

# **The role of forecasting in monetary policy**

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## The role of forecasting in monetary policy

### 1. Introduction

As is well known, the Reserve Bank Act requires the Bank to seek to maintain price stability, an objective similar in spirit to that of most modern advanced-country central banks. The Governor is legally responsible for monetary policy decisions and they are made independently from the government. Last week he explained in a speech how we make and communicate these and other important Reserve Bank decisions.<sup>1</sup>

***Forecasting is essential to monetary policy decisions***

Because the economy is never at rest, and monetary policy actions take time to affect inflation, forecasting economic conditions is an essential part of making these decisions. The forward-looking nature of monetary policy is reflected in the Policy Targets Agreement (PTA) between the Governor of the Bank and the Minister of Finance, which specifies the price stability target as “future CPI inflation outcomes between one percent and three percent on average over the medium term, with a focus on keeping future average inflation near the two percent target midpoint”.

There are difficulties and uncertainties involved in assessing the current state of the economy and its likely future path. Modern central banks therefore put a huge amount of energy into forecasting. Events such as the global financial crisis and the Canterbury earthquakes showed how we must be prepared to pivot, at times very quickly. Reflecting this complex policymaking environment, the Bank’s Governing Committee is advised by a team of about 40 economists and financial market analysts, including two external monetary policy advisers drawn from the private sector.

***There are difficulties and uncertainties***

This speech explains how forecasting fits into the monetary policy process. I’ll address the limitations and trade-offs involved in forecasting and how we manage these in monetary policy decision-making, and illustrate by discussing important issues in the current forecast.

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<sup>1</sup> Wheeler, G (2013) “Decision making in the Reserve Bank of New Zealand”, speech delivered to the University of Auckland Business School, 7 March.

## 2. The forecasting process and economic framework

Forecasting links the Bank's policy rate decisions and strategy to the requirements set out in the PTA. The forecasting process follows a quarterly cycle with two OCR reviews, one of which is accompanied by the *Monetary Policy Statement* for the quarter. Through the quarter, we examine the incoming data, update forecast tracks and scenarios, and discuss policy risks.

Inputs to the process are many and various. We draw on official data, surveys and other information covering output, sales, employment, consumption, investment, exports, imports, wages, prices and so on. We visit businesses and labour organisations representing all the country's regions and economic sectors to gather up-to-date perspectives on economic developments "on the ground". We analyse other agencies' forecasts and stay in close touch with other central banks. Our market monitoring and prudential supervision activities provide financial and credit market intelligence. Finally, our external monetary policy advisers are a key source of private sector input to our deliberations.

We use all this to form a coherent picture of international and domestic conditions and a macroeconomic projection. The projection captures our view of the most likely future developments in inflation, output, employment, interest rates, the exchange rate and other key macroeconomic variables, based on the information to hand and our understanding of how the economy works.

### ***The economic framework***

Forming an assessment that can support policy decisions requires an economic framework to boil down the large and complex set of information into something more manageable. The framework includes some fundamental economic principles to anchor our analysis and dialogue. These include the big lesson from the 1970s experience, that you can't sustainably get higher growth by tolerating a bit more inflation, and that to try to do so will eventually cause high and variable inflation, and damage the economy. Long-run growth is fundamentally determined by growth in the productive base of the economy – that is, labour, the capital stock and knowledge.

The best contribution monetary policy can make to long-run growth is to keep aggregate inflation predictably low, so that it can form a useful benchmark for pricing behaviour. This involves

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***The framework includes principles to anchor analysis***

