Principles of Finance

Prof. Dr. Dennis A. V. Dittrich

2014

Guest Lecture: Urban Economics

On Friday December 12th we will have a lecture of Dr. Wendland and discussion afterwards with the topic gUrban Economicsh (room Berlin from 10.00 to 12.30)

In particular Dr. Wendland will focus on the real estate market in Berlin, its development and some methods of real estate evaluation.

In the coming term (Spring 2015) Dr. Wendland is going to teach two classes at Touro with the focus on Real Estate Y SReal Estate ManagementT and SUrban EconomicsT.

Attendance is mandatory

Quizzes as Homework

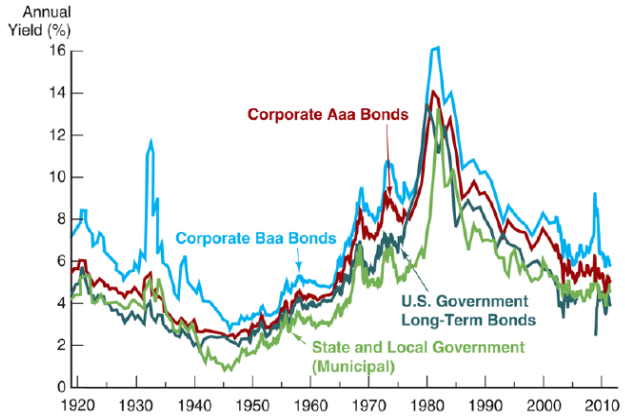
You are encouraged to hand in the solution to the problem sets jointly in groups of up to three students. Every member of the group should be able to explain their solution if asked to do so.

`http://economicscience.net/content/principles-finance-2014`

First problem set due on Dec. 11th, beginning of lecture.

Long-Term Bond Yields, 1919-2011

Risk Structure of Interest Rates



Risk Structure of Interest Rates

Bonds with the same maturity have dic erent interest rates due to:

- Default risk
- Liquidity
- Tax considerations

Risk Structure of Interest Rates

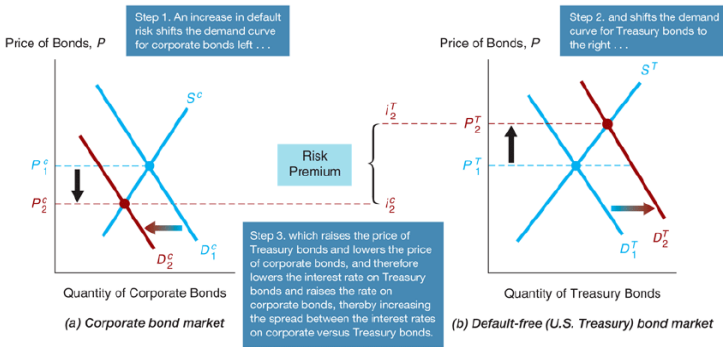
Default risk probability that the issuer of the bond is unable or unwilling to make interest payments or pay oc the face value

- U.S. Treasury bonds are considered default free (government can raise taxes).

Risk premium the spread between the interest rates on bonds with default risk and the interest rates (same maturity) Treasury bonds

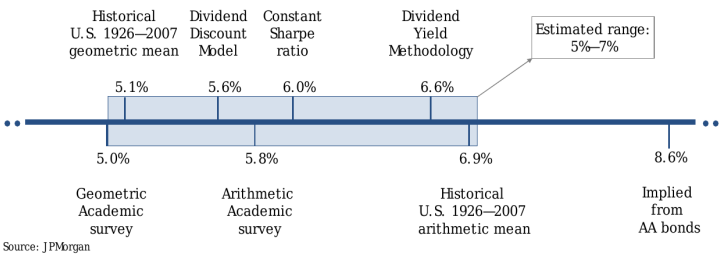
- the risk premium refers to the amount by which an asset's expected rate of return exceeds the risk-free interest rate
- the market (risk) premium is the historical dic erence in return of the market over the risk-free interest rate
- the equity (risk) premium is the return of a portfolio over the risk-free rate required by an investor

Response to an Increase in Default Risk on Corporate Bonds



Risk premiums on corporate bonds are usually anti-cyclical, that is, they decrease during business cycle expansions and increase during recessions. Why?

Estimate(s) of the Market Risk Premium



Source: JPMorgan

- the MRP re, ects a broader outlook on the whole economy
- the expected return of an asset is often expressed as a function of the MRP:
  Expected return on an asset
  = Risk-free rate of return + β * market risk premium

