins=100)
```

```
/Users/marci/anaconda/lib/python3.5/site-packages/statsmodels/
nonparametric/kdetools.py:20: VisibleDeprecationWarning: using a non-
integer number instead of an integer will result in an error in the
future
  y = X[:m/2+1] + np.r_[0,X[m/2+1:],0]*1j
```

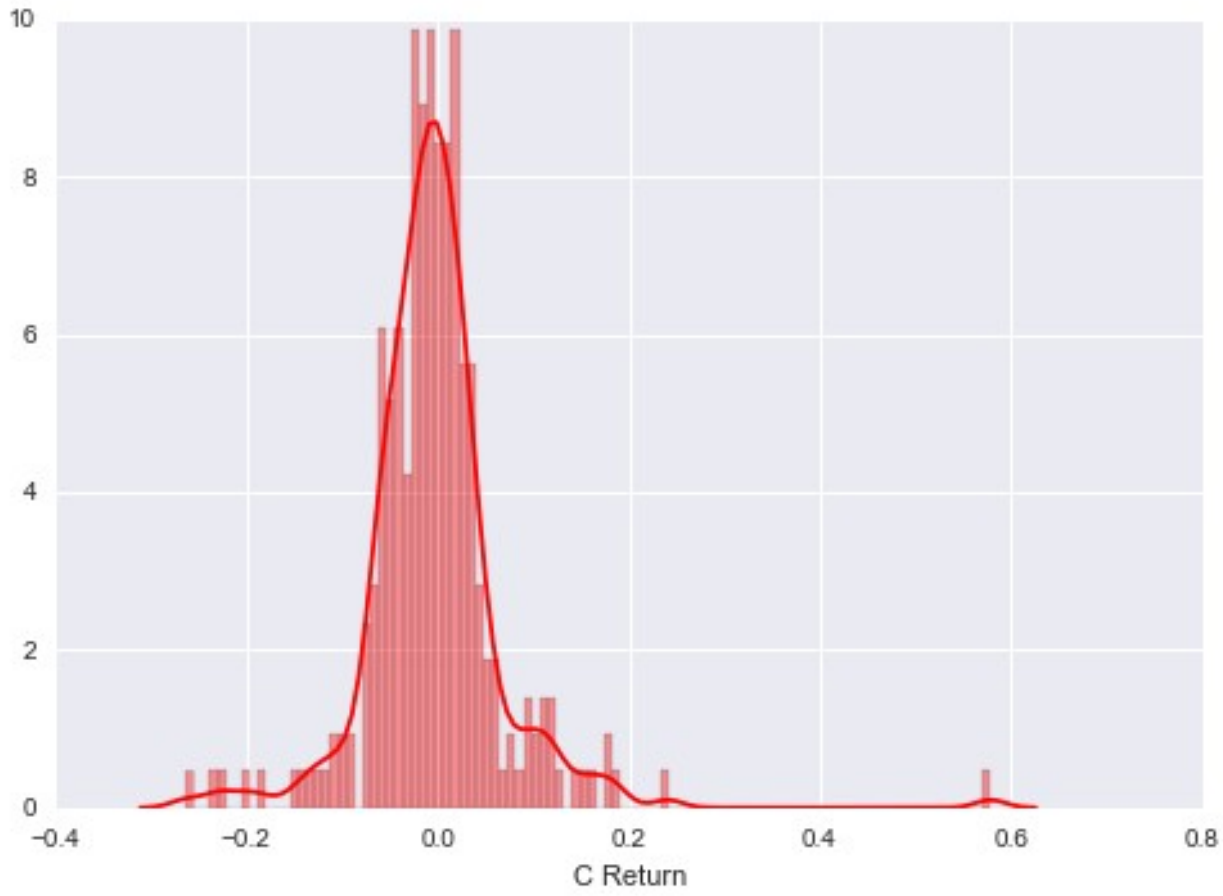
```
<matplotlib.axes._subplots.AxesSubplot at 0x11cc84828>
```




```
sns.distplot(returns.ix['2008-01-01':'2008-12-31']['C
Return'],color='red',bins=100)
```

```
/Users/marci/anaconda/lib/python3.5/site-packages/statsmodels/
nonparametric/kdetools.py:20: VisibleDeprecationWarning: using a non-
integer number instead of an integer will result in an error in the
future
  y = X[:m/2+1] + np.r_[0,X[m/2+1:],0]*1j
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x11efb9518>
```



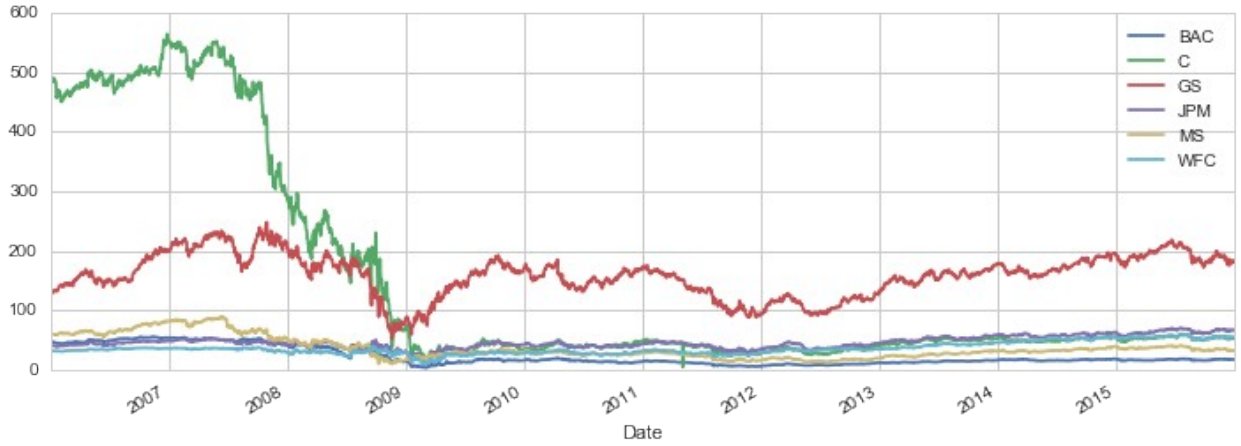

```
import matplotlib.pyplot as plt
import seaborn as sns
sns.set_style('whitegrid')
%matplotlib inline

# Optional Plotly Method Imports
import plotly
import cufflinks as cf
cf.go_offline()
```

```
<IPython.core.display.HTML object>
```

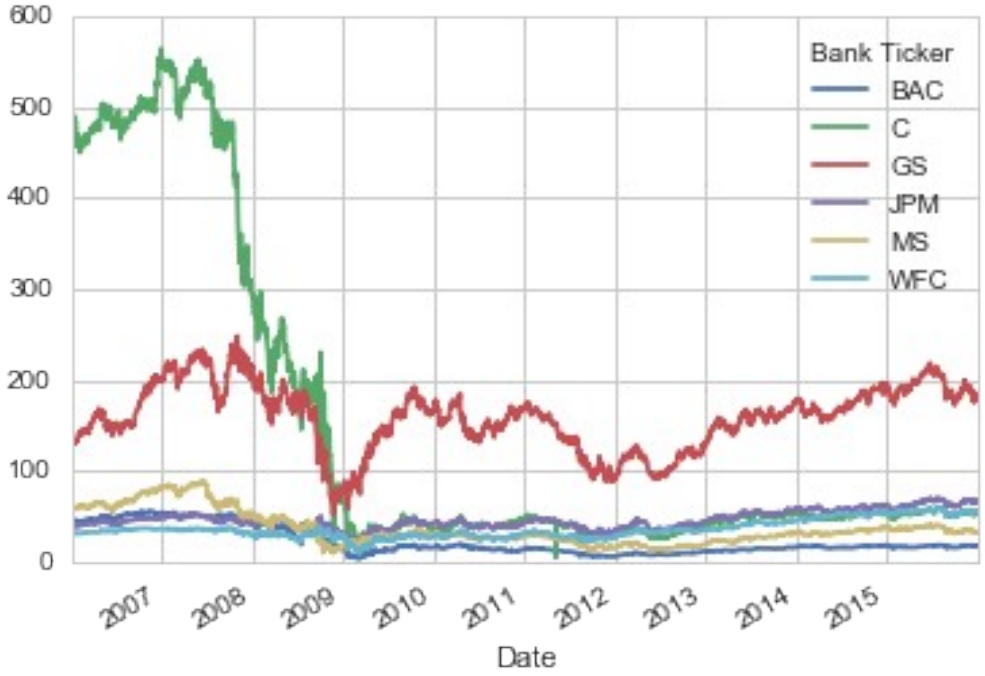
```
for tick in tickers:
    bank_stocks[tick]['Close'].plot(figsize=(12,4),label=tick)
plt.legend()
```

```
<matplotlib.legend.Legend at 0x116137748>
```




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

