FRBSF ECONOMIC LETTER

Number 2004-28, October 8, 2004

Gauging the Market's Expectations about Monetary Policy

In recent months, some Federal Reserve officials have discussed the organization's efforts at communicating to make the foundations of their decisionmaking more transparent to the public. Janet Yellen, president of the Federal Reserve Bank of San Francisco, said, "The reason for the focus on communication is that economic developments are affected by longer-term interest rates, equity values, the exchange rate, and other asset values—and these factors depend not only on the current [federal] funds rate, but, more importantly, on the expected *future* path of the funds rate" (Yellen 2004). Ben Bernanke, a member of the Board of Governors, spoke about the potential for using market expectations as a way to gauge the efficacy of Federal Reserve communication (2004).

Of course, one way to gather information on market expectations is simply to ask market participants about their views of future monetary policy, and, indeed, numerous surveys do just that. In an efficient capital market, however, this information also should be reflected in asset prices; that is, asset prices should reflect the most up-to-date information, including monetary policy expectations, that market participants actually are betting on. Thus, the expected future path of monetary policy can be inferred from financial asset prices. This *Economic Letter* describes an array of financial instruments that are suitable for extracting expectations about monetary policy, compares their forecasting power, and discusses some technical considerations in using them to forecast monetary policy.

Which financial market instruments and why?

Gurkaynak, Sack, and Swanson 2002 (GSS) examined several market-based measures of monetary policy expectations and identified six money market instruments that are potentially useful.

Term federal funds rates. The federal funds rate—the policy instrument of the Federal Reserve—is the unsecured overnight borrowing rate among banks. Although overnight lending is by far the most active segment of the federal funds market, banks can also borrow and lend to one another for longer periods in this market. The rates on these longer-term loans, or term federal funds rates, should provide information about expected future levels of the overnight federal funds rate, given banks' ability to substitute between term federal funds and overnight federal funds.

Federal funds futures rates. Federal funds futures contracts have been traded on the Chicago Board of Trade (CBOT) since 1988. These contracts have a payout at maturity based on the average effective federal funds rate during the month of expiration. Thus, the value of these securities reflects the expected month-average federal funds rate. The CBOT offers contracts with monthly expirations out to two years, but most of the trading activity is concentrated in contracts with shorter horizons. Currently, federal funds futures contracts are extremely liquid at expirations out to three months and remain fairly liquid up to about six months. Also, the open interest, that is, the total number of contracts outstanding, in federal funds futures contracts has risen markedly since their inception in 1988.

Term Eurodollar deposit rates. Term Eurodollars are U.S. dollar-denominated time deposits held at financial institutions outside the United States. Eurodollar deposit maturities range from overnight to several years, although volumes tend to concentrate on those with maturities of less than one year. The credit quality of the financial institutions offering Eurodollar deposits may not be the same as the financial institutions that borrow in the federal funds market, so there is likely a credit spread between the Eurodollar rate and the federal funds rate.

Eurodollar futures rates. Eurodollar futures have been traded on the Chicago Mercantile Exchange since 1982 and are the most actively traded futures instruments in the world. These contracts are settled in cash based on the quoted three-month London Inter-Bank Offer Rate (Libor) on the settlement date. Contracts expiring in March, June, September, and December are available out to horizons of ten years, although liquidity tends to decline at longer horizons. Both trading volume and open interest are relatively high for contracts expiring over the first several years. Since the value of these contracts is directly tied to the Libor rather than to the federal funds rate, the accuracy of

these contracts for predicting U.S. monetary policy will depend, as with term Eurodollars, on the extent to which the Libor tracks the federal funds rate.

Treasury bill rates. The U.S. Treasury bill market is well known for its extraordinary liquidity and resiliency. With very active secondary market trading of Treasury bills whose maturities range from a few weeks up to a year, the bill rates provide information about the future path of the overnight federal funds rate. However, Treasury bills are viewed by market participants as default free, whereas federal funds are a form of private short-term credit that contains credit risk. This introduces a potential shortcoming of Treasury bill rates as a predictor of future federal funds rates. It should also be noted that some researchers have found that this market could be segmented from the rest of the Treasury market, which may lead to some idiosyncratic results.

Commercial paper rates. Commercial paper is unsecured short-term credit of maturity less than 270 days issued by investment-grade corporations. Most commercial paper issuance is concentrated at maturities of less than 90 days, with an average maturity of around 30 days. Despite the large quantity of commercial paper outstanding at a given time, most commercial paper is bought and held by institutional investors with very little secondary market trading. Another complication in using commercial paper rates to forecast federal funds rates is the potential difference in credit risk between commercial paper issuers and federal funds purchasers. Nevertheless, to the extent that investors who buy and hold commercial paper would require a return that is compatible with selling federal funds, the rate at which commercial paper is issued contains information about market expectations of future federal funds rates.

Predictive power

Using data from 1994 to 2001, GSS examined the predictive power of these six market instruments in forecasting the federal funds rate. They reported that, over their sampling period, these instruments explained between 50% and 80% of the changes in the federal funds rate one to six months ahead. The reasonably good performance of these instruments in forecasting future monetary policy over short horizons seems to suggest that, over time, market participants have been increasingly successful in anticipating monetary policy actions. This may stem from the Federal Reserve's effort to improve transparency over the years. In 1994, the Federal Open Market Committee (FOMC) started explicitly announcing changes in the target federal funds rate in a statement released on the day of the meeting; in 1999, the Committee began announcing its policy "tilt," indicating the most likely future interest rate action; in 2000, it replaced the "tilt" with a statement describing the "balance of risks" to inflation and the economic outlook; in 2002, it included in the statement the votes of individual Committee members and the preferred policy choice of any dissenters.

