

# ECS307

UNISA

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# Chapter 5: The Risk & term structure of interest Rates

- ▶ We examined the determination of just one interest rate yet there are enormous numbers of bonds on which the interest rates can differ
- ▶ We examine the r/ship of the various interest rates to one another which helps decisions on which bonds to purchase as investments and which ones to sell.
- ▶ Bonds with the same term to maturity may have different interest rates & the r/ship among these interest rates is called **risk structure of interest rates**
- ▶ The r/ship among interest rates on bonds with different terms to maturity is called the **term structure of interest rates**

# Risk structure of interest rates

- ▶ What factors are responsible for the spread (difference) between the interest rates of bonds with the same term to maturity?

## 1. Default Risk

- ▶ Occurs when the issuer of the bond is unable or unwilling to make interest payments and the face value when the bond matures
- ▶ Bonds with no default risk are called default-free bonds e.g. US treasury bonds coz the govt can always raise taxes to meet obligations
- ▶ The spread btwn the interest rates on bonds with default risk & default-free bonds of the same maturity is called the **risk premium**.

- ▶ The risk premium indicates how much additional interest people must earn to be willing to hold that risky bond.
- ▶ A bond with default risk always has a positive risk premium & an increase in its default risk will raise the risk premium
- ▶ Purchasers of bonds need to know whether a corporation is likely to default on its bonds
- ▶ This information is provided by credit-ratings agencies, investment advisory firms that rate the quality of corporate and municipal bonds in terms of the probability of default
- ▶ High default risk bonds are called **junk bonds or speculative-grade bonds or high-yield bonds** coz they always have higher interest rates than **investment-grade securities**

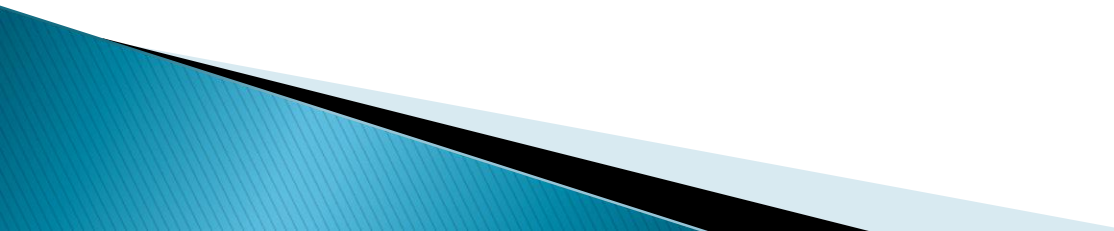
## 2. Liquidity

- ▶ Liquidity of a bond influences its interest rate.
- ▶ It is relatively easier to find buyers for liquid bonds in an emergency
- ▶ Treasury bonds are the most liquid of all long term bonds e.g. compared to corporate bonds
- ▶ Lower liquidity of corporate bonds relative to treasury bonds increase the spread between the interest rates on these 2 bonds
- ▶ The differences btwn interest rates on corporate bonds and treasury bonds (ie risk premiums) reflect not only the corporate bond's default risk but also its liquidity.
- ▶ This is why ***a risk premium is more accurately a “risk and liquidity premium”*** but conventionally called a “risk premium”

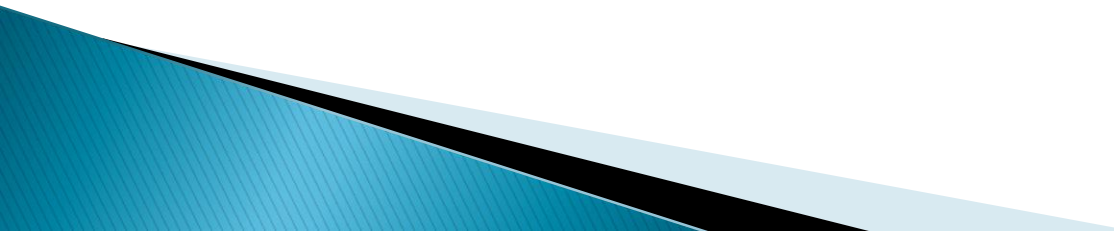
# Income tax considerations

- ▶ Municipal bonds are:
  - certainly not default-free;
  - Not as liquid as treasury bonds; **but**
  - Have had lower interest rates than treasury bonds
- ▶ Coz municipal bonds are **exempt from federal income tax** wc has the same effect as an increase in their **expected return**

# Term structure of interest rates

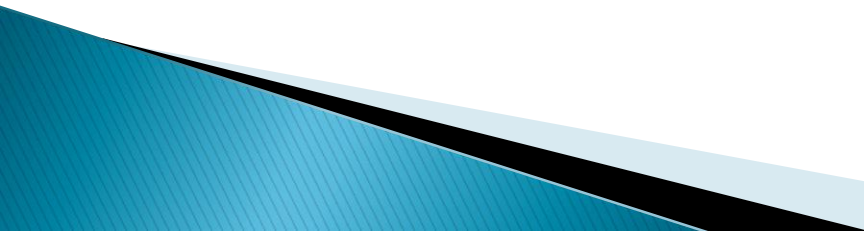
- ▶ Bonds with identical risk, liquidity and tax characteristics may have different interest rates coz their timing remaining to maturity is different
  - ▶ A plot of the yields on bonds with differing terms to maturity but the same risk, liquidity and tax considerations is called a yield curve
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# Yield curves