```
<matplotlib.axes._subplots.AxesSubplot at 0x11f7bd908>
```




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

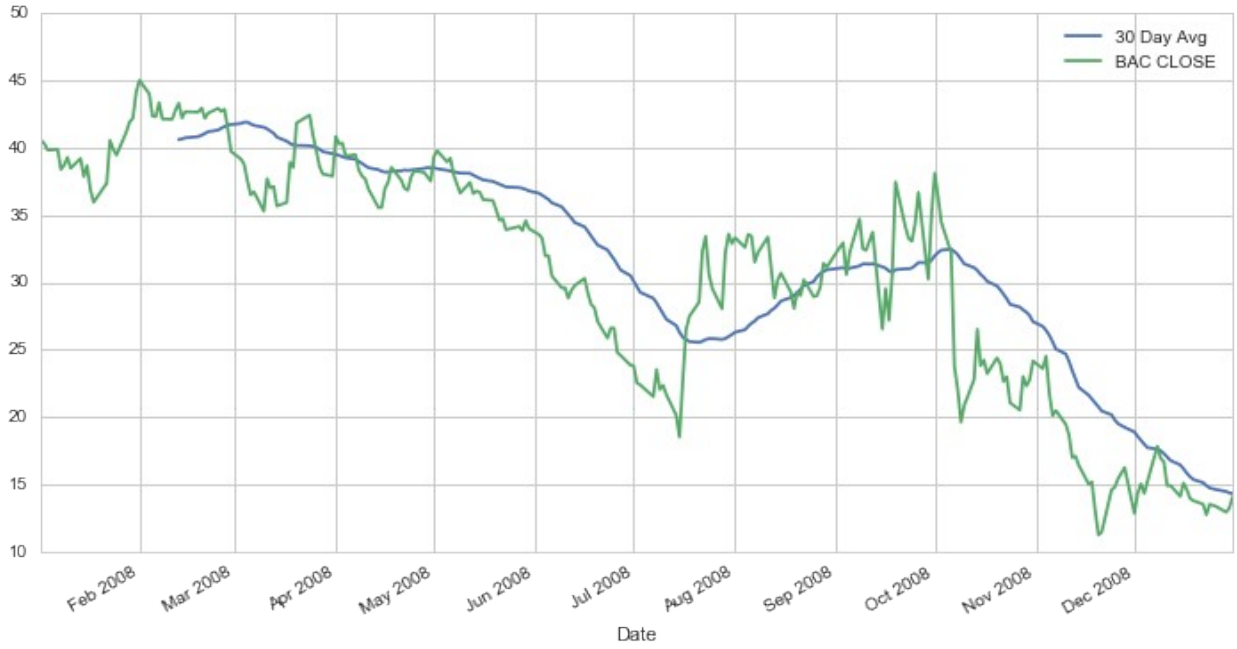
```
<IPython.core.display.HTML object>
```

Moving Averages

Let's analyze the moving averages for these stocks in the year 2008.

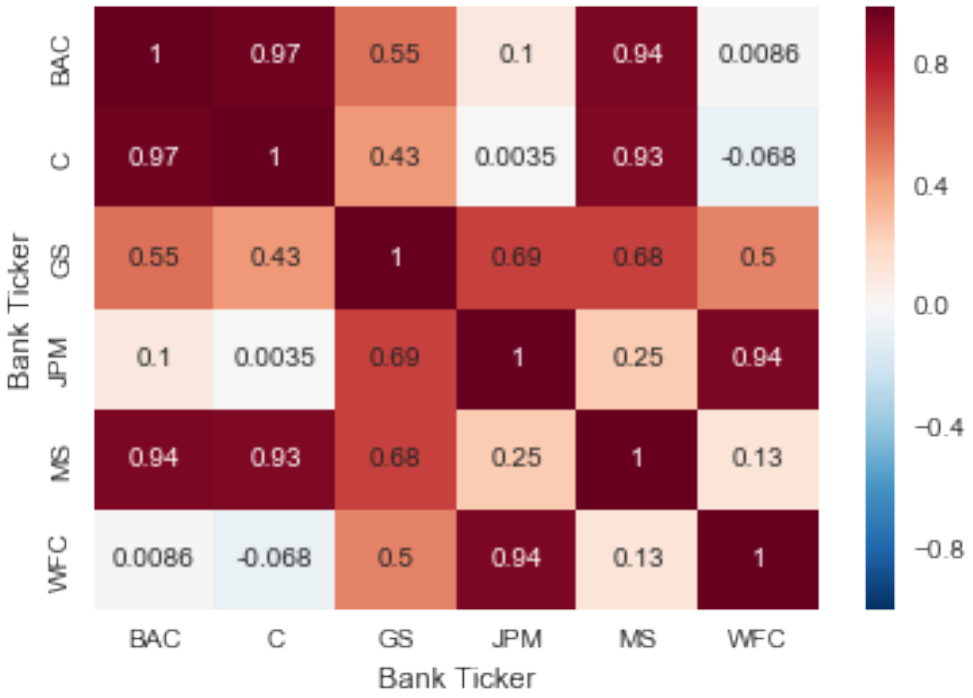
```
plt.figure(figsize=(12,6))
BAC['Close'].ix['2008-01-01':'2009-01-
01'].rolling(window=30).mean().plot(label='30 Day Avg')
BAC['Close'].ix['2008-01-01':'2009-01-01'].plot(label='BAC CLOSE')
plt.legend()
```

