In [8]:
```python
import pandas_datareader as pdr
import numpy as np
import matplotlib.pyplot as plt

df_mortgage_rates = pdr.get_data_fred(['MORTGAGE30US','MORTGAGE15US'])

df_mortgage_rates.plot(figsize=(15,7))
```
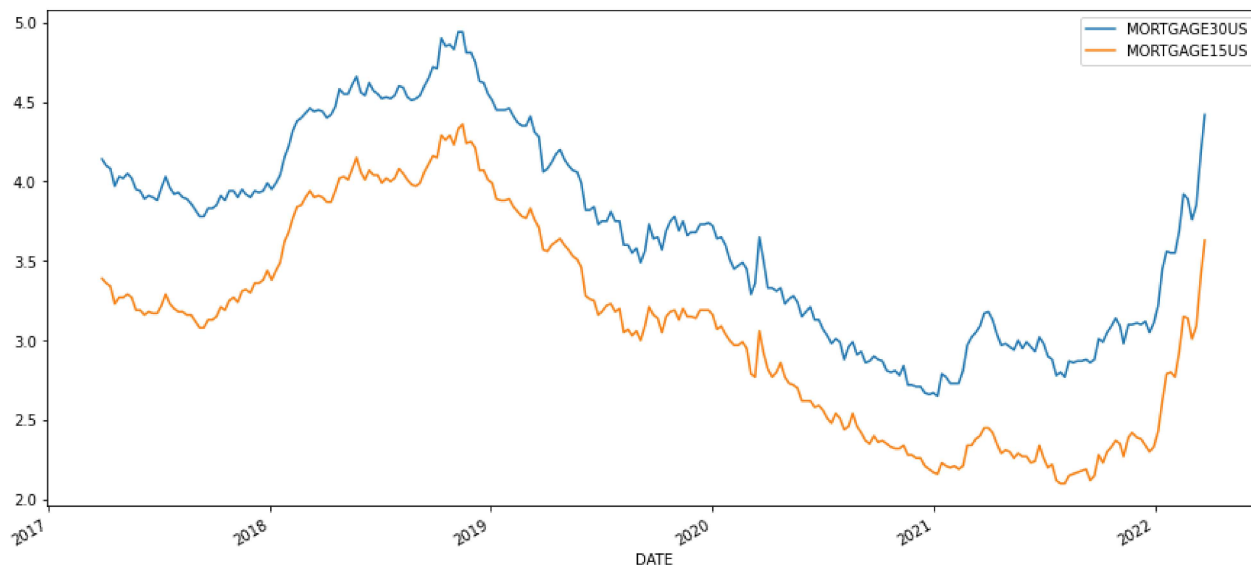
Out[8]: <AxesSubplot:xlabel='DATE'>

In [9]:
```python
df_dff = pdr.get_data_fred('DFF')

df.head(10)
```
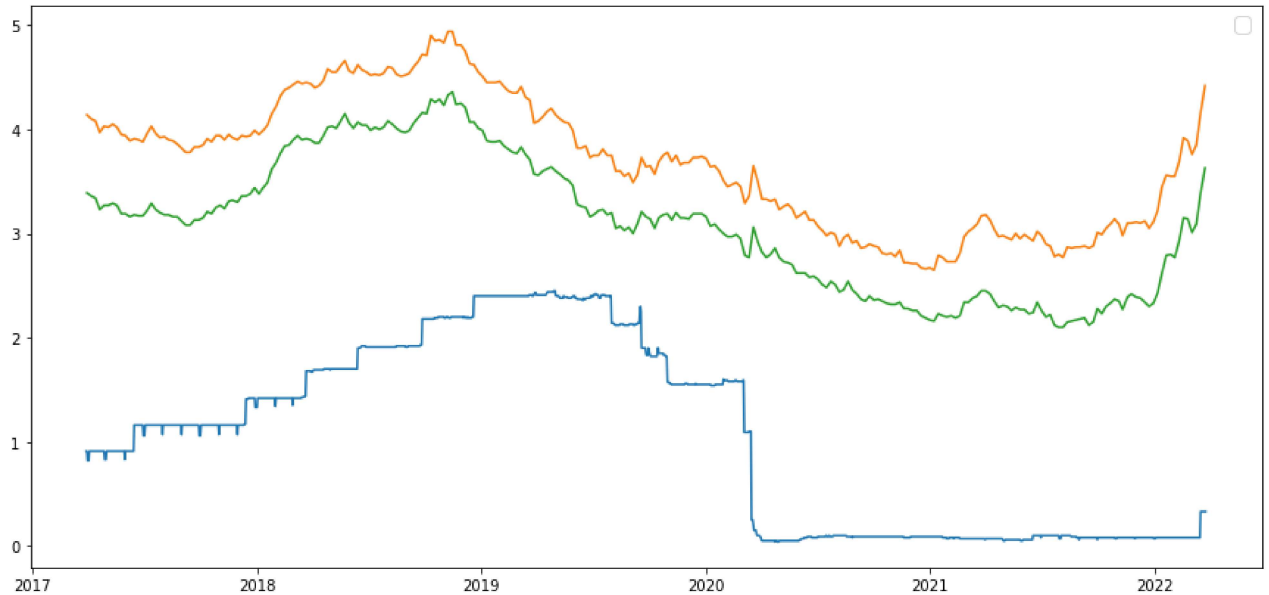
Out[9]:

