FRBSF ECONOMIC LETTER

Finance and Macroeconomics

This Economic Letter *summarizes papers presented at the conference "Finance and Macroeconomics" held at the Federal Reserve Bank of San Francisco on February 28 and March 1, 2003, under the joint sponsorship of the Bank and the Stanford Institute for Economic Policy Research. The papers are listed at the end and are available at http://www.frbsf.org/economics/conferences/0303/index.html.*

The finance literature and the macroeconomics literature often approach the same economic topic from different perspectives and with different techniques. The seven papers presented at this conference provide some exciting new research at the confluence of these two disciplines.

Three of the papers examine the relationship between financial asset valuations and macroeconomic fundamentals. Hall tries to account for corporate equity valuations using fundamentals such as taxes, risk, and depreciation with mixed results. Bernanke and Kuttner also examine the fundamental determinants of equity prices, but they focus only on monetary policy surprises, which appear to have a significant effect through changes in the equity premium. Engel and West try to pin down whether exchange rates, when viewed as asset prices, can be related to fundamentals.

Three papers consider the interaction between the term structure of interest rates and macroeconomic fundamentals. Ang, Piazzesi, and Wei simplify the entire yield curve to just two factors—the general level of interest rates and the slope or tilt of the yield curve—and then model these two factors along with real GDP growth. Hördahl, Tristani, and Vestin examine a similar structure with a more detailed accounting for macroeconomic dynamics that relates movements in bond yields to shocks in demand, supply, monetary policy, and an inflation target. Gürkaynak, Sack, and Swanson focus on the excess sensitivity of long-term rates to economic news. All three papers emphasize changes in the general level of interest rates, which they interpret as time variation in inflation or in the inflation target.

Auerbach and Obstfeld suggest an important role for the transmission of expansionary monetary policy through quantities when short-term interest rates are at zero. Such a situation typically is not addressed by the standard analyses in finance or macroeconomics, which focus on allocation by price using linear models.

Dynamics of corporate earnings

Hall investigates why the market value of corporate claims in the late 1990s was so high relative to the book value of the sector's capital stock. However, rather than focus on the market value relative to capital's replacement cost, his study looks at corporate earnings and what they add to a company's value. To assess a company's corporate earnings, he develops a theoretical benchmark that includes adjustments to account for the cost of supplying capital services, of risk, and of capital adjustment.

He finds that, at the company level, actual earnings are broadly consistent with the theoretical benchmark, indicating that taxes, depreciation, risk, and adjustment costs account for most of the observed movements in earnings, leaving little room for earnings on intangibles to explain market values. At the industry level, in contrast, he finds substantial discrepancies between earnings and the theoretical benchmark. However, these discrepancies do not appear to be caused by rents associated with adjustment costs. In resource-based industries, these discrepancies can be accounted for by fluctuations in the value of extracted resources, while in the auto industry they are partly accounted for by the decline in domestic production in the early 1980s, caused by high gas prices and increased competition with Japan.

Stock market reactions to Federal Reserve policy

Bernanke and Kuttner quantify the stock market's response to surprise monetary policy interventions and assess the reasons for the response. They use the movements in federal funds rate futures that occur on the day of a change in the target policy rate to obtain a market-based measure of the surprise component of the policy intervention. (Rudebusch (1998) provides a discussion of such market-based measures.) The authors then analyze the stock market's response to the sequence of unanticipated changes in the funds rate.

Their results show that the stock market responds strongly to surprise changes in the federal funds rate. On average, the S&P500 rises about 1.3% for every 25-basis-point surprise policy easing. However, some industries respond more than others; the construction sector shows the largest response, while the mining and utility sectors register almost no response. The markets do not respond in any significant way to the anticipated component of policy interventions. The results show that an unanticipated policy easing causes an immediate increase in equity prices, but that this increase is then followed by a sustained period of lower-than-normal returns. One way to interpret this result is that financial markets correlate monetary policy surprises with changes in the equity premium.

The yield curve and GDP growth

Ang, Piazzesi, and Wei build a model that uses features of the term structure of interest rates to forecast movements in real GDP growth. In principle, a steep yield curve should signal rising growth rates. However, because interest rates tend to be highly correlated with one another, making it difficult to disentangle which, if any, aspect of the yield curve offers explanatory power, the authors' solution is to condense the information in the term structure into a small number of variables, or factors. The factors used are the level of the nominal interest rate, the slope of the interest rate term structure, and lagged real GDP growth.

They use three methods to determine whether these factors help forecast real GDP growth. The first method regresses future economic growth on the factors, without modeling the factors themselves. The second models the factors using an unrestricted Vector AutoRegression (VAR) and uses the predictions from it to forecast future real growth. The third method is closely related to the second, in that a VAR is used to model the factors, but now no-arbitrage restrictions are imposed, giving the system greater structure.

The authors find that, regardless of the forecast horizon for economic growth, the slope of the term structure should use the difference between the longest and the shortest possible bond yields. They also find that imposing the no-arbitrage conditions on the VAR when modeling the factors leads to better predictive power than an unrestricted VAR. Surprisingly, however, it is the level of the term structure rather than its slope that provides the predictive power. Moreover, it is the inflation component of the nominal interest rate, rather than the real interest rate component, that helps forecast future economic growth.

