Economics Department research over the past year: a review

Economics Department

This article provides an overview of some of the research carried out by the Economics Department during the past year.

I Introduction

The past year has seen many research developments, not least renewed development of a structural macro-economic model. Work on this economic model (named the Forecasting and Policy System (FPS)) is well advanced and we plan to have it fully in use by the middle of next year. On the monetary policy front, we have looked into the causes and policy implications of various asymmetries. Moreover, in May we hosted our second Monetary Policy Workshop, with Ralph Bryant from the Brookings Institution the keynote speaker. Also speaking were Warwick McKibbin from the Australian National University, David Turner from the OECD and Eric Hansen from the Reserve Bank of New Zealand. As with the first workshop, many of New Zealand's leading macro and monetary economists were present.

As a general characterisation, the Economics Department's research can be categorised into three groups; macro-model research, monetary policy research and forecast-related research. It is natural, therefore, to divide this article into three sections. We begin by discussing the macro-model being built by the Bank, and explain how we are building this model so that it can be used both as an aid for forecasting and as a tool to explore policy issues. Significant resources have been invested in this economic model and its completion will represent a major milestone in the Bank's research agenda.

Research that can be placed under the general umbrella of policy research is discussed in section III. This section talks briefly about the Monetary Policy Workshop held in May before turning to policy research carried out in-house. Finally, in section IV we discuss 'forecast research' - that is research that aims to improve our forecasts.

II Macro-model research

Over the past year the Economics Department has undertaken to build a new macro-model of the New Zealand economy. This program of work has been initiated with the aim of using the model for producing economic projections and for assessing risks to these projections. Since it is intended that the model be used for both forecasting and policy analysis, it has been appropriately named the Forecasting and Policy System, or FPS for short.

To some, the advantages of having a macro-model when forecasting and investigating policy questions may seem obvious. Through a model, simple relationships linking economic variables, that should hold by construction, can be imposed and hence do not get overlooked. While such relationships can be accounted for using less formal methods (such as spreadsheets), it is easier to ensure that the economic story being told is internally consistent if a macro-model is used. More generally, a model enables us to have a clearly articulated view of how the economy works, which provides consistency from one period to the next and consistency across the economy.

Aside from the generic difficulties of building any macro-economic model, building one that combines an ability to do policy simulations as well as to forecast may seem to present no special difficulties. In practice, however, as our past experience testifies, this is not the case. Conflicts arise because the features of a model that need to be drawn out and emphasised for policy simulation work are not the same as those for forecasting.

To underscore this point, consider the following example. When a model is used for forecasting the horizon of interest may be only a few years. In contrast, policy simulations are typically analysed from a longer-term perspective. Accordingly, the exact long-run properties, or equilibrium conditions of a model are hugely important for policy analysis, but are of somewhat less concern for short-term forecasting. In fact, many macro-models used for forecasting do not have well defined steady-states at all. This difference in horizons would not be a problem if the short-run and the long-run were unrelated, but clearly they cannot be, since the short-run behaviour of a model describes how the economy gets to its long-run equilibrium.

Similarly, the level of detail needed for short-term forecasting is generally much greater than that required for policy simulation. For example, when forecasting we would typically be interested in what is happening to both private and government consumption of durables and non-durables, but for policy simulations we are more likely to treat all consumption as a single aggregate variable. The additional detail imposed on the model by its forecasting role may often make its policy simulations difficult to interpret and analyse.

One possible solution to this dilemma is to have two models; one for forecasting and one for policy analysis. While this solution is feasible it is not an easy job to maintain two models. Even if both models start out the same, it is highly likely that their properties will drift apart over time. The forecasting model will be changed and adapted as the forecasters try and improve the model's forecasts in some sectors. Similarly, as researchers change the policy questions they wish to address they will also change the structure of their model. Though this process may be gradual, over time the two models will begin to resemble each other less and less. Eventually a point may be reached where the two economic frameworks can no longer be compared and reconciled.

Rather than build two models, then, the route we have gone down is to develop a system of recursively linked models. Our model will consist of a steady-state system, a system of equilibrium aggregate dynamics,[1] a system of data motivated aggregate dynamics,[2] and a system of satellite models. These levels are successively over-laid on each other to build up the total model. For policy simulations, the steady-state model can be easily separated out from the dynamic model, preventing the dynamics from confusing the picture unnecessarily.