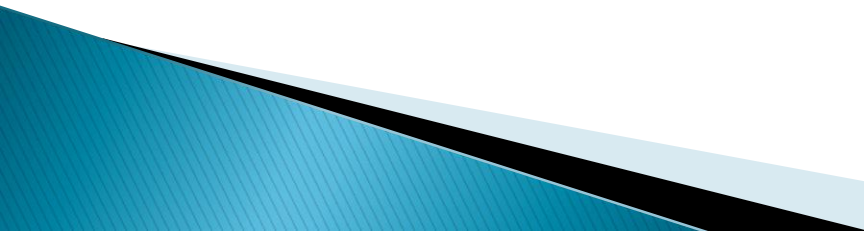
- ▶ A yield curve describes the term structure of interest rates for particular types of bonds such as government bonds (p.g. 168)
  - ▶ When yield curves slope upwards (usual case), long term “ $i$ ” > short term “ $i$ ”
  - ▶ When yield curves are flat LT “ $i$ ” = ST “ $i$ ”
  - ▶ When they slope downwards LT “ $i$ ” < ST “ $i$ ” and they are called **inverted yield curves**
  - ▶ Yield curves can have more complicated shapes combining different characteristics
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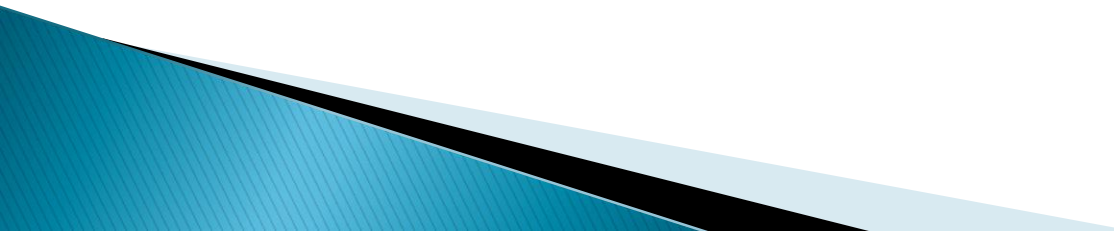


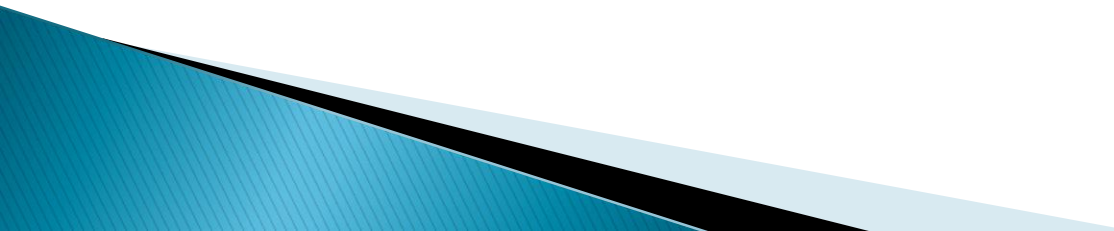
# Theories of the term structure of “i”

- ▶ A good theory of the term structure explains the following 3 important empirical facts:
    1. Interest rates on bonds of different maturities move together over time;
    2. 3 possible shapes of the yield curves; and
    3. Yield curves almost always slope upward.
  - ▶ 3 theories put forward
    1. The expectations theory;
    2. The segmented markets theory; and
    3. Liquidity premium theory.
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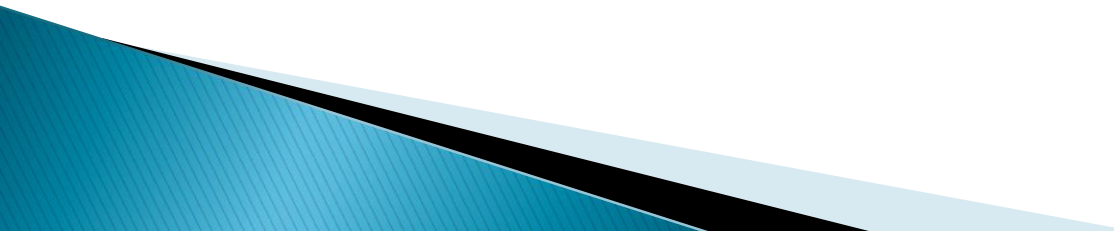
# Expectations theory

