Federal Reserve Bank of San Francisco

Spring 1983 Economic Review Number 2

MANAGING UNCERTAINTY

Managing Uncertainty

Unpredictable events surround economic decisions and are often critical to their outcome. For example, was it uncertain demographic change or inflation that was responsible for the rise in housing prices relative to other assets in the 1970s? In the conduct of monetary policy, the choice of strategies relies on the predictability of the behavior of money demand. And unexpected fluctuations in interest rates, such as those experienced in the recent past, have had a major impact on depository institutions' net interest income. The three articles in this *Economic Review* present methods for identifying the effects of unpredictable events and for managing uncertainty.

Some housing economists have attributed most of the increase in the value of housing relative to corporate stock in the 1970s to increased speculative demand. They believe the increased demand resulted from the interaction of inflation and a non-indexed tax system. Roger Craine, in the first article, points out that demographic shifts in the demand for housing also has a significant impact on its relative price. His conclusion has an implication for the future of the housing market that differs from that commonly held. Even if inflation abates in the 1980s and reduces the speculative demand for housing, Craine's findings imply that there will remain a strong demographic demand for housing.

Craine believes that the uncertainty associated with the household formation rate of the post-World War II baby boom increased the risk associated with housing investments. As a result, the rate of return on houses had to exceed the average rate of return on other assets to compensate investors. In a series of regressions of excess returns to housing on short-run anticipated household formation and inflation, he shows that the influence of household formation cannot be dismissed in a statistical sense: "The data support the hypothesis that one or the other or both expected inflation and household formation influenced the rate of return on... housing over the 1965 to 1980 period."

John Judd addresses the question of whether the decline in the velocity of M1 in 1982 was due to an unexpected upward shift in the public's desire to hold money or to a predictable money demand response to dropping interest rates and inflation. In that year, the velocity of M1 declined at a 4.6 percent rate (it had risen at an average 2.8 percent annual rate for the last twenty years), and led some to conclude that this was another instance of money-demand "instability"—of the public's demand for money turning out to be different from what historical relationships would have predicted.

Judd uses the San Francisco Money Market Model to show that the demand for money was "consistent with available information on the behavior of widely recognized determinants of M1 growth," and thus did not constitute a shift in demand. He finds that the rapid M1-growth in the last two quarters of 1982 can be "explained by the moderate growth in nominal income and the large decline in short-term interest rates."

Instead of being an unpredictable change in public behavior, the decline in velocity was a response to the large drop in inflation which permitted a parallel decline in nominal interest rates although not in real interest rates. Since money demand responds to nominal interest rates, the public was willing to hold more M1. But since GNP growth responds to real rates of interest, GNP did not receive the same stimulus: "As a result money growth accelerated relative to GNP growth, implying a decline in velocity." Judd's analysis suggests that velocity should exhibit more "normal" behavior in the second half of 1983 because inflation appears to have stabilized at its new lower level.

In the last article, Alden Toevs develops a better model for banks and other depository institutions to use in monitoring and managing the exposure of

bank earnings to unforeseen changes in interest rates. The model of comparison is the popular "gap management model" where the gap refers to the dollar value difference between rate-sensitive assets (i.e., assets whose yields are sensitive to changes in market rates of interest) and rate-sensitive liabilities. According to the gap model, a bank would hedge against earnings being affected by changes in interest rates (so-called interest rate risk) by keeping the gap equal to zero in the time interval concerned.

Toevs, however, notes two serious shortcomings. First, he believes that the existing model "unnecessarily constrains a bank's choice of assets and liabilities" in creating a hedge. The constraints, in turn, reduce "the bank's ability to accommodate customer demands for bank services." Second, the model is unable to generate "a simple and reliable index of interest-rate risk exposure."

To improve on the gap model, Toevs develops a "duration" gap model that, by using more general conditions for hedging interest rate risk and by incorporating the timing of repricing decisions by the bank, "reveals a larger set of asset and liability choices to financial institutions" to hedge net interest income. With the model, he is also able to develop "risk-return frontiers" to quantify the choices for those institutions that wish to position their balance sheets to profit from interest rate forecasts. The duration gap model also yields a single number to quantify the risk position of the financial institution using it. This number is useful if interest rate risk for the entire bank is to be hedged in the futures market. Finally, the duration gap model is generalized to hedge the market value of bank capital against unexpected change in interest rates.

San Francisco Money Market Model Revised

New documentation on the San Francisco Monthly Money Market Model developed at the Federal Reserve Bank of San Francisco is now available through the Economic Research Department of the Bank.

Developed in 1980 by John P. Judd and John L. Scadding, Research Officers, this model of the money market was first presented in the Reserve Bank's *Economic Review* (Summer 1981) in an article entitled "Liability Management, Bank Loans and Deposit 'Market' Disequilibrium."

The model was documented again and examined in Richard G. Anderson and Robert H. Rasche, "What Do Money Markets Tell Us About How to Conduct Monetary Policy?" *Journal of Money, Credit and Banking* (November 1982, Part 2). An expanded version of the model that included an endogenous loan market was reported in John P. Judd and John L. Scadding, "What Do Money Market Models Tell Us About How To Use Monetary Policy?—Reply," *ibid.*

Since then, the model has been revised further by including an equation to predict the M2 monetary aggregate and by simplifying the specification of the equations predicting banks' demand for reserves. Documentation of the revised model is contained in John P. Judd, "A Monthly Model of the Money and Bank Loan Markets," Federal Reserve Bank of San Francisco, Working Paper No. 83-01, May 1983. Requests for copies should be addressed to the Economic Research Department, Federal Reserve Bank of San Francisco, P.O. Box 7702, San Francisco, CA 94120.