

NPTEL ONLINE CERTIFICATION COURSES

Management of Fixed Income Securities

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Lecture 11: Level of Interest Rate Determination-II

CONCEPTS COVERED

- Determinants of Demand for Bonds
- Determinants of Supply of Bonds

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KEYWORDS

- Wealth
- Business cycle
- Inflation
- Investment opportunity
- Liquidity

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Factors that Shift Demand Curve for Bonds

- Income or wealth
- Expected returns on bonds relative to alternative assets
- Risk of bonds relative to alternative assets
- Liquidity of bonds relative to alternative assets

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Factors that Shift Demand Curve for Bonds Cont…

- In a business cycle expansion with growing income / wealth, the demand for bonds rises and the demand curve for bonds shifts to the right.
- In a recession, when income and wealth are falling, the demand for bonds falls, and the demand curve shifts to the left.
- Higher expected interest rates in the future lower the expected return for long-term bonds, decrease the demand, and shift the demand curve to the left
- Lower expected interest rates in the future increase the demand for long-term bonds and shift the demand curve to the right

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Factors that Shift Demand Curve for Bonds Cont…

- Changes in expected returns on other assets can also shift the demand curve for bonds.
- An increase in the expected rate of inflation lowers the expected return for bonds, causing their demand to decline and the demand curve to shift to the left
- An increase in the riskiness of bonds causes the demand for bonds to fall and the demand curve to shift to the left
- An increase in the riskiness of alternative assets causes the demand for bonds to rise and the demand curve to shift to the right

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Factors that Shift Demand Curve for Bonds Cont…

- Increased liquidity of bonds results in an increased demand for bonds, and the demand curve shifts to the right
- Similarly, increased liquidity of alternative assets lowers the demand for bonds and shifts the demand curve to the left.

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Factors that Shift Supply Curve for Bonds

- Expected profitability of investment opportunities
- Expected inflation
- Government activities

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Factors that Shift Supply Curve for Bonds

- In a business cycle expansion, the supply of bonds increases, and the supply curve shifts to the right.
- In a recession, when there are far fewer expected profitable investment opportunities, the supply of bonds falls, and the supply curve shifts to the left.
- An increase in expected inflation causes the supply of bonds to increase and the supply curve to shift to the right
- Higher government deficits increase the supply of bonds and shift the supply curve to the right
- Government surpluses, decrease the supply of bonds and shift the supply curve to the left.

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CONCLUSIONS

- Major factors which change the equilibrium interest rate include Income or wealth, expected returns on bonds relative to alternative assets, risk of bonds relative to alternative assets, liquidity of bonds relative to alternative assets, expected profitability of investment opportunities and government activities

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REFERENCES

- Mishkin Frederic S. (2016) The Economics of Money, Banking and Financial Markets, Eleventh Edition, Pearson Education Limited.

- Bhole, L.M and Mahakud, J (2017), Financial Institutions and Markets, Sixth Edition, McGraw Hill Education (India) Private Limited.

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Lecture 12: Level of Interest Rate Determination-III

CONCEPTS COVERED

- Keynesian theory of interest rate determination
- Liquidity Trap

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KEYWORDS

- Transactions demand for money
- Precautionary demand for money
- Speculative demand for money
- Supply of money

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Keynesian Theory

- According to Keynes, interest rate is a purely monetary phenomenon. This means that the rate of interest, at least in the short-run, is determined by the monetary factors, i.e., it depends on the actions of the monetary authorities (the Central Bank and the Government), and on the attitude of economic units towards holding money as an alternative to holding bonds.
- In other words, interest rate is determined by the interaction between the supply of money and demand for it in the economic system.

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Assumptions

- There are two main categories of assets that people use to store their wealth: money and bonds
- Total wealth in the economy must equal the total quantity of bonds plus money in the economy, which equals the quantity of bonds supplied (B^S) plus the quantity of money supplied (M^S).
- The quantity of bonds (B^D) and money (M^D) that people want to hold and thus demand must also equal the total amount of wealth
- The quantity of bonds and money supplied must equal the quantity of bonds and money demanded

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Assumptions

- $B^S + M^S = B^D + M^D$
- $B^S - B^D = M^D - M^S$
- if the market for money is in equilibrium ($M^S = M^D$), then $B^S = B^D$, meaning that the bond market is also in equilibrium.

