Testing the Rational Expectations and Structural Neutrality Hypotheses: Some Further Results for the U.K.

By M.J. Driscoll, A.W. Mullineux and S.Sen, Birmingham

Abstract: In this paper we test directly for the restrictions implied by rational expectations and structural neutrality. The tests are direct in the sense that they employ the Lucas output equation rather than the approximations to it, which replace the lagged output term by lagged monetary shocks, commonly considered in the literature.

The direct approach is considered preferable because it avoids these ad hoc approximations and saves significantly on degrees of freedom. The latter permits us to pursue a fully nested testing procedure, which was not possible in earlier work employing postwar U.K. annual data. The main result is that the rational expectations restrictions are not accepted.

Introduction

The rational expectations hypothesis coupled with the proposition that anticipated monetary shocks have neutral output effects, are extremely important concepts in current macroeconomic theory. Empirical investigation of rational expectations (RE) and structural neutrality (SN) are therefore crucial in validating the theoretical results in the area.

Earlier work by Barro [1977, 1978] tests the joint rational expectations structural neutrality (RESN) hypothesis using U.S. data, as do Attfield et al. [1981a, b] for the U.K. Such tests fail to distinguish between the separate validity of these independent hypotheses. In Driscoll et al. [1983a], we test separately the RE and SN restrictions on an output equation for the U.K., thus allowing for the possibility that expectations may be held rationally and yet (anticipated) government monetary policy may have an effect on output giving rise to effective stabilisation policies.

The basis of these small macro models is a variant of the Lucasian supply hypothesis [see Lucas], where current output is a function of a current price shock (the difference between actual and expected price level), as well as a lagged output term. As explained later, usually a monetary shock (the difference between the actual shock of money and its expected value), is substituted for the price shock. More importantly, however,
In this paper we propose to test directly for the (separate) restrictions implied by the rational expectations and structural neutrality hypotheses. The tests are direct in the sense that they employ the Lucas supply hypothesis in its theoretical form, rather than an approximation to it using lagged monetary shocks as explanatory variables, as done elsewhere.

In addition to being a direct and specific test of the basic equation of the theoretical monetarist literature, our method has a number of other attractive features. It avoids unnecessary data based approximations to the output equation, which, unless treated with caution, may become relatively ad hoc. Secondly, we save significantly on degrees of freedom. This is useful because the general econometric approach in the area requires the specification of an unrestricted model which contains a number of implicit exclusion restrictions. The extra degrees of freedom given by the direct method, allows us to test the unrestricted model (UM) against the unrestricted reduced form (URF) of the model. It is important to do so because otherwise the UM may have limited validity. This last test is an innovation of this paper and was not possible in the previous studies by Driscoll et al. [1983a] and Attfield et al. [1981a, b], because of the lack of degrees of freedom in the post war annual data set which was used. A complete nested test procedure is, therefore, possible using the method proposed in the paper. The pitfalls involved in inadequate testing of the UM against the URF model are illustrated in Driscoll et al. [1983b], in which it is shown that Leiderman's interpretation of his tests of the RE and SN hypotheses are questionable.

The rest of the paper is organised as follows. The model is set out in Section 2. The results of the estimations and the tests of the restrictions are presented in Section 3. A summary and some conclusions are provided in Section 4.

2. The Model

In order to analyse the effects of monetary policy on output, the basic model requires the specification of an output equation and a money stock equation. The output equation employed is:

\[ y_t = y^*_t + \beta_0 (m_t - m_t) + \beta_1 y_{t-1} + u_{1t} \]  

(1)

where \( y_t \) is log of output at time \( t \) and \( y^*_t \) is its natural rate, \( m_t \) is log of the money supply at time \( t \) and \( m_t \) is the expected value of \( m_t \), given information available at time \( t - 1 \). In this equation the unanticipated change in the money stock replaces the unanticipated change in the log of the price level \((P_t - P_{t-1})\), which appears in the Lucas structural supply equation. This is simply because with a (log) demand for money that depends upon the (log of) the price level the structural supply equation becomes equation (1) in its reduced form, as it does in all rational expectations.