Each satellite model addresses in detail a specific sector of the economy. Because they are more disaggregated, these satellite models do not formally feed back into the aggregate model. By having our system in several layers we can forecast and explore policy issues within a single, consistent, economic framework.

When used for forecasting, the model's (baseline) predictions will be used as one source of information. Indicator models, as well as the judgement of our sectoral experts, will be combined with the model to arrive at a final set of internally consistent projections. As the projection horizon extends from the short- to the medium- to the long-term, the use of judgemental adjustments will decline and the model's projections will increasingly dominate.

The economic theory supporting the model will be explained in subsequent *Bulletin* articles as further progress is made. We aim to release the model publicly some time around the middle of 1997.

1 Dynamics suggested by economic theory.

2 Dynamics needed to explain movements in the data.

III Policy research

While many central banks have price stability as a central aim for monetary policy and some have a quantitative inflation target similar to our 0 - 2 percent per annum target, New Zealand is perhaps somewhat distinctive in that it does not have as an objective achieving stability in the real economy. Although this is a distinction which can be overdrawn - in fact the Reserve Bank pays a lot of attention to developments in the real economy in formulating its view on prospective inflation developments and the required monetary policy response - it is also the case that short-run stabilisation of the real economy is not a policy objective in its own right.

It is not surprising, therefore, that Ralph Bryant, Professional Fellow in Monetary Economics at Victoria University, commented upon this during his time in New Zealand. Bryant (1996) took the approach that making low inflation the sole goal of monetary policy can be extremely beneficial and appropriate when lowering inflation, and that low inflation should be the sole *long-run* objective for monetary policy. However, once inflation has been reduced to a manageable level, he argued that there was scope to undertake some macro-stabilisation in the *short-run*, as a complement to *long-run* price stability.

Bryant made these comments, favouring short-run stabilisation policy, during a speech at Victoria University. However, he also contributed to policy debate at the Bank by presenting some of his work in progress as part of the Bank's second Monetary Policy Workshop. At this workshop, Bryant explored the interaction between monetary and fiscal policy using different assumptions (in the form of rules) about how monetary and fiscal policy makers behave.

Aside from the Monetary Policy Workshop, much of our other monetary policy research can be described as an investigation into the policy consequences of various asymmetries.[3] Razzak (1995) explores the short-run inflation-output trade-off, asking the question whether the Phillips curve[4] is symmetric. This question is explored using innovative research techniques proposed in Laxton, Rose, and Tetlow (1993). Razzak (1995) finds that the

3 An example of an asymmetry would be if importers were to raise their prices faster when the exchange rate declined than they were to lower them when the exchange rate rose.

4 A Phillips curve is a relationship between inflation, expected inflation, output, and equilibrium output. The economics behind the Phillips curve suggest that inflation will rise if inflation expectations riseä or if output is above its equilibrium. Note, however, that this short-run relationship does not imply that there is a *long-run* trade-off between output and inflation.

Phillips curve in New Zealand is both non-linear and asymmetric, but that these results depend on how potential (or equilibrium) output is measured.

The non-linearity in the Phillips curve suggests that large shocks will have a disproportionately greater effect on inflation than small shocks. The asymmetry of the Phillips curve suggests that positive shocks and negative shocks, of equal magnitude, have different inflationary effects. From a policy perspective, Razzak's findings indicate that monetary policy must guard against upward inflationary movements, for the cost of lowering inflation outweighs any short-run benefit arising from the higher inflation rate.

Cassino (1995), in an extensive survey, looks into wage and price changes, examining whether evidence supporting 'sticky' price or wage theories can be found in the data. His study finds that nominal wages almost never fall and that there is evidence supporting downward price stickiness. Cassino (1995) also finds that the low inflation environment of recent years has changed firms' pricing behaviour.

Finally, Roger (1995) argues that, partly due to asymmetries in the distribution of price changes, a (weighted) median measure of inflation may have superior properties to a (weighted) average measure. As Roger (1995) explains, the (weighted) median also has the attractive properties that it automatically filters out many supply shocks and that it can be replicated independently of the Reserve Bank. However, the median is not a panacea. Generalised price changes, such as those stemming from exchange rate movements, can cause problems for the median inflation measure.

IV Forecast-related research

Most of our efforts to improve our forecasts have gone into the structural macro-model, FPS, described earlier. In addition to building this macro-model, we have looked into import pricing and the fundamental equilibrium real exchange rate (FEER).

Import pricing

Around 30 percent of retail goods are imported, making import prices an important contributor to retail prices and hence also to consumer prices - as measured by the Consumers Price Index (CPI). Therefore, understanding the process by which import prices are set can greatly benefit our forecasts of consumer price inflation.

Hansen (1996) undertakes to explain New Zealand's import prices using the theory of 'pricing to market'. In an ideal world, or as a first approximation to a more complex economy, prices of goods traded on world markets may be thought of as being determined by the 'law of one price'. The law of one price argues that any good bought and sold in more than one country should have the same New Zealand dollar price regardless of which country the good is traded in. If the New Zealand dollar price of a good differs between countries, producers will move their product to sell it in the country where they can get the better return. In doing so they increase the supply of the good in the expensive country - lowering the price of the good in that country - and reduce the supply of the good in the cheaper country - raising the price of the good in that country. In theory, this process will continue until the good has the same New Zealand dollar price in both countries.

While the law of one price is highly intuitive it is not always the most realistic theory of import pricing. Implicit in the law of one price is the assumption that import prices are set in world markets and are not influenced by domestic factors such as production costs or the level of demand. In contrast, 'pricing to market' takes the opposing view that domestic factors are important. Pricing to market suggests that foreign producers price their goods in different countries depending on the economic conditions prevailing in each country at the time. Pricing to market, then, takes the law of one price as a bench-mark and adds country specific price adjustments, in the form of markups, depending on the availability of substitutes and domestic demand.

When testing whether the theory of pricing to market holds for New Zealand, Hansen (1996) makes adjustments to by-pass the unavailability of some data series. But with these problems out of the way, Hansen (1996) finds strong support for the pricing to market hypothesis for New Zealand imports.

Fundamental Equilibrium Real Exchange Rate

Finally we turn to the theory of the FEER, which has been investigated in New Zealand by Hansen, Hutchison, and Redward (1995). The FEER is that level of the real exchange rate that achieves both internal and external equilibrium. As a simplification, internal equilibrium relates to labour market equilibrium, whereas external equilibrium relates to a constant foreign debt to GDP ratio. If we assume that output is at potential output, then we can solve for the FEER as the real exchange rate that equates the trade deficit with debt servicing costs.

As Hansen *et al* (1995) point out, there are numerous problems with calculating the FEER, not least the fact that to do it properly a complete, well specified, macro-model is needed to capture accurately feedback interactions aris-

ing in the economy. Furthermore, even if an estimate of the FEER can be made, Hansen *et al* (1995) demonstrate that these estimates depend heavily on various assumptions and that there is no reason to expect the real exchange rate to converge to the FEER in the medium-run anyway. They conclude that the FEER is not a particularly useful concept for forecasting or for thinking about monetary policy.

V References

Bryant, R.,(1996), 'Central Bank independence, fiscal responsibility, and the goals of macroeconomic policy: An American perspective on the New Zealand experience', *mimeo*, Victoria University Foundation speech.

Cassino, V., (1995), 'The distributions of price and wage changes in New Zealand', *Reserve Bank of New Zealand Discussion Paper, G95/6.*

Hansen, E., (1996), 'A 'pricing-to-market' explanation for the price of New Zealand's imports from the US', *Applied Economics*, (forthcoming).

Hansen, E., M Hutchison, and P Redward (1995), 'The fundamental equilibrium exchange rate (FEER)', *Reserve Bank of New Zealand Research Note, N95/13.*

Laxton, D., D Rose, and R. Tetlow, (1993), 'Problems in identifying non-linear Phillips curves: Some further consequences of mis-measuring potential output', *Bank of Canada Working Paper, 93-6.*

Razzak, W., (1995), 'The inflation-output trade off: Is the Phillips curve symmetric?', *Reserve Bank of New Zealand Discussion Paper, G95/7.*

Roger, S., (1995), 'Measures of underlying inflation in New Zealand, 1981-95', *Reserve Bank of New Zealand Discussion Paper, G95/5.*