	MORTGAGE30US
DATE	
2017-03-30	4.14
2017-04-06	4.10
2017-04-13	4.08
2017-04-20	3.97
2017-04-27	4.03
2017-05-04	4.02
2017-05-11	4.05
2017-05-18	4.02
2017-05-25	3.95
2017-06-01	3.94

In [10]:
```python
fig, ax = plt.subplots(figsize=(15,7))
```

```
plt.plot(df_dff)
plt.plot(df_mortgage_rates)
legend = ax.legend(loc='upper right', fontsize='x-large')
```

No handles with labels found to put in legend.

In [11]:
```
df_combined = df_mortgage_rates
df_combined['DFF'] = df_dff

df_combined
```

Out[11]:

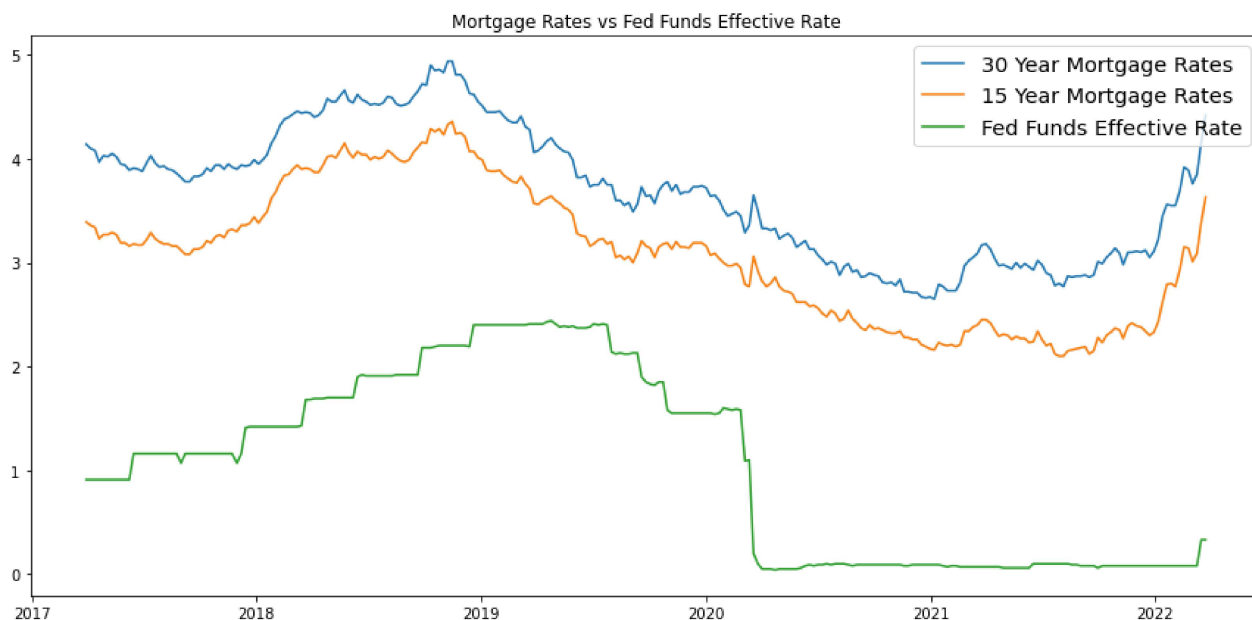| DATE	MORTGAGE30US	MORTGAGE15US	DFF
2017-03-30	4.14	3.39	0.91
2017-04-06	4.10	3.36	0.91
2017-04-13	4.08	3.34	0.91
2017-04-20	3.97	3.23	0.91
2017-04-27	4.03	3.27	0.91
...	...	...	...
2022-02-24	3.89	3.14	0.08
2022-03-03	3.76	3.01	0.08
2022-03-10	3.85	3.09	0.08
2022-03-17	4.16	3.39	0.33
2022-03-24	4.42	3.63	0.33

261 rows × 3 columns

In [30]:
```
fig, ax = plt.subplots(figsize=(15,7))
```

```
plt.plot(df_combined['MORTGAGE30US'], label='30 Year Mortgage Rates')
plt.plot(df_combined['MORTGAGE15US'], label='15 Year Mortgage Rates')
plt.plot(df_combined['DFF'], label='Fed Funds Effective Rate')

legend = ax.legend(loc='upper right', fontsize='x-large')
plt.title('Mortgage Rates vs Fed Funds Effective Rate')
```

Out[30]:   Text(0.5, 1.0, 'Mortgage Rates vs Fed Funds Effective Rate')

In [20]:
```
df_norm = (df_combined-df_combined.min())/(df_combined.max()-df_combined.min())
```

In [21]:
```
df_norm
```

Out[21]:

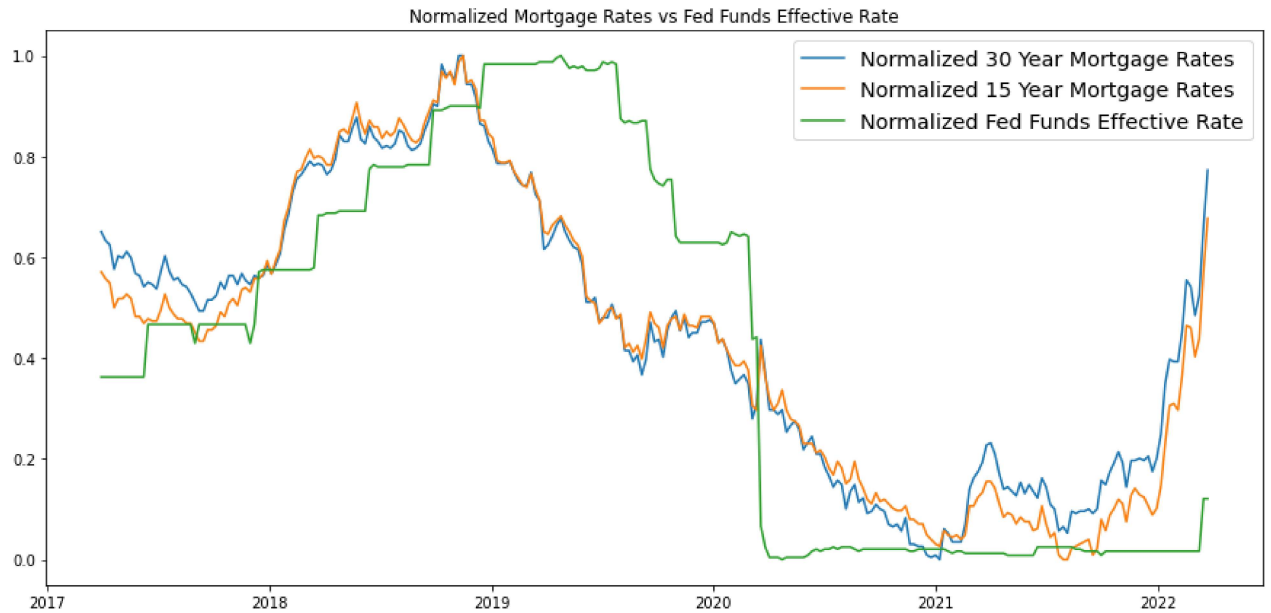|	MORTGAGE30US	MORTGAGE15US	DFF
DATE			
2017-03-30	0.650655	0.570796	0.362500
2017-04-06	0.633188	0.557522	0.362500
2017-04-13	0.624454	0.548673	0.362500
2017-04-20	0.576419	0.500000	0.362500
2017-04-27	0.602620	0.517699	0.362500
...	...	...	...
2022-02-24	0.541485	0.460177	0.016667
2022-03-03	0.484716	0.402655	0.016667
2022-03-10	0.524017	0.438053	0.016667
2022-03-17	0.659389	0.570796	0.120833
2022-03-24	0.772926	0.676991	0.120833

261 rows × 3 columns

```python
fig, ax = plt.subplots(figsize=(15,7))

plt.plot(df_norm['MORTGAGE30US'], label='Normalized 30 Year Mortgage Rates')
plt.plot(df_norm['MORTGAGE15US'], label='Normalized 15 Year Mortgage Rates')
plt.plot(df_norm['DFF'], label='Normalized Fed Funds Effective Rate')

legend = ax.legend(loc='upper right', fontsize='x-large')
plt.title('Normalized Mortgage Rates vs Fed Funds Effective Rate')
```

Out[29]: Text(0.5, 1.0, 'Normalized Mortgage Rates vs Fed Funds Effective Rate')

In [ ]: