Chapter Title: Concluding Remarks

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7   Concluding Remarks

Rather than recount the empirical results already adequately summarized at the end of each chapter, now is the appropriate time to provide a general perspective on the methods used in this book. A general view will be worthwhile particularly because, although the empirical studies in the preceding chapters analyze quite different issues, certain patterns of results recur in all of them. These patterns say something important about the line of research pursued here, and they deserve to be emphasized.

The models analyzed in this book which stress the distinction between effects from unanticipated and anticipated movements in variables require measures of expectations in order to be estimated. Life is hard for the econometrician because unfortunately the real world rarely supplies him with the data he needs, in this case measures of expectations. The solution to the problem here is first to specify forecasting equations and then to use the assumption of rational expectations to generate the required expectations measures. The danger in this approach is that misspecification of the expectations measures can lead to seriously biased results, which lead in turn to inappropriate conclusions.

A surprising finding—at least at first—arises in all the empirical studies in this book. The specification of equations describing expectations does not seem to matter very much. Results in Chapter 4 with an efficient-markets model, where the expectations of short-rates are a function of lagged short rates, are very close to results with a similar efficient-markets model in Mishkin (1978), where, in contrast, the short-rate expectations are described by a forward rate measure. In Chapter 5 and its Appendix 5.2, changing the specifications of the expectations equations does not appreciably affect the results and conclusions. In Chapter 6, although the specification of money growth expectations is quite

different from that of Barro and Rush (1980), the results are strikingly similar.

The robustness of the results in these studies to changes in the specification of expectations is too consistent to be mere coincidence. It appears that in models of the type discussed here, where the effects of unanticipated movements in variables are emphasized, the danger from misspecification of expectations is not very severe. Paradoxically, the explanation for this good news might be simply that macro variables are extremely hard to forecast. Thus forecast errors may be so large relative to the error in specifying expectations that any resulting errors-in-variables bias is quite small.

Another potential problem in the empirical analysis here is the failure of theory to indicate whether economic agents focus on seasonally adjusted or on unadjusted data. All the empirical studies in this book indicate that this problem, too, is not severe. Results from either adjusted or unadjusted data are similar, except that results from unadjusted data do appear to be somewhat stronger. Possibly the unadjusted data are "cleaner": that is, they are not filtered as occurs with seasonal adjustment using such programs as Census X-11.

On balance the results in the preceding chapters justify using the assumption of rational expectations in empirical work, especially when financial markets are studied. Chapter 4 finds that, except for inflation during the unusual 1959–1969 period, forecasts in the bond market appear to be rational. The long bond results in Chapter 5 are also favorable to the rational expectations hypothesis, and the rejections of constraints in the short-rate models can be attributed plausibly to an inappropriate model of market equilibrium. The results of the rationality tests in Chapter 6 are somewhat mixed. However, the null hypothesis of rationality is accepted more often than it is rejected, and, of the two component hypotheses of the MRE hypothesis, rationality fares substantially better than neutrality.

This is the good news about the use of rational expectations models of the type discussed in this book; there is, however, some bad news as well. The hypothesis of rational expectations has nothing to say about whether the models estimated here are true reduced forms where the error term is uncorrelated with the explanatory variables. Only when there is further information to identify the models as reduced forms is the interpretation of the empirical results clear-cut. If this information is not available, very different inferences are possible. This unsatisfactory situation is not specific to the models estimated here. As Sims (1980) has noted, the same problem plagues all macroeconometric modeling, and it is one reason why understanding the macro economy is such a difficult task.

So called "causality" or "exogeneity" tests based on the work of Granger (1969) or Sims (1972) do not help remedy the problem encoun-

tered here. If we could determine that our unanticipated variables are exogenous, then we would be more willing to believe that our models are true reduced forms, and interpreting empirical results would be much simpler. Unfortunately, Granger-"causality" tells us nothing about the kind of exogeneity most relevant to the analysis here, the potential contemporaneous correlation of unanticipated variables with the error term. This is not to say that Granger-causality is a useless concept for rational expectations econometrics. Certain rational expectations models lead to testable implications about Granger-causal relations among the data. Even more important, the use of the Granger concept can tell us what information belongs in equations describing expectations formation and therefore in the decision rules of economic agents. The concept of Granger-causality has often been misused in the literature (see Zellner 1979), but it does have a real, though limited, role to play in the kind of econometrics described in this book.

The preceding chapters should have convinced the reader of the value of using the rational expectations hypothesis to analyze important empirical issues in macroeconomics. The research in this book is only a start in this direction. The approach used here is applicable to a wider range of problems, several of which have been mentioned in Chapter 1. It is to be hoped that this book will stimulate research that makes further use of the techniques described in the preceding pages.