# Forecasting Growth on Other Stocks

- Used examples of both positive and negative growth stocks
- They include:
  1. American Airlines (AAL)
  2. Amazon (AMZN)
  3. General Electric (GE)
  4. Intel (INTC)
  5. Tesla (TSLA)

In [1]:

```
from Functions import *
```

In [2]:

```
# Container Variables for Results
stocks = ['American Airlines','Amazon','General Electric', 'Intel','Tesla', 'MongoDB']
models = []
```

In [3]:

```
aal = pd.read_csv('Data/AAL.csv')
amzn = pd.read_csv('Data/AMZN.csv')
ge = pd.read_csv('Data/GE.csv')
intc = pd.read_csv('Data/INTC.csv')
tsla = pd.read_csv('Data/TSLA.csv')
mdb = pd.read_csv('Data/MongoDB.csv')
```

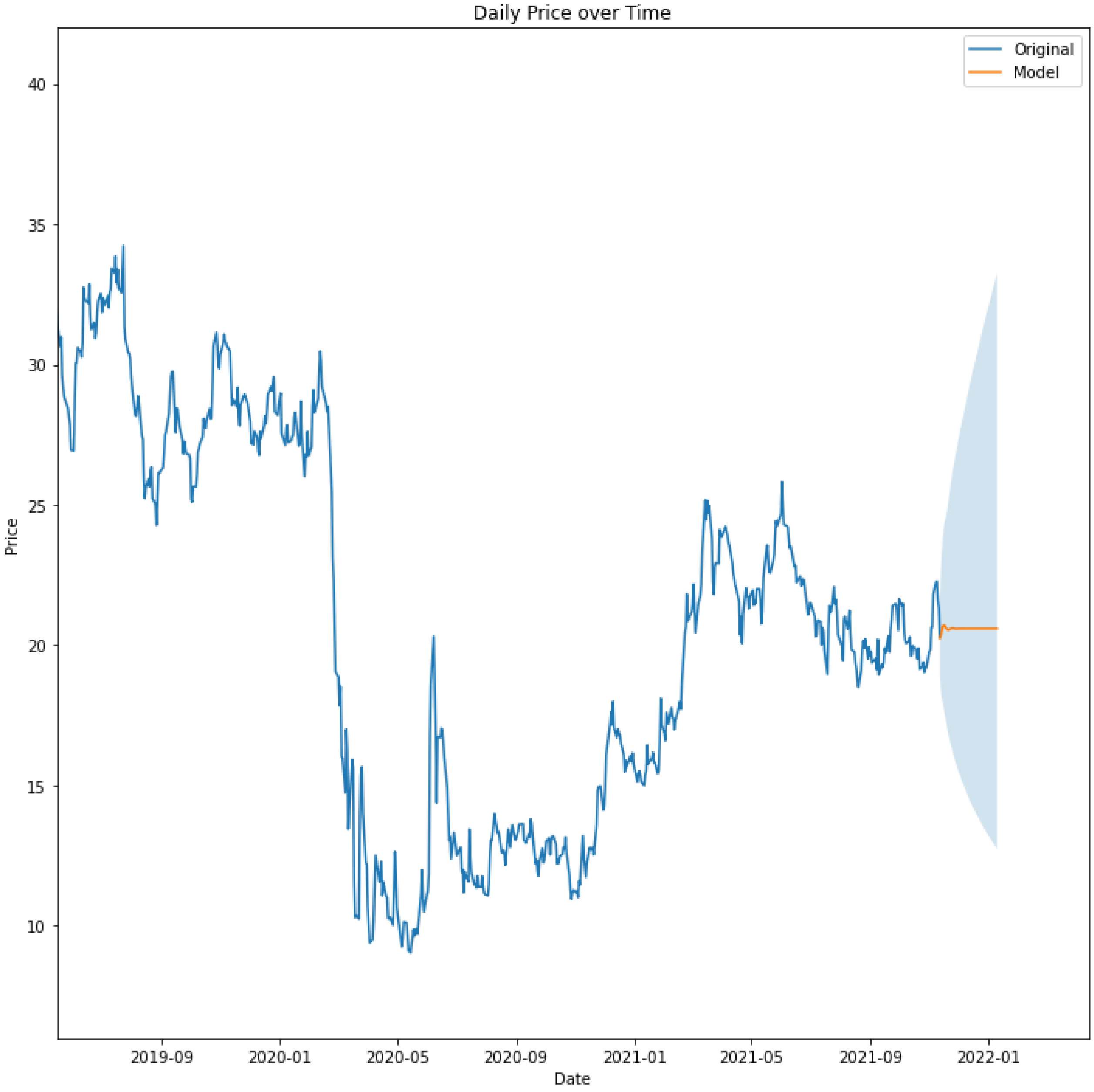
# American Airlines

## Best Model

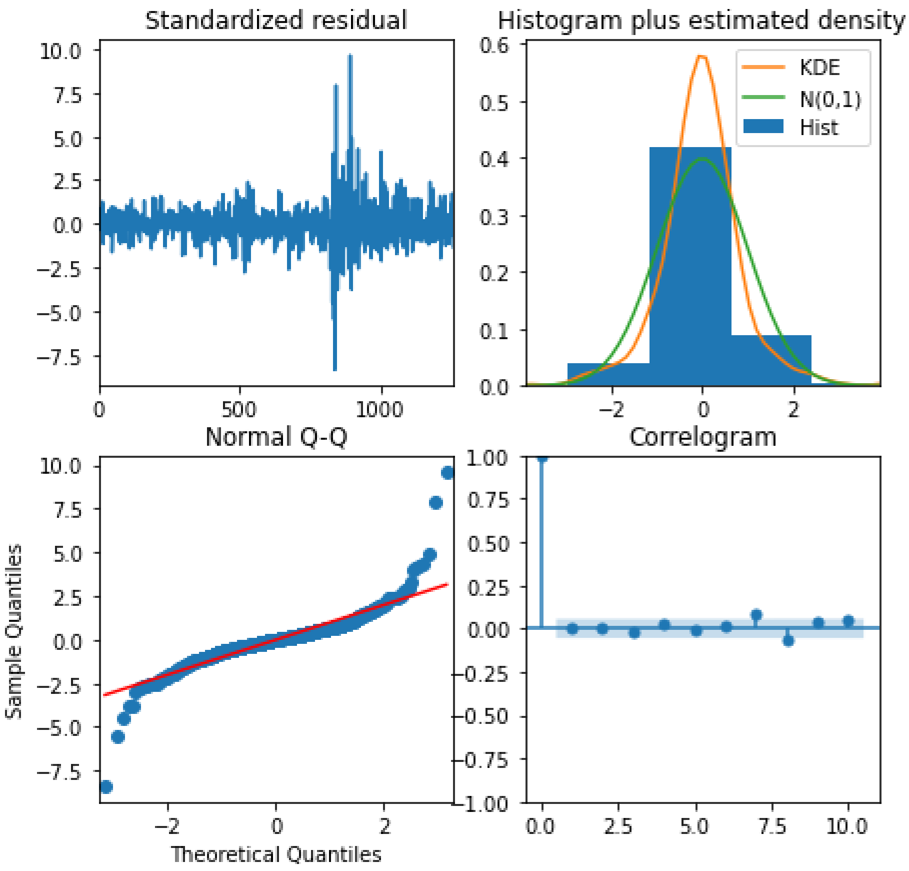
In [4]:

```
best_aal = best_model(aal, plotting=True)
models.append(best_aal)
```

```
Returns: p, d, q
ARIMA Test RMSE:  11.365709622494357
Returns: p, d, q
ARIMA Test RMSE:  8.924438661392783
Auto Arima Test RMSE:  6.493396172773847
Auto Arima Test RMSE:  6.0916688635104
Prophet Test RMSE: 28.199373463885628
Logged Prophet Test RMSE: 14.747956256682585
```



```
ROI:  1.68 %
Best Model: Logged_Auto_ARIMA
```



