

In [1]:

```
# importing libraries
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import nsepy
from datetime import date
from nsepy import get_history
%matplotlib inline

import warnings
warnings.filterwarnings('ignore')
```

In [2]:

```
# ref. code: https://nsepy.readthedocs.io/en/latest/
# getting dataset of infosys.
infosys = get_history(symbol='INFY',
                      start=date(2015,1,1),
                      end=date(2015,12,31))
```

In [3]:

```
infosys.head()
```

Out[3]:

	Symbol	Series	Prev Close	Open	High	Low	Last	Close	VWAP	Volume	Turnover	Trades	Deliverable Volume	%De
Date														
2015-01-01	INFY	EQ	1972.55	1968.95	1982.00	1956.9	1971.00	1974.40	1971.34	500691	9.870306e+13	14908	258080	
2015-01-02	INFY	EQ	1974.40	1972.00	2019.05	1972.0	2017.95	2013.20	2003.25	1694580	3.394669e+14	54166	1249104	
2015-01-05	INFY	EQ	2013.20	2009.90	2030.00	1977.5	1996.00	1995.90	2004.59	2484256	4.979911e+14	82694	1830962	
2015-01-06	INFY	EQ	1995.90	1980.00	1985.00	1934.1	1965.10	1954.20	1954.82	2416829	4.724458e+14	108209	1772070	
2015-01-07	INFY	EQ	1954.20	1965.00	1974.75	1950.0	1966.05	1963.55	1962.59	1812479	3.557162e+14	62463	1317720	

In [4]:

```
infosys.columns
```

Out[4]:

```
Index(['Symbol', 'Series', 'Prev Close', 'Open', 'High', 'Low', 'Last',
      'Close', 'VWAP', 'Volume', 'Turnover', 'Trades', 'Deliverable Volume',
      '%Deliverble'],
      dtype='object')
```

In [5]:

```
#setting index as date
if(infosys.columns.is not 'Date'):
    infosys.insert(0, 'Date', pd.to_datetime(infosys.index, format='%Y-%m-%d') )
infosys.columns
```

Out[5]:

```
Index(['Date', 'Symbol', 'Series', 'Prev Close', 'Open', 'High', 'Low', 'Last',
      'Close', 'VWAP', 'Volume', 'Turnover', 'Trades', 'Deliverable Volume',
      '%Deliverble'],
      dtype='object')
```

In [6]:

```
# getting dataset of tcs
tcs = get_history(symbol='TCS',
                  start=date(2015,1,1),
                  end=date(2015,12,31))

tcs.head()
```

Out[6]:

	Symbol	Series	Prev Close	Open	High	Low	Last	Close	VWAP	Volume	Turnover	Trades	Deliverable Volume	%De
Date														
2015-01-01	TCS	EQ	2558.25	2567.0	2567.00	2541.00	2550.00	2545.55	2548.51	183415	4.674345e+13	8002	52870	
2015-01-02	TCS	EQ	2545.55	2551.0	2590.95	2550.60	2588.40	2579.45	2568.19	462870	1.188740e+14	27585	309350	
2015-01-05	TCS	EQ	2579.45	2581.0	2599.90	2524.65	2538.10	2540.25	2563.94	877121	2.248886e+14	43234	456728	
2015-01-06	TCS	EQ	2540.25	2529.1	2529.10	2440.00	2450.05	2446.60	2466.90	1211892	2.989615e+14	84503	714306	
2015-01-07	TCS	EQ	2446.60	2470.0	2479.15	2407.45	2426.90	2417.70	2433.96	1318166	3.208362e+14	101741	886368	

In [7]:

```
#setting index as date
if(tcs.columns is not 'Date'):
    tcs.insert(0, 'Date', pd.to_datetime(tcs.index,format='%Y-%m-%d') )
print(tcs.columns,'\n')
print(tcs.shape)
```

```
Index(['Date', 'Symbol', 'Series', 'Prev Close', 'Open', 'High', 'Low', 'Last',
      'Close', 'VWAP', 'Volume', 'Turnover', 'Trades', 'Deliverable Volume',
      '%Deliverble'],
      dtype='object')
```

(248, 15)

In [8]:

```
nifty = get_history(symbol="NIFTYIT",
                  start=date(2015,1,1),
                  end=date(2015,12,31),
                  index=True)

nifty.head()
```

Out[8]:

	Open	High	Low	Close	Volume	Turnover
Date						
2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	3.575100e+09
2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09
2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	1.059000e+10
2015-01-06	11186.10	11186.10	10909.00	10959.90	12515739	1.364500e+10
2015-01-07	11013.20	11042.35	10889.55	10916.00	10976356	1.203440e+10

In [9]:

```
nifty.columns
```

Out[9]:

```
Index(['Open', 'High', 'Low', 'Close', 'Volume', 'Turnover'], dtype='object')
```

```
In [10]:
```

```
#setting index as date
if(nifty.columns is not 'Date'):
    nifty.insert(0, 'Date', pd.to_datetime(nifty.index, format='%Y-%m-%d') )
nifty.columns
```

```
Out[10]:
```

```
Index(['Date', 'Open', 'High', 'Low', 'Close', 'Volume', 'Turnover'], dtype='object')
```

## Part 1:

1. Create 4,16,.....,52 week moving average(closing price) for each stock and index. This should happen through a function.

```
In [41]:
```

```
# * Ref.:https://github.com/Atul-Anand-Jha/NSEPY-Time-Series-Forecast/tree/master/pdfs
```

```
In [11]:
```

```
week = [4, 16, 28, 40, 52]
```

```
In [12]:
```

```
def indexing_stocks(stock):
    stock.index = stock['Date']
    return stock.head()
```

```
In [13]:
```

```
indexing_stocks(tcs)
indexing_stocks(infosys)
indexing_stocks(nifty)
```

```
Out[13]:
```

	Date	Open	High	Low	Close	Volume	Turnover
<b>2015-01-01</b>	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	3.575100e+09
<b>2015-01-02</b>	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09
<b>2015-01-05</b>	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	1.059000e+10
<b>2015-01-06</b>	2015-01-06	11186.10	11186.10	10909.00	10959.90	12515739	1.364500e+10
<b>2015-01-07</b>	2015-01-07	11013.20	11042.35	10889.55	10916.00	10976356	1.203440e+10

```
In [14]:
```

```
def plot_time_series(stock, weeks = [4, 16, 28, 40, 52]):

    dummy = pd.DataFrame()
    # First Resampling into Weeks format to calculate for weeks
    dummy['Close'] = stock['Close'].resample('W').mean()

    for i in range(len(weeks)):
        m_a = dummy['Close'].rolling(weeks[i]).mean() # M.A using inbuilt function
        dummy[" Mov.AVG for " + str(weeks[i]) + " Weeks"] = m_a
        print('Calculated Moving Averages: for {0} weeks: \n\n {1}'.format(weeks[i], dummy['Close']
    ))
    dummy.plot(title="Moving Averages for {} \n\n ".format(stock))
```

```
In [15]:
```

```
plot_time_series(tcs)
```

Calculated Moving Averages: for 4 weeks:

Date	
2015-01-04	2562.500000
2015-01-11	2472.130000
2015-01-18	2520.160000
2015-01-25	2508.480000
2015-02-01	2517.087500
2015-02-08	2542.980000
2015-02-15	2482.970000
2015-02-22	2644.262500
2015-03-01	2677.941667
2015-03-08	2721.962500
2015-03-15	2619.490000
2015-03-22	2582.510000
2015-03-29	2562.020000
2015-04-05	2553.583333
2015-04-12	2618.400000
2015-04-19	2585.225000
2015-04-26	2450.250000
2015-05-03	2486.550000
2015-05-10	2506.990000
2015-05-17	2520.940000
2015-05-24	2552.710000
2015-05-31	2608.980000
2015-06-07	2602.010000
2015-06-14	2563.390000
2015-06-21	2522.040000
2015-06-28	2575.840000
2015-07-05	2583.720000
2015-07-12	2568.300000
2015-07-19	2531.880000
2015-07-26	2532.470000
2015-08-02	2499.450000
2015-08-09	2538.200000
2015-08-16	2637.360000
2015-08-23	2704.450000
2015-08-30	2573.610000
2015-09-06	2569.260000
2015-09-13	2545.440000
2015-09-20	2550.212500
2015-09-27	2547.725000
2015-10-04	2603.650000
2015-10-11	2665.810000
2015-10-18	2523.270000
2015-10-25	2520.662500
2015-11-01	2517.460000
2015-11-08	2516.600000
2015-11-15	2448.925000
2015-11-22	2375.500000
2015-11-29	2364.475000
2015-12-06	2354.190000
2015-12-13	2357.400000
2015-12-20	2403.850000
2015-12-27	2427.875000
2016-01-03	2443.412500

Freq: W-SUN, Name: Close, dtype: float64

Calculated Moving Averages: for 16 weeks:

Date	
2015-01-04	2562.500000
2015-01-11	2472.130000
2015-01-18	2520.160000
2015-01-25	2508.480000
2015-02-01	2517.087500
2015-02-08	2542.980000
2015-02-15	2482.970000
2015-02-22	2644.262500
2015-03-01	2677.941667
2015-03-08	2721.962500
2015-03-15	2619.490000
2015-03-22	2582.510000
2015-03-29	2562.020000
2015-04-05	2553.583333

2015-04-05	2553.583333
2015-04-12	2618.400000
2015-04-19	2585.225000
2015-04-26	2450.250000
2015-05-03	2486.550000
2015-05-10	2506.990000
2015-05-17	2520.940000
2015-05-24	2552.710000
2015-05-31	2608.980000
2015-06-07	2602.010000
2015-06-14	2563.390000
2015-06-21	2522.040000
2015-06-28	2575.840000
2015-07-05	2583.720000
2015-07-12	2568.300000
2015-07-19	2531.880000
2015-07-26	2532.470000
2015-08-02	2499.450000
2015-08-09	2538.200000
2015-08-16	2637.360000
2015-08-23	2704.450000
2015-08-30	2573.610000
2015-09-06	2569.260000
2015-09-13	2545.440000
2015-09-20	2550.212500
2015-09-27	2547.725000
2015-10-04	2603.650000
2015-10-11	2665.810000
2015-10-18	2523.270000
2015-10-25	2520.662500
2015-11-01	2517.460000
2015-11-08	2516.600000
2015-11-15	2448.925000
2015-11-22	2375.500000
2015-11-29	2364.475000
2015-12-06	2354.190000
2015-12-13	2357.400000
2015-12-20	2403.850000
2015-12-27	2427.875000
2016-01-03	2443.412500

Freq: W-SUN, Name: Close, dtype: float64  
Calculated Moving Averages: for 28 weeks:

Date	
2015-01-04	2562.500000
2015-01-11	2472.130000
2015-01-18	2520.160000
2015-01-25	2508.480000
2015-02-01	2517.087500
2015-02-08	2542.980000
2015-02-15	2482.970000
2015-02-22	2644.262500
2015-03-01	2677.941667
2015-03-08	2721.962500
2015-03-15	2619.490000
2015-03-22	2582.510000
2015-03-29	2562.020000
2015-04-05	2553.583333
2015-04-12	2618.400000
2015-04-19	2585.225000
2015-04-26	2450.250000
2015-05-03	2486.550000
2015-05-10	2506.990000
2015-05-17	2520.940000
2015-05-24	2552.710000
2015-05-31	2608.980000
2015-06-07	2602.010000
2015-06-14	2563.390000
2015-06-21	2522.040000
2015-06-28	2575.840000
2015-07-05	2583.720000
2015-07-12	2568.300000
2015-07-19	2531.880000
2015-07-26	2532.470000
2015-08-02	2499.450000
2015-08-09	2538.200000
2015-08-16	2637.360000
2015-08-23	2704.450000
2015-08-30	2573.610000
2015-09-06	2569.260000
2015-09-13	2545.440000
2015-09-20	2550.212500
2015-09-27	2547.725000
2015-10-04	2603.650000
2015-10-11	2665.810000
2015-10-18	2523.270000
2015-10-25	2520.662500
2015-11-01	2517.460000
2015-11-08	2516.600000
2015-11-15	2448.925000
2015-11-22	2375.500000
2015-11-29	2364.475000
2015-12-06	2354.190000
2015-12-13	2357.400000
2015-12-20	2403.850000
2015-12-27	2427.875000
2016-01-03	2443.412500

2015-08-23	2704.450000
2015-08-30	2573.610000
2015-09-06	2569.260000
2015-09-13	2545.440000
2015-09-20	2550.212500
2015-09-27	2547.725000
2015-10-04	2603.650000
2015-10-11	2665.810000
2015-10-18	2523.270000
2015-10-25	2520.662500
2015-11-01	2517.460000
2015-11-08	2516.600000
2015-11-15	2448.925000
2015-11-22	2375.500000
2015-11-29	2364.475000
2015-12-06	2354.190000
2015-12-13	2357.400000
2015-12-20	2403.850000
2015-12-27	2427.875000
2016-01-03	2443.412500

Freq: W-SUN, Name: Close, dtype: float64  
Calculated Moving Averages: for 40 weeks:

Date	
2015-01-04	2562.500000
2015-01-11	2472.130000
2015-01-18	2520.160000
2015-01-25	2508.480000
2015-02-01	2517.087500
2015-02-08	2542.980000
2015-02-15	2482.970000
2015-02-22	2644.262500
2015-03-01	2677.941667
2015-03-08	2721.962500
2015-03-15	2619.490000
2015-03-22	2582.510000
2015-03-29	2562.020000
2015-04-05	2553.583333
2015-04-12	2618.400000
2015-04-19	2585.225000
2015-04-26	2450.250000
2015-05-03	2486.550000
2015-05-10	2506.990000
2015-05-17	2520.940000
2015-05-24	2552.710000
2015-05-31	2608.980000
2015-06-07	2602.010000
2015-06-14	2563.390000
2015-06-21	2522.040000
2015-06-28	2575.840000
2015-07-05	2583.720000
2015-07-12	2568.300000
2015-07-19	2531.880000
2015-07-26	2532.470000
2015-08-02	2499.450000
2015-08-09	2538.200000
2015-08-16	2637.360000
2015-08-23	2704.450000
2015-08-30	2573.610000
2015-09-06	2569.260000
2015-09-13	2545.440000
2015-09-20	2550.212500
2015-09-27	2547.725000
2015-10-04	2603.650000
2015-10-11	2665.810000
2015-10-18	2523.270000
2015-10-25	2520.662500
2015-11-01	2517.460000
2015-11-08	2516.600000
2015-11-15	2448.925000
2015-11-22	2375.500000
2015-11-29	2364.475000
2015-12-06	2354.190000
2015-12-13	2357.400000
2015-12-20	2403.850000
2015-12-27	2427.875000
2016-01-03	2443.412500

Freq: W-SUN, Name: Close, dtype: float64  
Calculated Moving Averages: for 52 weeks:

Date	
2015-01-04	2562.500000
2015-01-11	2472.130000
2015-01-18	2520.160000
2015-01-25	2508.480000
2015-02-01	2517.087500
2015-02-08	2542.980000
2015-02-15	2482.970000
2015-02-22	2644.262500
2015-03-01	2677.941667
2015-03-08	2721.962500
2015-03-15	2619.490000
2015-03-22	2582.510000
2015-03-29	2562.020000
2015-04-05	2553.583333
2015-04-12	2618.400000
2015-04-19	2585.225000
2015-04-26	2450.250000
2015-05-03	2486.550000
2015-05-10	2506.990000
2015-05-17	2520.940000
2015-05-24	2552.710000
2015-05-31	2608.980000
2015-06-07	2602.010000
2015-06-14	2563.390000
2015-06-21	2522.040000
2015-06-28	2575.840000
2015-07-05	2583.720000
2015-07-12	2568.300000
2015-07-19	2531.880000
2015-07-26	2532.470000
2015-08-02	2499.450000
2015-08-09	2538.200000
2015-08-16	2637.360000
2015-08-23	2704.450000
2015-08-30	2573.610000
2015-09-06	2569.260000
2015-09-13	2545.440000
2015-09-20	2550.212500
2015-09-27	2547.725000
2015-10-04	2603.650000
2015-10-11	2665.810000
2015-10-18	2523.270000
2015-10-25	2520.662500
2015-11-01	2517.460000
2015-11-08	2516.600000
2015-11-15	2448.925000
2015-11-22	2375.500000
2015-11-29	2364.475000
2015-12-06	2354.190000
2015-12-13	2357.400000
2015-12-20	2403.850000
2015-12-27	2427.875000
2016-01-03	2443.412500