***You can't get sustainable higher growth by tolerating a little inflation***

***The best contribution is to keep inflation predictably low***

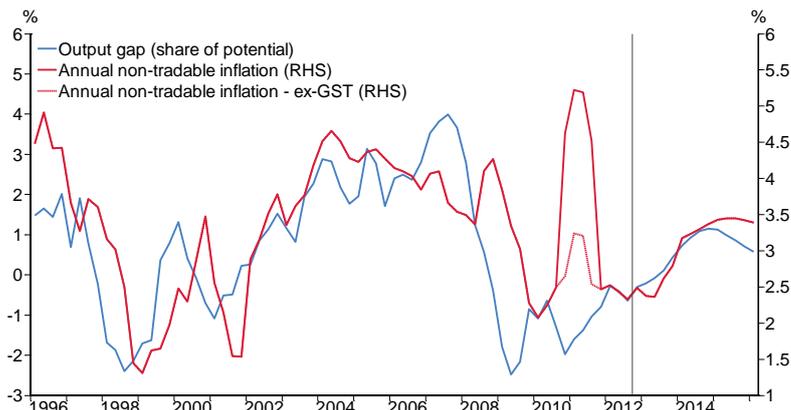
counteracting, where possible, the inflation effects of emerging economic pressures (sometimes referred to as shocks).

In understanding the macroeconomic consequences of shocks, the main effects to account for are as follows. Firstly, inflation tends to fall when demand is weak enough for there to be slack in the labour and goods markets (technically, a “negative output gap”), and rise when the opposite is true. This relationship is most obvious in the case of non-tradable inflation (see Figure 1). Secondly, investment and consumption demand tend to rise when interest rates fall. Thirdly, the exchange rate tends to be high when relative prospective returns available in New Zealand are above those offshore. Finally, short term interest rates, reflecting the price stability objective of monetary policy, tend to rise in response to increases in future inflation pressure.

***We look at the effect of shocks on demand... of interest rates on investment and consumption... understand the drivers of the exchange rate ... and future inflation***

**Figure 1.**

### **Output gap and non-tradables inflation**



All of these key macroeconomic variables are therefore linked together by economic behavioural tendencies. We say “tendencies” because other things than those mentioned matter too, and may at times be substantial drivers of the patterns we see in the data. For example, a major source of exchange rate fluctuations in New Zealand is the outlook for the world prices of our commodity exports and the terms of trade. Housing investment moves quite substantially with the ebbs and flows of net migration. Government spending and other fiscal policy changes are a further source of demand shock.

***Variables are linked by economic behaviours***

### ***The role of models and the need for judgement***

The overall variation in the data can therefore be viewed as a combination of the sequence of shocks and the responses of the

economy to those shocks. One major task of the economic analyst is to disentangle the two, at least conceptually.

One tool we use to help with the task is a structural forecasting model, which continues our long tradition of using such models in forecasting and policy analysis. The model is calibrated to the “typical” economic behaviour observed over the past two decades of price stability in New Zealand, and embeds the fairly standard views of economic behaviour outlined above. Its key features include intuitive economic mechanisms, a relatively simple structure, and adaptability to accommodate a range of economic circumstances.

***We use a forecasting model...***

Using a model provides a number of benefits. It enables us to link policy decisions to our objectives and to the economic outlook, to consider simultaneous shocks and interactions among economic variables systematically and consistently, and to ensure that there is some consistency in interpreting the flow of data between forecast updates and policy decisions.

***... to link decisions to objectives, consider interactions, and ensure consistency***

But even the most advanced models can only be very abstract representations of the economy, and our forecasting model is deliberately designed to be relatively simple and adaptable. Too much complexity would make it difficult to understand the transmission mechanisms and dynamics in the model, and would be unlikely to improve forecasting accuracy materially.

Judgemental input to any model and adjustment to the model's outputs are therefore a necessary part of building up the forecast – and indeed the process of adding judgement itself helps us form views about the outlook in a systematic manner.

***And we apply judgement...***

There are three main motivations for adding judgement currently. Firstly, responses to rare events such as the global financial crisis and the Canterbury earthquakes will, by design, not be picked up in the forecasts of a model that is calibrated to the “average” experience over the last 20 years. Secondly, like most macroeconomic models, our model does not explicitly model the financial sector, which is a key feature of modern economies. The modelling framework does include an interest rate spread between the floating mortgage rates and the 90-day bank bill rate, and this is the point where we typically add judgement to account for financial factors in the model. Finally, judgement is needed to account for how the economy responds at different points in the business cycle, since models generally only generate the average response seen across the cycle.

