1. About data For this analysis, I have used 2 years of historical data from around mid-Feb 2018 to Feb 2020 of the below stocks listed on National Stock Exchange(NSE)—

HDFC Ltd. Sun Pharmaceutical Industries Ltd. Tata Consultancy Services Ltd. Jindal Steel & Power Ltd. Jubilant FoodWorks Ltd.

2. Understanding data & general statistics Import necessary libraries —

In [1]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import datetime
import warnings
warnings.filterwarnings('ignore')
```

In [4]:
```
# import package
import pandas_datareader.data as web
# set start and end dates
start = datetime.datetime(2018, 2, 15)
end = datetime.datetime(2020, 2, 14)
# extract the closing price data
combined_df = web.DataReader(['HDFC.NS', 'JINDALSTEL.NS','JUBLFOOD.NS','SUNPHARMA
                             'yahoo', start = start, end = end)['Adj Close']
```

In [5]:
```
# drop null values
combined_df.dropna(inplace = True, axis = 0)
# display first few rows
combined_df.head()
```

Out[5]:

Symbols	HDFC.NS	JINDALSTEL.NS	JUBLFOOD.NS	SUNPHARMA.NS	TCS.NS	^NSI
Date						
2018-02-15	1704.119507	264.763580	198.565872	552.590515	1342.856079	10545.5000
2018-02-16	1691.078735	250.944199	192.619461	552.110474	1346.160522	10452.2998
2018-02-19	1689.728271	249.447510	196.784424	538.817749	1341.823242	10378.4003
2018-02-20	1687.585938	251.443085	197.115036	536.994263	1351.530273	10360.4003
2018-02-21	1699.741577	246.753479	196.434021	504.601715	1396.302246	10397.4501

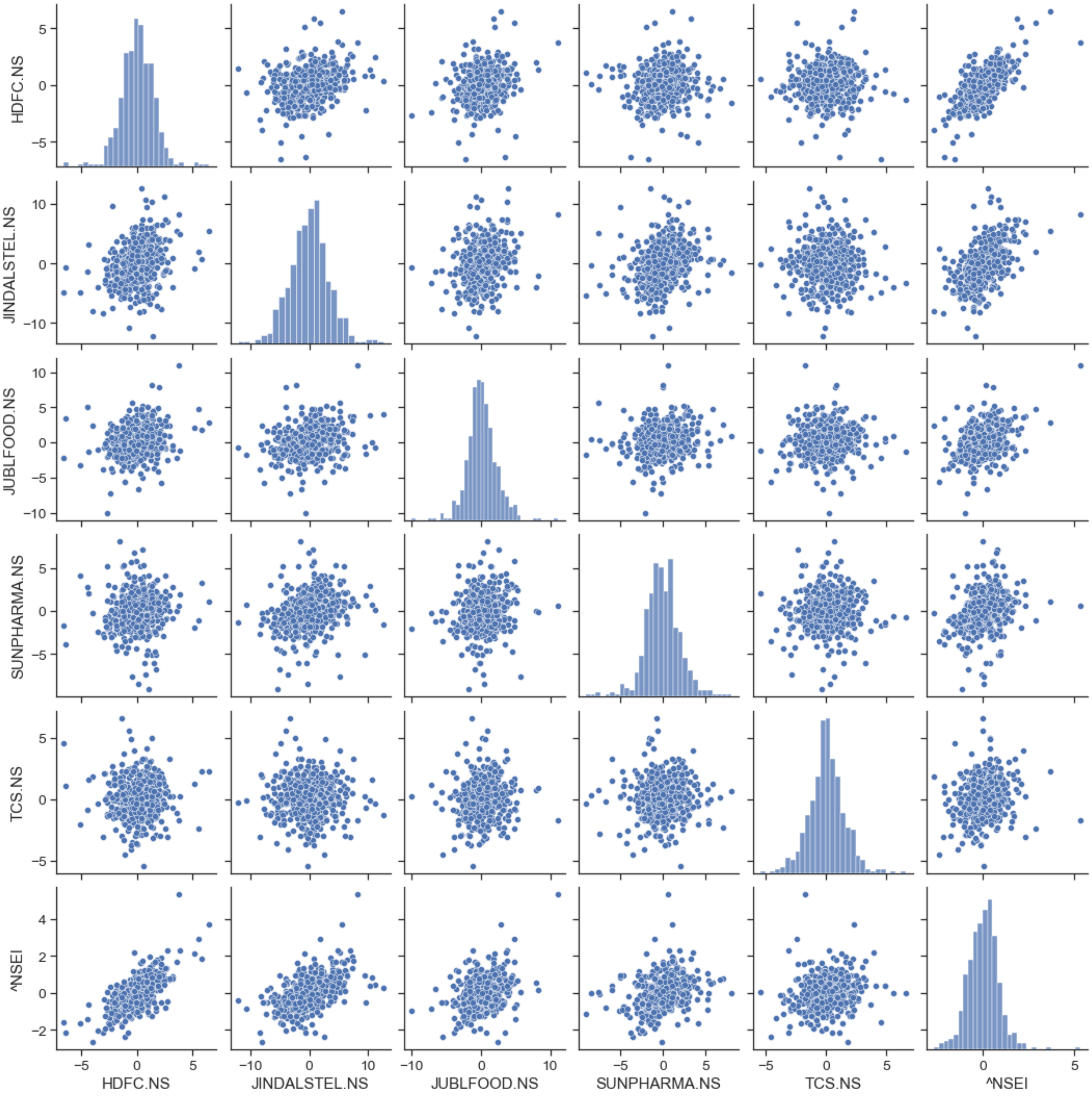
Correlation Analysis Of Stocks with Pair plot and Joint plots

In [7]:

```
# store daily returns of all above stocks in a new dataframe
pct_chg_df = combined_df.pct_change()*100
pct_chg_df.dropna(inplace = True, how = 'any', axis = 0)
# plotting pairplot
import seaborn as sns
sns.set(style = 'ticks', font_scale = 1.25)
sns.pairplot(pct_chg_df)
```

Out[7]:

```
<seaborn.axisgrid.PairGrid at 0x1e0c93449a0>
```



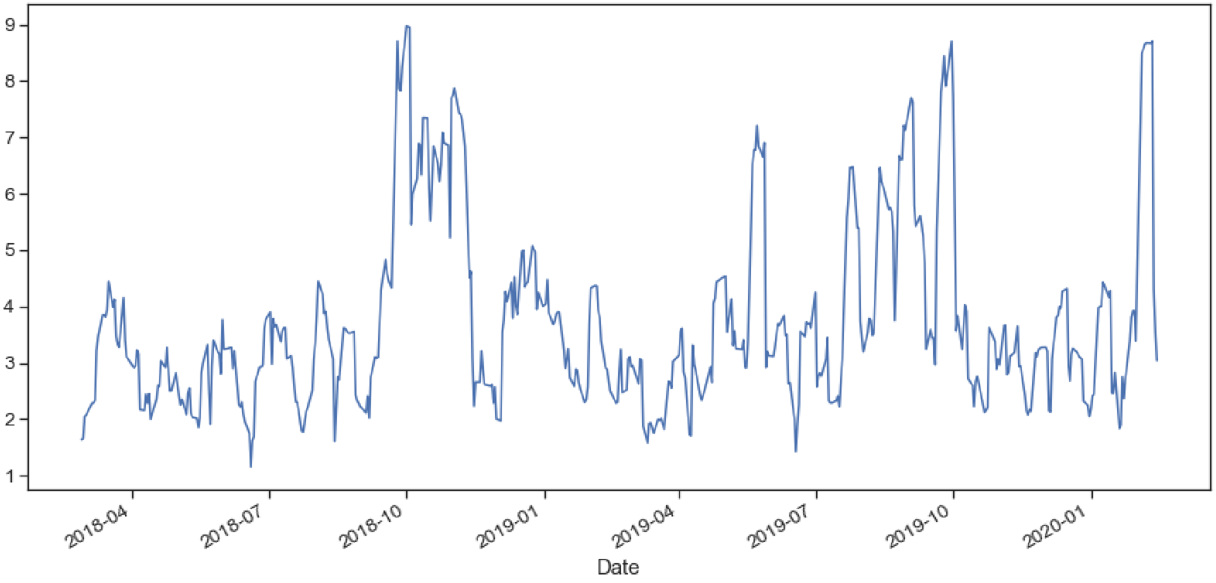
Volatility analysis:

Volatility is one of the most important pillars in financial markets. A stock is said to have high volatility if its value can change dramatically within a short span of time. On other hand, lower volatility means that value of stock tends to be relatively steady over a period of time. These movements are due to several factors including demand and supply, sentiment, corporate actions, greed, and fear, etc. Mathematically, volatility is measured using a statistical measure called ‘standard deviation’, which measures an asset’s departure from its average value.

We have already calculated the intraday returns (daily returns) of the HDFC stock and several other stocks. Next, we will calculate the 7-day rolling mean(also called moving average) of the daily returns, then compute the standard deviation (which is square root of the variance) and plot the values. Relax, we don’t have to calculate all this manually; Pandas ‘rolling()’ function and ‘std()’ function does the job for us in just one line