Freq: W-SUN, Name: Close, dtype: float64

Moving Averages for	Date	Symbol	Series	Prev Close	Open	High	Low \
2015-01-01	2015-01-01	TCS	EQ	2558.25	2567.00	2567.00	2541.00
2015-01-02	2015-01-02	TCS	EQ	2545.55	2551.00	2590.95	2550.60
2015-01-05	2015-01-05	TCS	EQ	2579.45	2581.00	2599.90	2524.65
2015-01-06	2015-01-06	TCS	EQ	2540.25	2529.10	2529.10	2440.00
2015-01-07	2015-01-07	TCS	EQ	2446.60	2470.00	2479.15	2407.45
2015-01-08	2015-01-08	TCS	EQ	2417.70	2442.40	2449.00	2420.55
2015-01-09	2015-01-09	TCS	EQ	2443.80	2455.00	2519.90	2450.00
2015-01-12	2015-01-12	TCS	EQ	2512.30	2517.00	2528.00	2480.25
2015-01-13	2015-01-13	TCS	EQ	2509.70	2520.00	2530.40	2480.10
2015-01-14	2015-01-14	TCS	EQ	2497.90	2516.00	2531.80	2500.50
2015-01-15	2015-01-15	TCS	EQ	2521.95	2533.00	2581.75	2523.25
2015-01-16	2015-01-16	TCS	EQ	2539.10	2543.70	2545.00	2484.30
2015-01-19	2015-01-19	TCS	EQ	2532.15	2536.00	2551.00	2503.00
2015-01-20	2015-01-20	TCS	EQ	2511.00	2520.00	2530.00	2483.25
2015-01-21	2015-01-21	TCS	EQ	2500.45	2522.00	2522.00	2488.25
2015-01-22	2015-01-22	TCS	EQ	2513.80	2516.50	2521.25	2495.50
2015-01-23	2015-01-23	TCS	EQ	2513.55	2514.00	2532.05	2496.10
2015-01-27	2015-01-27	TCS	EQ	2503.60	2512.35	2515.00	2480.55

2015-01-27	2015-01-27	TCS	EQ	2503.00	2512.33	2513.00	2489.33
2015-01-28	2015-01-28	TCS	EQ	2502.05	2503.00	2544.90	2502.90
2015-01-29	2015-01-29	TCS	EQ	2539.60	2538.00	2568.70	2512.90
2015-01-30	2015-01-30	TCS	EQ	2544.65	2560.70	2575.00	2470.00
2015-02-02	2015-02-02	TCS	EQ	2482.05	2482.00	2521.45	2462.05
2015-02-03	2015-02-03	TCS	EQ	2514.20	2511.65	2565.00	2507.10
2015-02-04	2015-02-04	TCS	EQ	2558.25	2568.00	2571.70	2502.10
2015-02-05	2015-02-05	TCS	EQ	2514.30	2520.00	2591.70	2519.00
2015-02-06	2015-02-06	TCS	EQ	2552.40	2553.00	2594.80	2550.85
2015-02-09	2015-02-09	TCS	EQ	2575.75	2561.50	2569.10	2500.00
2015-02-10	2015-02-10	TCS	EQ	2512.90	2510.00	2526.25	2433.00
2015-02-11	2015-02-11	TCS	EQ	2441.15	2455.05	2487.25	2447.25
2015-02-12	2015-02-12	TCS	EQ	2459.90	2479.80	2479.80	2447.00

2015-11-18	2015-11-18	TCS	EQ	2390.55	2388.90	2388.90	2346.00
2015-11-19	2015-11-19	TCS	EQ	2351.45	2365.35	2381.60	2352.00
2015-11-20	2015-11-20	TCS	EQ	2362.55	2366.50	2423.55	2361.95
2015-11-23	2015-11-23	TCS	EQ	2398.35	2405.30	2413.40	2382.25
2015-11-24	2015-11-24	TCS	EQ	2391.05	2380.05	2392.45	2365.50
2015-11-26	2015-11-26	TCS	EQ	2367.95	2377.90	2382.40	2337.85
2015-11-27	2015-11-27	TCS	EQ	2345.55	2348.00	2359.45	2332.50
2015-11-30	2015-11-30	TCS	EQ	2353.35	2365.00	2391.25	2350.15
2015-12-01	2015-12-01	TCS	EQ	2364.70	2362.90	2378.05	2357.05
2015-12-02	2015-12-02	TCS	EQ	2361.90	2378.00	2378.10	2346.50
2015-12-03	2015-12-03	TCS	EQ	2365.20	2360.00	2373.00	2347.00
2015-12-04	2015-12-04	TCS	EQ	2350.75	2340.00	2347.30	2321.10
2015-12-07	2015-12-07	TCS	EQ	2328.40	2332.20	2343.90	2315.25
2015-12-08	2015-12-08	TCS	EQ	2319.80	2319.40	2349.00	2317.30
2015-12-09	2015-12-09	TCS	EQ	2329.00	2337.90	2372.80	2320.00
2015-12-10	2015-12-10	TCS	EQ	2367.65	2369.00	2391.20	2352.00
2015-12-11	2015-12-11	TCS	EQ	2384.55	2383.00	2391.95	2363.25
2015-12-14	2015-12-14	TCS	EQ	2386.00	2335.20	2387.00	2330.60
2015-12-15	2015-12-15	TCS	EQ	2378.45	2378.45	2385.00	2363.05
2015-12-16	2015-12-16	TCS	EQ	2375.85	2384.00	2414.50	2384.00
2015-12-17	2015-12-17	TCS	EQ	2408.40	2415.00	2445.00	2393.35
2015-12-18	2015-12-18	TCS	EQ	2439.75	2420.00	2434.20	2400.65
2015-12-21	2015-12-21	TCS	EQ	2416.80	2419.95	2450.00	2406.85
2015-12-22	2015-12-22	TCS	EQ	2446.40	2440.00	2440.00	2400.00
2015-12-23	2015-12-23	TCS	EQ	2405.05	2415.00	2435.00	2410.55
2015-12-24	2015-12-24	TCS	EQ	2425.80	2421.00	2438.20	2404.00
2015-12-28	2015-12-28	TCS	EQ	2434.25	2428.00	2466.40	2420.20
2015-12-29	2015-12-29	TCS	EQ	2462.70	2458.35	2465.30	2445.75
2015-12-30	2015-12-30	TCS	EQ	2455.80	2453.05	2459.00	2412.30
2015-12-31	2015-12-31	TCS	EQ	2418.30	2415.75	2448.50	2407.50

	Last Date	Close	VWAP	Volume	Turnover	Trades \
2015-01-01	2550.00	2545.55	2548.51	183415	4.674345e+13	8002
2015-01-02	2588.40	2579.45	2568.19	462870	1.188740e+14	27585
2015-01-05	2538.10	2540.25	2563.94	877121	2.248886e+14	43234
2015-01-06	2450.05	2446.60	2466.90	1211892	2.989615e+14	84503
2015-01-07	2426.90	2417.70	2433.96	1318166	3.208362e+14	101741
2015-01-08	2446.00	2443.80	2434.81	782704	1.905739e+14	47699
2015-01-09	2510.00	2512.30	2490.01	1598821	3.981082e+14	81743
2015-01-12	2527.95	2509.70	2497.82	798003	1.993266e+14	58810
2015-01-13	2498.00	2497.90	2509.40	734216	1.842440e+14	49993
2015-01-14	2525.05	2521.95	2517.54	893548	2.249546e+14	69237
2015-01-15	2542.05	2539.10	2550.97	2504960	6.390076e+14	96363
2015-01-16	2526.00	2532.15	2511.39	2646915	6.647444e+14	127847
2015-01-19	2509.00	2511.00	2516.06	567537	1.427954e+14	38860
2015-01-20	2498.00	2500.45	2498.94	1029283	2.572121e+14	58066
2015-01-21	2518.00	2513.80	2507.75	1155240	2.897055e+14	75976
2015-01-22	2511.00	2513.55	2509.31	1056607	2.651355e+14	74837
2015-01-23	2504.10	2503.60	2507.34	1575190	3.949530e+14	94619
2015-01-27	2504.20	2502.05	2502.26	1369368	3.426510e+14	71406
2015-01-28	2533.40	2539.60	2529.32	1560990	3.948240e+14	101994
2015-01-29	2560.70	2544.65	2531.88	1867196	4.727520e+14	67497
2015-01-30	2484.00	2482.05	2494.94	2908701	7.257025e+14	119200
2015-02-02	2516.00	2514.20	2500.60	1590901	3.978211e+14	89485
2015-02-03	2552.25	2558.25	2536.23	1172527	2.973793e+14	75106
2015-02-04	2514.95	2514.30	2523.08	1122709	2.832687e+14	60615
2015-02-05	2553.00	2552.40	2558.13	2265084	5.794386e+14	77935
2015-02-06	2576.10	2575.75	2578.40	1068208	2.754265e+14	82449
2015-02-09	2512.00	2512.90	2531.83	1038216	2.628585e+14	72967
2015-02-10	2445.50	2441.15	2473.88	1899527	4.699201e+14	114773
2015-02-11	2460.00	2459.90	2468.94	1468761	3.626283e+14	115345
2015-02-12	2469.00	2462.15	2462.56	1553990	3.826787e+14	113845
2015-11-18	2349.65	2351.45	2358.29	760176	1.792717e+14	43678
2015-11-19	2367.00	2362.55	2366.14	933453	2.208681e+14	55764
2015-11-20	2394.50	2398.35	2403.22	1006063	2.417790e+14	60130
2015-11-23	2389.30	2391.05	2397.62	544041	1.304405e+14	42359
2015-11-24	2366.00	2367.95	2378.62	499320	1.187695e+14	35776
2015-11-26	2346.00	2345.55	2355.52	1457646	3.433509e+14	77452
2015-11-27	2354.95	2353.35	2348.70	868603	2.040086e+14	62719
2015-11-30	2373.55	2364.70	2365.21	2050024	4.848745e+14	85439
2015-12-01	2359.75	2361.90	2363.85	860997	2.035267e+14	51511
2015-12-02	2367.00	2365.20	2362.86	820148	1.937896e+14	38694



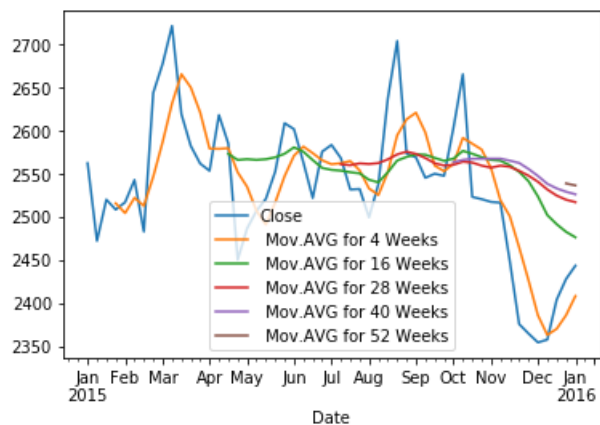
2015-12-03	2350.00	2350.75	2356.59	1141679	2.690468e+14	41715
2015-12-04	2330.00	2328.40	2330.08	623046	1.451747e+14	32999
2015-12-07	2321.00	2319.80	2322.27	691302	1.605390e+14	52150
2015-12-08	2326.25	2329.00	2332.95	569982	1.329739e+14	47957
2015-12-09	2370.00	2367.65	2361.23	2641403	6.236954e+14	59592
2015-12-10	2380.95	2384.55	2374.82	861994	2.047084e+14	52429
2015-12-11	2383.15	2386.00	2384.13	826189	1.969746e+14	53651
2015-12-14	2375.00	2378.45	2364.84	1359266	3.214443e+14	58637
2015-12-15	2379.50	2375.85	2375.03	567934	1.348859e+14	52585
2015-12-16	2407.50	2408.40	2402.07	717967	1.724609e+14	48074
2015-12-17	2434.10	2439.75	2418.57	809422	1.957647e+14	46818
2015-12-18	2409.80	2416.80	2416.02	1512485	3.654198e+14	47644
2015-12-21	2443.00	2446.40	2428.40	805052	1.954989e+14	41004
2015-12-22	2407.00	2405.05	2413.33	780429	1.883430e+14	30995
2015-12-23	2418.80	2425.80	2425.06	424917	1.030449e+14	31057
2015-12-24	2435.00	2434.25	2424.03	421580	1.021924e+14	21932
2015-12-28	2456.95	2462.70	2455.00	1852099	4.546896e+14	43390
2015-12-29	2449.35	2455.80	2452.26	854262	2.094875e+14	26975
2015-12-30	2421.70	2418.30	2442.06	802881	1.960682e+14	49464
2015-12-31	2430.00	2436.85	2428.90	620159	1.506303e+14	42600

Deliverable Volume %Deliverble

Date

2015-01-01	52870	0.2883
2015-01-02	309350	0.6683
2015-01-05	456728	0.5207
2015-01-06	714306	0.5894
2015-01-07	886368	0.6724
2015-01-08	450768	0.5759
2015-01-09	865777	0.5415
2015-01-12	451228	0.5654
2015-01-13	386133	0.5259
2015-01-14	498193	0.5575
2015-01-15	1598846	0.6383
2015-01-16	1372200	0.5184
2015-01-19	309156	0.5447
2015-01-20	733487	0.7126
2015-01-21	771316	0.6677
2015-01-22	742399	0.7026
2015-01-23	1205911	0.7656
2015-01-27	1079233	0.7881
2015-01-28	1142166	0.7317
2015-01-29	1547590	0.8288
2015-01-30	2355497	0.8098
2015-02-02	1171718	0.7365
2015-02-03	701449	0.5982
2015-02-04	807091	0.7189
2015-02-05	1638106	0.7232
2015-02-06	582019	0.5449
2015-02-09	695542	0.6699
2015-02-10	1383973	0.7286
2015-02-11	1143243	0.7784
2015-02-12	1269759	0.8171
...	...	...
2015-11-18	506662	0.6665
2015-11-19	632570	0.6777
2015-11-20	575994	0.5725
2015-11-23	351815	0.6467
2015-11-24	342427	0.6858
2015-11-26	969589	0.6652
2015-11-27	518858	0.5973
2015-11-30	1102521	0.5378
2015-12-01	672976	0.7816
2015-12-02	580713	0.7081
2015-12-03	765969	0.6709
2015-12-04	426970	0.6853
2015-12-07	487587	0.7053
2015-12-08	336913	0.5911
2015-12-09	1365071	0.5168
2015-12-10	556996	0.6462
2015-12-11	598804	0.7248
2015-12-14	758806	0.5582
2015-12-15	421587	0.7423
2015-12-16	494205	0.6883
2015-12-17	569320	0.7034
2015-12-18	1052042	0.6956
2015-12-21	425890	0.5290
2015-12-22	476137	0.6101
2015-12-23	253475	0.5965
2015-12-24	188670	0.4475
2015-12-28	1060100	0.5724
2015-12-29	433986	0.5080
2015-12-30	632180	0.7874
2015-12-31	400391	0.6456

[248 rows x 15 columns]



In [16]:

```
plot_time_series(infosys)
```

Calculated Moving Averages: for 4 weeks:

Date	
2015-01-04	1993.800000
2015-01-11	1992.310000
2015-01-18	2117.210000
2015-01-25	2161.620000
2015-02-01	2142.112500
2015-02-08	2164.980000
2015-02-15	2283.870000
2015-02-22	2295.762500
2015-03-01	2279.383333
2015-03-08	2277.950000
2015-03-15	2201.790000
2015-03-22	2244.910000
2015-03-29	2202.500000
2015-04-05	2206.766667
2015-04-12	2197.440000
2015-04-19	2206.600000
2015-04-26	2105.930000
2015-05-03	1962.237500
2015-05-10	1955.970000
2015-05-17	1958.800000
2015-05-24	2031.520000
2015-05-31	2006.470000
2015-06-07	2023.410000
2015-06-14	1998.270000
2015-06-21	996.560000
2015-06-28	1003.010000
2015-07-05	990.040000
2015-07-12	959.360000
2015-07-19	979.260000
2015-07-26	1080.530000
2015-08-02	1072.120000
2015-08-09	1081.020000
2015-08-16	1129.360000
2015-08-23	1153.300000
2015-08-30	1087.230000
2015-09-06	1091.230000
2015-09-13	1075.490000
2015-09-20	1101.262500
2015-09-27	1117.225000
2015-10-04	1140.600000
2015-10-11	1153.820000
2015-10-18	1102.430000
2015-10-25	1131.550000
2015-11-01	1147.050000
2015-11-08	1134.940000
2015-11-15	1111.712500
2015-11-22	1052.380000
2015-11-29	1053.400000
2015-12-06	1066.880000
2015-12-13	1043.800000
2015-12-20	1086.630000

```
2015-12-27      1096.100000
2015-12-27      1096.100000
2016-01-03      1100.287500
Freq: W-SUN, Name: Close, dtype: float64
Calculated Moving Averages: for 16 weeks:
```