In [5]:
```
best_aal.head()
```

Out[5]:

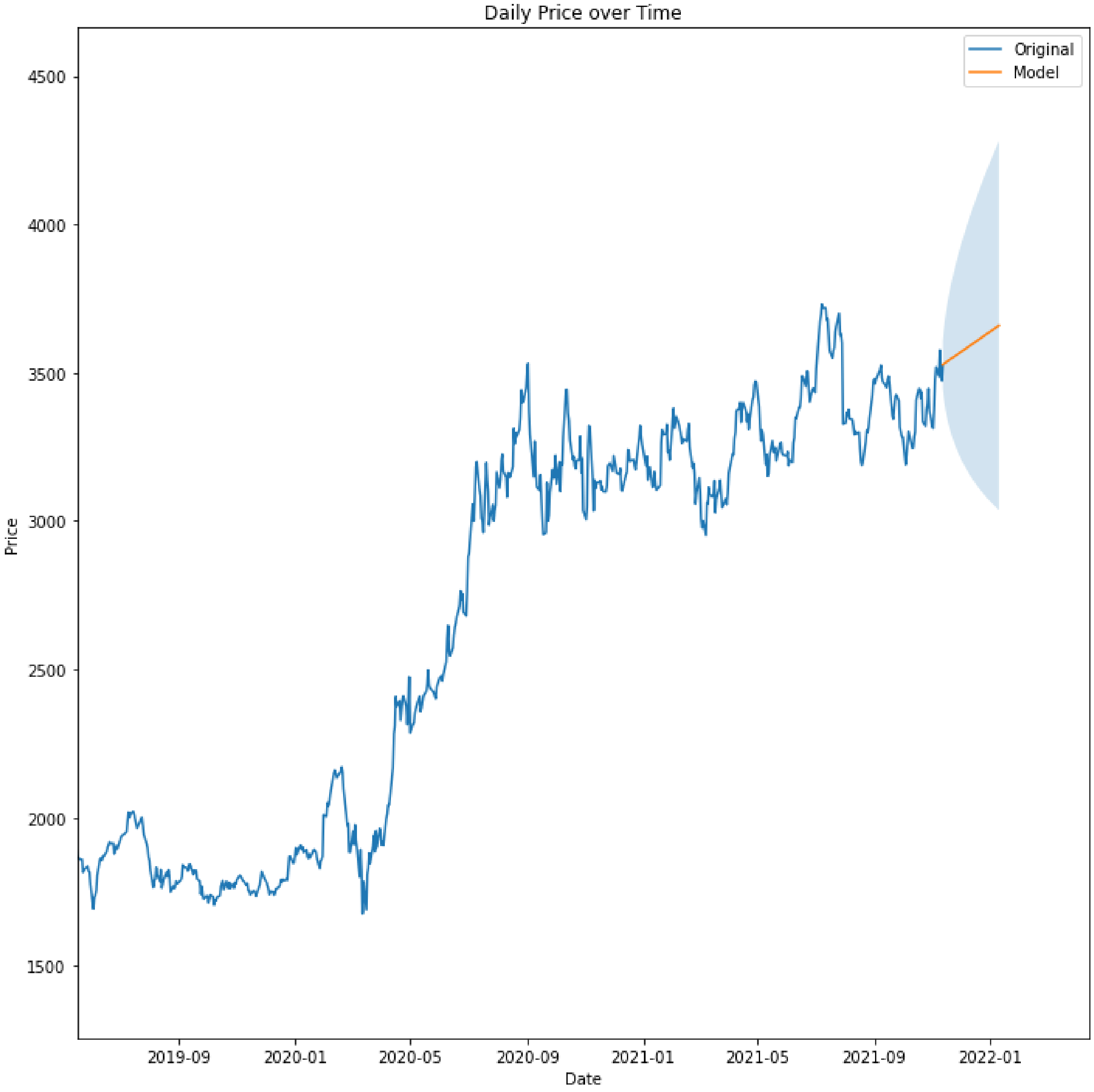
|  | ARIMA | Logged_ARIMA | Auto_ARIMA | Logged_Auto_ARIMA | Prophet | Logged_Prophet | Best_ |
|---|---|---|---|---|---|---|---|
| **0** | 11.37 | 8.92 | 6.49 | 6.09 | 28.2 | 14.75 | Logged_Auto_ |