Judgemental adjustment in the framework often is motivated by the qualitative information we receive from business visits, as well as from the knowledge of experienced forecasters gained over many business cycles.

*...motivated by business visits and experience*

As noted, our forecasts are updated regularly. As new data comes in each quarter, we are able to learn from our errors, get a sense of which bits of the model to trust and which to keep adjusting, and revise our forecasts accordingly.

### **3. Monetary policy, risk management and trade-offs**

Monetary policy operates in a complex environment. In developing our central projection, we must consider multiple risks and trade-offs.

*We consider multiple risks and tradeoffs*

#### ***Monetary policy and risk management***

The likelihoods of various economic outcomes affect markedly the costs and benefits of alternative policy actions. Forming a view on these likelihoods is, furthermore, subject to a range of uncertainties. Firstly, the information on the economy's current state and direction and rate of movement can be difficult to read, conflicting and sometimes revised. Secondly, some important economic concepts cannot even be directly observed, including the "potential" level of output consistent with stable inflation, or the "neutral" rate of interest that has neither a stimulatory nor a contractionary effect on spending. Thirdly, our understanding of economic behaviour is imperfect, and behaviour itself can shift over time as the economy's structure and opportunities available to firms and households change.

Because of these uncertainties, monetary policy can often appear "cautious", in the sense that, under normal circumstances, we tend to adjust interest rates quite smoothly to economic developments, at least compared to the observed volatility in the data. This reflects a desire not to jerk the economy around in response to bumps in the data that may turn out to be quite temporary.

*Which mean monetary policy can seem cautious*

But now and then the economy is hit by a big and unusual shock quite outside the range of possibilities one might reasonably anticipate, for the purposes of monetary policy at least. The series of Canterbury earthquakes, or the events of the global financial crisis, are obvious examples. When such big events hit,

the monetary response instead may be very rapid, reflecting that we can be sure that the outlook has markedly changed.

These uncertainties explain the limited predictive power of economic forecasts. Our analysis generally suggests that our forecasting track record is somewhat better than the average of other forecasters.<sup>2</sup> But what is also clear is that all forecasters face difficulties in predicting future economic outcomes beyond the next few quarters. Quite simply, much can happen over that timeframe.

The central projection in our *Monetary Policy Statement* therefore represents just one path of the many possible.

### ***Monetary policy and trade-offs***

Even if we knew the future perfectly, we would face important choices about how quickly and strongly to react to economic pressures and to seek to restore future inflation to target. These choices have impacts on the economic volatility during the adjustment period.

The PTA recognises this trade-off. It requires the Bank to seek to avoid unnecessary instability in interest rates, output and the exchange rate in its pursuit of the price stability target. This is known as flexible inflation targeting and all inflation-targeting countries take the same basic approach.

The forecasting framework enables these trade-offs to be systematically addressed and balanced. There's often concern, for example, that increases to the policy interest rate will adversely affect growth by causing exchange rate appreciation. But we do not hike the interest rate for no reason. While higher interest rates are normally associated with a higher exchange rate, this usually reflects strengthening of the economy due to other forces on spending, such as a pickup in foreign demand, rising terms of trade, or an increase in government spending.

It therefore does not follow that keeping interest rates lower than otherwise in order to prevent exchange rate appreciation would necessarily be successful. Assuming the inflation target is