Date	
2015-01-04	1993.800000
2015-01-11	1992.310000
2015-01-18	2117.210000
2015-01-25	2161.620000
2015-02-01	2142.112500
2015-02-08	2164.980000
2015-02-15	2283.870000
2015-02-22	2295.762500
2015-03-01	2279.383333
2015-03-08	2277.950000
2015-03-15	2201.790000
2015-03-22	2244.910000
2015-03-29	2202.500000
2015-04-05	2206.766667
2015-04-12	2197.440000
2015-04-19	2206.600000
2015-04-26	2105.930000
2015-05-03	1962.237500
2015-05-10	1955.970000
2015-05-17	1958.800000
2015-05-24	2031.520000
2015-05-31	2006.470000
2015-06-07	2023.410000
2015-06-14	1998.270000
2015-06-21	996.560000
2015-06-28	1003.010000
2015-07-05	990.040000
2015-07-12	959.360000
2015-07-19	979.260000
2015-07-26	1080.530000
2015-08-02	1072.120000
2015-08-09	1081.020000
2015-08-16	1129.360000
2015-08-23	1153.300000
2015-08-30	1087.230000
2015-09-06	1091.230000
2015-09-13	1075.490000
2015-09-20	1101.262500
2015-09-27	1117.225000
2015-10-04	1140.600000
2015-10-11	1153.820000
2015-10-18	1102.430000
2015-10-25	1131.550000
2015-11-01	1147.050000
2015-11-08	1134.940000
2015-11-15	1111.712500
2015-11-22	1052.380000
2015-11-29	1053.400000
2015-12-06	1066.880000
2015-12-13	1043.800000
2015-12-20	1086.630000
2015-12-27	1096.100000
2016-01-03	1100.287500

```
Freq: W-SUN, Name: Close, dtype: float64
Calculated Moving Averages: for 28 weeks:
```

Date	
2015-01-04	1993.800000
2015-01-11	1992.310000
2015-01-18	2117.210000
2015-01-25	2161.620000
2015-02-01	2142.112500
2015-02-08	2164.980000
2015-02-15	2283.870000
2015-02-22	2295.762500
2015-03-01	2279.383333
2015-03-08	2277.950000
2015-03-15	2201.790000
2015-03-22	2244.910000
2015-03-29	2202.500000
2015-04-05	2206.766667

2015-04-03	2200.700000
2015-04-12	2197.440000
2015-04-19	2206.600000
2015-04-26	2105.930000
2015-05-03	1962.237500
2015-05-10	1955.970000
2015-05-17	1958.800000
2015-05-24	2031.520000
2015-05-31	2006.470000
2015-06-07	2023.410000
2015-06-14	1998.270000
2015-06-21	996.560000
2015-06-28	1003.010000
2015-07-05	990.040000
2015-07-12	959.360000
2015-07-19	979.260000
2015-07-26	1080.530000
2015-08-02	1072.120000
2015-08-09	1081.020000
2015-08-16	1129.360000
2015-08-23	1153.300000
2015-08-30	1087.230000
2015-09-06	1091.230000
2015-09-13	1075.490000
2015-09-20	1101.262500
2015-09-27	1117.225000
2015-10-04	1140.600000
2015-10-11	1153.820000
2015-10-18	1102.430000
2015-10-25	1131.550000
2015-11-01	1147.050000
2015-11-08	1134.940000
2015-11-15	1111.712500
2015-11-22	1052.380000
2015-11-29	1053.400000
2015-12-06	1066.880000
2015-12-13	1043.800000
2015-12-20	1086.630000
2015-12-27	1096.100000
2016-01-03	1100.287500

Freq: W-SUN, Name: Close, dtype: float64  
Calculated Moving Averages: for 40 weeks:

Date	
2015-01-04	1993.800000
2015-01-11	1992.310000
2015-01-18	2117.210000
2015-01-25	2161.620000
2015-02-01	2142.112500
2015-02-08	2164.980000
2015-02-15	2283.870000
2015-02-22	2295.762500
2015-03-01	2279.383333
2015-03-08	2277.950000
2015-03-15	2201.790000
2015-03-22	2244.910000
2015-03-29	2202.500000
2015-04-05	2206.766667
2015-04-12	2197.440000
2015-04-19	2206.600000
2015-04-26	2105.930000
2015-05-03	1962.237500
2015-05-10	1955.970000
2015-05-17	1958.800000
2015-05-24	2031.520000
2015-05-31	2006.470000
2015-06-07	2023.410000
2015-06-14	1998.270000
2015-06-21	996.560000
2015-06-28	1003.010000
2015-07-05	990.040000
2015-07-12	959.360000
2015-07-19	979.260000
2015-07-26	1080.530000
2015-08-02	1072.120000
2015-08-09	1081.020000
2015-08-16	1129.360000
2015-08-23	1153.300000

```
2015-08-23    1155.300000
2015-08-30    1087.230000
2015-09-06    1091.230000
2015-09-13    1075.490000
2015-09-20    1101.262500
2015-09-27    1117.225000
2015-10-04    1140.600000
2015-10-11    1153.820000
2015-10-18    1102.430000
2015-10-25    1131.550000
2015-11-01    1147.050000
2015-11-08    1134.940000
2015-11-15    1111.712500
2015-11-22    1052.380000
2015-11-29    1053.400000
2015-12-06    1066.880000
2015-12-13    1043.800000
2015-12-20    1086.630000
2015-12-27    1096.100000
2016-01-03    1100.287500
Freq: W-SUN, Name: Close, dtype: float64
Calculated Moving Averages: for 52 weeks:
```

```

Date
2015-01-04    1993.800000
2015-01-11    1992.310000
2015-01-18    2117.210000
2015-01-25    2161.620000
2015-02-01    2142.112500
2015-02-08    2164.980000
2015-02-15    2283.870000
2015-02-22    2295.762500
2015-03-01    2279.383333
2015-03-08    2277.950000
2015-03-15    2201.790000
2015-03-22    2244.910000
2015-03-29    2202.500000
2015-04-05    2206.766667
2015-04-12    2197.440000
2015-04-19    2206.600000
2015-04-26    2105.930000
2015-05-03    1962.237500
2015-05-10    1955.970000
2015-05-17    1958.800000
2015-05-24    2031.520000
2015-05-31    2006.470000
2015-06-07    2023.410000
2015-06-14    1998.270000
2015-06-21     996.560000
2015-06-28    1003.010000
2015-07-05     990.040000
2015-07-12     959.360000
2015-07-19     979.260000
2015-07-26    1080.530000
2015-08-02    1072.120000
2015-08-09    1081.020000
2015-08-16    1129.360000
2015-08-23    1153.300000
2015-08-30    1087.230000
2015-09-06    1091.230000
2015-09-13    1075.490000
2015-09-20    1101.262500
2015-09-27    1117.225000
2015-10-04    1140.600000
2015-10-11    1153.820000
2015-10-18    1102.430000
2015-10-25    1131.550000
2015-11-01    1147.050000
2015-11-08    1134.940000
2015-11-15    1111.712500
2015-11-22    1052.380000
2015-11-29    1053.400000
2015-12-06    1066.880000
2015-12-13    1043.800000
2015-12-20    1086.630000
2015-12-27    1096.100000
2016-01-03    1100.287500
Freq: W-SUN, Name: Close, dtype: float64
```

Freq: W-SUN, Name: Close, dtype: float64

Moving Averages for		Date	Symbol	Series	Prev Close	Open	High	Low \
2015-01-01	2015-01-01	INFY	EQ	1972.55	1968.95	1982.00	1956.90	
2015-01-02	2015-01-02	INFY	EQ	1974.40	1972.00	2019.05	1972.00	
2015-01-05	2015-01-05	INFY	EQ	2013.20	2009.90	2030.00	1977.50	
2015-01-06	2015-01-06	INFY	EQ	1995.90	1980.00	1985.00	1934.10	
2015-01-07	2015-01-07	INFY	EQ	1954.20	1965.00	1974.75	1950.00	
2015-01-08	2015-01-08	INFY	EQ	1963.55	1985.60	1997.00	1950.00	
2015-01-09	2015-01-09	INFY	EQ	1973.45	1980.10	2109.00	1913.05	
2015-01-12	2015-01-12	INFY	EQ	2074.45	2092.00	2119.20	2075.00	
2015-01-13	2015-01-13	INFY	EQ	2115.95	2107.80	2107.80	2075.00	
2015-01-14	2015-01-14	INFY	EQ	2088.90	2098.50	2133.00	2092.60	
2015-01-15	2015-01-15	INFY	EQ	2128.65	2135.20	2152.80	2112.25	
2015-01-16	2015-01-16	INFY	EQ	2134.25	2148.00	2160.00	2112.00	
2015-01-19	2015-01-19	INFY	EQ	2118.30	2120.00	2132.35	2094.60	
2015-01-20	2015-01-20	INFY	EQ	2102.50	2107.00	2133.00	2101.45	
2015-01-21	2015-01-21	INFY	EQ	2124.20	2131.50	2175.95	2118.00	
2015-01-22	2015-01-22	INFY	EQ	2169.90	2174.80	2203.00	2161.30	
2015-01-23	2015-01-23	INFY	EQ	2196.45	2200.00	2225.00	2165.10	
2015-01-27	2015-01-27	INFY	EQ	2215.05	2221.00	2221.00	2130.10	
2015-01-28	2015-01-28	INFY	EQ	2136.50	2150.00	2154.80	2130.30	
2015-01-29	2015-01-29	INFY	EQ	2144.55	2145.00	2149.90	2127.60	
2015-01-30	2015-01-30	INFY	EQ	2145.50	2161.50	2162.55	2126.95	
2015-02-02	2015-02-02	INFY	EQ	2141.90	2141.50	2152.00	2126.05	
2015-02-03	2015-02-03	INFY	EQ	2136.85	2136.85	2139.95	2102.00	
2015-02-04	2015-02-04	INFY	EQ	2120.90	2139.90	2150.00	2126.40	
2015-02-05	2015-02-05	INFY	EQ	2142.85	2150.80	2220.00	2148.00	
2015-02-06	2015-02-06	INFY	EQ	2193.80	2205.00	2247.80	2188.50	
2015-02-09	2015-02-09	INFY	EQ	2230.50	2200.00	2254.00	2200.00	
2015-02-10	2015-02-10	INFY	EQ	2248.90	2243.00	2298.00	2241.00	
2015-02-11	2015-02-11	INFY	EQ	2278.30	2280.50	2293.20	2256.25	
2015-02-12	2015-02-12	INFY	EQ	2284.85	2283.00	2321.95	2273.00	
...								
2015-11-18	2015-11-18	INFY	EQ	1061.50	1041.00	1045.15	1011.25	
2015-11-19	2015-11-19	INFY	EQ	1020.00	1030.25	1052.00	1023.80	
2015-11-20	2015-11-20	INFY	EQ	1047.80	1048.00	1063.20	1042.05	
2015-11-23	2015-11-23	INFY	EQ	1052.40	1050.00	1062.40	1038.00	
2015-11-24	2015-11-24	INFY	EQ	1053.70	1050.00	1050.80	1037.00	
2015-11-26	2015-11-26	INFY	EQ	1041.15	1040.95	1059.50	1040.05	
2015-11-27	2015-11-27	INFY	EQ	1052.40	1058.00	1070.00	1045.00	
2015-11-30	2015-11-30	INFY	EQ	1066.35	1070.00	1098.30	1056.20	
2015-12-01	2015-12-01	INFY	EQ	1087.90	1088.00	1095.00	1072.95	
2015-12-02	2015-12-02	INFY	EQ	1079.00	1079.95	1079.95	1059.00	
2015-12-03	2015-12-03	INFY	EQ	1060.70	1061.00	1064.80	1049.05	
2015-12-04	2015-12-04	INFY	EQ	1057.75	1049.00	1064.90	1040.10	
2015-12-07	2015-12-07	INFY	EQ	1049.05	1055.30	1059.00	1040.00	
2015-12-08	2015-12-08	INFY	EQ	1046.25	1045.05	1062.75	1039.30	
2015-12-09	2015-12-09	INFY	EQ	1044.40	1043.00	1046.95	1022.55	
2015-12-10	2015-12-10	INFY	EQ	1028.20	1036.60	1051.60	1030.30	
2015-12-11	2015-12-11	INFY	EQ	1047.35	1054.00	1061.90	1045.90	
2015-12-14	2015-12-14	INFY	EQ	1052.80	1049.50	1073.15	1048.05	
2015-12-15	2015-12-15	INFY	EQ	1069.50	1073.25	1079.10	1058.80	
2015-12-16	2015-12-16	INFY	EQ	1077.55	1083.40	1098.00	1083.40	
2015-12-17	2015-12-17	INFY	EQ	1095.85	1100.00	1109.80	1088.00	
2015-12-18	2015-12-18	INFY	EQ	1107.10	1103.40	1103.40	1079.45	
2015-12-21	2015-12-21	INFY	EQ	1083.15	1077.00	1107.40	1065.95	
2015-12-22	2015-12-22	INFY	EQ	1103.45	1097.45	1097.45	1080.10	
2015-12-23	2015-12-23	INFY	EQ	1083.75	1095.05	1102.50	1087.05	
2015-12-24	2015-12-24	INFY	EQ	1100.85	1102.05	1104.45	1090.10	
2015-12-28	2015-12-28	INFY	EQ	1096.35	1090.00	1110.00	1090.00	
2015-12-29	2015-12-29	INFY	EQ	1104.75	1101.25	1110.00	1097.30	
2015-12-30	2015-12-30	INFY	EQ	1104.70	1101.10	1106.60	1083.00	
2015-12-31	2015-12-31	INFY	EQ	1086.30	1090.15	1109.95	1087.00	

Last		Close	VWAP	Volume	Turnover	Trades \
Date						
2015-01-01	1971.00	1974.40	1971.34	500691	9.870306e+13	14908
2015-01-02	2017.95	2013.20	2003.25	1694580	3.394669e+14	54166
2015-01-05	1996.00	1995.90	2004.59	2484256	4.979911e+14	82694
2015-01-06	1965.10	1954.20	1954.82	2416829	4.724458e+14	108209
2015-01-07	1966.05	1963.55	1962.59	1812479	3.557162e+14	62463
2015-01-08	1979.25	1973.45	1972.78	3391230	6.690160e+14	92752
2015-01-09	2075.30	2074.45	2037.69	11215832	2.285439e+15	359214
2015-01-12	2112.95	2115.95	2099.40	3189722	6.696516e+14	107209
2015-01-13	2092.00	2088.90	2089.42	2200309	4.597374e+14	66676
2015-01-14	2129.00	2128.65	2110.88	2480315	5.235638e+14	53263
2015-01-15	2130.00	2134.25	2137.46	2085613	4.457911e+14	48882
2015-01-16	2115.00	2118.30	2125.77	1672740	3.555858e+14	63848
2015-01-19	2105.00	2102.50	2104.55	1021936	2.150713e+14	62963
2015-01-20	2119.20	2124.20	2118.16	1701126	3.603258e+14	66871
2015-01-21	2172.00	2169.90	2148.41	2123727	4.562628e+14	82679
2015-01-22	2194.95	2196.45	2193.10	2489599	5.459951e+14	82961
2015-01-23	2211.90	2215.05	2194.58	2371582	5.204624e+14	78929
2015-01-27	2137.55	2136.50	2146.45	3434992	7.373022e+14	117167
2015-01-28	2144.45	2144.45	2144.45	3283588	7.241381e+14	88134

