ECO 301: Money and Banking   **Name:** _____
In-class Exercise: Term Structure of Interest Rates

Learning Objective: LO3: Predict changes in interest rates using fundamental economic theories including present value calculations, behavior towards risk, and supply and demand models of money and bond markets.

Background: The expectations theory and liquidity theory of the term structure of interest rates suggests that in normal times the yield curve should be upward sloping. It has been suggested with these and other theories that abnormal shapes for the yield curve may help predict downward swings in the economy. One such simple explanation by Professor Campbell Harvey is given in the following pages. (Only the first two pages were attached to this assignment, see `http://people.duke.edu/~charvey/Classes/ba350/term/term.htm` for Professor Harvey's full description.)

1. Explain Harvey's bond-demand theory for why inverted yield curves precede recessions, using supply and demand models for bonds.

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Predicting Business Cycle Turning Points with the Term Structure

Overview

In my University of Chicago dissertation in 1986 and my September/October 1989 *Financial Analysts Journal* article, I proposed a method to forecast economic growth from the term structure of interest rates. Since writing the article, the economy ha s experienced a recession. My research showed that the slope of the term structure correctly predicted the four cyclical turnings points over the last 25 years. Now we have a fifth. How did the model perform in this out-of-sample test? Indeed, there is m uch discussion of an pending recession in 1996. What does the term structure tell us about the next business cycle turning point.

The Link Between the Term Structure and Economic Growth

A theory's success if often judged by its out-of-sample performance. In my dissertation at the University of Chicago in 1986, I argued that the term structure of interest rates could be used to forecast economic growth. While the evidence was impressive (almost 50% of the variance in real GNP growth could be explained and the forecasts were not beaten by any commercially available projections), the model was 'fit' on historical data. Since the writing of the paper, we have experienced a complete business cycle. Now, we can perform a post-mortem on the out-of-sample performance.

I will show that the term structure model provided accurate and timely forecasts of the most recent business cycle. The model predicted a downturn five quarters before the recession officially began. The model forecast the duration of the recession to be three quarters which is now considered the official length. Furthermore, I will argue that the term structure provided the correct signal in early 1995 when the interest rate curve flattened.

Basic Intuition

Consider the basic intuition behind the model. Interest rates are ex ante measures representing expected future payoffs. When market rates are set, it is plausible to assume that expectations of future economic growth influence this process.

Consider a simple example. Assume that investors want to insure their economic well being. Most would prefer a reasonably stable level of income rather than very high income in one stage of the business cycle and very low income in another stage. This pre ference for stability drives the demand for insurance or hedging.

Suppose the economy is presently in a growth stage and the general consensus is for a slowdown or recession during the next year. This desire to hedge will lead consumers to purchase a financial instrument that will deliver payoffs in the slowdown. Such a n instrument is a one year discount bond.

If many people are buying the one-year bond, the price of the security will increase and the yield to maturity will decrease. To finance the purchase of the one year bonds, consumers may sell their shorter term assets. This selling pressure will drive down the price of the short term instrument, and as a result, raise its yield.

So, if a recession is expected, we will see long rates decrease and short rates will increase. As a result, the term structure or yield curve (difference between long rates and short rates) will become flat or inverted. The shape of the term structure o f interest rates today provides a forecast of future economic growth.

From this example, it should be clear that the interest rate based model is very simple. It contains only two components. The first component is the slope of the term structure or the long term--short term yield spread. The second component is a measure o f the average propensity to hedge in the economy (which is provided in my 1989 paper and in my 1986 dissertation).

The previous interpretation relied on the actions of consumers and investors. There is a production side explanation which is equivalent. Suppose the corporation expects a downturn in the longer horizon. Capital projects are less attractive because cash f lows are usually positively correlated with the business cycle. Hence, projects are delayed. Given that corporations often try to match the maturity of the financing of a project to the life of a project, this will reduce the pressure on the corporate bo nd market (i.e. less long term corporate bonds being floated). This will tend to reduce long-term interest rates. If, at the same time, corporations concentrate on shorter maturity projects and shorter maturity financing, the shorter term rates will have positive pressure. These two effects together, or separately, will reduce the slope of the yield curve.

In previous research, I have shown that more elaborate (and expensive) econometric models are unable to deliver predictions that outperform the simple term structure model. I have tested this model on the U.S. economy and the other G-7 countries.

The Historical Performance

Recessionary periods are classified by the National Bureau of Economic Research (NBER). A recession is the period between an economic trough and peak. The NBER Business Cycle Dating Committee decided the most recent recession began in July 1990 (peak) an d ended March 1991 (trough) -- a duration of about three quarters.

Consider the record of the term structure over the past 25 years:

- *Recession 69Q4-70Q4* [Total GDP decline .1%]: Term structure begins inversion 68Q3 correctly signalling a recession four quarters in advance.
- *Recession 73Q4-75Q1* [Total GDP decline 4.2%]: Term structure begins inversion 73Q2 correctly predicting the recession with a two quarter lead time.
- *Recession 80Q1-80Q3* [Total GDP decline 2.6%]: Term structure begins inversion in 78Q4 correctly forecasting the downturn with a five quarter lead.