GSS found that the federal funds futures contracts dominate all other instruments for predicting near-term changes in the federal funds rate. The difference in the relative performance is most striking over the first few months of the contracts, the period in which the federal funds futures have the most liquidity. It is not surprising that other instruments would do a fairly good job at forecasting the federal funds rate changes as well, while not being as accurate as the federal funds futures, since money market instruments tend to be priced off each other. Indeed, GSS found that the federal funds futures rates encompass or summarize all of the information embedded in the rates of the other instruments in predicting the future funds rate over the near-term horizon. Over forecast horizons of one to four quarters ahead, the relative predictive power of the different money market instruments is much closer, and the forecasting power of all of them declines. Nonetheless, over these longer horizons, the Eurodollar futures contracts appear to have a slight edge over the other instruments in forecasting the funds rate changes.

Expected federal funds rate path

Based on the GSS findings, a reasonable way to map out market expectations of the future federal funds rate path would be to use the information from the federal funds futures contracts for the near-term forecast and the Eurodollar futures contracts for longer horizons. Before translating the futures rates into the expected funds rate path, we need to take into consideration the presence of the risk premium in futures contracts. Since all futures contracts are simply bets by investors today on the realization of the underlying contract outcome in the future, which is uncertain at the time they place the bet, investors who are risk-averse would demand a risk premium for holding the futures contract. Hence, the observed futures rates include both the expected realization of the contract rate and a risk premium.

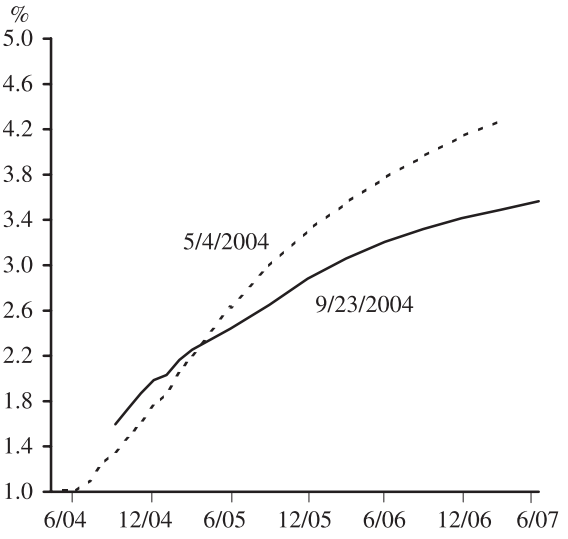
Assuming that the risk premium is constant, GSS estimated that the risk premiums embedded in federal funds futures rates are quite small, beginning at just a few basis points for one-month contracts and increasing only a few basis points per month thereafter. However, more recent work by Piazzesi and Swanson (2004) shows that the risk premium in federal funds futures contracts appears to be time-varying and strongly countercyclical, suggesting that we need

to exercise caution in interpreting these market-based data, especially over longer forecasting horizons.

In using the Eurodollar futures contract to predict the future federal funds rate, the risk premium is further complicated by the differences in credit risk between Eurodollar borrowers and federal funds borrowers, and between a longer-term Eurodollar loan and the federal funds overnight loan. GSS estimated that the risk premia embedded in Eurodollar futures contracts are about 10 to 20 basis points for one to two quarters ahead, respectively.

Simply assuming a stationary risk premium, Figure 1 shows market expectations of the federal funds rate path as of May 4 and September 23 of this year. On May 4, for the first time this year, the FOMC indicated that (then current monetary) "policy accommodation can be removed at a pace that is likely to be measured." The market promptly interpreted this as a signal that in forthcoming FOMC meetings, the target federal funds rate would be raised from the level at that time, which was 1%. On that date, the market expected the funds rate to go up to 1.1% by July and to rise gradually to 1.76% by the end of 2004 before reaching 3.3% by the end of 2005. Note that market expectations shift over time in response to new economic data and financial developments. Now fast-forward to September 23. After the Fed raised the target funds rate in three steps to 1.75%, the market now expects the funds rate to continue to rise to about 1.98% by the end of 2004. Interestingly, the projected trajectory of the future funds rate path has been revised down somewhat since May, perhaps in response to the soft economic data released during the summer. As of September 23, the market expected the federal funds rate to be at about 2.9% by the end of 2005, which was almost one-half of a percentage point lower than the expectation just a few months ago.

Figure 1
Expected federal funds rate



Note: Based on federal funds futures and Eurodollar futures, with an allowance for term premium and other adjustments.

Conclusions

The research discussed here indicates that selected financial market data contain fairly accurate predictions of future monetary policy action. Specifically, the federal funds futures contract has been found to have strong forecasting power for near-term monetary policy, and the Eurodollar futures contract does a reasonably good job in forecasting the federal funds rate over longer forecasting horizons. At the moment, prices from federal funds futures contracts and Eurodollar futures contracts indicate that market participants are expecting the federal funds rate to rise to about 1.98% by December of this year and to about 2.9% by the end of 2005. However, it should be noted that market expectations are constantly shifting and some subtlety is required to interpret the market-based data. Further research would continue to improve our ability to extract useful information from financial market data.

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