Week 2 Learning Objectives

- Distinguish between nominal and real interest rates.
- Understanding the difficulties in measuring the inflation premium on interest rates.
- Understand the loanable funds theory of interest rates.
- Apply the loanable funds model to explain events in today's financial markets.
- Understand yield curves and an understanding of theories about the shape of yield curve, including expectations (unbiased and liquidity premium) and market segmentation theory.

Week 2 Lecture

This is a big week as we jump into the deep end of the pool with our discussion about interest rates. This session is a bit awkward since interest rate determination is a complex topic requiring a full elaboration of macroeconomic theory. Furthermore, economists (and everyone else) have historically done a poor job predicting interest rates, indicating that the theory is lacking. That said, let's push forward.

Before we get into the model, let's talk about nominal and real interest rates. The actual or nominal interest rate contains two components, the real interest rate (reflecting the time value of money and risk characteristics of the instrument) and an expected inflation component. Unfortunately, we just observe the nominal rate and have no sure way of knowing inflationary expectations. Some people simply subtract the current inflation rate from the nominal rate to estimate the real rate. However, this assumes that inflationary expectations equal today's inflation. This may be somewhat realistic during long periods of stable inflation. One thing we know is that inflationary expectations are formed by past experience. For instance, many investors thought that the (approximate) 2 percent annual inflation experienced during the 1997-99 period was an aberration, since it was due in part to depressed oil and commodity prices, and a strong dollar. As a result, the inflation premium on interest rates probably exceeded 2 percent during that period. Indeed, inflation climbed above 3% in 2000 as energy (and several other) prices rebounded. But as energy prices settled down, inflation settled back near 2 percent in 2001 and stayed under 3% for 2002 but fell recently to 1.6% leading to fears of deflation.

The textbook presents the most commonly used model of interest rates, called the loanable funds theory. The loanable funds theory focuses on the basic demand and supply for funds. Since the demand for funds reflects underlying real investment, this function could be re-

labeled investment, while the supply of funds could be re-labeled saving. It is important to realize this since the financial sector is a mirror of the real economy. Thus, an increase in investment demand will boost the demand for borrowed funds, boosting interest rates. Similarly, a decrease in saving by private market participants or by the government will boost interest rates. This is an issue in the U.S., where private saving is quite low. But the government became a net saver in recent years as the budget has moved into surplus, offsetting much of the upward pressure due to the lack of private saving. As a result, we enjoyed relatively low interest rates in the face of strong investment demand in recent history. In 2001, the budget surplus eroded and moved back into deficit and looks to be getting deeper into deficit on a daily basis. But private investment demand has simultaneously weakened, so interest rates have remained low to date and are now approaching record lows. When the economy (and private investment demand) eventually recovers, interest rates could rise fairly quickly if the government does not get its fiscal house in order as the government and the private sector would be competing for the same available funds.

The Federal Reserve can influence the loanable funds market through its open market operations. When the Fed adds reserves to the banking system (by purchasing Treasury securities) it increases the supply of loanable funds, putting downward pressure on interest rates. When the Fed reduces bank reserves (by selling Treasury securities) it reduces the supply of loanable funds, putting upward pressure on interest rates. From June 1999 to May 2000, the Fed reduced bank reserves (measured on a net basis) by selling government securities, causing short-term market interest rates to increase. (An exception occurred in December 1999, when the Fed temporarily boosted bank reserves to provide extra liquidity in the run-up to Y2K.) During 2001, the Fed rapidly boosted bank reserves by engaging in open market purchases of government securities. The Fed's open market operations primarily involve short-term Treasury bills (though they occasionally dabble in other types of securities), and thus primarily impact short-term interest rates. The Fed's open market operations have the biggest impact on the Fed Funds rate, which is the rate banks charge each other for overnight loans to cover reserve requirements. More about this in coming weeks.

You should practice using the loanable funds model, making sure you understand the factors that shift the demand and supply functions. I will provide additional background on the loanable funds model in one of this week's supplementary lecture.

Financial markets at their core are about price and interest rate relationships reflecting market assessments of the risk characteristics of the borrower and financial instrument. We have so far only looked at a general "market interest rate" without reference to the characteristics of the issuer or the nature of the instrument. There are also differences in interest rates across tenors or maturities of a given type of instrument issued by the same borrower.