***But our track record is no worse than others***

***We face important choices ...***

***...to avoid unnecessary volatility***

***The forecasting framework addresses trade-offs ...***

***... such as between interest rates and the exchange rate...***

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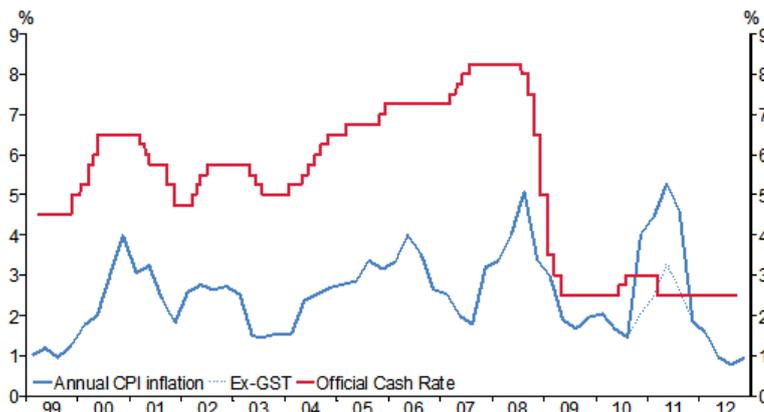
<sup>2</sup> The latest assessment of our forecasting accuracy is Labbé and Pepper (2009). McCaw and Ranchhod (2002) is also useful for more detailed discussion of the reasons for the historical pattern of forecasting errors.

credible, strength in the domestic economy will generally cause the exchange rate to appreciate even without immediate policy tightening, as people will anticipate eventual monetary tightening in order to limit rising inflation pressure. This kind of response is consistent with the principles of economic behaviour outlined above.

The sustained economic expansion in New Zealand prior to the global financial crisis illustrates these trade-offs well. The OCR was steadily raised 200 basis points from 2003 to 2006 and the New Zealand dollar exchange rate moved from 55 US cents to 75 US cents. Even a tightening of monetary conditions of this magnitude was not sufficient to prevent CPI inflation from reaching more than three percent by the end of 2006 (Figure 2). We could perhaps have leaned harder against this expansion at the time, but this would probably have exaggerated the exchange rate cycle on both the upswing and the downswing.

**Figure 2.**

### **The OCR and CPI inflation**



We draw several lessons from this experience. One is that when there are strong forces on the New Zealand economy, policy settings may need to lean quite hard against them. A second is that financial cycles can be surprisingly large and long-lasting. A third is that such forces in a small open economy can cause large exchange rate swings. Difficult judgements must be made about the balance across the trade-offs.

### ***Issues in our current forecasts***

Our current forecasts also show the current challenges in predicting the balance of opposing economic forces, recognising the uncertainties, and accounting for trade-offs. The combination

of the global financial crisis and the Canterbury earthquakes has left a legacy of tough economic issues to resolve. The persistently elevated exchange rate, high household debt overhang, and substantial fiscal consolidation will weigh on the economy, but acting in the opposite direction are rising house prices and the large construction spending surge from the Canterbury rebuild.

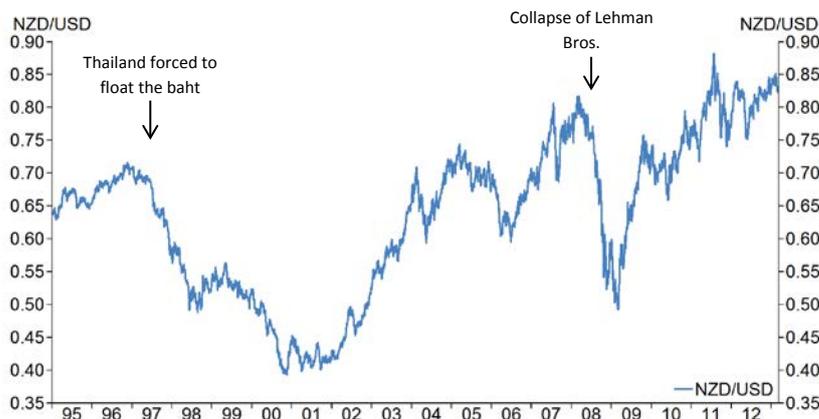
Our central projection indicates low inflation in the near-term but strengthening over the medium-term. Mindful of our requirement to focus on future average inflation over the medium term, our policy strategy is to “smooth through” these near-term variations in inflation in a forward-looking manner.

