Q8_work_HW_lec_14

August 6, 2023

[3]:
```
import pandas as pd

# Set up function to calculate the bond's purchase and sale prices

def calculate_bond_values_and_returns(df):
    # 1. Calculate bond purchase price
    df['PV_purchase'] = df['C'] * (1 - (1 +␣
 ↪df['r_purchase'])**-df['n_purchase']) / df['r_purchase'] + df['F'] / (1 +␣
 ↪df['r_purchase'])**df['n_purchase']

    # 2. Calculate bond sale price
    df['PV_sale'] = df['C'] * (1 - (1 + df['r_sale'])**-df['n_sale']) /␣
 ↪df['r_sale'] + df['F'] / (1 + df['r_sale'])**df['n_sale']

    return df

# Create df with bond details
df_bonds = pd.DataFrame({
    'C': [0.05 * 1000],  # 5% annual coupon of $1,000 par value
    'F': [1000],  # Face value
    'r_purchase': [0.065],  # YTM at purchase = 6.5%
    'n_purchase': [20],  # Number of years until maturity at purchase
    'r_sale': [0.065],  # YTM at sale = 6.5%
    'n_sale': [17]  # Number of years until maturity at sale (20 - 3 years)
})

# Call initial function and get bond's delta three years after issuance
df_results = calculate_bond_values_and_returns(df_bonds)
bond_value_increase = df_results['PV_sale'].values[0] -␣
 ↪df_results['PV_purchase'].values[0]
bond_value_increase
```

[3]:
```
13.618958247767068
```

The bond's value will increase by ~ $13.62 three years after issuance, given that the YTM remains unchanged.

[ ]:
```

```