# Amazon

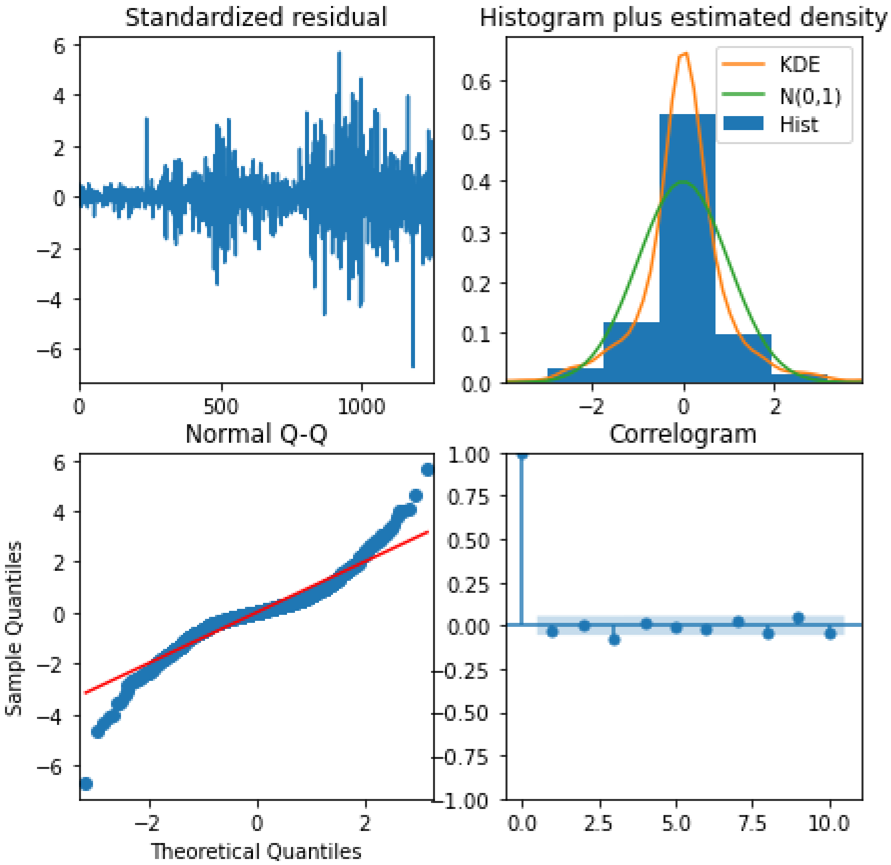
## Best Model

In [6]:
```
best_amzn = best_model(amzn,plotting=True)
models.append(best_amzn)
```

```
Returns: p, d, q
ARIMA Test RMSE:  335.37145274496186
Returns: p, d, q
ARIMA Test RMSE:  936.7865112799977
Auto Arima Test RMSE:  333.2338199023155
Auto Arima Test RMSE:  933.7324232003156
Prophet Test RMSE: 746.3832855026207
Logged Prophet Test RMSE: 1918.6492756259152
```



```
ROI:  3.73 %
Best Model: Auto_ARIMA
```

