

An Empirical Analysis of Business Cycle Fluctuations in the Context of a Multisectoral Model - Non-Technical Summary

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Abstract

The project "An Empirical Analysis of Business Cycle Fluctuations in the Context of a Multisectoral Model" was an ESRC-funded project (ref. no. R000233608) carried out at the Department of Applied Economics, University of Cambridge between July 1992-June 1994. A non-technical summary of the project's work follows.

This project was concerned with the analysis of cyclic fluctuations in activity in the macroeconomy, paying particular attention to the importance of interconnections between various industries in explaining these fluctuations. While there is a substantial literature on the analysis of business cycle fluctuations at an aggregate level, there has been relatively little attention paid to the role of sectoral interactions in the generation and transmission of business cycles either in the theoretical or empirical literature. This project aimed to take a step towards filling this gap.

One explanation for this lack of attention to the multisectoral dimension of business cycle fluctuations is the paucity of tools for the analysis of multisectoral models. One aspect of the research aimed to develop appropriate tools for this purpose, and a number of important theoretical and econometric methods have been developed in the course of the project to this end. For example, new methods for the solution of multivariate rational expectations models have been developed which are capable of dealing with a variety of multisectoral models. These methods are particularly complicated in cases where agents in different sectors have access to different information, so that the outcome of the model depends on individuals' forecasts of other individuals' forecasts. The research also paid particular attention to the econometric analysis of multisectoral models where the specification of the sectoral relations are subject to parameter heterogeneity, and showed the pitfalls surrounding the application of standard (pooling and aggregate time series) estimation and hypothesis testing techniques to such models. Further, under the project, methods are developed for the comparative analysis of aggregate and disaggregated models, extending earlier research by project members in a number of important directions.

The research has also made considerable advances in the development of new techniques for the estimation and analysis of vector autoregressive (VAR) models involving unit root processes. Building on pioneering work by Johansen and Phillips, statistical techniques have been developed for the estimation and testing of restrictions on the long-run cointegrating relations that exist between the variables. This framework therefore provides the means of obtaining a multivariate model with the flexibility of a standard VAR model (with no restrictions imposed on the short-run dynamics), but with the possibility of testing and then imposing restrictions suggested by economic theory on the long-run relationships between variables. Such methods are, of course, of considerable use in the analysis of multisectoral models, but they are also applicable in a wide variety of multivariate models, and, in our opinion, they represent an important advance in long-run

structural modelling in the context of VAR models.

The second part of the research undertaken under the project was concerned with the empirical investigation of output fluctuations in the UK and elsewhere. In one application, data on output from twenty-four industries in the UK, over the period 1973q1-1991q4, was used to show that the statistical characterisation of business cycle fluctuations, and the understanding of fluctuations in aggregate output, are considerably enhanced by the use of industrial data of this kind. Clearly the use of aggregate, economy-wide data means that information is lost on the wide variations in growth rates achieved across industries. However, it was found that the interactions between industries linked along the chain of production is also important in understanding the evolution of outputs across sectors, and this information is also lost in aggregating the data. Further, fluctuations in aggregate output was shown to be explained better using the disaggregated industrial data than the aggregate data alone, and evidence of aggregation bias was found in models characterising business cycle fluctuations estimated on the basis of aggregate data only.

The research on the analysis of sectoral output fluctuations in the UK also focuses on the sources of shocks which generate cyclic fluctuations and the time profiles of the effects of these shocks. The effects of such factors as oil price shocks, exchange rate shocks, money supply shocks, and stock market shocks were investigated, and, as might be expected, it was demonstrated that different shocks among these had different effects in different sectors of the economy. For example, not only was it found that oil price and exchange rate shocks were among the more important sources of cyclic fluctuations, but it was also shown that it is the production sector industries (Construction, Durable Manufacturing and Non-Durable Manufacturing) which play the primary role in propagating and sustaining the effects of these macroeconomic shocks. Interesting findings were also obtained in the analysis of the role of expectations in the explanation of business cycle fluctuations. Specifically, it was found that the time series properties of actual industrial output are significantly influenced by expected output changes, and that there was a high degree of interdependence in expected output growth across industries (indicating that output expectations might be driven primarily by optimism or pessimism about economy-wide developments). Once again, this indicates that understanding cyclic fluctuations in the UK macroeconomy requires explicit consideration of the industrial and sectoral experiences on which they are based.

A final area of empirical work carried out under the project concerns the

analysis of international output growth, considering output growth of the individual countries of the G7 (using the same techniques employed in the analysis of individual industries within a single economy). This analysis confirms the importance of the interactions between output growth across the economies of the G7 (which ensure that equilibrating pressures are brought to bear on individual countries growing excessively quickly or excessively slowly), while also demonstrating that there are a number of independent shocks impacting on output determination in the individual countries. The persistent effect of shocks to different economies differs considerably across countries, and the time profile of the effects of these shocks accumulates gradually over time, being influenced by the feedback of effects on output growth across countries and the differential speeds of adjustment in different countries. Among the explicitly identified types of shock that are considered, those arising from fluctuations in oil prices and in the volume of world trade are found to have the most persistent effects.