```
In [10]: HDFC_vol = pct_chg_df['HDFC.NS'].rolling(7).std()*np.sqrt(7)
         HDFC_vol.plot(figsize = (15, 7))
```

```
Out[10]: <AxesSubplot:xlabel='Date'>
```



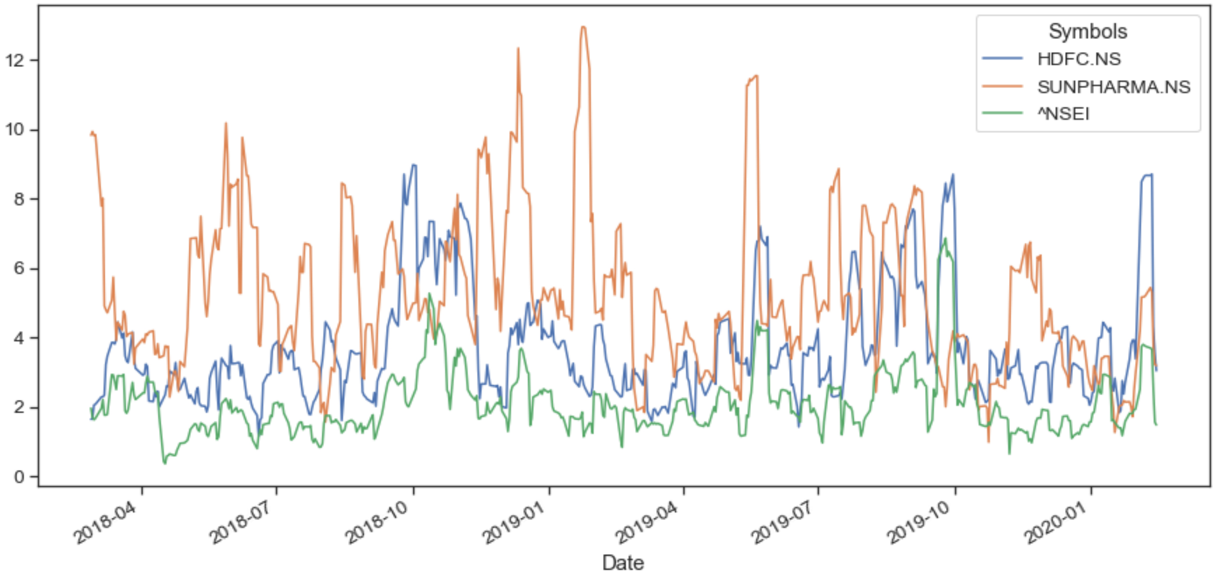
Next we’ll see the comparative volatility analysis of HDFC stock with SunPharma stock and NIFTY50 index. Just like above, we compute 7-day rolling mean, and standard deviation, all in a single line of code.

In [11]:

