

# FRIEDBERG'S

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## US-Canadian "yield curve" equations

In our July 1987 piece, "Forecasters versus the markets," we concluded that the information contained in market prices reveals more about the future than that included in professional forecasts. In other words, market participants, who put their own wealth at risk, do a better job of anticipating the future course of the economy than do professional forecasters.

Given this conclusion, the question is: Should we use stock or bond prices to predict the future course of the economy? Equity prices have had a large following as leading indicators of real economic activity. Indeed, they (the S&P Composite Index) are the only prices contained in the US Department of Commerce's index of leading indicators.

However, many have begun to question the efficacy of using stock prices to forecast economic activity. The skeptics note that stock prices emit too many false signals. Hence, many conclude that equity prices are of limited use. To support their case, the skeptics point to the October 1987 stock-market crash and the fact that an economic slowdown in 1988 never occurred. In addition, they argue that the 1961 to 1988 period produced nine troughs in the year-to-year change in S&P 500, but only four recessions were recorded.

Recent research shows that prices in the bond market contain more reliable information about economic growth than do stock prices. What is more, forecasts that use information contained in bond prices are superior to forecasts made by the commercial, econometric, forecasting services. Hence, the validity of our conclusion that markets are superior to professional forecasters.

### The reliable yield curve

The specific price relationship that has been shown to be a superior forecasting tool is the yield curve, which measures the difference between long-term and short-term interest rates. When short-term rates are below long-term rates, spreads are positive, yield curves are positively sloped, and market participants anticipate an economic expansion. Alternatively, a negative yield curve (spread) precedes an economic slowdown or recession. Indeed, when measured by the difference between the 10-year and three-month yield on government bonds, the spread became negative in 1969, 1973, 1979, and 1981. Hence, these negative spreads anticipated

each of the last four recessions.

The theory behind the relationship between the interest rate spread and real economic activity was first developed in 1907 by Professor Irving Fisher. In that year, Professor Fisher, who ranks as one of the greatest economists that America has produced, published his classic treatise, *The Rate of Interest*. Building on Professor Fisher's insights, modern economists have refined and tested his theory. For example, Dr. Campbell R. Harvey, a native of Toronto and Ph.D. from the University of Chicago, has produced an impressive set of research papers about the Fisherian theory.

Dr. Harvey suggests that investors receive more benefit from a dollar when their consumption levels are "low" (during a slowdown or a recession) than from a dollar when their consumption levels are "high" (during the peak of a business cycle). In consequence, if investors anticipate an economic downturn, they will tend to sacrifice current income (during "good" times) in exchange for future income (during "bad" times). In other words, during good times, investors will tend to invest in assets that will provide insurance for an expected downturn in the economy.

This investment hedging behavior is intended to allow investors to smooth their consumption over time. It also implies that in anticipation of an economic slowdown, investors will tend to sell some of their short-term bonds and substitute longer-term bonds that will generate income dur-

### In this issue

The PPP phoenix rises from the ashes; the yen/DM cross; we add to the short side of oil with puts; sidelined in the stock market; Is gold bottoming? Also Greek and Australian exotics. Contributions by Albert D. Friedberg, Dr. Steve H. Hanke, Daniel A. Gordon, Michael D. Hart, and Brian Baker.

### Special Note

We will not publish an issue in August. The next issue will be published in September. Call the Hotline for updates in the meantime.

ing an anticipated economic slowdown. This will cause the price for short-term bonds to be bid down, which will cause their yields to rise, and the price for longer-term bonds to be bid up, which will cause their yields to fall. In other words, an anticipated economic downturn will cause a "normal," positively-sloped yield curve to become flatter or invert. Just how much substitution between short-term and long-term bonds takes place (the magnitude of the bond price and yield movements) will depend on the strength of investors' expectations about the future course of the economy.

In conclusion, the Fisherian theory of interest spreads implies that current interest rate spreads contain information about expected economic growth. In consequence, this information should be able to be used to forecast the course of the economy.

