Optimising Central Bank Behaviour in a Stochastic Environment with Uncertain Credibility

by

Hilary Croke

A thesis presented in
partial fulfilment of the requirements for the degree of
Master of Applied Economics
at Massey University

1998

Acknowledgments

I would like to express my appreciation to Ben Hunt[†] for the overall supervision of this thesis and for providing useful comments on the first draft. I am also grateful to Professor Allan Rae[‡] for additional suggestions. I would also like to thank Aaron Drew[†] for his invaluable technical assistance. Any remaining errors or omissions are my own responsibility.

[†] Economics Department, Reserve Bank of New Zealand.
[‡] School of Applied and International Economics, Massey University.

Abstract

Central bank credibility is defined for the purposes of this thesis as the belief held by agents that the central bank will not renege on its commitment to the specified monetary policy objective. Agents' perceptions on both the integrity and ability of the central bank to achieve and maintain price stability affect the determination of actual inflation via expected inflation. In the past, theoretical models have attempted to capture credibility effects through the application of game theory to assimilate the strategic interaction that occurs between the central bank, the government and agents. For the most part, these models are simple in structure and combined with the limitations commonly attributed to game theory have been heavily criticised. The results derived from empirical analyses of credibility have also been subject to debate due to the directly unobservable nature of credibility. In the past, such analyses have used a variety of measures to proxy credibility effects. While it is generally accepted that expected inflation would perhaps be the most accurate indicator, expectations are equally as subjective as credibility.

The results presented in this thesis are derived from simulations of the Reserve Bank's macroeconomic model used for forecasting and policy analysis (FPS). Given that the central bank faces uncertainty regarding its true level of credibility, it is necessary for policymakers to assume the level of credibility when formulating monetary policy. Depending on the specific disturbance that hits the economy, the combined effect of the bank's assumed and actual level of credibility can ultimately determine the success of the implemented policy. The main motivation of this thesis is to determine the extent to which the central bank benefits when it is aware of the fact it truly has credibility or whether the optimal policy response should always be based on the premise of no credibility.

In order to provide a more realistic analysis, stochastic simulations of FPS are used. In this case, the central bank observes a combination of five impulses simultaneously hit the economy in the current period and taking into account the effects of the impulses from previous periods, formulates monetary policy depending on its assumed level of

credibility. Despite the added dimension of uncertainty the central bank faces surrounding the occurrence of future shocks, the results indicate that the increase in output loss normally associated with a harsh policy response is minimal. By assuming a lack of credibility and thereby adopting a prudent approach to monetary policy, inflation variability is substantially reduced without any significant increase in output variability.

Table of Contents

Chapter 1

Introduction

In order to attain the objective of price stability, central banks will find it less costly if economic agents perceive the target to be both credible and achievable. As a result there has recently been a tendency among central banks to adopt clear and concise policy objectives, in particular the specification of a target band for inflation. However, at this point it is important to differentiate between the credibility of monetary policy and the credibility of the policy instrument. The former refers to the belief held by agents that the central bank will commit itself to the objective of price stability without the threat of the bank deliberately reneging on its commitment. The latter is concerned with the appropriate use and effect of the instrument used by the central bank to control inflation. The focus of this research will be directed towards the credibility of monetary policy and the inevitable uncertainty the central bank is forced to operate under when it is unable to determine its credibility as perceived by the public.

Intuitively, it may seem logical to assume that official forecasts on the state of the economy published by the private sector may be a fairly accurate indication of the central bank's level of credibility. However, forecasts of inflation do not provide information solely on the private sector's belief about whether the central bank is committed to its target or not. Forecasts will largely depend on the state of the economy as an aggregate, taking into account both current and anticipated shocks. The use of both forecast errors and inflation expectations as a proxy for central bank credibility have been popular measures for a great deal of the recent literature on the subject. However, the inappropriateness of forecasts and surveys of expectations as measures of credibility will be discussed in more depth in Chapter 3.

With particular reference to New Zealand, the Reserve Bank Act 1989 commits the Reserve Bank to achieving and maintaining "stability in the general level of prices" and in effect granted the Bank a larger degree of independence and prevention of direct intervention by the government. The Act, coupled with the Policy Target Agreement (PTA) which specifies the target band for inflation (currently 0 to 3 percent) provides

the primary requirement for credibility as a concise and transparent policy objective. The question as to whether the Reserve Bank has achieved credibility remains to be seen, if in fact this is possible to determine at all.

Given the vague nature of credibility and therefore the difficulty encountered when attempting to quantify it, the results presented in this paper are derived from simulations of the Reserve Bank's model used for forecasting and policy analysis (FPS). The results from five different shock experiments are analysed (aggregate demand, exchange rate, price, terms of trade and a foreign demand shock) and a comparison made between the effects of each individual shock and the combined effect of all five. The results will indicate the various reponses by the central bank in an environment where it faces uncertainty regarding credibility. Policy responses to various shocks will differ according to the particular level of credibility the bank assumes it has and the level it truly has.

Initially, this paper will follow the progression that research on credibility has followed over the past two decades. This starts with a discussion on the 'rules versus discretion' debate which for the most part provided the motivation for the subsequent research on central bank credibility. Chapter 3 will summarise the different types of measures that have been used to proxy credibility in recent studies, an issue that remains highly controversial. The next chapter will look at the effect on credibility from granting central banks independence from direct government intervention in the formulation of monetary policy. Chapter 5 discusses the possible motives for a central bank to renege on its commitment to price stability and the way in which specific incentives may prevent such behaviour. This is followed by a summary of New Zealand's recent history in monetary policy. Chapter 7 will include a brief outline of the Reserve Bank's model used for the credibility analysis with the following two chapters displaying the results from simulation experiments using the model. Finally, Chapter 10 will provide some concluding remarks.