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NOTEECONOMETRIC FORECASTS FOR SCOTLAND

In the first issue (July 1975) of the Fraser of Allander Institute Quarterly Economic Commentary, the special article, by Professor J McGilvray, reviewed the problems associated with constructing regional econometric models to forecast key economic variables. Since that time, a number of forecasts for the Scottish economy have been made in the main text or in special articles of the Quarterly Commentary. Many of these have been underpinned by forecasting relationships which have been estimated for particular sectors of the economy. Up to now we have been unable to produce a set of relationships which could genuinely be described as a 'model' of the Scottish economy. The reason for this is simple, but illustrative of the type of problem discussed by Professor McGilvray. To understand it one must be acquainted with the fundamental differences which exist between national and regional economic models.

National models, typified in the UK by those of the National Institute, the London Business School and the Treasury, concentrate on the components of aggregate expenditure to explain movements in economic variables. That is to say, they view gross domestic product as the sum of expenditures on consumption, investment and government expenditure, rather than, say, as the sum of the outputs of each industry. Their principal behavioural relations then seek to explain changes in the level of consumption, of investment etc. Now for a regional model it is very rarely the case that adequate series exist for each of the components of aggregate expenditure. For the Scottish economy, data on investment and consumption have recently become available and some attempts have been made in the Institute to model these. However, we have consistently taken the view that it is more useful to view GDP as a sum of outputs, rather than expenditures. There are a number of reasons for this.

Firstly, it was felt that the most useful way to model the links between the Scottish and UK economies, whose existence was clearly demonstrated by the recent input-output study, was to describe the response of output in Scotland to fluctuations in UK output. Secondly, it was felt that any model of the Scottish economy should place a substantial emphasis on the determinants of employment and,

consequently, of unemployment and migration. Expenditure models are not suited to this task whereas models where employment can be determined as a function of output and capital stock have been substantially developed in the econometric literature. Thirdly, data on industrial output in Scotland are available with about a six month lag, whereas data on any components of expenditure are usually about two years in arrears. This would mean that any forecasts for the future would be much more liable to error since it would be necessary to also forecast the recent past. Finally, the existence of quarterly output series may, in the future, enable substantial parts of an output based model to be placed on a quarterly, rather than an annual basis, thus providing fairly short-term forecasts.

Now, without sufficiently long series on production it would clearly be impossible to estimate an output model of the type just described. Until last year no such data existed. However, the publication by the Scottish Economic Planning Department of a revised index of industrial production for Scotland (Scottish Economic Bulletin Summer 1977) remedied this deficiency and enabled preliminary studies to be commenced.

Since that time, work on a fairly small model, consisting of 18 equations, has been completed, and the estimation of a larger model which currently consists of 70 equations, is proceeding. It is hoped that details of these will be published later in the year.

The main behavioural features of the smaller model are:

- (a) the links with the UK economy
- (b) the operation of labour market variables
- (c) the demographic relationships
- (d) GDP forecasts

Let us discuss these in turn:-

- (a) There are two main channels whereby the UK aggregate economy is assumed to 'drive' the Scottish economy. Firstly, and most importantly, close trade links between Scotland and the rest of the UK ensure that Scottish output responds quickly to movements in output in the rest of the United Kingdom. Secondly, shifts in labour market variables, notably the rate of change of price expectations (which is assumed to be equal throughout the UK) determine the rate of wage inflation in Scotland. In turn, the relative wage between Scotland and the UK, goes some way to explaining the level of migration to the rest of the UK.

- (b) In the labour market, it is assumed that, for a given output, capital stock and labour utilisation, there is a desired level of employment. Then a discrepancy between actual and desired employment gives a measure of the excess demand. Excess demand (positive or negative) in the labour market is an important variable which is used elsewhere in the world as a determinant of migration, wage inflation and unemployment. (For a fuller discussion of this see D N F Bell and R A Hart, "The Regional Demand for Labour Services" Fraser of Allander Institute Discussion Paper No.7, October 1977).
- (c) Demographic forecasts rarely take account of economic variables even though it is widely acknowledged that they play an important role in determining births and migration (see D N F Bell and F X Kirwan "Population, Employment and Labour Force Projections", Quarterly Economic Commentary, July 1977). The model uses relationships between female employment and births and between migration and various labour market variables to determine shifts in population. It is intended to link these to a more detailed demographic model in the future.
- (d) Since, as was indicated earlier in the discussion, the model is primarily output oriented, forecasts for real GDP growth are determined partly by movements in production. However, the index of production does not cover all sectors and, in particular, fluctuations in the output of services will have a strong influence on GDP. There are many conceptual problems associated with the measurement of service output. So far, we have taken the view that service employment is the best available proxy for this variable. Our results indicate that fluctuations in the level of real GDP in Scotland can be quite successfully explained by movements in industrial production and in service employment.

The whole model has been estimated using annual data for the period 1965 to 1975 and a program has been written to enable forecasts to be made incorporating alternative assumptions as to movements in exogenous variables and in error terms.

How successful this smaller model can be in forecasting movements in the Scottish economy will take some time to evaluate. The introduction of a larger model will not necessarily improve the forecasts but should increase our understanding of the complex structure of the economy. Forecasts of a number of key variables for 1978 using the smaller model are presented in the Outlook and Appraisal section.