### Theory and practice

So much for the theory. Do the data support it? To answer this question, we rely on Dr. Harvey's studies of the U.S. and Canadian economies and their bond markets. Dr. Harvey has estimated "yield curve" equations for the US and Canada. These equations are based on 53 quarterly observations from 1976:1 to 1989:1.

For the US, two yield spreads are used to estimate two equations: the five-year government bond yield minus the three-month Treasury bill rate and the 10-year government bond yield minus the three-month Treasury bill rate. For Canada, one yield spread is used to estimate one equation: the 10-year government bond yield minus the three-month Treasury bill rate. The equations are displayed in Chart 1.

Before we forecast economic growth in the US and Canada, we should mention that equations (1) and (2) account for 44% and 45% of the changes in the US real GNP one year ahead, respectively, and equation (3) accounts for 43% of the changes in the Canadian real GNP one year ahead. This level of explanatory power is significantly greater than that obtained by modelling stock prices in New York and Toronto. Moreover, over the period 1976:1 to 1989:1, the yield curve equations perform better than the seven leading

commercial forecasting services.

To forecast economic activity for the period 1988:3 to 1990:3, we must obtain only the average interest rates for the most recent quarter (April to June) and insert them into the relevant equations.

For example, let's work through the Canadian forecast. The average 10-year yield on government bonds for April to June was 0.0985, and the three-month Treasury bill rate was 0.1234. If we add 1.0 to each of these numbers and divide the former by the latter (1.0985/1.1234), we obtain 0.9778. Next, we must take the natural logarithm ( $\ln$ ) times 0.9778 because we are forecasting a continuous rate of growth for real GNP. The result of this multiplication equals -0.0225, which is inserted into equation (3a).

Note that the value of -0.0225 can be roughly interpreted as a -225 basis-point difference between the 10-year bond yield and the three-month Treasury bill rate. If we then perform relevant operations defined in equation (3a), we obtain the growth rate for the Canadian economy for the period 1989:3 to 1990:3 of -0.3%. If we perform the same operations for the US, we obtain economic growth rates of +1.7% with equation (1a) and +1.6% with equation (2a).

In conclusion, the yield curve equations (the markets and the mild, negative yield spreads) forecast a slowdown, but no recession, for the US economy. This is consistent with the views that we have expressed for many months. The picture is not as rosy for Canada. The market expectations, which are incorporated into the rather large negative yield spread, show that the Canadian economy is expected to fall into a mild recession.

**STRATEGY:** *The anticipated downturn in the Canadian economy will result in a mild recession. In consequence, the Bank of Canada will be forced to loosen monetary policy and allow short rates to fall. When this occurs, the Canadian dollar will come under heavy downward pressure. Add to previously-purchased out-of-the-money, one-year put options. They are extremely cheap.*

– Dr. Steve H. Hanke

Chart 1 – "Yield Curve" Equations

UNITED STATES	
	<b>Five-Year Yield Curve</b>
(1)	$\Delta\text{GNP next year} = 0.020 + \left[ 1.271 \times \ln \left( \frac{\$1 + \text{five-year yield}}{\$1 + \text{three-month rate}} \right) \right]$
(1a)	$\Delta\text{GNP 1989:3-1990:3} = 0.020 + [1.271 \times -0.002137] = +1.7\%$
	<b>10-Year Yield Curve</b>
(2)	$\Delta\text{GNP next year} = 0.019 + \left[ 1.118 \times \ln \left( \frac{\$1 + \text{10-year yield}}{\$1 + \text{three-month rate}} \right) \right]$
(2a)	$\Delta\text{GNP 1989:3-1990:3} = 0.019 + [1.118 \times -0.002842] = +1.6\%$
CANADA	
	<b>10-Year Yield Curve</b>
(3)	$\Delta\text{GNP next year} = 0.026 + \left[ 1.2738 \times \ln \left( \frac{\$1 + \text{10-year yield}}{\$1 + \text{three-month rate}} \right) \right]$
(3a)	$\Delta\text{GNP 1989:3-1990:3} = 0.026 + [1.2738 \times -0.0225] = -0.3\%$