```
<matplotlib.legend.Legend at 0x11f966cf8>
```



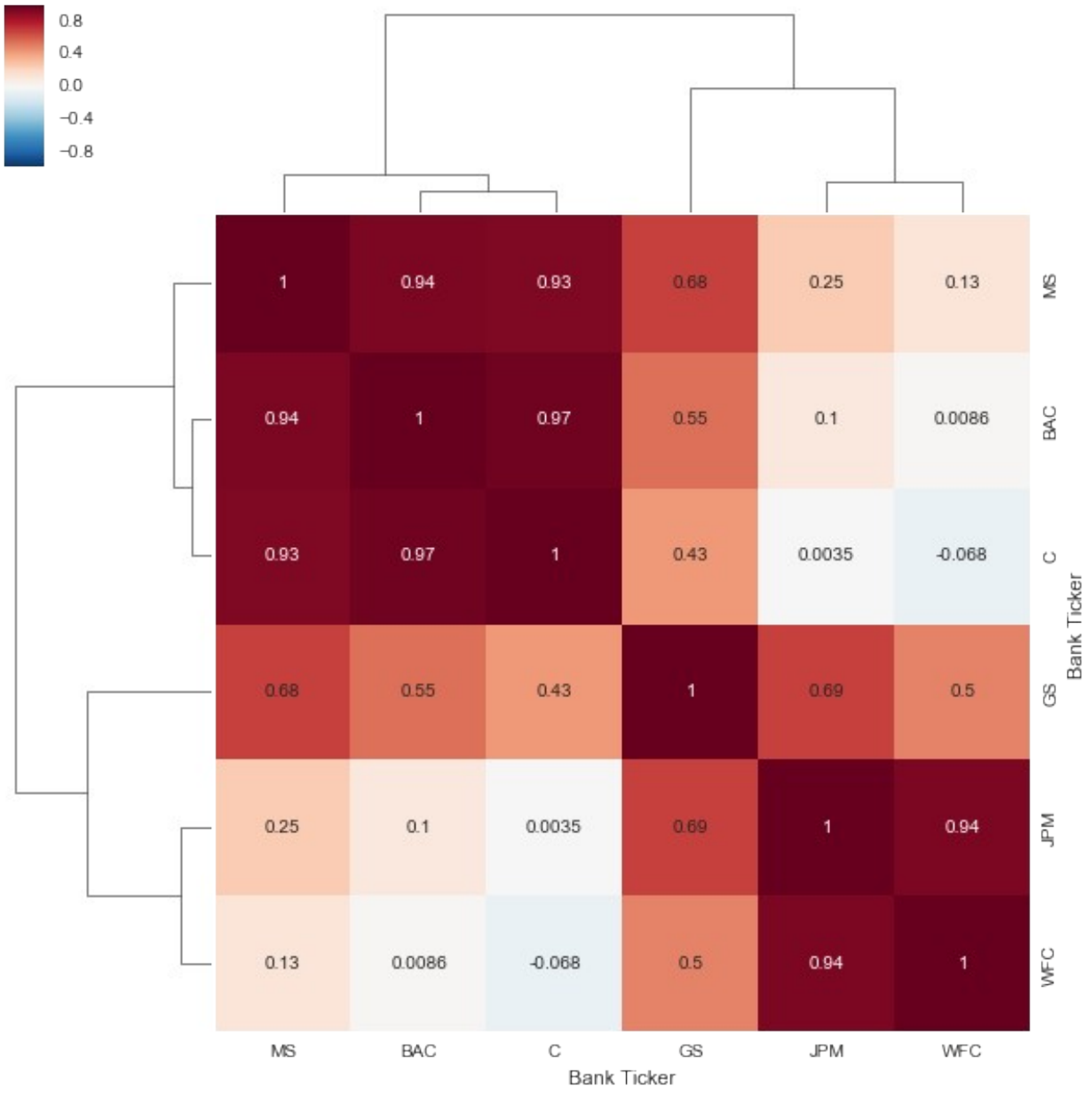

```
sns.heatmap(bank_stocks.xs(key='Close',axis=1,level='Stock
Info').corr(),annot=True)
```

```
<matplotlib.axes._subplots.AxesSubplot at 0x12045e2b0>
```




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

```
<seaborn.matrix.ClusterGrid at 0x1204755c0>
```


0.8
0.4
0.0
−0.4
−0.8
1
0.94
0.93
0.68
0.25
0.13
0.94
1
0.97
0.55
0.1
0.0086
0.93
0.97
1
0.43
0.0035
-0.068
0.68
0.55
0.43
1
0.69
0.5
0.25
0.1
0.0035
0.69
1
0.94
0.13
0.0086
-0.068
0.5
0.94
1
MS
BAC
C
GS
JPM
WFC
Bank Ticker
MS
BAC
C
GS
JPM
WFC
Bank Ticker