# Study Notes

Financial Accounting: An Introduction to Concepts, Methods, and Uses, 14e
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### Problem Statement

Based on economists' forecasts and analysis, one-year Treasury bill rates and liquidity premiums for the next four years are expected to be as follows:

| | |
|---|---|
| Current 1-Year Treasury Bill Rate | ${}_1R_1 = 5.65\%$ |
| Expected 1-Year Treasury Bill Rate 1-Year from today | $E({}_2r_1) = 6.75\%$ |
| Expected 1-Year Treasury Bill Rate 2-Year from today | $E({}_3r_1) = 6.85\%$ |
| Expected 1-Year Treasury Bill Rate 3-Year from today | $E({}_4r_1) = 7.15\%$ |
| Liquidity Premium for 1-Year T-Bill Rate 1-Year from today | $L_2 = 0.05\%$ |
| Liquidity Premium for 1-Year T-Bill Rate 2-Year from today | $L_3 = 0.10\%$ |
| Liquidity Premium for 1-Year T-Bill Rate 3-Year from today | $L_4 = 0.12\%$ |

Using the liquidity premium theory, plot the current yield curve. Make sure you label the axes on the graph and identify the four annual rates on the curve both on the axes and on the yield curve itself.

### Assumptions

long-term rates are equal to geometric averages of current and expected short-term rates, plus liquidity risk premiums that increase with the security's maturity. (Liquidity premium theory).

### Solution

Data input:

```
c1yTb1y <- 0.0565
e1yTb2y <- 0.0675
e1yTb3y <- 0.0685
e1yTb4y <- 0.0715
liqPr2y <- 0.0005
liqPr3y <- 0.0010
liqPr4y <- 0.0012
```

Calculations:

```
# Current 1-year T-bill rate 1-year from today
c1yTb2y <- ( ( ( 1 + c1yTb1y ) *
               ( 1 + e1yTb2y + liqPr2y ) ) ^ ( 1 / 2 ) ) - 1
# Current 1-year T-bill rate 2-year from today
c1yTb3y <- ( ( ( 1 + c1yTb1y ) *
               ( 1 + e1yTb2y + liqPr2y ) *
               ( 1 + e1yTb3y + liqPr3y ) ) ^ ( 1 / 3 ) ) - 1
# Current 1-year T-bill rate 3-year from today
c1yTb4y <- ( ( ( 1 + c1yTb1y ) *
               ( 1 + e1yTb2y + liqPr2y ) *
               ( 1 + e1yTb3y + liqPr3y ) *
               ( 1 + e1yTb4y + liqPr4y ) ) ^ ( 1 / 4 ) ) - 1
```

Results:

- Current 1-Year Treasury Bill Rate: 5.650%.
- Current 1-Year Treasury Bill Rate 1 year from today: 6.223%.
- Current 1-Year Treasury Bill Rate 2 year from today: 6.465%.
- Current 1-Year Treasury Bill Rate 3 year from today: 6.666%.

Yield curve: