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FOREWORD

by

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Rational expectations analysis has received increasing attention from economists in recent years. Some of this attention has been evident in papers published in the first volume of this journal, and at recent control conferences sponsored by the *Society of Economic Dynamics and Control.* That rational expectations analysis has become a frequent topic of research among those interested in the application of methods of dynamic analysis and control to economic problems is natural, in the sense that rational expectations analysis depends heavily on such methods. This issue of the JEDC is devoted entirely to rational expectations research with an emphasis on general methodological considerations and policy implications. The idea for such a collection originated with David Kendrick who suggested that it might help to clarify some of the more controversial issues in the field, as well as to indicate which areas are most likely to require additional research. The selection of papers for this issue has reflected these general aims, as discussed below.

Interest in rational expectations has been stimulated by both empirical and policy evaluation problems. Empirically, it has become evident that many extrapolative models of expectation formation (such as adaptive expectations), which are based on fixed weighted averages of past observations, are too rigid to reflect the increased volatility of most economic variables, especially prices, interest rates, and exchange rates. Extrapolative expectations procedures are thought to be unrealistic in many applications because they do not respond adequately to sharp changes in these economic variables. The rational expectations hypothesis, that people use all available information in making forecasts, is evidently one way to make expectations more responsive, and several of the papers in this issue use the technique for exactly this reason. In practice, of course, the use of rational expectations has required certain approximations – such as the approximation that the available information includes the forecasts of the economic model currently

under investigation. Because of these approximations, rational expectations analysis as now practised is not without its own shortcomings. As a practical technique, however, the current approach appears to be providing satisfactory results in many applications. Of course, certain modifications which treat learning problems more realistically might be necessary in other applications, and might eventually increase the general usefulness of the technique. But this is still an open research question.

A second important stimulus to the research on rational expectations comes from difficulties with conventional econometric policy evaluation procedures as first pointed out by Robert Lucas (1976). The Lucas criticism is that the basic assumption upon which most policy analysis is based – that the parameters of econometric models are invariant to changes in policy – is frequently inaccurate and misleading. One of the reasons that the parameters of these models are not invariant to policy is that they incorporate people's expectations, which of course will change when economic policy is changed. Rational expectations has been used as a technique to account for this particular aspect of the Lucas criticism and to appropriately modify econometric policy evaluation procedures. This particular use of rational expectations is evident in all of the papers in this issue of the JEDC.

As already mentioned, the success of this approach in dealing with the Lucas criticism depends on the accuracy of the rational expectations assumption. If it takes people a long time to learn about policy, then the rational expectations technique as used in these papers might not be relevant for examining the immediate effects of a sudden shift in policy, such as that associated with a major economic reform. A description of the learning process would also be necessary. However, the techniques are useful for examining the effects of a different policy regime over a longer period of time. For example, using these techniques one might examine how the U.S. economy would have performed during the 1970's if a much less accommodative monetary policy rule had been in effect at the start of the decade and had been maintained throughout. Would the recessions have been worse? Would price stability have been greater? And by how much? The results of such a study would presumably be useful in determining how accommodative monetary policy should be in the 1980's. Because of the longer run focus, questions of this type are apparently amenable to current methods of rational expectations analysis without an explicit model of learning behavior, even if comparative policy experiments over the next few quarters would require a learning model.

In addition to expectation effects there are, of course, other reasons for parameters of an econometric model to shift. For example, firms might find it optimal to accelerate ongoing construction projects if reports of material shortages become widespread. This would reduce the chance of expensive

delays later when bottlenecks become more severe. Because of this acceleration in construction, the parameters of an equation relating capital expenditures to a distributed lag of construction starts would begin to shift. Since most econometric models are based on fixed parameter equations of this type, policy evaluation problems would arise, especially if the original source of the shift – spot shortages – is related to policy. The paper in this issue by Hansen and Sargent represents an econometric approach to avoid shifts of this kind, while simultaneously dealing with the expectations effects already discussed. Assuming that tastes and technological parameters are relatively stable, and in particular invariant to policy changes, Hansen and Sargent derive and show how to estimate equations which are based only on the traditional assumptions of individual utility maximization and firm profit maximization. In principle, this approach avoids all parameter shifts of the type Lucas warned about. The approach is fundamental, and as their paper indicates, is just underway. The paper by Kydland and Prescott in this issue also uses the utility maximization approach. As discussed below, they emphasize optimal policy selection issues, rather than the econometric issues studied by Hansen and Sargent.

Another technique for dealing with these other sources of parameter variation is to model in detail – perhaps using microeconomic data – those institutional features of the economy which appear to be relatively stable. For example, wage or price contracts are an important institutional feature of most market economies. While it may be difficult to derive these contracts using the utility maximization approach, they are evidently an important part of the economy, and if they are expected to remain stable, they should be a part of a *model* of the economy. This approach is taken in the paper by Taylor in this issue where simple aggregative models based on wage contracting mechanisms of this type are estimated for a number of different countries. It should be emphasized that the utility maximization approach and this more direct approach are not, in general, substitutes. Indeed policy problems must deal with many facets of economic behavior, some of which are more appropriately handled by formal utility maximization techniques, others of which must be dealt with more directly. The paper by Calvo in this issue, for example, uses elements of both approaches in order to examine the effects of fiscal policy with rational expectations.

Much of the research on rational expectations has been concerned with whether policy is effective or not. In fact, in many less technical expositions of the subject, the rational expectations hypothesis has been equated with the strong neutrality hypothesis which states that announced changes in the money supply do not affect output and employment. After considerable research, it is now clear, as summarized by Lucas (1980) and exemplified in several papers in this issue, that the rational expectations hypothesis alone

does not imply the strong neutrality hypothesis, anymore than it implies one of the many non-neutrality hypotheses. This point is illustrated in the model studied by Calvo in this issue: *fiscal* policy is ineffective when expectations are fixed, but becomes effective when expectations are rational. This is not to say that the evidence is conclusive either in favor of or against the strong neutrality hypothesis. The empirical evidence described by Taylor in this issue shows how one non-neutral model is generally consistent with the macroeconomic data. Barro (1978) and Sargent (1976) on the other hand have provided evidence that is consistent with the strong neutrality hypothesis. That more than one model can explain the same empirical phenomena is not unusual in economics or in other sciences, but it obviously suggests an area where further research would be fruitful.

The applicability of optimal control techniques – or general quantitative optimization procedures – in rational expectation models, has also been the subject of much discussion in the literature, even when policy variables are assumed to have significant economic effects. The subject is taken up in this issue by Chow, Kydland and Prescott, and Fischer. The problem of time inconsistency, originally pointed out by Calvo (1978) and Kydland and Prescott (1977) is important for evaluating the usefulness of optimization techniques. The problem occurs when there is an incentive to change policy after the start of an optimal plan even when economic conditions and tastes remain constant. Although it is now generally recognized that the problem does not preclude the use of optimization techniques, it does raise questions about how optimization should be done, and how the results should be applied in practice. The papers by Chow, and by Kydland and Prescott, consider some of the technical problems associated with calculating optimal policies when time inconsistency is an issue. Chow suggests an iterative procedure very similar to dynamic programming, and also shows how policy simulation can be conducted in rational expectations models. Kydland and Prescott suggest adding an additional state variable to constrain policy to be time consistent when computing optimal policy. They apply their procedure to an optimal taxation problem which has features common to most economic policy problems. The paper by Fischer provides some useful insights into the problem of time inconsistency, and develops some alternative solutions. He also raises a number of interesting policy implications.

It is of course impossible for one issue of a journal to cover all of the applications and implications of rational expectations. One ongoing research area which is not represented here is the effort to incorporate rational expectations into large scale econometric models [see Fair (1979), Anderson (1979), Holly and Zarrop (1979), and Minford (1978)]. Another active area is the estimation of rational expectations models with limited information methods, as distinct from full systems-estimation exemplified by the Hansen–

Sargent paper in this issue [see McCallum (1976) and Nelson (1975)]. When supplemented by this additional research, the papers in this issue should indicate some of the advantages and the disadvantages of the rational expectations approach to economic modelling and policy problems.

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