The “net” of all these effects and their timing are quite sensitive to assumptions. Our task with our quarterly forecast updates is to keep up to speed with the incoming evidence on whether our assumptions are accurate.

Judgement is particularly important in respect of future movements in the exchange rate. The exchange rate can move sharply and suddenly, for reasons that cannot be foreseen even if in hindsight the connections seem quite obvious. Often, sudden and large downward movements (depreciations) result from large and sudden shocks from offshore, such as seen at the onset of the Asian crisis in mid-1997 or the sudden intensification of global financial disruptions in 2008 (Figure 3).

**Figure 3.**

### **New Zealand dollar exchange rate**



At other times, an unexpectedly long period of strong or weak relative economic performance, or strong forces such as commodity price swings or domestic demand pressures, can

generate substantial and prolonged departures of the exchange rate from its long-run average levels.

A second key judgement in our forecasts is the extent to which household spending is constrained by high debt levels and the GFC experience, which has implications for the degree to which the strengthening housing market will feed into private consumption. Finally, the profile and wider spillover effects into construction costs of the Canterbury rebuild will depend upon how capacity pressures are resolved. Our current judgements are that the household debt position means consumption is likely to follow less of a pronounced upswing as a result of the housing market upturn than has historically been the case, and that the concentrated character of the rebuild means its spillover effects to housing markets in the rest of the country will be muted. However, since there is little recent experience against which to benchmark these events, we will have to monitor the evidence carefully to ensure that our judgements in this area remain reasonable.

The current environment also confronts us with trade-offs across policy objectives. Near-term inflation is low and is forecast to gradually increase back to the midpoint of the target range. An interest rate cut might help inflation return to target sooner. But such a cut would also probably exacerbate the current strength in house prices, risking further increases in private debt levels, potentially raising financial stability issues. Indeed, the PTA specifies that, in setting monetary policy, we must monitor asset prices and have regard to the soundness and efficiency of the financial system.<sup>3</sup> On the other hand, while an interest rate hike might limit housing market risks, it could also place further upward pressure on the exchange rate.

In the near future, macro-prudential measures will be part of the toolkit for responding to financial stability risks. These measures will generally support and complement our efforts to stabilise inflation with monetary policy, as upswings in the macroeconomy often coincide with increasing asset prices and leverage. We're currently engaged in consultation regarding the use of macro-

***...or whether households will spend or save because of high debt ...***

***... or the spillover effect from the Canterbury rebuild***

***We make judgements on policy ... such as whether to cut interest rates if there seems to be room in the inflation target ...***

***...or will this exacerbate house price inflation and financial stability risks?***

***Macro-prudential measures will be part of our toolkit***

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<sup>3</sup> A box in the December 2012 *Monetary Policy Statement* explains the new PTA.

prudential instruments and will say more about this in our upcoming Financial Stability Report.

#### **4. Forecasting supports accountability and communication activities**

Forecasts, risk assessment and management of trade-offs are a critical element of our communication of policy strategy and accountability for our actions. We aim to be as clear as possible in the *Monetary Policy Statement* about both the economic outlook and the strategy framing monetary policy decisions and plans.<sup>4</sup> Shortly after the Statement is published, the Governor holds a press conference and the Statement is reviewed by Parliament's Finance and Expenditure Select Committee. The Bank's Board of Directors, who are appointed by the Minister of Finance, formally review each Statement and OCR decision as part of their duty to monitor constantly the Reserve Bank's performance of its obligations under the Act.

***We aim to be clear...***

These various examinations and question and answer sessions are very thorough. In addition, senior Bank staff travel around New Zealand and give talks explaining the main considerations supporting the latest decision. By explaining the rationale for policy decisions, we enable our views to be discussed and challenged.

***... and our decisions are openly discussed and challenged***

The Statement thus acts as a record of our monetary policy deliberations. Some other central banks instead publish minutes of their monetary policy meetings, which amounts to much the same thing.