Capital Asset Pricing Model: β

- An asset's β is a measure of co-movement and relative risk

$$\beta_i = \frac{\rho_{im}\sigma_i}{\sigma_m}$$

where

ρ_{im} the correlation between returns on the asset i and the market portfolio

σ_i standard deviation of returns on asset i

σ_m the standard deviation of returns on the market portfolio

Bond Ratings by Moody's, Standard and Poor's, and Fitch

Rating			
Moody's	S&P	Fitch	Definitions
Aaa	AAA	AAA	Prime Maximum Safety
Aa1	AA–	AA–	High Grade High Quality
Aa2	AA	AA	
Aa3	AA–	AA–	
A1	A+	A+	Upper Medium Grade
A2	A	A	
A3	A–	A–	
Baa1	BBB+	BBB+	Lower Medium Grade
Baa2	BBB	BBB	
Baa3	BBB–	BBB–	
Ba1	BB+	BB+	Noninvestment Grade
Ba2	BB	BB	Speculative
Ba3	BB–	BB–	
B1	B–	B–	Highly Speculative
B2	B	B	
B3	B–	B–	
Caa1	CCC+	CCC	Substantial Risk
Caa2	CCC	—	In Poor Standing
Caa3	CCC–	—	
Ca	—	—	Extremely Speculative
C	—	—	May Be in Default
—	—	DDD	Default
—	—	DD	—
—	D	D	

Junk Bonds

- Junk Bonds have a rating of Baa / BBB ad worse
- They are referred to as ȘunkȚin that they are very risky investments,
  but provide high yields to investors who buy them at very low prices and are therefore compensated with a high risk premium.

Which should have the higher risk premium on its interest rate, a corporate bond with a Moody's Baa rating or a corporate bond with a C rating? Why?

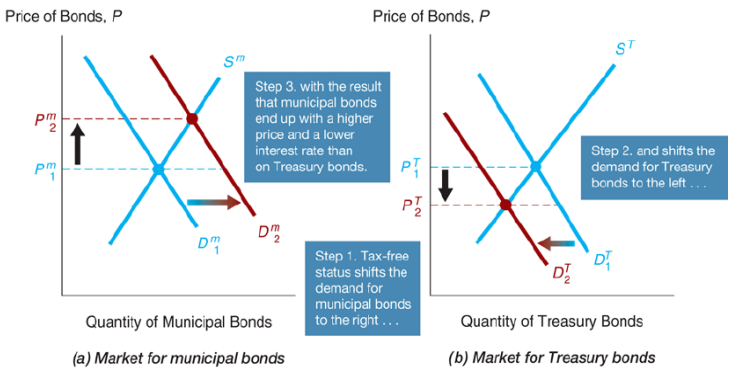
Risk Structure of Interest Rates

Liquidity the relative ease with which an asset can be converted into cash

- Cost of selling a bond
- Number of buyers/sellers in a bond market

Income tax considerations Interest payments on municipal bonds are exempt from federal income taxes. [USA]

Interest Rates on Municipal and Treasury Bonds



Predict what will happen to interest rates on a corporation's bonds if the government guarantees today that it will pay creditors if the corporation goes bankrupt in the future. What will happen to the interest rates on Government securities?

Term Structure of Interest Rates

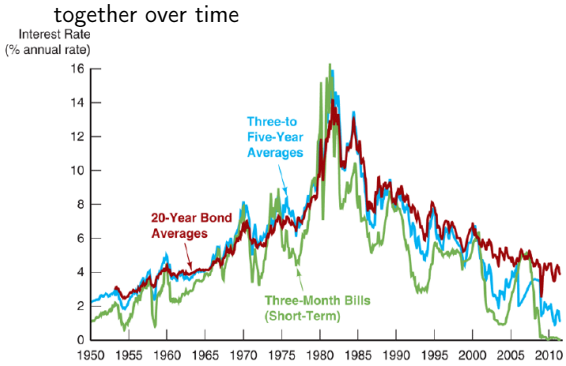
- Bonds with identical risk, liquidity, and tax characteristics may have dic erent interest rates because the time remaining to maturity is dic erent

Yield curve a plot of the yield on bonds with dic ering terms to maturity but the same risk, liquidity and tax considerations

- **Upward-sloping** long-term rates are above short-term rates
- **Flat** short- and long-term rates are the same
- **Inverted** long-term rates are below short-term rates

Observations that the Theory of the Term Structure of Interest Rates Must Explain

1. Interest rates on bonds of dic erent maturities move together over time



Observations that the Theory of the Term Structure of Interest Rates Must Explain

2. When short-term interest rates are low, yield curves are more likely to have an upward slope; when short-term rates are high, yield curves are more likely to slope downward and be inverted
3. Yield curves almost always slope upward