```
volatility = pct_chg_df[['HDFC.NS', 'SUNPHARMA.NS', '^NSEI']].rolling(7).std()*np
volatility.plot(figsize = (15, 7))
```

Out[11]:

```
<AxesSubplot:xlabel='Date'>
```



In [18]:

```
HDFC_df = web.DataReader(['HDFC.NS'],
                              'yahoo', start = start, end = end)['Adj Close']
HDFC_df
HDFC_df.dropna(axis = 0, inplace = True)
```

In [19]:

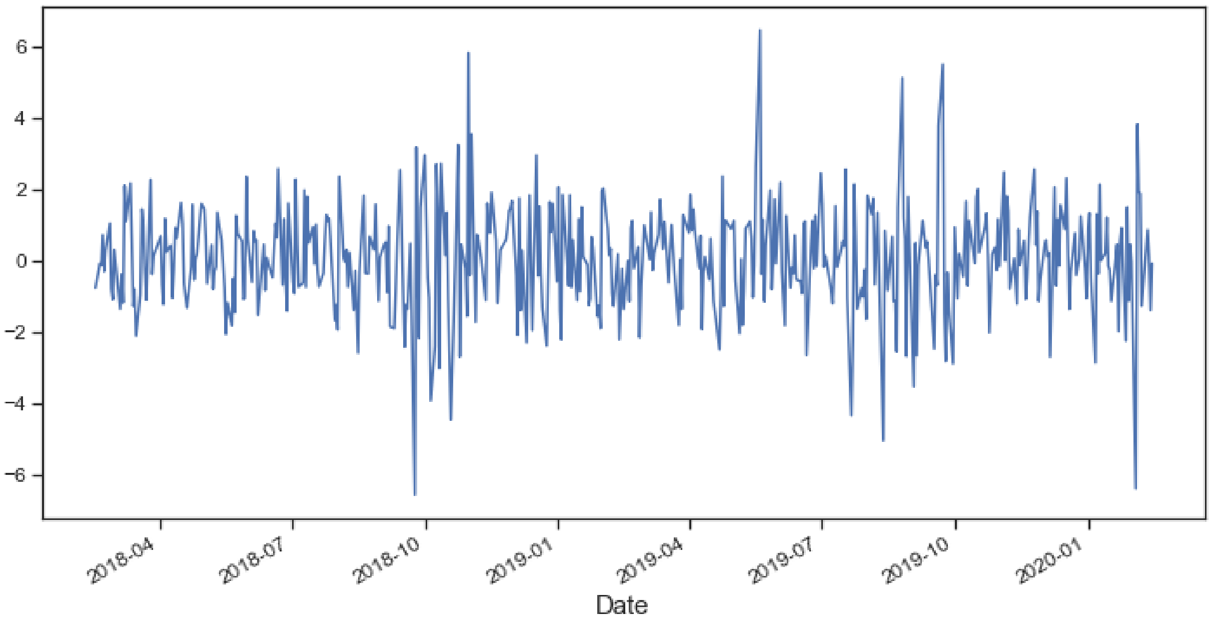
```
HDFC_df['Day_Perc_Change'] = HDFC_df.pct_change()*100
HDFC_df.head()
```

Out[19]:

Symbols	HDFC.NS	Day_Perc_Change
Date		
2018-02-15	1704.119507	NaN
2018-02-16	1691.078857	-0.765243
2018-02-19	1689.728394	-0.079858
2018-02-20	1687.585693	-0.126807
2018-02-21	1699.741699	0.720319