- ▶ *Explains the first 2 facts but not the third*
  - ▶ It states that the interest rate on a long term bond will equal an average of the short-term interest rates that people expect to occur over the life of the long term bond.
  - ▶ The key assumption behind this theory is that buyers of bonds do not prefer bonds of one maturity over another, so they will not hold any quantity of a bond if its expected return is less than that of another bond with a different maturity
  - ▶ What this means is that if bonds with different maturities are perfect substitutes, the expected return on these must be equal.
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- ▶ When the yield curve is upward sloping, the expectations theory suggests that short-term interest rates are expected to rise in the future
  - ▶ When the yield curve is inverted, the average of future short-term interest rates is expected to be lower than the current short-term rate, implying that short-term interest rates are expected to fall, in the future
  - ▶ Only when the yield curve is flat does the expectations theory suggest that short-term interest rates are not expected to change, on average, in the future
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- ▶ The expectations theory also explains fact 1: because long term rates are the average of expected future short-term rates, a rise in short-term rates will also raise long term rates, causing short-term and long-term rates to move together
  - ▶ The expectations theory also explains fact 1: when short term rates are low, people generally expect them to rise to some normal level in the future and the average of future expected short term rates is high relative to the current short term rate. conversely if short term rates are high people usually expect them to come back down
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## ▶ **Shortcomings of the expectations theory**

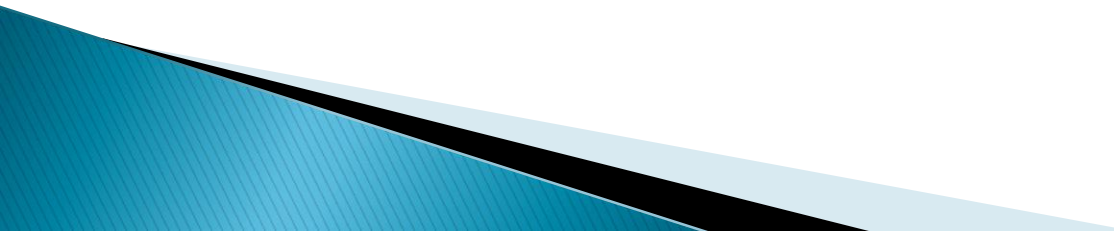
- ▶ It cannot explain fact 3 which says that yield curves are usually slope upward. The typical upward slope of the yield curves imply that short term interest rates are usually expected to rise in the future. In practice, short term interest rates are just as likely to fall as they are to rise, and so the expectations theory suggests that the typical yield curve should be flat rather than upward sloping.
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# Segmented Markets Theory

- ▶ *Explains fact 3 but not the first 2*
  - ▶ It states that bonds of different maturities are not substitutes at all
  - ▶ The interest rate for each bond with a different maturity is determined by the demand for and supply of that bond
  - ▶ Investors have preferences for bonds of one maturity over another
  - ▶ If investors generally prefer bonds with shorter maturities that have less interest-rate risk, then this explains why yield curves usually slope upward (fact 3)
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# Liquidity Premium & Preferred Habitat Theories

- ▶ *Combines the 2 theories to explain all 3 facts*
- ▶ The interest rate on a long-term bond will equal an average of short-term interest rates expected to occur over the life of the long-term bond plus a liquidity premium that responds to supply and demand conditions for that bond
- ▶ Bonds of different maturities are partial (not perfect) substitutes
- ▶ Investors have a preference for bonds of one maturity over another
- ▶ They will be willing to buy bonds of different maturities only if they earn a somewhat higher expected return
- ▶ Investors are likely to prefer short-term bonds over longer-term bonds

- ▶ Interest rates on different maturity bonds move together over time
  - ▶ Yield curves tend to slope upward when short-term rates are low and to be inverted when short-term rates are high;
  - ▶ Yield curves typically slope upward;
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# Comparisons of theories of term structure

	Fact addressed	Short vs. long term interest rate	Substitution btwn. bonds	Investor Bond Preferences
<b>Expectations Theory</b>	Facts <b>1 &amp; 2</b>	Interest rates on long term bond = <b>average of the short term interest rates</b>	Bonds with different maturities are <b>substitutes</b>	Investors have <b>no preferences</b> of bonds of certain maturity over the other
<b>Segmented Markets Theory</b>	Fact <b>3</b>	Interest rates of bonds of different maturities = <b><math>f(\text{demand \&amp; supply of that bond})</math></b>	Bonds with different maturities are <b>not substitutes at all</b>	Investors have <b>preferences</b> of bonds of shorter maturities
<b>Liquidity premium &amp; Preferred Habitat Theories</b>	Fact <b>1, 2 &amp; 3</b>	Interest rates on long term bond = <b>average of the short term interest rates + liquidity premium responding to demand &amp; supply</b>	Bonds with different maturities are <b>partial (not perfect) substitutes</b>	Investors are likely to <b>prefer short term bonds</b> over longer term bonds <b>BUT</b> likely to buy <b>longer term bonds with higher expected</b>