Three Theories to Explain the Three Facts

Expectations theory explains the : rst two facts but not the third

Segmented markets theory explains fact three but not the : rst two

Liquidity premium theory combines the two theories to explain all three facts

Expectations Theory

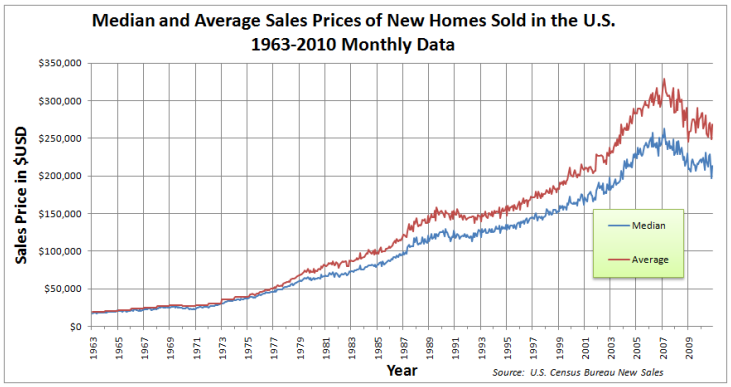
- The interest rate on a long-term bond will equal an average of the short-term interest rates that people expect to occur over the life of the long-term bond
- Buyers of bonds do not prefer bonds of one maturity over another; they will not hold any quantity of a bond if its expected return is less than that of another bond with a dic erent maturity
- Bond holders consider bonds with dic erent maturities to be perfect substitutes

Expectations Theory: Example

- Let the current rate on one-year bond be 6%.
- You expect the interest rate on a one-year bond to be 8% next year.
- Then the expected return for buying two one-year bonds (: rst one and after it matures the second) averages $(6\% + 8\%)/2 = 7\%$.
- The interest rate on a two-year bond must be 7% for you to be willing to purchase it.

True, False, or Uncertain?

SAccording to the expectation theory of the term structure of interest rates, it is better to invest on one-year bonds, reinvested over two years, than to invest in a two year bond, if interest rates on one-year bonds are expected to be the same in both years.T



- numbers of foreclosures in USA began to increase in 2006
- USA housing prices began declining in early 2007: Begin of the Great Recession

Yield curve and expectations

Upward-sloping Investors expect the economy to grow in the future, this growth is associated with a greater expectation that in, ation will rise in the future rather than fall, and, consequently, interest rates to go up in the future:
long-term rates are above short-term rates

Flat Investors have no clear prediction about the future development of the economy:
short- and long-term rates are the same

Inverted Investors expect the economy will slow or even decline in the future; a predictor of economic recession:
long-term rates are below short-term rates

Expectations Theory

- Explains why the term structure of interest rates changes at dic erent times
- Explains why interest rates on bonds with dic erent maturities move together over time (observation 1)
- Explains why yield curves tend to slope up when short-term rates are low and slope down when short-term rates are high (observation 2)
- Cannot explain why yield curves usually slope upward (observation 3)

Segmented Markets Theory

- Bonds of dic erent maturities are not substitutes at all
- The interest rate for each bond with a dic erent 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 (observation 3)

If bond investors decide that 30-year bonds are no longer as desirable an investment, predict what will happen to the yield curve, assuming

a) the expectation theory of the term structure holds.
b) the segmented markets theory of the term structure holds.

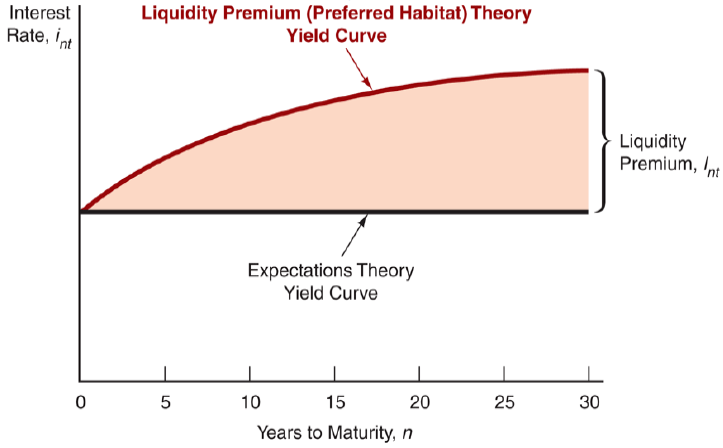
Liquidity Premium & Preferred Habitat Theories

Liquidity Premium Theory 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

Preferred Habitat Theory Bonds of dic erent 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 dic erent maturities only if they earn a somewhat higher expected return
- Investors are likely to prefer short-term bonds over longer-term bonds

The Relationship Between the Liquidity Premium and Expectations Theory



Liquidity Premium and Preferred Habitat Theories

$$i_{nt} = \frac{i_t + i^e_{t+1} + i^e_{t+1} i^e_{t+1} + \ldots + i^e_{t+n-1}}{n} + l_{nt}$$

where l_{nt} is the liquidity premium for the n-period bond at time t; it is always positive and rises with the term to maturity

- Interest rates on dic erent maturity bonds move together over time; explained by the : rst term in the equation
- Yield curves tend to slope upward when short-term rates are low and to be inverted when short-term rates are high; explained by the liquidity premium term in the : rst case and by a low expected average in the second case
- Yield curves typically slope upward; explained by a larger liquidity premium as the term to maturity lengthens

Calculate the liquidity premium for each multi-year bond using the below expected future one-year bond interest rates, as well as the current interest rates on multi-year bonds.

Year	1-Year Bond Rate	Multi-Year Bond Rate
1	2%	2%
2	3%	3%
3	4%	5%
4	6%	6%