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Financial Markets and Institutions

Study Questions: Term Structure of Interest Rates (Answers on subsequent pages)

1. In a hypothetical economy the risk-free (no default or liquidity risk) 30-year bond has a yield to maturity of 6%, but bondholders are taxed at a 40% rate on that yield. A 30-year municipal bond has a risk premium of 2%, but its yield escapes taxation.

What is the yield on the 30-year municipal bond?

2. Today a 1-year risk-free (no default or liquidity risk) bond has a yield to maturity of 4%. The following are forecasts of 1-year yields:

One year from now: 5%

Two years from now: 6%

Three years from now: 7%

Four years from now: 8%

The following are liquidity premiums required by bondholders

1-year maturity: none

2-year maturity: .3%

3-year maturity: .5%

4-year maturity: .7%

5-year maturity: .8%

a) Use pure expectations theory to formulate a yield curve for today.

b) Use liquidity preference theory to formulate a yield curve for today.

3. As you know, today's yield curve has a "bowl" shape; it is downward-sloping for a bit, then reverses itself and becomes upward-sloping. Use concepts from pure expectations theory to explain this shape.

1. In a hypothetical economy the risk-free (no default or liquidity risk) 30-year bond has a yield to maturity of 6%, but bondholders are taxed at a 40% rate on that yield. A 30-year municipal bond has a risk premium of 2%, but its yield escapes taxation.

What is the yield on the 30-year municipal bond?

$$\text{Municipal bond yield} = [(1 - \text{tax rate}) \times (6\%)] + 2\% = 5.6\%$$

2. Today a 1-year risk-free (no default or liquidity risk) bond has a yield to maturity of 4%. The following are forecasts of 1-year yields:

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a) Use pure expectations theory to formulate a yield curve for today.

$$1\text{-year yield} = 4\%$$

$$2\text{-year yield} = (4\% + 5\%)/2 = 4.5\%$$

$$3\text{-year yield} = (4\% + 5\% + 6\%)/3 = 5\%$$

$$4\text{-year yield} = (4\% + 5\% + 6\% + 7\%)/4 = 5.5\%$$

$$5\text{-year yield} = (4\% + 5\% + 6\% + 7\% + 8\%)/5 = 6\%$$

(the yield curve is upward-sloping)

b) Use liquidity preference theory to formulate a yield curve for today.

$$1\text{-year yield} = 4\%$$

$$2\text{-year yield} = .3\% + (4\% + 5\%)/2 = 4.8\%$$

$$3\text{-year yield} = .5\% + (4\% + 5\% + 6\%)/3 = 5.5\%$$

$$4\text{-year yield} = .7\% + (4\% + 5\% + 6\% + 7\%)/4 = 6.2\%$$

$$5\text{-year yield} = .8\% + (4\% + 5\% + 6\% + 7\% + 8\%)/5 = 6.8\%$$

(the yield curve is even more upward-sloping than under pure expectations theory)

3. As you know, today's yield curve has a "bowl" shape; it is downward-sloping for a bit, then reverses itself and becomes upward-sloping. Use concepts from pure expectations theory to explain this shape.

According to pure expectations theory, if one expects short term yields to fall in the future, then the yield curve will slope downward; and if one expects short term yields to rise then the yield curve will slope upward.

Well then, if today's yield curve slopes downward for a bit, then slopes upward, then, to be consistent with pure expectations theory, folks must be expecting short term yields to fall for a few years, then rise for a few years after that.