Information in Financial Market Indicators: An Overview

By Gerard O Reilly

ABSTRACT
Asset prices can provide central banks with valuable information regarding market expectations of macroeconomic variables. In this paper, an overview is given on how interest rate instruments such as government bonds can be used to assess financial market expectations with respect to 1) the future direction of short-term interest rates, 2) the future path of monetary policy and 3) future inflation. Such information is pivotal in the formulation of monetary policy as the monetary authority seeks to manage expectations regarding the future path of inflation and monetary policy.

1. Introduction
Asset prices can provide central banks with a rich array of information regarding market expectations of macroeconomic variables. In this article, an overview is provided of some of the information that can be extracted from various financial assets. The focus will be on how interest rate instruments such as government securities can be used to extract market expectations regarding 1) the direction of future short-term interest rates, 2) the future path of monetary policy and 3) future inflation.

The process of setting prices for financial assets is, by its very nature, a forward-looking one because the value of these assets usually depends on events that occur in the future. For example, the value of a share in a company will depend on the expected future dividend stream, the capital gain or loss when the share is sold in the future and the opportunity cost of money invested in such an asset. Hence, financial asset prices embody market expectations regarding the future path of a whole range of factors.

The principal goals of monetary policy are the maintenance of low inflation and macroeconomic stability over the medium term. Attaining these goals depends in large part on a central bank’s ability to manage the public’s expectations regarding the future path of inflation and the future conduct of monetary policy. Therefore, it is natural that the monetary authority should be interested in financial market participants’ expectations of the future values of interest rates and inflation.

1 The author is an economist in the Economic Analysis, Research and Publications Department. The views expressed in this article are the personal responsibility of the author and are not necessarily those held by the CBFSI. The author would like to thank Tom O’Connell, Maurice McGuire and Karl Whelan for helpful comments.
There are a number of methods for using the information available in various asset prices to estimate financial market expectations regarding interest rates and inflation. This article discusses some of these methods. The contents of the rest of the article are as follows. In Section 2, the relationship between short, medium and long-term interest rates is considered. The discussion centres on a theory known as “the expectations hypothesis of the term structure” that seeks to explain how interest rates for various maturities are linked. Based on this approach, one can derive market expectations regarding future short-term interest rates and thus the likely course of future monetary policy. Interest-rate futures contracts are also discussed and how they can be used to forecast future interest rates. Section 3 examines the relationship between nominal and real interest rates and how inflation-indexed bonds can be used to determine inflation expectations. In Section 4, the factors that determine real interest rates are considered and finally there is a brief conclusion.

2. Expectations About Future Interest Rates

In this section, two methods for extracting information about financial markets’ expectations for the future path of interest rates are considered: the yield curve and interest rate futures contracts.

2.1 The Yield Curve and the Expectations Hypothesis of the Term Structure

The yield curve is a plot of the interest rates associated with bonds of differing maturities at a particular point in time where all other characteristics such as default risk are the same. This plot is also referred to as “the term structure of interest rates” because it describes the relationship between short, medium and long-term rates. The most commonly reported yield curves are those for government-backed securities.

The main theory used to explain the relationship between interest rates of various maturities is the expectations hypothesis of the term structure. This theory states that long-term interest rates should reflect average expected future short rates. For example, today’s two-year interest rate can be expressed as an average of the current one-year interest rate and the one-year rate that is expected to prevail one year from today. This can be written formally as

\[ \text{2 Year Rate} = 0.5(\text{1 Year Rate} + \text{Expected 1 Year Rate Next Year}) \]

The logic underlying this relationship is that the expected return from holding a two-year security should be the same as the expected return from buying a one-year security and then rolling over the proceeds at the end of the year into another one-year security. If the expected returns from these two strategies are not
the same, then market participants will see profitable opportunities in switching to the investment strategy with the higher return. This strategy will continue to be favoured until returns from the two investment strategies are equalised.

One caveat to this analysis is the assumption that investors are not concerned about the riskiness of the two alternative investment strategies. For instance, given the uncertainty that exists at any time about future developments relating to interest rates and inflation, an investor may require additional compensation to be induced into holding a longer-term bond. Thus, the return on the two strategies may differ due to the presence of this so-called “term premium”. Hence, the above relationship can be modified to take this into account:

\[ 2 \text{ Year Rate} = 0.5(1 \text{ Year Rate} + \text{Expected 1 Year Rate Next Year}) + \text{Term Premium} \]

However, a term premium of this sort is usually quite small and relatively constant over time. Term premia are ignored in our subsequent analysis. We next examine how the relationship between long-term interest rates and short-term interest rates can be used to give a forecast of where the market expects short-term interest rates to move in the future.

In the above example, comparing the current two-year interest rate with the current one-year interest rate today provides one with a forecast of the likely value of the future one-year interest rate. If the current two-year interest rate is greater than the current one-year interest rate this suggests that markets believe that the one-year interest rate next year will be higher than the current one-year interest rate. Alternatively, if the current one-year interest rate is above the two-year interest rate, markets expect the one-year rate a year from now to be lower than the current one-year rate. More generally, an upward sloping yield curve suggests that short-term interest rates are expected to rise in the future; a flat yield curve suggests that short-term interest rates are expected to remain unchanged; while a downward sloping yield curve suggests that short-term interest rates are likely to fall in the future.

Most central banks currently implement monetary policy by targeting some short-term interest rate. In the US, the Federal Reserve targets the overnight federal funds interest rate. The ECB pursues a similar policy by implicitly targeting short-term rates. In the euro zone, the main refinancing operations of the ECB, in the form of weekly repurchases, provides a strong signal to markets of the implicit target the ECB has for short-term rates, with short-term money market rates closely aligned to the ECB’s main refinancing rate.
On the basis of these considerations, longer-term interest rates are usually considered a key indicator of market participants’ expectations regarding the future course of monetary policy. Financial market analysts and commentators pay close attention to the shape of the yield curve in assessing the likely course of monetary policy with an upward sloping curve indicating a likely tightening of monetary policy and a downward sloping curve indicating a loosening of monetary policy. In addition, new information about the economy often changes the shape of the yield curve, as the market processes the central bank’s likely response to this new information. For example, a statistical release reporting higher-than-expected inflation will often lead to a steepening of the yield curve as markets anticipate the possibility of the monetary authority raising interest rates to counter inflationary pressures.

![Figure 1: Euro Area Yield Curve](image)

To give an example of the recent behaviour of the euro area yield curve, Figure 1 plots two curves, one relating to June 2004 and the other relating to September 2005. The figure plots yields for various maturities out to 120 months. As can be seen from the graph, both of these yield curves sloped upwards with interest rates increasing with maturity. This suggests that markets have been expecting short-term interest rates to rise at some point in the future. However, comparing the two plots in Figure 1, it can be seen that the yield curve has shifted downward over the past year with markets now anticipating lower interest rates in the medium term than had previously been expected. Thus, it appears that markets are not expecting the ECB to raise interest rates quite as much over the next few years as they had previously anticipated.
2.2 Interest Rate Futures

The yield curve can be used to forecast future interest rates going out to the relatively distant future. One can construct interest rate forecasts for up to ten years out from the yield curves such as in Figure 1. However, for the nearer-term, there exists an alternative, more direct, measure of expected short-term interest rates based on interest-rate futures contracts. These contracts are essentially a bet on what the value of some underlying interest rate will be in the future. Speculators and hedgers buy and sell these contracts based on their best guess on what the value of the relevant interest rate will be. In the euro area, the most heavily traded interest rate futures contract is the three-month euribor futures contract where the underlying asset is the three-month euribor deposit rate.

Interest-rate futures contracts can be used to infer market expectations regarding the future path of short-term interest rates. For example, by observing the price today of say the three-month euribor futures contract for delivery in six months time one can infer what financial markets believe the three-month euribor spot rate will be in six months. A potential caveat when attempting to infer the likely course of interest rates from futures markets is the possible presence of risk premia. Given a futures contract is a bet on the value of the interest rate in the future, it involves some element of risk. If an investor dislikes risk, they may need to be compensated for taking on such a bet. Hence, the value implied by the future’s contract may consist of two components: 1) the expected realization of the contract rate and 2) a risk premium for undertaking the bet in the first place.

Figure 2: Three-Month Euribor Futures Rates
In Figure 2, the three-month euribor futures rates for contracts with settlement dates out to June 2007 are plotted. Consistent with the information in the yield curve, futures markets expect three-month euribor rates to increase very gradually over the next two years. Since the three-month euribor deposit rate is closely aligned to other short-term interest rates in the euro area it also can be used as a measure of market expectations concerning the policy actions of the ECB.

3. Expected Inflation

Given that the central goal of monetary policy in the euro area is the maintenance of price stability, it is not surprising that the ECB pays close attention to inflation expectations in the economy. Long-term inflation expectations can be used to gauge the credibility of the monetary authority’s regime. If inflation expectations at a long horizon are stable and close to the authority’s inflation target, this would suggest the current monetary regime has credibility with financial markets. In this section, financial instruments that are linked to future inflation and that can be used to provide a useful measure of expected future inflation are examined.

3.1 Nominal and Real Interest Rates

Ultimately, what matters to an investor is not the nominal return on an investment but rather the increase in purchasing power that accrues from a particular investment. To measure this, one must adjust any return for the effects of inflation over the time horizon of an investment. For example, suppose an investment provides a nominal return of 5 per cent. However, if inflation is 3 per cent over the time period of the investment, the return on investment would have to be 3 per cent in order to maintain purchasing power.