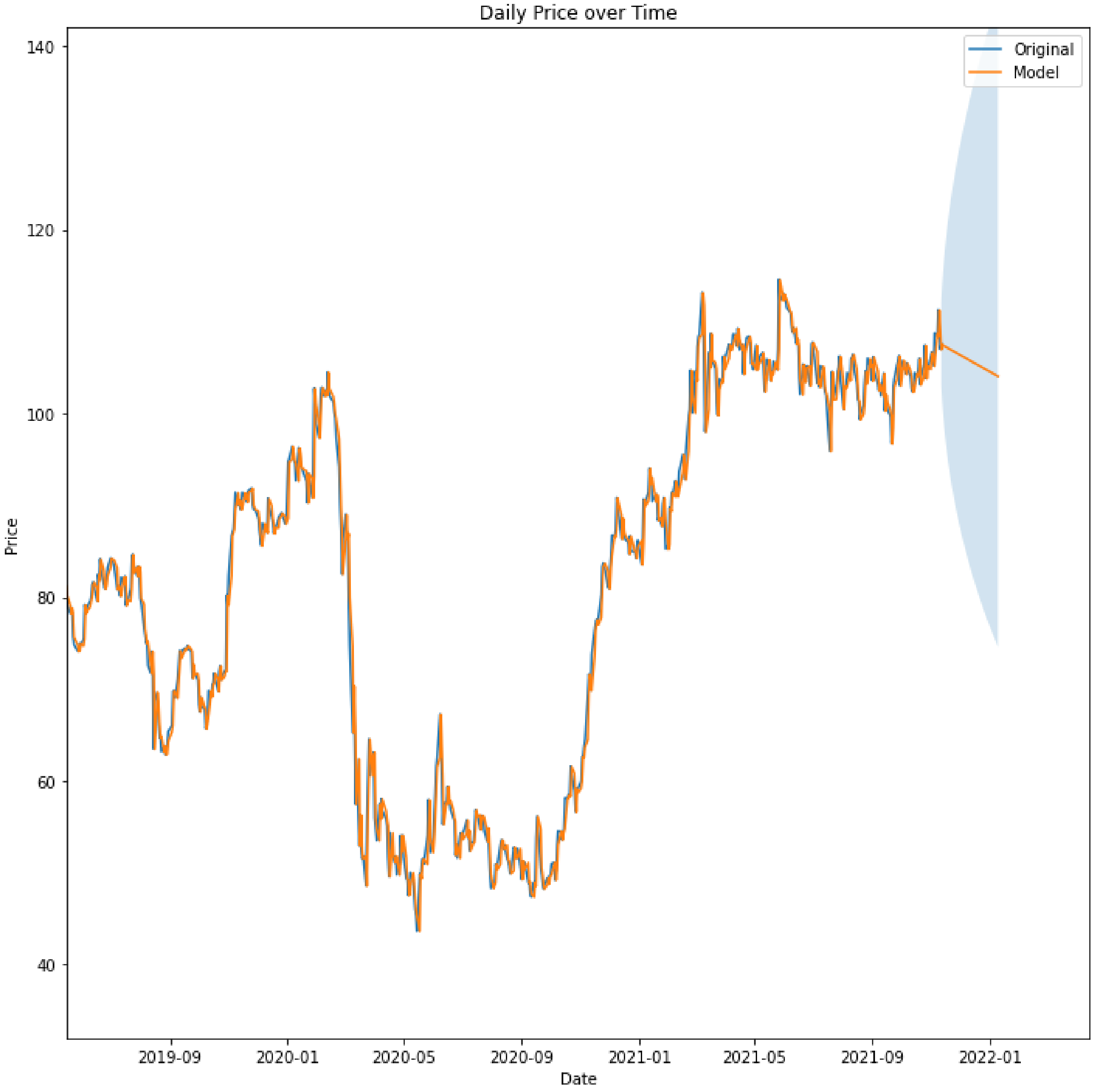


# General Electric

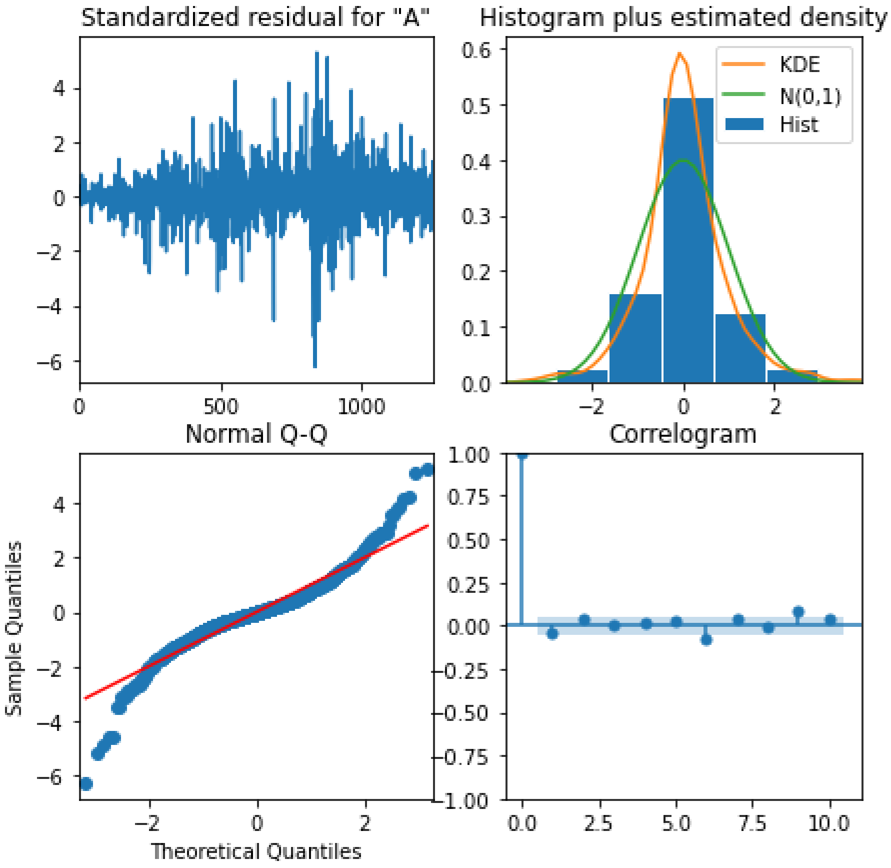
## Best Model

In [7]:
```
best_ge = best_model(ge,plotting=True)
models.append(best_ge)
```

```
Returns: p, d, q
ARIMA Test RMSE:  74.04947673615601
Returns: p, d, q
ARIMA Test RMSE:  55.01813299395058
Auto Arima Test RMSE:  74.04480837067062
Auto Arima Test RMSE:  55.07069358965366
Prophet Test RMSE: 97.25108398415385
Logged Prophet Test RMSE: 59.02979594648951
Returns: p, d, q
```



```
ROI:  -3.23 %
Best Model: Logged_ARIMA
```

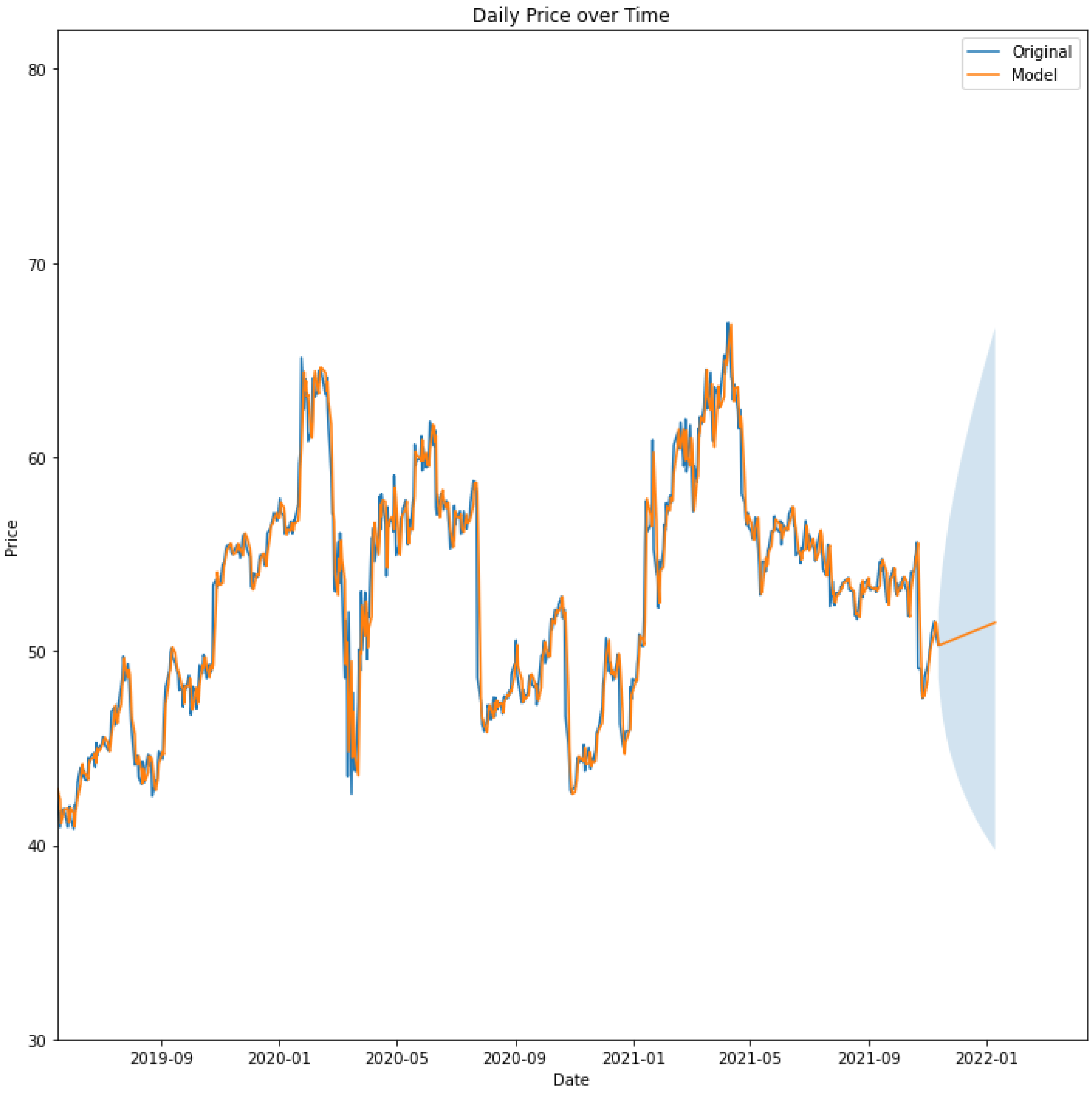


# Intel

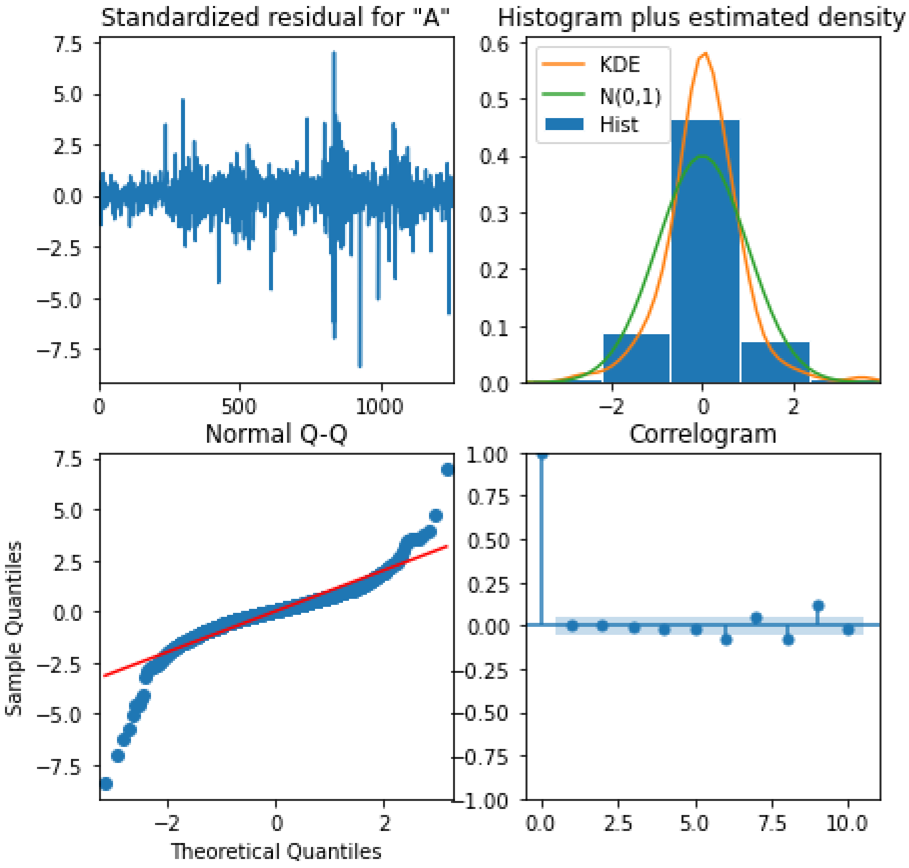
## Best Model

In [8]:
```
best_intc = best_model(intc,plotting=True)
models.append(best_intc)
```

```
Returns: p, d, q
ARIMA Test RMSE:  6.487104285918575
Returns: p, d, q
ARIMA Test RMSE:  5.794795624994909
Auto Arima Test RMSE:  7.977109747974804
Auto Arima Test RMSE:  7.985860625638707
Prophet Test RMSE: 6.442102234468254
Logged Prophet Test RMSE: 6.2586874254655305
Returns: p, d, q
```



```
ROI:  2.33 %
Best Model: Logged_ARIMA
```