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Demand for Money

- The demand to hold money is called the "liquidity preference".
- There are three motives or reasons behind the demand for liquidity or liquidity preference of individuals, firms, and institutions: (a) transactions motive, (b) precautionary motive, and (c) speculative motive.

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Transactions Demand for Money

- Amount of money which consumers need for transactions purpose mostly for buying and selling of goods and services
- Factors affecting transactions demand for money:
  - Income, spending habits, time interval after which income is received, banking developments, Industrial structure

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Precautionary Demand for Money

- Money demanded to meet unforeseen contingencies
- Factors affecting precautionary demand for money are:
  - Nature of business
  - Access to money market
  - Degree of conservatism
  - Degree of liquidity of the assets
  - Income

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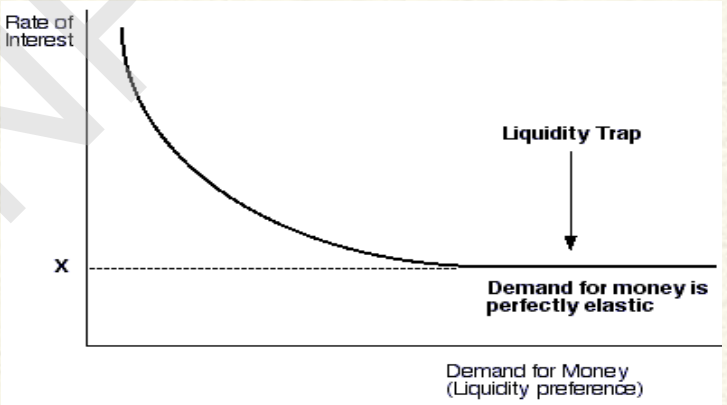
Speculative Demand for Money

- Amount of money people hold for making speculations in the financial markets
- There is an inverse relationship between interest rates and the speculative demand for money
- Relationship between interest rate and speculative demand for money is called the Liquidity Preference Curve
- Interest elasticity of speculative demand for money increases as the interest rate declines

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Liquidity Trap

- The rate of interest at which the speculative demand for money becomes perfectly elastic is called liquidity trap
- At the liquidity trap interest rate, the wealth holders hold their entire wealth in the form of money instead of holding the interest bearing bonds
- At the liquidity trap rate of interest, money becomes perfect substitute for bonds



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Changes in the Equilibrium Interest Rates

- Income Effect: A higher level of income causes the demand for money to increase and the demand curve to shift to the right
- Price Effect: rise in the price level causes the demand for money to increase and the demand curve to shift to the right
- An increase in the money supply engineered by the Central bank will shift the supply curve for money to the right
- When the money supply increases (everything else remaining equal), interest rates will decline

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CONCLUSIONS

- As per Keynesian theory interest rate is determined by the interaction between the supply of money and demand for it in the economic system
- There are three motives behind the demand for money: (a) transactions motive, (b) precautionary motive, and (c) speculative motive
- At the liquidity trap rate of interest, money becomes perfect substitute for bonds
- Income, price of commodities and government policies are major determinants of interest rate

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REFERENCES

- Mishkin Frederic S. (2016) The Economics of Money, Banking and Financial Markets, Eleventh Edition, Pearson Education Limited.

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Lecture 13: The Term Structure of Interest Rates-I

CONCEPTS COVERED

- **Determinants of Interest Rate**
- **Term Structure of Interest Rate**

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KEYWORDS

- Risk premium
- Yield curve
- Maturity spread

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Determinants of Interest Rates

Fundamental determinants of interest rates

$$i = RFR + EI + RP$$

where:

RFR = real risk-free rate of interest

EI = expected rate of inflation

RP = risk premium

i = f (Economic forces, Bond issue characteristics)

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Determinants of Interest Rates Cont…

- **Economic factors**
  - real growth rate
  - tightness or ease of capital market
  - expected inflation
  - or supply and demand of loanable funds
- **Bond characteristics**
  - credit quality
  - term to maturity
  - indenture provisions
  - foreign bond risk including exchange rate risk and country risk

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Determinants of Interest Rates Cont…

- The time remaining on a bond's life is referred to as its terms to maturity or simply maturity
- Bond are generally classified into three maturity sectors:
  - Short-term
  - Intermediate term
  - Longer term.
- The spread between any two maturity segment is called ***a maturity spread***.

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The Term Structure of Interest Rates

- How interest rate differences can be observed between similar bonds with different maturities?

- The term structure of interest rates is a static function that relates the term to maturity to the yield to maturity for a sample of bonds at a given point of time

- A plot of YTM against the term to maturity for similar bonds is known as *Yield Curve*

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The Term Structure of Interest Rates Cont…

- A yield curve can be constructed from current observations. For example, one could take all outstanding corporate bonds from a group in which the bonds are almost identical in all respects except their maturities, then generate the current yield curve.

- For investors who are more interested in long-run average yields instead of current ones, the yield curve could be generated by taking the average yields over a sample period (e.g., 7-year averages) and plotting these averages against their maturities.

- A widely-used approach is to generate a spot yield curve from spot rates.

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Shape of the Yield Curve

1. Yield curves can be ***positively-sloped*** with long-term rates being greater than shorter-term ones.
   - Such yield curves are called ***normal*** or ***upward sloping curves***. They are usually convex from below, with the YTM flattening out at higher maturities.

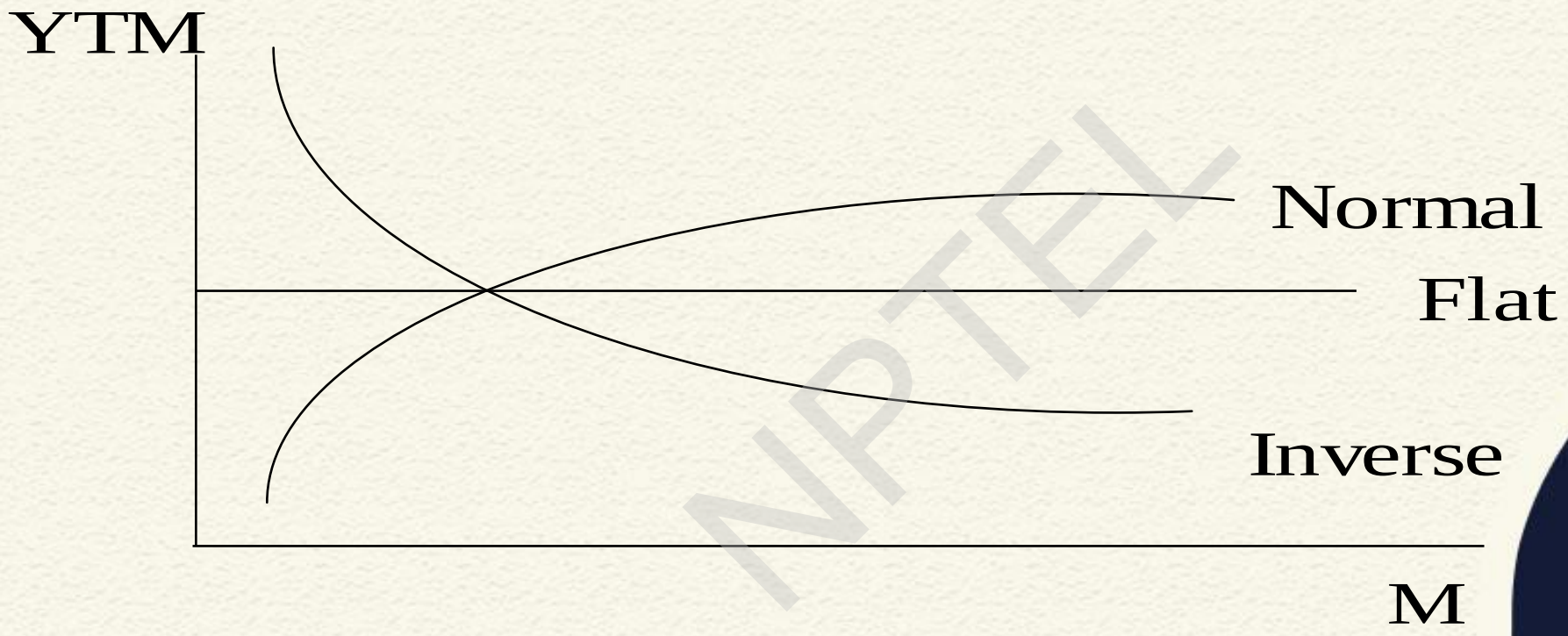
2. Yield curves can also be ***negatively-sloped***, with short-term rates greater than long-term ones.
   - These curves are known as ***inverted*** or ***downward sloping yield curves***. Like normal curves, these curves also tend to be convex, with the yields flattening out at the higher maturities.

3. Yield curves can be relatively ***flat***, with YTM being invariant to maturity.

4. Occasionally a yield curve can take on a more complicated shape in which it can have both positively-sloped and negatively-sloped portions; these are often referred to as a ***humped yield curve*.**

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Shape of the Yield Curve



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Factors Affecting the Shape of the Yield Curve

- The types of bonds under consideration (e.g., AAA bond versus BBB bond)
- Economic conditions (e.g., economic growth or recession, tight monetary conditions, etc.)
- The maturity preferences of investors and borrowers
- Investors' and borrowers' expectations about future rates, inflation, and the state of economy.

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CONCLUSIONS

- Major factors affecting interest rate determination include economic factors and bond specific characteristics
- Yield curve shows the relationship between YTM and term to maturity of the similar bonds at a given point of time
- The shape of the yield curve depends on the types of bonds, economic factors and expectations about the future

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REFERENCES

- Johnson, R.S. (2010), Bond Valuation, Selection, and Management, Second Edition, John Wiley & Sons, Inc., Hoboken, New Jersy.
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Lecture 14: The Term Structure of Interest Rates-II

CONCEPTS COVERED

- **Market Segmentation Theory**

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KEYWORDS

- Maturity segment
- Substitution effect
- Economic Expansion
- Economic Recession

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Market Segmentation Theory

- Market segmentation theory assumes that markets are segmented by maturity.
- This theory posits that the yield curve is determined by supply and demand conditions unique to each maturity segment.
- It recognizes the interdependence between markets in different sectors within the particular maturity segment. For example, short-term investors will substitute between short-term Treasury bonds and corporate commercial paper depending on their relative rates; and long-term investors will substitute between long-term government bonds and long-term corporate bonds depending on their relative rates.

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Example

- Assume that the yield curve for corporate bonds having similar quality is segmented into two markets: (i) Short-term and (ii) Long-term
- Short-term Market:
  - The supply of short-term corporate bonds depends on business demand for short-term assets such as inventories, accounts receivables etc.
  - The demand for short-term corporate bonds comes investors looking to invest their excess cash for short periods
  - The demand for short-term bonds by investors and the supply of such bonds by corporations ultimately determine the rate on short-term corporate bonds.

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Example Cont…

- **Long-Term Market**
  - The supply of long-term bonds comes from corporations trying to finance their long-term assets (plant expansion, equipment purchases, acquisitions, etc.).
  - The demand for such bonds comes from investors, either directly or indirectly through institutions (e.g., pension funds, mutual funds, insurance companies, etc.), who have long-term liabilities and horizons.
  - The demand for long-term bonds by investors and the supply of such bonds by corporations ultimately determine the rate on long-term corporate bonds.

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Market Segmentation Theory (MST) Cont…

- According to MST, the short-term bond market is unaffected by rates determined in the intermediate or long-term markets, and vice versa.
- This independence assumption is based on the premise that investors and borrowers have a strong need to match the maturities of their assets and liabilities.
- In general, the positions and the shapes of yield curves depend on the factors that determine the supply and demand for short-term, intermediate, and long-term bonds

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Market Segmentation Theory (MST) Cont…

- All these factors include economic state, expected inflation, credit risk, relative liquidity, and the sales and purchases by the central bank etc.

- Changes in these factors will cause a change in the structure of interest rates that will be reflected by different shifts and twists in the yield curves.

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Example

- If the yield curve were initially positively sloped, then an economic or financial change that increased short-term Treasury bills rates would cause the yield curve to become flatter.

- If the yield curve were initially negatively sloped, then the rate change would cause the curve to become even more negatively sloped.

- A change in an economic or financial factor can have not only a direct impact on one sector (e.g., open market operations affecting Treasury bills rates), but also an indirect impact on another sector (change in the Treasury bills rate resulting from an open market operation affecting the demand for corporate bonds).

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Factors Affecting Yield curve shifts

- Assumption: Two-sector (Treasury and corporate) and two-segment (short-term (ST) and long-term (LT)) world
  - Economic Expansion
  - Economic Recession
  - Recession, Credit Risk, and Credit Tightening
  - Deficit Financing with Short-Term Securities
  - Deficit Financing with Long-Term Securities
  - Government Purchase of Long-Term Treasuries from a Surplus
  - Expansionary Open Market Operation with the Purchase of Short-term Treasury Bills
  - Contractionary Open Market Operation with the Sale of Short-term Treasury Bills

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Economic Expansion and Yield to Maturity

- Economic expansion increases the business demand for short-term and long-term assets.
- many companies issue more short-term bonds to finance their larger inventories and accounts receivables.
- They also issue more long-term bonds to finance their increase in investments in plants, equipment, and other long-term assets.
- In the bond market, these actions cause the short-term and the long-term supplies of bonds to increase as the economy grows.
- At the initial interest rates, the increase in bonds outstanding creates an excess supply. This drives bond prices down and the YTM up.
- The excesses cause corporate bond prices to fall and rates to rise until a new equilibrium is reached

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Substitution Effect

- As the rates on short-term and long-term corporate bonds increase, short-term and long-term government securities become relatively less attractive.

- As a result, the demands for short-term and long-term government decrease, creating excess supply in both markets at the initial rates.

- Like the corporate bond markets, the excess supply in the government security markets will cause their prices to decrease and their rates to rise until a new equilibrium is attained

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Substitution Effect Cont…

- The supply and demand analysis shows that economic expansion has a tendency to increase both short-term and long-term rates for corporate bonds, and by a substitution effect, increase short-term and long-term Treasury rates.
- Hence, an economic expansion causes the yield curves for both sectors to shift up.
- If we assume economic conditions impact the demand for bonds, then we would conclude that an expansion would cause interest rates to increase provided that the supply impact on interest rate dominates the demand impact. If the demand impact dominates, then an expansion could push down rates.

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Summary

Corporate Bond Market:

Increase in capital formation $\Rightarrow$ More corporate bonds sold $\Rightarrow$ Excess supply for corporate bonds $\Rightarrow$ Corporate bond prices decrease and yields increase $\therefore$ Upward shift in Corporate YC

Government Bond Market:

Substitution Effect: As corporate yields increase $\Rightarrow$ Demand for Treasury securities decrease $\Rightarrow$ Treasury bond prices decrease and yields increase $\therefore$ Upward shift in Treasury YC

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Economic Recession and Yield to Maturity

Corporate Bond Market (Short Term and Long Term):

Decrease in capital formation $\Rightarrow$ Fewer corporate bonds sold $\Rightarrow$ Excess demand for corporate bonds $\Rightarrow$ Corporate bond prices increase and yields decrease: Downward shift in Corporate YC

Government Bond Market (Short-Term and Long-Term):

Substitution Effect: As corporate yields decrease $\Rightarrow$ Demand for Government securities increases $\Rightarrow$ Government bond prices increase and yields decrease: Downward shift in Government YC

If we assume economic conditions impact the demand for bonds, then we would conclude that a recession would cause interest rates to decrease provided that the supply impact on interest rate dominates the demand impact. If the demand impact dominates, then a recession could push down up.

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CONCLUSIONS

- According to market segmentation theory the yield curve is determined by supply and demand conditions unique to each maturity segment
- This theory is based on the idea of unique or independent markets.
- The factors affecting yield vary across the maturity segments

- An economic condition causes the yield curves for corporate and government sectors to shift

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REFERENCES

- Johnson, R.S. (2010), Bond Valuation, Selection, and Management, Second Edition, John Wiley & Sons, Inc., Hoboken, New Jersy.
- Reilly, F. K and Brown, K. C. (2012), Analysis of Investments & Management of Portfolios, Cengage Learning India Private Limited

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Lecture 15: The Term Structure of Interest Rates-III

CONCEPTS COVERED

- Yield curve shift
- Deficit Financing and yield

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KEYWORDS

- Credit Risk
- Credit Tightening
- Deficit financing

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Factors Affecting Yield curve shifts

- Assumption: Two-sector (Government and corporate) and two-segment (short-term (ST) and long-term (LT)) world
  - Credit Risk, and Credit Tightening
  - Deficit Financing with Short-Term Securities
  - Deficit Financing with Long-Term Securities

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Credit Risk, Credit Tightening and Yield Curve

- An increase in credit risk combined with an increase in credit tightening would lead to an increase in the demand for short-term and long-term Government bonds and a decrease in the demand for corporate bonds.

- These change in demand would lead to rightward shifts in the ST and LT government bond curves, lowering government bond rates and shifting the government bond yield curve down, and leftward shifts in the ST and LT corporate bonds, increasing corporate rates and shifting the corporate yield curve up.

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Credit Risk, Credit Tightening and Yield Curve

- The combination of recession accompanied by an increase in credit risk would lead to lower government bond yields and possibly corporate yields and a widening of the spreads between corporate bond and government bond.

- The opposite results would occur if the economy moved from recession to economic expansion and the expansion was accompanied by a decrease in credit risk and credit tightening.

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Deficit Financing with Short-Term Securities and Yield

- If the Government were to finance a deficit by selling short-term Treasury bills, then there would be an increase in the supply of the short-term Treasury bills. The increase in supply would push the price of the short-term government securities down, providing a higher short-term Treasury bill yield.
- In the corporate bond market, the higher rates on short-term government securities would lead to a "crowding out effect," decreasing the demand for short-term corporate securities, which, in turn, would lead to an excess supply in that market as short-term corporate bondholders try to sell their corporate bonds in order to buy the higher yielding government securities.
- As bondholders try to sell their short-term corporate bonds, the prices on such bonds would decrease, causing the rates on short-term corporate bonds to rise until a new equilibrium is reached.

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Deficit Financing with Short-Term Securities and Yield Cont..

- The sale of the short-term Government securities increases both short-term government and short-term corporate rates.

- Because the long-term market is assumed to be independent of short-term rates, the total adjustment to the Government's sale of short-term securities would occur through the increase in short-term corporate and Treasury bill rates.

- Moreover, given corporate and Treasury bill yield curves that are initially flat, the Government’s action causes the yield curves to become negatively sloped.

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Summary

Treasury Bills Market

Government sells S-T Treasuries (T-Bills) $\Rightarrow$ T-Bill prices decrease and yields increase: Tendency for treasury bills YC to become negatively sloped.

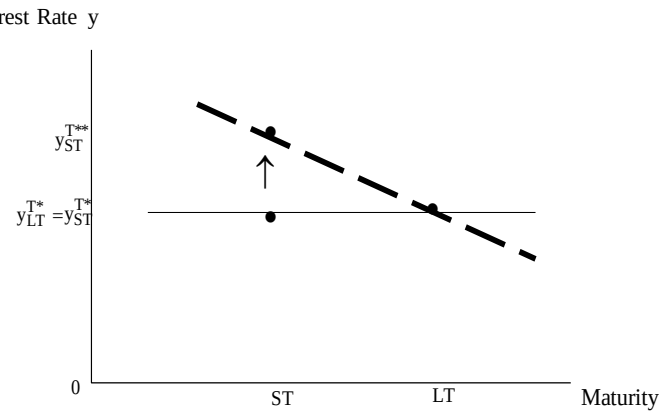
Corporate Market

Substitution effect: As S-T treasury bills yields increase, the demand for S-T corporate securities decrease $\Rightarrow$ S-T Corporate bond prices decrease and their rates to increase: Tendency for Corporate bond YC to become negatively sloped.

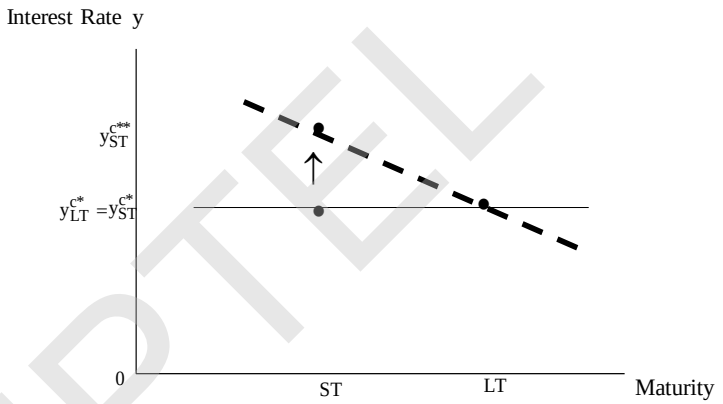
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Diagrammatic Representation

Treasury Bill Yield Curve



Corporate Bond Yield Curve



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Deficit Financing with Long-Term Securities and Yield

Government Securities Market

Government sells L-T Bonds $\Rightarrow$ L-T Bond prices decrease and yields increase : Tendency for Treasury YC to become positively sloped.

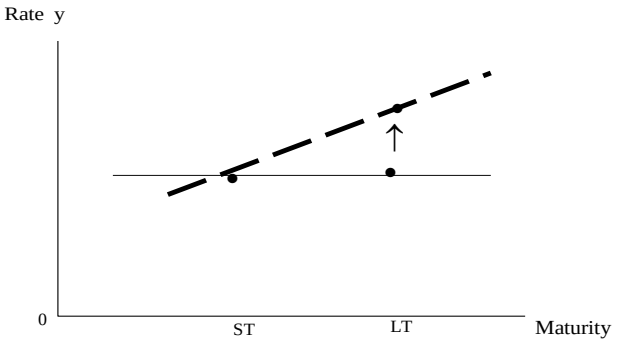
Corporate Market

Substitution effect: As L-T Government bond yields increase, the demand for L-T corporate securities decreases $\Rightarrow$ L-T Corporate bond prices decrease and their yields increase: Tendency for Corporate YC to become positively sloped.

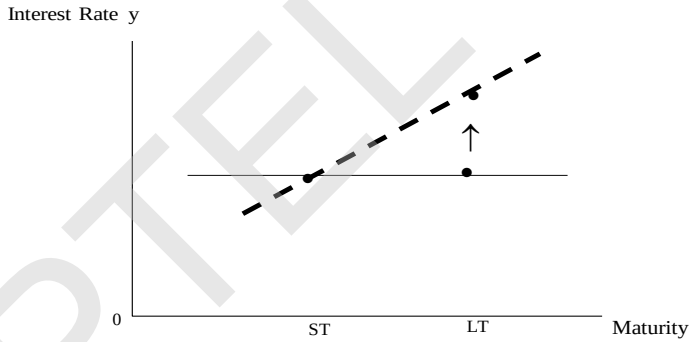
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Diagrammatic Representation

Government Bond Yield Curve



Corporate Bond Yield Curve



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Deficit Financing with Long-Term Securities and Yield Cont…

- The sale of the long-term Treasury securities increases both long-term government and long-term corporate rates.
- As the short-term market is assumed to be independent of long-term rates, the total adjustment to the Government's sale of long-term securities would occur through the increase in long-term corporate and government bond rates.
- Moreover, given corporate and government bond yield curves that are initially flat, the government's action causes the yield curves to become positively sloped.

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CONCLUSIONS

- The combination of recession accompanied by an increase in credit risk would lead to lower government bond yields and possibly corporate yields and a widening of the spreads between corporate bond and government bond.
- The sale of the short-term Government securities increases both short-term government and short-term corporate rates
- The sale of the long-term government securities increases both long-term government and long-term corporate rates.

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