Thus, nominal returns can be decomposed into a return to compensate for inflation and a real return that reflects a genuine increase in the investor’s purchasing power. In the above example, the nominal return of 5 per cent implies a real return of 2 per cent. Hence, the real return on an investment is the difference between the nominal return and the inflation rate over the period of the investment. Thus, when an investor is comparing alternative investment strategies one should examine real returns rather than nominal returns.

3.2 Inflation-Indexed Bonds

If an individual is concerned about inflation eating into their returns they could invest in a security that protects them against future inflation. One such class of security are inflation-indexed bonds. The nominal return on these bonds is indexed to the future consumer price index. Thus, the real return on the inflation-indexed bond is known when it is purchased.
Inflation-indexed bonds can be used to infer expectations regarding future inflation. By comparing the difference between the return on a nominal bond and return on an inflation-indexed bond of the same maturity, one can derive a measure of expected inflation. This measure is frequently referred to as the break-even inflation rate because it provides an estimate of the expected inflation rate at which an investor would be indifferent between the two bonds. Hence, the difference between the nominal interest rate and the real interest rate will provide an index of market expectations of the future inflation rate.

To be more concrete, suppose the real return on a one-year inflation-indexed bond is 2 per cent and the return on a nominal bond is 5 per cent. Through arbitrage, the real rate of return will be equalised between the two investments implying that expected inflation is 3 per cent. A number of caveats must be borne in mind with respect to inflation expectations derived from index bonds. For example, liquidity issues are likely to be important for index-linked bonds as they are traded less than their counterpart nominal bonds. Estimates of expected inflation from surveys and econometric modelling are often cross-referenced with measures of expected inflation derived from inflation-indexed bonds. In the euro area, France, Italy and Greece issue inflation-indexed bonds that are linked to the Harmonised Index of Consumer Prices and measures of inflation garnered from the break-even inflation rate are used by the ECB as an index of expected inflation and are regularly reported in its monthly bulletin.

Figure 3: Expected Inflation Rate

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2 The ECB Monthly Bulletin February (2002) describes the calculation of the break-even inflation rate and discusses some of the caveats involved in interpreting inflation expectations derived from indexed linked bonds.
In Figure 3, the break-even inflation rate associated with the French inflation-indexed bond that matures in 2012 is graphed. Expected future long run inflation has been close to the ECB’s target rate of 2 per cent over the last year suggesting that the monetary policy approach of the Eurosystem has been credible.

4. Real Interest Rates

Information from the inflation-indexed bonds market allows one to shed some additional light on the downward shift in the euro area yield curve seen over the past year. A decline in expected future nominal interest rates could be due to a decline in inflation expectations. Alternatively, it could be due to a decline in expected future real rates. As seen from Figure 3, inflation expectations have remained stable and are close to the ECB target. Hence, the decline in expected future nominal returns must be due to declining real interest rates.

Figure 4: Long-Term Real Interest Rate

Figure 4 plots the long-term real interest rates associated with French indexed bonds over the past couple of years. The figure shows that long-term real rates have declined quite substantially over the last year. This development likely reflects the arrival of weaker economic news over the last year leading market participants to revise downward medium-term growth prospects. Such news included weaker economic growth figures than expected and higher oil prices. Thus, markets appear to anticipate that the monetary authority will not have to raise rates to stem future inflation as much as had previously been anticipated in the face of lower economic activity.

Another factor that may be influencing long-term real rates is expectations about European productivity growth. Generally,
economies with faster rates of productivity growth will have higher real interest rates on financial assets. This is because investments in real capital—such as office equipment or bricks and mortar—in these economies will have a higher rate of return, and so arbitrage conditions will require real interest rates on financial assets also to be higher. So, it is possible that disappointing news about euro area productivity growth has contributed to the current low level of real interest rates.

Finally, long-term real interest rates in Europe are also likely to be affected by other factors influencing global financial markets. For instance, an increase in the demand for long-term bonds due to higher savings or substitution away from equities may end up reducing long-term real rates via the economics of supply and demand. A recent example of this pattern has been the shift in the allocation of pension fund assets from equities to bonds; this pushed bond yields lower than would otherwise have been the case. Indeed, former Fed Governor Ben Bernanke has recently put forward the idea that the low level of real long-term rates currently prevailing in the US is related to a “global glut of saving” much of which has been invested in US securities.

5. Conclusions
The assessment of financial market expectations is an important input into the monetary policy decision-making process. Financial instruments have the potential to provide monetary authorities with timely measures of market expectations of important macroeconomic variables. These expectations are of direct interest to central banks, and can also provide a useful input into central banks’ own forecasting exercise. However, such measures should be viewed as complements rather than substitutes for other methods used to assess market expectations or construct forecasts such as surveys and econometric modelling.

3 Bernanke’s speech on this issue can be found on the Federal Reserve Board’s Website at http://www.federalreserve.gov/boarddocs/speeches/2005/200503102/default.htm