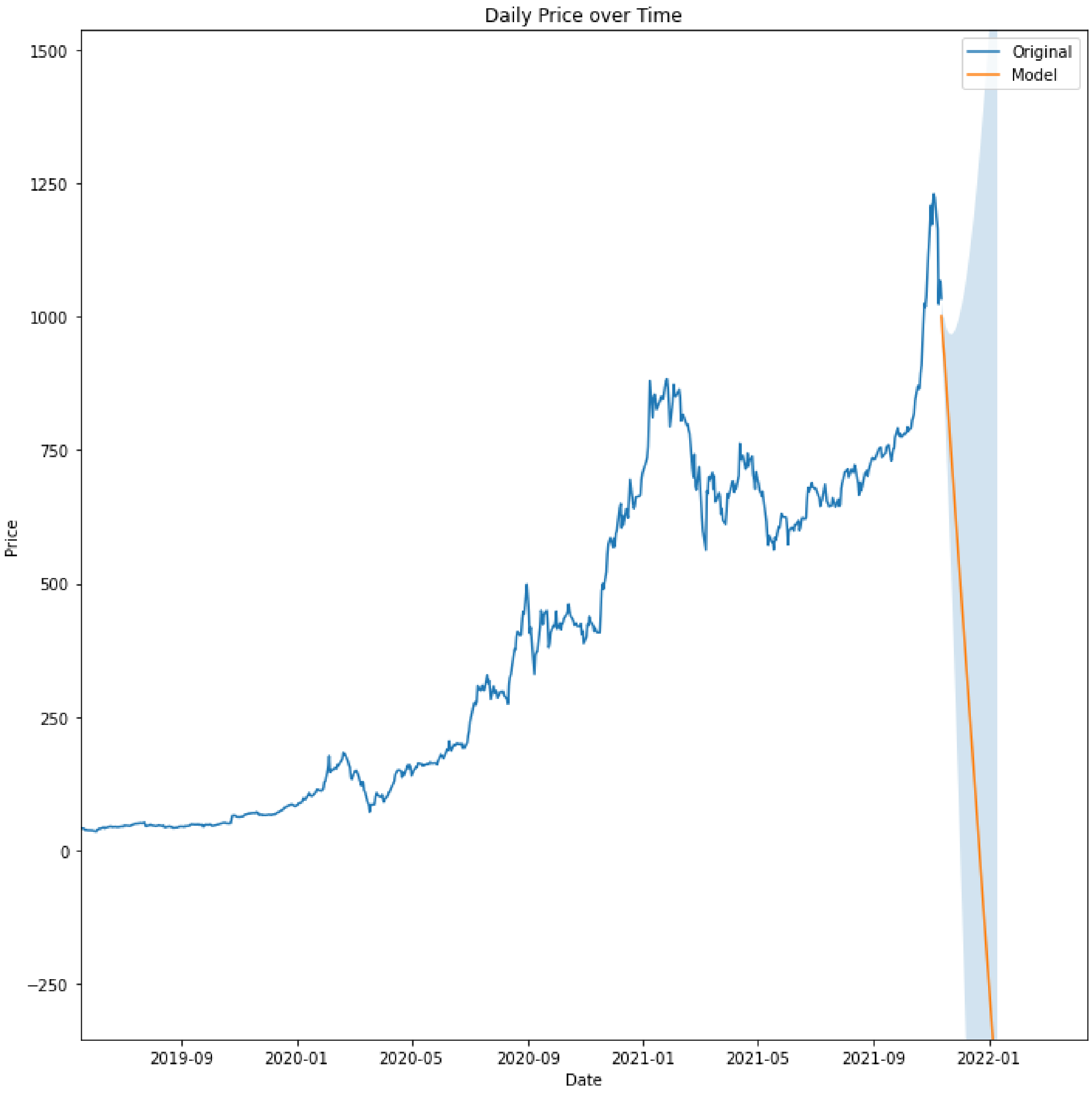
# Tesla

## Best Model

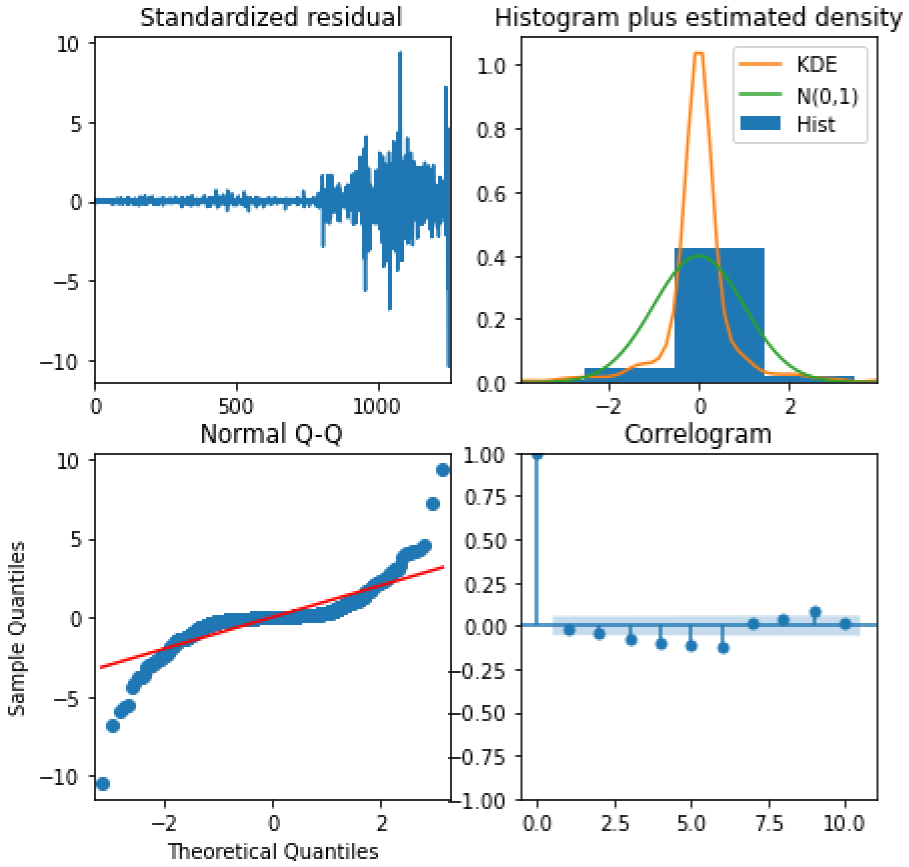
In [9]:

```
best_tsla = best_model(tsla,plotting=True)
models.append(best_tsla)
```

```
Returns: p, d, q
ARIMA Test RMSE:  319.78347341876986
Returns: p, d, q
ARIMA Test RMSE:  210.92099542311496
Auto Arima Test RMSE:  138.17489392543104
Auto Arima Test RMSE:  225.7631349763984
Prophet Test RMSE: 254.49099160733334
Logged Prophet Test RMSE: 1098.8272205362439
```



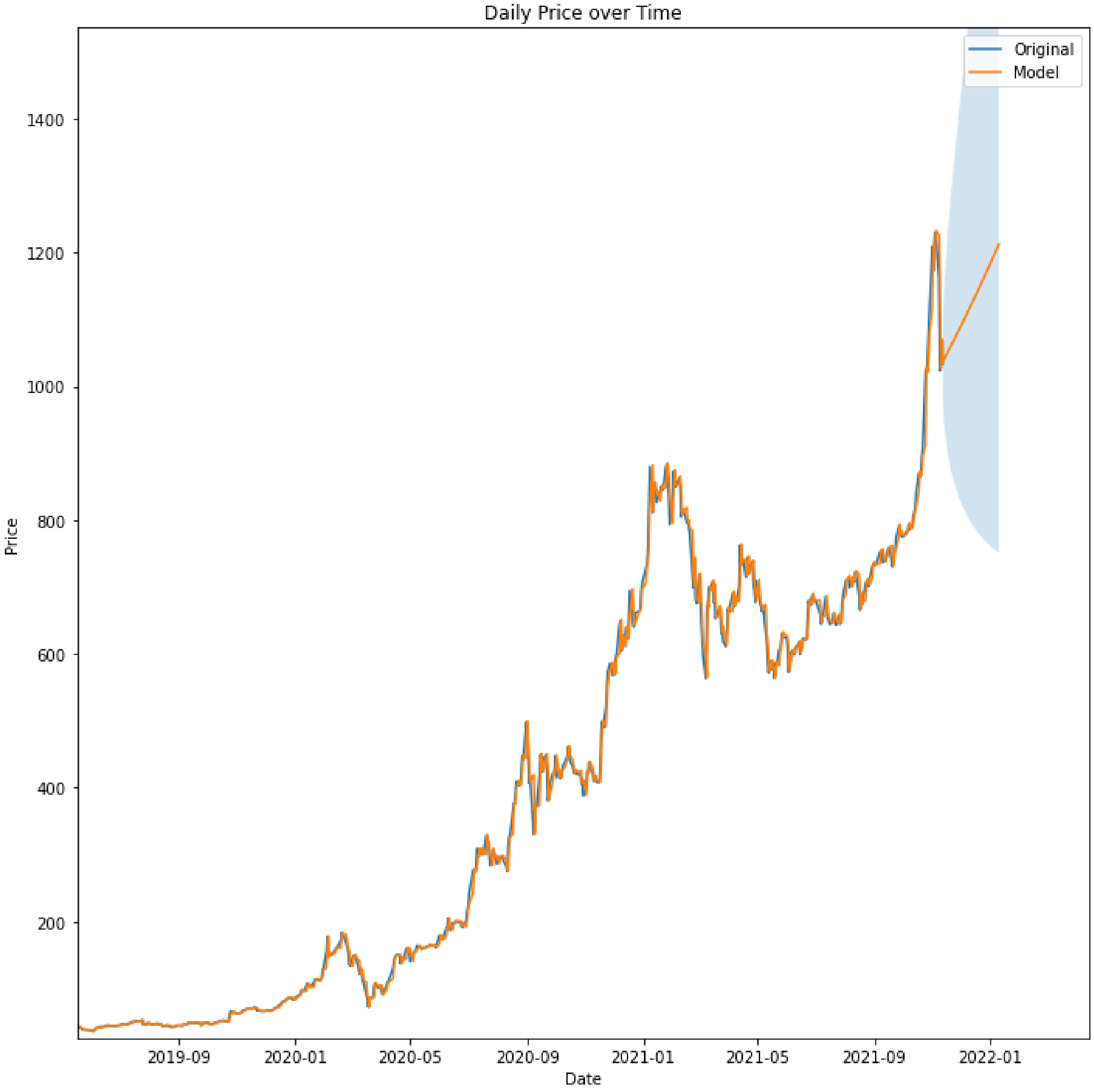
```
ROI:  -147.13 %
Best Model: Auto_ARIMA
```



In [10]:

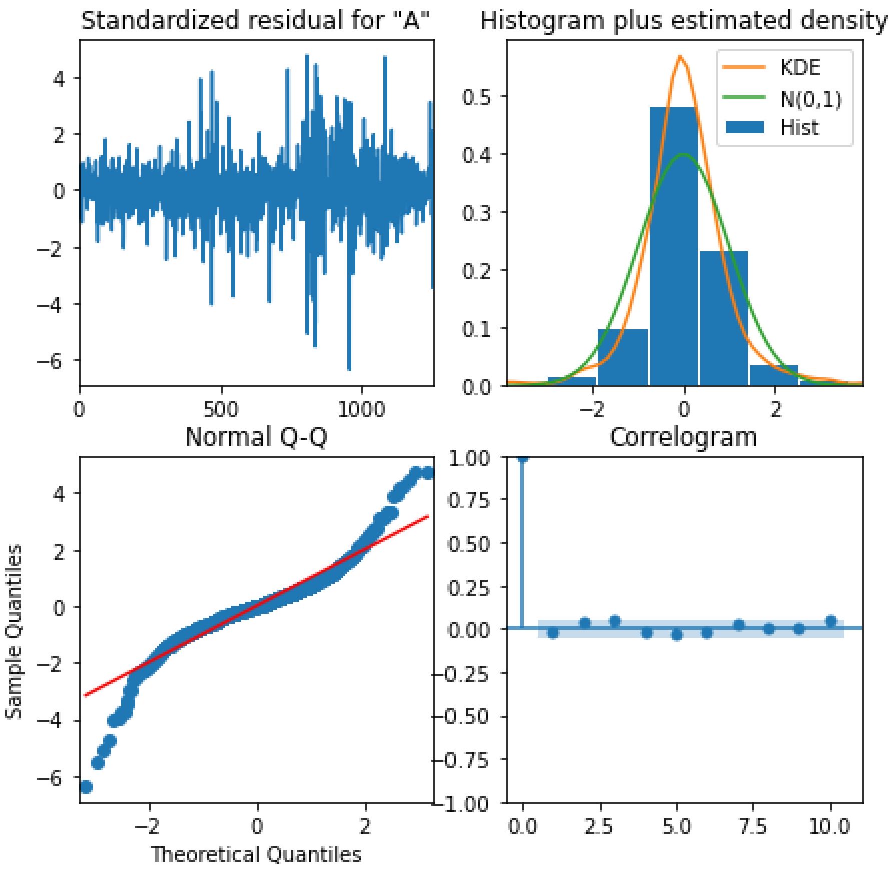
```
# The best auto_arima model here appears off, using the next best model
base_model(tsla,exog=True,logged=True,plotting=True, full=True, roi=True)
```

```
Returns: p, d, q
```



```
ROI:  17.01 %
```

```
Out[10]: <statsmodels.tsa.statespace.sarimax.SARIMAXResultsWrapper at 0x22fd8c05e80>
```



# Findings

## Merging Results into a Data Frame

In [11]:

```
# adding Mongo DB to results
best_mongo = best_model(mdb)
models.append(best_mongo)
```

```
Returns: p, d, q
ARIMA Test RMSE:  92.10970700146592
Returns: p, d, q
ARIMA Test RMSE:  58.08241838017868
Auto Arima Test RMSE:  92.40403475573405
Auto Arima Test RMSE:  58.022142322809934
Prophet Test RMSE: 65.78887755293908
Logged Prophet Test RMSE: 369.84401898575334
ROI:  17.41 %
Best Model: Logged_Auto_ARIMA
```

In [12]:

```
full_data = models[0].copy()
```

In [13]:

```
for i in range(1,len(models)):
    full_data = full_data.append(models[i])
```

In [14]:

```
full_data
```

Out[14]:

| | ARIMA | Logged_ARIMA | Auto_ARIMA | Logged_Auto_ARIMA | Prophet | Logged_Prophet | Best_ |
|---|---|---|---|---|---|---|---|
| **0** | 11.37 | 8.92 | 6.49 | 6.09 | 28.2 | 14.75 | Logged_Auto_ |

| | ARIMA | Logged_ARIMA | Auto_ARIMA | Logged_Auto_ARIMA | Prophet | Logged_Prophet | Best_ |
|---|---|---|---|---|---|---|---|
| **0** | 335.37 | 936.79 | 333.23 | 933.73 | 746.38 | 1918.65 | Auto_ |
| **0** | 74.05 | 55.02 | 74.04 | 55.07 | 97.25 | 59.03 | Logged_ |
| **0** | 6.49 | 5.79 | 7.98 | 7.99 | 6.44 | 6.26 | Logged_ |
| **0** | 319.78 | 210.92 | 138.17 | 225.76 | 254.49 | 1098.83 | Auto_ |
| **0** | 92.11 | 58.08 | 92.4 | 58.02 | 65.79 | 369.84 | Logged_Auto_ |

In [15]:

```
full_data['Stocks']=stocks
full_data['Expected_60day_Growth(%)'] = full_data['Expected_60day_Growth(%)'].astype(fl
table = full_data.set_index('Stocks')
table.head()
```

Out[15]:

| | ARIMA | Logged_ARIMA | Auto_ARIMA | Logged_Auto_ARIMA | Prophet | Logged_Prophet | |
|---|---|---|---|---|---|---|---|
| **Stocks** | | | | | | | |
| **American Airlines** | 11.37 | 8.92 | 6.49 | 6.09 | 28.2 | 14.75 | Logge |
| **Amazon** | 335.37 | 936.79 | 333.23 | 933.73 | 746.38 | 1918.65 | |
| **General Electric** | 74.05 | 55.02 | 74.04 | 55.07 | 97.25 | 59.03 | |
| **Intel** | 6.49 | 5.79 | 7.98 | 7.99 | 6.44 | 6.26 | |
| **Tesla** | 319.78 | 210.92 | 138.17 | 225.76 | 254.49 | 1098.83 | |

In [18]:

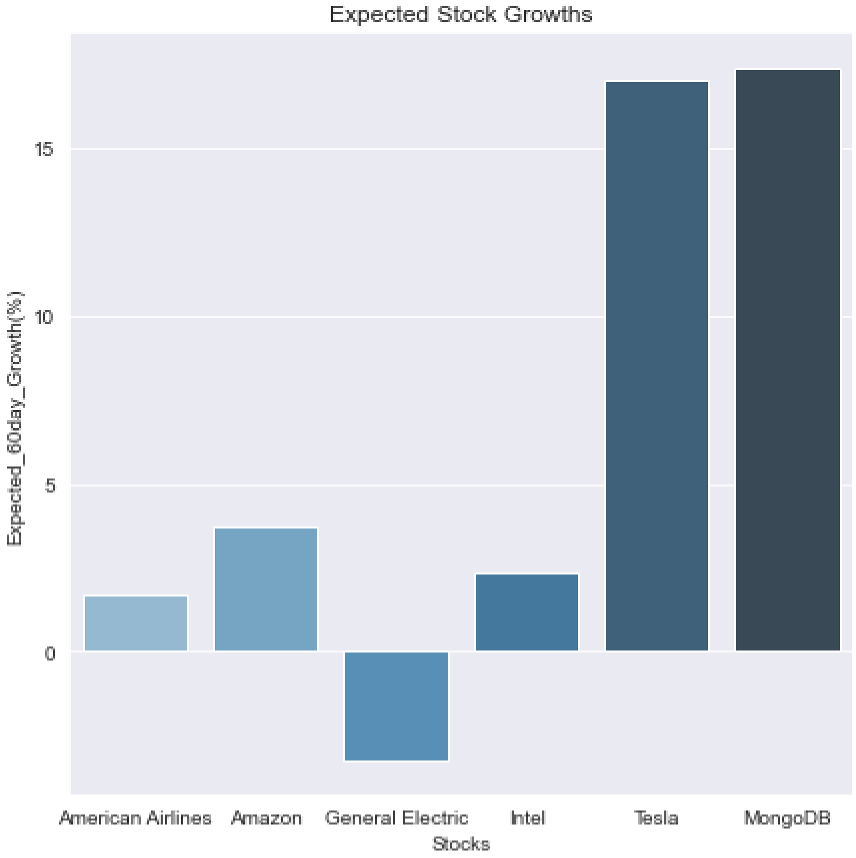
```
table.loc['Tesla','Expected_60day_Growth(%)'] = 17.01
table.head()
```

Out[18]:

| | ARIMA | Logged_ARIMA | Auto_ARIMA | Logged_Auto_ARIMA | Prophet | Logged_Prophet | |
|---|---|---|---|---|---|---|---|
| **Stocks** | | | | | | | |
| **American Airlines** | 11.37 | 8.92 | 6.49 | 6.09 | 28.2 | 14.75 | Logge |
| **Amazon** | 335.37 | 936.79 | 333.23 | 933.73 | 746.38 | 1918.65 | |
| **General Electric** | 74.05 | 55.02 | 74.04 | 55.07 | 97.25 | 59.03 | |
| **Intel** | 6.49 | 5.79 | 7.98 | 7.99 | 6.44 | 6.26 | |
| **Tesla** | 319.78 | 210.92 | 138.17 | 225.76 | 254.49 | 1098.83 | |

In [20]:

```
figure = plt.figure(figsize=(7,7))
sns.set_style('darkgrid')
sns.barplot(x=table.index,y=table['Expected_60day_Growth(%)'], palette='Blues_d')
plt.title('Expected Stock Growths')
plt.show();
```



In [19]:

```
table.reset_index()
```

Out[19]:

| | Stocks | ARIMA | Logged_ARIMA | Auto_ARIMA | Logged_Auto_ARIMA | Prophet | Logged_Prophet | |
|---|---|---|---|---|---|---|---|---|
| **0** | American Airlines | 11.37 | 8.92 | 6.49 | 6.09 | 28.2 | 14.75 | Lc |
| **1** | Amazon | 335.37 | 936.79 | 333.23 | 933.73 | 746.38 | 1918.65 | |
| **2** | General Electric | 74.05 | 55.02 | 74.04 | 55.07 | 97.25 | 59.03 | |
| **3** | Intel | 6.49 | 5.79 | 7.98 | 7.99 | 6.44 | 6.26 | |
| **4** | Tesla | 319.78 | 210.92 | 138.17 | 225.76 | 254.49 | 1098.83 | |
| **5** | MongoDB | 92.11 | 58.08 | 92.4 | 58.02 | 65.79 | 369.84 | Lc |

# Results

- Tesla has the highest growth in 60 days
- Prophet never performed the best, but came close in a few instances
- I think parameters in prophet can be improved to better fit the data