BASMOD

An econometric model for the Swedish economy

Version for Sveriges Riksbank

MANUAL

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Purpose

The purpose with BASMOD is mainly to be a tool in the forecasting activity of a serious forecasting organisation, like the APP. The model should be an alternative to the Excel sheet so often used, “arket”, and offer an opportunity to forecast consistently the resource balance and other variables which belong to a standard macroeconomic forecasting environment. The model has initially been developed by one single person but the purpose is that the model should be used and developed by many, i.e. those engaged in the forecasting activity in APP. Therefore, the model has been programmed in Eviews, the econometric package most commonly used in APP. Since the model is used in the forecasting activity its parameters have been estimated on historical data on a quarterly basis. Since it is a substitute for the sheet, “arket”, the model is big and has more than 100 equations, of which approximately 25 are stochastic.

Model philosophy and a comparison with other models

Everybody wants a model which is a) theoretically coherent, b) forecasting well, c) suitable for monetary policy simulations, and d) possible to use for answering many different questions. These requirements can be interpreted as the model should be derived from utility and profit maximising from individual consumers and firms in a dynamic setting, give the least possible RMSE (root of mean square error) and at least be seriously competitive with the forecasts done by sectoral experts, show plausible effects of monetary policy taking into account the Lucas critique as well as be so big that questions that comonly arise at APP should be able to be reasonably answered.

In practice no model satisfies all these requirements. Different compromises must be made. Pros and cons of a certain model should be judged with respect to these compromises. Different kinds of compromises have been done by different model builders and models have developed in various directions over time. During the 60s and 70s large scale Keynesian econometric models were dominating. But that was during a period when computers were still at low capacity and econometrics less developed. Those models were questioned and criticised, by Robert Lucas and others. The critique was justified and led to improved models.

Lucas’ and Sargent’s development program suggested that models should be developed on sound microeconomic foundations, on utiliy and profit maximising in a dynamic perspective implying that so called deep parameters emanating from preferences and technology be identified. Such models would automatically be immune to the Lucas critique (i.e. that model parameters are functions of the parameters of the policy rule). The program was very ambitious, I think too ambitious. Macroeconomics deals with aggregate data and should explain relationships between aggregate variables. They describe the outcome of millions of decisions by individual households and firms, entities that are far from identical. It is impossible to identify the deep parameters of these individuals by studying the relationships between aggregate variables only.

Which road should then be taken if this is the conclusion? Should theory be given a smaller role in model building? No existing model based on aggregate data can explain the behaviour of individual agents. In addition, models for individual households and firms could not be tested using aggregate data. Still, very often these tests are carried out and the theory is rejected, e.g. when testing the theoretical restrictions in the Slutsky matrix. However, almost everybody continue to believe in the theory, so why conduct this type of tests?

Since the deep parameters cannot be identified one has to compromise with respect to the micro relationships and is most likely to end up in a situation of ‘second best’. Once there, one cannot be certain that the best way to proceed is by adhering to the microeconomic foundations. (This is for the same reason that a decrease in some tax rate in a system with a complicated tax structure may not improve welfare.)

Therefore, when building BASMOD the first criteria above has not been as important as in e.g. a RBC model. This does not mean that economic theory has been without importance, but the ambition to develop relationships from first principles has not always been guiding the development. Rather, micro theory has been used to find econometric specifications that might later be rejected by the data. In such cases the theoretical restrictions may simply be imposed or some other specification be used in which theory is less pregnant.

Theoretical foundations are nevertheless important for model behaviour, particularly in the long run and for model stability. The long run relationships are therefore theoretically established one way or the other. The long run relationships are part of the estimated equations and are therefore evaluated empirically (though not always estimated).

The other three criteria above have also been important, i.e. empirical evaluation of forecasting performance, simulation properties and the inclusion of as many variables as possible of those regarded as important by APP. Empirical evaluation is done in several steps. The equations in BASMOD are in most cases estimated equation-by-equation but in some cases in system. The general idea behind this is as follows. A detailed ‘big’ model cannot be estimated in a system since macroeconomic models use quarterly data with a limited time horizon. In Sweden these data cover the period 1980-2003, i.e. observations. BASMOD has 25 stochastic equations implying that each equation could have at the most 3-4 parameters to estimate, since the number of parameters of a system as a whole cannot exceed the number of observations (as a whole = 90 in our case). A requirement that the equations of the model should be estimated in a system is therefore unreasonable. In BASMOD equations are estimated as a system if this is required for theoretical reasons. A typical example is the estimation of a product price equation and a demand for labour equation. Consider the cost function , where y is output, w is the wage rate and is the rental price of capital. From the cost function we can derive a price and a demand for labour equation as and , where h is the number of hours worked. f and g obviously contain the same parameters and hence these equations must be estimated simultaneously in order to impose the restrictions. Therefore, some equations are estimated in systems, where such cross-equation restrictions are considered important and are not rejected by data.

In addition, the usual diagnostics tests are conducted, i.e. goodness of fit, residual tests as for normality, homoscedasticity, no autocorrelation and tests for stability. When a system is estimated these tests are performed both on an equation-by-equation and a system basis.

Even though separate parts of the model can be evaluated empirically it is the system properties that are the most important. Therefore, the forecasting performance of the model is evaluated, within and out of sample.