Our communications activities are also intended to assist the economy by stabilising inflation expectations. Published forecasts help markets assess the economic environment and understand our policy strategy.<sup>5</sup> We have published policy outlooks since 1997 in the form of a future path for short term interest rates. A number of other central banks, including those

***Our communications aim to stabilise inflation expectations***

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<sup>4</sup> Blinder et al. (2008) discuss these aspects of monetary policy communications in detail.

<sup>5</sup> Svensson (2006) and Woodford (2005) offer useful discussions of this principle.

of Sweden and Norway, have subsequently followed this practice.

The future interest rate track in any projection represents the Bank's best view of the outlook for monetary policy settings given the information to hand at the time, and is not a commitment to the particular path shown. Our analysis shows that as long as the markets do not regard our published interest rate path as a commitment, there are benefits for the economy from the publication of the numbers.<sup>6</sup>

There are various ways of communicating the policy outlook. We present our projection as a single narrow line. Of course, around this line is a range of possibilities that widens markedly the further ahead one looks. We find that projecting a single central projection, though, simplifies the discussion considerably, and makes the forecast numbers easier to connect to the forecast story.

There are obvious risks of oversimplification or inadvertently conveying unrealistic precision in such an approach. But on the other hand, showing an unhelpfully wide range can undermine the central message. Different central banks handle this issue in different ways. Some use "fan charts" showing distributions of possible outcomes, while others use explicit or implicit statements of policy "bias" rather than a projected path for interest rates. In our case we've placed emphasis on the clarity of the basis for our policy decisions and outlook, which we think large fans could obscure to the extent that they hide the relationships between the different macroeconomic variables in the forecast story.

As another means to show these relationships and how they inform policy, we now and then make use of "alternative scenarios", where we work through quantitatively the implications for the forecast numbers of different settings for the key assumptions, to show how outcomes might differ from our central projections. For example, the *Monetary Policy Statement* released yesterday features an alternative scenario and discussion of the (distinct) possibility that the exchange rate might follow a different path, higher or lower, to that in our current central projection.

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<sup>6</sup> Bergstrom and Karagedikli (2013).

## 5. Conclusion

Forecasting is a difficult but essential part of modern monetary policy. This reflects that the economy is never in a state of rest, and that there are lags between changes in the OCR and their effects on the economy. Forecasting provides value by explaining the economic story and framing the risks underpinning the policy strategy. If done well, this process helps policymakers, firms and households to plan for and adapt to changing circumstances.

As well as enforcing internal discipline and structure on policymakers' deliberations, an explicit, coherent and transparent forecasting framework also facilitates external accountability. Forecasting, central bank independence and a strong accountability framework are now all part of the orthodox, "full" framework for inflation targeting adopted by more than 20 developed countries.<sup>7</sup>

The models and processes we use to support our forecasting are carefully designed. As in the design of any process there are trade-offs that must be managed. We want to capture complex economic relationships and phenomena, while preserving the flexibility to accommodate unusual circumstances and a grasp of the essentials.

No one in the forecasting business is under any illusions that what they do is a perfect science. Moreover, the economy is not a collection of mechanical equations, but a growing, changing system of interacting human choices. With experience comes improvement.

Currently, monetary policy faces some big forecasting issues. One is the treatment of the exchange rate and its likely future path, which will have substantial effects on the economy. Another is the reconstruction in Canterbury and the effects flowing from that.

The outcomes in practice could, and probably will, turn out quite differently to our projections at any particular time. But the important thing is that we've done the best we can to anticipate the different possibilities and how we might have to react to them. In our quarterly forecast cycle we do our best to update, test, revise and communicate our views thoroughly. This enables us to keep the OCR as well-positioned as we can, and our policy strategy well-understood, so that our efforts to maintain stable inflation do not cause more economic volatility than necessary.

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<sup>7</sup> Roger (2009) provides a review of the two decades of inflation targeting experience around the world, that began with New Zealand's introduction of inflation targeting with the Reserve Bank Act of 1989 and subsequently spread.

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