Untitled9

September 18, 2025

0.0.1 Modeling Yield Curve Using Spline Interpolation

Here we have a curve that interpolates two points

[26]:
```
# Iport libraries
import numpy as np
import matplotlib.pyplot as plt
from scipy.interpolate import CubicSpline
```

[28]:
```
# Original Data
maturities_original = np.array([1/12, 2/12, 3/12, 4/12, 6/12, 1, 2, 3, 5, 7,␣
 ↪10, 20, 30])
yields_original = np.array([4.72, 4.72, 4.64, 4.49, 4.39, 4.27, 4.19, 4.11, 4.
 ↪16, 4.22, 4.26, 4.55, 4.44])

# Cubic spline interpolation
cs = CubicSpline(maturities_original, yields_original)
```

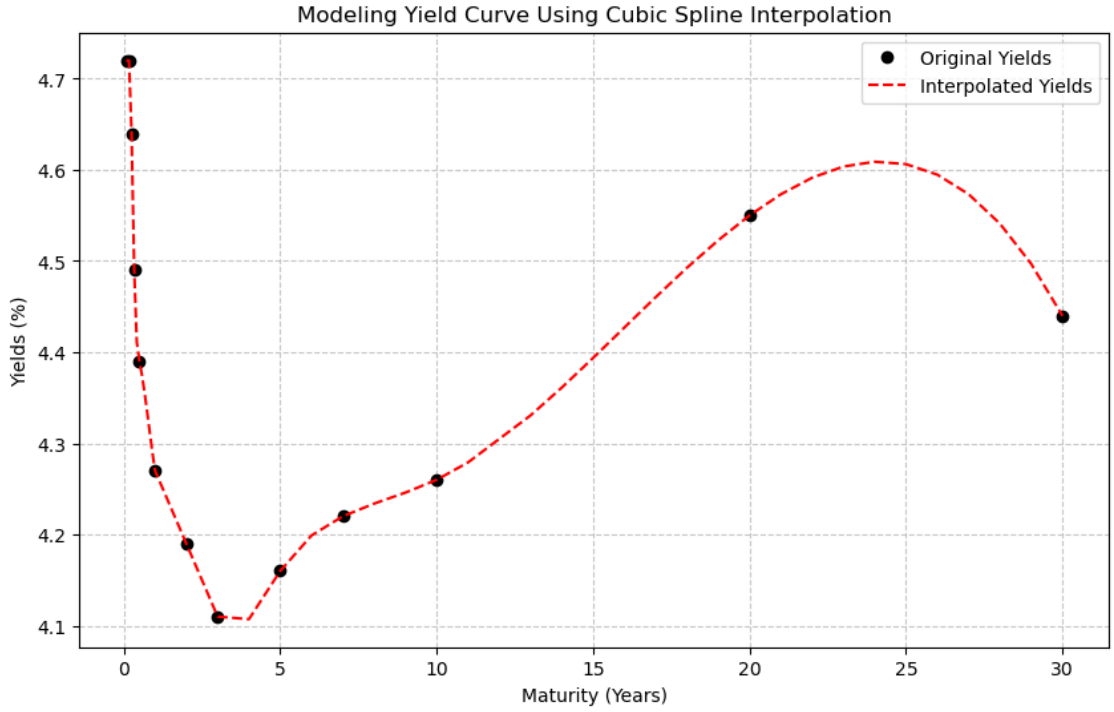
[30]:
```
# Maturities for which interpolation is needed
maturities_new = np.array([1/12, 2/12, 3/12, 4/12, 5/12, 6/12, 7/12, 8/12, 9/
 ↪12, 10/12, 11/12,
                           1, 2, 3, 4, 5, 6, 7, 8, 9, 10,
                           11, 11, 13, 14, 15, 16, 17, 18, 19, 20,
                           21, 22, 23, 24, 25, 26, 27, 28, 29, 30])

# Calculate yields for new maturities
yields_new = cs(maturities_new)
print(yields_new)
```

```
[4.72       4.72       4.64       4.49       4.41105872 4.39
 4.3745275  4.35533022 4.33384349 4.31150265 4.28974304 4.27
 4.19       4.11       4.10713805 4.16       4.19898613 4.22
 4.23391351 4.24596866 4.26       4.27903945 4.27903945 4.33062623
 4.36121141 4.39368301 4.42705998 4.46036123 4.4926057  4.52281232
 4.55       4.57318768 4.5913943  4.60363877 4.60894002 4.60631699
 4.59478859 4.57337377 4.54109145 4.49696055 4.44      ]
```

[34]:
```
# Plot
plt.figure(figsize=(10,6))
```

```
plt.plot(maturities_original, yields_original, 'o', color = 'black', label =␣
 ↪'Original Yields')
plt.plot(maturities_new, yields_new, '--', color = 'red', label = 'Interpolated␣
 ↪Yields')
plt.xlabel('Maturity (Years)')
plt.ylabel('Yields (%)')
plt.title('Modeling Yield Curve Using Cubic Spline Interpolation')
plt.legend()
plt.grid(True, linestyle = '--', alpha = 0.7)
plt.show()
```



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