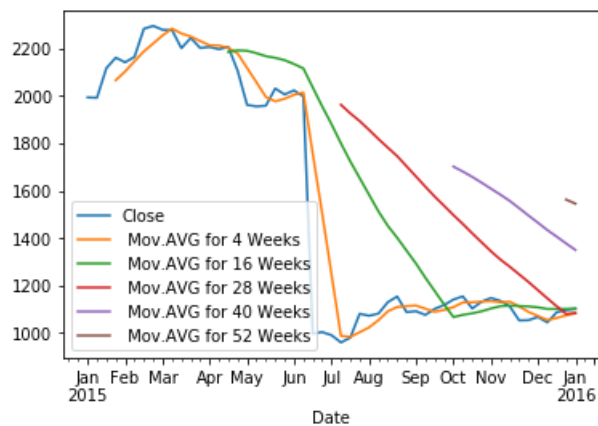
2015-01-28	2144.45	2144.55	2144.51	3285589	7.041041e+14	99154
2015-01-29	2147.80	2145.50	2141.67	3842356	8.229076e+14	79209
2015-01-30	2141.85	2141.90	2144.44	2708436	5.808066e+14	99180
2015-02-02	2137.00	2136.85	2142.80	2175635	4.661958e+14	47871
2015-02-03	2124.00	2120.90	2117.92	1316489	2.788217e+14	64490
2015-02-04	2143.80	2142.85	2142.92	1290004	2.764378e+14	49317
2015-02-05	2186.00	2193.80	2189.61	2968984	6.500912e+14	112707
2015-02-06	2228.00	2230.50	2229.51	1863432	4.154534e+14	79072
2015-02-09	2245.00	2248.90	2238.75	1634217	3.658597e+14	96994
2015-02-10	2268.00	2278.30	2270.89	2129230	4.835242e+14	84805
2015-02-11	2287.80	2284.85	2279.82	1449243	3.304009e+14	58510
2015-02-12	2309.90	2311.20	2301.63	1571884	3.617897e+14	66827
...	...	...	...	...	...	...
2015-11-18	1020.45	1020.00	1027.76	5062626	5.203187e+14	163352
2015-11-19	1048.00	1047.80	1038.56	4269811	4.434439e+14	169433
2015-11-20	1051.00	1052.40	1053.83	3041489	3.205220e+14	151348
2015-11-23	1052.00	1053.70	1053.76	2808175	2.959156e+14	90521
2015-11-24	1040.70	1041.15	1043.40	2162901	2.256779e+14	58310
2015-11-26	1050.00	1052.40	1051.79	4926984	5.182137e+14	114757
2015-11-27	1066.00	1066.35	1060.99	2571239	2.728063e+14	69214
2015-11-30	1083.05	1087.90	1083.44	9052767	9.808155e+14	108763
2015-12-01	1075.45	1079.00	1082.42	2949275	3.192357e+14	76585
2015-12-02	1061.10	1060.70	1064.12	3198808	3.403929e+14	90123
2015-12-03	1059.00	1057.75	1056.77	2752363	2.908624e+14	110543
2015-12-04	1048.85	1049.05	1047.32	4187765	4.385928e+14	209805
2015-12-07	1046.00	1046.25	1048.08	2256935	2.365448e+14	65005
2015-12-08	1042.00	1044.40	1051.88	2862186	3.010684e+14	87394
2015-12-09	1024.00	1028.20	1036.19	3409127	3.532487e+14	85433
2015-12-10	1049.90	1047.35	1040.47	2793873	2.906945e+14	80028
2015-12-11	1055.65	1052.80	1052.88	2695099	2.837607e+14	84930
2015-12-14	1067.50	1069.50	1066.30	2408336	2.568018e+14	104978
2015-12-15	1078.50	1077.55	1071.44	2715904	2.909926e+14	76821
2015-12-16	1094.00	1095.85	1092.86	2747926	3.003094e+14	66894
2015-12-17	1105.50	1107.10	1099.83	2479391	2.726907e+14	87599
2015-12-18	1085.95	1083.15	1086.91	3609910	3.923651e+14	65866
2015-12-21	1107.00	1103.45	1095.68	2165506	2.372707e+14	61692
2015-12-22	1085.00	1083.75	1085.81	2054627	2.230939e+14	51963
2015-12-23	1100.00	1100.85	1097.35	1435464	1.575200e+14	38571
2015-12-24	1095.80	1096.35	1095.84	615027	6.739696e+13	20528
2015-12-28	1103.80	1104.75	1105.51	2763476	3.055046e+14	51103
2015-12-29	1103.00	1104.70	1104.14	1672531	1.846706e+14	52409
2015-12-30	1088.00	1086.30	1094.45	2576985	2.820380e+14	65379
2015-12-31	1107.00	1105.40	1102.09	3971969	4.377467e+14	75143

Deliverable Volume %Deliverble

Date		
2015-01-01	258080	0.5154
2015-01-02	1249104	0.7371
2015-01-05	1830962	0.7370
2015-01-06	1772070	0.7332
2015-01-07	1317720	0.7270
2015-01-08	2686012	0.7920
2015-01-09	3369489	0.3004
2015-01-12	1818800	0.5702
2015-01-13	1385009	0.6295
2015-01-14	1832958	0.7390
2015-01-15	1410992	0.6765
2015-01-16	1254004	0.7497
2015-01-19	673948	0.6595
2015-01-20	1284137	0.7549
2015-01-21	1394125	0.6565
2015-01-22	1879561	0.7550
2015-01-23	1622130	0.6840
2015-01-27	2765575	0.8051
2015-01-28	2313485	0.7046
2015-01-29	2797911	0.7282
2015-01-30	2093132	0.7728
2015-02-02	1641719	0.7546
2015-02-03	821456	0.6240
2015-02-04	889211	0.6893
2015-02-05	2025011	0.6821
2015-02-06	1073921	0.5763
2015-02-09	1074815	0.6577
2015-02-10	1385146	0.6505
2015-02-11	962023	0.6638
2015-02-12	995751	0.6335
...	...	...
2015-11-18	2860889	0.5651
2015-11-19	2638720	0.6180
2015-11-20	1851747	0.6088
2015-11-23	1799534	0.6408
2015-11-24	1249010	0.5775
2015-11-26	3656974	0.7422
2015-11-27	1799884	0.7000
2015-11-30	5565189	0.6148
2015-12-01	1982960	0.6724
2015-12-02	2139233	0.6688
2015-12-03	1838358	0.6670

2015-12-03	1838589	0.6073
2015-12-04	3031773	0.7240
2015-12-07	1441112	0.6385
2015-12-08	1790175	0.6255
2015-12-09	2068578	0.6068
2015-12-10	1838589	0.6581
2015-12-11	1623053	0.6022
2015-12-14	1419333	0.5893
2015-12-15	1951187	0.7184
2015-12-16	1988090	0.7235
2015-12-17	1294917	0.5223
2015-12-18	2604590	0.7215
2015-12-21	1223571	0.5650
2015-12-22	1204818	0.5864
2015-12-23	861318	0.6000
2015-12-24	294731	0.4792
2015-12-28	1880078	0.6803
2015-12-29	967577	0.5785
2015-12-30	1754378	0.6808
2015-12-31	2641827	0.6651

[248 rows x 15 columns]



In [17]:

```
plot_time_series(nifty)
```

Calculated Moving Averages: for 4 weeks:

Date	
2015-01-04	11293.9000
2015-01-11	11108.4500
2015-01-18	11598.0400
2015-01-25	11777.4900
2015-02-01	11787.9750
2015-02-08	12055.9700
2015-02-15	12298.5000
2015-02-22	12603.9250
2015-03-01	12567.3500
2015-03-08	12728.9250
2015-03-15	12383.0900
2015-03-22	12343.4000
2015-03-29	12104.1300
2015-04-05	12045.3500
2015-04-12	12149.4100
2015-04-19	12087.6000
2015-04-26	11439.2800
2015-05-03	11061.5750
2015-05-10	11120.0700
2015-05-17	11175.8000
2015-05-24	11514.0700
2015-05-31	11519.7300
2015-06-07	11381.0800
2015-06-14	11211.9500
2015-06-21	11163.1100
2015-06-28	11339.5300
2015-07-05	11154.1100
2015-07-12	11000.4400
2015-07-19	11130.7500
2015-07-26	11517.8000
2015-08-02	11425.6200



2015-08-09	11542.7000
2015-08-16	11859.2800
2015-08-23	12085.5600
2015-08-30	11420.2300
2015-09-06	11554.6600
2015-09-13	11408.5000
2015-09-20	11597.5000
2015-09-27	11769.4250
2015-10-04	11901.2375
2015-10-11	11810.5400
2015-10-18	11438.4600
2015-10-25	11515.7000
2015-11-01	11567.6500
2015-11-08	11523.2300
2015-11-15	11244.6250
2015-11-22	11005.4700
2015-11-29	11086.1000
2015-12-06	11132.5700
2015-12-13	11001.8200
2015-12-20	11140.1000
2015-12-27	11175.1875
2016-01-03	11213.8500

Freq: W-SUN, Name: Close, dtype: float64

Calculated Moving Averages: for 16 weeks:

Date	
2015-01-04	11293.9000
2015-01-11	11108.4500
2015-01-18	11598.0400
2015-01-25	11777.4900
2015-02-01	11787.9750
2015-02-08	12055.9700
2015-02-15	12298.5000
2015-02-22	12603.9250
2015-03-01	12567.3500
2015-03-08	12728.9250
2015-03-15	12383.0900
2015-03-22	12343.4000
2015-03-29	12104.1300
2015-04-05	12045.3500
2015-04-12	12149.4100
2015-04-19	12087.6000
2015-04-26	11439.2800
2015-05-03	11061.5750
2015-05-10	11120.0700
2015-05-17	11175.8000
2015-05-24	11514.0700
2015-05-31	11519.7300
2015-06-07	11381.0800
2015-06-14	11211.9500
2015-06-21	11163.1100
2015-06-28	11339.5300
2015-07-05	11154.1100
2015-07-12	11000.4400
2015-07-19	11130.7500
2015-07-26	11517.8000
2015-08-02	11425.6200
2015-08-09	11542.7000
2015-08-16	11859.2800
2015-08-23	12085.5600
2015-08-30	11420.2300
2015-09-06	11554.6600
2015-09-13	11408.5000
2015-09-20	11597.5000
2015-09-27	11769.4250
2015-10-04	11901.2375
2015-10-11	11810.5400
2015-10-18	11438.4600
2015-10-25	11515.7000
2015-11-01	11567.6500
2015-11-08	11523.2300
2015-11-15	11244.6250
2015-11-22	11005.4700
2015-11-29	11086.1000
2015-12-06	11132.5700
2015-12-13	11001.8200
2015-12-20	11140.1000

```
2015-12-27    11175.1875
2016-01-03    11213.8500
Freq: W-SUN, Name: Close, dtype: float64
Calculated Moving Averages: for 28 weeks:
```

```

Date
2015-01-04    11293.9000
2015-01-11    11108.4500
2015-01-18    11598.0400
2015-01-25    11777.4900
2015-02-01    11787.9750
2015-02-08    12055.9700
2015-02-15    12298.5000
2015-02-22    12603.9250
2015-03-01    12567.3500
2015-03-08    12728.9250
2015-03-15    12383.0900
2015-03-22    12343.4000
2015-03-29    12104.1300
2015-04-05    12045.3500
2015-04-12    12149.4100
2015-04-19    12087.6000
2015-04-26    11439.2800
2015-05-03    11061.5750
2015-05-10    11120.0700
2015-05-17    11175.8000
2015-05-24    11514.0700
2015-05-31    11519.7300
2015-06-07    11381.0800
2015-06-14    11211.9500
2015-06-21    11163.1100
2015-06-28    11339.5300
2015-07-05    11154.1100
2015-07-12    11000.4400
2015-07-19    11130.7500
2015-07-26    11517.8000
2015-08-02    11425.6200
2015-08-09    11542.7000
2015-08-16    11859.2800
2015-08-23    12085.5600
2015-08-30    11420.2300
2015-09-06    11554.6600
2015-09-13    11408.5000
2015-09-20    11597.5000
2015-09-27    11769.4250
2015-10-04    11901.2375
2015-10-11    11810.5400
2015-10-18    11438.4600
2015-10-25    11515.7000
2015-11-01    11567.6500
2015-11-08    11523.2300
2015-11-15    11244.6250
2015-11-22    11005.4700
2015-11-29    11086.1000
2015-12-06    11132.5700
2015-12-13    11001.8200
2015-12-20    11140.1000
2015-12-27    11175.1875
2016-01-03    11213.8500
```

```
Freq: W-SUN, Name: Close, dtype: float64
Calculated Moving Averages: for 40 weeks:
```

```

Date
2015-01-04    11293.9000
2015-01-11    11108.4500
2015-01-18    11598.0400
2015-01-25    11777.4900
2015-02-01    11787.9750
2015-02-08    12055.9700
2015-02-15    12298.5000
2015-02-22    12603.9250
2015-03-01    12567.3500
2015-03-08    12728.9250
2015-03-15    12383.0900
2015-03-22    12343.4000
2015-03-29    12104.1300
2015-04-05    12045.3500
```

2015-01-04	11293.9000
2015-04-12	12149.4100
2015-04-19	12087.6000
2015-04-26	11439.2800
2015-05-03	11061.5750
2015-05-10	11120.0700
2015-05-17	11175.8000
2015-05-24	11514.0700
2015-05-31	11519.7300
2015-06-07	11381.0800
2015-06-14	11211.9500
2015-06-21	11163.1100
2015-06-28	11339.5300
2015-07-05	11154.1100
2015-07-12	11000.4400
2015-07-19	11130.7500
2015-07-26	11517.8000
2015-08-02	11425.6200
2015-08-09	11542.7000
2015-08-16	11859.2800
2015-08-23	12085.5600
2015-08-30	11420.2300
2015-09-06	11554.6600
2015-09-13	11408.5000
2015-09-20	11597.5000
2015-09-27	11769.4250
2015-10-04	11901.2375
2015-10-11	11810.5400
2015-10-18	11438.4600
2015-10-25	11515.7000
2015-11-01	11567.6500
2015-11-08	11523.2300
2015-11-15	11244.6250
2015-11-22	11005.4700
2015-11-29	11086.1000
2015-12-06	11132.5700
2015-12-13	11001.8200
2015-12-20	11140.1000
2015-12-27	11175.1875
2016-01-03	11213.8500

Freq: W-SUN, Name: Close, dtype: float64  
Calculated Moving Averages: for 52 weeks:

Date	
2015-01-04	11293.9000
2015-01-11	11108.4500
2015-01-18	11598.0400
2015-01-25	11777.4900
2015-02-01	11787.9750
2015-02-08	12055.9700
2015-02-15	12298.5000
2015-02-22	12603.9250
2015-03-01	12567.3500
2015-03-08	12728.9250
2015-03-15	12383.0900
2015-03-22	12343.4000
2015-03-29	12104.1300
2015-04-05	12045.3500
2015-04-12	12149.4100
2015-04-19	12087.6000
2015-04-26	11439.2800
2015-05-03	11061.5750
2015-05-10	11120.0700
2015-05-17	11175.8000
2015-05-24	11514.0700
2015-05-31	11519.7300
2015-06-07	11381.0800
2015-06-14	11211.9500
2015-06-21	11163.1100
2015-06-28	11339.5300
2015-07-05	11154.1100
2015-07-12	11000.4400
2015-07-19	11130.7500
2015-07-26	11517.8000
2015-08-02	11425.6200
2015-08-09	11542.7000
2015-08-16	11859.2800
2015-08-23	12085.5600

```

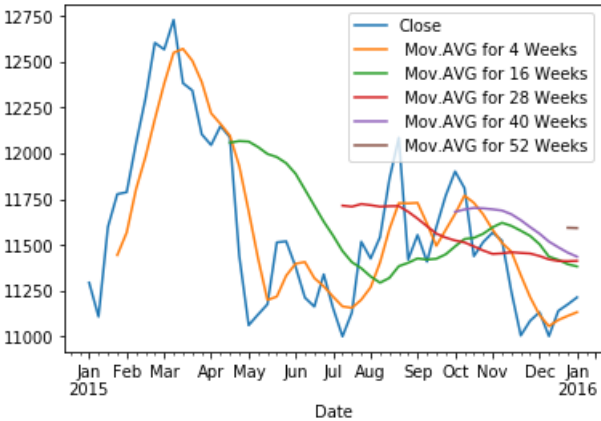
2015-08-20 11400.2300
2015-08-30 11420.2300
2015-09-06 11554.6600
2015-09-13 11408.5000
2015-09-20 11597.5000
2015-09-27 11769.4250
2015-10-04 11901.2375
2015-10-11 11810.5400
2015-10-18 11438.4600
2015-10-25 11515.7000
2015-11-01 11567.6500
2015-11-08 11523.2300
2015-11-15 11244.6250
2015-11-22 11005.4700
2015-11-29 11086.1000
2015-12-06 11132.5700
2015-12-13 11001.8200
2015-12-20 11140.1000
2015-12-27 11175.1875
2016-01-03 11213.8500
Freq: W-SUN, Name: Close, dtype: float64

```

Moving Averages for		Date	Open	High	Low	Close	Volume \
Date							
2015-01-01	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	
2015-01-02	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	
2015-01-05	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	
2015-01-06	2015-01-06	11186.10	11186.10	10909.00	10959.90	12515739	
2015-01-07	2015-01-07	11013.20	11042.35	10889.55	10916.00	10976356	
2015-01-08	2015-01-08	11031.15	11058.15	10915.05	11018.15	12975117	
2015-01-09	2015-01-09	11058.05	11484.90	10932.20	11399.65	24812224	
2015-01-12	2015-01-12	11456.00	11565.85	11378.80	11543.65	16505074	
2015-01-13	2015-01-13	11545.25	11546.60	11437.95	11502.80	12511358	
2015-01-14	2015-01-14	11561.95	11631.55	11521.00	11614.30	12544558	
2015-01-15	2015-01-15	11672.30	11774.50	11575.10	11669.85	13882213	
2015-01-16	2015-01-16	11708.85	11708.85	11582.85	11659.60	12368107	
2015-01-19	2015-01-19	11732.50	11797.60	11629.05	11642.75	13696381	
2015-01-20	2015-01-20	11681.80	11721.90	11635.70	11695.00	11021415	
2015-01-21	2015-01-21	11732.45	11838.30	11659.70	11813.70	18679282	
2015-01-22	2015-01-22	11832.55	11884.50	11782.95	11850.85	15715515	
2015-01-23	2015-01-23	11877.90	11921.00	11767.40	11885.15	30034833	
2015-01-27	2015-01-27	11915.60	11917.25	11679.55	11693.45	17005337	
2015-01-28	2015-01-28	11712.55	11821.80	11693.80	11809.55	16876897	
2015-01-29	2015-01-29	11812.35	11861.50	11728.75	11824.15	15520902	
2015-01-30	2015-01-30	11998.35	12003.35	11799.35	11824.75	18559078	
2015-02-02	2015-02-02	11871.35	11972.60	11847.80	11943.95	17272113	
2015-02-03	2015-02-03	11963.75	12000.65	11849.00	11963.90	21053605	
2015-02-04	2015-02-04	12027.10	12027.10	11902.35	11938.90	14453955	
2015-02-05	2015-02-05	11967.75	12295.35	11963.80	12165.15	15826989	
2015-02-06	2015-02-06	12190.70	12380.45	12186.95	12267.95	11167848	
2015-02-09	2015-02-09	12160.90	12285.45	12160.90	12249.30	10996415	
2015-02-10	2015-02-10	12215.20	12297.75	12129.65	12162.85	17687306	
2015-02-11	2015-02-11	12198.45	12265.70	12149.35	12243.40	12905131	
2015-02-12	2015-02-12	12277.20	12397.00	12253.05	12372.00	16012381	
...		...	...	...	...	...	
2015-11-18	2015-11-18	10967.75	10969.50	10799.00	10836.70	10167296	
2015-11-19	2015-11-19	10910.50	11059.85	10893.75	11032.90	9850813	
2015-11-20	2015-11-20	11045.65	11195.75	11036.90	11118.85	10781657	
2015-11-23	2015-11-23	11126.25	11189.50	11084.35	11121.20	8727231	
2015-11-24	2015-11-24	11096.40	11122.05	11036.05	11057.35	7784549	
2015-11-26	2015-11-26	11048.40	11129.25	11013.90	11042.95	15045631	
2015-11-27	2015-11-27	11064.60	11136.40	11031.45	11122.90	7402279	
2015-11-30	2015-11-30	11147.85	11279.65	11083.60	11206.00	21067524	
2015-12-01	2015-12-01	11216.95	11293.20	11216.95	11256.30	9112940	
2015-12-02	2015-12-02	11298.90	11298.90	11134.90	11149.60	7524996	
2015-12-03	2015-12-03	11149.30	11153.70	11067.55	11081.90	9384540	
2015-12-04	2015-12-04	11034.65	11037.95	10940.30	10969.05	10062731	
2015-12-07	2015-12-07	11009.50	11054.00	10943.85	10998.65	8477753	
2015-12-08	2015-12-08	10989.20	11109.30	10946.00	10981.85	8486760	
2015-12-09	2015-12-09	10978.25	11027.30	10916.25	10930.05	11006038	
2015-12-10	2015-12-10	10971.55	11073.15	10931.15	11055.50	7908231	
2015-12-11	2015-12-11	11086.55	11086.55	11015.60	11043.05	8502528	
2015-12-14	2015-12-14	10940.75	11124.90	10940.75	11099.70	7044052	
2015-12-15	2015-12-15	11139.55	11139.55	11044.35	11058.25	9065922	
2015-12-16	2015-12-16	11081.75	11187.85	11081.75	11144.90	8751937	
2015-12-17	2015-12-17	11182.95	11293.05	11122.45	11275.15	9556916	
2015-12-18	2015-12-18	11227.15	11227.15	11094.80	11122.50	11781399	
2015-12-21	2015-12-21	11096.40	11232.50	11067.20	11224.75	6043899	
2015-12-22	2015-12-22	11201.80	11201.80	11081.15	11095.45	5998230	
2015-12-23	2015-12-23	11163.80	11206.40	11130.65	11195.65	4638075	
2015-12-24	2015-12-24	11193.25	11197.50	11152.85	11184.90	2927864	
2015-12-28	2015-12-28	11152.70	11303.05	11146.85	11271.80	8055590	
2015-12-29	2015-12-29	11257.05	11287.50	11206.60	11253.45	6024174	
2015-12-30	2015-12-30	11247.35	11263.60	11100.10	11117.60	6564991	

Date	Turnover
2015-01-01	3.575100e+09
2015-01-02	9.645600e+09
2015-01-05	1.059000e+10
2015-01-06	1.364500e+10
2015-01-07	1.203440e+10
2015-01-08	1.485630e+10
2015-01-09	3.536420e+10
2015-01-12	1.712310e+10
2015-01-13	1.417510e+10
2015-01-14	1.438530e+10
2015-01-15	1.764560e+10
2015-01-16	1.714690e+10
2015-01-19	1.183750e+10
2015-01-20	1.234730e+10
2015-01-21	1.973070e+10
2015-01-22	1.655670e+10
2015-01-23	2.001210e+10
2015-01-27	1.866840e+10
2015-01-28	1.937590e+10
2015-01-29	2.160790e+10
2015-01-30	2.905950e+10
2015-02-02	2.304050e+10
2015-02-03	1.770590e+10
2015-02-04	1.290570e+10
2015-02-05	2.124010e+10
2015-02-06	1.325990e+10
2015-02-09	1.221010e+10
2015-02-10	1.851870e+10
2015-02-11	1.363700e+10
2015-02-12	1.515950e+10
...	...
2015-11-18	1.012920e+10
2015-11-19	1.008630e+10
2015-11-20	1.071380e+10
2015-11-23	8.513000e+09
2015-11-24	7.501700e+09
2015-11-26	1.492540e+10
2015-11-27	7.693000e+09
2015-11-30	2.154870e+10
2015-12-01	9.271000e+09
2015-12-02	8.086300e+09
2015-12-03	9.792900e+09
2015-12-04	9.755500e+09
2015-12-07	8.108600e+09
2015-12-08	8.256700e+09
2015-12-09	1.352400e+10
2015-12-10	8.326600e+09
2015-12-11	9.019600e+09
2015-12-14	8.280500e+09
2015-12-15	8.154000e+09
2015-12-16	8.490500e+09
2015-12-17	9.097200e+09
2015-12-18	1.222450e+10
2015-12-21	6.415600e+09
2015-12-22	6.366300e+09
2015-12-23	4.562900e+09
2015-12-24	3.182700e+09
2015-12-28	1.001900e+10
2015-12-29	6.626200e+09
2015-12-30	7.071900e+09
2015-12-31	8.590500e+09

[248 rows x 7 columns]



**2. Create rolling window of size 10 on each stock/index. Handle unequal time series due to stock market holidays. You should look to increase your rolling window size to 75 and see how the data looks like. Remember they will create stress on your laptop RAM load. ( Documentation you might need: <http://in.mathworks.com/help/econ/rolling-window-estimation-of-state-space-models.html>)**

In [18]:

```
TCS = tcs.asfreq('D', method='pad')           # pad-ffill : forward-fill
INFY = infosys.asfreq('D', method='pad')
NIFTY = nifty.asfreq('D', method='pad')

TCS.name = 'TCS'
INFY.name = 'INFY'
NIFTY.name = 'NIFTY_IT'
```

In [19]:

```
def plot_roll_win(stock, win = [10, 75]):

    dummy = pd.DataFrame()

    dummy['Close'] = stock['Close']

    for i in range(len(win)):
        m_a = dummy['Close'].rolling(win[i]).mean() # M.A using predefined function
        dummy[" Mov.AVG for " + str(win[i]) + " Roll Window"] = m_a
        print('Calculated Moving Averages: for {0} weeks: \n\n {1}'.format(win[i], dummy['Close']))
    )

    dummy.plot(title="Moving Averages for {} \n\n".format(stock))
```

In [20]:

```
plot_roll_win(TCS)
```

Calculated Moving Averages: for 10 weeks:

Date	
2015-01-01	2545.55
2015-01-02	2579.45
2015-01-03	2579.45
2015-01-04	2579.45
2015-01-05	2540.25
2015-01-06	2446.60
2015-01-07	2417.70
2015-01-08	2443.80
2015-01-09	2512.30
2015-01-10	2512.30
2015-01-11	2512.30
2015-01-12	2509.70
2015-01-13	2497.90
2015-01-14	2521.95
2015-01-15	2539.10
2015-01-16	2532.15
2015-01-17	2532.15
2015-01-18	2532.15
2015-01-19	2511.00
2015-01-20	2500.45
2015-01-21	2513.80
2015-01-22	2513.55
2015-01-23	2503.60
2015-01-24	2503.60
2015-01-25	2503.60
2015-01-26	2503.60
2015-01-27	2502.05
2015-01-28	2539.60
2015-01-29	2544.65
2015-01-30	2482.05
...	
2015-12-02	2365.20

2015-12-03	2350.75
2015-12-04	2328.40
2015-12-05	2328.40
2015-12-06	2328.40
2015-12-07	2319.80
2015-12-08	2329.00
2015-12-09	2367.65
2015-12-10	2384.55
2015-12-11	2386.00
2015-12-12	2386.00
2015-12-13	2386.00
2015-12-14	2378.45
2015-12-15	2375.85
2015-12-16	2408.40
2015-12-17	2439.75
2015-12-18	2416.80
2015-12-19	2416.80
2015-12-20	2416.80
2015-12-21	2446.40
2015-12-22	2405.05
2015-12-23	2425.80
2015-12-24	2434.25
2015-12-25	2434.25
2015-12-26	2434.25
2015-12-27	2434.25
2015-12-28	2462.70
2015-12-29	2455.80
2015-12-30	2418.30
2015-12-31	2436.85

Freq: D, Name: Close, Length: 365, dtype: float64  
Calculated Moving Averages: for 75 weeks:

Date	
2015-01-01	2545.55
2015-01-02	2579.45
2015-01-03	2579.45
2015-01-04	2579.45
2015-01-05	2540.25
2015-01-06	2446.60
2015-01-07	2417.70
2015-01-08	2443.80
2015-01-09	2512.30
2015-01-10	2512.30
2015-01-11	2512.30
2015-01-12	2509.70
2015-01-13	2497.90
2015-01-14	2521.95
2015-01-15	2539.10
2015-01-16	2532.15
2015-01-17	2532.15
2015-01-18	2532.15
2015-01-19	2511.00
2015-01-20	2500.45
2015-01-21	2513.80
2015-01-22	2513.55
2015-01-23	2503.60
2015-01-24	2503.60
2015-01-25	2503.60
2015-01-26	2503.60
2015-01-27	2502.05
2015-01-28	2539.60
2015-01-29	2544.65
2015-01-30	2482.05
...	
2015-12-02	2365.20
2015-12-03	2350.75
2015-12-04	2328.40
2015-12-05	2328.40
2015-12-06	2328.40
2015-12-07	2319.80
2015-12-08	2329.00
2015-12-09	2367.65
2015-12-10	2384.55
2015-12-11	2386.00
2015-12-12	2386.00
2015-12-13	2386.00
2015-12-14	2378.45

2015-12-15 2375.85  
2015-12-16 2408.40  
2015-12-17 2439.75  
2015-12-18 2416.80  
2015-12-19 2416.80  
2015-12-20 2416.80  
2015-12-21 2446.40  
2015-12-22 2405.05  
2015-12-23 2425.80  
2015-12-24 2434.25  
2015-12-25 2434.25  
2015-12-26 2434.25  
2015-12-27 2434.25  
2015-12-28 2462.70  
2015-12-29 2455.80  
2015-12-30 2418.30  
2015-12-31 2436.85

Freq: D, Name: Close, Length: 365, dtype: float64

Moving Averages for		Date	Symbol	Series	Prev Close	Open	High	Low \
2015-01-01	2015-01-01	TCS	EQ	2558.25	2567.00	2567.00	2541.00	
2015-01-02	2015-01-02	TCS	EQ	2545.55	2551.00	2590.95	2550.60	
2015-01-03	2015-01-02	TCS	EQ	2545.55	2551.00	2590.95	2550.60	
2015-01-04	2015-01-02	TCS	EQ	2545.55	2551.00	2590.95	2550.60	
2015-01-05	2015-01-05	TCS	EQ	2579.45	2581.00	2599.90	2524.65	
2015-01-06	2015-01-06	TCS	EQ	2540.25	2529.10	2529.10	2440.00	
2015-01-07	2015-01-07	TCS	EQ	2446.60	2470.00	2479.15	2407.45	
2015-01-08	2015-01-08	TCS	EQ	2417.70	2442.40	2449.00	2420.55	
2015-01-09	2015-01-09	TCS	EQ	2443.80	2455.00	2519.90	2450.00	
2015-01-10	2015-01-09	TCS	EQ	2443.80	2455.00	2519.90	2450.00	
2015-01-11	2015-01-09	TCS	EQ	2443.80	2455.00	2519.90	2450.00	
2015-01-12	2015-01-12	TCS	EQ	2512.30	2517.00	2528.00	2480.25	
2015-01-13	2015-01-13	TCS	EQ	2509.70	2520.00	2530.40	2480.10	
2015-01-14	2015-01-14	TCS	EQ	2497.90	2516.00	2531.80	2500.50	
2015-01-15	2015-01-15	TCS	EQ	2521.95	2533.00	2581.75	2523.25	
2015-01-16	2015-01-16	TCS	EQ	2539.10	2543.70	2545.00	2484.30	
2015-01-17	2015-01-16	TCS	EQ	2539.10	2543.70	2545.00	2484.30	
2015-01-18	2015-01-16	TCS	EQ	2539.10	2543.70	2545.00	2484.30	
2015-01-19	2015-01-19	TCS	EQ	2532.15	2536.00	2551.00	2503.00	
2015-01-20	2015-01-20	TCS	EQ	2511.00	2520.00	2530.00	2483.25	
2015-01-21	2015-01-21	TCS	EQ	2500.45	2522.00	2522.00	2488.25	
2015-01-22	2015-01-22	TCS	EQ	2513.80	2516.50	2521.25	2495.50	
2015-01-23	2015-01-23	TCS	EQ	2513.55	2514.00	2532.05	2496.10	
2015-01-24	2015-01-23	TCS	EQ	2513.55	2514.00	2532.05	2496.10	
2015-01-25	2015-01-23	TCS	EQ	2513.55	2514.00	2532.05	2496.10	
2015-01-26	2015-01-23	TCS	EQ	2513.55	2514.00	2532.05	2496.10	
2015-01-27	2015-01-27	TCS	EQ	2503.60	2512.35	2515.00	2489.55	
2015-01-28	2015-01-28	TCS	EQ	2502.05	2503.00	2544.90	2502.90	
2015-01-29	2015-01-29	TCS	EQ	2539.60	2538.00	2568.70	2512.90	
2015-01-30	2015-01-30	TCS	EQ	2544.65	2560.70	2575.00	2470.00	
...	...	...	...	...	...	...	...	
2015-12-02	2015-12-02	TCS	EQ	2361.90	2378.00	2378.10	2346.50	
2015-12-03	2015-12-03	TCS	EQ	2365.20	2360.00	2373.00	2347.00	
2015-12-04	2015-12-04	TCS	EQ	2350.75	2340.00	2347.30	2321.10	
2015-12-05	2015-12-04	TCS	EQ	2350.75	2340.00	2347.30	2321.10	
2015-12-06	2015-12-04	TCS	EQ	2350.75	2340.00	2347.30	2321.10	
2015-12-07	2015-12-07	TCS	EQ	2328.40	2332.20	2343.90	2315.25	
2015-12-08	2015-12-08	TCS	EQ	2319.80	2319.40	2349.00	2317.30	
2015-12-09	2015-12-09	TCS	EQ	2329.00	2337.90	2372.80	2320.00	
2015-12-10	2015-12-10	TCS	EQ	2367.65	2369.00	2391.20	2352.00	
2015-12-11	2015-12-11	TCS	EQ	2384.55	2383.00	2391.95	2363.25	
2015-12-12	2015-12-11	TCS	EQ	2384.55	2383.00	2391.95	2363.25	
2015-12-13	2015-12-11	TCS	EQ	2384.55	2383.00	2391.95	2363.25	
2015-12-14	2015-12-14	TCS	EQ	2386.00	2335.20	2387.00	2330.60	
2015-12-15	2015-12-15	TCS	EQ	2378.45	2378.45	2385.00	2363.05	
2015-12-16	2015-12-16	TCS	EQ	2375.85	2384.00	2414.50	2384.00	
2015-12-17	2015-12-17	TCS	EQ	2408.40	2415.00	2445.00	2393.35	
2015-12-18	2015-12-18	TCS	EQ	2439.75	2420.00	2434.20	2400.65	
2015-12-19	2015-12-18	TCS	EQ	2439.75	2420.00	2434.20	2400.65	
2015-12-20	2015-12-18	TCS	EQ	2439.75	2420.00	2434.20	2400.65	
2015-12-21	2015-12-21	TCS	EQ	2416.80	2419.95	2450.00	2406.85	
2015-12-22	2015-12-22	TCS	EQ	2446.40	2440.00	2440.00	2400.00	
2015-12-23	2015-12-23	TCS	EQ	2405.05	2415.00	2435.00	2410.55	
2015-12-24	2015-12-24	TCS	EQ	2425.80	2421.00	2438.20	2404.00	
2015-12-25	2015-12-24	TCS	EQ	2425.80	2421.00	2438.20	2404.00	
2015-12-26	2015-12-24	TCS	EQ	2425.80	2421.00	2438.20	2404.00	
2015-12-27	2015-12-24	TCS	EQ	2425.80	2421.00	2438.20	2404.00	
2015-12-28	2015-12-28	TCS	EQ	2434.25	2428.00	2466.40	2420.20	
2015-12-29	2015-12-29	TCS	EQ	2462.70	2458.35	2465.30	2445.75	
2015-12-30	2015-12-30	TCS	EQ	2455.80	2453.05	2459.00	2412.30	
2015-12-31	2015-12-31	TCS	EQ	2418.30	2415.75	2448.50	2407.50	

