Chapter 15 - The Term Structure of Interest Rates

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Summary from BKM (2023)

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1. The term structure of interest rates refers to the interest rates for various terms to maturity embodied in the prices of default-free zero-coupon bonds.
2. In a world of certainty, all investments must provide equal total returns for any investment period. Short-term holding-period returns on all bonds would be equal in a risk-free economy; all returns would be equal to the rate available on short-term bonds. Similarly, total returns from rolling over short-term bonds over longer periods would equal the total return available from long-maturity bonds.
3. The forward rate of interest is the break-even future interest rate that would equate the total return from a rollover strategy to that of a longer-term zero-coupon bond. It is defined by the equation

$$(1 + y_{n-1})^{n-1}\,(1 + f_n) = (1 + y_n)^n$$

   where n is a given number of periods from today. This equation can be used to show that yields to maturity and forward rates are related by the equation

$$(1 + y_n)^n = (1 + r_1)(1 + f_2)(1 + f_3)\ \cdots\ (1 + f_n)$$

4. A common version of the expectations hypothesis holds that forward interest rates are unbiased estimates of expected future interest rates. However, there are good reasons to believe that forward rates differ from expected short rates because of a risk premium known as a *liquidity premium.* A positive liquidity premium can cause the yield curve to slope upward even if no increase in short rates is anticipated.
5. The existence of liquidity premiums complicates attempts to infer expected future interest rates from the yield curve. Such an inference would be made easier if we could assume the liquidity premium remained reasonably stable over time. However, both empirical and theoretical considerations cast doubt on the constancy of that premium.
6. Forward rates are market interest rates in the important sense that commitments to forward (i.e., deferred) borrowing or lending arrangements can be made at these rates.

Key equations from BKM (2023)

Forward rate of interest: $1 + f_n = \dfrac{(1 + y_n)^n}{(1 + y_{n-1})^{n-1}}$

Yield to maturity given sequence of forward rates: $1 + y_n = [(1 + r_1)(1 + f_2)(1 + f_3) \cdots (1 + f_n)]^{1/n}$

Liquidity premium = Forward rate − Expected short rate

References I

 Bodie, Zvi, Alex Kane, and Allan J. Marcus (2023). *Investments*. 13th ed. New York: McGraw Hill.