Macroeconomic and term structure dynamics

Hördahl, Tristani, and Vestin estimate a joint model of macroeconomic and yield curve dynamics. When this model is solved, bond yields are linearly related to macroeconomic fundamentals, whose evolution over time determines how bond yields and the slope and curvature of the term structure respond to shocks and to macroeconomic developments. The absence of arbitrage opportunities is imposed and the resulting model provides a relatively good description of German data, while accommodating demand shocks, supply shocks, monetary policy shocks, and an inflation target shock.

The model estimates reveal several interesting results. Notably, the inflation target for Germany is found to have declined from around 4% in 1975 to around 1% in 1998. The model predicts that a shock to the inflation target leads to gradual increases in inflation and output and pushes up the middle portion of the yield curve more than the short or long ends of the curve. Monetary policy shocks tend to reduce output with little impact on prices and cause the yield curve to flatten, although this latter effect dissipates after four to five years. The model also implies that an increase in the inflation target will lead to a large increase in the term premia; however, the term premia are relatively well insulated from other macroeconomic shocks.

Exchange rates and fundamentals

Engel and West examine how exchange rate movements are related to fundamentals. Ever since Meese and Rogoff (1983) showed that uncovered interest parity, the hypothesis that expected exchange rate movements are related to interest rate differentials, was unable to forecast exchange rate movements better than the assumption that the exchange rate follows a random walk, modeling exchange rates has been troublesome. However, instead of examining how exchange rate changes relate to fundamentals, such as interest rate differentials, they examine how future fundamentals relate to past exchange rate changes. Central to this approach is the notion that exchange rates are asset prices that depend on expectations. If exchange rates reflect expected future fundamentals, then, from a statistical standpoint, changes to the exchange rate should help forecast, or "cause," future movements in fundamentals.

Engel and West consider several candidates for exchange rate fundamentals including relative money

supplies, relative price levels, interest rate differentials, and relative income. They test whether changes in these fundamentals are predicted by changes in bilateral exchange rates, using data for the U.S. and the remaining six G7 countries. They find causality from exchange rates to fundamentals in 12 out of 36 cases, while they find causality in the opposite direction in only 2 out of 36 cases. For the post-1990 period, the results are more balanced, with causality from exchange rate to fundamentals found in 14 out of 36 cases and causality from fundamentals to exchange rates obtained in 10 out of 36 cases. These results provide a bit more support than most other studies for the view that exchange rate movements are related to fundamentals.

Excess sensitivity of long-term interest rates

Gürkaynak, Sack, and Swanson examine why long-term interest rates are as sensitive as short-term rates to news and data releases that are expected to have only temporary implications for the economy. Standard term-structure models hold that long-term interest rates should be closely related to an average of expected future short-term interest rates and that, due to this averaging effect, news about the cyclical dynamics of the economy should affect short-term interest rates much more than long-term interest rates.

After examining several explanations for this "interest rate sensitivity" puzzle, the authors conclude that uncertainty about the Federal Reserve's implicit inflation target is the source of this sensitivity. This uncertainty leaves investors unsure of how the Federal Reserve will respond to news; in particular, economic news could alter the inflation target and have a sustained impact on long-run inflation expectations. Such movements in long-run inflation expectations would then be reflected in long-term interest rates.

Open market purchases in a liquidity trap

Auerbach and Obstfeld examine whether monetary policy is effective when short-term nominal interest rates are zero, i.e., when the economy is in a liquidity trap. A liquidity trap is widely seen as problematic because it makes the standard method for easing policy—cutting short-term rates—impossible. The authors argue that monetary policy interventions in the form of expansionary open market operations can still stimulate the economy and raise welfare even during a liquidity trap because they monetize part of the national debt and because they create the expectation that prices will rise.

The advantage to monetizing part of the national debt is that it allows the government to cut other tax rates, reducing distortions, without adversely affecting the government's balance sheet. The benefit to creating the expectation that prices will rise is that it generates an immediate increase in today's price level while also boosting current output levels. The authors show that a 1% increase in the level of base money could lead to a permanent annual welfare gain of about 0.06% of national income. Applying their findings to Japan, which many believe is stuck in a liquidity trap, the authors argue that although the Bank of Japan's interventions have had no apparent impact on inflation, they have, nevertheless, raised welfare.

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Economist   **Vice President**

Conference Papers

Ang, Andrew, Monika Piazzesi, and Wei Min. "What Does the Yield Curve Tell Us about GDP Growth?" Columbia Business School.

Auerbach, Alan J., and Maurice Obstfeld. "The Case for Open-Market Purchases in a Liquidity Trap." University of California, Berkeley.

Bernanke, Ben S., and Kenneth N. Kuttner. "What Explains the Stock Market's Reaction to Federal Reserve Policy?" Board of Governors of the Federal Reserve System.

Engel, Charles, and Kenneth D. West. "Exchange Rate and Fundamentals." University of Wisconsin.

Gürkaynak, Refet, Brian Sack, and Eric Swanson. "The Excess Sensitivity of Long-Term Interest Rates: Evidence and Implications for Macroeconomic Models." Board of Governors of the Federal Reserve System.

Hall, Robert. "Dynamics of Corporate Earnings." Stanford University.

Hördahl, Peter, Oreste Tristani, and David Vestin. "A Joint Econometric Model of Macroeconomic and Term Structure Dynamics." European Central Bank.

References

Meese, Richard, and Kenneth Rogoff. 1983. "Empirical Exchange Rate Models of the Seventies: Do They Fit Out of Sample?" *Journal of International Economics* 14, pp. 3–24.

Rudebusch, Glenn. 1998. "Do Measures of Monetary Policy in a VAR Make Sense?" *International Economic Review* 39, pp. 907–931.

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