Last Close VWAP Volume Turnover Trades \

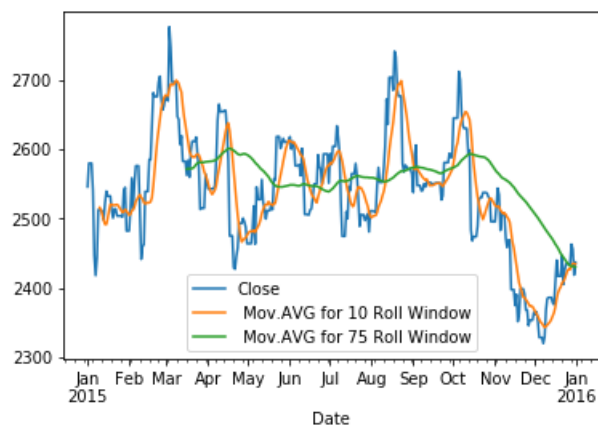


	Last Date	Close	VWAP	Volume	Turnover	Trades \
2015-01-01	2550.00	2545.55	2548.51	183415	4.674345e+13	8002
2015-01-02	2588.40	2579.45	2568.19	462870	1.188740e+14	27585
2015-01-03	2588.40	2579.45	2568.19	462870	1.188740e+14	27585
2015-01-04	2588.40	2579.45	2568.19	462870	1.188740e+14	27585
2015-01-05	2538.10	2540.25	2563.94	877121	2.248886e+14	43234
2015-01-06	2450.05	2446.60	2466.90	1211892	2.989615e+14	84503
2015-01-07	2426.90	2417.70	2433.96	1318166	3.208362e+14	101741
2015-01-08	2446.00	2443.80	2434.81	782704	1.905739e+14	47699
2015-01-09	2510.00	2512.30	2490.01	1598821	3.981082e+14	81743
2015-01-10	2510.00	2512.30	2490.01	1598821	3.981082e+14	81743
2015-01-11	2510.00	2512.30	2490.01	1598821	3.981082e+14	81743
2015-01-12	2527.95	2509.70	2497.82	798003	1.993266e+14	58810
2015-01-13	2498.00	2497.90	2509.40	734216	1.842440e+14	49993
2015-01-14	2525.05	2521.95	2517.54	893548	2.249546e+14	69237
2015-01-15	2542.05	2539.10	2550.97	2504960	6.390076e+14	96363
2015-01-16	2526.00	2532.15	2511.39	2646915	6.647444e+14	127847
2015-01-17	2526.00	2532.15	2511.39	2646915	6.647444e+14	127847
2015-01-18	2526.00	2532.15	2511.39	2646915	6.647444e+14	127847
2015-01-19	2509.00	2511.00	2516.06	567537	1.427954e+14	38860
2015-01-20	2498.00	2500.45	2498.94	1029283	2.572121e+14	58066
2015-01-21	2518.00	2513.80	2507.75	1155240	2.897055e+14	75976
2015-01-22	2511.00	2513.55	2509.31	1056607	2.651355e+14	74837
2015-01-23	2504.10	2503.60	2507.34	1575190	3.949530e+14	94619
2015-01-24	2504.10	2503.60	2507.34	1575190	3.949530e+14	94619
2015-01-25	2504.10	2503.60	2507.34	1575190	3.949530e+14	94619
2015-01-26	2504.10	2503.60	2507.34	1575190	3.949530e+14	94619
2015-01-27	2504.20	2502.05	2502.26	1369368	3.426510e+14	71406
2015-01-28	2533.40	2539.60	2529.32	1560990	3.948240e+14	101994
2015-01-29	2560.70	2544.65	2531.88	1867196	4.727520e+14	67497
2015-01-30	2484.00	2482.05	2494.94	2908701	7.257025e+14	119200
...	...	...	...	...	...	...
2015-12-02	2367.00	2365.20	2362.86	820148	1.937896e+14	38694
2015-12-03	2350.00	2350.75	2356.59	1141679	2.690468e+14	41715
2015-12-04	2330.00	2328.40	2330.08	623046	1.451747e+14	32999
2015-12-05	2330.00	2328.40	2330.08	623046	1.451747e+14	32999
2015-12-06	2330.00	2328.40	2330.08	623046	1.451747e+14	32999
2015-12-07	2321.00	2319.80	2322.27	691302	1.605390e+14	52150
2015-12-08	2326.25	2329.00	2332.95	569982	1.329739e+14	47957
2015-12-09	2370.00	2367.65	2361.23	2641403	6.236954e+14	59592
2015-12-10	2380.95	2384.55	2374.82	861994	2.047084e+14	52429
2015-12-11	2383.15	2386.00	2384.13	826189	1.969746e+14	53651
2015-12-12	2383.15	2386.00	2384.13	826189	1.969746e+14	53651
2015-12-13	2383.15	2386.00	2384.13	826189	1.969746e+14	53651
2015-12-14	2375.00	2378.45	2364.84	1359266	3.214443e+14	58637
2015-12-15	2379.50	2375.85	2375.03	567934	1.348859e+14	52585
2015-12-16	2407.50	2408.40	2402.07	717967	1.724609e+14	48074
2015-12-17	2434.10	2439.75	2418.57	809422	1.957647e+14	46818
2015-12-18	2409.80	2416.80	2416.02	1512485	3.654198e+14	47644
2015-12-19	2409.80	2416.80	2416.02	1512485	3.654198e+14	47644
2015-12-20	2409.80	2416.80	2416.02	1512485	3.654198e+14	47644
2015-12-21	2443.00	2446.40	2428.40	805052	1.954989e+14	41004
2015-12-22	2407.00	2405.05	2413.33	780429	1.883430e+14	30995
2015-12-23	2418.80	2425.80	2425.06	424917	1.030449e+14	31057
2015-12-24	2435.00	2434.25	2424.03	421580	1.021924e+14	21932
2015-12-25	2435.00	2434.25	2424.03	421580	1.021924e+14	21932
2015-12-26	2435.00	2434.25	2424.03	421580	1.021924e+14	21932
2015-12-27	2435.00	2434.25	2424.03	421580	1.021924e+14	21932
2015-12-28	2456.95	2462.70	2455.00	1852099	4.546896e+14	43390
2015-12-29	2449.35	2455.80	2452.26	854262	2.094875e+14	26975
2015-12-30	2421.70	2418.30	2442.06	802881	1.960682e+14	49464
2015-12-31	2430.00	2436.85	2428.90	620159	1.506303e+14	42600

	Deliverable Volume	%Deliverble
Date		
2015-01-01	52870	0.2883
2015-01-02	309350	0.6683
2015-01-03	309350	0.6683
2015-01-04	309350	0.6683
2015-01-05	456728	0.5207
2015-01-06	714306	0.5894
2015-01-07	886368	0.6724
2015-01-08	450768	0.5759
2015-01-09	865777	0.5415
2015-01-10	865777	0.5415
2015-01-11	865777	0.5415
2015-01-12	451228	0.5654
2015-01-13	386133	0.5259
2015-01-14	498193	0.5575
2015-01-15	1598846	0.6383
2015-01-16	1372200	0.5184
2015-01-17	1372200	0.5184
2015-01-18	1372200	0.5184
2015-01-19	309156	0.5447
2015-01-20	733487	0.7126
2015-01-21	771316	0.6677
2015-01-22	742399	0.7026

2015-01-23	1205911	0.7656
2015-01-24	1205911	0.7656
2015-01-25	1205911	0.7656
2015-01-26	1205911	0.7656
2015-01-27	1079233	0.7881
2015-01-28	1142166	0.7317
2015-01-29	1547590	0.8288
2015-01-30	2355497	0.8098
...	...	...
2015-12-02	580713	0.7081
2015-12-03	765969	0.6709
2015-12-04	426970	0.6853
2015-12-05	426970	0.6853
2015-12-06	426970	0.6853
2015-12-07	487587	0.7053
2015-12-08	336913	0.5911
2015-12-09	1365071	0.5168
2015-12-10	556996	0.6462
2015-12-11	598804	0.7248
2015-12-12	598804	0.7248
2015-12-13	598804	0.7248
2015-12-14	758806	0.5582
2015-12-15	421587	0.7423
2015-12-16	494205	0.6883
2015-12-17	569320	0.7034
2015-12-18	1052042	0.6956
2015-12-19	1052042	0.6956
2015-12-20	1052042	0.6956
2015-12-21	425890	0.5290
2015-12-22	476137	0.6101
2015-12-23	253475	0.5965
2015-12-24	188670	0.4475
2015-12-25	188670	0.4475
2015-12-26	188670	0.4475
2015-12-27	188670	0.4475
2015-12-28	1060100	0.5724
2015-12-29	433986	0.5080
2015-12-30	632180	0.7874
2015-12-31	400391	0.6456

[365 rows x 15 columns]



In [21]:

```
plot_roll_win(INFY)
```

Calculated Moving Averages: for 10 weeks:

Date	
2015-01-01	1974.40
2015-01-02	2013.20
2015-01-03	2013.20
2015-01-04	2013.20
2015-01-05	1995.90
2015-01-06	1954.20
2015-01-07	1963.55
2015-01-08	1973.45
2015-01-09	2074.45
2015-01-10	2074.45
2015-01-11	2074.45
2015-01-12	2115.95
2015-01-13	2088.90
2015-01-14	2133.05

2015-01-14	2128.65
2015-01-15	2134.25
2015-01-16	2118.30
2015-01-17	2118.30
2015-01-18	2118.30
2015-01-19	2102.50
2015-01-20	2124.20
2015-01-21	2169.90
2015-01-22	2196.45
2015-01-23	2215.05
2015-01-24	2215.05
2015-01-25	2215.05
2015-01-26	2215.05
2015-01-27	2136.50
2015-01-28	2144.55
2015-01-29	2145.50
2015-01-30	2141.90

...

2015-12-02	1060.70
2015-12-03	1057.75
2015-12-04	1049.05
2015-12-05	1049.05
2015-12-06	1049.05
2015-12-07	1046.25
2015-12-08	1044.40
2015-12-09	1028.20
2015-12-10	1047.35
2015-12-11	1052.80
2015-12-12	1052.80
2015-12-13	1052.80
2015-12-14	1069.50
2015-12-15	1077.55
2015-12-16	1095.85
2015-12-17	1107.10
2015-12-18	1083.15
2015-12-19	1083.15
2015-12-20	1083.15
2015-12-21	1103.45
2015-12-22	1083.75
2015-12-23	1100.85
2015-12-24	1096.35
2015-12-25	1096.35
2015-12-26	1096.35
2015-12-27	1096.35
2015-12-28	1104.75
2015-12-29	1104.70
2015-12-30	1086.30
2015-12-31	1105.40

Freq: D, Name: Close, Length: 365, dtype: float64

Calculated Moving Averages: for 75 weeks:

Date

2015-01-01	1974.40
2015-01-02	2013.20
2015-01-03	2013.20
2015-01-04	2013.20
2015-01-05	1995.90
2015-01-06	1954.20
2015-01-07	1963.55
2015-01-08	1973.45
2015-01-09	2074.45
2015-01-10	2074.45
2015-01-11	2074.45
2015-01-12	2115.95
2015-01-13	2088.90
2015-01-14	2128.65
2015-01-15	2134.25
2015-01-16	2118.30
2015-01-17	2118.30
2015-01-18	2118.30
2015-01-19	2102.50
2015-01-20	2124.20
2015-01-21	2169.90
2015-01-22	2196.45
2015-01-23	2215.05
2015-01-24	2215.05
2015-01-25	2215.05

```

2015-01-26    2215.05
2015-01-27    2136.50
2015-01-28    2144.55
2015-01-29    2145.50
2015-01-30    2141.90
...
2015-12-02    1060.70
2015-12-03    1057.75
2015-12-04    1049.05
2015-12-05    1049.05
2015-12-06    1049.05
2015-12-07    1046.25
2015-12-08    1044.40
2015-12-09    1028.20
2015-12-10    1047.35
2015-12-11    1052.80
2015-12-12    1052.80
2015-12-13    1052.80
2015-12-14    1069.50
2015-12-15    1077.55
2015-12-16    1095.85
2015-12-17    1107.10
2015-12-18    1083.15
2015-12-19    1083.15
2015-12-20    1083.15
2015-12-21    1103.45
2015-12-22    1083.75
2015-12-23    1100.85
2015-12-24    1096.35
2015-12-25    1096.35
2015-12-26    1096.35
2015-12-27    1096.35
2015-12-28    1104.75
2015-12-29    1104.70
2015-12-30    1086.30
2015-12-31    1105.40

```

```
Freq: D, Name: Close, Length: 365, dtype: float64
```

Moving Averages for		Date	Symbol	Series	Prev Close	Open	High	Low \
2015-01-01	2015-01-01	INFY	EQ	1972.55	1968.95	1982.00	1956.90	
2015-01-02	2015-01-02	INFY	EQ	1974.40	1972.00	2019.05	1972.00	
2015-01-03	2015-01-02	INFY	EQ	1974.40	1972.00	2019.05	1972.00	
2015-01-04	2015-01-02	INFY	EQ	1974.40	1972.00	2019.05	1972.00	
2015-01-05	2015-01-05	INFY	EQ	2013.20	2009.90	2030.00	1977.50	
2015-01-06	2015-01-06	INFY	EQ	1995.90	1980.00	1985.00	1934.10	
2015-01-07	2015-01-07	INFY	EQ	1954.20	1965.00	1974.75	1950.00	
2015-01-08	2015-01-08	INFY	EQ	1963.55	1985.60	1997.00	1950.00	
2015-01-09	2015-01-09	INFY	EQ	1973.45	1980.10	2109.00	1913.05	
2015-01-10	2015-01-09	INFY	EQ	1973.45	1980.10	2109.00	1913.05	
2015-01-11	2015-01-09	INFY	EQ	1973.45	1980.10	2109.00	1913.05	
2015-01-12	2015-01-12	INFY	EQ	2074.45	2092.00	2119.20	2075.00	
2015-01-13	2015-01-13	INFY	EQ	2115.95	2107.80	2107.80	2075.00	
2015-01-14	2015-01-14	INFY	EQ	2088.90	2098.50	2133.00	2092.60	
2015-01-15	2015-01-15	INFY	EQ	2128.65	2135.20	2152.80	2112.25	
2015-01-16	2015-01-16	INFY	EQ	2134.25	2148.00	2160.00	2112.00	
2015-01-17	2015-01-16	INFY	EQ	2134.25	2148.00	2160.00	2112.00	
2015-01-18	2015-01-16	INFY	EQ	2134.25	2148.00	2160.00	2112.00	
2015-01-19	2015-01-19	INFY	EQ	2118.30	2120.00	2132.35	2094.60	
2015-01-20	2015-01-20	INFY	EQ	2102.50	2107.00	2133.00	2101.45	
2015-01-21	2015-01-21	INFY	EQ	2124.20	2131.50	2175.95	2118.00	
2015-01-22	2015-01-22	INFY	EQ	2169.90	2174.80	2203.00	2161.30	
2015-01-23	2015-01-23	INFY	EQ	2196.45	2200.00	2225.00	2165.10	
2015-01-24	2015-01-23	INFY	EQ	2196.45	2200.00	2225.00	2165.10	
2015-01-25	2015-01-23	INFY	EQ	2196.45	2200.00	2225.00	2165.10	
2015-01-26	2015-01-23	INFY	EQ	2196.45	2200.00	2225.00	2165.10	
2015-01-27	2015-01-27	INFY	EQ	2215.05	2221.00	2221.00	2130.10	
2015-01-28	2015-01-28	INFY	EQ	2136.50	2150.00	2154.80	2130.30	
2015-01-29	2015-01-29	INFY	EQ	2144.55	2145.00	2149.90	2127.60	
2015-01-30	2015-01-30	INFY	EQ	2145.50	2161.50	2162.55	2126.95	
...								
2015-12-02	2015-12-02	INFY	EQ	1079.00	1079.95	1079.95	1059.00	
2015-12-03	2015-12-03	INFY	EQ	1060.70	1061.00	1064.80	1049.05	
2015-12-04	2015-12-04	INFY	EQ	1057.75	1049.00	1064.90	1040.10	
2015-12-05	2015-12-04	INFY	EQ	1057.75	1049.00	1064.90	1040.10	
2015-12-06	2015-12-04	INFY	EQ	1057.75	1049.00	1064.90	1040.10	
2015-12-07	2015-12-07	INFY	EQ	1049.05	1055.30	1059.00	1040.00	
2015-12-08	2015-12-08	INFY	EQ	1046.25	1045.05	1062.75	1039.30	
2015-12-09	2015-12-09	INFY	EQ	1044.40	1043.00	1046.95	1022.55	
2015-12-10	2015-12-10	INFY	EQ	1028.20	1036.60	1051.60	1030.30	
2015-12-11	2015-12-11	INFY	EQ	1047.35	1054.00	1061.90	1045.90	

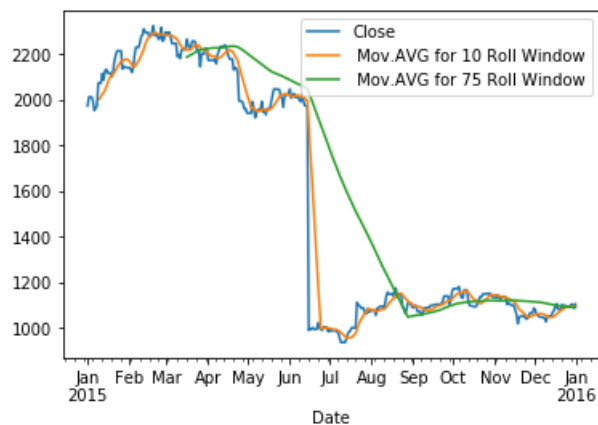
2015-12-12	2015-12-11	INFY	EQ	1047.35	1054.00	1061.90	1045.90
2015-12-13	2015-12-11	INFY	EQ	1047.35	1054.00	1061.90	1045.90
2015-12-14	2015-12-14	INFY	EQ	1052.80	1049.50	1073.15	1048.05
2015-12-15	2015-12-15	INFY	EQ	1069.50	1073.25	1079.10	1058.80
2015-12-16	2015-12-16	INFY	EQ	1077.55	1083.40	1098.00	1083.40
2015-12-17	2015-12-17	INFY	EQ	1095.85	1100.00	1109.80	1088.00
2015-12-18	2015-12-18	INFY	EQ	1107.10	1103.40	1103.40	1079.45
2015-12-19	2015-12-18	INFY	EQ	1107.10	1103.40	1103.40	1079.45
2015-12-20	2015-12-18	INFY	EQ	1107.10	1103.40	1103.40	1079.45
2015-12-21	2015-12-21	INFY	EQ	1083.15	1077.00	1107.40	1065.95
2015-12-22	2015-12-22	INFY	EQ	1103.45	1097.45	1097.45	1080.10
2015-12-23	2015-12-23	INFY	EQ	1083.75	1095.05	1102.50	1087.05
2015-12-24	2015-12-24	INFY	EQ	1100.85	1102.05	1104.45	1090.10
2015-12-25	2015-12-24	INFY	EQ	1100.85	1102.05	1104.45	1090.10
2015-12-26	2015-12-24	INFY	EQ	1100.85	1102.05	1104.45	1090.10
2015-12-27	2015-12-24	INFY	EQ	1100.85	1102.05	1104.45	1090.10
2015-12-28	2015-12-28	INFY	EQ	1096.35	1090.00	1110.00	1090.00
2015-12-29	2015-12-29	INFY	EQ	1104.75	1101.25	1110.00	1097.30
2015-12-30	2015-12-30	INFY	EQ	1104.70	1101.10	1106.60	1083.00
2015-12-31	2015-12-31	INFY	EQ	1086.30	1090.15	1109.95	1087.00

	Last Date	Close	VWAP	Volume	Turnover	Trades \
2015-01-01	1971.00	1974.40	1971.34	500691	9.870306e+13	14908
2015-01-02	2017.95	2013.20	2003.25	1694580	3.394669e+14	54166
2015-01-03	2017.95	2013.20	2003.25	1694580	3.394669e+14	54166
2015-01-04	2017.95	2013.20	2003.25	1694580	3.394669e+14	54166
2015-01-05	1996.00	1995.90	2004.59	2484256	4.979911e+14	82694
2015-01-06	1965.10	1954.20	1954.82	2416829	4.724458e+14	108209
2015-01-07	1966.05	1963.55	1962.59	1812479	3.557162e+14	62463
2015-01-08	1979.25	1973.45	1972.78	3391230	6.690160e+14	92752
2015-01-09	2075.30	2074.45	2037.69	11215832	2.285439e+15	359214
2015-01-10	2075.30	2074.45	2037.69	11215832	2.285439e+15	359214
2015-01-11	2075.30	2074.45	2037.69	11215832	2.285439e+15	359214
2015-01-12	2112.95	2115.95	2099.40	3189722	6.696516e+14	107209
2015-01-13	2092.00	2088.90	2089.42	2200309	4.597374e+14	66676
2015-01-14	2129.00	2128.65	2110.88	2480315	5.235638e+14	53263
2015-01-15	2130.00	2134.25	2137.46	2085613	4.457911e+14	48882
2015-01-16	2115.00	2118.30	2125.77	1672740	3.555858e+14	63848
2015-01-17	2115.00	2118.30	2125.77	1672740	3.555858e+14	63848
2015-01-18	2115.00	2118.30	2125.77	1672740	3.555858e+14	63848
2015-01-19	2105.00	2102.50	2104.55	1021936	2.150713e+14	62963
2015-01-20	2119.20	2124.20	2118.16	1701126	3.603258e+14	66871
2015-01-21	2172.00	2169.90	2148.41	2123727	4.562628e+14	82679
2015-01-22	2194.95	2196.45	2193.10	2489599	5.459951e+14	82961
2015-01-23	2211.90	2215.05	2194.58	2371582	5.204624e+14	78929
2015-01-24	2211.90	2215.05	2194.58	2371582	5.204624e+14	78929
2015-01-25	2211.90	2215.05	2194.58	2371582	5.204624e+14	78929
2015-01-26	2211.90	2215.05	2194.58	2371582	5.204624e+14	78929
2015-01-27	2137.55	2136.50	2146.45	3434992	7.373022e+14	117167
2015-01-28	2144.45	2144.55	2144.31	3283589	7.041041e+14	99134
2015-01-29	2147.80	2145.50	2141.67	3842356	8.229076e+14	79209
2015-01-30	2141.85	2141.90	2144.44	2708436	5.808066e+14	99180
2015-12-02	1061.10	1060.70	1064.12	3198808	3.403929e+14	90123
2015-12-03	1059.00	1057.75	1056.77	2752363	2.908624e+14	110543
2015-12-04	1048.85	1049.05	1047.32	4187765	4.385928e+14	209805
2015-12-05	1048.85	1049.05	1047.32	4187765	4.385928e+14	209805
2015-12-06	1048.85	1049.05	1047.32	4187765	4.385928e+14	209805
2015-12-07	1046.00	1046.25	1048.08	2256935	2.365448e+14	65005
2015-12-08	1042.00	1044.40	1051.88	2862186	3.010684e+14	87394
2015-12-09	1024.00	1028.20	1036.19	3409127	3.532487e+14	85433
2015-12-10	1049.90	1047.35	1040.47	2793873	2.906945e+14	80028
2015-12-11	1055.65	1052.80	1052.88	2695099	2.837607e+14	84930
2015-12-12	1055.65	1052.80	1052.88	2695099	2.837607e+14	84930
2015-12-13	1055.65	1052.80	1052.88	2695099	2.837607e+14	84930
2015-12-14	1067.50	1069.50	1066.30	2408336	2.568018e+14	104978
2015-12-15	1078.50	1077.55	1071.44	2715904	2.909926e+14	76821
2015-12-16	1094.00	1095.85	1092.86	2747926	3.003094e+14	66894
2015-12-17	1105.50	1107.10	1099.83	2479391	2.726907e+14	87599
2015-12-18	1085.95	1083.15	1086.91	3609910	3.923651e+14	65866
2015-12-19	1085.95	1083.15	1086.91	3609910	3.923651e+14	65866
2015-12-20	1085.95	1083.15	1086.91	3609910	3.923651e+14	65866
2015-12-21	1107.00	1103.45	1095.68	2165506	2.372707e+14	61692
2015-12-22	1085.00	1083.75	1085.81	2054627	2.230939e+14	51963
2015-12-23	1100.00	1100.85	1097.35	1435464	1.575200e+14	38571
2015-12-24	1095.80	1096.35	1095.84	615027	6.739696e+13	20528
2015-12-25	1095.80	1096.35	1095.84	615027	6.739696e+13	20528
2015-12-26	1095.80	1096.35	1095.84	615027	6.739696e+13	20528
2015-12-27	1095.80	1096.35	1095.84	615027	6.739696e+13	20528
2015-12-28	1103.80	1104.75	1105.51	2763476	3.055046e+14	51103
2015-12-29	1103.00	1104.70	1104.14	1672531	1.846706e+14	52409
2015-12-30	1088.00	1086.30	1094.45	2576985	2.820380e+14	65379
2015-12-31	1107.00	1105.40	1102.09	3971969	4.377467e+14	75143

Deliverable Volume %Deliverble  
Date  
2015-01-01 258080 0.5154

2015-01-01	238888	0.5134
2015-01-02	1249104	0.7371
2015-01-03	1249104	0.7371
2015-01-04	1249104	0.7371
2015-01-05	1830962	0.7370
2015-01-06	1772070	0.7332
2015-01-07	1317720	0.7270
2015-01-08	2686012	0.7920
2015-01-09	3369489	0.3004
2015-01-10	3369489	0.3004
2015-01-11	3369489	0.3004
2015-01-12	1818800	0.5702
2015-01-13	1385009	0.6295
2015-01-14	1832958	0.7390
2015-01-15	1410992	0.6765
2015-01-16	1254004	0.7497
2015-01-17	1254004	0.7497
2015-01-18	1254004	0.7497
2015-01-19	673948	0.6595
2015-01-20	1284137	0.7549
2015-01-21	1394125	0.6565
2015-01-22	1879561	0.7550
2015-01-23	1622130	0.6840
2015-01-24	1622130	0.6840
2015-01-25	1622130	0.6840
2015-01-26	1622130	0.6840
2015-01-27	2765575	0.8051
2015-01-28	2313485	0.7046
2015-01-29	2797911	0.7282
2015-01-30	2093132	0.7728
...	...	...
2015-12-02	2139233	0.6688
2015-12-03	1838358	0.6679
2015-12-04	3031773	0.7240
2015-12-05	3031773	0.7240
2015-12-06	3031773	0.7240
2015-12-07	1441112	0.6385
2015-12-08	1790175	0.6255
2015-12-09	2068578	0.6068
2015-12-10	1838589	0.6581
2015-12-11	1623053	0.6022
2015-12-12	1623053	0.6022
2015-12-13	1623053	0.6022
2015-12-14	1419333	0.5893
2015-12-15	1951187	0.7184
2015-12-16	1988090	0.7235
2015-12-17	1294917	0.5223
2015-12-18	2604590	0.7215
2015-12-19	2604590	0.7215
2015-12-20	2604590	0.7215
2015-12-21	1223571	0.5650
2015-12-22	1204818	0.5864
2015-12-23	861318	0.6000
2015-12-24	294731	0.4792
2015-12-25	294731	0.4792
2015-12-26	294731	0.4792
2015-12-27	294731	0.4792
2015-12-28	1880078	0.6803
2015-12-29	967577	0.5785
2015-12-30	1754378	0.6808
2015-12-31	2641827	0.6651

[365 rows x 15 columns]



In [22]:

```
plot_rolling_win(NIFTY)
```

Calculated Moving Averages: for 10 weeks:

```
Date
2015-01-01    11215.70
2015-01-02    11372.10
2015-01-03    11372.10
2015-01-04    11372.10
2015-01-05    11248.55
2015-01-06    10959.90
2015-01-07    10916.00
2015-01-08    11018.15
2015-01-09    11399.65
2015-01-10    11399.65
2015-01-11    11399.65
2015-01-12    11543.65
2015-01-13    11502.80
2015-01-14    11614.30
2015-01-15    11669.85
2015-01-16    11659.60
2015-01-17    11659.60
2015-01-18    11659.60
2015-01-19    11642.75
2015-01-20    11695.00
2015-01-21    11813.70
2015-01-22    11850.85
2015-01-23    11885.15
2015-01-24    11885.15
2015-01-25    11885.15
2015-01-26    11885.15
2015-01-27    11693.45
2015-01-28    11809.55
2015-01-29    11824.15
2015-01-30    11824.75
...
2015-12-02    11149.60
2015-12-03    11081.90
2015-12-04    10969.05
2015-12-05    10969.05
2015-12-06    10969.05
2015-12-07    10998.65
2015-12-08    10981.85
2015-12-09    10930.05
2015-12-10    11055.50
2015-12-11    11043.05
2015-12-12    11043.05
2015-12-13    11043.05
2015-12-14    11099.70
2015-12-15    11058.25
2015-12-16    11144.90
2015-12-17    11275.15
2015-12-18    11122.50
2015-12-19    11122.50
2015-12-20    11122.50
2015-12-21    11224.75
2015-12-22    11095.45
2015-12-23    11195.65
2015-12-24    11184.90
2015-12-25    11184.90
2015-12-26    11184.90
2015-12-27    11184.90
2015-12-28    11271.80
2015-12-29    11253.45
2015-12-30    11117.60
2015-12-31    11212.55
Freq: D, Name: Close, Length: 365, dtype: float64
Calculated Moving Averages: for 75 weeks:
```

```
Date
2015-01-01    11215.70
2015-01-02    11372.10
2015-01-03    11372.10
2015-01-04    11372.10
2015-01-05    11248.55
2015-01-06    10959.90
2015-01-07    10916.00
```

```

2015-01-07    11018.15
2015-01-08    11018.15
2015-01-09    11399.65
2015-01-10    11399.65
2015-01-11    11399.65
2015-01-12    11543.65
2015-01-13    11502.80
2015-01-14    11614.30
2015-01-15    11669.85
2015-01-16    11659.60
2015-01-17    11659.60
2015-01-18    11659.60
2015-01-19    11642.75
2015-01-20    11695.00
2015-01-21    11813.70
2015-01-22    11850.85
2015-01-23    11885.15
2015-01-24    11885.15
2015-01-25    11885.15
2015-01-26    11885.15
2015-01-27    11693.45
2015-01-28    11809.55
2015-01-29    11824.15
2015-01-30    11824.75

```

...

```

2015-12-02    11149.60
2015-12-03    11081.90
2015-12-04    10969.05
2015-12-05    10969.05
2015-12-06    10969.05
2015-12-07    10998.65
2015-12-08    10981.85
2015-12-09    10930.05
2015-12-10    11055.50
2015-12-11    11043.05
2015-12-12    11043.05
2015-12-13    11043.05
2015-12-14    11099.70
2015-12-15    11058.25
2015-12-16    11144.90
2015-12-17    11275.15
2015-12-18    11122.50
2015-12-19    11122.50
2015-12-20    11122.50
2015-12-21    11224.75
2015-12-22    11095.45
2015-12-23    11195.65
2015-12-24    11184.90
2015-12-25    11184.90
2015-12-26    11184.90
2015-12-27    11184.90
2015-12-28    11271.80
2015-12-29    11253.45
2015-12-30    11117.60
2015-12-31    11212.55

```

Freq: D, Name: Close, Length: 365, dtype: float64

Moving Averages for Date		Date	Open	High	Low	Close	Volume \
2015-01-01	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	
2015-01-02	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	
2015-01-03	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	
2015-01-04	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	
2015-01-05	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	
2015-01-06	2015-01-06	11186.10	11186.10	10909.00	10959.90	12515739	
2015-01-07	2015-01-07	11013.20	11042.35	10889.55	10916.00	10976356	
2015-01-08	2015-01-08	11031.15	11058.15	10915.05	11018.15	12975117	
2015-01-09	2015-01-09	11058.05	11484.90	10932.20	11399.65	24812224	
2015-01-10	2015-01-09	11058.05	11484.90	10932.20	11399.65	24812224	
2015-01-11	2015-01-09	11058.05	11484.90	10932.20	11399.65	24812224	
2015-01-12	2015-01-12	11456.00	11565.85	11378.80	11543.65	16505074	
2015-01-13	2015-01-13	11545.25	11546.60	11437.95	11502.80	12511358	
2015-01-14	2015-01-14	11561.95	11631.55	11521.00	11614.30	12544558	
2015-01-15	2015-01-15	11672.30	11774.50	11575.10	11669.85	13882213	
2015-01-16	2015-01-16	11708.85	11708.85	11582.85	11659.60	12368107	
2015-01-17	2015-01-16	11708.85	11708.85	11582.85	11659.60	12368107	
2015-01-18	2015-01-16	11708.85	11708.85	11582.85	11659.60	12368107	
2015-01-19	2015-01-19	11732.50	11797.60	11629.05	11642.75	13696381	
2015-01-20	2015-01-20	11681.80	11721.90	11635.70	11695.00	11021415	



2015-01-21	2015-01-21	11732.45	11838.30	11659.70	11813.70	18679282
2015-01-22	2015-01-22	11832.55	11884.50	11782.95	11850.85	15715515
2015-01-23	2015-01-23	11877.90	11921.00	11767.40	11885.15	30034833
2015-01-24	2015-01-23	11877.90	11921.00	11767.40	11885.15	30034833
2015-01-25	2015-01-23	11877.90	11921.00	11767.40	11885.15	30034833
2015-01-26	2015-01-23	11877.90	11921.00	11767.40	11885.15	30034833
2015-01-27	2015-01-27	11915.60	11917.25	11679.55	11693.45	17005337
2015-01-28	2015-01-28	11712.55	11821.80	11693.80	11809.55	16876897
2015-01-29	2015-01-29	11812.35	11861.50	11728.75	11824.15	15520902
2015-01-30	2015-01-30	11998.35	12003.35	11799.35	11824.75	18559078

2015-12-02	2015-12-02	11298.90	11298.90	11134.90	11149.60	7524996
2015-12-03	2015-12-03	11149.30	11153.70	11067.55	11081.90	9384540
2015-12-04	2015-12-04	11034.65	11037.95	10940.30	10969.05	10062731
2015-12-05	2015-12-04	11034.65	11037.95	10940.30	10969.05	10062731
2015-12-06	2015-12-04	11034.65	11037.95	10940.30	10969.05	10062731
2015-12-07	2015-12-07	11009.50	11054.00	10943.85	10998.65	8477753
2015-12-08	2015-12-08	10989.20	11109.30	10946.00	10981.85	8486760
2015-12-09	2015-12-09	10978.25	11027.30	10916.25	10930.05	11006038
2015-12-10	2015-12-10	10971.55	11073.15	10931.15	11055.50	7908231
2015-12-11	2015-12-11	11086.55	11086.55	11015.60	11043.05	8502528
2015-12-12	2015-12-11	11086.55	11086.55	11015.60	11043.05	8502528
2015-12-13	2015-12-11	11086.55	11086.55	11015.60	11043.05	8502528
2015-12-14	2015-12-14	10940.75	11124.90	10940.75	11099.70	7044052
2015-12-15	2015-12-15	11139.55	11139.55	11044.35	11058.25	9065922
2015-12-16	2015-12-16	11081.75	11187.85	11081.75	11144.90	8751937
2015-12-17	2015-12-17	11182.95	11293.05	11122.45	11275.15	9556916
2015-12-18	2015-12-18	11227.15	11227.15	11094.80	11122.50	11781399
2015-12-19	2015-12-18	11227.15	11227.15	11094.80	11122.50	11781399
2015-12-20	2015-12-18	11227.15	11227.15	11094.80	11122.50	11781399
2015-12-21	2015-12-21	11096.40	11232.50	11067.20	11224.75	6043899
2015-12-22	2015-12-22	11201.80	11201.80	11081.15	11095.45	5998230
2015-12-23	2015-12-23	11163.80	11206.40	11130.65	11195.65	4638075
2015-12-24	2015-12-24	11193.25	11197.50	11152.85	11184.90	2927864
2015-12-25	2015-12-24	11193.25	11197.50	11152.85	11184.90	2927864
2015-12-26	2015-12-24	11193.25	11197.50	11152.85	11184.90	2927864
2015-12-27	2015-12-24	11193.25	11197.50	11152.85	11184.90	2927864
2015-12-28	2015-12-28	11152.70	11303.05	11146.85	11271.80	8055590
2015-12-29	2015-12-29	11257.05	11287.50	11206.60	11253.45	6024174
2015-12-30	2015-12-30	11247.35	11263.60	11100.10	11117.60	6564991
2015-12-31	2015-12-31	11113.00	11233.85	11113.00	11212.55	8197040

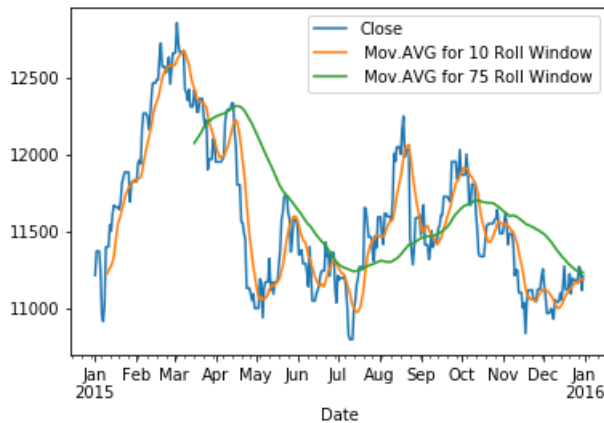
Turnover		
Date		
2015-01-01	3.575100e+09	
2015-01-02	9.645600e+09	
2015-01-03	9.645600e+09	
2015-01-04	9.645600e+09	
2015-01-05	1.059000e+10	
2015-01-06	1.364500e+10	
2015-01-07	1.203440e+10	
2015-01-08	1.485630e+10	
2015-01-09	3.536420e+10	
2015-01-10	3.536420e+10	
2015-01-11	3.536420e+10	
2015-01-12	1.712310e+10	
2015-01-13	1.417510e+10	
2015-01-14	1.438530e+10	
2015-01-15	1.764560e+10	
2015-01-16	1.714690e+10	
2015-01-17	1.714690e+10	
2015-01-18	1.714690e+10	
2015-01-19	1.183750e+10	
2015-01-20	1.234730e+10	
2015-01-21	1.973070e+10	
2015-01-22	1.655670e+10	
2015-01-23	2.001210e+10	
2015-01-24	2.001210e+10	
2015-01-25	2.001210e+10	
2015-01-26	2.001210e+10	
2015-01-27	1.866840e+10	
2015-01-28	1.937590e+10	
2015-01-29	2.160790e+10	
2015-01-30	2.905950e+10	
...		
2015-12-02	8.086300e+09	
2015-12-03	9.792900e+09	
2015-12-04	9.755500e+09	
2015-12-05	9.755500e+09	
2015-12-06	9.755500e+09	
2015-12-07	8.108600e+09	
2015-12-08	8.256700e+09	
2015-12-09	1.352400e+10	
2015-12-10	8.326600e+09	
2015-12-11	9.019600e+09	
2015-12-12	9.019600e+09	
2015-12-13	9.019600e+09	
2015-12-14	8.380500e+09	

```

2015-12-14 8.280500e+09
2015-12-15 8.154000e+09
2015-12-16 8.490500e+09
2015-12-17 9.097200e+09
2015-12-18 1.222450e+10
2015-12-19 1.222450e+10
2015-12-20 1.222450e+10
2015-12-21 6.415600e+09
2015-12-22 6.366300e+09
2015-12-23 4.562900e+09
2015-12-24 3.182700e+09
2015-12-25 3.182700e+09
2015-12-26 3.182700e+09
2015-12-27 3.182700e+09
2015-12-28 1.001900e+10
2015-12-29 6.626200e+09
2015-12-30 7.071900e+09
2015-12-31 8.590500e+09

```

[365 rows x 7 columns]



### 3. Create the following dummy time series:

- 3.1 Volume shocks - If volume traded is 10% higher/lower than previous day - make a 0/1 boolean time series for shock, 0/1 dummy-coded time series for direction of shock.
- 3.2 Price shocks - If closing price at T vs T+1 has a difference > 2%, then 0/1 boolean time series for shock, 0/1 dummy-coded time series for direction of shock.
- 3.3 Pricing black swan - If closing price at T vs T+1 has a difference > 2%, then 0/1 boolean time series for shock, 0/1 dummy-coded time series for direction of shock.
- 3.4 Pricing shock without volume shock - based on points a & b - Make a 0/1 dummy time series.

In [23]:

```

# 3.1. volume shocks
def volume_shocks(stock):
    """
    'Volume' - Vol_t
    'Volume next day - vol_t+1

    """
    stock["vol_t+1"] = stock.Volume.shift(1) #next rows value

    stock["volume_shock"] = ((abs(stock["vol_t+1"] - stock["Volume"])/stock["Volume"]*100) > 10).astype(int)

    return stock.head()

```

In [24]:

```

volume_shocks(TCS)
volume_shocks(INFY)
volume_shocks(NIFTY)

```

Out[24]:

Date	Open	High	Low	Close	Volume	Turnover	vol_t+1	volume_shock
------	------	------	-----	-------	--------	----------	---------	--------------

Date	Date	Open	High	Low	Close	Volume	Turnover	vol_t+1	volume_shock
2015-01-01	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	3.575100e+09	NaN	0
2015-01-02	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	4246150.0	1
2015-01-03	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0
2015-01-04	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0
2015-01-05	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	1.059000e+10	10004862.0	1

In [25]:

```
# direction of shocks
def direction_fun(stock):

    # considering only shock - 1 valued rows.
    # 0 - negative and 1- positive
    if stock["volume_shock"] == 0:
        pass
    else:
        if (stock["vol_t+1"] - stock["Volume"]) < 0:
            return 0
        else:
            return 1
```

In [26]:

```
def vol_shock_direction(stock):
    stock['VOL_SHOCK_DIR'] = 'Nan'
    stock['VOL_SHOCK_DIR'] = stock.apply(direction_fun, axis=1)
    return stock.head()
```

In [27]:

```
vol_shock_direction(TCS)
vol_shock_direction(INFY)
vol_shock_direction(NIFTY)
```

Out[27]:

	Date	Open	High	Low	Close	Volume	Turnover	vol_t+1	volume_shock	VOL_SHOCK_DIR
Date										
2015-01-01	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	3.575100e+09	NaN	0	NaN
2015-01-02	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	4246150.0	1	0.0
2015-01-03	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN
2015-01-04	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN
2015-01-05	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	1.059000e+10	10004862.0	1	1.0

In [28]:

```
# 3.2. Price shocks
def price_shocks(stock):
    """
    'ClosePrice' - Close_t
    'Close Price next day - vol_t+1

    """
    stock["price_t+1"] = stock.Close.shift(1) #next rows value

    stock["price_shock"] = (abs((stock["price_t+1"] - stock["Close"])/stock["Close"]*100) > 2).astype(int)

    stock["price_black_swan"] = stock['price_shock'] # Since both had same data anad info/
```

```
return stock.head()
```

In [29]:

```
price_shocks(TCS)
price_shocks(INFY)
price_shocks(NIFTY)
```

Out[29]:

	Date	Open	High	Low	Close	Volume	Turnover	vol_t+1	volume_shock	VOL_SHOCK_DIR	price_t+1
Date											
2015-01-01	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	3.575100e+09	NaN	0	NaN	NaN
2015-01-02	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	4246150.0	1	0.0	11215.7
2015-01-03	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN	11372.1
2015-01-04	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN	11372.1
2015-01-05	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	1.059000e+10	10004862.0	1	1.0	11372.1

In [30]:

```
# 3.3. Price black swan

def direction_fun_price(stock):

    # considerng only shock - 1 valued rows.
    # 0 - negative and 1- positive
    if stock["price_shock"] == 0:
        pass
    else:
        if (stock["price_t+1"] - stock["Close"]) < 0:
            return 0
        else:
            return 1
```

In [31]:

```
def price_shock_direction(stock):
    stock['PRICE_SHOCK_DIR'] = 'Nan'
    stock['PRICE_SHOCK_DIR'] = stock.apply(direction_fun_price, axis=1)
    return stock.head()
```

In [32]:

```
vol_shock_direction(TCS)
vol_shock_direction(INFY)
vol_shock_direction(NIFTY)
```

Out[32]:

	Date	Open	High	Low	Close	Volume	Turnover	vol_t+1	volume_shock	VOL_SHOCK_DIR	price_t+1
Date											
2015-01-01	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	3.575100e+09	NaN	0	NaN	NaN
2015-01-02	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	4246150.0	1	0.0	11215.7
2015-01-03	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN	11372.1
2015-01-04	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN	11372.1
2015-01-05	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	1.059000e+10	10004862.0	1	1.0	11372.1

	Date	Open	High	Low	Close	Volume	Turnover	vol_t+1	volume_shock	VOL_SHOCK_DIR	price_t+1
--	------	------	------	-----	-------	--------	----------	---------	--------------	---------------	-----------

In [33]:

```
# 3.4. Pricing shock without volume shock
def price_shock_wo_vol_shock(stock):

    stock["not_vol_shock"] = (~(stock["volume_shock"].astype(bool))).astype(int)
    stock["price_shock_w/o_vol_shock"] = stock["not_vol_shock"] & stock["price_shock"]

    return stock.head()
```

In [34]:

```
price_shock_wo_vol_shock(TCS)
price_shock_wo_vol_shock(INFY)
price_shock_wo_vol_shock(NIFTY)
```

Out[34]:

	Date	Open	High	Low	Close	Volume	Turnover	vol_t+1	volume_shock	VOL_SHOCK_DIR	price_t+1
<b>Date</b>											
<b>2015-01-01</b>	2015-01-01	11214.80	11235.75	11166.35	11215.70	4246150	3.575100e+09	NaN	0	NaN	NaN
<b>2015-01-02</b>	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	4246150.0	1	0.0	11215.7
<b>2015-01-03</b>	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN	11372.1
<b>2015-01-04</b>	2015-01-02	11214.65	11399.10	11214.65	11372.10	10004862	9.645600e+09	10004862.0	0	NaN	11372.1
<b>2015-01-05</b>	2015-01-05	11369.35	11433.75	11186.95	11248.55	8858018	1.059000e+10	10004862.0	1	1.0	11372.1

## Part 2 (data visualization ):

For this section, you can use only bokeh. <https://bokeh.pydata.org/en/latest/docs/gallery.html>

1. Create timeseries plot of close prices of stocks/indices with the following features:
2. Color timeseries in simple blue color.
3. Color timeseries between two volume shocks in a different color (Red)
4. Gradient color in blue spectrum based on difference of 52 week moving average.
5. Mark closing Pricing shock without volume shock to identify volumeless price movement.
6. Hand craft partial autocorrelation plot for each stock/index on upto all lookbacks on bokeh - sample reference - [https://www.statsmodels.org/dev/generated/statsmodels.graphics.tsaplots.plot\\_pacf.html](https://www.statsmodels.org/dev/generated/statsmodels.graphics.tsaplots.plot_pacf.html)

In [35]:

```
import bokeh
from bokeh.plotting import figure, output_file, show
from bokeh.io import show, output_notebook
from bokeh.palettes import Blues9
from bokeh.palettes import RdBu3
from bokeh.models import ColumnDataSource, CategoricalColorMapper, ContinuousColorMapper
from bokeh.palettes import Spectral11
```

In [36]:

```
output_notebook()
```

Loading BokehJS ...

In [37]:

```
def bokeh_plot(stock):
```

```

data = dict(stock=stock['Close'], Date=stock.index)

p = figure(plot_width=800, plot_height=250, title = 'time series for {}'.format(stock.name),
x_axis_type="datetime")
p.line(stock.index, stock['Close'], color='blue', alpha=0.5)

#show price shock w/o vol shock

p.circle(stock.index, stock.Close*stock["price_shock_w/0_vol_shock"], size=4, legend='price shock without vol shock')
show(p)

```

In [38]:

```

output_file("timeseries.html")

bokeh_plot(TCS)
bokeh_plot(INFY)
bokeh_plot(NIFTY)

```

In [39]:

```

from statsmodels.tsa.stattools import acf, pacf

def draw_pacf(stock):

    lags = 50

    x = list(range(lags))

    p = figure(plot_height=500, title="Partial Autocorrelation Plot {}".format(stock.name))

    partial_autocorr = pacf(stock["Close"], nlags=lags)
    p.vbar(x=x, top=partial_autocorr, width=0.9)
    show(p)

```

In [40]:

```

output_file("PACF.html")

draw_pacf(TCS)
draw_pacf(INFY)
draw_pacf(NIFTY)

```

BokehUserWarning: ColumnDataSource's columns must be of the same length. Current lengths: ('top', 51), ('x', 50)

BokehUserWarning: ColumnDataSource's columns must be of the same length. Current lengths: ('top', 51), ('x', 50)

BokehUserWarning: ColumnDataSource's columns must be of the same length. Current lengths: ('top', 51), ('x', 50)

In [ ]:

```


```