The term (or maturity) structure is referred to as the yield curve, since it is frequently graphed to demonstrate the yield at each maturity. Yield curves can be upward or downward sloping (or flat). They can also reverse direction within the same curve. The most commonly accepted explanation for the shape of yield curve is the expectations theory, which says that the yield on each maturity is based on market expectations for future interest rates.

There are two versions of this theory. The first says that expectations are unbiased, implying that observed long term interest rates are simply averages of observed short term rates and unobserved expectations of short term rates in the future. This implies that all maturities of an instrument are perfect substitutes. The second version of the expectations theory is called the liquidity premium theory. It argues that expectations are biased, implying that investors demand a premium for holding longer-term securities given the uncertainty of the long term course of interest rates. In my view, this is most realistic version of the expectations theory and fits with observed market behavior.

Observed yield curves are heavily influenced by market expectations of where we are in the business cycle and expectations of central bank policy. For example, during the first half of 1999, the strong U.S. economy induced market expectations that the Federal Reserve would raise interest rates. These expectations both raised and steepened the yield curve for U.S. Treasury securities. When the Fed actually began to tighten monetary policy during the second half of 1999, the yield curve flattened quite substantially, with yields on the short end of the yield curve rising more rapidly than long term yields. This is because investors felt that the Fed was doing its job properly, implying that (1) inflation (an important component of interest rate expectations) would be kept under control and (2) not much additional monetary tightening would be required in the future. The Fed, in fact, continued to raise interest rates until May 2000, and held rates steady the rest of that year.

There are periods of time when the yield curve inverts, e.g. short term rates exceed long term rates. This typically happens after the central bank completes a round of monetary tightening. Investors then usually expect interest rates to decline. Some economists and financial analysts think that an inverted yield curve is a good leading indicator of recession. Here in the United States, the Treasury yield curve was inverted during most of the year 2000. Expectations theory would tell us that the inversion meant that interest rate cuts were coming, and that certainly has been the case in 2001. The inverted yield curve

may also have been a harbinger of the recession that began in 2001. Another key factor contributing to the year 2000 yield curve inversion was the fact that the U.S. Treasury Department began buying back some of its outstanding long-term Treasury instruments (and issuing fewer new ones), as it utilized its budget surplus to repay much of its debt. Thus, the yield curve must be interpreted quite carefully, taking into account market expectations combined with information we might have that would affect the demand and supply of instruments of various maturities.

The Treasury yield curve became upward sloping again during the first half of 2001. This reflected expectations that the Fed be would soon be finished easing monetary policy, with another phase of monetary tightening to follow when the economy picked. The events of Sept. 11, of course, changed expectations about the timing of economic recovery and near-term rate moves, and investors came to expect further monetary easing. Investors also worried that, in the aftermath of the Sept. 11 tragedy, the government budget surplus would disappear, implying more long-term government borrowing. These concerns turned out to be warranted as the budget has now moved into deficit and the Treasury has increased the magnitude of its borrowing programs. The yield curve has thus remained fairly steep in 2002 and 2003 but has started to flattened recently.

Another popular theory of the yield curve is called the market segmentation theory. This theory simply states that each maturity of a financial instrument has its own supply and demand characteristics which determines its equilibrium. For example, beginning in 1999, the Japanese government switched to 2-5 year funding of its financing needs in place of 10-year funding. This raised interest rates on 2- and 5- year government securities slightly, while pushing down 10-year yields. And, as pointed out above, long-term U.S. Treasury yields declined, and the yield curve inverted, after the Treasury began a program to buy back some of these instruments in 2000. But in 2001, the yield curve steepened as the buyback program was scaled down and investors began to worry (correctly) that the budget surplus would disappear. The market segmentation theory is without question valid. But it is also consistent with expectations theory. Both simultaneously operate in the markets at all times. We will take a closer look at the yield curves in key industrial countries in this week's supplementary lecture.

The yield curve is, in fact, an important economic indicator. As such, it is included as one of 10 components of the U.S. leading indicators published each month by the Conference Board. In fact, most recessions have been preceded by inverted yield curves. But inverted yield curves have often not been followed by recessions, so using the yield curve as an economic forecasting tool can be hazardous.

Can you see why forecasting interest rates is so difficult? And we haven't even dealt with the crucial issue of default risk yet. More on this in a supplemental lecture

Supplementary Lecture – Real & Nominal Interest Rates

FMI (pages 196-198) discusses nominal and real interest rates. But I would like to re-emphasize a couple of points. The dilemma we face on this subject is that it is nearly impossible to know what the real interest rate is, since it reflects inflationary expectations rather than actual inflation If we naively assume borrowers and lenders expect inflation to remain at this rate, we could calculate real interest rates by subtracting current CPI of 2.2%from current nominal rates. For example, the 10-year Treasury bond yield is currently 4.07%, so the real interest rate for this instrument would be 1.87%.

The reality is that expectations of inflation may differ from actual inflation. If, for example, investors expect inflation will climb back to 3.0% per year over the average holding period of a 10-year bond, the real rate on this bond would be measured at 1.07%. If actual inflation turns out higher than these expectations, this would benefit debtors (DSUs), who would get to pay back cheaper dollars to creditors (SSUs), who would lose out. The creditors, on the other hand, might actually realize a negative rate of return. This has not been unknown during periods of high inflation, such as the 1940's and the 1970's. Thus, the expected inflation premium represents current market estimates of the likely rate of depreciation in the value of money, which could turn out to be incorrect.

Supplementary Lecture – Loanable Funds Theory

I would like to elaborate further on the dynamics of supply and demand in the loanable funds market. Also, here is a paper that might do a better job in explaining this concept. Loanable Funds

At the outset, you should recall from your other economics courses that price cannot shift the supply curve or the demand curve. A change in price can only affect the quantity demanded on the demand curve, or the quantity supplied on the supply curve. This principle holds true in the loanable funds market as well; the only difference is that, by reason of custom, we refer to the price as the interest rate. Although the interest rate is very influential, it is only a price, nevertheless.

Although changes in the interest rate (the price of loanable funds) won't move the supply or demand curves for loanable funds, they will still have a profound affect on people's behavior (as prices do!) A decrease in the interest rate will affect how many big-ticket items households will purchase (like homes and cars) because of the rates of financing for the purchase. Businesses will think about pursuing projects with lower internal rates of return than would otherwise be feasible. An increase in interest rates may even halt public borrowing in some regions, as there are states and municipalities with regulatory caps on

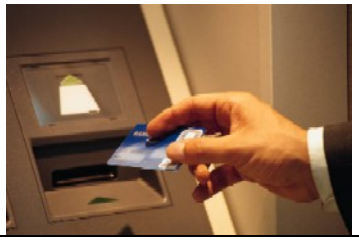
the permitted rate for borrowing public funds. On the supply side, changes in interest rates can affect the savings rate in households, and the supply of funds that institutions and firms are willing to loan out. What does shift the demand curve is a change in the need of DSUs to borrow, across all prices. If DSUs (borrowers) demand more loanable funds (for example because of rising household or business income), the demand for loanable funds would shift rightward, boosting interest rates. Similarly, only a change in the innate willingness of SSUs to supply loanable funds to the market, across all interest rates, can actually move a supply curve in the loanable funds market. If SSUs (creditors) supply more funds to the market, the supply of loanable funds shifts rightward, leading to lower interest rates.

For instance: a pervasive optimism in the economy, reflected in the desire of firms to expand, would naturally lead to an increase in the desire for loanable funds at all rates, represented by a movement of the loanable funds demand curve to the right. Deficit spending by governments at all levels can also lead an increased need to borrow funds. An example of such a cause could be a large, expensive war, such as the Vietnam War.

Inversely, government surpluses can lead to a movement of the supply curve to the right. Climbing interest rates overseas can lead foreign investors to seek funds at more favorable rates in the United States. Also, when businesses chose to retain earnings, they are increasing the supply of loanable funds.

The Federal Government has an immense impact on the loanable funds market. The Federal Reserve, being the monopoly supplier of money, is able to move the supply curve to the right (by pursuing an expansionary monetary policy) or the left (by pursuing a contractionary monetary policy. The Treasury, on the other hand, is the only DSU which is able to effectively eliminate default risk through the legal use of armed force to stay solvent (you recognize this function as taxation.) When the Treasury borrows, this shifts the demand curve to the right, and can result in the crowding out of private borrowers who have a positive default risk.