```
In [20]: HDFC_df['Day_Perc_Change'].plot(figsize = (12, 6), fontsize = 12)
```

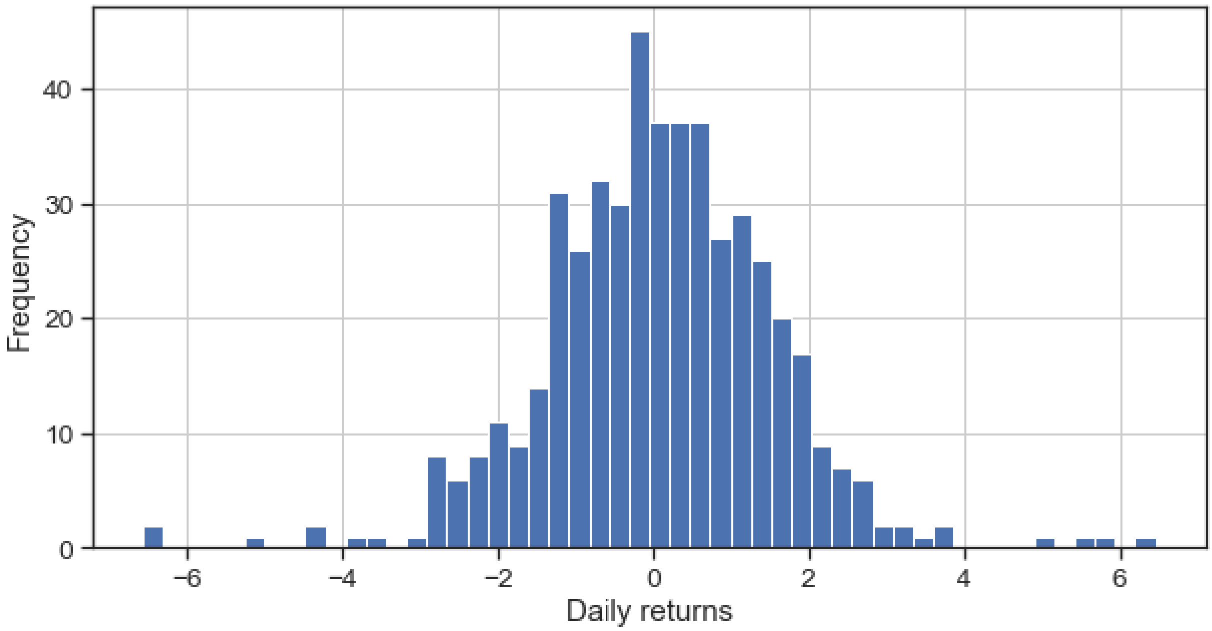
```
Out[20]: <AxesSubplot:xlabel='Date'>
```



Plotting daily returns distribution histogram:

In [21]:

```
HDFC_df['Day_Perc_Change'].hist(bins = 50, figsize = (10,5))
plt.xlabel('Daily returns')
plt.ylabel('Frequency')
plt.show()
#satistics
HDFC_df.Day_Perc_Change.describe()
```



Out[21]:

```
count    490.000000
mean       0.072189
std        1.491031
min       -6.561932
25%       -0.804406
50%        0.058352
75%        1.009955
max        6.463018
Name: Day_Perc_Change, dtype: float64
```

In [24]:

