

Seminar 5 solutions

1. Read the [following article](#) and answer the following questions:
Which yield curve is higher in the US (2-year or 10-year) and why?
What signals about the future of the US economy do we get from yield curves?
For more details read also [this article](#).

2. **Suppose the market price of a 20-year pure discount bond with a face value of \$1,000 is \$214.55. What is the spot interest rate for the 20-year maturity expressed in percentage per annum?**

Answer:

We know that the relationship between the price of a pure discount bond and the spot interest rate at the 20/year maturity satisfies

$$P(t) = \frac{\$1,000}{(1 + i(t,20))^{20}}$$

Substituting the price of \$214.55 and solving for $i(t,20)$, we find

$$i(t,20) = \left[\frac{\$1,000}{\$214.55} \right]^{1/20} - 1 = 0.08$$

Therefore, the spot interest rate for the 20-year maturity expressed in percentage per annum is 8%.

3. **Consider a 2-year euro-denominated bond that has a current market price of €970, a face value of €1,000, and an annual coupon of 5%. Suppose the 1-year euro-denominated spot interest rate is 5.5%. What is the 2-year euro-denominated spot interest rate?**

Answer: The present value of a coupon paying bond is found by discounting each annual coupon and the final principal payment at the appropriate spot interest rates for those maturities. Thus, to find the 2-year euro-denominated spot interest rate we must solve for the two-period spot interest rate in the following equation:

$$€970 = \frac{€50}{1.055} + \frac{€1050}{(1+i(t,2))^2}$$

The answer is $i(t,2) = 6.68\%$.

4. **What should be the 2-year forward rate to prevent arbitrage? The spot exchange rate is ¥132.192/£.**

| | U.K. | Japan |
|--------|-------|-------|
| 1 year | 1.105 | 0.370 |
| 2 year | 1.770 | 0.430 |

What should be the 2-year forward rate to prevent arbitrage?

Answer:

$$FW = 132.192 \times (1 + 0.00430)^2 / (1 + 0.0177)^2 = 127.7435$$

5. Please, try to calculate EUR/USD 2 year forward rate based on the current market data. Find the current EUR/USD spot rate, Germany 2-Year Bond Yield and U.S. 2 Year Treasury Note. Compare your result to market forward rate.

Answer:

Spot rate EUR/USD 0.9753

2-year German bond yield 1.844

2-year US bond yield 4.47%

FW price 1.0568

FW points 431.59 indicate EURUSD 1.0185