An alternative, but equivalent, way of looking at the credit market is by examining the demand and supply of financial securities (e.g. bonds), rather than of loanable funds. In this case, the price of the security, rather than the interest rate, is on the vertical axis. The SSU, the supplier of loanable funds, is also the demander of the security. The DSU, the demander of loanable funds, is also the supplier (issuer) of the security. When SSUs demand more securities, the securities demand curve shifts rightward, pushing up the price of securities. Since bond prices are inversely related to interest rates, this implies that interest rates are falling.



From the loanable funds perspective, the increase in demand for securities is equivalent to an increase in the supply of loanable funds. Recall that an increase in the supply of loanable funds pushes down interest rates. So the two approaches are consistent in their conclusions. Sometimes market analysts will refer to the loanable funds market, other

times to the securities market. So you need to be aware that they are just different ways of looking at the same thing.

Supplementary Lecture – Interpreting Yield Curves

You should read the discussion of term structure carefully, making sure you understand the expectations and liquidity premium (or biased expectations) theories of term structure. I believe that elements of both expectations and market segmentation operate in tandem.

You can check the U.S. yield curve in most daily financial newspapers. It appears in the Money and Investing section of the Wall Street Journal every weekday. You can also look at the Treasury yield curves for G-7 countries (U.S., Canada, France, Germany, Italy, Japan, U.K.) online.

As I mentioned in the Lesson, the yield curve was inverted during most of the year 2000. This inversion probably resulted from (1) expectations of Fed easing (which occurred beginning in Jan. 2001) and (2) the U.S. Treasury's program to reduce the volume of long-term bond issues and to buy back some of its long term debt.

The yield curve became upward sloping again in 2001. As the yield curve steepened, it has also "shifted" downward as the Fed has rapidly reduced overnight interest rates. The yield curve steepened further after tragic events on September 11. This was partly due to expectations of lower short-term rates following the terrorist attack, which turned out to be correct. But I think a more important factor was the disappearing budget surplus (which became a certainty after Sept. 11), which investors feared would lead to greater long-term government borrowing and higher yields.

You can see that explaining the Treasury yield curve really involves a combination of expectations theory and market segmentation theory (e.g. specific supply and demand dynamics for a given maturity). It is very difficult to decompose these effects or to figure out which effect is dominating at any one time. In the year 2000, for instance the Treasury's bond buyback program seemed to hold sway over the markets, implying that market segmentation issues dominated. But over the past few years, expectation effects asserted greater sway on the yield curve.

Japan's government bond yield curve slopes upward. Flatness in the shorter maturities of Japan's Treasury yield curve reflect investor views that the economy will remain weak and the BOJ will keep short-term interest rates near zero for some time to come. The sharp upward slope of the yield curve after the 2-year tenor may partly reflect expectations that the economy will eventually recover, price deflation will end, and the Bank of Japan will begin to raise rates. But I think Japan's growing budget deficit is having a much greater impact on the yield curve. Since a huge chunk of the deficit is being financed with longer-term debt instruments, the yields on these instruments are considerably higher than for short-term instruments. This fits in with the market segmentation theory.

Yield curves are not always smooth, as they may have various upward and downward sloping (and flat) portions. In part, this reflects market views of future interest rate patterns. But in many cases, it also reflects peculiarities of supply and demand for particular maturities, in line with the market segmentation theory. Governments frequently attempt to restructure the term structure of their debt (as the U.S. and Japan have been doing in recent years) in order to minimize overall debt service costs. Understanding the factors behind the yield curve is a complex endeavor, requiring much market knowledge and a lot of guesswork.

As I mentioned in the Lesson, some people use the yield curve as an economic forecasting tool. In fact, it is one of the 10 composite variables included in the U.S. leading economic indicators published by the Conference Board. For example, many say that the yield curve inversion in 2000 pointed to the recession 2001. But beware that expectations (reflected in the yield curve) do not always match reality. Yield curve inversions have often been followed by recession, but have given even a greater number of false signals. For this reason, I caution against using the yield curve as a forecasting tool. But the yield curve certainly contains lots of information that can provide some clues about our economic outlook. The problem is trying to sort out much of the "noise" from the more useful information in the yield curve.

Lots going on this week but hang in there and work hard. This will pay off as we move through the next couple of weeks.