```
import pandas as pd
import yfinance as yf
#from yahoofinancials import YahooFinancials
```

In [ ]:

In [33]:
```
HDFC_df = yf.download('HDFC.NS',
                      start=start,
                      end=end,
                      progress=False)
HDFC_df.head()
```

Out[33]:

	Open	High	Low	Close	Adj Close	Volume
Date						
2018-02-15	1828.900024	1851.000000	1819.150024	1829.500000	1704.119507	3382968
2018-02-16	1835.500000	1836.949951	1804.199951	1815.500000	1691.078857	2368880
2018-02-19	1827.750000	1830.199951	1801.000000	1814.050049	1689.728271	1603737
2018-02-20	1832.900024	1840.000000	1802.500000	1811.750000	1687.586182	2523482
2018-02-21	1825.000000	1832.699951	1816.000000	1824.800049	1699.741577	3795216

In [29]:
```
HDFC_df = HDFC_df.dropna(axis = 0, inplace = True)
```

In [35]:
```
HDFC_df['Day_Perc_Change'] = HDFC_df['Adj Close'].pct_change()*100
HDFC_df.head()
```

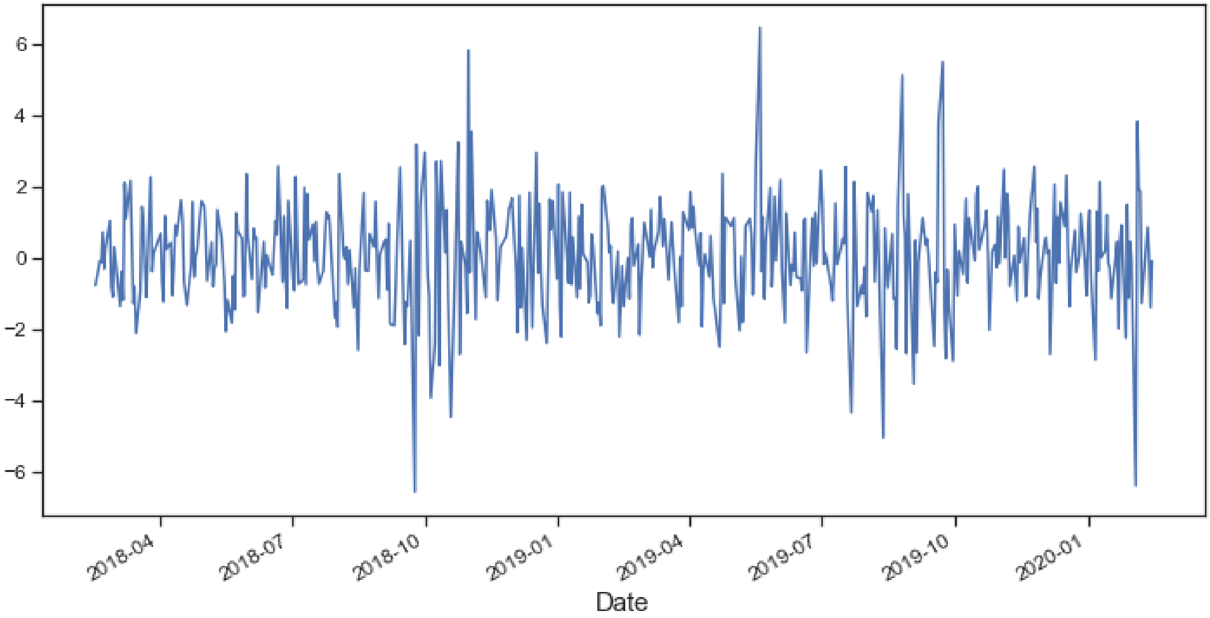
Out[35]:

	Open	High	Low	Close	Adj Close	Volume	Day_Perc_Chang
Date							
2018-02-15	1828.900024	1851.000000	1819.150024	1829.500000	1704.119507	3382968	Na
2018-02-16	1835.500000	1836.949951	1804.199951	1815.500000	1691.078857	2368880	-0.76524
2018-02-19	1827.750000	1830.199951	1801.000000	1814.050049	1689.728271	1603737	-0.0798
2018-02-20	1832.900024	1840.000000	1802.500000	1811.750000	1687.586182	2523482	-0.12677
2018-02-21	1825.000000	1832.699951	1816.000000	1824.800049	1699.741577	3795216	0.7202

In [36]:
```
HDFC_df.dropna(axis = 0, inplace = True)
```

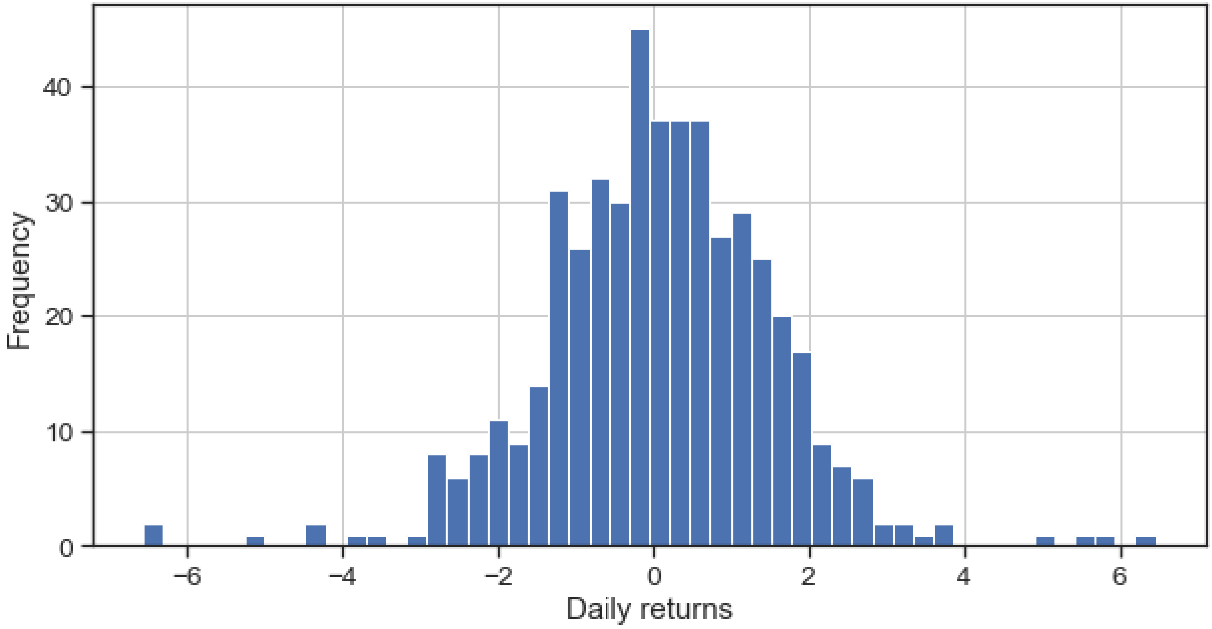
```
In [37]: HDFC_df['Day_Perc_Change'].plot(figsize = (12, 6), fontsize = 12)
```

```
Out[37]: <AxesSubplot:xlabel='Date'>
```



It can be observed that for most of the days, the returns are between -2% to 2% with few spikes in between crossing 6% mark on both the sides.

In [38]:
```
HDFC_df['Day_Perc_Change'].hist(bins = 50, figsize = (10,5))
plt.xlabel('Daily returns')
plt.ylabel('Frequency')
plt.show()
#satistics
HDFC_df.Day_Perc_Change.describe()
```



Out[38]:
```
count    490.000000
mean       0.072189
std        1.491031
min       -6.561912
25%       -0.804423
50%        0.058361
75%        1.009956
max        6.463017
Name: Day_Perc_Change, dtype: float64
```

Trend Analysis

Next we add a new column ‘Trend’ whose values are based on the day-to-day percentage change we calculated above. Trend is determined from below relationship —

In [40]:
```
def trend(x):
  if x > -0.5 and x <= 0.5:
    return 'Slight or No change'
  elif x > 0.5 and x <= 1:
    return 'Slight Positive'
  elif x > -1 and x <= -0.5:
    return 'Slight Negative'
  elif x > 1 and x <= 3:
    return 'Positive'
  elif x > -3 and x <= -1:
    return 'Negative'
  elif x > 3 and x <= 7:
    return 'Among top gainers'
  elif x > -7 and x <= -3:
    return 'Among top losers'
  elif x > 7:
    return 'Bull run'
  elif x <= -7:
    return 'Bear drop'
HDFC_df['Trend']= np.zeros(HDFC_df['Day_Perc_Change'].count())
HDFC_df['Trend']= HDFC_df['Day_Perc_Change'].apply(lambda x:trend(x))
HDFC_df.head()
```

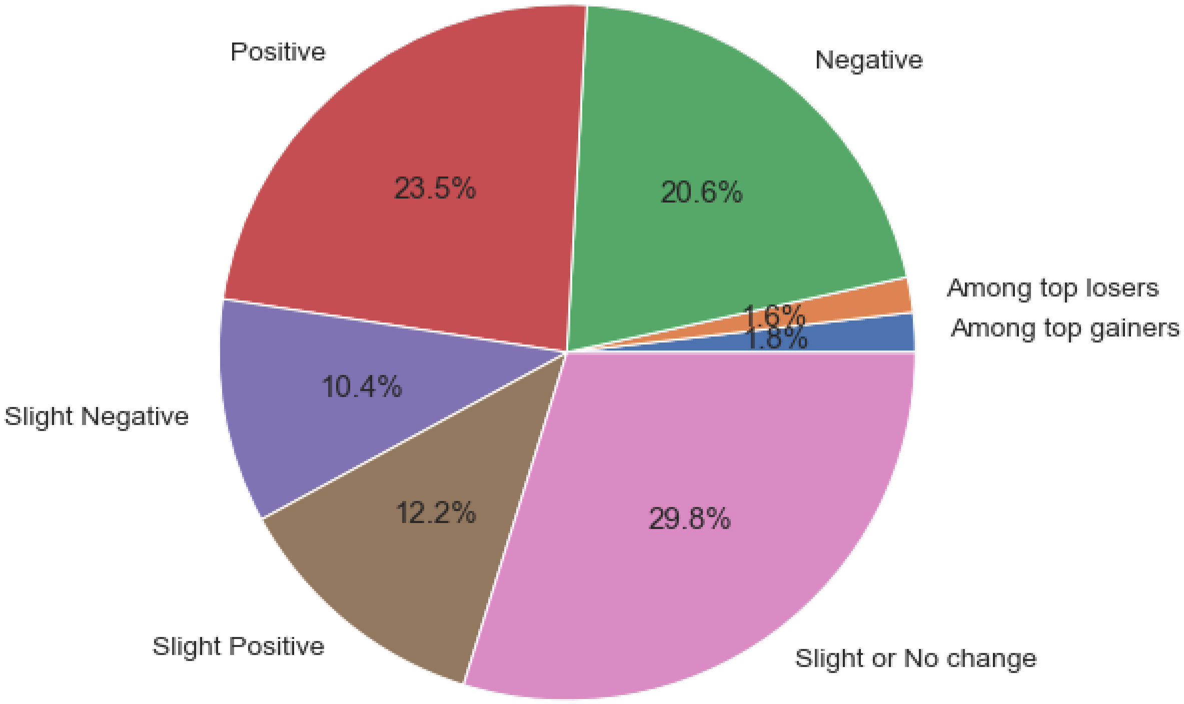
Out[40]:

	Open	High	Low	Close	Adj Close	Volume	Day_Perc_Chang
Date							
2018-02-16	1835.500000	1836.949951	1804.199951	1815.500000	1691.078857	2368880	-0.76524
2018-02-19	1827.750000	1830.199951	1801.000000	1814.050049	1689.728271	1603737	-0.07986
2018-02-20	1832.900024	1840.000000	1802.500000	1811.750000	1687.586182	2523482	-0.12677
2018-02-21	1825.000000	1832.699951	1816.000000	1824.800049	1699.741577	3795216	0.72028
2018-02-22	1819.699951	1825.000000	1807.699951	1819.250000	1694.572021	6229874	-0.30413

Visualizing Trend Frequency with Pie-Chart:

```
In [43]: HDFC_pie_data = HDFC_df.groupby('Trend')
         pie_label = sorted([i for i in HDFC_df.loc[:, 'Trend'].unique()])
         plt.pie(HDFC_pie_data['Trend'].count(), labels = pie_label,
                 autopct = '%1.1f%%', radius = 2)

         plt.show()
```



For the period under consideration from mid-Feb 2018 to Feb 2020, the HDFC stock was among the top gainers for about 1.8% of the time, and among the top losers for 1.6 %. For about 12.4% of the time period, the stock has performed positively on a given day. Likewise, for most period of time (about 29.6%) the stock showed a very slight change in the price. These observations are consistent with the daily return histogram we saw in above section.